Antimicrobial Lock Therapy and Prophylaxis Practice Patterns: An Emerging Infections Network Survey

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Abstract

Background: Infection of an antimicrobial solution into a catheter lumen is used to prevent and treat catheter-related bloodstream infections (CRBSI). Most current studies have shown that antimicrobial lock prophylaxis (ALP) reduces the risk of bloodstream infections in high-risk patient populations. Also, some evidence suggests that antimicrobial lock therapy (ALT) may be used to help clear CRBSI caused by certain organisms. However, limited clinical data are available, and little is known about how frequently antimicrobial locks are used. The purpose of this study was to gather data on clinical practices involving ALP and ALT.

Methods: In September 2007, the IDSA EIN surveyed its 1084 members by fax or email to determine whether infectious diseases clinicians (IDCs) are using ALP and, if so, what agents are used. Members were also asked if they attempted catheter salvage with tunneled or implanted CRBSI and, if so, whether they used ALP. Non-responding members were sent two reminders in October.

Results: Six hundred sixty of the 1084 members (56%) who received this survey responded. 81% of respondents have never used ALP; 19% has most commonly used for long-term catheters, e.g., cuffed/subcutaneous, hemodialysis or ports. 10% used ALP routinely and 65% used under special circumstances. ALP was infrequently used for short-term central lines and PICC lines (1% used routinely and 25% used under special circumstances). Among IDCs who use ALP, the most frequently used agents included vancomycin (56%), heparin (50%), and vancomycin + heparin (46%). A majority of respondents (78%) use antimicrobial lock prophylaxis (ALP) for catheters infected with coagulase-negative staphylococci (54%), Enterococcus spp. (28%, 17%), and Gram-negative bacilli using agents tailored to the pathogen's susceptibility [38 members responded]. Vancomycin + another antimicrobial* was used along with systemic therapy by 45% of those members. Vancomycin alone for 10-14 days with a dead time of 6-12 hours was the most common ALP regimen among the many reported for this setting. Catheter salvage and ALT was less frequently attempted for the following organisms: S. aureus (30%, 47%), Enterococcus spp. (19%, 35%), Pseudomonas aeruginosa (19%, 30%), and Acinetobacter spp. (19%, 25%). Both catheter salvage and ALT were performed for 10% of those respondents (25% of those responding to the Section 2 questions).

Conclusions: ALP is practiced by a minority of respondents, who reported use of a wide variety of agents and concentrations. ALT is much more common, particularly for treatment of infections caused by coagulase-negative staphylococci, but little uniformity exists in the mechanics of therapy. Given the wide variation in clinical practice, the depth of applicable data, and the urgency of the need to prevent and treat CRBSI, data from randomized controlled trials in a variety of patient populations are needed.

Introduction

Antimicrobial lock prophylaxis and treatment involve instillation of an antimicrobial (antibiotic solution into a catheter lumen (antimicrobial lock) and leaving the solution to dwell. Guidelines in 2002 do not recommend routine use of antimicrobial lock solutions to prevent catheter-related bloodstream infections (CRBSI). Nonetheless, two recent meta-analyses concluded that use of a vancomycin-heparin lock solution reduces the rate of bloodstream infections in high-risk patient populations.

2007 guidelines for treatment of CRBSI recommend antimicrobial lock therapy for management of hemodialysis and tunneled implanted catheters along with systemic therapy. Antimicrobial lock therapy may be used to treat uncomplicated CRBSI due to coagulase-negative staphylococci. S. aureus and Gram-negative bacilli using agents tailored to the pathogen's known susceptibilities. More recent in vitro data suggest that vancomycin (and related) locks actively affect both in-vitro and in-vivo catheters, and that a variety of other agents, such as daptomycin, linezolid, and tigecycline, have demonstrated efficacy as antimicrobial lock therapy in animal models. These agents, however, require additional clinical investigation before they can be recommended for routine use in clinical practice. The primary goals of this survey were to determine whether infectious diseases clinicians:
- use antimicrobial lock prophylaxis, and if so, which agents
- attempt catheter salvage with tunneled or implanted CRBSI, and if so, whether antimicrobial lock therapy is used

Results:

1. Do you use antimicrobial lock prophylaxis for the prevention of catheter-related bloodstream infection?
   • Yes
   • No
   • I don't use ALP

2. Which type of intravascular catheters do you use antimicrobial lock prophylaxis for?
   • Venous
   • Arterial

3. Do you routinely use anticoagulant agents with ALP?
   • Yes
   • No

4. Which antimicrobial(s) have you used for antimicrobial lock prophylaxis?
   • Vancomycin
   • Gentamicin
   • Doxy
   • Cipro
   • Others

