# A Two-Center Review of Bacteremia in the Community Hospital

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*There are fewer studies on bacteremia coming from the community hospital, where the practicing family physician is likely to see this problem, than from the university hospital. The hypothesis of this study was that patterns of bacteremia would be different between the two types of hospitals. Two hundred four patient episodes of culture-proven bacteremia from two analogous community hospitals were reviewed. Bacteremia was discovered in 2.6 of 1,000 patients, which is lower than reports from university hospitals. Of the 213 organisms isolated, slightly more were gram-negative than gram-positive, whereas many tertiary care centers report a preponderance of gram-negative organisms. About 20 percent of the episodes of bacteremia ended in death, a rate lower than in many tertiary care centers, and slightly more patients died of gram-negative than gram-positive bacteremia. The most common organisms in descending order were the streptococci and Escherichia coli followed by Staphylococcus aureus, Klebsiella pneumoniae, Proteus species, and Streptococcus pneumoniae. The most common sources of bacteremia were, in decreasing order, urinary tract, source unknown, heart valve, and lung. The most common underlying disorders were, in decreasing order, malignancy, diabetes mellitus, complicated urinary tract infection, valvular heart disease, and postoperative infection. Correctness of treatment of bacteremia appeared to increase survival.*

Papers occasionally appear in the literature that suggest that descriptions of various disease entities found in the community may differ from those found in the academic medical center.[1,2] Most of the data on blood-borne infections come from the academic medical center and many concentrate on gram-negative infections. Only a few papers have been published on the subject with data from community hospitals. Two such studies have shown differences in bacteremia patterns between community hospitals and academic medical centers.[3,4] Unfortunately, much of what is taught in US medical schools is based on research done at the latter institutions.

The hypothesis of this study was that patterns of bacteremia in the community hospital would be different in several ways from those in the tertiary care center. Another purpose of this article was to undertake a comprehensive study of a series of patients with bacteremia from two community hospitals. Unlike many studies of this type, this study was designed to encompass the age spectrum a family physician might see: infancy through the elderly. In addition, gram-positive and anaerobic organisms were considered as well as gram-negative organisms.

## METHODS

To give the study as much countrywide applicability to community hospitals as possible, data from two analogous community hospitals in different parts of the country were used. Other than for their geographic location, the two hospitals had strikingly similar demographic characteristics. One hospital was Mercy Hospital of Iowa City, Iowa, and the other was Alachua General Hospital of Gainesville, Florida.

The study period for Mercy Hospital was four years and the period of surveillance for Alachua General Hospital covered one year. All patients with blood cultures positive for bacteremia during these times were entered

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into the study. The study population was found by review of microbiology culture reports, and access was then gained to patient charts. The definition of bacteremia used for purposes of the study was a positive blood culture that was thought by both the attending physician by chart review and the investigators not to be a contaminant on the basis of all the patient's clinical data. Streptococcus pneumoniae was tabulated separately from other species of streptococci because of its historical separation and because of the unique way it acts clinically. Most patients had blood drawn for culturing three times when bacteremia was suspected. Unfortunately, the number of cultures could not be standardized for each patient because different attending physicians ordered different numbers of cultures.

Only one case without a positive blood culture was used for the study, a patient with a vaginal culture positive for Neisseria gonorrhoeae and biopsy-proven evidence of septic embolization. To decide whether to include cultures positive for Staphylococcus epidermidis, Diphtheroids, and Bacillus sp, several clinical circumstances were considered. The first two organisms were likely to be considered true pathogens when more than one blood culture was positive or when a foreign body such as a prosthetic heart valve or joint was present. Most, though not all, cultures positive for these organisms were eventually excluded from the study as cultural contaminants.

The basic unit used for study was episode of bacteremia rather than individual patients or organisms. For example, a patient who became bacteremic with two organisms, was treated and recovered, and then became bacteremic two months later with one organism counted as two separate episodes of bacteremia for purposes of this study. As the object of this study was to simply review all organisms causing bacteremia in these hospitals, no attempt was made to divide the organisms into community-acquired and nosocomial categories.

