Dermergency! An Approach to Identification and Management of Life-Threatening Rashes

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Pharmacy Grand Rounds
January 15th, 2019
Objectives

• Review common terms and categories used to describe rashes
• Identify rashes which are considered dermatologic emergencies
• Outline an algorithmic approach for management of dermatologic emergencies
Disclaimer

• This presentation contains sensitive images.
Introduction

• Rash = common complaint in all areas of care
  • Over 5% of all ED visits
  • Among top 20 reasons for ED visits

• Wide range of etiologies
  • Many benign but some life-threatening
  • Rapid recognition is key
Common Terms

Lesion
- Single, small diseased area

Rash
- Eruption of more than a single lesion on the skin

Macule
- Circumscribed area of change in normal skin color with no skin elevation

Common Terms

Papule
• Solid, raised lesion ≤0.5 cm; variable color

Nodule
• Similar to papule but located deeper in the dermis and subcutaneous tissue; raised lesion >0.5 cm

Plaque
• Circumscribed elevation of skin >0.5 cm; often a confluence of papules

Common Terms

Pustule
- Circumscribed area containing pus

Vesicle
- Circumscribed, elevated, fluid-filled lesion ≤0.5 cm

Bulla
- Circumscribed, elevated, fluid-filled lesion >0.5 cm

Common Terms

Petechiae
- Small red or brown macules up to 0.5 cm that do not blanch with pressure

Purpura
- Circumscribed petechiae >0.5 cm

History & Physical Exam

- **History**
  - Onset and progression
  - Travel history
  - Medical and occupational history
  - Medication regimens

- **Physical Exam**
  - General appearance
    - Sick or not sick?
  - Skin
    - Nikolsky sign
    - Morphology
    - Pattern and distribution
    - Percentage of body affected

Positive Nikolsky sign
Red Flags

- New medication
- Toxic appearance
- Fever
- Hypotension
- Extensive skin involvement (>10% BSA)
- Rapid progression
- Severe pain
- Mucosal lesions
- Extremes of age
- Immunosuppressed

BSA: body surface area

Categories of Rashes

- Maculopapular
- Vesiculobullous
- Petechial/Purpuric
- Erythematous

Assessment Question #1

Which of the following is a red flag for a dermatologic emergency?

- 5-10% BSA affected
- Hypertension
- Toxic appearance
- Middle age
**Maculopapular**

- Toxic appearance ± fever
  - Central
    - Measles
    - Lyme disease
    - Viral exanthem
  - Peripheral
    - *Erythema multiforme (EM)*
    - Stevens-Johnson syndrome (SJS)
    - Lyme disease
    - Syphilis

- No toxic appearance ± fever
  - Central
    - *Drug reaction*
  - Peripheral
    - Scabies
    - Eczema
    - Psoriasis

Cutaneous Drug Reactions

- Majority not serious but can be life-threatening
- >75% due to non-immunologic causes
- Common drug culprits:
  - Sulfonamides
  - Penicillins
  - Anticonvulsants
  - NSAIDs

NSAIDs: nonsteroidal anti-inflammatory drugs

Cutaneous Drug Reactions

- Morbilliform or exanthematous
- Erythematous macules and papules
  - Central distribution
- Self-limited
- Treatment:
  - Discontinuation of offending agent
  - Oral antihistamines

Erythema Multiforme

- Unclear pathophysiology
  - Immune complex-mediated hypersensitivity
  - 50% of cases → idiopathic
  - Herpes or drug exposure
  - Ages 20-40

- EM minor
  - Self-limited rash

- EM major
  - Can be life-threatening
  - Mucous membrane involvement

Erythema Multiforme

- Prodrome
  - Malaise, fever, arthralgias

- Macular eruption on palms, soles, and extensor surfaces
  - Progresses to target lesion – papule with dusky center
  - Symmetric, uniform size, non-pruritic
  - No epidermal detachment

Erythema Multiforme
Erythema Multiforme

• Treatment:
  • Discontinuation of offending agent
  • Fluid and analgesia management
  • Wound care
  • Topical steroids
  • Systemic steroids?
    • No strong evidence of benefit
    • Oral prednisone 40-60 mg/day tapered over 2-4 weeks

Erythematous

- Toxic appearance ± fever
  - + Nikolsky
    - Staphylococcal scalded skin syndrome (SSSS)
    - Toxic epidermal necrolysis (TEN)
  - - Nikolsky
    - Toxic shock syndrome (TSS)
    - Kawasaki disease
    - Scarlet fever

- No toxic appearance ± fever
  - + Nikolsky
    - Toxic epidermal necrolysis (TEN)
  - - Nikolsky
    - Anaphylaxis
    - Alcohol flush
    - Medications (vancomycin, niacin)

