Final Contract Report

Community-Acquired Skin Infections in the Age of Methicillin-Resistant Organisms

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Prepared by:
Barcey T. Levy, Ph.D., M.D.
Iowa Research Network Practices
University of Iowa

Jeanette Daly, Ph.D.
Iowa Research Network Practices
University of Iowa

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Introduction

The epidemiology of methicillin-resistant *Staphylococcus aureus* (MRSA) has changed considerably over the past decade. Initially, hospitalized patients acquired MRSA in the health care environment, but now cases of MRSA infections have been found in people who were not hospitalized and had no underlying illnesses. An estimated 95,000 people in the United States developed MRSA infections during 2005, and 19,000 Americans died from MRSA infections that year. Fourteen percent of those MRSA infections were community associated and 85 percent were hospital or other health setting associated.[1]

Recent data show that Americans visit the doctor approximately 12 million times each year to get checked for suspected *Staphlococcus* or MRSA skin infections.[2] The prevalence of these skin and soft tissue infections acquired in the community by persons without established risk factors for MRSA has increased rapidly over the past decade.[3,4] Community-acquired MRSA (CA-MRSA) has the potential to develop quickly from a localized abscess or furuncle into an invasive skin infection requiring hospital admission and has also been associated with severe complications, such as sepsis and necrotizing pneumonia.[5,6] Since most CA-MRSA infections are managed initially on an outpatient basis, it is critical that primary care clinicians recognize and appropriately treat patients suspected of having such infections.

When a physician in the community cannot manage the infections, patients are typically sent to the emergency department or a specialist. Visit rates for skin and soft tissue infection to emergency departments increased by 31 percent from 2001 to 2003.[7] In one urban academic center, all visits presenting with hand infections to the emergency department in 2007 were evaluated. Eighty-five patients presented and 55 percent had CA-MRSA infections.[8] In 11 U.S. emergency departments, of 422 patients presenting with skin and soft tissue infections, 249 were MRSA.[9]

The purpose of this study was to assess how family physicians manage patients with skin and soft tissue infections in the current "age of MRSA."

Methods

Three hundred and two Iowa Research Network (IRENE) physicians were invited to participate in this study. IRENE is a practice-based research network of family physicians. IRENE's mission is to create new knowledge relevant to rural primary care clinicians and their patients to improve patient care. We sent each physician member a fax that included a cover letter that described the purpose of the task order, the funding agency, the timeline for the project, and specific details about what each office would be expected to do if it chose to participate. Fourteen physicians from different practices were willing to participate. Funding constraints limited the study to 10 sites (Tables 1 and 2, Figure 1). We purposefully chose sites so that practices in small towns or more rural areas participated.

A study team investigator and research assistant visited each site for a focus group discussion of management of skin and soft tissue infections, review of the Centers for Disease Control and Prevention (CDC) guidelines, and explanation of the study's purpose. These focus group discussions lasted about 50 minutes, and the research team recorded and transcribed conversations regarding management of skin and soft tissue infections. During the focus groups, the research team asked practices for ideas on what might be helpful to them in managing these infections. The research team provided information about the CDC algorithm and the Up-To-

Date algorithms for skin and soft tissue infection management and asked physicians which they would prefer. The results of these focus groups have been presented. (Daly, Ely, Levy, et al., submitted to *J of Rural Health* 2010). After the research team summarized the results of the focus groups, it asked each office what specific items it would like to use to try to improve management of skin and soft tissue infections. All offices chose to use the CDC guidelines, to which the research team added information on medication dosages and drug categories for pregnant women (an idea which came out of the focus groups). The research team laminated the document and provided multiple copies to each office to post in strategic locations throughout the clinic. Each site agreed to abstract the medical records of at least 20 patients who had presented with a skin or soft tissue infection over the preceding year (with a goal of at least 30 patients).

The University of Iowa provided Institutional Review Board approval for the study and methods. Offices were compensated for participating in the study.

Medical Record Review Form

An interdisciplinary team of faculty and staff from the Department of Family Medicine and College of Public Health developed a comprehensive instrument to describe the management of skin and soft tissue infections. In developing the draft data collection form, we incorporated the knowledge about emerging risk factors for CA-MRSA and hospital-acquired MRSA identified in the literature. These include skin-to-skin contact among athletes or family members,[10,11] working in hog confinement,[12] colonization with *Staphylococcal aureus*,[13] and known risk factors for hospital-acquired MRSA.[14,15] In Iowa, being hospitalized in a small hospital with less than 200 beds was an independent risk factor for MRSA, and 31 percent of all *Staphylococcus* isolates were methicillin-resistant.[13] The final instrument had 44 items.

Department of Family Medicine faculty practice physicians piloted the subject data collection form while they were seeing patients with skin and soft tissue infections. After the pilot, six physicians, two nurses, two statisticians, and an epidemiologist met and revised the data collection form.

The 44 items included demographics (age, gender, race, ethnicity, insurance coverage, and a rural-urban code[16] that a nurse assigned based on the subject's residence ZIP code), antibiotic allergies, patient risk factors for MRSA (immunosuppression; diabetes; nursing home resident; working in hog confinement; history of MRSA infection or colonization; family member recently infected with MRSA; history of admission to nursing home, hospitalization, dialysis, or surgery in the past month; indwelling catheter; athlete; eczema; or other), clinical information (temperature, presence of abscess or cellulitis, infection site, size of infection, whether incision and drainage was done, whether the wound was packed if incision and drainage was done, antibiotic(s) prescribed, whether a culture was sent, what the culture grew, whether follow-up visit(s) were scheduled, whether the patient was hospitalized, and the cause of infection, if known). In addition, information on all follow-up visits was collected, including number of days since the original visit, whether the infection resolved, whether there was a need for additional antibiotics, and whether the patient needed to be seen elsewhere, such as an emergency treatment center. A variable was created for time to resolution of infection, which was the interval, in days, from the day of the first infection visit until resolution of infection. If there were no follow-up visits, the interval was the duration of the initial antibiotic prescription. Each form used a study identification number but did not contain personal identifying information.

Education of Medical Record Abstractors

Two research team members traveled to each office, met with the designated site coordinator, and reviewed the abstracting form with them. Site coordinators completed their certification in human subjects protection.

Subjects were identified using the following International Classification of Diseases-9 codes for abscess and cellulitis: carbuncle and furuncle (680.x) and code range 680.0–680.9; cellulitis and abscess of finger and toe (681.x) (codes 681.0 [finger], 681.1 [toe], 681.9 [cellulitis and abscess of unspecified digit]); 682 (other cellulitis and abscess) and codes 682.0–682.9; 684 impetigo; 685 pilonidal cyst (codes 685.0–685.1); and 686 other local infections of skin and subcutaneous tissue (codes 686.0–686.9). By using the codes for abscess and cellulitis, we were able to review a sample of all patients presenting with skin and soft tissue infections not just those patients who underwent incision and drainage.

Site coordinators were given a list of Iowa ZIP codes that were matched by the counties' Rural-Urban Continuum Codes (U.S. Department of Agriculture, 2004). They reviewed the subject's ZIP code and put the rural-urban county code on the abstracting form. The codes have nine categories, with 1 = counties in metro areas of 1 million population or more and 9 = completely rural or less than 2,500 urban population, not adjacent to a metro area. Subjects were considered rural if they came from counties categorized as 8 or 9; the rest were considered urban.

The site coordinator returned the completed skin or soft tissue forms by mail each month. The study team sent e-mail reminders every 2 weeks if forms were not received. If the study team did not receive a response through e-mail, then they called the site coordinator.

