



## **Comparison of Antibiotics Vs No Antibiotics After Incision and Drainage of Simple Subcutaneous Abscesses in Children**

Fatima Majeed \*

*1. The Children's Hospital and The Institute of Child's Health, Ferozepur Road Lahore, 54600, Punjab, Pakistan.*

**\*Correspondence to:** Fatima Majeed, The Children's Hospital and The Institute of Child's Health, Ferozepur Road Lahore, 54600, Punjab, Pakistan, Research is Accredited with Australian New Zealand Randomised control trial Registry.

### **Copyright**

© 2023 **Fatima Majeed**. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**Received:** 06 June 2023

**Published:** 01 July 2023

DOI: 10.1027/marpe.2023.0187

**Keywords:** *Abscess, Antibiotics, MRSA*

**Abstract**

**Background:** *The skin and soft tissue infections (SSTI) are very common in adult as well as pediatrics population. Among the SSTI, patients with simple subcutaneous abscesses are frequently seen in emergency departments and specially the cases of Methicillin Resistant Staphylococcus Aureus (MRSA) infection are on rise day by day. The mainstream treatment of simple abscesses is incision and drainage, but the use of antibiotics is controversial. According to guidelines antibiotics are recommended only in complicated cases, but the rising number of Community Acquired MRSA infections are causing recurrence of abscesses and treatment failures when no antibiotics are used. Whereas, antibiotics can cause better treatment outcomes, lesser pain and recurrence. But on the other hand, the misuse of antibiotics is a cause of antibiotics resistance and increased monetary burden on hospitals. The aim of our study is to evaluate cure rate and recurrence, after incision and drainage of simple subcutaneous abscesses, in children, with and without use of antibiotics.*

**Results:** *The patients were divided into two groups. Group A was given antibiotics after incision and drainage of abscesses and Group B was not given antibiotics postoperatively. Total 60 patients were randomized into two groups. There were 37 patients in group A and 23 patients in group B. In group A 97.3%(n=36) were cured and only 2.7%(n=1) had persistence of disease. Recurrence was noted in only 8.8%(n=3) patients and 92% (n=31) patients had no recurrence. In group B all patients were cured. Whereas, recurrence was noted in only 5.6%(n=1) patients. Culture reports showed that MRSA infection was most common (51.8%) and after that, results of staphylococcus aureus species were found on second number (14.3%). All patients having recurrence of disease, were MRSA positive of culture report and post-operative antibiotics had no significant role in prevention of recurrence.*

**Conclusion:** *Antibiotics are not required after incision and drainage of simple subcutaneous abscesses in order to attain cure and to prevent recurrence of abscesses. Patients having MRSA infection had more chances of recurrence of abscess. Larger randomized control trials are needed for further evaluation.*

## Introduction

Skin and soft tissue infections are one of the causes of frequent visits to emergency department (ED). The number of daily visits to ED for abscesses are increasing day by day (1). The emergence of community acquired MRSA (Methicillin Resistant Staphylococcus Aureus) species has caused significant problem and it is considered to be one of the causes of rapid rise in skin and soft tissue infections (SSTI). Among SSTI, simple subcutaneous abscesses are very common in pediatrics population (2) The key treatment of simple subcutaneous abscesses is through incision and drainage (I and D) of pus but the use of antibiotics post-operatively is controversial (3).

