

Final Contract Report

Cellulitis and Abscess Management in the Era of Resistance to Antibiotics (CAMERA)

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Introduction

In the United States, *Staphylococcus aureus* is the most common cause of skin and soft tissue infections (SSTIs).¹ Methicillin resistance, which first emerged more than four decades ago among seriously ill patients in health care settings,² has now become common. In 2006, the Centers for Disease Control and Prevention (CDC) released clinical recommendations for the management of community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA).³ These recommendations highlighted the importance of:

- Considering MRSA in the differential diagnosis for all skin abscesses.
- Incising and draining abscesses.
- Using culture results and antimicrobial sensitivity to guide antibiotic treatment.
- Educating patients to limit the spread of CA-MRSA and to ensure close followup for those patients who do not improve.

Primary care providers play a central role in providing care to individuals with SSTIs. Barriers to following the CDC recommendations could include factors related to the physician (e.g., lack of awareness about the CDC recommendations, lack of training in incision and drainage [I&D]), practice organizational characteristics (e.g., lack of time, lack of reimbursement, practice stress and chaos), and patient characteristics (e.g., health status and likelihood of CA-MRSA infections, access to health care).

Employing a best practices research⁴ approach, we identified several factors that could improve the delivery of care for patients with SSTIs. These included:

- A detailed description of the infection in the medical record.
- I&D with culture, when indicated.
- Documentation of culture result in the medical record when a culture is obtained.
- Documented use of antibiotics and rationale for the choice (e.g., presumed CA-MRSA, need to cover another organism such as *Streptococcus*).
- Patient education, including wound care, hygiene, and indications for followup with documentation of such patient indication in the medical record.

Study Goals

The overarching goals of this study were to identify and disseminate effective, feasible, and sustainable strategies for the diagnosis and management of CA-MRSA in the primary care practice setting. The specific objectives were:

1. To develop tools to assist primary care providers in identifying and managing SSTIs that may be caused by CA-MRSA and field test the tools in a sample of nine primary care practices.
2. To assess the effectiveness of the bundle of tools within the sample of nine primary care practices.
3. To characterize the barriers to and facilitators of implementation of the bundle of tools.
4. To disseminate feasible and sustainable practice-level tools based on the findings within the sample of nine primary care practices.

Overview of Study Interventions

At the start of the project, we developed three tools: the Skin and Soft Tissue Infection Action Plan (Appendix A), the Skin and Soft Tissue Culture Kit (Appendix B), and the Skin and Soft Tissue Patient Information Material (Appendix C). The action plan was a document to assist providers in recording all elements recommended by the CDC in the management of a patient with a SSTI, including appearance, the need for I&D, whether a culture was obtained, and the initial antibiotic choice (if any), along with the rationale for the choice. Practices could modify the action plan to fit their work flow (e.g., specific chart layout, modification as a template for an electronic medical record [EMR]). The culture kit fulfills our recommendation that each practice organize the materials required for I&D. Having this kit reduces the time it takes to gather supplies, which we have found to be a barrier to other procedures, and ensures the practice has the appropriate tools to perform I&D when needed. The patient information material consisted of a range of printed material (e.g., posters produced by the CDC, general information sheets about SSTIs).

We developed a 45-minute PowerPoint training presentation (Appendix D, available at [url]) on SSTIs that provided practical management advice and engaged practitioners to think about how to improve clinical care for patients with SSTIs. This presentation included CDC materials. During the training presentation, we also introduced the tools and solicited advice about how they could be modified to fit with the practice flow.

Study Setting

This project was conducted by NCNC, a statewide consortium of primary care practices and academic institutions. Two of the NCNC practice-based research networks participated in this project: the Duke Primary Care Research Consortium (PCRC) and the Robeson County Primary Care Network (RCPCN). The PCRC is the academic home of the principal investigator and includes practices in Chapel Hill, Durham, and Raleigh, NC. The RCPCN includes practices in rural North Carolina and includes many patients who identify themselves as American Indians.

Participating Practices

Nine primary care practices were selected from NCNC (Table 1). Of these, five were primary care pediatric practices and four were internal medicine practices. Most practices were located either in rural areas or small cities. The median number of physicians was 7 (range 1 to 11) in the pediatric practices and 1.5 (range 1 to 5) in the internal medicine practices. Three (60 percent) of the pediatric practices and two (50 percent) of the internal medicine practices used physician extenders (e.g., nurse practitioners, physician assistants). Three (60 percent) of the pediatric practices and one (25 percent) of the internal medicine practices used an EMR to document patient encounters.

Table 1. Characteristics of participating practices

Practice Number	Type	Location	Number of Physicians	Number of Physician Extenders	Electronic Medical Record
1	Pediatric	Small City	7	1	No
2	Pediatric	Small City	7	0	No
3	Pediatric	Small City	8	0	Yes
4	Pediatric	Rural	11	5	Yes
5	Pediatric	Rural	1	4	Yes
6	Internal Medicine	Small City	2	0	No
7	Internal Medicine	Large City	5	1	Yes
8	Internal Medicine	Rural	1	1	No
9	Internal Medicine	Rural	1	0	No

Human Subjects Protection and Subject Followup

The Institutional Review Boards of the Duke University Medical Center and at the University of North Carolina, Chapel Hill, approved this practice-level intervention study. Because patients within the practices did not provide consent to be contacted, the research team was unable to contact individuals to follow up on the outcomes of treatment. Since monitoring the results of treatment is a recommended part of routine care, we developed a patient diary that would provide feedback to the practice on outcomes of treatment. This form (Appendix E), which was designed to be part of the medical record, could both improve care and serve as a method for the research team to quantify outcomes. However, few patients returned these forms. No analysis of these forms is therefore presented. We did collect and analyze follow-up information for the month after diagnosis of the index infection from the participating practices.

