VASP Skin and Soft Tissue Infection – Inpatient Management

This guidance document is meant to provide general recommendations and does not supersede clinical decision making.

Purulent Cellulitis	Non-purulent Cellulitis	Cat/Human/Dog Bites
Pyomyositis	Impetigo or Ecthyma	Necrotizing Fasciitis/ Fournier's Gangrene
Furuncles and Carbuncles	Cutaneous Abscess	Surgical Site Infections

Purulent Skin and Soft Tissue Infections			
	Disease Characteristics	**Treatment**	**Duration**

Purulent Cellulitis	Purulent drainage without a drainable abscess
	
	Pathogen of concern:
	S. aureus
		Antibiotic Selection:
		≤ 1 SIRS Criteria*:
		• Empiric antibiotics options
		  ○ TMP-SMX 5-8 mg/kg/day TMP PO
		  ○ Cephalexin + Doxycycline 100mg BID PO†
		  ○ Linezolid 600mg BID PO
		• Targeted MRSA options
		  ○ TMP-SMX 5-8 mg/kg/day TMP PO
		  ○ Doxycycline 100mg BID PO
		  ○ Linezolid 600mg BID PO
		• Targeted MSSA options
		  ○ Cephalexin 500mg Q6h or 1000mg Q8h PO†
		
		≥ 2 SIRS Criteria:
		• Obtain blood cultures
		• Empirically initiate IV vancomycin + ceftriaxone 2g IV daily or Ampicillin/Sulbactam 2gQ6h
		• Stepdown to above PO options once:
		  ○ MRSA Bacteremia is ruled out
		  ○ Clinical stability obtained ≥ 24 hours
		  ○ Patient is tolerating oral therapy
			5 Days‡

*SIRS Criteria: Body Temperature >38C or <36C; Pulse > 90 beats/minute; Respiratory rate > 20 breaths/minute; WBC > 12K or <4 K

‡: Consider prolonging for infections without resolution at end of therapy

†: Can prescribe cefadroxil 1000mg BID PO at discharge

Last Updated: 12/12/2023
Date Approved: 12/6/2023

Purulent Skin and Soft Tissue Infections			
	Disease Characteristics	**Treatment**	**Duration**
Cutaneous Abscess	Collection of pus in the dermis circled by erythematous swelling Pathogen of concern: *S. aureus*	I&D without antibiotics unless patient has: • > 1 SIRS Criteria* • >2 cm surrounding erythema • Multiple abscesses • Lack of response to I&D or incomplete I&D • Severely immunocompromising status If antibiotics are indicated based on above criteria, obtain abscess cultures with I&D and tailor therapy based on species and susceptibilities. Antibiotic Selection: Follow criteria seen for Purulent Cellulitis above	5 Days
Furuncles and Carbuncles	Infection of the hair follicle(s) extending from dermis where abscess forms in subcutaneous tissue Pathogen of concern: *S. aurues*		

*SIRS Criteria: Body Temperature >38C or <36C; Pulse > 90 beats/minute; Respiratory rate > 20 breaths/minute; WBC > 12K or <4 K

Purulent Skin and Soft Tissue Infections			
	Disease Characteristics	**Treatment**	**Duration**

Pyomyositis	Collection of pus within individual muscle groups
	
	Pathogen of concern:
	S. aurues (90%)
		Obtain blood and abscess cultures. Initiate empiric antimicrobial therapy with focus on gram-positive coverage.
		
		Antibiotic Selection:
		• Empirically initiate IV vancomycin + ceftriaxone
		• Step-down to PO options once:
		  ○ MRSA Bacteremia is ruled out
		  ○ Clinical stability obtained
		  ○ Patient is tolerating oral therapy
		• Step-down options:
		  ○ Empiric step down options:
		  ▪ TMP-SMX 5-8 mg/kg/day TMP PO
		  ▪ Doxycycline 100mg BID PO
		  ▪ Linezolid 600mg BID PO
		  ○ Targeted MRSA options
		  ▪ Same as above
		  ○ Targeted MSSA options
		  ▪ Cephalexin 500m Q6h or 1000mg Q8h PO†
			14 – 21 Days

