Skin Infection Knowledge, Attitudes, and Practices Among Alaska Native People — Three Rural Alaska Communities, 2012

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Arctic Investigations Program
Grand Rounds
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Request for CDC Assistance

- May 17, 2012: Medical Director from Yukon Kuskokwim Health Corporation contacted the Arctic Investigations Program (AIP)
- Anecdotal increase in skin and soft tissue clinical encounters in southwestern Alaska

Water and Sanitation in Alaska

- 20% rural homes lack running water, flush toilets
- Alaska Natives suffer disproportionate burden of water and sanitation related diseases
- Significant challenges with providing water and sanitation services in remote areas
  - Material transport
  - Engineering challenges with extreme Arctic conditions
  - Cost-prohibitive

Skin and Soft Tissue Infections

- Boil: an infection under the skin that causes a painful, pus-filled lump
  - Furuncle: deep infection of the hair follicle
  - Carbuncle: a collection of furuncles

Staphylococcus aureus

- Common cause of skin infection
- Spread by direct contact
- Colonizes skin and nasal sinuses
  - 25-30% of US population
- Antibiotic resistance, emerging public health concern
  - MRSA: Methicillin-resistant Staphylococcus aureus
  - MSSA: Methicillin-sensitive Staphylococcus aureus

Early Documentation of Boils in Alaska

- Historically high rates of skin, soft tissue infections
  - Documented as early as 1842 in the Yukon River Delta

Lavrenty Zagoskin
Investigation Links Steambaths to Boils
- 1996 Outbreak investigation
  - ~25% of population reported having a boil during previous 12 months
- Risk factors for boils:
  - Traditional sauna or "Steambath" use
  - Steam with more than 8 people
  - Not sitting on a protective barrier
  - Household member with boil

Boil Outbreak Associated with Community Acquired MRSA
- 2000 Skin infection outbreak reported
  - 10-fold increase in MRSA isolates
  - 75% of MRSA+ cultures: no classic risk factors
  - Nasal carriage: 40% MRSA; 33% MSSA
- Risk factors identified:
  - Antimicrobial drug use within previous 12 months
  - Crowded steambaths
  - Household member with boils
  - MRSA colonized steambaths

MRSA Colonized Steambaths
- Surfaces contained a biofilm matrix with coccoid organisms consistent in size and shape with staphylococci
- Bacterial cultures of wood samples from steambath seating areas grew MRSA

Public Health Response
- Standardized treatment guidelines
  - Emphasized incision and drainage
  - Adjusted antibiotic regimens
- Educational messages developed:
  - Disinfect steambaths with bleach after use
  - Use barriers while seated in steambaths
  - Limit crowding in steambaths
  - Avoid using steambath with skin infections
  - Avoid sharing towels

Traditional Steambaths
- Maqiq: traditionally used for personal hygiene
  - Extremely hot temperatures inside
  - Basin baths after steaming
  - "Scrub" to scour skin clean
- Cultural, social significance
  - Men steam first
  - Women, children second
  - Fun, enjoyable
Inside a Steambath

- Inside height ~1.25 meters

Stakeholder Working Group

- Arctic Investigations Program
- Alaska State Health Department
- Yukon Kuskokwim Health Corporation
- Hospitalization for skin infections common
  - 6th most common reason in Southwest Alaska in 2005
  - 10th most common reason statewide in 2007

Hospitalization for skin infections common

- 6th most common reason in Southwest Alaska in 2005
- 10th most common reason statewide in 2007

Descriptive Epidemiology


ICD9 Coded Skin Infection Encounter Rates by Community, Year (per person-year)