Study Measures

The primary source of data for this project came from chart audits of patients treated with suspected SSTIs. We audited up to 30 charts per month from each practice. The chart audit instrument appears in Appendix F.

Charts were identified based on the encounter billing data. Although we were primarily interested in the management of abscesses, we sampled all charts for which any significant SSTI was included in the diagnosis claims. We also sampled charts that included claims for incision and drainage. Charts were audited at least 1 month after the initial encounter. This allowed for entry into billing systems for identification and for short-term followup of the SSTI.

The International Classification of Diseases, 9th Revision (ICD-9) codes were:

- 041.1, Staphylococcus infection
- 680.X, Carbuncle and furuncle
- 681.X, Cellulitis and abscess of finger and toe
- 682.X, Other cellulites and abscess
- 684.X, Impetigo
- 685.X, Pilonidal cyst
- 686.X, Other infections of skin and subcutaneous tissue

The Current Procedural Terminology (CPT®) codes were:

- 10060, I&D of abscess (single or simple)
- 10061, I&D of abscess complicated or multiple
- 10080, I&D of pilonidal cyst (single)
- 10081, I&D of pilonidal cyst (complicated)
- 10160, Puncture aspiration of abscess, hematoma, bulla, or cyst

The research team collected their experiences and observations in field notes during the interventions with the practices. These qualitative experiences became central to understanding the project findings.

Practice Duration of Enrollment

The study intervention period for each practice began after the practice presentation. We collected data from up to 3 preceding months (equivalent to up to 90 chart audits) covering the period before the start of the intervention. Practices could participate in the intervention period for up to 12 months, with up to 30 chart audits per month. Because of the rolling start date for participation, practices participated for a variable amount of time in the project. The period of practice enrollment is illustrated in Table 2. The median number of months of participation was 9 (range 8 to 12) for the pediatric practices and 8 (range 6 to 12) for the internal medicine practices.

Table 2. Duration of practice enrollment

Practice	Type	Project Month															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Pediatric		X	O	O	O	O	O	O	O	O	O	O	O			
2	Pediatric	X	O	O	O	O	O	O	O	O	O	O	O				
3	Pediatric							X	O	O	O	O	O	O	O		
4	Pediatric							X	O	O	O	O	O	O			
5	Pediatric							X	O	O	O	O	O	O			
6	Internal Medicine		X	O	O	O	O	O	O	O	O	O	O				
7	Internal Medicine							X	O	O	O	O	O	O	O	O	
8	Internal Medicine							X	O	O	O	O					
9	Internal Medicine							X	O	O	O	O					

Key: Eligible patient visits for the chart audit began in February 2009 (labeled as Project Month 1) and finished in June 2010 (labeled as Project Month 16). “X” indicates the month of the practice presentation and “O” indicates the subsequent months in which the practice participated.

Barriers to Practice Participation

Three factors decreased practice participation: The H1N1 influenza outbreak, staff turnover, and inability to identify potential cases.

The H1N1 influenza outbreak diminished interest in MRSA. At the start of the project, providers considered MRSA to be an important cause of morbidity in their practice; however, interest rapidly switched to concern about H1N1. Our research team was regularly asked advice about management of H1N1.

Because one practice (practice 7) had significant physician and office staff turnover, there was no memory within the practice of the initial presentation or the project’s goals. Practice

chaos precluded active engagement in the project. However, because the practice used an EMR, we were able to continue with monthly chart audits.

Finally, two practices (practices 8 and 9) had difficulty in identifying potential cases from their billing systems, leading to time periods before charts could be abstracted. These practices were therefore unable to provide data for a 12-month intervention period.

Findings

Findings are categorized by those related to diagnosis and those related to treatment and outcomes. Field notes are used to clarify quantitative findings.

Diagnosis

We found significant variations in the use of CPT codes to identify SSTIs, with no clear pattern related to the chart note. The notes describing encounters often lacked specificity in describing lesions, including whether an abscess was present. Similarly, the ICD-9 codes were used inconsistently. Practices had little knowledge about these codes. This was surprising because I&D is usually a reimbursable procedure when the proper billing codes are used. One practice (practice 8) was aware of the ICD-9 codes but did not realize until our review that the codes were not being processed within its internal billing system, leading to loss of revenue.

Practices were inconsistent in using the Skin and Soft Tissue Infection Action Plan note. However, one practice (practice 1) reported that the action plan was helpful in improving documentation. All four practices that used EMRs expressed interest in converting the action plan into a template for their systems. However, despite their interest, none of the practices were able to do so because the process of generating a new template was more difficult than initially thought. These practices lacked the information technology support to produce new templates.

