How Rural is Rural?
Welcome to the Great Land

Michael Levy MD
Medical Director Anchorage Fire Department
Affiliate Assoc Prof UAA WWAMI
Financial Disclosure
Michael Levy MD

- None
With Rural and Remote...

Size Does Matter
Alaska

- 663,228 sq mi
- Width 2261 mi
- Length 1420 mi
- Population 710,231
Toronto, thank you!

I DON'T ALWAYS SMOKE CRACK

BUT WHEN I DO, IT'S IN A DRUNKEN STUPOR

Look, Shiny object!

YAAAAAAAAAAAYY!!!
What’s the difference between “Rural” and “Remote”?
Hint: How much of Alaska is connected by roads?
Health Care Facts

- 75% of Ak Communities not reachable by road
- 24 acute care hospitals in AK
  - 14 with <50 beds
- Anchorage and Matsu Valley 6 hospitals
History Quiz
Has US soil ever been occupied by a foreign force in the past 100 years?
Bleak, mountainous Attu Island in Alaska had a population of only about 46 people prior to the Japanese invasion. On June 6, 1942, a Japanese force of 1,100 soldiers landed, occupying the island. One resident was killed in the invasion, the remaining 45 were shipped to a Japanese prison camp near Otaru, Hokkaido, where sixteen died while in captivity. This is a picture of Attu village situated on Chichagof Harbor. (O. J Murie/LOC)
A heavily damaged midget submarine base constructed by occupying Japanese forces on Kiska Island, photo taken sometime in 1943, after Allied forces retook the island. (U.S. Navy)
Nuke Tests in Alaska
You betcha!
On June 3, 1942, a Japanese aircraft carrier strike force launched air attacks over two days against the Dutch Harbor Naval Base and Fort Mears in Dutch Harbor, Alaska. In this photo, bombs explode in the water near Dutch Harbor, during the attack on June 4, 1942. (U.S. Navy)
Unalaska (Dutch Harbor)
Prudhoe Bay
How Did the Iditarod get its start?
Unique Alaska Roadtrips
Bethel
Does Vast Roadlessness Matter?

Just Send a “Chopper”
Crew Member with "bad diabetes" on a foreign flagged vessel in Bering Sea.
PJs deploy RamZ from C130 and follow in with parachutes
Board the vessel via Jacob ladder
Findings?
A few missions
Cold Bay, Alaska

A generator mount breaks and injures a crewman’s leg
Coast Guard Rescues injured party from ship
What is an immersion injury?
What is a Honey Bucket?
Honey bucket lake

BTW: Do you ever call your sweetie “Honeybucket”?
Sewage Lagoon Immersion

• 3 yo playing w cousin on ice of sewage lagoon, fell through

• Extricated by adults and CPR started

• Medivac crew: child listless, unresponsive, low sats

• RSI: suctioned 100-150 of sewage from lungs

• Transported to small regional hospital
Sewage Lagoon Immersion (cont)

• Severe problems with compliance (surfactant washout?)

• Transferred with three crewmembers to Anchorage

• Oscillating ventilator

• Long hospital course with multi-organism pneumonia (8 different organisms)

• 1 month in hospital then discharged fully recovered
Sewage Lagoon Immersion: Follow up

- From the medic:

- “Three years later I was in Chefornak picking up that kid's 100 year old great grandmother, and a woman kept looking at me from across the room. It was the child's mother who thanked me for saving her son and introduced him to me again. It was one of those rare, gratifying moments as a caregiver when you are fortunate enough to meet your patient again”
Bariatrics

- Lear 35 dispatched to Southeast Alaska for obese male with severe Pickwickian syndrome
- We called for weight and girth measurements
- They were woefully optimistic
Bariatrics

- Actual weight 750#
- Who you gonna call?

When the C-130 arrived, he was moved by forklift and the bed was attached to a large metal pallet and slid into the back of the aircraft. We didn't have a 50psi port that would hook up to the ventilator, so we got all the small O2 bottles we could find and the flight surgeon with us took on the task of changing out O2 bottles frequently. That was the first and only flight where I was able to move around all sides of a patient unobstructed.
Ventilatory Failure (x3)

- Family of three
- Difficulty swallowing
- Facial palsy
- Blurred vision
- Ptosis
- Respiratory distress
- Nausea and cramps
- Paralysis

Quinhagak

WTF?
Botulism

Fermented whale skin with blubber.

from: Beller, Gessner, Wainwright, Barrett: Botulism in
History of botulism

• First studied after outbreak in Wildbad, Germany 1793: 6 deaths related to blood sausage

• Subsequent study of 230 cases, illness became known as “botulism” after “botulus”, Latin for sausage.
History of botulism

• 1897: botulism established as an intoxication, not infection and that the toxin was produced by obligate anaerobe: Clostridium botulinum. Also showed that the toxin was inactivated by heat.