Non-Purulent Skin and Soft Tissue Infections			
	Disease Characteristics	**Treatment**	**Duration**
Erysipelas or Cellulitis	Acutely spreading, erythematous, painful, edematous infection of the epidermis, dermis, and subcutaneous tissue without abscess or purulent drainage Pathogen of concern: *S. pyogenes* *S. aureus* is rare MRSA Risk Factors: • Recent or ongoing MRSA infection at alternate site • IVDU • Penetrating trauma	Antibiotic Selection: ≤ 1 SIRS Criteria*: • Cephalexin 500mg Q6h PO † Not a PO candidate: • Cefazolin 2g Q8h until patient can tolerate PO MRSA risk factors OR severe Cephalosporin Allergy: • TMP-SMX 1-2 DS BID PO • Linezolid 600mg BID PO >1 SIRS Criteria: • Obtain blood cultures • Empirically initiate Ceftriaxone 2g daily Severe Cephalosporin allergy: • Levofloxacin 750mg Daily MRSA Risk Factors Present: • Add IV vancomycin to options above • Discontinue once blood cultures are negative for MRSA	5 Days ‡
Impetigo or Ecthyma	Erythematous papules evolve into pustules that rupture forming honey-colored crust Pathogens of concern: *S. aureus* *S. pyogenes*	Impetigo single lesion: Mupirocin 2% Ointment 2 to 3 times daily Ecthyma or Impetigo with numerous lesions: • Amox/Clav 875/125mg BID PO • Cephalexin 500mg Q6h or 1000mg Q8h PO† Severe Cephalosporin allergy: • TMP-SMX 1-2 DS BID PO	5 Days ‡

*SIRS Criteria: Body Temperature >38C or <36C; Pulse > 90 beats/minute; Respiratory rate > 20 breaths/minute; WBC > 12K or <4 K

‡: Consider prolonging to 7-14 days for infections without resolution at end of therapy

†: Can prescribe cefadroxil 1000mg BID PO at discharge

Last Updated: 12/12/2023
Date Approved: 12/6/2023

Necrotizing Skin and Soft Tissue Infections			
	Disease Characteristics	**Treatment**	**Duration**
Necrotizing Fasciitis Or **Fournier's Gangrene**	Aggressive subcutaneous infection that tracks along superficial fascia compromising all tissue between skin and muscles. Pathogens of concern: *S. aureus* *S. pyogenes* *V. vulnificus* *A. hydrophila* *Peptostreptococcus* *P. aeruginosa* *C. perfringens*	Surgical intervention is the mainstay of therapy. In addition to aggressive I&D, intravenous antimicrobials should be started targeting pathogens of concern. Blood cultures and surgical cultures should be obtained with antibiotics tailored accordingly. Antibiotic Selection: Empiric Preferred regimens: • Linezolid 600mg BID IV + piperacillin/tazobactam Empiric regimens when severe penicillin allergy: • Linezolid 600mg BID IV + cefepime 2g IV Q8h + metronidazole 500mg BID IV Empiric regimens when severe penicillin and cephalosporin allergy: • Linezolid 600mg BID IV + levofloxacin 750mg Q24h IV + metronidazole 500mg BID IV Transition linezolid (1:1), levofloxacin (1:1), and metronidazole (1:1) to oral therapy once: • Clinical stability is obtained • Patient is tolerating oral therapy If a patient cannot receive Linezolid due to allergies, or multiple serotonergic drug interactions: • Vancomycin IV + piperacillin/tazobactam + clindamycin 900mg Q8h IV Severe Penicillin allergy: • Vancomycin IV + cefepime 2g Q8h IV + clindamycin 900mg Q8h IV Severe Penicillin and Cephalosporin allergy: • Vancomycin IV + levofloxacin 750mg Q24h IV + clindamycin 900mg Q8h IV Transition levofloxacin (1:1) and metronidazole (1:1) to oral therapy once: • Clinical stability is obtained • Patient is tolerating oral therapy	Antibiotics should be discontinued 48 hours after definitive source control Anti-toxin coverage can be discontinued once clinical stability is obtained (MRSA/anaerobic coverage needed until cultures indicate otherwise)