Because the word “abscess” was often not used in the medical record, we classified lesions as an abscess if they were >1 cm. in diameter and painful or tender, or were fluctuant or indurated. This definition was developed to maximize specificity in classification. Overall, there were 498 patients with abscesses based on this definition included in this study. Table 3 summarizes the total number of patients with abscesses among the total number of chart audits, all with SSTIs.

Table 3. Number of abscesses and the total number of skin or soft tissue infections, by practice and audit point

Practice	Audit Point																							
	Baseline		1		2		3		4		5		6		7		8		9		10		11	
	Abscesses	SSTI	Abscesses	Skin	Abscesses	SSTI	Abscesses	SSTI	Abscesses	SSTI	Abscesses	SSTI	Abscesses	SSTI	Abscesses	SSTI	Abscesses	SSTI	Abscesses	SSTI	Abscesses	SSTI	Abscesses	SSTI
1	10	89	5	28	4	28	5	30	6	30	8	30	9	31	14	30	5	28	8	27	30	30	5	29
2	5	37	8	34	2	20	0	11	4	23	4	19	2	18	5	21	3	17	3	13	12	12	3	13
3	12	53	5	18	4	14	0	0	1	23	6	32	1	26	3	30	3	30						
4	16	58	10	30	20	30	17	30	12	30	14	30	7	30	12	30	10	30	16	30	30	30		
5	5	30	4	4	9	30	13	30	15	30	12	30	9	30	9	28	11	30	10	30	30	12		
6	2	12	0	5	0	9	0	6	0	7	1	10	0	6	1	4	1	5	2	5	6	6	0	6
7	2	16	0	4	2	8	0	6	0	9	0	5	0	9	0	9	0	7	1	7				
8	11	21	4	7	2	4	1	2	2	8	2	9	4	8	2	3								
9	12	20	3	7	2	4	0	2	5	7	1	4	4	9	2	4								
Total	75	336	39	163	45	147	36	117	45	167	48	121	36	167	48	159	34	147	40	112	108	37	8	48

Abscess Treatment

At the start of the project, many providers reported that there was insufficient time to perform I&D and that reimbursement was not sufficient to justify the time. Many reported that they instead would routinely refer patients to a local surgeon, urgent care clinic, or emergency department. There were many questions about how to perform I&D. One practice reported that it would manually express abscesses to force them to drain. Manual expression was poorly documented in charts; it was often difficult to determine whether the abscess was already draining. Overall, 26 percent of patients were documented to have been treated with I&D, 4 percent by needle aspiration, 21 percent by manual expression, and 49 percent had no documented abscess drainage. However, all practices reported that they routinely refer patients for I&D based on patient factors (e.g., size, location, age) and practice factors (e.g., training and experience, business schedule). Of those categorized as having an abscess, 52 percent (n=259) were documented to have been cultured. Table 4 shows the number of abscesses that were cultured based on method of drainage.

Table 4. Proportion with culture by treatment

Treatment	Proportion With Culture
I&D	90%
Needle aspiration	89%
Manual expression	82%
No documented drainage	16%

Among those who had an abscess and were cultured, 56 percent (162) were documented to have MRSA, 10 percent (28) had *Staphylococcus aureus* without specification of methicillin resistance, 5 percent (15) had methicillin-sensitive *Staphylococcus aureus*, 10 percent (29) had skin flora or mixed culture results, 10 percent (29) had negative culture results, 3 percent (8) had a culture positive for a streptococcal species, and 6 percent (16) had a culture positive for another organism (e.g., *Klebsiella*, *Proteus mirabilis*). In only four cases was a culture indicated as obtained with no documentation of result.

All but 27 (5 percent) of those with an abscess were treated with an oral or topical antibiotic. These are listed in Table 5. Antibiotic treatment nearly always covered MRSA.

Table 5. Initial antibiotic therapy for those with an abscess

Antibiotic	% (n)
Beta-Lactam/Cephalosporin	7% (36)
Beta-Lactam/Cephalosporin and Mupirocin	1% (4)
Beta-Lactam/Cephalosporin and Retapamulin	<1% (1)
Beta-Lactam/Cephalosporin and Sulfonamide	5% (23)
Beta-Lactam/Cephalosporin, Sulfonamide, and Mupirocin	1% (5)
Clindamycin	8% (39)
Clindamycin and Mupirocin	2% (10)
Clindamycin and Tetracycline	<1% (1)
Clindamycin, Mupirocin, and Sulfonamide	1% (3)
Docycycline	<1% (2)
Docycycline and Fluorquinalone	<1% (1)
Doxycycline and Sulfonamide	<1% (1)
Fluorquinalone	<1% (2)
Fluorquinalone and Mupirocin	<1% (1)
Fluorquinalone and Tetracycline	1% (3)
Mupirocin	1% (6)
Sulfonamide	47% (232)
Sulfonamide and Clindamycin	1% (5)
Sulfonamide and Erythromycin	<1% (1)
Sulfonamide and Fluorquinalone	<1% (2)
Sulfonamide and Metronidazole	<1% (1)
Sulfonamide and Mupirocin	16% (80)
Sulfonamide and Retapamulin	1% (4)
Sulfonamide and Tetracycline	<1% (2)
Sulfonamide and Mupirocin	<1% (1)
Sulfonamide and Retapamulin	<1% (1)
Tetracycline	1% (3)

Of the 47 patients with an abscess who were not treated with an oral antibiotic that could potentially treat a MRSA infection, 33 (70 percent) were not cultured. Six of those with no documented drainage required follow-up office visits, one of whom subsequently underwent I&D. Issues related to followup are further described in the next section.

