Caring for Little People in the Big Sky Country:
Navigating Pediatric Hospital Medicine in Montana, a Frontier Medicine State

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Pediatric Hospitalist
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Disclaimers:

- No financial disclosures

- I continue to learn more every day about the healthcare system in Montana
- Medically underserved areas are not unique to Montana

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Objectives:

- Overview of Montana and the landscape of pediatric medicine here
  - Limitations/challenges
  - Rewards/privileges
- Describe a bit of what life is like as a community pediatric hospitalist in Missoula
- Review a few interesting cases in more detail to highlight how we navigate care here

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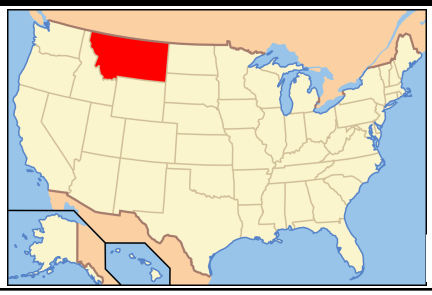
MONTANA



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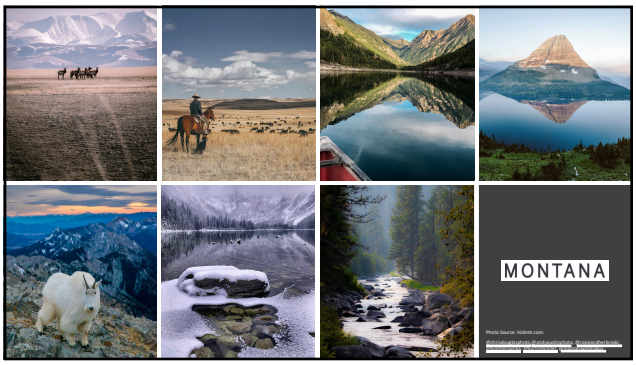

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MONTANA

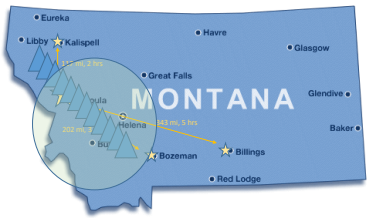

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Photo Source: google photos

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MONTANA Pediatrics Overview

- 5 Pediatric Hospitalist Programs in the state
- 146 Montana AAP members
- Goal to keep kids as close to home as often (and as safely) as possible

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Distance from Tertiary/Quaternary Children's Hospitals

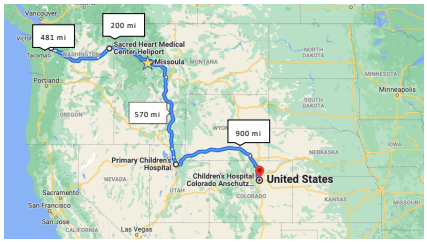

Photo Source: google photos

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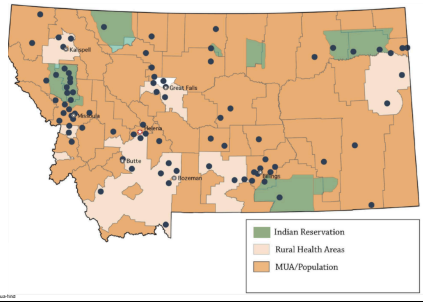
Medically Underserved Regions



Map Source: Sarah Holewa, MD https://data.hrsa.gov/tools/shortage-area/mua-hmz

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Considerations for Montana



Photo Sources:
https://m.washingtontimes.com/news/2017/oct/19
https://www.kpax.com/news/western-montana-news/snow-bringing-slick-roads-to-western-montana
https://missoulacurrent.com

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Considerations for Montana

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Community Hospital Medicine:

- 2012: ~70% of pediatric hospitalizations occur in general hospitals
- 2018: ~25% of American children experienced increase in distance to inpatient pediatric services
  - Disproportionately affecting rural and micropolitan areas
- Each CHMP is unique- roles align with hospitals and communities served
- Frequently, independently covering for all of pediatrics: inpatient, consults, deliveries, etc

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Missoula Pediatrics Overview

- Community Medical Center
  - 151 Beds, 13 ped unit, 2 PICU beds, Level III NICU
- St. Patrick Hospital
  - 237 Beds, Admit to Med/Surg, 7 bed maternity unit w/ 3 SCN beds
  - Level II Trauma

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Missoula Pediatrics Overview

- Inpatient pediatrics
  - Direct admissions from local clinics
  - Transfers from referring hospitals
  - ED admissions
- ED consults
- Degree of critical care management
- Local phone consultations
  - Birthing centers
  - EDs
  - PCPs
- Infusion program patients
- Sedation program (Pediatric intensivist)
- Surgical patient co-management
- Newborn nursery rounding, deliveries