Wang W. reported in a meta-analysis, that the use of antibiotics postoperatively, reduced the risk of treatment failure, recurrence at early period of 1 month and late period of 1-3 months, pain and additional surgical procedures (4). However, according to guidelines antibiotics are not considered beneficial after incision and drainage of simple subcutaneous abscesses (5). But the use of antibiotics is not devoid it's harmful effects. Moreover, misuse of antibiotics is a cause of monetary burden on hospitals as well as antibiotics resistance(6,7) there is global threat of ongoing antibiotics resistance and it is causing treatment failures , serious illnesses and a huge cost burden on health system (8). One example of which is development of Methicillin Resistant Staphylococcus Aureus (MRSA) that has increased virulence and common cause of many infections. (9)

The objective of the study is to compare cure rate and recurrence in children undergoing incision and drainage of simple subcutaneous abscesses with and without postoperative antibiotics. We hypothesize that after incision and drainage of simple subcutaneous abscesses, the use of antibiotics and no antibiotics postoperatively, along with wound wash and daily dressings, have similar efficacy for cure of simple subcutaneous abscesses in children.

## Patients and Methods

This study was conducted in The Children's Hospital and the University of Child Health, Lahore, from February 2020 to June 2021, after authorization from Ethical Committee of Hospital. Patient's parents/guardians were counseled about detailed explanation of the study, possible postoperative complications and management of complications. All male and female patients from age of 1year to 12

years, who needed incision and drainage for simple subcutaneous abscesses were included in the study. All patients were assessed by history, physical examination and investigations. Patients who had any generalized debilitating disease, malnourished, immunocompromised, diabetic or using steroids, had any systemic illness or more than one abscess on body, who had allergy to routinely used antibiotics, had an area of induration of more than 5cm or had perineal, perianal and paronychia abscesses, were excluded from study.

### **Procedure and Data Collection**

It was a single blinded randomized control trial and patients were allocated to two groups according to lottery method. Patients were divided into two groups: Antibiotic group (group A) and No antibiotics group (group B). Written informed consent was taken from all patients. Patients in group A were given Amoxicillin clavulanic acid 30-50mg/kg orally, TDS for 3 to 5 days after I and D while patients in group B were not given any antibiotic. All the patients in both groups had undergone I and D by same surgical team in a same manner. Under aseptic measures, an incision was given in most dependent area of collection. Pus was drained and wound was washed with normal saline and packing was done with povidone soaked gauze. Afterwards daily dressing of wound was done. Post-operatively patients were examined for cure and recurrence at 1st, 7th, and 30th post-operative day.

### **Simple abscess:**

Collection of pus that is limited to skin and subcutaneous tissue and not involving deep structures, in an immunocompetent child.