Data relating to the bacteremia cases were then tabulated. The source of the organism, ie, the site in the body from which the cultured organism was thought to arise, was determined as best possible on the basis of the clinical data. For example, a patient with a blood culture positive for Escherichia coli with a urine culture positive for significant numbers of the same organism had urinary tract listed for the source of the organism. If the portal of entry could not be determined, it was listed as unknown. This latter category included septic infants, even though the source for organisms is presumed to be colonization from the mothers' vaginal tract during the delivery. The underlying disorder is the disease the patient may have had other than bacterial infection that makes him prone to bacteremia. Without an underlying disorder the infection only was listed, eg, pneumonia only.

Correct treatment for bacteremia was defined for this study by the following criteria: (1) the antibiotic should be given parenterally and in correct doses for the organism in question and its source, and (2) two or more antibiotics should be used at the onset of bacteremia with a likelihood that the probable infecting organism would be susceptible to one of the antibiotics prescribed. For example, a patient who presents with signs of biliary tract infection (fever, jaundice, abdominal pain) would be expected to be treated initially with an antibiotic combination that would cover Escherichia coli, Klebsiella pneumoniae, and anaerobic organisms. As another example, a patient who was treated for Escherichia coli bacteremia of urinary tract origin with 500 mg of ampicillin given orally on a six-hour basis was considered to have been treated incorrectly. With these criteria an attempt was made to compare the correctness of treatment with the results of treatment, ie, survival or death. Whereas it may be argued, for example, that a patient with pneumonia secondary to Streptococcus pneumoniae may be initially treated with penicillin G alone, these criteria were applied uniformly to all patients.

## RESULTS

Both hospitals in this study are acute-care hospitals that serve their communities and surrounding rural areas. Both hospitals have major tertiary care referral centers located in close proximity (the University of Iowa Hospitals and Shands Teaching Hospital). Both community hospitals are also practice sites for university-based family practice residencies. A comparison of sources (portals of entry) of bacteremia for patients for the two hospitals revealed them to be similar. Methods of blood drawing and blood culturing techniques were studied for the two hospitals and found to be comparable. Statistical analysis revealed that for any patient the mortality from becoming bacteremic would not differ in either hospital ($\chi^2 = 1.017$, $P = .31$). The mean age of the population with bacteremia at Mercy Hospital was 57.08 years and at Alachua General Hospital, 60.93 years. The mean age overall was 58.81 years. The data for the two hospitals were therefore combined for comparable parameters.

At Mercy Hospital 51,396 patients were admitted during the study period, 57 percent of whom were female. Of this population of patients, a total of 3,154 blood cultures were done. Of the 3,154 blood cultures, 113 separate episodes of bacteremia were documented in 103 patients with 118 different organisms. Thus, of the 3,154 blood culture determinations done over this period, bacteremia was documented by 3.6 percent of them. The number of patients admitted to Alachua General Hospital during the study period was 25,091, of whom 55 percent were female.

**TABLE 1. ORGANISMS CAUSING BACTEREMIA WITH MORTALITY**

| | Total | Species Subtotal | Mortality | Percent |
|---|---|---|---|---|
| Streptococci | 50 | | | |
| α-Hemolytic sp | | 4 | — | — |
| α-Hemolytic, non-group D | | 11 | — | — |
| α-Hemolytic, group D | | 3 | — | — |
| Group A sp | | 1 | — | — |
| β-Hemolytic, group A | | 4 | 1 | — |
| β-Hemolytic, group D | | 6 | 2 | — |
| β-Hemolytic, group B | | 4 | — | — |
| Group B sp | | — | — | 12.0 |
| γ-Hemolytic, non-group A | | 1 | — | — |
| γ-Hemolytic, non-group A or D | | 1 | — | — |
| γ-Hemolytic, "ungroupable" | | 1 | — | — |
| γ-Streptococcus, group D | | 3 | 1 | — |
| γ-Streptococcus, non-group D | | 3 | — | — |
| Group D streptococcus | | 3 | — | — |
| Anaerobic streptococcus sp | | 3 | 2 | — |
| Streptococcus sp, unidentified | | 1 | — | — |
| Escherichia coli | 50 | — | 5 | 10.0 |
| Staphylococcus aureus | 33 | — | 7 | 21.9 |
| Klebsiella pneumoniae | 17 | — | 6 | 35.3 |
| Proteus sp | 14 | | | |
| mirabilis | | 8 | — | — |
| morgagni* | | 4 | 1 | — |
| vulgaris | | 1 | 1 | — |
| rettgeri** | | 1 | | |
| Streptococcus pneumoniae | 10 | — | 3 | 30.0 |
| Pseudomonas sp | 10 | | | 30.0 |
| Pseudomonas sp, unidentified | | 4 | 2 | |
| Pseudomonas aeruginosa | 0 | 5 | 1 | |
| Pseudomonas fluorescens | — | 1 | — | — |
| Serratia marcescens | 6 | — | — | — |
| Bacteroides sp, unidentified | 4 | — | — | — |
| Bacteroides fragilis | 1 | — | — | — |
| Clostridium sp | 3 | — | — | — |
| Staphylococcus epidermidis | 2 | — | 1 | — |
| Hemophilus influenzae | 2 | — | — | — |
| Hemophilus sp, unidentified | 1 | — | — | — |
| Enterobacter cloacae | 2 | — | 1 | — |
| Bacillus sp | 1 | — | 1 | — |
| Miscellaneous | 7 | — | 2 | — |
| | 213 | | 37 | |