Skin and Soft Tissue Infections Secondary to Bites			
	Disease Characteristics	**Treatment**	**Duration**
Cat Bite	Pathogens of concern: *S. aureus* (MSSA) *Streptococcus sp.* *Pasteruella multicida*	3-5 days of preemptive antibiotics only indicated if patient has: • Immunocompromising status/Asplenia • Advanced liver disease • Injuries that have penetrated the periosteum or joint capsule • Severe injuries particularly to the hands or face Otherwise, antibiotics should be withheld unless there are signs/symptoms of skin and soft tissue infection. Preferred therapy: • Amoxicillin-clavulanate 875/125mg BID PO Penicillin allergic options: • Cefuroxime 500mg BID PO + Metronidazole 500mg BID PO Penicillin and Cephalosporin allergic options: • Doxycycline 100mg BID PO + Metronidazole 500mg BID PO • Levofloxacin 750mg Daily PO + Metronidazole 500mg BID PO Animal Bites Tetanus Vaccination: Tetanus Vaccination Considerations: • Adults who have not received DTap, Tdap, or TD in previous 5 years should receive either Td or Tdap • Adults who have never received Tdap or whole Tdap history is unknown should receive Tdap Tetanus Immune Globulin (HyperTET S/D) • Wounds that are not clean or minor in patients with ≤ 2 prior Tetanus vaccines • Inject 250 Units IM x 1 dose Rabies: Not Previously vaccinated: • Inject RabAvert (PCECV) 1ml IM on day 0, 3, 7, and 14 ○ For persons with immunosuppression, PCECV should be administered using a 5-dose vaccine regimen (i.e., 1 dose of vaccine on days 0, 3, 7, 14, and 28), ○ Schedule follow up vaccines after discharge with the Belcourt Clinic 615-875-1000 • Inject 20 U/kg body weight of Human Rabies Immune Globulin (HRIG) around and into previously cleansed wounds. Any remaining volume should be administered at a site distant from vaccine administration site. Previously Vaccinated: • Inject RabAvert (PCECV) 1ml IM on day 0, 3 ○ Schedule follow up vaccines after discharge with the Belcourt Clinic 615-875-1000 • HRIG should not be administered	5 Days
Dog Bite	Pathogens of concern: *S. aureus* (MSSA) *Streptococcus sp.* *Pasteruella canis* *Capnocytophaga* *Fusobacterium*		
Human Bite	Pathogens of concern: *S. aureus* (MSSA) Streptococcus Viridans *Eikenella corrodens* *Peptostreptococcus* *Fusobacterium* *Prevotella* *Corynebacterium*		

Surgical Site Infections (SSI)			
	Disease Characteristics	**Treatment**	**Duration**

Superficial SSI	Only involves the subcutaneous space between the skin and underlying muscular fascia and usually occurs within 30 days
	
	Pathogens of concern:
	S. aureus
	S. pyogenes
	Clostridium species Coagulase negative Staphylococcus
		Surgical intervention is the mainstay of therapy to ensure infected material is evacuated.
		I&D alone without antibiotics is sufficient if:
		• <5cm of erythema and induration
		• ≤ 1 SIRS criteria noted
		  ○ A fever alone up to four days after procedure is likely postoperative inflammation rather than infection.
		If antibiotics are indicated based on above criteria, obtain abscess cultures with I&D and tailor therapy based on culture and susceptibilities.
		
		Antibiotic Selection:
		• Empirically initiate IV vancomycin
		  ○ In cases of intraabdominal/perineal/axilla/female reproductive procedures the addition of ceftriaxone 2g IV daily + metronidazole 500mg BID PO is reasonable
		• Stepdown to PO options once:
		  ○ MRSA Bacteremia is ruled out
		  ○ Clinical stability obtained
		  ○ Patient is tolerating oral therapy
		• Stepdown PO options:
		  ○ TMP-SMX 5-8 mg/kg/day TMP PO
		  ○ Doxycycline 100mg BID PO
		  ○ Linezolid 600mg BID PO
		• In cases of intraabdominal/perineal/axilla/female reproductive procedures:
		  ○ Addition Levofloxacin 750mg + metronidazole 500mg BID PO OR Amox/Clav 875mg/125mg BID PO is reasonable
		• Targeted MRSA options
		  ○ Same as above
		• Targeted MSSA options
		  ○ Cephalexin 500mg Q6h PO †
			5 Days ‡

Deep SSI	Involves the fascia and muscle and occurs within 30 days of procedure or within 1 year if prosthesis was inserted
	
	Pathogens of concern:
	S. aureus
	S. pyogenes
	Coagulase negative Staphylococcus
		<u>Surgical intervention</u> is the mainstay of therapy to ensure infected material is evacuated.
		
		Obtain abscess cultures with I&D and blood cultures if systemic signs of infection are noted. Tailor therapy based on species and susceptibilities.
		
		Antibiotic Selection:
		• Empirically initiate vancomycin IV + ceftriaxone 2g IV daily
		  ○ In cases of intraabdominal/perineal/axilla/female reproductive procedures the addition of metronidazole 500mg BID PO is reasonable
		• Stepdown to PO options once:
		  ○ MRSA bacteremia is ruled out
		  ○ Clinical stability obtained
		  ○ Patient is tolerating oral therapy
		• Stepdown PO options:
		  ○ TMP-SMX 5-8 mg/kg/day TMP PO
		  ○ Linezolid 600mg BID PO
		  ○ Doxycycline 100mg BID PO + Cephalexin 500mg PO Q6h †
		• In cases of intraabdominal/perineal/axilla/female reproductive procedures:
		  ○ Addition Levofloxacin 750mg + metronidazole 500mg BID PO OR Amox/Clav 875mg/125mg BID PO is reasonable
			7 Days
			(Dependent on source control)