**Cure:** It means complete resolution of abscess with no need for further drainage and recurrence.

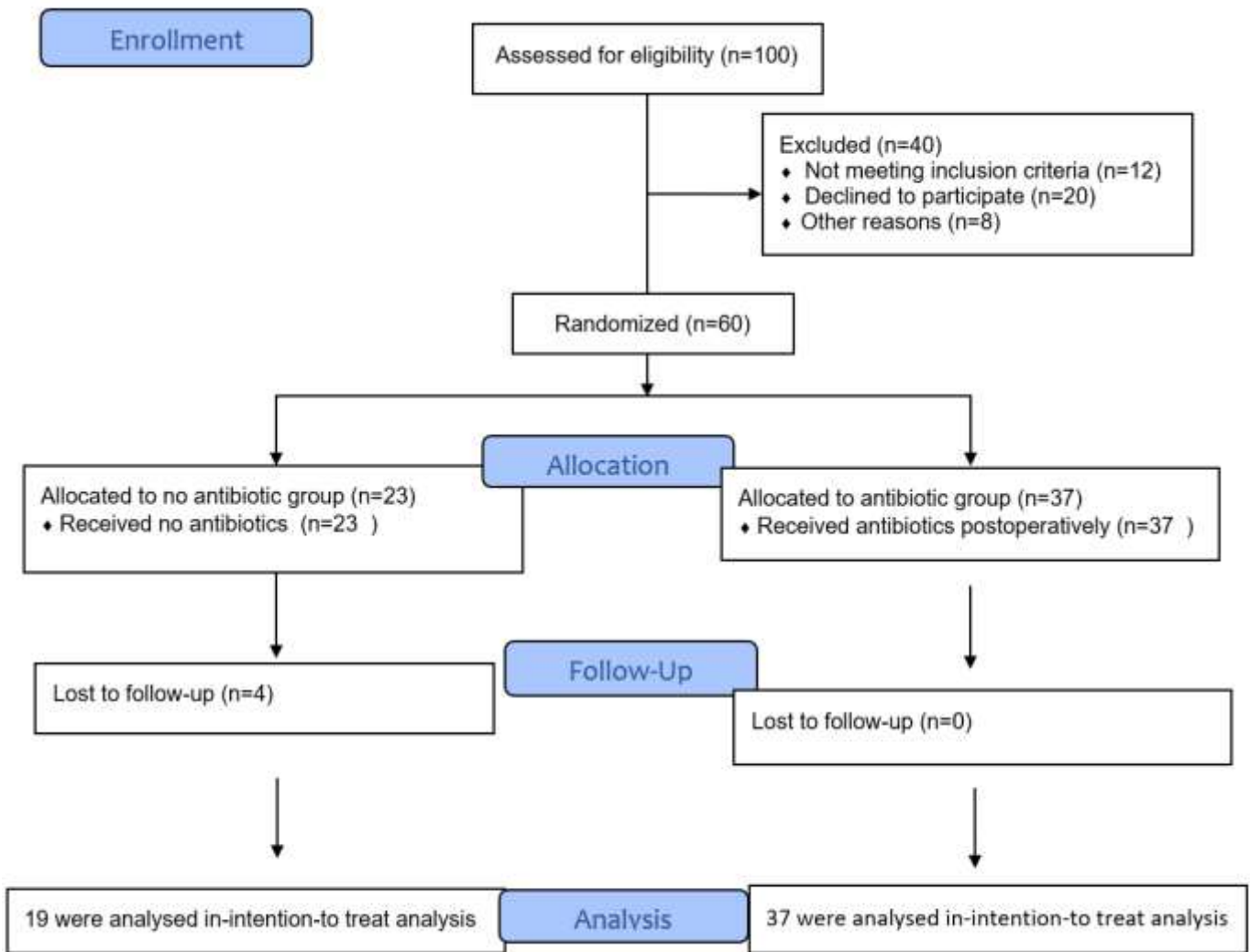
**Recurrence:** It means that the reaccumulation of collection at same place or some other site requiring drainage or antibiotics.

### **Data Analysis Procedure**

The collected data was entered and analyzed accordingly using SPSS version 22 through its statistical program. Mean  $\pm$  Standard deviation was calculated for age of the patients.

Stratification for age and gender was done to control the effect modifiers. Post-stratification chi-square test was applied. Qualitative variables like gender and number of patients developing recurrence and cure in both groups were presented as frequency and percentages. P-value  $\leq 0.05$  was considered as significant.

**CONSORT 2010 Flow Diagram**



## Results

After randomization, 37 patients were allocated to antibiotics group (A group) and 23 to no antibiotics group (group B). Demographics of patients in both groups are described in table 1. Results of cure and recurrence after incision and drainage were recorded in both groups.

In A group, cure was present in 36 (97.3%) patients and only one patient (2.7%) had disease persistence (table 2). Recurrence was noted in only 3 (8.8%) patients and 31(92%) patients had no recurrence (table 3). When follow up was done for assessment of recurrence 3 more patients were lost from group A and 1 was lost from group B.

In B group, all patients were cured (table 2). Whereas, recurrence was noted in only one (5.6%) patient (table 3).

In both cases, P-value was greater than 0.05 and was not significant.

