Improving outcomes for patients with Rocky Mountain spotted fever

A Tribal, State, County, and Hospital partnership

Arizona Tribal Vector Borne Diseases Meeting
February 14, 2018
Confirmed and probable RMSF cases in Arizona, 2003-2017

- Probable
- Confirmed
RMSF in Arizona
RMSF in Arizona
Clinical presentation and treatment

- Symptoms include fever, headache, muscle pain, nausea and vomiting, abdominal pain
- Some cases develop a rash
Clinical presentation and treatment

- Symptoms include fever, headache, muscle pain, nausea and vomiting, abdominal pain
- Some cases develop a rash
- Fatal if not treated
- Treatment = doxycycline
RMSF hospital transfers

• Patients frequently transferred from tribal lands to acute care hospitals in urban areas
RMSF hospital transfers

- Gaps in communication led to doxycycline discontinuation, missed diagnosis
RMSF hospital transfers

• Lack of awareness among providers about unique nature of RMSF in Arizona
Gaps in provider knowledge

ASSESSMENT:
1. Electrolyte abnormalities with hyponatremia, hypokalemia, dehydration.
2. Leukocytosis and thrombocytopenia.
3. Hypotension.
4. Elevated liver function tests.
5. Questionable tick bite.

PLAN: The patient will be admitted to the Medical Center telemetry floor. They will be rehydrated aggressively with serial labs. Will check for Lyme disease. She does complain about headaches and recent tick bite. She does have a scar on her left arm that she says she has been scratching. Once again, somewhat of a poor historian. Also, tobaccoism but denies alcoholism. Once again, will try to get hold of other family members since the patient is such a poor historian. DVT and GI prophylaxis. Previous home medications as we can find and her blood pressure tolerates.
Gaps in provider knowledge

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Clinically compatible symptoms
Report of tick bite
Gaps in provider knowledge

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Clinically compatible symptoms
Report of tick bite
Transferred from high-risk area
Gaps in provider knowledge

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Lyme disease?
RMSF transfer protocol 2012
RMSF transfer protocol 2012

Tribe
RMSF transfer protocol 2012

Tribe

State
RMSF transfer protocol 2012

Tribe

State

County
RMSF transfer protocol 2012

- Tribe
- State
- County
- Hospital
RMSF algorithm

• ALL patients from Tribal Lands or transferred from Indian Health Services

• With measureable or subjective fever

• Initiate and/or maintain doxycycline and order RMSF testing.
Evaluation of effectiveness

Before transfer protocol

After transfer protocol

January 2011

July 2012

October 2017
Improvements in outcomes
Continuous doxy through transfer

Before | After
--- | ---
17% |
Improvements in outcomes
Continuous doxy through transfer

Before: 17%  
After: 73%
Improvements in outcomes
Fatalities

Before | After
---|---
17% | 73%

Before | After
---|---
83% | 18%
Improvements in outcomes
Following treatment protocol

Plan

Plan: Follow blood culture from St. Carlos (P: 928-475-7250).

Restart oral doxycyclin (as per health department recommendation for suspected RMSF).

Follow clinically.

Discussed with mother.
Conclusions and Recommendations

• Patient treatment and outcomes improved after implementation of multi-jurisdictional partnership
Conclusions and Recommendations

• Patient treatment and outcomes improved after implementation of multi-jurisdictional partnership
• Combination of targeted education and structured communication
Acknowledgements

• Maricopa County Department of Public Health
  • Nicole Fowle
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  • Craig Levy
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  • Ron Klein
  • Tammy Sylvester

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• Hospital Partners
  • Chris Ireland, PCH
  • Esther Munoz, PCH

• Arizona Department of Health Services
  • Michael Allison
  • Kristen Herrick
  • Kenneth Komatsu
  • Heather Venkat
  • Hayley Yaglom

• Centers for Disease Control and Prevention
  • Kris Bisgard
  • Sally Ann Iverson

3/2/2018
Panel Discussion

San Carlos Apache Tribe
Jeanette Brislan, Public Health Nurse

Maricopa County Department of Public Health
Melissa Kretschmer, Epidemiologist
Craig Levy, Epizoologist

Arizona Department of Health Services
Heather Venkat, Acting State Public Health Veterinarian
Hayley Yaglom, RMSF Epidemiologist

Phoenix Children’s Hospital
Christine Ireland, Infection Preventionist
**PHOENIX CHILDREN'S Hospital**