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Missoula Pediatrics Overview

- Advocacy
  - Local, statewide
  - Hospital Committees
- Education
  - Medical Student
  - Resident (Family Medicine, Pediatrics)
  - Outreach

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Interesting cases:

Scurvy	V-tach in DKA patient	Bilateral PEs, DVT -> IVC in setting of Catastrophic antiphospholipid syndrome	Capnocytophaga(?) complicated pneumonia
Rocky Mountain Spotted Fever	Systemic Sclerosis(?) presenting as FTT	Dilated cardiomyopathy due to aberrant ventricular conduction	Tularemia

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Spectrum of Medical Complexity:

- Heart transplant patient (in conjunction with Seattle Children's Heart Failure Team)
- Pyruvate Carboxylase Deficiency (in conjunction with Shodair Genetics and CHCO Metabolics)
- TPN dependent short gut patients (in conjunction with local Pediatric GI)
- Trach/Vent dependent ex-premature patients (in conjunction with local Pediatric Pulmonary)
- Bardet- Biedl Syndrome with cardiomyopathy and CKD (in conjunction with Seattle Children's Nephrology team)
- AND anyone can walk through the door (ED door) at any given time, ie Bone Marrow Transplant patient, etc

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My very own clinical conundrums:

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7pm: Referral line call from outside hospital

Referring hospital is a critical access hospital approximately 50 minutes away

10-year-old female presenting with acute onset altered mental status during indoor soccer game

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HPI:

- Previously healthy, vaccinated
- Parents have been out of town for the past few days, until earlier today . Pt stayed at her maternal aunt's house 2 nights ago, and last night stayed over at a friend's house (supervised). Aunt and friend's mother reported no unusual behaviors, sick symptoms, or concerns.
- During game: slowed, looked dizzy, weak, and unstable gait.
- Bifrontal headache. No syncopal event, but rather was helped to sideline and parents were called. Maternal aunt picked her up and she started with NBNB emesis in route home, so brought to ED instead.
- No report of trauma, collisions by witnesses. Patient denies head injury.

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ROS, Past Medical, Family Hx:

- Family report no recent fevers, cough, congestion. No vomiting prior to tonight. No diarrhea. No rashes. No recent viral illnesses. No known sick contacts. Notable for recent WCC and flu vaccine administration. No recent weight loss. Normally a very active kid- with acute change today. No personal hx or family hx of seizures.
- No family hx of bleeding disorders, autoimmune disorders, thyroid issues, metabolic issues, diabetes. No cardiac hx in family. Deny aneurysms.

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OSH presentation and work-up

- **Vitals** with bradycardia, normal RR, GCS 14-15, BP 120s/60s, saturation 90+ in room air
- Somnolent but wakens to verbal command
- CMP: Potassium 3, glucose 130 otherwise WNL. Lipase: WNL
- CBC, troponin: WNL
- Upreg: Negative
- UA: ketones and RBCs but otherwise WNL
- EKG: Sinus rhythm
- Head CT w/o contrast: WNL

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GIF source: https://tenor.com/view/monsters-inc-boo-mike-wazowski-this-is-the-perfect-time-to-panic-spray-gif-16690415

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In-time advice?

What to prepare for?

Photo source: Google Images

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Arrival to CMC via EMS

- **Vitals:** 97.8 F HR: 73 bpm BP: 122/76 mmHg, 98% RA

Exam:

- **General**: GCS 15 when aroused, though very somnolent and requires frequent awakenings by voice. **Constantly yawning** when aroused. Difficulty sitting up, slumps back to the bed
- **Eye**: Pupils are equal, round and reactive to light, Extraocular movements are intact, EOMI- though eyes mildly disconjugate with upward gaze/tracking. Requires frequent refocusing to track fully.
- **Respiratory**: Lungs are clear to auscultation, Respirations are non-labored, Breath sounds are equal, Symmetrical chest wall expansion.
- **Cardiovascular**: Regular rhythm, No murmur, Good pulses equal in all extremities.

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Arrival to CMC via EMS

- Vitals: 97.8 F HR: 73 bpm BP: 122/76 mmHg, 98% RA

Exam:

- **Musculoskeletal**: Unable to assess gait due to instability. Mild strength discrepancy with decreased strength on left compared to right.
- **Neurologic**:
  - **Very difficult exam, due to somnolence and poor compliance.**
  - She is is oriented to name, age, birthdate, general location of hospital.
  - Left sided strength appears decreased: hand squeeze and arms
  - B/L down-going babinksi. Reflexes +2 b/l in achilles, +1 b/l in patellar. Normal sensation to temperature and pain
  - Finger-nose-testing uncoordinated without ability to touch finger to provider's finger, okay to nose. Difficulty sitting up on own without support.
- **Cognition and Speech**: speech slow, not slurred. Oriented when aroused, otherwise difficult to wake.