<table>
<thead>
<tr>
<th>Community</th>
<th>Average</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chefornak</td>
<td>1.65</td>
<td>1.65</td>
<td>1.82</td>
<td>2.11</td>
<td>2.23</td>
</tr>
<tr>
<td>Toksook Bay</td>
<td>1.13</td>
<td>1.04</td>
<td>1.12</td>
<td>1.41</td>
<td>1.60</td>
</tr>
<tr>
<td>Kwethluk</td>
<td>0.85</td>
<td>0.79</td>
<td>1.10</td>
<td>0.88</td>
<td>0.63</td>
</tr>
<tr>
<td>Katiguak</td>
<td>0.62</td>
<td>0.61</td>
<td>0.67</td>
<td>0.61</td>
<td>0.60</td>
</tr>
<tr>
<td>Scammon Bay</td>
<td>0.61</td>
<td>0.81</td>
<td>0.76</td>
<td>0.61</td>
<td>0.39</td>
</tr>
<tr>
<td>Atlin Lake</td>
<td>0.57</td>
<td>0.41</td>
<td>0.60</td>
<td>0.52</td>
<td>0.72</td>
</tr>
<tr>
<td>Kongiganak</td>
<td>0.52</td>
<td>0.51</td>
<td>0.38</td>
<td>0.44</td>
<td>0.52</td>
</tr>
<tr>
<td>Aklakvik</td>
<td>0.51</td>
<td>0.22</td>
<td>0.39</td>
<td>0.60</td>
<td>0.80</td>
</tr>
<tr>
<td>Hooper Bay</td>
<td>0.48</td>
<td>0.21</td>
<td>0.44</td>
<td>0.57</td>
<td>0.66</td>
</tr>
<tr>
<td>Newtok</td>
<td>0.47</td>
<td>0.43</td>
<td>0.54</td>
<td>0.47</td>
<td>0.44</td>
</tr>
<tr>
<td>All Villages</td>
<td>0.37</td>
<td>0.23</td>
<td>0.36</td>
<td>0.28</td>
<td>0.19</td>
</tr>
</tbody>
</table>

Plan of Action for Reducing Skin and Soft Tissue Infections in Rural Southwest Alaska

- Descriptive Epidemiology
- Knowledge, Attitudes, and Practices Survey
- Intervention Strategy
- Post-Intervention Evaluation

Epi-Aid Investigation

- September 13, 2012 Epi-Aid requested
- Evaluation of community knowledge, attitudes, and practices (KAP)

- Three member teams conducted interviews

- Three communities
  - Toksook Bay: Sep. 30–Oct. 8, 2012
**KAP Survey Objectives**

- Determine the knowledge of boil risk factors
- Identify current practices for prevention of boils
- Describe barriers to implementing previous recommendations
- Evaluate acceptability of potential interventions

**Methods**

- **Cross-Sectional Mixed-Methods Approach**
  - Hospital surveillance
  - Quantitative: 40 fixed answer questions
  - Qualitative: 28 open-ended questions
  - Ethnographic observation

- **Survey administered in person**
  - ≥18 years of age
  - 2 persons per household
  - Interviews ~25 minutes each

**Methods**

- **Villages Selection**
  - Highest rates of skin infection encounters
- **US Census information**

**Data Analysis**

- **Quantitative data**
  - Double data entry
  - STATA v10
- **Qualitative data**
  - Double data entry
  - Analyzed for general themes: Health Belief Model
  - Susceptibility, Severity, Barriers, Benefits
  - Coded twice independently

**Survey Tool**

- **Knowledge**:
  - Boil identification
  - Boil risk factors
- **Attitudes**:
  - Severity of boils
  - Boil treatment
- **Practices**:
  - Laundry
  - Personal hygiene
  - Steambath cleaning

**RESULTS**
KNOWLEDGE

What is a boil?

- **Traditional understanding:**
  - "Aninguag; a little person in there with pus"
- **Infection:**
  - "Bacteria, it can have MRSA"
  - "Infection from being dirty"
- **Visual:**
  - "Large pimple"
- **Feeling:**
  - "A bad thing. They make me sick and depressed"

How do you know if you have a boil?

- **Visual:**
  - "a regular pimple that gets bigger"
- **Prior experience:**
  - "My son has them"
  - "I have had one before"
- **Sensation:**
  - "Painful, itching, irritating"

Percent of People Endorsing Getting Boils

<table>
<thead>
<tr>
<th>By sharing clothes or towels</th>
<th>Chefornak</th>
<th>Toksook Bay</th>
<th>Kwethluk</th>
</tr>
</thead>
<tbody>
<tr>
<td>By touching other people</td>
<td>91%</td>
<td>84%</td>
<td>90%</td>
</tr>
<tr>
<td>By touching other peoples’ boils</td>
<td>87%</td>
<td>80%</td>
<td>88%</td>
</tr>
</tbody>
</table>

Stay away from people with boils

Be clean, wear clean clothes, and use clean towel to sit on

Clean fingernails and hands, washing and (be) careful where scratching
How can a person get a boil?

- **Hygiene as a risk factor:**
  - "Not cleaning steam or house or clothes"
  - "Slimy sauna surfaces"

- **Steaming as a risk factor:**
  - "Contagious bacteria by passing in steamhouse"
  - "If I go to another person's steam I can probably get a boil"

- **Idiopathic responses uncommon:**
  - "I'm not sure, it seems like they just grow on people"

Would you worry about steaming with a person that has a boil?

