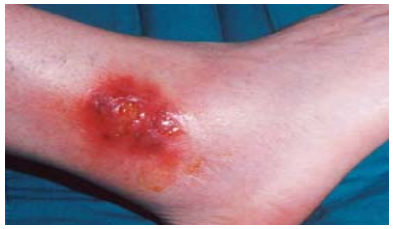
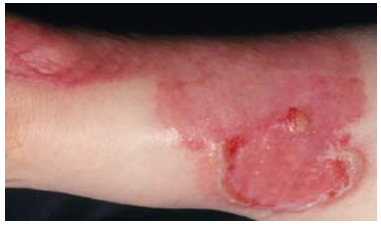
Interesting Mimics

Pyoderma Gangrenosum



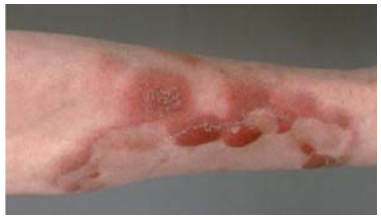
- An inflammatory, noninfectious ulcerative skin disease associated with several systemic illnesses including IBD, hematologic malignancies, and collagen vascular diseases. Invocation of lesions often caused by trauma including needle sticks. Systemic steroids are the mainstay of therapy.

Neutrophilic Dermatosis



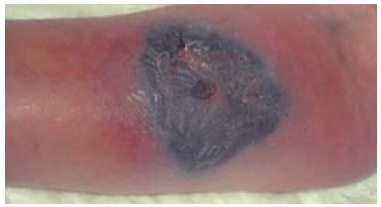
- Sweet's syndrome is an inflammatory disorder manifesting as multiple painful erythematous plaques associated with fever. Associated with IBD, strep PNA, drugs, and hematologic malignancies. Lesions may occur in areas of skin trauma. Treat with steroids.

Cutaneous T Cell Lymphoma



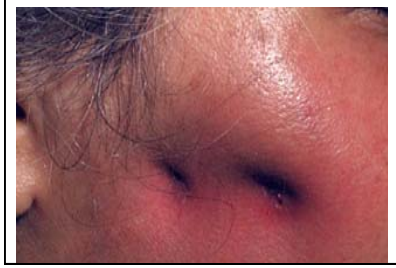
- Mycosis fungoides is the most common type of CTCL, accounting for 50% of all primary cases. Look for erythematous patches and plaques with fine scale and papules and nodules. Diagnosis requires a punch biopsy or an excisional biopsy.

Mucormycosis



- Caused by the Phycomycetes species including Mucor, Rhizopus, and Absidia fungi. Can appear in immunocompromised patients including HIV patients, neutropenic patients and IV drug users. Look for a black, necrotic ulcer with a violaceous border.

Actinomycosis



- Caused by anaerobic bacteria from the actinomycetales group, usually Actinomyces israelii. Look for painful erythematous or violaceous nodules with overlying sinus tracts, fistulae, and grainy exudates. Tend to present at the law line or the thoracic or abdominal wall.

Inpatient Cellulitis

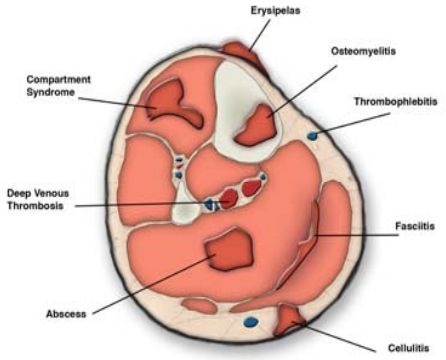
Clinical Evaluation

First, **consider the differential** with respect to the anatomic location and clinical context. An effective strategy is thinking about the contiguous anatomy

- **Limb**
  - **Infectious alternatives** include **necrotizing fasciitis**, bursitis, **osteomyelitis**, erythema migrans, compartment syndrome, **abscess**, ecthyema gangrenosum, **zoster**, toxic epidermal necrolysis
  - **Non-infectious alternatives** include compartment syndrome, **pyoderma gangrenosum**, nummular eczema, contact dermatitis, **deep venous thrombosis**, thrombophlebitis, **acute gout**, drug reaction, cutaneous T cell lymphoma, acute febrile neutrophilic dermatosis, lymphedema, erythema nodosum, stasis dermatitis, calciphylaxis, sarcoidoisis, eosinophilic cellulitis, cutaneous GVHD
- **Trunk**
  - **Infectious alternatives** include **necrotizing fasciitis**, Fournier's gangrene, **focal abscess**, zoster, ecthyema gangrenosum
  - **Non-infectious alternatives** include **pyoderma gangrenosum**, nummular eczema, contact dermatitis, cutaneous T cell lymphoma, drug reaction, calciphylaxis, carcinoid erysipeloides, Paget disease of the breast, radiation recall
- **Face**
  - **Infectious alternatives** include necrotizing fasciitis, abscess, herpes simplex virus, zoster, cutaneous sinus tract, sinusitis, dental abscess, mucormycosis, actinomycosis
  - **Non-infectious alternatives** include eosinophilic cellulitis, contact dermatitis, angioedema, dermatomyositis, angiosarcoma, drug reaction, dacrocystitis (inflammation of lacrimal sac), cavernous sinus thrombosis