Toxic Shock Syndrome

• Exotoxin-mediated illness
  • Staphylococcal toxic shock syndrome (TSS)
  • Streptococcal toxic shock syndrome (STSS)
• Classically associated with tampon use
  • 45% of cases → non-menstrual
    • Nasal packing, surgical wounds, postpartum infection, abscesses
  • Women, ages 20-50
• STSS = higher morbidity and mortality

Toxic Shock Syndrome

- **Prodrome**
  - Low-grade fever, malaise, myalgias, vomiting

- **Rapid onset of major symptoms**
  - High fever, rash, hypotension, mucous membrane involvement

- **Diffuse, non-pruritic, blanching, macular erythroderma**
  - Trunk, hands, feet
  - TSS – fine and full-thickness desquamation
  - STSS – extreme localized pain

Toxic Shock Syndrome
Toxic Shock Syndrome

- **Treatment:**
  - Rapid removal of infected material
  - IV antibiotics
    - Clindamycin + vancomycin + carbapenem OR penicillin/beta-lactamase inhibitor
      - *Staphylococcus aureus* (MRSA)
      - *Streptococcus pyogenes* (GAS)
      - Gram-negative bacilli
  - Fluid resuscitation
  - Surgical debridement
  - IV immunoglobulin (STSS)
  - Hyperbaric oxygen

MRSA: methicillin-resistant *Staphylococcus aureus*  
GAS: Group A streptococci

# Clindamycin & IVIG in STSS

**Parks et al. 2018**

<table>
<thead>
<tr>
<th>Design</th>
<th>Systematic review and meta-analysis</th>
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</thead>
<tbody>
<tr>
<td>Population</td>
<td>Clindamycin-treated patients with STSS (n = 165)</td>
</tr>
<tr>
<td></td>
<td>- 1 randomized study</td>
</tr>
<tr>
<td></td>
<td>- 4 nonrandomized studies</td>
</tr>
<tr>
<td>Intervention</td>
<td>Clindamycin ± IVIG</td>
</tr>
<tr>
<td>Primary Outcome</td>
<td>Risk ratio (RR) for death at 30 days</td>
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</tbody>
</table>

Clindamycin & IVIG in STSS

<table>
<thead>
<tr>
<th>Study</th>
<th>RR (95% CI)</th>
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<tbody>
<tr>
<td>Kaul et al. 1999</td>
<td>0.57 (0.25-1.27)</td>
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<tr>
<td>Darenberg et al. 2003</td>
<td>0.42 (0.05-3.28)</td>
</tr>
<tr>
<td>Adalat et al. 2014</td>
<td>0.22 (0.01-3.81)</td>
</tr>
<tr>
<td>Carapetis et al. 2014</td>
<td>0.31 (0.04-2.29)</td>
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<tr>
<td>Linner et al. 2014</td>
<td>0.40 (0.13-1.27)</td>
</tr>
<tr>
<td>Overall</td>
<td>0.46 (0.26-0.83)</td>
</tr>
</tbody>
</table>

• Conclusion:
  • Adjunctive IVIG + clindamycin associated with a statistically significant reduction in mortality rate

CI: confidence interval

**Petechial/Purpuric**

- Toxic appearance ± fever
  - Palpable
    - Meningococcemia
    - Rocky Mountain spotted fever (RMSF)
  - Bacterial endocarditis
  - Disseminated gonococcal infection
- Non-palpable
  - Thrombotic thrombocytopenic purpura (TTP)
  - Disseminated intravascular coagulation (DIC)
  - Purpura fulminans

- No toxic appearance ± fever
  - Palpable
    - Autoimmune vasculitis
  - Non-palpable
    - Idiopathic thrombocytopenia (ITP)

Meningococcemia

- Disseminated infection with *Neisseria meningitidis*
  - Winter and spring months
  - Ages 6 months-1 year
- High mortality (10-20%), fatal if untreated
- Incubation period = 2-10 days
  - Disease begins 3-4 days after exposure
- Initial symptoms → upper respiratory infection

Meningococcemia

- Rash seen in >70%
  - Petechiae on wrists and ankles
  - May be mistaken for RMSF
  - Rapid spread to rest of body and development into purpuric macules
- Clinical manifestations = septic shock
- Administer antibiotics ASAP!

Meningococcemia

- Treatment:
  - Ceftriaxone IV 2 g q12h
  - Chloramphenicol IV 4 g/day for penicillin allergy
  - Vancomycin $\rightarrow$ resistant *Streptococcus pneumoniae*
  - Prophylaxis if close contact/potential exposure to respiratory secretions
    - Rifampin, ciprofloxacin, ceftriaxone
  - Steroids
    - Dexamethasone prior to antibiotics to reduce neurologic sequelae

Rocky Mountain Spotted Fever

- Tick-borne illness caused by *Rickettsia rickettsii*
  - American dog or Rocky Mountain wood tick
  - Disseminates into bloodstream and invades endothelium of blood vessels
    - Vasculitis → petechiae, hemorrhage, edema
- Rural parts of central and eastern U.S. between April and September
- High mortality (>30%) when untreated or with treatment delay
Rocky Mountain Spotted Fever

- Rash typically appears on 4th day after tick bite
  - Wrists and ankles
  - Spreads centrally to trunk and proximal extremities
  - Reddish macules that blanch with pressure → petechial and purpuric
  - “Spotless” fever in 10-15%

- Fever, headaches, myalgias, malaise, pain in calves and abdomen, third spacing

- Serologic testing
  - Generally unnecessary
  - Confirmatory after ~2 weeks

- Administer antibiotics ASAP!

