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Guidelines for rational use of antibiotics

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Abstract

Resistance to anti-microbial is common in hospitals and increasingly in the community knowledge of a precious adverse drug reaction may prevent the inappropriate administration of an anti-microbial drug to which the patient is allergic, restrict prophylactic anti-microbial therapy to situations in which it has been shown to be effective or where the consequences of infections are disastrous if a non-infective diagnosis is confirmed, early cessation of anti-microbial is warranted, it is important to review the empirical regimen when culture results have identified the organism present and their susceptibility to anti-microbial drugs.it is important to restrict topical anti-microbial therapy to few proven indications. To minimize selection of antibiotic resistance it is important to limit duration of therapy. Prophylaxis is the use of antibiotics to prevent infection at surgical site. One third to one half of antibiotic use in hospital practice is for surgical prophylaxis studies have shown levels of inappropriate use ranging from 30 to 90%. Prophylaxis should be considered when there is a significant, risk of infection, where postoperative infection, routine use of vancomycin prophylaxis should be discouraged, to prevent selection pressure for vancomycin-resistant enterococci (VRE) and vancomycin-intermediate MRSA(VISA), the route of administration, timing and duration of prophylactic antibiotics should be chosen to achieve effective plasma and tissue levels of the drugs during and shortly after the surgical procedure, when bacterial contaminations is maximal. IV antibiotic should be given as soon as the patient is stabilized after induction of anesthesia, the critical period for successful prophylaxis is the 4 hours following implantation of organisms into a wound. A second dose may be necessary under special circumstances.

Keywords: adverse drug reaction, Prophylaxis, MRSA(VISA).

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Introduction

General [1, 2]

- Use antibiotics only when the benefits are scientifically demonstrable and substantial
- In general, use the narrowest spectrum antimicrobial to treat the known likely pathogen
- Use immunotherapy unless it has been proven that combination therapy is required to ensure efficacy or reduce the selection of clinically significant resistance.
- Use a dose that is high enough to minimize the risk of resistance selection and low enough to minimize the risk of dose-related toxicity

Therapy

- Base choice of therapy on either culture and susceptibility test results (directed therapy) or known common pathogen in the condition and their current resistance patterns (Empirical therapy).
- Duration should be as short as possible and should not exceed 7 days unless there is proof that this duration is inadequate.

Prophylaxis

- Base choice of antimicrobial on known or likely pathogen
- Duration should be as short as possible. A single antibiotic is recommended for surgical prophylaxis. Administer long-term prophylaxis only when it has been demonstrated that benefits out-weigh that risk of resistance selection or propagation.

Antimicrobial resistance [3]

Antimicrobial resistance is increasing in many pathogens include Streptococcus pneumoniae, methicillin-resistant Staphylococcus aureus(MRSA) in both the community and hospitals, vancomycin-resistant enterococci (VRE), strains of Klebsiellaand Escherichia coli with extended-spectrum beta-lactamase resistance, and multi-resistant Acinetobacterand Pseudomonas aeruginosa. Emergence of resistance to reserve antibiotics such as the fluoroquinolones, the carbapenems and vancomycin is also of concern. Antibiotic use is one of the pressures that increases resistance. Appropriate antibiotic use will delay the emergence of resistance and minimize resistance after it has emerge

Antimicrobial choice

When an antimicrobial is indicated, base the choice on factors such as spectrum of activity in relation to the known or suspected causative organism, safety including adverse reactions and drug interactions, previous clinical experience, cost, and the potential for selection of resistant organisms and the associated risk of superinfection, as well as patient factors. The relative importance of each of these factors will be influenced by the severity of the illness and whether the drug is to be used for prophylaxis, empirical therapy or directed therapy.

Knowledge of a previous adverse drug reaction may prevent the inappropriate administration of an antimicrobial drug to which the patient is allergic. Failure to take an adequate history can have serious and sometimes fatal consequences.