<b>Table: 1 demographics</b>			
		<b>Antibiotics group</b>	<b>No antibiotics group</b>
<b>Age (months; mean (SD))</b>		49.40(43.81)	32.78(32.84)
<b>gender</b>	<b>Female n(%)</b>	23(62.2%)	09(39.1%)
	<b>Male;n(%)</b>	14(37.8%)	14(60.8%)

<b>Outcome</b>	<b>Antibiotics group</b>		<b>No antibiotics group</b>		<b>Relative risk</b>	<b>Pearson chi-square test</b>	<b>p-value</b>
	<b>N</b>	<b>n(%)</b>	<b>N</b>	<b>n(%)</b>	<b>(95%CI)</b>		
<b>Cured</b>	36	97.3%	19	100%	0.973	0.523	0.47
<b>Disease persists</b>	01	2.7%	0	0			
<b>Lost to follow up</b>	04						
<b>Results of outcome for each group RECURRENCE</b>							
<b>No recurrence</b>	31	91.2%	17	94.4%	0.973	0.117	0.732
<b>recurred</b>	3	8.8%	1	5.6%	1.459		
<b>Lost to follow up</b>	08						

**Table : 2+3** Results of outcome for each group of CURE

The pus collected from incision and drainage of abscesses was sent for culture and sensitivity reporting. The most common organism found in pus reports was MRSA (51.8%) and the second most common organism was staphylococcus aureus (14.3%) (table:4) The MRSA was sensitive to vancomycin, teicoplanin, gentamycin, amikacin and linezolid. Whereas staphylococcus was sensitive to amoxicillin clavulanic acid and above-mentioned drugs sensitive to MRSA as well and it was resistant to penicillin and amoxicillin. Table 5 divided patients in both groups A and B according to result of pus culture reports. Cure and recurrence were again stratified in both groups according to pus culture report (table:6)

<b>Table: 4 culture report of pus</b>		
	<b>Frequency</b>	<b>Percent</b>
<b>MRSA</b>	29	51.8%
<b>Staphylococcus aureus</b>	8	14.3%
<b>No organism found</b>	6	10.7%
<b>Pseudomonas species</b>	2	3.6%
<b>Streptococcus species</b>	1	1.8%
<b>Not available</b>	10	17.9%

<b>Table :5 patients in both groups according to culture report</b>												
	<b>MRSA</b>		<b>Staphylococcus aureus</b>		<b>No organism found</b>		<b>Pseudomonas species</b>		<b>Streptococcus species</b>		<b>Not available</b>	
	<b>N</b>	<b>n(%)</b>	<b>N</b>	<b>n(%)</b>	<b>N</b>	<b>n(%)</b>	<b>N</b>	<b>n(%)</b>	<b>N</b>	<b>n(%)</b>	<b>N</b>	<b>n(%)</b>
<b>Antibiotics</b>	20	54.1%	4	10.8%	4	10.8%	2	5.4%	0	0%	7	18.9%
<b>No antibiotics</b>	9	47.4%	4	21.1%	2	10.5%	0	0.0%	1	5.3%	3	15.8%

<b>Table:6 cure and recurrence among patients with different organisms</b>				
	<b>Cure</b>		<b>recurrence</b>	
	<b>cured</b>	<b>Disease persists</b>	<b>No recurrence</b>	<b>recurred</b>
<b>MRSA</b>	28	01	25	4
<b>Staphylococcus aureus</b>	8	0	8	0
<b>No organism found</b>	6	0	6	0
<b>Pseudomonas species</b>	2	0	2	0
<b>Streptococcus species</b>	1	0	1	0
<b>Not available</b>	10	0	10	0

Among the patients who had MRSA positive of culture report, 28 were cured and only 1 patient had persistence of disease. The patient whose disease persisted, was not given post operative antibiotics at start and later on, when initial treatment failed, he was advised antibiotics according to sensitivity. This patient had no recurrence at 30 days after I and D. All the patients with other organisms in pus report, were cured.

The 4 patients who had recurrence, had MRSA positive on culture report, 3 of them belonged to antibiotics group and 1 belonged to no antibiotics group. All four of them were also given antibiotics later on, according to sensitivity report, once initial treatment failed. Thus, our study showed that even in case of MRSA infection, incision and drainage is sufficient for cure of abscesses without any need of post-operative antibiotics. However, recurrence rate was higher in case of MRSA infection but even post-operative antibiotics had no role in prevention of recurrence.