Participation Payment

Each site was reimbursed $25 for a completed retrospective chart review form. Some clinic administrators paid the person abstracting the data; others reimbursed the clinic only.

Prospective Study

After the initial focus groups were held at each practice, the research team created a checklist based on the suggestions clinicians and nursing staff offered for improving the management of skin and soft tissue infections. The research team provided a checklist to each office, and offices returned the sheet, indicating which interventions they wished to implement. All physicians liked the CDC two-page algorithm (CDC, 2007) but wanted the typical doses of antibiotics and drug categories for pregnant women added to the algorithm. The research team added this information and provided multiple laminated copies to all offices. All offices agreed to incorporate the algorithm into care by having it readily available when a patient came in. The study team also provided all of the offices copies of the American Academy of Family Physicians patient education handouts on MRSA and Caring for Wounds. Nine offices received a handout on Wound Packing Instructions that the study team prepared (Table 1). Since the interventions were nearly identical at all offices, the retrospective time period was compared with the prospective time period for analyses.

For the prospective portion, patients provided their signed informed consent and agreed to allow the site coordinators to review their medical records for the initial visit and any follow-up visits for their skin infections. If they did not have scheduled follow-up visits, they agreed to receive weekly follow-up telephone calls from the office study nurse to assess the status of their

infections until it was resolved. The office or office nursing staff (depending on the office) was compensated $25 per subject for each completed prospective form.

Initially, nine IRENE offices participated in the retrospective medical records review and the prospective recruitment of subjects with skin and soft tissue infections. After 9 months of not enrolling any subjects in the prospective study, the Bloomfield office was removed from the study, and the Institutional Review Board gave approval for another office, the University of Iowa Family Medicine, to participate. As a result, there are 10 offices in the retrospective study and 9 offices in the prospective study.

Analyses

Means and frequencies were calculated for all variables. New variables were created for a number of variables, including whether the patient had a risk factor for MRSA infection (based on 13 possible risk factors), whether the initial or subsequent antibiotics prescribed covered MRSA, the total number of antibiotics prescribed over the course of the infection, the broad category of antibiotic prescribed at each time point, and various categorizations of temperature (e.g., < 99 degrees Fahrenheit versus 99 degrees Fahrenheit or higher). One of the main outcomes was factors associated with time to resolution of infection. For the retrospective data, Cox proportional hazards models were run for time to resolution using sandwich estimates (to control for clustering by clinic) to determine hazard ratios for presenting subject clinical factors (one model) and for subject clinical and treatment factors for the outcomes (second model) for all subjects. The retrospective information was compared with the prospective information using t-tests, one-way ANOVA, or chi-square tests, as appropriate. P-values < 0.5 were considered statistically significant.

Results

Retrospective Results

The 10 IRENE offices completed 295 skin and soft tissue forms (Table 2). Seven of the IRENE offices were located in towns of population less than 10,000. Of the 295 forms, 263 of the forms were usable. Forms that were incomplete or that provided information on chronic cellulitis, sebaceous cysts, fungal infections, venous stasis ulcers, or diabetic foot ulcers were omitted from analysis. Table 3 shows some of the demographic characteristics by clinic site.

Demographic information for the overall study population is shown in Table 4. Half of the subjects were male, 93 percent were insured, the mean age was 41 years, and 30 percent lived in a rural county. Ninety-six percent of the subjects were Caucasian, 5 percent Hispanic, and 3 percent black, with the remainder Asian or American Indian.

Table 5 shows the characteristics of the infections and whether they were incised and drained or cultured. Ninety-four (36 percent) were classified as an abscess only, 141 (54 percent) were classified as cellulitis only, and 28 (11 percent) were classified as both. An incision and drainage was completed on 86 (32 percent) of the infections, 92 (35 percent) cultures were sent, and 248 (94 percent) were treated with an antibiotic. (Some cultures were sent on infections that were not incised and drained.) Forty-five (49 percent) of those cultured were MRSA positive (18.6 percent of all infections).

Table 6 shows treatment according to infection type. Incision and drainage were completed for 73 percent of the abscesses and 57 percent of the abscess and cellulitis wounds.

Twenty-three percent of the abscesses that were incised and drained were packed. Fewer abscess infections (91 percent) were prescribed an antibiotic at the first visit compared to those with cellulitis where 98 percent antibiotics were prescribed. At initial visit, 43 percent of the antibiotics covered MRSA for the abscess and 18 percent for the cellulitis. Mean number of days to resolution of infection was fewer (10.6 days) for the abscess wounds compared to the cellulitis only wounds (12.3 days), while abscess and cellulitis wounds had the longest time to resolution (13.7 days).

Table 7 shows abscess treatment comparing those abscesses that were incised and drained or not. Of those cultured, MRSA was identified significantly more often in the wounds not incised and drained compared with those incised and drained (100 percent versus 50 percent, p=.007). The mean time to resolution of the infection was longer for the wound not incised and drained (12.8 days) compared to those that were incised and drained (9.8 days).

Table 8 shows the mean time to resolution, in days, for a number of variables. Infections took longer to resolve in males than females (12.9 days versus 10.8 days, p=.028), in those prescribed greater numbers of antibiotics, in those with both abscess and cellulitis (13.7 days) compared with those with either abscess only (10.6 days) or cellulitis only (12.3 days, p=.059), in those who lived in rural areas compared with urban areas (14.6 days versus 10.7 days, p<.001), in those who were hospitalized versus those who were not (21.6 days versus 11.4 days. p<.001), in those with temperatures at their initial visit of 99 Fahrenheit or above versus those < 99 degrees Fahrenheit (15.1 days versus 11.5 days, p=.031), in those who did not have incision and drainage done (12.7 days versus 10.2 days, p=.014), and in those with at least one risk factor for MRSA (13.8 days versus 11.2 days, p=.016). There was a trend toward a longer time to resolution in those who had MRSA cultured (13.3 days versus 11.6 days, p=.160). For those who underwent incision and drainage, there was no significant difference in the time to resolution of infection whether the wound was packed or not (9.6 days versus 10.5 days, p=.592).

Table 9 shows the Cox proportional hazards model for time to resolution of infection. The first part of the table considers patient characteristics only, and the second considers both patient and clinical characteristics. Considering patient characteristics only, infections were less likely to resolve in males (hazard ratio [HR] 0.831, p<.0001), those who lived in a rural area (HR 0.657, p=.0009), those who had at least one MRSA risk factor (HR 0.782, p=0.047), and those with infections of the face or neck (HR 0.549, p=.0054) or groin, pubic area, or lower extremity (HR 0.574, p<.0001) compared with infections of the thorax or upper extremity. The hazard ratios for the patient characteristics were similar when clinical characteristics were also considered. Additional factors in the model include the total number of antibiotics prescribed over the course of the infection with those patients prescribed two or fewer antibiotics nearly 2.8 times as likely to have their infection resolve at any given time point compared with patients prescribed more than two antibiotics. Those hospitalized were less likely to have their infection resolve (HR .567, p=.0135) and those with MRSA identified were also less likely to have their infection resolve (HR 0.862, p=.063)

Figures 2 and 3 show the patterns of antibiotic prescribing at the initial visit and at the first follow-up visit. At the initial visit, cephalosporins were most commonly prescribed, followed by TMP-sulfa. At the first follow-up visit, most individuals did not receive an antibiotic, but if an antibiotic was given, it was most commonly a cephalosporin or TMP-sulfa.