Practice Followup

Table 6 summarizes the proportion of individuals who had followup after the diagnosis of abscess or other skin or soft tissue infection by practice within 14 days. There was no statistically significant difference in the rate of followup for those with abscesses between the pediatric and internal medicine practices (36 percent versus 39 percent, $p=0.63$). Among those with other SSTIs, the rate of followup was lower among the pediatric clinics compared to the internal medicine clinics (16 percent versus 29 percent, $p<0.001$). The median number of follow-up visits was one, regardless of practice type or whether the initial infection was an abscess or other SSTI.

Table 6. Rates of followup within each practice after the diagnosis of an abscess or other skin or soft tissue infection

Practice	Type	Abscesses (n)	Followup % (n)	Other Skin or Soft Tissue Infections (n)	Followup % (n)
1	Pediatric	92	17% (16)	344	6% (22)
2	Pediatric	42	38% (16)	196	14% (27)
3	Pediatric	35	29% (10)	191	12% (23)
4	Pediatric	148	51% (75)	210	31% (66)
5	Pediatric	109	33% (36)	219	21% (46)
6	Internal Medicine	9	67% (6)	78	45% (35)
7	Internal Medicine	6	17% (1)	74	23% (17)
8	Internal Medicine	28	32% (9)	34	12% (4)
9	Internal Medicine	29	41% (9)	28	25% (7)
Total		498	181 (36%)	1,374	18% (247)

Among those with an abscess, 12 percent (57) required a change in antibiotic. The rate was lower (6 percent, n=77) among those with other SSTIs ($p<0.001$). Nearly all of these changes involved expanding coverage for MRSA.

None of the patients diagnosed with a SSTI not classified as an abscess required care in an emergency department or urgent care setting. Among those with an abscess, 5 percent (24) were documented to have required emergency department or urgent care, including 21 (12 percent) of those who had at least one follow-up visit and 3 (1 percent) who had no follow-up visits.

Among those with an abscess, 6 percent (27 out of 452) required hospitalization compared to 2 percent without an abscess (28 out of 1,277). Rates of hospitalization did not vary between the pediatric and internal medicine practices ($p>0.79$).

There was no difference in the likelihood of emergency department or urgent care followup or hospitalization by sex ($p=0.96$). The rate did vary by age ($p<0.001$) as described in Table 7. Overall, the highest rate was among the youngest children. However, there was significant fluctuation, likely due to the sample size. These results are not adjusted for clustering by clinic site due to sample size constraints.

Table 7. Rate of emergency department or urgent care followup or hospitalization by age

Age	Sample Size (n)	Rate
< 4 years	577	8%
4-12 years	636	1%
13-20 years	378	5%
21-40 years	66	2%
40-64 years	130	7%
≥ 65 years	85	4%

Conclusions

This report summarizes our experience in working with nine primary care practices to improve the quality of care for individuals with SSTIs. Lessons we learned from this study include:

- SSTIs are often poorly documented in the medical record. Often it is difficult to tell if an abscess was present. Similarly, treatment, even including I&D, is poorly documented. Practices were interested in the use of the standardized patient note, although some found it difficult to incorporate into their EMR.
- Diagnostic and treatment administrative claims data are unreliable for identifying individuals with SSTIs or the procedures that they undergo (e.g., I&D). Administrative claims databases are therefore unreliable to monitor changes in the incidence of SSTIs or to assess quality of care.
- Among practices willing to perform I&D, the recommendation for the culture kit was perceived as helpful.
- The rate of abscess culture was high.
- Referral from primary care for the management of an abscess is common.
- Most patients with an abscess are treated with an antibiotic that can provide coverage for MRSA. However, nearly half of the patients did not receive an antibiotic that would cover streptococcal infections. Some patients require subsequent change to an antibiotic that covers MRSA.
- Rates of documented emergency department utilization or hospitalization were low after the management of a SSTI in the primary care practice setting.
- About one in three patients had followup for a SSTI within 2 weeks of diagnosis. Follow-up rates for infections without an abscess were higher in internal medicine practices compared with pediatric practices.
- Delivering messages about SSTIs to busy primary care physicians is complex because of the competition from information about other conditions. At the start of the project, there was great enthusiasm about improving care for MRSA infections. However, that enthusiasm rapidly decreased with the H1N1 influenza outbreak.

Recommendations

Based on our findings, we make the following suggestions for improving care for patients with SSTIs:

- Clear documentation facilitates adherence to clinical guidelines, and proper administrative coding can be an important adjunct to population-level surveillance. Based on our findings, practices are losing revenue due to incomplete documentation and coding. Not surprisingly, coding workshops are popular at national and local meetings.

Recommendation:

- Develop documentation and coding presentations in partnership with national and State chapters of physician groups (e.g., American Academy of Pediatrics, American Academy of Family Physicians, American College of Physicians).
- Integrating templates into EMRs for describing SSTIs may help improve documentation and subsequent care.