#### **Adverse effects /Harms:**

No Adverse effects or Harms were recorded.

#### **Discussion**

The diagnosis of subcutaneous abscess is made on clinical evaluation mostly but use of ultrasound in diagnosing abscesses is evolving. it helped in improving the decision of diagnosing abscesses in complicated cases, where clinician was not certain about diagnosis.



Moreover, it helped to find exact location, depth and size of abscess. (10) Ultrasound can help in differentiating subcutaneous abscess from cellulitis as the treatment of abscess involves incision and drainage, whereas cellulitis is treated mostly by antibiotics alone (11). Moreover, color doppler can be used to assess vascularity around abscess area. (12)

The standard treatment of skin abscesses is incision and drainage. In our study we have used incision and drainage of abscess. But there is another technique of loop drainage for abscesses that has better results as compared to incision and drainage in terms of short hospital stay, less recurrence and also easy wound care by decreased number of packings. In loop drainage, two small incisions are given at extreme ends of abscess. Pus is drained, cavity is washed and any loculations are broken. After that, a small rubber tube is passed from one end and taken out from the other end and both ends are tied together (13). A meta-analysis showed that loop drainage results in less treatment failure than incision and drainage in adults and also in pediatrics population. (14)

The use of antibiotics post-operatively after incision and drainage of simple abscesses is a controversial topic. Many studies showed that antibiotics after incision and drainage, improved outcome of simple subcutaneous abscess as compared to no antibiotics (15,16,17,18). A meta-analysis showed that antibiotics are associated with improvement in pain control, less recurrence and decreased treatment failure. However, use of antibiotics is not spared of its side effects. (4)

However, the 2014 Infectious Diseases Society of America (IDSA) skin and soft tissue infections (SSTI) guidelines recommended that incision and drainage alone without antibiotics can be good source of resolution of symptoms, for treatment of simple subcutaneous abscesses. (19,20,21,22,23,24.) Moreover there was no difference in recurrence of abscesses. This is suitable even in presence of MRSA infection and that is comparable to our study as well. (19) Two old meta-analyses also support same notion (1,25).

According to Garcea.G et.al, the most common organism found in pus culture of abscesses was staphylococcus aureus (55.9%), the second most common was streptococcal species (17.7%) and anaerobes (17.7%) and MRSA was found in only 2.9% of culture reports (26). Whereas in our study most common organism found was MRSA (51.8%) and the second most common organism found was staphylococcus aureus (14.3%). In our study most of MRSA found on culture were sensitive to teicoplanin, vancomycin, linezolid, amikacin and gentamycin. whereas staphylococcus organisms were sensitive to co-amoxiclav. These results were comparable with study of Garcea.G.

The incidence of SSTI with MRSA infection is on a rise day by day . MRSA SSTI s are associated with greater risk of recurrence. (27) Our study also showed greater risk of recurrence of abscesses in MRSA infected patients. The mainstream treatment of simple subcutaneous abscesses is incision and drainage (28,29). According to IDSA guidelines, the use of post-operative antibiotics for MRSA infection is only advised under special circumstances like patients having extensive disease, immunocompromised patients, those having systemic illness, etc. (5) Antibiotics for 5 days are enough for simple abscesses. (28)

MRSA infection is commonly treated with trimethoprim sulphamethoxazole (TMP-SMX) and clindamycin. (30) Both these drugs were compared for side effects and showed that clindamycin is associated with high risk of diarrhea whereas TMP-SMX had high risk of nausea . (4)

## Conclusion

In patients with simple subcutaneous abscesses, post-operatively after incision and drainage, there was no difference in cure rates and recurrence with and without antibiotics. Larger randomized control trials are required for further evaluation.