Prospective Results

Tables 10, 11, and 12 show the number of prospective forms returned; demographic information; and the breakdown by infection type, treatment, and whether MRSA was cultured by office. Table 13 compares the retrospective and prospective information on a number of characteristics. There were no differences found in demographics or patient presenting characteristics. However, there were significantly more infections classified as abscess only (and fewer as combined abscess and cellulitis) in the retrospective as compared with the prospective data ($p<.001$). There were no differences in treatment characteristics of whether the infection was incised and drained, cultured, or packed between the retrospective and the prospective groups. However, among those cultured during the prospective period, MRSA was less likely to be cultured (30 percent MRSA positive prospective versus 49 percent MRSA positive retrospective, $p=.029$). During the prospective time period, there were significantly more antibiotics prescribed initially that would cover MRSA (51 percent versus 29 percent, $p<.001$) and at any time (60 percent versus 37 percent, $p<.001$). This was also true when considering infections that involved abscesses only or abscess plus cellulitis (Table 14). Figure 4 shows the patterns of antibiotic prescription at the initial prospective visit, with the stacked bar indicating when a combination of antibiotics was used. When comparing this with Figure 2, one can see that there more proportionally more initial prescriptions for TMP-sulfa or tetracycline compared with cephalosporins at the prospective initial visit compared with the retrospective initial visit.

Table 15 shows the univariate analyses for time to resolution of infection for the retrospective group, prospective group, and overall. Due to the relatively small number of prospective cases, most of the variables that were significant in the retrospective comparisons of time to resolution were no longer significant in the prospective comparisons, although trends remained largely the same. Infections of the thorax and upper extremities showed a trend toward more rapid time to resolution than those of the face or neck or groin, pubic area, or lower extremities ($p=.184$). Wound packing made no difference in the time to resolution in the retrospective data, but packed wounds took longer to heal in the prospective data ($p=.046$). The standard deviation was quite high for the prospective data set for packed wounds, so this result should be interpreted with caution. Infections of the thorax and upper extremities showed a trend toward more rapid time to resolution than those of the face or neck or groin, pubic area, or lower extremities ($p=.184$).

For the combined data, women healed more rapidly than men (12.1 days versus 13.7 days, $p=.079$), individuals living in non-rural areas healed more rapidly than those from rural areas (12.0 days versus 15.1 days, $p=.004$), infections of the thorax or upper extremities healed faster than those of the face or neck or groin, pubic area, or lower extremities (10.7 days versus 15.0 days and 14.9 days, $p<.001$). We did not find that duration of infection prior to the initial physician visit was related to duration of time to resolution, nor did we find that men waited longer than women to be seen or that individuals from rural areas waited longer to be seen. Not surprisingly, those presenting with a temperature below 99 degrees Fahrenheit healed faster than those with higher temperatures (12.5 days versus 16.8 days, $p=.053$) and those not hospitalized healed faster than those hospitalized (12.4 days versus 23.6 days, $p=.029$). Having no risk factors for MRSA (versus at least one risk factor) was associated with more rapid healing (12.3 days versus 14.4 days, $p=.025$). Infections that were incised and drained healed more rapidly than those not incised and drained (11.4 days versus 13.6, $p=.019$). In the overall data set, there was no difference in rate of healing of packed versus not packed infections (11.8 days versus 11.1 days, $p=.615$). Being treated with an antibiotic that covered MRSA at some point during the

infection was associated with a longer time to resolution (14.4 days versus 12.0 days, p=.006). Those individuals who required more than two antibiotics for treatment over the course of the infection had a longer time to resolution than those who required less than two antibiotics (11.8 days versus 23.8 days, p<.001).

Conclusions

Using the retrospective data, Cox proportional hazards models controlling for clinic-level clustering revealed a number of predictors of longer time to resolution including: male patients; rural address; at least one risk factor for MRSA; infection of the face or neck or groin, pubic area, or lower extremity as compared with the thorax or upper extremity; being hospitalized; and having MRSA identified. Those prescribed fewer than two antibiotics over the course of the infection (versus more than two) were 2.8 times as likely to have their infection resolve at any given time point.

The offices that participated in this study were unique in that they were willing to have their care scrutinized and to participate in an intervention study. Physicians were appropriately more likely to cover for MRSA when the infection was an abscess or an abscess combined with cellulitis. The major finding associated with the intervention was that antibiotics that covered MRSA were significantly more likely to be prescribed initially and at any time point for prospective patients as compared with retrospective patients (p< .001 for both comparisons). Whether this was a result of the focus group discussions (where the CDC algorithm was presented) and/or the multiple copies of the algorithm that were supplied to each office is impossible to say.

Conducting prospective studies in practice-based networks is challenging. Fewer patients were recruited over the time period of the prospective study than were originally planned. One stumbling block was the need for written informed consent for the prospective component because the data being collected for each individual were not typically collected during standard clinical care (e.g,. close followup with weekly phone calls for time to infection resolution). If we could have conducted this study without a written informed consent (i.e., as a quality improvement study), then it is likely that we would have had more patients to include in the prospective portion. Investigators attempting practice-based research will need to find creative ways or more funding than is typically available for these types of studies because recruiting and closely following individuals takes significant time, and most practices do not have the luxury of nursing staff available for these additional duties.

Implications for Practice

There are a number of factors that clinicians could be made aware of that impact the time to resolution of skin infections. Many of these have been previously identified, but some that we found have not been reported previously. For example, individuals living in rural areas and those with an infection at a site other than the thorax or upper extremities took longer to heal. Physicians were more likely to prescribe an antibiotic that covered MRSA after participating in the focus groups and being provided with the revised CDC algorithm. Wound packing and its impact on healing should be studied prospectively with a group of individuals with well-defined abscesses (abscesses of at least a minimal size) because our results do not indicate that packing makes a difference in terms of time to resolution. O'Malley's series of abscesses that were incised and drained and randomized to packing or not showed no difference in the need for a

second intervention at 48 hours, but higher pain scores and use of pain meds in those packed versus not packed. (O'Malley, *Emergency Medicine*, 2009). However, O'Malley did not study time to resolution of infection.

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Table 1. Summary of interventions by office

Office	Intervention
The Country Doctor, Bloomfield Dr. Brodale	CDC Algorithm for MRSA Treatment Education forms (MRSA Fact Sheet, Caring for Wounds)
Manchester Family Medicine Associates, Guttenberg Dr. Hoffman	CDC Algorithm for MRSA Treatment (will put on EMRelectronic medical record) Education forms (MRSA Fact Sheet, Caring for Wounds, Wound Packing Instructions) Office policy for patients with skin infections
Genesis Medical Center, Blue Grass Dr. Bunting	CDC Algorithm for MRSA Treatment Education forms (MRSA Fact Sheet, Caring for Wounds, Wound Packing Instructions)
Genesis Medical Center, Davenport Dr. Andresen	CDC Algorithm for MRSA Treatment Education forms (MRSA Fact Sheet, Caring for Wounds, Wound Packing Instructions)
Medical Associates, Le Mars Dr. Doorenbos	CDC Algorithm for MRSA Treatment Office policy for patients with skin infections (extant) Education forms (MRSA Fact Sheet, Caring for Wounds, Wound Packing Instructions)
Regional Family Health, Manchester Dr. Boom	CDC Algorithm for MRSA Treatment Education forms (MRSA Fact Sheet, Caring for Wounds, Wound Packing Instructions)
University of Iowa Hospitals and Clinics CMS Lone Tree Clinic, (Moved to Riverside on March 15, 2010) Dr. Bedell	CDC Algorithm for MRSA Treatment Education forms (MRSA Fact Sheet, Caring for Wounds, Wound Packing Instructions)
University of Iowa Hospitals and Clinics CMS Sigourney Clinic Dr. Saxena	CDC Algorithm for MRSA Treatment Office skin infection management protocol Education forms (MRSA Fact Sheet, & Caring for Wounds) Office skin infection management protocol
University of Iowa Hospitals and Clinics Family Medicine Clinic, Iowa City Dr. Wilbur	CDC Algorithm for MRSA Treatment Education forms (MRSA Fact Sheet, Caring for Wounds, Wound Packing Instructions)
Urbandale Family Physicians, Urbandale Dr. Shirk	CDC Algorithm for MRSA Treatment Education forms (MRSA Fact Sheet, Caring for Wounds, Wound Packing Instructions)