**EMERGENCY DEPARTMENT**

**PHYSICIAN REFERRAL FORM**

<table>
<thead>
<tr>
<th>Date:</th>
<th>Time:</th>
<th>Patch</th>
<th>Courtesy Notification</th>
<th>Call Back</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Name - Unit Calling</th>
<th>Referring Facility</th>
<th>Contact Number</th>
<th>DOB</th>
<th>AGE</th>
<th>Sex</th>
<th>M</th>
<th>F</th>
</tr>
</thead>
</table>

Patient Name / Alarm Number:

Chief Complaint / Reason for Referral:

Physical Findings:

**Vital Signs:**

<table>
<thead>
<tr>
<th>Temp</th>
<th>Pulse</th>
<th>Rhythm</th>
<th>BP</th>
<th>Resp</th>
<th>G2 Sat</th>
<th>Pupils</th>
<th>Glucose</th>
<th>LOC/GCS</th>
<th>Wr</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>TIME</th>
<th>Time</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Timer</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>LEVEL 1 Activation</th>
<th>Time:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>LEVEL 2 Activation</th>
<th>Time:</th>
</tr>
</thead>
</table>

Transfer from: Scene, Outside Facility

Treatment Started:

IV, SVN, EKG, AIRWAY, SPINAL MOTION RESTRICTION, Other:

Post Medical History:

Cardiac, Seizures, DM, Asthma, Sickle Cell, Oncology, Metabolic, CP/Developmental Delay, Other:

Medications: Allergies:

Physician Orders:

**Destination:**

Transport Mode: Air, Ground, FOV

ETA:

Time Notified:

Person Notified:

Staff Signature: [Signature]

Physician Signature: [Signature]

ALS Referral: [Signature]

No Change from Post Hospital Report

See EMR for EMS Handoff Documentation

Patient Status Change:

Additional Information:

Staff Signature: [Signature]

Name of Person Notified: [Name]

Date/Time: [Date/Time]
# Trauma Activation Criteria Checklist

## Trauma Level I Activation Criteria

- Traumatic injury with signs of shock
- Penetrating injuries to the head, neck, chest, abdomen or pelvis
- Respiratory distress secondary to trauma
- Facial or tracheal injury with airway compromise
- Neurological injury with GCS <12
- Suspected spinal cord injury
- Amputation proximal to the wrist or ankle
- Crushed, de-gloved, or pulseless extremity
- Fracture of two or more proximal long bones
- Skull fractures that are both open and depressed
- Patients requiring blood products to maintain vital signs
- Traumatic cardiopulmonary arrest from trauma with or without vital signs en route
- Thoracic Esophageal button battery ingestions (following X-ray identification)

## Trauma Level II Activation Criteria

- Motor Vehicle Crashes with history of:
  - Ejection of the patient from the vehicle
  - Death of an occupant in same vehicle
  - Prolonged extrication (>20 minutes)
  - A rollover collision
  - Intrusion of 18” into passenger compartment or 12” into space occupied by patient
- Neurological injuries with a GCS 13 or 14
- Hanging or strangulation mechanisms
- Motor vehicle vs. pedestrian or bicycle crashes involving speeds > or = 10 mph
- Motorized vehicle (motorcycle, motorized scooter, ATV) vs. any object, involving speeds > or = 10 mph
- Falls > 1 story or 10 feet
- Trauma transfers less than 12 hours from injury with a grade 3, 4 or 5 solid organ injury has had recent hemodynamic instability or recent signs of bleeding but does not meet Level 1 criteria
- Trample injuries (horse, cow, etc.)

**NOT APART OF THE PATIENT RECORD**

## Justification:

**Decision By:**

ED Attending
ED Fellow
CS
TCCNL

CS/TCCNL Printed Name
**PEDIATRIC SEPTIC SHOCK COLLABORATIVE TRIAGE TRIGGER TOOL**

Patient presents to the ED with concern for infection and/or temperature abnormality (in the ED or within 4 hrs of presentation)?

- **NO**
  - Exclude from shock triage tool. Continue routine triage process

- **YES**
  - Continue assessment at triage

  General assessment:
  - Is patient critically ill?