<table>
<thead>
<tr>
<th></th>
<th>Chefornak</th>
<th>Toksook Bay</th>
<th>Kwethluk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent ENDORSING WORRY</td>
<td>84%</td>
<td>65%</td>
<td>71%</td>
</tr>
</tbody>
</table>

"They can spread (boils) with their leaking pus"

"Where they sit... it could spread. Should wash the steam if someone with a boil sat there"

***

"You should not shun people with the illness because it will be more likely that it will come [to you]"

How Serious Is It To Get a Boil?

<table>
<thead>
<tr>
<th></th>
<th>Chefornak</th>
<th>Toksook Bay</th>
<th>Kwethluk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very serious</td>
<td>56%</td>
<td>53%</td>
<td>50%</td>
</tr>
<tr>
<td>Somewhat serious</td>
<td>40%</td>
<td>34%</td>
<td>41%</td>
</tr>
<tr>
<td>Not very serious</td>
<td>4%</td>
<td>11%</td>
<td>9%</td>
</tr>
</tbody>
</table>

"It can enter tissue ... and it might go to the heart"

"It is going to spread ... usually 2 others will appear"

"It can get in your blood and you can die, my cousin died from Staph in the blood"

What Are the Best Ways to Cure Boils?

<table>
<thead>
<tr>
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<th>Chefornak</th>
<th>Toksook Bay</th>
<th>Kwethluk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lancing / Draining</td>
<td>50%</td>
<td>42%</td>
<td>49%</td>
</tr>
<tr>
<td>Frequent washing</td>
<td>21%</td>
<td>35%</td>
<td>28%</td>
</tr>
<tr>
<td>Drugs given by health center</td>
<td>32%</td>
<td>30%</td>
<td>22%</td>
</tr>
<tr>
<td>Bandage and ointment</td>
<td>24%</td>
<td>20%</td>
<td>31%</td>
</tr>
<tr>
<td>Traditional / Herbal remedies</td>
<td>13%</td>
<td>14%</td>
<td>8%</td>
</tr>
</tbody>
</table>

96% of people said that boils can be cured
Village Water Sources

- Piped water service

- Self-haul Treated

- Self-haul Natural

Strict Water Conservation Practices

- Water is difficult to collect
- High cost
- Difficult to transport

Average Daily Use: 1–2 gallons (~3.75–7.6 liters)
- SPHERE minimum: 7.5–15 liters per person per day

<table>
<thead>
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<th>Chefornak</th>
<th>Toksook Bay</th>
<th>Kwethluk</th>
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</thead>
<tbody>
<tr>
<td>Piped Water</td>
<td>2%</td>
<td>70%</td>
<td>6%</td>
</tr>
<tr>
<td>(% households)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Haul Treated</td>
<td>82%</td>
<td>29%</td>
<td>29%</td>
</tr>
<tr>
<td>(% households)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Haul Natural</td>
<td>93%</td>
<td>27%</td>
<td>94%</td>
</tr>
<tr>
<td>(% households)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Average Daily Use:
- Drinking: 2–4 gallons (~7.5–15 liters)
- Cooking: 1–2 gallons (~3.75–7.6 liters)
- Personal washing: 1 gallon (~3.75 liters)
- Washing clothes: 1–2 gallons (~3.75–7.6 liters)
- Cleaning home: 1–2 gallons (~3.75–7.6 liters)
- Sanitation and waste disposal: 1 gallon (~3.75 liters)

Average Daily Use per Person:
- Drinking: 1–2 gallons (~3.75–7.6 liters)
- Cooking: 1–2 gallons (~3.75–7.6 liters)
- Personal washing: 1 gallon (~3.75 liters)
- Washing clothes: 1–2 gallons (~3.75–7.6 liters)
- Cleaning home: 1–2 gallons (~3.75–7.6 liters)
- Sanitation and waste disposal: 1 gallon (~3.75 liters)
Impacts of Water Conservation

- Laundry
- Hand washing
- Personal hygiene

Laundry in Homes Without Running Water

- Most washers are portable, "Danby"
  - ~10 lb clothes
  - ~15 gallons of water
- Two separate parts:
  - "Washer" / agitator
  - "Spinner" / dryer
- Drainage tube used to drain or recycle water

Laundry Drying Practices

- Homes do not have dryers and often the dryers are not used in the washeteria due to cost (~$7 per load)

Where is Laundry Done?

<table>
<thead>
<tr>
<th></th>
<th>Chefornak</th>
<th>Toksook Bay</th>
<th>Kwethluk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>92%</td>
<td>77%</td>
<td>37%</td>
</tr>
<tr>
<td>Washeteria</td>
<td>0%</td>
<td>0%</td>
<td>63%</td>
</tr>
<tr>
<td>Family, friends</td>
<td>8%</td>
<td>24%</td>
<td>1%</td>
</tr>
</tbody>
</table>

- When public facilities are available, two-thirds of communities use this resource

How Often is Laundry Done?