Table 2. Skin infection forms received by study site

IRENE Office (Office No.)	City	City Population	No. of Skin and Soft Tissue Forms Returned
The Country Doctor (6)	Bloomfield	2,601	21
Family Medicine Associates (3)	Guttenberg	1,987	30
Genesis Family Medicine (1)	Davenport	98,359	31
Genesis Family Medicine (2)	Blue Grass	1,169	30
Manchester Family Medical Associates (4)	Manchester	5,257	30
Medical Associates (5)	Le Mars	9,237	30
University of Iowa Hospitals and Clinics CMS Riverside Clinic (7)	Riverside	928	30
University of Iowa Hospitals and Clinics CMS Sigourney Clinic (8)	Sigourney	2,209	33
University of Iowa Hospitals and Clinics Family Medicine Clinic (9)	Iowa City	62,220	30
Urbandale Family Physicians (10)	Urbandale	29,072	30

Table 3. Demographic characteristics by clinic site

Clinic	No. Useable Skin and Soft Tissue Infection Forms	Male n (%)	Uninsured n (%)	Mean Age (Years)	Rural County n (%)
1	25	7 (28)	1 (4)	40	0
2	26	12 (46)	0	40	0
3	26	14 (54)	1 (4)	53	25 (96)
4	26	4 (15)	1 (4)	44	1 (4)
5	29	22 (76)	6 (21)	39	0
6	21	12 (57)	3 (16)	30	20 (95)
7	25	16 (64)	3 (12)	46	9 (36)
8	26	17 (68)	0	35	25 (100)
9	30	11 (37)	1 (3)	38	0
10	30	17 (57)	2 (7)	43	0
Total	**263**	**132 (50%)**	**18 (7)**	**41**	**80 (30)**

Table 4. Demographic summary of retrospective study subjects

Demographics (N = 263)	N (%)
Age (years)	
> 20	60 (23)
20-39	66 (25)
40-64	88 (34)
≥ 65	48 (18)
Male	132 (50)
Caucasian	191 (96)
Hispanic	10 (5)
Insurance coverage	
Private	152 (59)
Medicaid	44 (17)
Medicare	44 (17)
Uninsured	18 (7)
Lives in rural county	80 (30)

Table 5. Skin infection type, incision and drainage done, culture sent, initial antibiotic prescribed, and MRSA in wound for retrospective subjects

Clinic	No. Useable Skin and Soft Tissue Infection Forms n (%)	Abscess Only n (%)	Cellulitis Only n (%)	Both Abscess & Cellulitis n (%)	Incision and Drainage Done n (%)	Culture Sent n (%)	Initial antibiotic prescribed n (%)	MRSA positive (n)
1	25	22 (88)	0	3 (12)	25 (100)	5 (20%)	16 (64)	2
2	26	13 (50)	13 (50)	0	10 (39)	0	25 (96)	0
3	26	4 (15)	16 (62)	6 (23)	6 (23)	10 (39)	26 (100)	1
4	26	2 (8)	20 (77)	4 (15)	3 (12)	4 (15)	26 (100)	0
5	29	12 (41)	12 (41)	5 (18)	10 (35)	19 (66)	28 (97)	19
6	21	7 (33)	10 (48)	4 (19)	7 (33)	13 (62)	21 (100)	5
7	25	5 (20)	20 (80)	0	3 (12)	3 (12)	23 (92)	0
8	25	2 (8)	19 (76)	4 (16)	3 (12)	16 (64)	24 (96)	8
9	30	12 (40)	17 (57)	1 (3)	6 (20)	11 (37)	30 (100)	6
10	30	15 (50)	14 (47)	1 (3)	13 (43)	11 (37)	29 (97)	4
Total	**263**	**94 (36)**	**141 (54)**	**28 (11)**	**86 (32)**	**92 (35)**	**248 (94)**	**45**

Table 6. Treatment according to infection type, retrospective data

	Abscess Only n = 93 n (%)	Cellulitis Only n = 143 n (%)	Both Abscess and Cellulitis n = 27 n (%)	P-value
Incision and drainage	68 (73)	Not applicable	15 (56)	0.082
Wound packed	22 (24)	Not applicable	8 (30)	0.126
Cultured	40 (43)	34 (24)	18 (67)	<0.001
MRSA identified	25 (27)	9 (6)	11 (41)	<0.001
Any antibiotic prescribed at the initial visit	81 (87)	138 (97)	27 (100)	0.006
Number of antibiotics used until infection healed				
0	11 (12)	4 (3)	0	
1	60 (65)	103 (72)	13 (48)	
2	16 (17)	25 (18)	9 (33)	
3	5 (5)	7 (5)	4 (15)	
4	1 (1)	2 (1)	0	
5	0	2 (1)	1(4)	0.015
Total number of antibiotics prescribed:				
> 2	6 (7)	11 (8)	5 (19)	
≤ 2	8 (93)	132 (92)	22 (81)	0.125
First or second antibiotic prescribed at initial visit covered MRSA	35 (43)	24 (17)	11 (41)	<0.001
MRSA coverage at any time	44 (54)	35 (25)	12 (44)	<0.001
Mean time (days) to resolution	10.5 (6.1)	12.3 (8.1)	14.0 (8.6)	0.059

Table 7. Abscess treatment by incision and drainage done versus not, retrospective data

	Abscess Only Incised and Drained N = 68 N (%)	Abscess Only Not Incised and Drained N = 25 N (%)	P-value
Wound packed	22 (100)	Not applicable	
Cultured	31 (46)	9 (36)	0.408
MRSA identified (of those cultured)	16 (24)	9 (36)	0.032
Any antibiotic prescribed at the initial visit	56 (82)	25 (100)	0.024
Number antibiotics used			
0	11 (16)	0	0.077
1	41 (60)	19 (76)	
2	13 (19)	3 (12)	
3	2 (3)	3 (12)	
4	1 (2)	0	
Total number of antibiotics prescribed:			
> 2	3 (4)	3 (12)	
≤ 2	65 (96)	22 (88)	0.187
First or second antibiotic prescribed at initial visit covered MRSA	26 (46)	9 (36)	0.381
MRSA coverage at any time	32 (56)	12 (48)	0.496
Mean time to resolution (days)	9.6 (5.3)	12.8 (7.5)	0.059

Table 8. Time to resolution of infection (days), univariate analyses retrospective information
N =263