*SIRS Criteria: Body Temperature >38C or <36C; Pulse > 90 beats/minute; Respiratory rate > 20 breaths/minute; WBC > 12K or <4 K

‡: Consider prolonging to 7-14 days for infections without resolution at end of therapy

†: Can prescribe cefadroxil 1000mg BID PO at discharge

References:

1. Stevens DL, Bisno AL, Chambers HF, Dellinger EP, Goldstein EJ, Gorbach SL, Hirschmann JV, Kaplan SL, Montoya JG, Wade JC; Infectious Diseases Society of America. Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. Clin Infect Dis. 2014 Jul 15;59(2):e10-52. doi: 10.1093/cid/ciu444. Erratum in: Clin Infect Dis. 2015 May 1;60(9):1448. Dosage error in article text. PMID: 24973422.
2. Hepburn MJ, Dooley DP, Skidmore PJ, Ellis MW, Starnes WF, Hasewinkle WC. Comparison of short-course (5 days) and standard (10 days) treatment for uncomplicated cellulitis. Arch Intern Med. 2004 Aug 9-23;164(15):1669-74. doi: 10.1001/archinte.164.15.1669. PMID: 15302637.Crum NF. Bacterial pyomyositis in the United States. Am J Med 2004; 117:420–8.
3. Terzian WTH, Nunn AM, Call EB, Bliss SE, Swinarska JT, Rigdon J, Avery MD, Hoth JJ, Miller PR 3rd. Duration of Antibiotic Therapy in Necrotizing Soft Tissue Infections: Shorter is Safe. Surg Infect (Larchmt). 2022 Jun;23(5):430-435. doi: 10.1089/sur.2022.011. Epub 2022 Apr 22. PMID: 35451883.Linezolid for SSTI
4. Crum NF. Bacterial pyomyositis in the United States. Am J Med. 2004 Sep 15;117(6):420-8. doi: 10.1016/j.amjmed.2004.03.031. PMID: 15380499.
5. Evans L, Rhodes A, Alhazzani W, Antonelli M, Coopersmith CM, French C, Machado FR, Mcintyre L, Ostermann M, Prescott HC, Schorr C, Simpson S, Wiersinga WJ, Alshamsi F, Angus DC, Arabi Y, Azevedo L, Beale R, Beilman G, Belley-Cote E, Burry L, Cecconi M, Centofanti J, Coz Yataco A, De Waele J, Dellinger RP, Doi K, Du B, Estenssoro E, Ferrer R, Gomersall C, Hodgson C, Møller MH, Iwashyna T, Jacob S, Kleinpell R, Klompas M, Koh Y, Kumar A, Kwizera A, Lobo S, Masur H, McGloughlin S, Mehta S, Mehta Y, Mer M, Nunnally M, Oczkowski S, Osborn T, Papathanassoglou E, Perner A, Puskarich M, Roberts J, Schweickert W, Seckel M, Sevransky J, Sprung CL, Welte T, Zimmerman J, Levy M. Surviving sepsis campaign: international guidelines for management of sepsis and septic shock 2021. Intensive Care Med. 2021 Nov;47(11):1181-1247. doi: 10.1007/s00134-021-06506-y. Epub 2021 Oct 2. PMID: 34599691; PMCID: PMC8486643.
6. Centers for Disease Control and Prevention. (2022, October 19). *Pinkbook: Tetanus*. Centers for Disease Control and Prevention. https://www.cdc.gov/vaccines/pubs/pinkbook/tetanus.html
7. Joshua Dorazio, Abby L Chiappelli, Ryan K Shields, Y Vivian Tsai, Peyton Skinker, Michael J Nabozny, Graciela Bauza, Raquel Forsythe, Matthew R Rosengart, Scott R Gunn, Rachel Marini, Lloyd Clarke, Bonnie Falcione, Justin Ludwig, Erin K McCreary, Clindamycin Plus Vancomycin Versus Linezolid for Treatment of Necrotizing Soft Tissue Infection, *Open Forum Infectious Diseases*, Volume 10, Issue 6, June 2023, ofad258, https://doi.org/10.1093/ofid/ofad258
8. Centers for Disease Control and Prevention. Use of a reduced (4-dose) vaccine schedule for postexposure prophylaxis to prevent human rabies-recommendations of the Advisory Committee on Immunization Practice. Ann Emerg Med. 2010 Jul;56(1):64-7. doi: 10.1016/j.annemergmed.2010.05.020. PMID: 20648715.

Last Updated: 12/12/2023
Date Approved: 12/6/2023