Rocky Mountain Spotted Fever

- Treatment:
  - Preferred:
    - Doxycycline IV or PO 100 mg BID x 7 days (or x 2 days after temperature has normalized)
  - Alternative:
    - Chloramphenicol IV 500 mg QID x 7 days (or x 2 days after temperature has normalized)
**Dental Staining in Children on Doxycycline**

<table>
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<th>Todd et al. 2015</th>
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<td><strong>Intervention</strong></td>
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<tr>
<td><strong>Primary Outcomes</strong></td>
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</table>
Dental Staining in Children on Doxycycline

Results

- No tetracycline-like staining observed
- No significant difference in enamel hypoplasia (P = 1.0) or tooth shade (P = 0.20)

Conclusion:
- No dental staining, enamel hypoplasia, or tooth color differences with short-term courses of doxycycline at <8 years of age

Todd et al. J Pediatr. 2015;166:1246-51
Vesiculobullous

- Toxic appearance ± fever
  - Diffuse
    - Varicella
    - Smallpox
    - Disseminated gonococcal infection
    - DIC
  - Localized
    - Necrotizing fasciitis
    - Hand-foot-and-mouth disease

- No toxic appearance ± fever
  - Diffuse
    - Bullous pemphigoid
    - Pemphigus vulgaris
  - Localized
    - Herpes zoster
    - Contact dermatitis
    - Burns

Necrotizing Fasciitis

- Severe soft tissue infection
  - Tissue destruction and systemic toxicity
  - Extremities, perineum, genitalia
- High morbidity and mortality
- Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score

## LRINEC Score

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Score</th>
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<tbody>
<tr>
<td>Hemoglobin (g/dL)</td>
<td>&gt;13.5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>11-13.5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>&lt;11</td>
<td>2</td>
</tr>
<tr>
<td>White blood cell count (10^9/L)</td>
<td>&lt;15</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>15-25</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>&gt;25</td>
<td>2</td>
</tr>
<tr>
<td>Sodium (mEq/L)</td>
<td>&lt;135</td>
<td>2</td>
</tr>
<tr>
<td>Creatinine (mg/dL)</td>
<td>&gt;1.6</td>
<td>2</td>
</tr>
<tr>
<td>Glucose (mg/dL)</td>
<td>&gt;180</td>
<td>1</td>
</tr>
<tr>
<td>C-reactive protein (mg/dL)</td>
<td>≥15</td>
<td>4</td>
</tr>
</tbody>
</table>

≤5 = <50% risk (low); 6-7 = intermediate risk; ≥8 = >75% risk (high)
Necrotizing Fasciitis

• Treatment:
  • Aggressive resuscitation
  • Broad-spectrum antibiotics
    • Carbapenem OR penicillin/beta-lactamase inhibitor
    • Vancomycin or daptomycin (MRSA)
    • Clindamycin (toxin production)
  • IVIG
  • Definitive = surgical debridement

Assessment Question #2

• For which of the following dermatologic emergencies does IVIG have the most evidence as an adjunctive therapy?
  • TSS
  • STSS
  • Meningococcemia
  • RMSF
Unknown rash

History, physical exam, vitals

Red flags?

*Toxic appearance ± fever

Yes

Yes

Dermergency!

No

No

Standard care
Dermergency!

Determine diagnosis and admit to ICU or burn unit

Overall management strategies

Withdrawal of offending agent

Fluid and electrolyte management

Antipyretics and pain control

Infection management

Adjunctive therapies

Early consultation
Assessment Question #3

• Which of the following is not an overall management strategy for dermatologic emergencies?
  • Withdrawal of offending agent
  • Fluid and electrolyte management
  • Systemic steroids
  • Antipyretics and pain control
Summary

• Rash has a wide range of etiologies and is often benign but may be life-threatening

• Thorough history and physical exam is important when evaluating an unknown rash

• Prompt recognition and management of dermatological emergencies is critical
Acknowledgements

• Images:
  • QREADS
  • AccessMedicine
  • Dr. Walter Wilson, Infectious Diseases
Questions and Discussion
Meningococcemia

- Who should get prophylaxis?
  - Close contacts exposed to oral secretions
  - Prolonged contact for ≥4 hours in the week before onset of illness

- Prophylaxis regimens:
  - Rifampin PO 600 mg q12h x 2 days
  - Ciprofloxacin PO 500 mg x 1 dose
  - Ceftriaxone IM 250 mg x 1 dose