• 1904-1978: different strains identified (A-G). Principal types are A,B and E
Mechanism

- Blocks the release of acetylcholine at the NMJ.
- Irreversible
Botulism in the Arctic

- *First reported outbreaks in the early 1900’s*
- *Over 200 outbreaks reported*
- *Overall case fatality rate is about 20%*
- *Most is type E*
Botulism in the Arctic

- *Lower 48*: usually associated with improper canning
- *Native outbreaks involve fermented (putrefied) foods*: whale, seal, fish, salmon eggs, beaver, caribou
Causes of Toxin Formation

- Inadvertent spoilage
- Stink foods: stink eggs, stink heads. Traditionally are buried in moss-lined pits and covered by turf and left for months. Modern method is to instead use plastic bag or jar: Increases risk of botulism toxin
Wooden barrel with plastic lid used to ferment salmon heads.
Clinical

- History: recent consumption of Alaska Native foods
- Incubation period 12-36 hours; severely affected patients may have symptoms in 6 hours.
- Delay of onset of up to 10 days has been reported
- Affected systems: GI, Neuro, Muscular
GI/Urinary

• *Earliest initial symptom*
• *Nausea/vomiting/diarrhea*
• *Ileus may be severe*
• *Urinary retention*
Neurologic

- Dryness of mucous membranes
- Ocular: diplopia, blurry vision, fixed or dilated pupils, ptosis (classic)
- Progressive descending paralysis: Cranial nn’s, neck, upper arms, trunk and diaphragm, last are hands and legs
Muscular

- Skeletal mm weakness: fatigue, shoulder, neck truncal weakness, dyspnea.

- Precipitous deterioration of respirations is cause of most deaths. Paralysis may impair patient’s ability to demonstrate their dire situation.
Differential Diagnosis

- Likely symptoms in Alaska Native after consuming traditional foods is Botulism until proven otherwise
- Diptheria (fever, pharyngeal exudate)
- Drug ingestion
- Gastroenteritis
Differential Diagnosis

- Guillain-Barre syndrome: ascending paralysis, no DTRs, sensory findings
- Myasthenia gravis: slow progression
- PSP: hx, presence of sensory findings
- Polio: muscle denervation findings
- Stroke: asymmetry; absence of GI
Diagnostic Pentad

- Nausea or vomiting
- Dysphagia
- Diplopia
- Dilated, fixed pupils
- Dry throat
- 3 or more present and consumption of Alaska Native foods: strongly suspect!
Treatment

- *Frequent FVC: if marginal intubate*
- *NGT*
- *Antitoxin*
Antitoxin

- Trivalent(ABE) horse serum: no documented cases of serum sickness or anaphylaxis in Alaska
- Acts by binding circulating toxin
- Does not reverse binding that has already occurred
Outcomes

• 33% of patients had continuing neurlogic and muscular deterioration

• Botulism in Alaska seems to be of shorter duration than described elsewhere
Botulism is a potentially life-threatening condition.

Symptoms can progress to ventilatory failure rapidly.

Diagnosis is initially clinical based upon food history and “pentad” (N/V, dry mouth, diplopia, dysphagia, dilated fixed pupils).
The run of RSV up in Barrow was definitely memorable as well. If I'm not mistaken, before it was all over we hauled 21 intubated children out of there. We would fly up there for one child and walk into the ER to find three intubated children being bagged. It was a nasty run of RSV but I also think it was found that the physician up there was being quite aggressive in his treatment. I went up two more times for children that certainly had RSV and were breathing 70-80 times per minute, but were not tired out and were certainly no worse than dozens of kids we’d flown out on the delta. I had to call Dr. Gonzalez, give her a report and have her speak with him and tell him we were going to tranport the children without intubating them.
Severe respiratory syncytial virus disease in Alaska native children. RSV Alaska Study Group.

Source
Center for Immunization Research, Johns Hopkins University School of Hygiene and Public Health, Baltimore, MD 21205, USA. rkarron@jhsph.edu

Abstract
Hospitalization rates for respiratory syncytial virus (RSV) infection range from 1 to 20/1000 infants. To determine the rate and severity of RSV infections requiring hospitalization for infants in the Yukon-Kusokkowim (YK) Delta of Alaska, a 3-year prospective surveillance study was conducted. The annual rate of RSV hospitalization for YK Delta infants <1 year of age was 53-249/1000. RSV infection was the most frequent cause of infant hospitalization. RSV disease severity did not differ among non-high-risk infants in the YK Delta and at Johns Hopkins Hospital (JHH). On average, 1/125 infants born in the YK Delta required mechanical ventilation for RSV infection. During the peak season, approximately $1034/child <3 years of age was spent on RSV hospitalization in the YK Delta. In YK Delta infants <6 months old, RSV microneutralizing antibody titers <1200 were associated with severe disease (odds ratio=6.2, P=.03). In the YK Delta and at JHH, newborns may be at greater risk for severe RSV illness than previously thought.

1/125 infants in YK Delta required mechanical ventilation due to RSV!!
RSV Hospitalizations in AI/AN

- YK Delta Alaska Native infants – RSV hospitalization rate 156 per 1000 compared with 34 per 1000 for U.S.

- YK high risk infants with prematurity, chronic lung disease, chronic heart disease - RSV hospitalization rate 439 per 1,000

- Alaska Natives - high hospitalization rates for wheezing in the first 4 years of life.
Can a hospital 500 miles from nowhere and with no road system go on Divert?

- Ummm...Yep.