Recommendations:

- Partner with vendors to make templates available based on the Skin and Soft Tissue Infection Action Plan developed for this project. If possible, embed the guidelines within the templates.

- Develop coding schemes within EMRs to ensure that descriptions of SSTIs are captured in a way that allows meaningful use of the data.
- Some primary care pediatricians lack self-efficacy in I&D due to lack of training and experience. All face significant time pressure.

Recommendations:

- Hold workshops in the management of SSTIs, including I&D. This can be conducted in conjunction with the previously described coding workshops.
- Work with residency training programs to ensure that the management of SSTIs in the outpatient setting is appropriately covered.
- The CDC has developed helpful educational material regarding the management of SSTIs for primary care practices. The tools developed for this project were generally considered to be helpful. Actively engaging primary care practices in the use of the tools may help further refine them and also be a strategy to spread innovation in health care delivery.

Recommendations:

- Provide information and tools developed through this project over the Internet (see next section).
- Develop quality improvement projects based on this study that physicians can use as part of their activities to maintain their board certification status.
- Most providers use antibiotic therapy that would treat MRSA for SSTIs. This could increase the pressure for the development of resistance.

Recommendations:

- Identify primary care practices that can serve as sentinel surveillance sites for patterns of antibiotic resistance.
- Develop guidelines for the use of strategies that can reduce MRSA colony counts (e.g., bleach baths).

Dissemination of Findings

We have two manuscripts in development: A summary of our experience in these activities, with a more detailed quantitative evaluation of the chart audit data, and a survey of pediatricians regarding the current management of SSTIs, including barriers to recommended care. This survey was developed based on our experience in this project.

We will also make all tools listed in the appendices as well as links to the CDC material available on a University of North Carolina Web site. This Web site was not part of the original contract for this project; therefore, it will not be complete until after this project is concluded. For maximum impact, however, we recommend that the CDC partner with the organizations representing primary care physicians (e.g., American Academy of Family Physicians, American Academy of Pediatrics, American College of Physicians) to advertise the availability of the material.

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Appendix A. Skin and Soft Tissue Infection Action Plan

Date: _____

Allergies:

Notes:

Fever:

History of Fever: Y N

Temperature at Visit: _____ ° ₁ C ₂ F

Vital Signs:

Pulse –

Blood Pressure –

Risk for MRSA:

- | | |
|---|--|
| <input type="checkbox"/> Recent hospitalization (<i>within 1 month</i>)
<input type="checkbox"/> Family Member with MRSA (<i>in last 6 months</i>)
<input type="checkbox"/> Sport team: _____
<input type="checkbox"/> History of MRSA: _____
<input type="checkbox"/> Excema | <input type="checkbox"/> Other skin condition _____
<input type="checkbox"/> Immunocompromized: _____
<input type="checkbox"/> Diabetes
<input type="checkbox"/> Other risk factor: _____
<input type="checkbox"/> None of the above |
|---|--|

Number of Infected Lesions: _____

	Site 1	Site 2	Site 3	Site 4
General description of infection				
Duration (days)				
Location (<i>face, neck, trunk, arm, hand, buttock, leg, foot, elsewhere</i>)				
Size (cm, greatest diameter)				
Red (erythema)	Y N	Y N	Y N	Y N
Swollen (edema)	Y N	Y N	Y N	Y N
Warm	Y N	Y N	Y N	Y N
Painful/Tender	Y N	Y N	Y N	Y N
Other Findings				
Is it an abscess?				
Fluctuant	Y N	Y N	Y N	Y N
Yellow or White Center	Y N	Y N	Y N	Y N
Central Point or "Head"	Y N	Y N	Y N	Y N
Draining pus (discharge, purulent)	Y N	Y N	Y N	Y N
Other Findings				
Was it Drained?				
I&D	Y N	Y N	Y N	Y N
Needle Aspiration	Y N	Y N	Y N	Y N

Manually Expressed	Y	N	Y	N	Y	N	Y	N
Packed	Y	N	Y	N	Y	N	Y	N
Referred for Further Management to:								
Was a Culture and Sensitivity Analysis Obtained?								
	Y	N	Y	N	Y	N	Y	N

Summary of other sites if more than four:

Antibiotic:

- None
 Empiric Treatment for suspected MRSA
(e.g., *clindamycin, doxycycline, minocycline, trimethoprim-sulfamethoxazole*)

Rx: _____

- Empiric Treatment for non-MRSA or Streptococcus (e.g., *beta lactam*)

Rx: _____

- Other Rx: _____

Patient Followup:

- PRN
 Scheduled for _____ days

Patient Education:

- CDC Information Sheet
 Other: _____

CPT CODES:

10060 – Simple or single I&D or needle aspiration
10061 – Complicated or multiple I&D or needle aspiration

ICD-9 Codes:

041.1 Staphylococcus infection
680.X* Carbuncle or furuncle
681.00 Cellulitis or abscess of finger
681.10 Cellulitis or abscess of the toe
681.9 Cellulitis or abscess of unspecified digit
682.X* Other cellulites or abscess