When considering a DDX…

- **CT** looking for gas is an excellent modality for **necrotizing fasciitis**; gas in absence of trauma or rim-enhancing collection is pathognomonic — *Raff, JAMA, 1016*
- **US** looking for **cutaneous abscesses** has a Sn 89-98% and Sp 64-88% — *Alsaawi, Eur J Em Med, 2015*
- **Osteomyelitis** can occur in the presence or absence of overlying skin ulceration although the presence of exposed bone has LR+ 9.2 — *Lipsky, Diab Metab Res Rev, 2012*
- For **osteo**, the pooled Sn of **plain XR** is 54% and Sp 68%; LR+ is 2.3 and LR– is 0.63; the pooled Sn of **MRI** 77-100% and the Sp is 40-100%; LR+ 3.8 and LR– 0.14; **three-phase bone scan** has Sn 90% and Sp 46% — *Lipsky, Diab Metab Res Rev, 2012*
- **Blood cultures** are strongly recommended in very ill pts and those with neutropenia, malignancy, immunodeficiency—*IDSA, Clin Inf Dis, 2014*



- Compression US to r/o DVT is reasonable although the incidence of co-existent DVT in documented cellulitis is estimated at 3.1%; the rate of ipsilateral DVT is estimated at 0.5% - 0.75%; it is generally not recommended unless a high Wells, high clinical suspicion, or hypercoagulable state; can reconsider if no response to seemingly appropriate therapy — *Raff, JAMA, 2016; Gunderson, Thomb Res, 2013; Mazge, BMC Inf dis, 2013*

Classifying the Disease

- **Second**, presuming you are dealing with a cellulitis, try to **classify as un-complicated or complicated** since this will have implications for treatment
- **Third**, try to make an educated guess as to the possible **culprit organism**
- **Finally**, keep several considerations in mind during the evaluation:
  - **If necrotizing fasciitis is suspected, contact General Surgery and Infectious Disease Medicine *urgently***
  - **Consider engaging Infectious Disease Medicine for unstable, toxic appearing, or treatment refractory patients**

Criteria that may suggest complicated infx

- Diabetic, ischemic, or chronic ulcers
- Surgical wounds or implanted devices
- Neutropenic or immunocompromised patients
- Periorbital or facial involvement
- Suspected deeper tissue infections or bites
- Surgical wounds
- Parasthesias, evidence of necrosis, shock

SIRS Criteria also used to "rate" severity of infx and suggest tx strategies — *Raff, JAMA, 2016*

- T > 38°C or < 36°C
- HR > 90/min
- Resp rate > 20/min
- WBC > 12 or < 4 cells/mm^3
- Pts with ≥ 2 criteria warrant IV therapy

Matching Therapy to the Disease (2 approaches)

Uncomplicated cellulitis

- Initial inpatient therapy
  - Vancomycin IV for most pts particularly when MRSA possible
  - Clindamycin IV is particularly effective for streptococcus
- Continued inpatient therapy (i.e. step-down)
  - Septra/Bactrim DS PO if estimated GFR > 30
  - Doxycycline PO if SMX/TMP is not an option
  - Clindamycin PO if streptococcus is in the ddx
  - *Some studies suggest a high treatment failure with cephalexin*

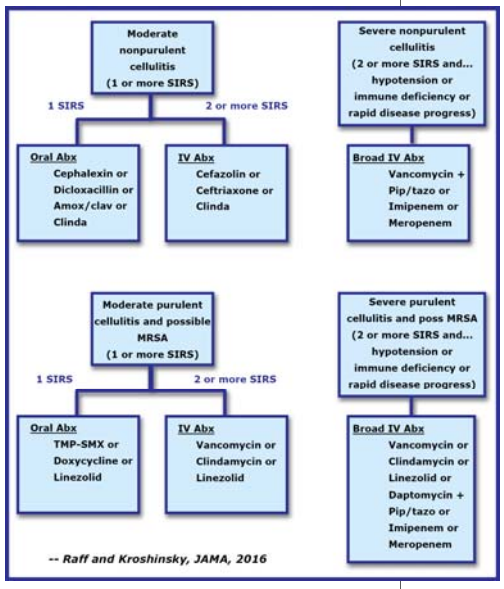
Complicated cellulitis

- Initial inpatient therapy
  - Vancomycin IV + piperacillin-tazobactam (Zosyn) IV
  - Cipro + metronidazole + vancomycin *if PCN allergic*
- Continued inpatient therapy (i.e. step-down)
  - Ciprofloxacin + clindamycin
  - Levofloxacin is a reasonable second line option