Gender	N	Time to Resolution (Days) Mean ± s.d.	ANOVA P-Value
Female	131	10.8 ± 6.3	
Male	132	12.9 ± 8.6	0.028
Age group (years)			
< 20	60	10.8 ± 4.5	
20 to < 40	66	11.4 ± 6.2	
40 to < 65	88	12.6 ± 10.1	
65 to 96	48	12.4 ± 7.1	0.467
Age group (years)			
< 40	126	11.2 ± 5.5	
40 and older	136	12.6 ± 9.1	0.129
Total number of antibiotics used over course of infection			
0	15	8.3 ± 5.9	
1	176	9.6 ± 3.7	
2	50	16.0 ± 10.3	
3	16	21.1 ± 10.0	
4	3	22.7 ± 12.6	
5	3	30.7 ± 14.6	< 0.001
Total number of antibiotics used			
≤ 2	241	10.9 ± 6.4	
> 2	22	22.6 ± 10.9	< 0.001
Classification of infection			
Abscess only	94	10.6 ± 6.1	
Cellulitis only	141	12.3 ± 8.2	
Abscess & cellulitis	28	13.7 ± 8.6	.088
Rurality of subject			
Non-rural	183	10.7 ± 6.3	
Rural	80	14.6 ± 9.0	< 0.001

Table 8. Time to resolution of infection (days), univariate analyses retrospective information (continued)

N =263

Gender	N	Time to Resolution (Days) Mean ± s.d.	ANOVA P-Value
Face/neck	34	13.5 ± 10.7	
Groin/pubic/lower extremities	122	13.4 ± 8.5	
Thorax/upper extremities	104	9.6 ± 4.1	< 0.001
Subject hospitalized			
Yes	11	21.6 ± 14.9	
No	252	11.4 ± 6.8	< 0.001
Initial temperature (°F) (not everyone had a temperature recorded)			
< 99	206	11.5 ± 7.3	
99 and above	24	15.1 ± 10.0	0.031
Initial antibiotics given covered MRSA during infection (not everyone received an antibiotic)			
Yes	70	11.4 ± 6.6	
No	176	12.3 ± 8.0	0.421
Antibiotics given covered MRSA at some point during infection (not everyone received an antibiotic)			
Yes	91	13.3 ± 8.3	
No	157	11.4 ± 7.1	0.064
Incision and drainage done			
Yes	85	10.2 ± 5.6	
No	178	12.7 ± 8.3	0.014
Wound packed			
Packed	30	9.8 ± 6.9	
Not packed	55	10.5 ± 4.8	
Incision and drainage not done	178	12.7 ± 8.3	0.046
Only for those (n = 85) who had incision and drainage			
Wound packed	30	9.6 ± 6.9	
Wound not packed	55	10.5 ± 4.8	0.592
MRSA identified vs. others			
MRSA identified	45	13.3 ± 6.2	
All others	218	11.6 ± 7.8	0.160
Patient risk factors (at least one of 13 risk factors)			
At least one of risk factors	69	13.8 ± 8.9	
No risk factors	194	11.2± 6.9	0.016

Table 9. Time to resolution using cox proportional hazards regression for retrospective data
N=260 cases, controlling for clinic-level clustering

Patient Characteristics

Variable	Hazard Ratio*	P-Value
Male (vs. female)	0.831	<.0001
Rural (vs. urban)	0.657	.0009
At least one MRSA risk factor (vs. none)	0.782	.0470
Infection Site (vs. thorax/upper extremity)		
Face/neck	0.549	.0054
Groin/pubic area/lower extremity	0.574	<.0001

Patient and Clinical Characteristics†

Variable	Hazard Ratio*	P-Value
Age <40 yrs. (vs. ≥ 40 yrs.)	1.088	N.S.
Male (vs. female)	0.838	.0003
Rural (vs. urban)	0.718	.0194
At least one MRSA risk factor (vs. none)	0.844	.1427
Infection Site (vs. thorax/upper extremity)		
Face/neck	0.548	.0014
Groin/pubic area/lower extremity)	0.564	<.0001
Total number of antibiotics prescribed over course of infection ≤2 (vs. >2)	2.797	<.0001
Patient hospitalized (vs. not)	0.567	.0135
MRSA identified (vs. not)	0.862	.0633

†Controlled for age category

*Hazard ratio: a value less than 1 means the infection is less likely to resolve at any given time point with the factor present; a value greater than 1 means the infection is more likely to resolve with the factor present.

Table 10. Prospective skin forms returned by clinic

IRENE Office (Office No.)	City	No. Prospective Skin and Soft Tissue Forms Returned	No. Prospective Skin and Soft Tissue Forms Used in Analysis
Family Medicine Associates (3)	Guttenberg	24	23
Genesis Family Medicine (1)	Davenport	10	8
Genesis Family Medicine (2)	Blue Grass	1	0
Manchester Family Medical Associates (4)	Manchester	9	9
Medical Associates (5)	Le Mars	11	11
The Country Doctor (6)	Bloomfield	0	0
University of Iowa Hospitals and Clinics CMS Riverside Clinic (7)	Riverside	7	5
University of Iowa Hospitals and Clinics CMS Sigourney Clinic (8)	Sigourney	12	10
University of Iowa Hospitals and Clinics Family Medicine Clinic (9)	Iowa City	30	30
Urbandale Family Physicians (10)	Urbandale	18	18
Total		**122**	**114**

Table 11. Demographic information from prospective skin and soft tissue infection forms

Clinic	No. Useable Skin and Soft Tissue Infection Prospective Forms	Male N (%)	Uninsured	Mean Age Years	Rural County N (%)
1	8	0	1 (4)	41	0
2	0	0	0	0	0
3	23	11 (48)	0	42	20 (91)
4	9	4 (44)	0	36	1 (11)
5	11	6 (55)	0	30	0
6	0	0	0	0	0
7	5	5 (100)	0	24	0
8	10	5 (50)	1 (9)	32	10 (100)
9	30	10 (33)	0	43	0
10	18	7 (39)	0	44	0
Total	**114**	**48 (42)**	**2 (2)**	**39**	**31 (27)**

Table 12. Skin infection type, treatment characteristics, and whether MRSA cultured for prospective patients

Clinic	No. Useable Skin and Soft Tissue Infection Prospective Forms n (%)	Abscess Only n (%)	Cellulitis Only n (%)	Both Abscess & Cellulitis n (%)	Incision and Drainage Done n (%)	Culture Sent n (%)	Antibiotic Prescribed at Initial Visit n (%)	MRSA Positive n (%)
1	8	1 (14)	4 (57)	2 (29)	2 (25)	2 (25%)	8 (100)	0
2	0	0	0	0	0	0	0	0
3	23	2 (9)	20 (87)	1 (4)	3 (13)	12 (52)	21 (91)	4 (33)
4	9	2 (22)	4 (44)	3 (33)	5 (56)	6 (67)	9 (100)	4 (67)
5	11	3 (30)	3 (30)	4 (40)	5 (46)	7 (64)	11 (100)	3 (43)
6	0	0	0	0	0	0	0	0
7	5	1 (25)	3 (75)	0	1 (20)	2 (40)	5 (100)	1 (50)
8	10	1 (10)	6 (60)	0	2 (20)	5 (50)	9 (90)	0
9	30	5 (17)	17 (57)	8 (27)	5 (17)	6 (20)	30 (100)	1 (17)
10	18	3 (17)	9 (50)	6 (33)	9 (50)	10 (56)	18 (100)	2 (20)
Total	**114**	**18 (17)**	**66 (61)**	**24 (22)**	**32 (28)**	**49 (43)**	**111 (97)**	**15**