* X=.0 face, .1 neck, .2 trunk, .3 arm, .4 hand, .5 buttock, .6 leg, .7 foot, .8, head, .9 elsewhere

Follow-up:

- Final Culture Result: _____ Date: _____

- Patient Notified: Y N Date: _____

- New Rx: _____

Other: _____

Appendix B. Skin and Soft Tissue Culture Kit

The following were recommended for inclusion in a small plastic bag to facilitate I&D:

Anesthetic agent (e.g., lidocaine)

Betadine, alcohol wipes

Culturette

Needle

Disposable scalpel

Gauze (2X2, 4X4)

Tape

Packing material

Forceps

Appendix C. Skin and Soft Tissue Patient Information Material

Information for Patients with Skin and Soft Tissue Infections

- Keep wounds that are draining covered with clean, dry, bandages.
- Always wash hands immediately after touching infected skin or any item that has come in direct contact with a draining wound.
- Do not share items that may touch your wound, such as towels, clothing, bedding, soap, razors, and sports equipment.
- Wash clothes that may touch with your wound after each use and dry completely.
- If you cannot keep your wound covered with a clean, dry bandage at all times, do not participate in activities in which you have skin to skin contact with other persons (such as sports activities).
- Disinfect equipment and surfaces that may be touched by more than one person. Use a product that specifies on its label that it disinfects against *Staphylococcus aureus*.
- Wash hands regularly with soap and water or alcohol-based hand gel.
- Continue to maintain good general hygiene with regular bathing.

Appendix D

Available at [URL]

Appendix E. Patient Diary

Directions for clinic staff: *Please fill in the patient name, medical record number, and beginning date before giving this form to the patient. Please enter the day of the week on the shaded Day # 1 row (Monday, Tuesday, etc.).*

Patient Name: _____

 Medical Record Number: _____

Start Date (MM/DD/YY): ____/____/____

Patient Contact Number: _____

PATIENT INSTRUCTIONS: Please fill out the information below for the next **14** days. Return this form to your provider in the attached envelope. Thanks.

Day #	Day of the week	Change in Infection <i>(Circle One for Each Day)</i>				Fever <i>(Put an X on any day you have a fever because of your skin infection.)</i>	Clinic Visit <i>(Put an X on any day you return to your clinic because of your skin infection.)</i>	Antibiotic Change for Your Skin Infection <i>(Please write the name of your new antibiotic on the day you start taking it.)</i>	Urgent Care or Emergency Department <i>(Put an X on any day you visited the ED or Urgent Care because of your skin infection.)</i>	Hospitalized <i>(Put an X on any day you were hospitalized because of your skin infection.)</i>
		Worse	Same	Better	All Better					
1		1	2	3	4					
2		1	2	3	4					
3		1	2	3	4					
4		1	2	3	4					
5		1	2	3	4					
6		1	2	3	4					
7		1	2	3	4					
8		1	2	3	4					

9		1	2	3	4					
10		1	2	3	4					
11		1	2	3	4					
12		1	2	3	4					
13		1	2	3	4					
14		1	2	3	4					

Appendix F. Chart Audit Instrument

I. Patient Demographic Information

<p>1. Age (years): _____ (if <1, Enter 0)</p> <p>2. Gender <input type="checkbox"/> 1 Male <input type="checkbox"/> 2 Female</p> <p>3. Race (<i>check all that apply</i>) <input type="checkbox"/> 1 American Indian / Alaska Native <input type="checkbox"/> 2 Asian <input type="checkbox"/> 3 Native Hawaiian or Other Pacific Islander <input type="checkbox"/> 4 Black or African American <input type="checkbox"/> 5 White <input type="checkbox"/> 6 Unknown</p>	<p>4. Ethnicity <input type="checkbox"/> 1 Hispanic or Latino <input type="checkbox"/> 2 Not Hispanic or Latino <input type="checkbox"/> 3 Unknown</p> <p>5. Insurance Status (<i>check all that apply</i>) <input type="checkbox"/> 1 Private or Managed Care <input type="checkbox"/> 2 Medicare <input type="checkbox"/> 3 Medicaid <input type="checkbox"/> 4 No Insurance / Self Pay <input type="checkbox"/> 5 Unknown</p>
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II. Visit Information – Reason for Visit:

<p>1. Visit Date (MM/YYYY): ____/____/20____</p> <p>2. Documented Risk Factors (<i>check all that apply</i>) <input type="checkbox"/> 1 Recent hospitalization (<i>within 1 month</i>) <input type="checkbox"/> 2 Family member within (<i>last 6 months</i>) <input type="checkbox"/> 3 Sport team: _____ <input type="checkbox"/> 4 History of MRSA: _____ <input type="checkbox"/> 5 Eczema <input type="checkbox"/> 6 Other skin condition: _____ <input type="checkbox"/> 7 Immunocompromized <i>(Cancer, HIV, chronic oral steroid use, or described as immunocompromized)</i> <input type="checkbox"/> 8 Diabetes <input type="checkbox"/> 9 None</p> <p>3. Fever: a. History of fever: <input type="checkbox"/> 1 Yes <input type="checkbox"/> 0 No b. Visit temperature _____° <input type="checkbox"/> 1 C <input type="checkbox"/> 2 F</p> <p>4. Number of skin or soft tissue lesions: _____ a. Describe if no number given.</p> <p>5. Description of the <u>largest</u> lesion:</p>	<p>5. Description of largest site continued:</p> <p>b. Size: <input type="checkbox"/> 1 < 1 cm <input type="checkbox"/> 2 1-5 cm <input type="checkbox"/> 3 > 5 cm <input type="checkbox"/> 4 Unknown/not documented in chart</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 70%;"></th> <th style="width: 10%;">Yes</th> <th style="width: 10%;">No</th> <th style="width: 10%;">No Mention</th> </tr> </thead> <tbody> <tr> <td>c. Red (<i>erythema</i>)</td> <td>1</td> <td>0</td> <td>7</td> </tr> <tr> <td>d. Swollen (<i>edema</i>)</td> <td>1</td> <td>0</td> <td>7</td> </tr> <tr> <td>e. Warm</td> <td>1</td> <td>0</td> <td>7</td> </tr> <tr> <td>f. Painful/Tender</td> <td>1</td> <td>0</td> <td>7</td> </tr> <tr> <td>g. Fluctuant, yellow or white center, central point or "head" (<i>induration</i>)</td> <td>1</td> <td>0</td> <td>7</td> </tr> <tr> <td>h. Draining Pus (<i>discharge, purulent</i>)</td> <td>1</td> <td>0</td> <td>7</td> </tr> </tbody> </table> <p>6. Incision and Drainage (<i>check all that apply</i>) <input type="checkbox"/> 1 Incision and Drainage <input type="checkbox"/> 2 Needle Aspiration <input type="checkbox"/> 3 Referred <input type="checkbox"/> 4 Manually Expressed</p>		Yes	No	No Mention	c. Red (<i>erythema</i>)	1	0	7	d. Swollen (<i>edema</i>)	1	0	7	e. Warm	1	0	7	f. Painful/Tender	1	0	7	g. Fluctuant, yellow or white center, central point or "head" (<i>induration</i>)	1	0	7	h. Draining Pus (<i>discharge, purulent</i>)	1	0	7
	Yes	No	No Mention																										
c. Red (<i>erythema</i>)	1	0	7																										
d. Swollen (<i>edema</i>)	1	0	7																										
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g. Fluctuant, yellow or white center, central point or "head" (<i>induration</i>)	1	0	7																										
h. Draining Pus (<i>discharge, purulent</i>)	1	0	7																										

a. Location: _____
(face, neck, trunk, arm, hand, buttock, leg, foot, head, elsewhere)

5 Packed
6 Not performed

III. Treatment and Follow-up

1. Culture –review the chart for:
1 Obtained
0 Not Obtained

2. If culture was obtained, which of the following was documented *(Check all that apply)*
1 Final Culture Result: _____
2 Patient Notification
3 New Prescription, specify: _____
0 Not documented in chart

3. Antibiotic Initially Prescribed: 1 Yes 0 No
 ↓
 1a. If Yes, name(s): _____

4. Initial Antibiotic justification:
1 Empiric for suspected MRSA
2 Empiric for non-MRSA or Streptococcus
3 Other, specify: _____
0 None

5. Scheduled patient follow-up
1 PRN *(as needed)*
2 Return to clinic scheduled
0 None

6. Patient education *(Check all that apply)*
1 Documented reasons to follow-up
2 Patient hand-out
3 Verbal teaching
0 None

IV. Diagnoses and Billing Codes

1. All ICD-9 Codes for the Visit:
 a. _____
 b. _____
 c. _____
 d. _____
 e. _____

2. All CPT Codes for the Visit:
 a. _____
 b. _____
 c. _____
 d. _____
 e. _____

V. Subsequent Office Care (next 14 days) and Patient Outcomes

<p>A. Subsequent Office Care:</p> <p>1. Number of return office visits for the same infection(s): _____</p> <p>2. Any additional procedures in the office: <input type="checkbox"/> 1 Yes <input type="checkbox"/> 0 No If YES, complete page 3 ←</p> <p>3. Change in Antibiotic: <input type="checkbox"/> 1 Yes <input type="checkbox"/> 0 No ↓ 3a. If Yes, name(s): _____</p> <p>4. Emergency department / urgent care visit: <input type="checkbox"/> 1 Yes <input type="checkbox"/> 0 No</p> <p>5. Hospitalization: <input type="checkbox"/> 1 Yes <input type="checkbox"/> 0 No</p>	<p>B. Patient-reported Outcomes:</p> <p>1. Type of report: <input type="checkbox"/> 1 Diary <input type="checkbox"/> 2 Telephone Survey <input type="checkbox"/> 0 None → (STOP, end of audit)</p> <p>2. Number of days until resolution of fever: _____</p> <p>3. Number of days until resolution of infection: _____</p> <p>4. Reported antibiotic change: <input type="checkbox"/> 1 Yes <input type="checkbox"/> 0 No ↓ 4a. If Yes, name(s): _____</p> <p>5. Reported Emergency Department Visit: <input type="checkbox"/> 1 Yes <input type="checkbox"/> 0 No</p> <p>6. Reported Hospitalization: <input type="checkbox"/> 1 Yes <input type="checkbox"/> 0 No</p>
--	---