Take additional care in the elderly, who may have altered pharmacokinetic or toxicodynamic profiles. Renal or hepatic impairment may require adjustment of the dose or dosing interval.

Prophylactic therapy

Restrict prophylactic antimicrobial therapy to situations in which it has been shown to be effective or where the consequences of infection are disastrous. Most surgical prophylaxis should be parenteral and commenced just before the procedure. A single dose is usually adequate for operations lasting less than 3 hours. The aim is to achieve high plasma and tissue levels at the time that contamination is most likely (ie during the procedure).

Empirical therapy [4]

Base empirical antimicrobial therapy on local epidemiological data, and on potential pathogens and their patterns of antimicrobial susceptibility. Where appropriate, obtain specimens for Gram stain, culture and susceptibility testing before commencing antimicrobial therapy. A Gram stain (egof sputum) or direct antigen detection methods may allow specific therapy to be commenced even before the pathogen has been cultured. If a no infective diagnosis is confirmed, early cessation of antimicrobials is warranted. Otherwise, in the absence of a proven causative organism, continue well-chosen empirical antimicrobials for at least 48 hours.

Directed therapy

It is important to review the empirical regimen when culture results have identified the organisms present and their susceptibility to antimicrobial drugs. Remember that organisms found to be present may not necessarily be responsible for the clinical condition. The natural resolution of a bacterial infection may also result from host defenses, despite laboratory-reported resistance. Antimicrobial therapy directed at specific organisms should include the most effective, least toxic, narrowest spectrum drug available. This practice reduces the problems associated with broad-spectrum therapy (ie selection of and superinfection with resistant microorganisms), and will usually be the most cost-effective.

Oral or parenteral therapy

Compared with oral administration, parenteral use of antimicrobials has several disadvantages including greater risk of serious adverse even, higher drug product cost, additional cost of equipment, and additional time and expertise needed for administration. Oral therapy should be used in preference to parenteral therapy unless:

oral administration is not tolerated or is not possible (e.g. swallowing difficulties) gastrointestinal absorption is an obvious problem (e.g. vomiting, severe diarrhea, gastrointestinal pathology), or a potential problem that may accentuate poor bioavailability of an oral antimicrobial an oral antimicrobial with a suitable spectrum of activity is unavailable

high doses are required to achieve effective concentrations at the site of infection (eg for

endocarditis, meningitis, osteomyelitis, septic arthritis) and are not readily achievable by oral administration

urgent treatment is required due to severe and rapidly progressing illness the patient is unlikely to adhere to oral treatment.

If parenteral administration is used, reassess the need daily, and convert to oral therapy as soon as possible.

Topical therapy

It is important to restrict topical antimicrobial therapy to a few proven indications (e.g. eye infections). In general, antimicrobials recommended for topical use should not be from classes used for systemic therapy.

Combination therapy [5,6]

Avoid antimicrobial combinations, unless indicated to:

extend the spectrum (e.g. empirical therapy of suspected mixed infections such as pelvic inflammatory disease, spreading neck infections)

achieve synergy that is known to improve outcomes (e.g. enterococcal endocarditis) prevent the emergence of resistant microorganisms (e.g. therapy of tuberculosis).

Duration of therapy [7,8]

To minimise selection of antibiotic resistance, it is important to limit duration of therapy. In a few infections (e.g. endocarditis), the minimal effective duration of therapy has been established by clinical trials. In most bacterial infections, the optimal duration of therapy is not well defined and the usual course of 5 days is based on tradition rather than sound evidence.

Monitoring of blood levels

Blood levels of potentially toxic drugs such as aminoglycosides, flucytosine and vancomycin should be monitored.

Surgical Prophylaxis

Introduction [9,10,11, 12]

One-third to one-half of antibiotic use in hospital practice is for surgical prophylaxis. Studies have shown levels of inappropriate use ranging from 30% to 90%, especially with respect to timing and duration. Adherence to the following principles will enable the potential benefit of surgical antibiotic prophylaxis to be achieved while minimizing adverse effects.