* *Now Morganella morgagni*
** *Now Providentia rettgeri*

There were 91 episodes of bacteremia in 89 patients with 95 organisms in this population. Thus, there were a total of 204 episodes of bacteremia in 79,747 patients, giving a rate of 2.6 for every 1,000 patients.

Of the total 213 organisms isolated, 101 (47.4 percent) were gram-positive organisms and 112 (52.6 percent) were gram-negative organisms. One patient had 7 separate episodes of bacteremia, two patients had 3 episodes, and five patients had 2 episodes each. Nine of the 204 episodes of bacteremia (4.4 percent) were found to be with multiple organisms, and three of these episodes ended in death. Of the 204 episodes of bacteremia, there were 40 deaths (19.6 percent of the episodes). Eighteen male patients died and 22 female patients died. The death rate for patients infected with gram-positive organisms was 0.23 for every 1,000 admissions and for those infected with gram-negative organisms was 0.29 for every 1,000 admissions.

The most common organisms found to cause bacter-

**TABLE 2. SOURCE OF EPISODE OF BACTEREMIA VS INCIDENCE AND MORTALITY**

| Source of Bacteremia | Episodes | Case Fatality No. (%) |
|---|---|---|
| Urinary tract | 58 | 9 (15.5) |
| Unknown | 28 | 8 (28.6) |
| Heart valve | 24 | 6 (25.0) |
| Lung | 24 | 9 (37.5) |
| Biliary tract | 11 | 1 (9.1) |
| Skin or subcutaneous | 11 | 0 (0) |
| Intestines | 11 | 2 (18.2) |
| Intravenous or central venous line | 11 | 0 (0) |
| Female reproductive tract | 8 | 0 (0) |
| Meninges | 5 | 0 (0) |
| Postoperative complication | 5 | 1 (20) |
| Joint | 4 | 3 (75) |
| Bone | 2 | 0 (0) |
| Liver | 2 | 0 (0) |
| Total | 204 | 40 (19.6) |

emia were the Streptococcus species and Escherichia coli, 50 isolations each (Table 1). Of the streptococci, $\alpha$-hemolytic was the most common subgroup followed by the $\beta$ and $\gamma$ subgroups. These were followed in descending order of incidence by Staphylococcus aureus, Klebsiella pneumoniae, Proteus species, Streptococcus pneumoniae, Pseudomonas species, Serratia marcescens, and Bacteroides species. Of the three most common organism types, the most lethal appeared to be Klebsiella pneumoniae (35.3 percent mortality) followed by Staphylococcus aureus (21.9), the streptococci (12.0 percent), and Escherichia coli (10.0 percent). Eleven (5.4 percent) of the 204 episodes of bacteremia involved anaerobic organisms, and two of these patients died.

Of the total number of bacteremic patients, 103 (50.5 percent) were female. Streptococci appeared to cause septicemia more commonly in male patients than in female patients (28 vs 18 episodes, 60.9 percent vs 39.1 percent, respectively). Otherwise, the incidence of each organism type did not appear to differ significantly between the sexes ($P = .20$).

The incidence of bacteremia together with mortality appeared to increase in the old and very young age groups. The most striking increases appear under 6 weeks of age and over 60 years of age. In the 0- to 6-week age group there were 14 episodes of bacteremia with a 14.3 percent mortality rate. There were fewer positive blood cultures with a rare death in each of the first five decades of life. In the sixth, seventh, eighth, and ninth decades of life, there were 15, 40, 58, and 39 episodes of bacteremia with 0 (0 percent), 10 (25.0 percent), 13 (22.4 percent), and 13 (33.3 percent) deaths, respectively. This increased incidence in the very young and old held true for each of the four most common organism types found in the study (streptococci, Escherichia coli, Staphylococcus aureus and Klebsiella pneumoniae).