5. Do you routinely use anticoagulant agents with antimicrobial lock prophylaxis?
   • Yes
   • No

Section 2: Antimicrobial Lock Treatment (ALT)

6. Would you use antimicrobial lock therapy for the prevention of catheter-related bloodstream infection?
   • Yes
   • No
   • I don't use ALT

7. Which type of intravascular catheter do you attempt catheter salvage with?
   • Venous
   • Arterial

8. Do you routinely use anticoagulant agents with antimicrobial lock therapy?
   • Yes
   • No

9. Which antimicrobial(s) have you used for antimicrobial lock therapy?
   • Vancomycin
   • Gentamicin
   • Doxy
   • Cipro
   • Others

10. Do you routinely use anticoagulant agents with antimicrobial lock therapy?
    • Yes
    • No

Figure 1. Antimicrobial Lock Prophylaxis

Figure 2. Most Frequent Antimicrobial Prophylaxis

Figure 3. Do you routinely use anticoagulants?

Figure 4. Organisms causing bloodstream infection with antimicrobial lock prophylaxis

Methods

EMERGING INFECTIONS NETWORK QUERY

Antimicrobial Lock Prophylaxis and Treatment of Catheter-Related Bloodstream Infections

Table 1.

<table>
<thead>
<tr>
<th>Section 1: Antimicrobial Lock Prophylaxis</th>
<th>Overall response rate: 606/1084 (55.9%) physicians responded from 9/26/07 to 11/5/07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
<td>No. (%).</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Do you use antimicrobial lock prophylaxis?</td>
<td>606 (100)</td>
</tr>
<tr>
<td>Do you routinely use anticoagulants?</td>
<td>547 (90.3)</td>
</tr>
<tr>
<td>Which antimicrobial(s) have you used for antimicrobial lock prophylaxis?</td>
<td>Vancomycin (337, 55.7%), Gentamicin (106, 17.4%), Doxy (78, 12.9%), Cipro (51, 8.4%), Others (24, 3.9%)</td>
</tr>
<tr>
<td>Which antimicrobial(s) have you used for antimicrobial lock prophylaxis?</td>
<td>Vancomycin (337, 55.7%), Gentamicin (106, 17.4%), Doxy (78, 12.9%), Cipro (51, 8.4%), Others (24, 3.9%)</td>
</tr>
<tr>
<td>Do you routinely use anticoagulant agents with antimicrobial lock prophylaxis?</td>
<td>Yes (319, 52.7%), No (245, 40.0%), I don't use ALP (42, 6.7%)</td>
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Table 2.

<table>
<thead>
<tr>
<th>Section 2: Antimicrobial Lock Treatment (ALT) Agents used for Treatment</th>
<th>Overall response rate: 606/1084 (55.9%) physicians responded from 9/26/07 to 11/5/07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
<td>No. (%).</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Would you use antimicrobial lock therapy?</td>
<td>606 (100)</td>
</tr>
<tr>
<td>Do you routinely use anticoagulant agents with antimicrobial lock therapy?</td>
<td>Yes (387, 63.8%), No (218, 35.9%), I don't use ALT (11, 1.8%)</td>
</tr>
<tr>
<td>Which antimicrobial(s) have you used for antimicrobial lock therapy?</td>
<td>Vancomycin (386, 63.6%), Gentamicin (114, 18.8%), Doxy (95, 15.7%), Cipro (54, 8.9%), Others (11, 1.8%)</td>
</tr>
<tr>
<td>Which antimicrobial(s) have you used for antimicrobial lock therapy?</td>
<td>Vancomycin (386, 63.6%), Gentamicin (114, 18.8%), Doxy (95, 15.7%), Cipro (54, 8.9%), Others (11, 1.8%)</td>
</tr>
<tr>
<td>Do you routinely use anticoagulant agents with antimicrobial lock therapy?</td>
<td>Yes (311, 51.2%), No (295, 48.8%), I don't use ALT (6, 1.0%)</td>
</tr>
</tbody>
</table>

Summary

- ALP is practiced by a minority of respondents, who reported use of a wide variety of agents and concentrations.
- ALT is much more common, particularly for treatment of infections caused by coagulase-negative staphylococci, but little uniformity exists in the mechanics of therapy.
- Given the wide variation in clinical practice, the dearth of applicable data, and the urgency of the need to prevent and treat CRBSI, data from randomized controlled trials in a variety of patient populations are needed.