Cellulitis with abscess

- Incision and drainage
- Abx as indicated above

— Stevens, IDSA, Clin Infx Dis, 2014



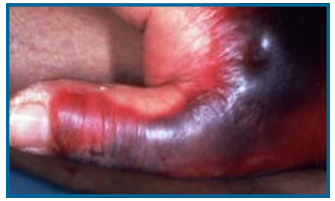
Guess the Organism

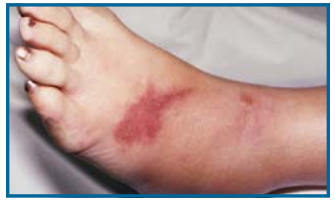
- **Group A beta-hemolytic strep** (S. pyogenes) tends to cause erysipelas, lymphangitis, peau d'orange skin, and toxic shock
- **Staph aureus** tends to furuncles, carbuncles, **purulent cellulitis**, and abscesses—associated with young people, athletes, people in close quarters, drug users, and homeless; often looks like a "spider bite"
- **Diabetic foot ulcers** — mild infections tend to be caused by staph and strep whereas severe infections can be polymicrobial including staph, strep, gram-negative rods, pseudomonas, and anaerobes
- **Animal bites** — Staph, strep, and anaerobes are very common; Pasteurella multocida is associated with cats whereas Capnocytophaga canimorsus is associated with dogs — consider treatment with Unasyn or Cipro/Flagyl
- **Water contact** — Consider Aeromonas hydrophila and Mycobacterium marinum with freshwater contact, Erysipelothrix rhusiopathiae or Mycobacterium marinum with saltwater contact, Vibrio vulnificus with brack-ish water contact, and Pseudomonas aeruginosa with hot tub exposure

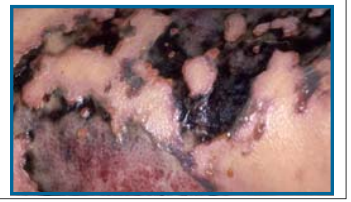
Evidence-Based Pearls

- Studies suggest a strep etiology is most common; MRSA is an uncommon cause of cellulitis — *Jeng, Medicine, 2010*
- Cefazolin, ceftriaxone, or clinda may be reasonable starting strategy, moving to vancomycin in severe cases, trauma, injection drug use, or known MRSA colonization — *IDSA, 2014*
- Results of wound and blood cultures may guide antibiotic choices but are positive in less than 5% of cases — *Stevens, Clin Inf Dis, 2005*
- Compression dressings and leg elevation may help in patients with venous insufficiency or pedal edema — *Ann Int Med, 2009*
- **Clinda resistance is not uncommon with MRSA; TMP-SMX has relatively poor activity against strep — *Daum, NEJM, 2007***
- Although patients typically receive 10-14d of abx, evidence shows similar outcomes in patients treated for 5 or 10 days — *Hepburn, Archives IM, 2004*
- In settings where micro is unknown, evidence does not show adding TMP-SMX to other agents (e.g. cephalexin) results in better outcomes (cure rates 82% vs 85%) — *Pallin, Clin Inf Dis, 2011*

Necrotizing Fasciitis







- Necrotizing fasciitis is a deep tissue infection that tracks along fascial planes and beyond cutaneous signs of infection; **group A beta-hemolytic strep** (S. pyogenes) is often implicated but also caused by **S. aureus**, V. vulnificus, Enterobacteriaceae, and Bacteroides spp.
- Patients are often thought to have cellulitis "not responding" to standard therapy — **consider if pain is out of proportion to exam, if presence of skin necrosis or bullae, if evidence of gas in the soft tissues, or if systemic illness incl fever, hypotension, or tachycardia**
- A WBC > 15400 cells/mm^3 or Na < 135 mEq/L has a Sn 90%; Sp 95%, LR+ 3.75, LR- 0.13 — *Wall, J Am Coll Surg, 2000*
- The **Laboratory Risk Indicator for Necrotizing Fasciitis** score (www.mdcalc.com) has a Sn 90%, Sp 95%, LR+ 19.95, LR- 0.10 — *Wong, Crit Care Med, 2004*
- Serum lactate of 2.0 mmol/L had Sn 100%, Sp 76%, LR+ 4.17, LR- 0 — *Murphy, J Plas Recon Aesth Surg, 2013*
- CT has excellent discriminatory value—has an estimated PPV 76% and NPV 100% — *Zacharias, Arch Surg, 2010*
- **If considering this diagnosis—*contact a surgeon now***