Table 13. Comparison of retrospective and prospective data, all cases

	Retrospective N = 263 N (%)	Prospective N = 114 N (%)	P-Value
Demographics			
Gender			
Female	131 (50)	66 (58)	0.149
Male	132 (50)	48 (42)	
Age groups			
< 20	27 (24)	60 (23)	0.489
20 to < 40	34 (30)	66 (25)	
40 to < 65	38 (34)	88 (34)	
65 to 96	14 (12)	48 (18)	
Age group (years)			
< 40	126 (48)	61 (54)	0.295
≥ 40	136 (52)	52 (46)	
Rurality			
Non-rural	183 (70)	82 (73)	0.561
Rural	80 (30)	31 (27)	
Insurance			
Private	152 (59)	76 (70)	0.037
Medicaid	44 (17)	20 (19)	
Medicare	44 (17)	10 (9)	
Uninsured	18 (7)	2 (2)	
Race			
Caucasian	191 (96)	107 (94)	0.398
Non-Caucasian	8 (4)	7 (6)	
Ethnicity			
Hispanic	10 (5)	2 (2)	0.124
Non-Hispanic	178 (95)	112 (98)	

Table 13. Comparison of retrospective and prospective data, all cases (continued)

	Retrospective N = 263 N (%)	Prospective N = 114 N (%)	P-Value
Patient Presenting Characteristics			
Site of Infection			
Face/neck	34 (13)	15 (14)	0.871
Groin/pubic/lower extremities	122 (47)	47 (44)	
Thorax/upper extremities	104 (40)	45 (42)	
Initial temperature (^{o}F)			
< 99^{o}	206 (90)	101 (91)	0.681
≥ 99^{o}	24 (10)	10 (9)	
Duration of infection prior to being seen			
< 5 days	132 (60)	65 (61)	0.783
≥ 5 days	89 (40)	41 (39)	
Patient hospitalized with infection			
Yes	11 (4)	3 (3)	
No	252 (96)	109 (97)	0.482
Patient had at least 1 risk factor for MRSA			
Yes	69 (26)	39 (34)	0.116
No	194 (74)	75 (66)	
Patient had diabetes			
Yes	35 (13)	19 (17)	0.393
No	228 (87)	95 (83)	
Wound Type			
Abscess only	93 (36)	18 (17)	< 0.001
Cellulitis only	143 (54)	66 (61)	
Abscess and cellulitis	27 (10)	24 (22)	
Treatment			
Incision and drainage done			
Yes	85 (32)	32 (28)	0.413
No	178 (67)	82 (72)	
Culture done			
Yes	92 (44)	50 (35)	0.102
No	171(65)	64 (56)	
Wound packed			
Wound packed	30 (11)	8 (7)	0.403
Wound not packed	55 (21)	22 (20)	
Incision and drainage not done	178 (68)	82 (73)	
Only for those (n = 115) who had an incision and drainage done			
Wound packed	30 (35)	8 (27)	0.388
Wound not packed	55 (65)	22 (73)	
MRSA cultured			
Yes	45 (49)	15 (30)	0.029
No	47 (51)	35 (70)	
Antibiotics Prescribed			
Antibiotic prescribed at initial visit			
Yes	246 (93)	111 (97)	0.127
No	17 (7)	3 (3)	
Antibiotic(s) at initial visit covered MRSA			
Yes	70 (29)	58 (51)	< 0.001
No	176 (71)	56 (49)	

Table 13. Comparison of retrospective and prospective data, all cases (continued)

	Retrospective N = 263 N (%)	Prospective N = 114 N (%)	P-Value
Antibiotics were prescribed that covered MRSA at some time during infection			
Yes	91 (37)	68 (60)	< 0.001
No	157 (63)	46 (40)	
Total number of antibiotics used over the course of the infection			
≤ 2	241 (92)	103 (90)	0.685
> 2	22 (8)	11 (10)	
Total number of antibiotics used over course of infection			
0	15 (6)	1 (1)	0.194
1	176 (67)	77 (67)	
2	50 (19)	25 (22)	
3	16 (6)	8 (7)	
4	3 (1)	2 (2)	
5	3 (1)	0	
6	0	1 (1)	

Table 14. Comparison of retrospective and prospective treatments for any infection that had an abscess

N=162

	Retrospective Abscess Only and Abscess & Cellulitis N = 120	**Prospective Abscess Only and Abscess and Cellulitis N = 42**	**P-Value**
Incision and drainage done			
Yes	83 (69)	24 (57)	0.157
No	37 (31)	18 (43)	
Culture done			
Yes	58 (48)	26 (62)	0.130
No	62 (52)	16 (38)	
Antibiotic prescribed at first visit			
Yes	108 (90)	41 (98)	0.118
No	12 (10)	1 (2)	
Initial antibiotics covered MRSA			
Yes	46 (43)	28 (67)	0.008
No	62 (57)	14 (33)	
Antibiotics covered MRSA at some time during infection			
Yes	56 (51)	28 (67)	0.090
No	53 (49)	14 (33)	

Table 15. Time to resolution according to various characteristics, retrospective, prospective, and all cases

	Retrospective (N = 263)			Prospective (N = 114)			Total (N = 377)		
	N	**Time to Resolution (Days)**	**ANOVA P-Value**	**N**	**Time to Resolution (Days)**	**Anova P-Value**	**N**	**Time to Resolution (Days)**	**ANOVA P-Value**
Demographics									
Gender									
Female	131	10.8 ± 6.3	0.028	66	14.7 ± 8.6	0.529	197	12.1 ± 7.4	0.079
Male	132	10.8 ± 6.3		48	15.9 ± 11.5		180	13.7 ± 9.5	
Age group (years)									
< 20	60	10.8 ± 4.5	0.467	27	18.1 ± 14.9	0.280	87	13.1 ± 9.7	0.768
20 to < 40	66	11.4 ± 6.2		34	13.4 ± 8.5		100	12.1 ± 7.1	
40 to < 65	88	12.6 ± 10.1		38	14.4 ± 7.2		126	13.2 ± 9.3	
65 to 96	48	12.4 ± 7.1		14	16.3 ± 6.7		62	13.3 ± 7.1	
Age group (years)									
< 40	126	11.2 ± 5.5	0.129	61	15.5 ± 12.0	0.733	187	12.6 ± 8.4	0.465
≥ 40	136	12.6 ± 9.1		52	14.9 ± 7.0		188	13.2 ± 8.6	
Rurality									
Non-rural	183	10.7 ± 6.3	< 0.001	82	14.9 ± 9.3	0.520	265	12.0 ± 7.6	0.004
Rural	80	14.6 ± 9.0		31	16.3 ± 11.4		111	15.1 ± 10.0	
Insurance									
Private	152	11.7 ± 7.8	0.824	76	14.5 ± 10.7	0.433	228	12.7 ± 8.9	0.641
Medicaid	44	11.3 ± 8.0		20	14.9 ± 8.2		64	12.4 ± 8.2	
Medicare	44	12.8 ± 7.7		10	20.1 ± 8.2		54	14.1 ± 8.2	
Uninsured	18	11.6 ± 5.6		2	15.0 ± 1.4		20	12.8 ± 8.5	
Race									
Caucasian	191	12.5 ± 8.0	0.163	107	15.4 ± 10.1	0.515	298	13.5 ± 8.9	0.198
Non-Caucasian	8	8.5 ± 1.6		7	12.9 ± 6.8		15	10.5 ± 5.1	
Ethnicity									
Hispanic	10	13.4 ± 10.8	0.773	2	8.5 ± 7.8	0.334	12	12.6 ± 10.2	0.682
Non-Hispanic	178	12.6 ± 8.2		112	15.3 ± 9.9		290	13.7 ± 9.0	

Table 15. Time to resolution according to various characteristics, retrospective, prospective, and all cases (continued)