## References

1. Singer AJ, Thode HC. Systemic antibiotics after incision and drainage of simple abscesses: a meta-analysis. *Emergency Medicine Journal*. 2014 Jul 1;31(7):576-8.
2. Duong M, Markwell S, Peter J, Barenkamp S. Randomized, controlled trial of antibiotics in the management of community-acquired skin abscesses in the pediatric patient. *Annals of emergency medicine*. 2010 May 1;55(5):401-7.
3. Kalan C, Femling J. Skin and soft tissue infections: causes and treatments. *Physician Assistant Clinics*. 2017 Jul 1;2(3):421-33
4. Wang W, Chen W, Liu Y, Siemieniuk RA, Li L, Martínez JP, Guyatt GH, Sun X. Antibiotics for uncomplicated skin abscesses: systematic review and network meta-analysis. *BMJ open*. 2018 Feb 1;8(2):e020991

5. Stevens DL, Bisno AL, Chambers HF, Dellinger EP, Goldstein EJ, Gorbach SL, Hirschmann JV, Kaplan SL, Montoya JG, Wade JC. Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. *Clinical infectious diseases*. 2014 Jul 15;59(2):e10-52.
6. Ventola CL. The antibiotic resistance crisis: part 1: causes and threats. *Pharmacy and therapeutics*. 2015 Apr;40(4):277.
7. Vermandere M, Aertgeerts B, Agoritsas T, Liu C, Burgers J, Merglen A, Okwen PM, Lytvyn L, Chua S, Vandvik PO, Guyatt GH. Antibiotics after incision and drainage for uncomplicated skin abscesses: a clinical practice guideline. *Bmj*. 2018 Feb 6;360.
8. Dadgostar P. Antimicrobial resistance: implications and costs. *Infection and drug resistance*. 2019;12:3903
9. Algammal AM, Hetta HF, Elkelish A, Alkhalifah DH, Hozzein WN, Batiha GE, El Nahhas N, Mabrok MA. Methicillin-Resistant *Staphylococcus aureus* (MRSA): one health perspective approach to the bacterium epidemiology, virulence factors, antibiotic-resistance, and zoonotic impact. *Infection and Drug Resistance*. 2020;13:3255.
10. Mower WR, Crisp JG, Krishnadasan A, Moran GJ, Abrahamian FM, Lovecchio F, Karras DJ, Steele MT, Rothman RE, Talan DA. Effect of initial bedside ultrasonography on emergency department skin and soft tissue infection management. *Annals of emergency medicine*. 2019 Sep 1;74(3):372-80.
11. Russell FM, Rutz M, Rood LK, McGee J, Sarmiento EJ. Abscess size and depth on ultrasound and association with treatment failure without drainage. *Western Journal of Emergency Medicine*. 2020 Mar;21(2):336.
12. Comer AB. Point-of-care ultrasound for skin and soft tissue infections. *Advanced emergency nursing journal*. 2018 Oct 1;40(4):296-303
13. Aprahamian CJ, Nashad HH, DiSomma NM, Elger BM, Esparaz JR, McMorrow TJ, Shadid AM, Kao AM, Holterman MJ, Kanard RC, Pearl RH. Treatment of subcutaneous abscesses in children with incision and loop drainage: a simplified method of care. *Journal of Pediatric Surgery*. 2017 Sep 1;52(9):1438-41.
14. Gottlieb M, Peksa GD. Comparison of the loop technique with incision and drainage for soft tissue

---

abscesses: A systematic review and meta-analysis. *The American journal of emergency medicine*. 2018 Jan 1;36(1):128-33.

15. Daum RS, Miller LG, Immergluck L, Fritz S, Creech CB, Young D, Kumar N, Downing M, Pettibone S, Hoagland R, Eells SJ. A placebo-controlled trial of antibiotics for smaller skin abscesses. *New England Journal of Medicine*. 2017 Jun 29;376(26):2545-55.