VI. Subsequent Visit Information (only answer the following sections if question V.A2. is “YES”)

<p>1. Visit Date (MM/YYYY): ____/____/20____</p> <p>2. Documented Risk Factors (check all that apply)</p> <p><input type="checkbox"/>1 Recent hospitalization (within 1 month)</p> <p><input type="checkbox"/>2 Family member within (last 6 months)</p> <p><input type="checkbox"/>3 Sport team: _____</p> <p><input type="checkbox"/>4 History of MRSA: _____</p> <p><input type="checkbox"/>5 Eczema</p> <p><input type="checkbox"/>6 Other skin condition: _____</p> <p><input type="checkbox"/>7 Immunocompromized (Cancer, HIV, chronic oral steroid use, or described as immunocompromized)</p> <p><input type="checkbox"/>8 Diabetes</p> <p><input type="checkbox"/>9 None</p> <p>3. Fever:</p> <p>a. History of fever: <input type="checkbox"/>1 Yes <input type="checkbox"/>0 No</p> <p>b. Visit temperature _____° <input type="checkbox"/>1 C <input type="checkbox"/>2 F</p> <p>4. Number of skin or soft tissue lesions: _____</p> <p>5. Description of the <u>largest</u> lesion:</p> <p>a. Location: _____ (face, neck, trunk, arm, hand, buttock, leg, foot, head, elsewhere)</p>	<p>5. Description of largest site continued:</p> <p>b. Size:</p> <p><input type="checkbox"/>1 < 1 cm</p> <p><input type="checkbox"/>2 1-5 cm</p> <p><input type="checkbox"/>3 > 5 cm</p> <p><input type="checkbox"/>4 Unknown/not documented in chart</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 10%;">Yes</th> <th style="width: 10%;">No</th> <th style="width: 10%;">No Mention</th> </tr> </thead> <tbody> <tr> <td>c. Red (erythema)</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">7</td> </tr> <tr> <td>d. Swollen (edema)</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">7</td> </tr> <tr> <td>e. Warm</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">7</td> </tr> <tr> <td>f. Painful/Tender</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">7</td> </tr> <tr> <td>g. Fluctuant, yellow or white center, central point or “head” (induration)</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">7</td> </tr> <tr> <td>h. Draining Pus (discharge, purulent)</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">7</td> </tr> </tbody> </table> <p>6. Incision and Drainage (check all that apply)</p> <p><input type="checkbox"/>1 Incision and Drainage</p> <p><input type="checkbox"/>2 Needle Aspiration</p> <p><input type="checkbox"/>3 Referred</p> <p><input type="checkbox"/>4 Manually Expressed</p> <p><input type="checkbox"/>5 Packed</p> <p><input type="checkbox"/>6 Not performed</p>		Yes	No	No Mention	c. Red (erythema)	1	0	7	d. Swollen (edema)	1	0	7	e. Warm	1	0	7	f. Painful/Tender	1	0	7	g. Fluctuant, yellow or white center, central point or “head” (induration)	1	0	7	h. Draining Pus (discharge, purulent)	1	0	7
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h. Draining Pus (discharge, purulent)	1	0	7																										

VII. Subsequent Treatment and Follow-up

<p>1. All ICD-9 Codes for the Visit:</p> <p>a. _____</p> <p>b. _____</p> <p>c. _____</p> <p>d. _____</p> <p>e. _____</p>	<p>2. All CPT Codes for the Visit:</p> <p>a. _____</p> <p>b. _____</p> <p>c. _____</p> <p>d. _____</p> <p>e. _____</p>
<p>1. Culture –review the chart for:</p> <p><input type="checkbox"/>1 Obtained</p> <p><input type="checkbox"/>0 Not Obtained</p> <p>2. If culture was obtained, which of the following was documented (<i>Check all that apply</i>)</p> <p><input type="checkbox"/>1 Final Culture Result: _____</p> <p><input type="checkbox"/>2 Patient Notification</p> <p><input type="checkbox"/>3 New Prescription, specify: _____</p> <p><input type="checkbox"/>0 Not documented in chart</p> <p>3. Antibiotic Prescribed: <input type="checkbox"/>1 Yes <input type="checkbox"/>0 No ↓</p> <p>1a. If Yes, name(s): _____</p>	<p>4. Antibiotic justification:</p> <p><input type="checkbox"/>1 Empiric for suspected MRSA</p> <p><input type="checkbox"/>2 Empiric for non-MRSA or Streptococcus</p> <p><input type="checkbox"/>3 Other, specify: _____</p> <p><input type="checkbox"/>0 None</p> <p>5. Scheduled patient follow-up</p> <p><input type="checkbox"/>1 PRN (<i>as needed</i>)</p> <p><input type="checkbox"/>2 Return to clinic scheduled</p> <p><input type="checkbox"/>0 None</p> <p>6. Patient education (<i>Check all that apply</i>)</p> <p><input type="checkbox"/>1 Documented reasons to follow-up</p> <p><input type="checkbox"/>2 Patient hand-out</p> <p><input type="checkbox"/>3 Verbal teaching</p> <p><input type="checkbox"/>0 None</p>

VIII. Subsequent Diagnoses and Billing Codes