	Retrospective (N = 263)			Prospective (N = 114)			Total (N = 377)		
	N	**Time to Resolution (Days)**	**ANOVA P-Value**	**N**	**Time to Resolution (Days)**	**ANOVA P-Value**	**N**	**Time to Resolution (Days)**	**ANOVA P-Value**
Patient Presenting Characteristics									
Site of Infection									
Face/neck	34	13.5 ± 10.7	<0 .001	15	18.3 ± 10.7	0.184	49	15.0 ± 10.8	< 0.001
Groin/pubic/ lower extremities	122	13.4 ± 8.5		47	15.8 ± 11.5		169	14.0 ± 9.4	
Thorax/upper extremities	104	9.6 ± 4.1		45	13.2 ± 7.3		149	10.7 ± 5.5	
Temperature (^{o}F)									
< 99^{o}	206	11.5 ± 7.3	0.031	101	14.6 ± 9.2	0.256	307	12.5 ± 8.1	0.053
≥ 99^{o}	24	15.1 ± 10.0		10	20.8 ± 16.0		34	16.8 ± 12.1	
Duration of infection prior to being seen									
< 5 days	132	11.4 ± 6.7	0.099	65	15.0 ± 11.3	0.851	197	12.6 ± 8.6	0.199
≥ 5 days	89	13.1 ± 8.9		41	15.4 ± 8.3		130	13.9 ± 8.8	
Patient hospitalized									
Yes	11	21.6 ± 14.9	<0 .001	3	31.0 ± 26.3	0.392	14	23.6 ± 17.1	0.029
No	252	11.4 ± 6.8		109	14.6 ± 8.8		361	12.4 ± 7.6	
Patient had at least 1 risk factor									
Yes	69	13.8 ± 8.9	0.016	39	15.6 ± 9.2	0765	108	14.4 ± 9.0	0.025
No	194	11.2± 6.9		75	15.0 ± 10.3		269	12.3 ± 8.2	
Patient had diabetes									
Yes	35	15.4 ± 10.4	0.032	19	15.1 ± 4.4	0.888	54	15.3 ± 8.7	0.026
No	228	11.3 ± 6.9		95	15.3 ± 10.7		323	12.5 ± 8.4	
Wound type									
Abscess only	93	10.5 ± 6.1	0.059	18	18.4 ± 13.8	0.347	111	11.8 ± 8.3	0.224
Cellulitis only	143	12.3 ± 8.1		66	15.1 ± 9.7		209	13.2 ± 8.7	
Abscess and cellulitis	27	14.0 ± 8.6		24	14.0 ± 7.2		51	14.0 ± 7.9	
Treatment at Office									
Incision and drainage done									
Yes	85	10.2 ± 5.6	0.014	32	14.4 ± 8.4	0.582	117	11.4 ± 6.7	0.019
No	178	12.7 ± 8.3		82	15.5 ± 10.4		260	13.6 ± 9.1	
Culture done									
Yes	92	13.4 ± 8.7	0.029	50	13.4 ± 7.3	0.088	142	13.4 ± 8.2	0.368
No	171	11.1 ± 6.8		64	16.7 ± 11.4		235	12.6 ± 8.7	

Table 15. Time to resolution according to various characteristics, retrospective, prospective, and all cases (continued)

	Retrospective (N = 263)			Prospective (N = 114)			Total (N = 377)		
	N	**Time to Resolution (Days)**	**ANOVA P-Value**	**N**	**Time to Resolution (Days)**	**ANOVA P-Value**	**N**	**Time to Resolution (Days)**	**ANOVA P-Value**
Wound packed									
Wound packed	30	9.8 ± 6.9	0.046	8	19.6 ± 11.2	0.200	38	11.8 ± 8.8	0.054
Wound not packed	55	10.5 ± 4.8		22	12.5 ± 7.0		77	11.1 ± 5.5	
Incision and drainage not done	178	12.7 ± 8.3		82	15.5 ± 10.4		260	13.6 ± 9.1	
For those who had incision and									
Wound packed	30	9.8 ± 6.9	0.592	8	19.6 ± 11.2	0.046	38	11.8 ± 8.8	0.615
Wound not packed	55	10.5 ± 4.8		22	12.5 ± 7.0		77	11.1 ± 5.5	
Antibiotics Prescribed									
Antibiotic prescribed at first visit									
Yes	246	12.1 ± 7.7	0.123	111	15.3 ± 10.0	0.783	357	13.1 ± 8.6	0.095
No	17	9.1 ± 6.0		3	13.7 ± 5.5		20	9.8 ± 6.0	
Initial antibiotics covered MRSA									
Yes	70	11.4 ± 6.6	0.421	58	15.1 ± 8.7	0.862	128	13.1 ± 7.8	0.974
No	176	12.3 ± 8.0		56	15.4 ± 11.1		232	13.0 ± 8.9	
Antibiotics covered MRSA at some time during infection									
Yes	91	13.3 ± 8.3	0.064	68	16.0 ± 10.0	0.286	159	14.4 ± 9.2	0.006
No	157	11.4 ± 7.1		46	14.0 ± 9.7		203	12.0 ± 7.8	
Total number of antibiotics used over the course of the infection									
≤ 2	241	10.9 ± 6.4	< 0.001	103	14.1 ± 7.8	0.056	344	11.8 ± 7.0	< 0.001
> 2	22	22.6 ±10.9		11	26.1 ± 18.4		33	23.8 ± 13.6	

Table 15. Time to resolution according to various characteristics, retrospective, prospective, and all cases (continued)

	Retrospective (N = 263)			Prospective (N = 114)			Total (N = 377)		
	N	**Time to Resolution (Days)**	**ANOVA P-Value**	**N**	**Time to Resolution (Days)**	**ANOVA P-Value**	**N**	**Time to Resolution (Days)**	**ANOVA P-Value**
Total number of antibiotics used over course of infection									
0	15	8.3 ± 5.9	< 0.001	1	8.0	0.005	16	8.3 ± 5.7	< 0.001
1	176	9.6 ± 3.7		77	13.9 ± 8.1		253	11.0 ± 5.8	
2	50	16.0 ± 10.3		25	14.9 ± 7.2		75	15.7 ± 9.3	
3	16	21.1 ± 10.0		8	25.3 ± 17.6		24	22.5 ± 12.8	
4	3	22.7 ± 12.6		2	31.0 ± 34.0		5	26.0 ± 19.7	
5	3	22.7 ± 12.6		0	---		3	30.7 ± 14.6	
6	0			1	23.0		1	23.0	