The most common source for bacteremia was the urinary tract, followed in decreasing order by source unknown, heart valve, and lung (Table 2). These areas were followed with equal numbers for biliary tract, skin or subcutaneous tissue, intestines, and intravenous or central venous line, and these latter sites were followed with equal numbers for meninges and postoperative complication. In only one case of urinary-tract–related bacteremia was there evidence of related catheterization. The highest mortality by source was seen for the lung, followed in order by source unknown, heart valve, and urinary tract.

The various organisms from the data are displayed on Table 3 according to the patients' ages. Most individual organisms appear to be generally evenly distributed over the age groups for the number of patients in each group. However, klebsiella bacteremia appears to be a disease of the elderly in the study population, whereas Hemophilus species, not surprisingly, are more common in the young.

The most common source for streptococcal bacteremia was source unknown (12 cases) followed by heart valve (7) and lung (6). The most common source for Escherichia coli bacteremia was urinary tract (32), followed by source unknown (5) and biliary tract (4). The most common sources for Staphylococcus aureus bacteremia were source unknown (7), intravenous or central venous line (7), heart valve (6), and skin or subcutaneous tissue (4). The most common source for Klebsiella pneumoniae bacteremia was source unknown (5), followed by urinary tract (4), lung (3), and intestines (3). The two most common sources for proteus bacteremia were urinary tract (7) and heart valve (5). Of the nine cases of Streptococcus pneumoniae bacteremia, eight originated in the lung.

Men appeared to acquire endocarditis, especially caused by streptococcal organisms, more often than women (18 vs 4 cases). Notable also is that women appeared to acquire bacteremia, including Escherichia coli bacteremia, from the urinary tract only slightly more frequently than men (31 vs 26 cases). Overall, the source of the organism was unknown approximately as often in male as female patients (15 vs 17 cases).

The most common underlying disorder for this group of bacteremic patients was malignancy followed by diabetes mellitus, complicated urinary tract infection, valvular heart disease, and postoperative infection (Table 4). The next most common underlying disorders with equal frequencies were biliary tract obstruction, nephrolithiasis, and coronary artery disease with heart failure. The percentages of mortality for underlying disorders were, in

TABLE 3. PREVALENCE OF INFECTING ORGANISMS ACCORDING TO AGE

| Organism Type | 0–6 weeks | 6 weeks–9 years | 10–19 years | 20–29 years | 30–39 years | 40–49 years | 50–59 years | 60–69 years | 70–79 years | 80+ years | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Streptococci | 6 | 4 | 2 | 4 | 3 | 1 | 5 | 7 | 8 | 7 | 47 |
| Escherichia coli | 3 | 1 | 1 | 2 | 0 | 0 | 4 | 11 | 17 | 11 | 50 |
| Staphylococcus aureus | 1 | 3 | 0 | 1 | 0 | 6 | 3 | 3 | 11 | 5 | 33 |
| Proteus sp | 0 | 0 | 0 | 0 | 3 | 0 | 2 | 2 | 7 | 2 | 14 |
| Streptococcus pneumoniae | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 5 | 10 |
| Pseudomonas sp | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 3 | 4 | 1 | 10 |
| Bacteroides sp | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 2 | 5 |
| Anaerobic streptococcus | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 3 |
| Klebsiella pneumoniae | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 6 | 5 | 3 | 17 |
| Bacillus sp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Hemophilus sp | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Neisseria gonorrhoeae | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Miscellaneous | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 4 | 6 | 4 | 19 |
| Totals | 12 | 13 | 4 | 11 | 6 | 10 | 16 | 41 | 60 | 40 | 213 |