16. Talan DA, Mower WR, Krishnadasan A, Abrahamian FM, Lovecchio F, Karras DJ, Steele MT, Rothman RE, Hoagland R, Moran GJ. Trimethoprim–sulfamethoxazole versus placebo for uncomplicated skin abscess. *N Engl J Med*. 2016 Mar 3;374:823-32.

17. Gottlieb M, DeMott JM, Hallock M, Peksa GD. Systemic antibiotics for the treatment of skin and soft tissue abscesses: a systematic review and meta-analysis. *Annals of emergency medicine*. 2019 Jan 1;73(1):8-16.

18. Lake JG, Miller LG, Fritz SA. Antibiotic duration, but not abscess size, impacts clinical cure of limited skin and soft tissue infection after incision and drainage. *Clinical Infectious Diseases*. 2020 Jul 27;71(3):661-3.

19. Pediatric Subcutaneous Abscess: Still a Clinical Exam-Based Diagnosis and Treatment Isabel C. Garcia

20.23, Stevens DL, Bisno AL, Chambers HF, Dellinger EP, Goldstein EJ, Gorbach SL, Hirschmann JV, Kaplan SL, Montoya JG, Wade JC. Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. *Clinical infectious diseases*. 2014 Jul 15;59(2):e10-52.

21. Singer AJ, Talan DA. Management of skin abscesses in the era of methicillin-resistant *Staphylococcus aureus*. *New England Journal of Medicine*. 2014 Mar 13;370(11):1039-47.

22. Newland JG, Herigon JC. Antibiotics provide no additional short-term benefit to surgical management of paediatric skin abscesses. *BMJ Evidence-Based Medicine*. 2010 Oct 1;15(5):138-9.

23. Glenn IC, Bruns NE, Soldes OS, Ponsky TA. Prospective observational study to assess the need for postoperative antibiotics following surgical incision and drainage of skin and soft tissue abscess in pediatric patients. *Journal of Pediatric Surgery*. 2018 Aug 1;53(8):1469-71.

24. Pulia MS, Schwei RJ, Patterson BW, Repplinger MD, Smith MA, Shah MN. Effectiveness of outpatient antibiotics after surgical drainage of abscesses in reducing treatment failure. *The Journal of emergency*

---

---

medicine. 2018 Oct 1;55(4):512-21

25. Fahimi J, Singh A, Frazee BW. The role of adjunctive antibiotics in the treatment of skin and soft tissue abscesses: a systematic review and meta-analysis. *Canadian Journal of Emergency Medicine*. 2015 Jul;17(4):420-32.
26. Garcea G, Lloyd T, Jacobs M, Cope A, Swann A, Berry D. Role of microbiological investigations in the management of non-perineal cutaneous abscesses. *Postgraduate medical journal*. 2003 Sep 1;79(935):519-21.
27. Papastefan ST, Buonpane C, Ares G, Benyamen B, Helenowski I, Hunter CJ. Impact of decolonization protocols and recurrence in pediatric MRSA skin and soft-tissue infections. *Journal of Surgical Research*. 2019 Oct 1;242:70-7.
28. Khan A, Wilson B, Gould IM. Current and future treatment options for community-associated MRSA infection. *Expert Opinion on Pharmacotherapy*. 2018 Mar 24;19(5):457-70.
29. Thomas O, Ramsay A, Yiasemidou M, Hardie C, Ashmore D, Macklin C, Bandyopadhyay D, Patel B, Burke JR, Jayne D. The surgical management of cutaneous abscesses: A UK cross-sectional survey. *Annals of Medicine and Surgery*. 2020 Dec 1;60:654-9.
30. Moellering Jr RC. Current treatment options for community-acquired methicillin-resistant *Staphylococcus aureus* infection. *Clinical Infectious Diseases*. 2008 Apr 1;46(7):1032-7.