  - **YES**
    - Transfer patient to a resuscitation room and immediately alert physician / resuscitation team

  - **NO**
    - Continue shock triage tool
      - Obtain a full set of vital signs including blood pressure and temperature
      - Perform a brief history and physical exam assessing mental status, skin, pulses and capillary refill/perfusion
      - Is the patient a high-risk patient? (see Table 1)

**Septic Shock Checklist**

- Temperature abnormality (Table 2)
- Hypotension (Table 2)
- Tachycardia (Table 2)
- Tachypnea (Table 2)
- Capillary refill abnormality (Table 3)
- Mental status abnormality (Table 3)
- Pulse abnormality (Table 3)
- Skin abnormality (Table 3)

- **YES**
  - Initiate/continue the Septic Shock protocol/pathway using the Septic Shock Order Set, and mobilize resources

- **NO**
  - Does patient meet 3 or more of the 8 clinical criteria, OR
    - Does high-risk patient meet 2 or more of the 8 clinical criteria?

  - **YES**
    - Identify the patient as meeting septic shock triage criteria, transfer to a room immediately and alert physician

  - **NO**
    - Continue routine triage process

  - **YES**
    - Does physician assessment concur with triage assessment?

      - **NO**
        - Continue routine care

      - **YES**
        - Continue assessment at triage

**Table 1. High Risk Conditions**

- Malignancy
- Asplenia (including SCD)
- Bone marrow transplant
- Central or indwelling line/catheter
- Solid organ transplant
- Severe MR/CP
- Immunodeficiency, immunocompromise or immunosuppression

**Table 2. Vital Signs (PALS)**

<table>
<thead>
<tr>
<th>Age</th>
<th>Heart Rate</th>
<th>Resp Rate</th>
<th>Systolic BP</th>
<th>Temp (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 d – 1 m</td>
<td>&gt; 205</td>
<td>&gt; 60</td>
<td>&lt; 60</td>
<td>&lt;36 or &gt;38</td>
</tr>
<tr>
<td>≥ 1 m - 3 m</td>
<td>&gt; 205</td>
<td>&gt; 60</td>
<td>&lt; 70</td>
<td>&lt;36 or &gt;38</td>
</tr>
<tr>
<td>≥ 3 m - 1 r</td>
<td>&gt; 190</td>
<td>&gt; 60</td>
<td>&lt; 70</td>
<td>&lt;36 or &gt;38.5</td>
</tr>
<tr>
<td>≥ 1 y - 2 y</td>
<td>&gt; 190</td>
<td>&gt; 40</td>
<td>&lt; 70 + (age in yr x 2)</td>
<td>&lt;36 or &gt;38.5</td>
</tr>
<tr>
<td>≥ 2 y - 4 y</td>
<td>&gt; 140</td>
<td>&gt; 40</td>
<td>&lt; 70 + (age in yr x 2)</td>
<td>&lt;36 or &gt;38.5</td>
</tr>
<tr>
<td>≥ 4 y - 8 y</td>
<td>&gt; 140</td>
<td>&gt; 34</td>
<td>&lt; 70 + (age in yr x 2)</td>
<td>&lt;36 or &gt;38.5</td>
</tr>
<tr>
<td>≥6 y - 10 y</td>
<td>&gt; 140</td>
<td>&gt; 30</td>
<td>&lt; 70 + (age in yr x 2)</td>
<td>&lt;36 or &gt;38.5</td>
</tr>
<tr>
<td>≥ 10 y - 13 y</td>
<td>&gt; 100</td>
<td>&gt; 30</td>
<td>&lt; 90</td>
<td>&lt;36 or &gt;38.5</td>
</tr>
<tr>
<td>&gt; 13 y</td>
<td>&gt; 100</td>
<td>&gt; 16</td>
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<td>&lt;36 or &gt;38.5</td>
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**Table 3. Exam Abnormalities**

<table>
<thead>
<tr>
<th>Pulses (central vs. peripheral)</th>
<th>Cold Shock</th>
<th>Warm Shock</th>
<th>Non-specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased or weak</td>
<td>Bounding</td>
<td></td>
<td></td>
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</table>

| Capillary refill (central vs. peripheral) | ≥ 3 sec | Flash (< 1 sec) |

| Skin | Mottled, cool | Flushed, ruddy, erythroderma (other than face) | Petechiae below the nipple, any purpura |

| Mental status | Decreased, irritability, confusion, inappropriate crying or drowsiness, poor interaction with parents, lethargy, diminished arousability, obtundation |
THANK YOU

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