TABLE 4. UNDERLYING DISORDER VS INCIDENCE AND MORTALITY

| | Number | Mortality No. (%) |
|---|---|---|
| Malignancy | 34 | 11 (32.3) |
| Diabetes mellitus | 23 | 4 (17.4) |
| Complicated urinary tract infection | 13 | 5 (38.4) |
| Valvular heart disease | 12 | 4 (33.3) |
| Postoperative infection | 11 | 0 (0) |
| Biliary tract obstruction | 10 | 1 (10.0) |
| Nephrolithiasis | 10 | 1 (10.0) |
| Coronary artery disease with heart failure | 10 | 3 (30.0) |
| Phlebitis at intravenous site | 8 | 0 (0) |
| Complicated alcoholism | 8 | 2 (25.0) |
| No known underlying disorder | 7 | 1 (14.3) |
| Prematurity | 6 | 2 (33.3) |
| Corticosteroid therapy | 5 | 2 (40.0) |
| Normal newborn | 5 | 0 (0) |
| Intestinal perforation | 4 | 1 (0) |
| Neurological disorder, severe | 4 | 1 (0) |
| Chronic obstructive pulmonary disease | 3 | 0 (0) |
| Diverticular disease | 3 | 1 (0) |
| Pneumonia only | 3 | 0 (0) |
| Postpartum complication | 3 | 0 (0) |
| Cellulitis or abscess | 2 | 0 (0) |
| Gastroenteritis | 2 | 0 (0) |
| Meningitis | 2 | 0 (0) |
| Peripheral vascular disease | 2 | 0 (0) |
| Miscellaneous | 14 | 1 (7) |
| Total | 204 | 40 (19.6) |

decreasing order, complicated urinary tract infection, malignancy, and diabetes mellitus.

Significantly fewer bacteremic episodes (14.5 percent of 117 episodes) in which correct treatment by the criteria established earlier was given resulted in death than in those episodes in which incorrect treatment (26.4 percent of 87 episodes) was given (P = .03) (Table 5).

## DISCUSSION

The incidence of bacteremia in this study in male and female patients was about equal. In two teaching hospitals[7,8] and one tertiary care center,[9] however, bacteremia was more common in male patients. The rate of 2.6 per 1,000 as the number of patients who became bacteremic is low compared with the rate of 5.6 per 1,000 in another community hospital[4] and 6.26 per 1,000 in a London teaching hospital,[10] and makes the phenomenon of bac-

**TABLE 5. TREATMENT VS OUTCOME**

| Treatment | Bacteremic Episodes No. (%) | Survived No. (%) | Died No. (%) |
|---|---|---|---|
| Correct | 117 (57.3) | 100 (85) | 17 (14.5) |
| Incorrect | 87 (42.7) | 64 (73.6) | 23 (26.4) |

*P = 0.03*

teremia appear uncommon. The study rate is still lower than the 4.3 per 1,000 found in a small, nonurban community hospital.[11] The percentage of blood cultures in Mercy Hospital that document episodes of bacteremia is lower than the 6.8 percent reported at a tertiary care center[9] and 10.7 percent at a teaching hospital.[12] One study from a community hospital reported 5 to 10 percent.[4] That a similar number of episodes of bacteremia occurred with gram-positive as gram-negative organisms agrees with findings in one tertiary care setting[9] and should make one take gram-positive bacteremia at least as seriously as gram-negative. However, of the episodes of bacteremia reported at one university hospital, 36 percent were gram-positive and 54 percent were gram-negative[7]; and one teaching hospital reported 35.7 percent and 62.6 percent, respectively.[12] McGowan et al[8] reported a rising incidence of gram-negative bacteremia at Boston City Hospital from 1935 to 1972. The present study showed a slightly higher mortality rate for gram-negative than gram-positive bacteremia. One teaching hospital showed a higher mortality rate for gram-negative than gram-positive bacteremia.[7] A study from a community hospital[4] showed higher mortality rates for gram-positive than gram-negative bacteremia, suggesting, again, that gram-positive bacteremia should be taken at least as seriously as gram-negative. The figure of 19.6 percent for episodes of bacteremia ending in death is lower than some tertiary care centers (23 percent,[7] 26 percent,[9] and 31 percent[4]). The figure concurs with 20.3 percent reported in one community hospital[3]; it also suggests that bacteremia in itself is not necessarily an indication of poor prognosis except perhaps in the immunocompromised patient and at the extreme ages of life.