Figure 1. Map of offices participating in CA-MRSA study

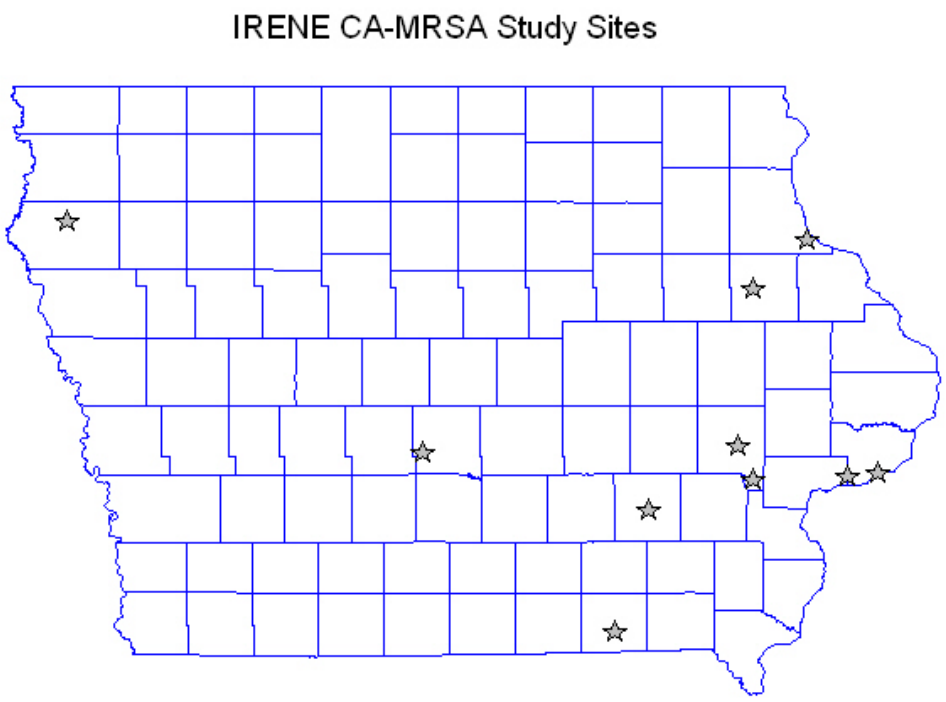

Figure 2. Antibiotics prescribed at initial visit

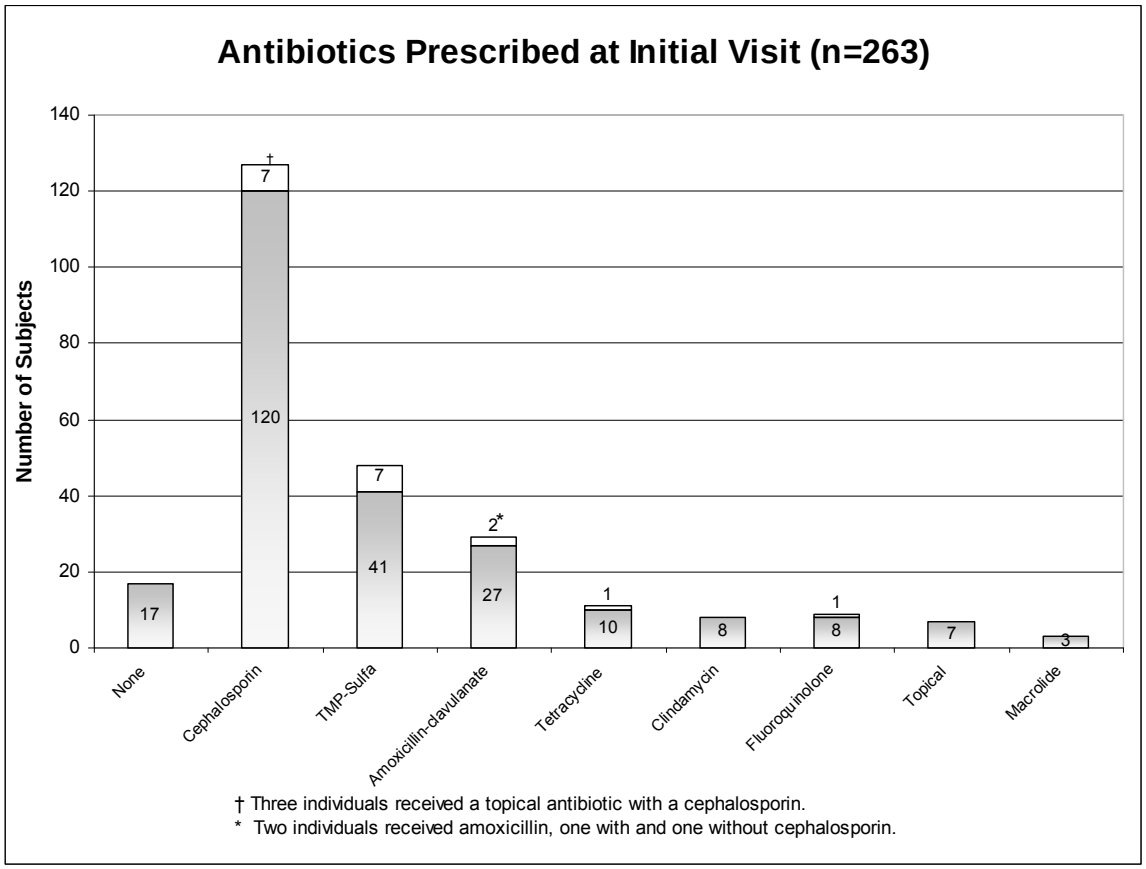

Figure 3. Antibiotics prescribed at first follow-up visit

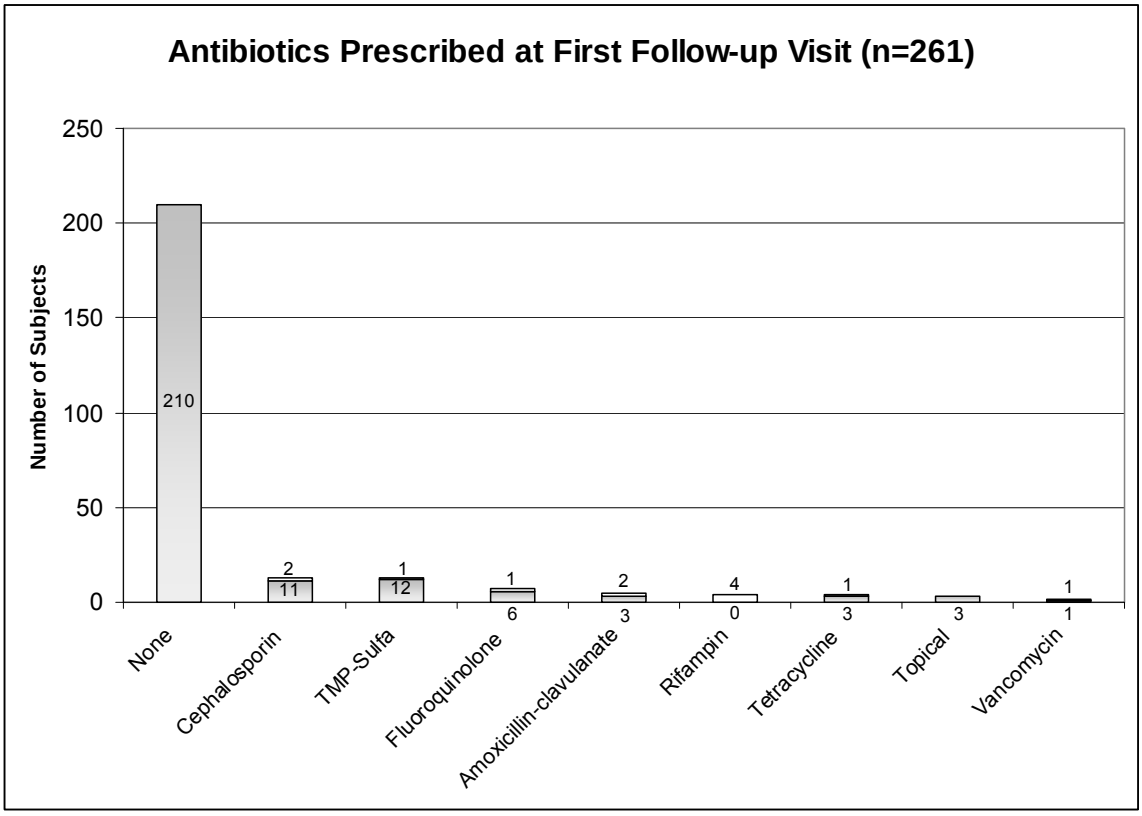

Figure 4. Antibiotics prescribed at initial prospective visit
N=114 individuals