<table>
<thead>
<tr>
<th></th>
<th>Chefornak</th>
<th>Toksook Bay</th>
<th>Kwethluk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average per Week</td>
<td>1.6</td>
<td>2.6</td>
<td>1.5</td>
</tr>
</tbody>
</table>

- Laundry is done more often when piped water is available (P <0.001)

Danby Water Recycling

- Concerns about unsafe water conservation practices noted early in investigation
- Question added to determine water "recycling"
Water is recycled more often in villages without running water ($P < 0.001$)

- **How Many Loads Are Washed Before the Water is Changed?**
  
<table>
<thead>
<tr>
<th></th>
<th>Chefornak</th>
<th>Toksook</th>
<th>Kwethluk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Number of Loads per Change of Water</td>
<td>4.1</td>
<td>1.2</td>
<td>2.8</td>
</tr>
</tbody>
</table>

- **Hand Washing: Plumbing but No Hookup**

- **Hand Washing Practices**

<table>
<thead>
<tr>
<th></th>
<th>Chefornak</th>
<th>Toksook</th>
<th>Kwethluk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Number of Household Sinks</td>
<td>2.0</td>
<td>1.9</td>
<td>2.0</td>
</tr>
<tr>
<td>Mean Number of Household Sinks with Running Water</td>
<td>0.0</td>
<td>1.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Mean Number of Times Hands Washed per Day</td>
<td>4.3 M, 5.8 F, 4.5 M, 5.5 F, 4.2 M, 5 F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Women hand wash more frequently ($P < 0.001$)
- Back of envelope: 10 hand washes per water change

- **How often do you ...?**

<table>
<thead>
<tr>
<th></th>
<th>Chefornak</th>
<th>Toksook</th>
<th>Kwethluk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shower (Average per Week)</td>
<td>0.3</td>
<td>1.1</td>
<td>0.8</td>
</tr>
<tr>
<td>Steam (Average per Week)</td>
<td>3.7</td>
<td>2.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Always use an abrasive scrub during steambath</td>
<td>98%</td>
<td>97%</td>
<td>98%</td>
</tr>
<tr>
<td>Share scrub with others</td>
<td>25%</td>
<td>21%</td>
<td>25%</td>
</tr>
<tr>
<td>Always use a towel to dry off after steaming</td>
<td>100%</td>
<td>99%</td>
<td>98%</td>
</tr>
<tr>
<td>Share your towel with others</td>
<td>19%</td>
<td>10%</td>
<td>17%</td>
</tr>
</tbody>
</table>

- **Frequency of Steambath Cleaning by Household**

<table>
<thead>
<tr>
<th></th>
<th>Chefornak</th>
<th>Toksook</th>
<th>Kwethluk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1x week</td>
<td>2%</td>
<td>9%</td>
<td>25%</td>
</tr>
<tr>
<td>1–2x week</td>
<td>35%</td>
<td>36%</td>
<td>41%</td>
</tr>
<tr>
<td>≥3x week</td>
<td>63%</td>
<td>55%</td>
<td>35%</td>
</tr>
</tbody>
</table>

- All respondents said they use either:
  - Diluted Clorox
  - Hexol
  - Pinesol

- **Summary**

  - **Knowledge**
    - No major misconceptions
    - Prior public health educational messages were understood and accepted

  - **Attitudes**
    - Communities believe boils are a problem
    - Motivated to prevent boils
    - "because [boils] can cause sepsis and kill"
Summary

- Practices
  - Identification of practices that can be improved
  - Hand washing
  - Laundry
  - Steamhouse cleaning
  - Sharing hygiene items

Limitations

- ICD9 data reflect encounters, not incidence of boils
- Under-reporting of boils likely
  - Cultural preferences for care at home
  - "I use topical alcohol wipes when the boil is starting or Pinesol; [then] tobacco leaves to cover them; [then] hot pack; [then] open the boil and put gauze in the wound...if it doesn't go away...I go to the clinic"
- Self reported data from interviews
  - Social desirability of answers

Next Steps

- Expand descriptive epidemiology
  - Microbiological data
- Develop educational materials for:
  - Laundering practices
  - Hand washing
  - Steambath/Washeteria cleaning
- Diminish barriers to implement practice
  - Laundry service access (e.g., dryer tokens)
  - Hand sanitizer
  - Bleach / cleaning supplies

Next Steps (2)

- Role for environmental testing
  - Laundry machines
  - Hand washing basins
  - Sinks
  - Public showers