The order of most common organisms in this study (streptococci, Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae) contrasts with the order Escherichia coli, Staphylococcus aureus, and Enterobacter sp,[13] and the order Streptococcus pneumoniae, Escherichia coli, Klebsiella-Enterobacter sp and Staphylococcus aureus[7] at two tertiary care centers. The author could find no other study in which the overall incidence of streptococcal bacteremia was as high as this one. As with most other studies,[3,7,8,11,12] Escherichia coli was the most common organism causing gram-negative bacteremia. An order similar to this study was reported in one community hospital: Escherichia coli, streptococci, Staphylococcus aureus, and Klebsiella-Enterobacter sp.[4] Klebsiella pneumoniae was the most lethal organism (35.3 percent). One university hospital[7] reported a similar mortality rate for Klebsiella (32 percent), but listed the order of lethality to be Pseudomonas sp, mixed sp, Klebsiella sp, and Escherichia coli. Many other studies emphasize a high mortality from Staphylococcus aureus bacteremia. In one study at a university hospital covering the years 1936 to 1955, the mortality from Staphylococcus aureus bacteremia in treated and untreated patients was 71.7 percent.[14]

This study supports findings in tertiary care[7,9,15] and community hospitals[13] that severe infection and its lethality increase in incidence in the very young and older age groups.

The order of source of bacteremia for this study (urinary tract, source unknown, heart valve, and lung) contrasts with urinary tract, peritoneum, lung, and intravenous catheter in one university hospital.[12] As expected, the urinary tract was the most common source of bacteremia, and most of the organisms recovered were gram-negative. This finding agrees with findings at a tertiary care center.[9] It was not expected, however, that bladder catheterization was involved in almost none of the episodes of urinary-tract–related bacteremia, suggesting that the catheterization in itself is not a major cause of bacteremia. The latter finding concurs with findings at one community hospital,[13] although a study of nosocomial bacteremia from four hospitals suggests otherwise.[16] It was unexpected that heart valve and intravenous or central venous line as sources of staphylococcal bacteremia were more common than skin or subcutaneous tissue and joint, thus, in general, making one think diagnostically of bacterial endocarditis and sepsis from venous catheters more often for this organism. As expected, most of the cases of Streptococcus pneumoniae bacteremia originated from lung. This study confirms findings at both tertiary care[7,9] and community hospitals that a significant number of bacteremia cases have an unknown source and such cases have a significant mortality rate. The order of commonness for unknown source (streptococci, Staphylococcus aureus, Escherichia coli, Klebsiella pneumoniae) contrasts with Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, and Streptococcus pneumoniae at a tertiary care center.[9] In addition, this study appears to indicate that almost as many male patients become bacteremic from urinary tract infections as female patients. This increased incidence of urosepsis in male patients is perhaps partially explained in that the actual nature of urinary tract infection for many of the elderly men in this study was prostatitis rather than simple cystitis. The order of mortality of urinary tract, source unknown, heart valve

and lung contrasts with peritoneum, lung, unknown, and biliary tract in one teaching hospital.[7]

The unusual commonness of proteus endocarditis in this study is noteworthy in that one patient was thought to be continually seeding his heart valves hematogenously from a proven occult intestinal malignancy, and he repeatedly grew different Proteus species in his blood cultures during his bacteremic episodes.

As expected, malignancy was the most common underlying disorder associated with bacteremic patients. Many of these patients, of course, were taking chemotherapy and were immunosuppressed, which could contribute to this result. The second and third most common underlying disorders were diabetes mellitus and complicated urinary tract infection. The high mortality rate for the latter, 38.4 percent, is of some concern, as on the surface, a severe urinary tract infection would seem an easily diagnosed disorder. If the initial urinalysis report is not closely scrutinized, a delay in diagnosis could result from the source of infection in urosepsis not being obvious and urine culture results not being available for two days.

Assessment of outcome of treatment was difficult, as criteria for correct treatment can be debated. In addition, this study's criteria for technically correct treatment did not include ethical considerations. This study, however, upholds the premise that bacteremic patients have a higher survival rate when treated correctly (as defined in this study) with antibiotics than when not treated correctly. Another study in a community hospital also supports the notion of higher survival rates with correct treatment of bacteremia.[4] The latter is seemingly a basic notion, but no notion in medicine is above undergoing close scrutiny. Again, the correctness of any treatment must be defined for the individual patient by the clinical circumstances and moral and ethical considerations involved in his case.

In summary, patients with bacteremia in the community hospital appear to differ from patients in the tertiary care center and teaching hospital in several ways. The overall rate of bacteremia appears to be lower, gram-positive organisms appear to be more common, and the overall mortality rate appears to be lower in community hospitals. Furthermore, there appear to be differences in the types of organisms and their sources in the community hospital as opposed to the academic medical center. These differences should be kept in mind by community physicians when they read and interpret the infectious disease literature.

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