Definitions

Prophylaxis is the use of antibiotics to prevent infections at the surgical site. This must be distinguished from their use in early treatment, where infection is already established although not necessarily evident preoperatively (eg removal of a perforated appendix).

Indications

Prophylaxis should be considered where there is a significant risk of infection (eg colonic resection) or where postoperative infection, even if uncommon, would have severe consequences (eg infection associated with a prosthetic implant).

Limitations

Antibiotic prophylaxis cannot be relied upon to overcome inadequate medical management (eg of diabetes), damage to tissues, inadequate debridement or poor surgical technique.

Causative organisms and antibiotic choice

In general, antimicrobials should be directed against the likely causative organism(s). However, an effective prophylactic or early treatment regimen need not necessarily include antibiotics that are active against every potential pathogen. Regimens that only decrease the total number of organisms may assist host defenses and prevent infection.

Most postsurgical infections are due to the patient's own organisms. In hospitalized patients, this may include multi resistant organisms, so the following recommendations may need to be modified.

The choice of antimicrobial drugs should take into account the organisms causing infections within the institution, their patterns of susceptibility and the selection pressure of antibiotic use. Accordingly, 'third-generation' cephalosporins (egcefotaxime and ceftriaxone) should be avoided.

When should vancomycin prophylaxis be considered?

Routine use of vancomycin prophylaxis should be discouraged, to prevent selection pressure for vancomycin-resistant enterococci (VRE) and vancomycin-intermediate MRSA (VISA).

However, vancomycin should replace the cephalosporin or penicillin component of the regimen in the following circumstances:

preoperative patients infected or colonised with an MRSA strain (hospital-acquired or community-associated) currently or in the past

patients having major surgery who are at high risk for MRSA colonisation (eg those who have resided for longer than 5 days in a health care facility where MRSA is endemic patients undergoing prosthetic cardiac valve, joint or vascular surgery where the procedure is a re-operation (return to theatre or revision)

patients hypersensitive to penicillins and/or cephalosporins.

If vancomycin is used, a second intraoperative dose is not required.

Antibiotic administration process Introduction

The route of administration, timing and duration of prophylactic antibiotics should be chosen to achieve effective plasma and tissue levels of the drug(s) during and shortly after the surgical procedure, when bacterial contamination is maximal.

Route of administration

The route of administration is usually parenteral, either IV or IM, but in certain instances rectal or oral administration is appropriate. With the exception of ophthalmic surgery, burns or extensive skin loss, topical antimicrobial prophylaxis is not recommended Timing

IV antibiotics (except for vancomycin) should be given as soon as the patient is stabilized after induction of anesthesia. Vancomycin requires a slower infusion that should be completed just prior to induction. IM antibiotics should be given at the time of premedication for surgery. Rectal metronidazole should be given 2 to 4 hours before surgery and oral tinidazole, 6 to 12 hours prior to surgery.

Duration

The critical period for successful prophylaxis is the 4 hours following implantation of organisms into a wound. In general, a single dose of a parenteral drug is sufficient. A second dose may be necessary under the following circumstances:

a delay in starting the operation if cephalothin, cephazolin, dicloxacillin or flucloxacillin is used and the operation is prolonged, give a second dose after 3 hours in specific circumstances (eg amputation of an ischemic limb).

Giving more than 1 or 2 doses postoperatively is not advised except where specifically recommended.

Conclusion

The Guidelines provides the grounds for rational use for antibiotics in hospitals to contract antimicrobial resistance and to improve quality of care of patients with infection by minimizing toxicity .Requirements for a successful implantation of ABS programmes as well as care and supplemental ABS for strategies of outlined. Most post-surgical infects are due to hospitalized patients, this may include multi resistant organisms, so the following recommendations may needs to be modified. IV antibiotic should be stabilized after introduction of anesthesia.

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