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Then the aunt takes out her cellphone for photos…

"She always has a lopsided smile"

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What to do?

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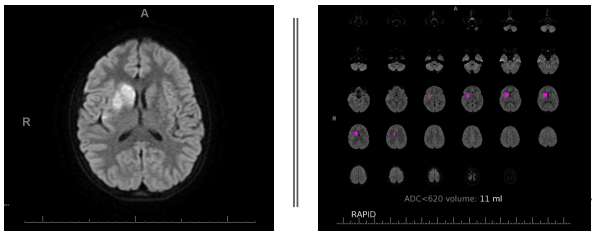
Results

Brain MRI w/ and w/o contrast



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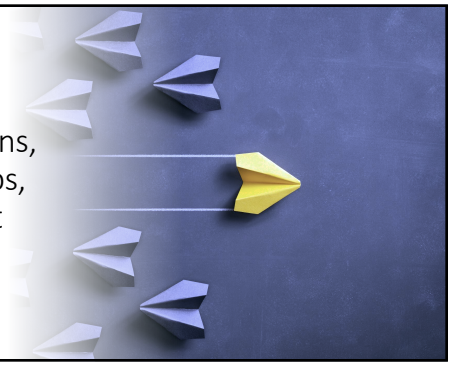
Discussions,
Next Steps,
Transport



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Follow-up:

- Admit to Spokane, WA
- Initially concern for R internal carotid dissection, changed diagnosis over time with serial imaging to focal cerebral arteriopathy
- Now on aspirin
- Now follows with Seattle Children's Stroke Team
- Physically doing well!
- Continued headaches and mood disorder, being evaluated by neurobehavioral specialists

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Learning Points:

- MRI tech not in-house after 7pm
  - Also- if radiologists (ie IR) needed, on-call from home or may be doing adult procedure/image at either of the two hospitals in town
- Wearing many hats all at once:
  - Social work, Case management, etc
- Even without weather delays, transport takes longer than you'd like

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Also, why all the yawning?

- Known issue with disorders affecting the brainstem
- Underappreciated phenomenon in pt with ischemic stroke

Brain Struct Funct. 2015; 220(2): 803–812. PMCID: PMC4341028
Published online 2013 Dec 12. doi: 10.1007/s00429-013-0684-6 PMID: 24337237

Insular and caudate lesions release abnormal yawning in stroke patients

Heinz Kreisel[1,2] Christian Weisstanner[3] Christian W. Hess,[1] Claudio L. Bassetti,[1] Arto Nirkko,[1] and Roland Wiest[3]

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6pm: Referral line call from outside hospital

Referring hospital is a critical access hospital approximately 50 minutes away

4-year-old female presenting with inability to walk

Photo source: Google Images

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HPI:

- Staying at maternal grandparent's past few nights
- Normal state of health yesterday, did fall playing outside playing out in field behind house
  - Fell oh her bottom, complained of pain for ~10 min, then resolved
- This AM woke complaining she could not walk
- Wet the bed, as unable to get up
  - Difficulty sitting on toilet without support
- Remained on couch for remainder of day
- Family noted difficulty moving upper extremities in PM

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ROS:

- Family deny: fevers, rashes, vomiting, diarrhea, cough, congestion. No respiratory symptoms recently.
- No recent immunizations (in fact due for 4-year-old vaccines, flu vaccine not given this past year)
- No recent travel, but was playing outside in the grass the past few days

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OSH ED:

- **Vitals:** 36.8 T, HR 76, RR 22, BP: 116/63

Exam:

- Normal mental status but clear b/l LE weakness, ataxia, poor finger-to-nose testing, unappreciable DTRs

Work-up:

- CMP, CBC reassuring. CT w/wo contrast of head normal

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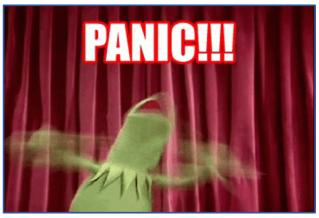

GIF source: https://tenor.com/view/kermit-panic-gif-12144702

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What to do?
What to ask?
What to request?

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Meet George:

Photo Source: https://health.mesacounty.us/

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Tick Paralysis:

- American Dog Tick, Rocky Mountain Wood Tick
- Neurotoxin released by salivary glands
- Start in feet and ascend
- Reflexes reduced or absent

Photo Source: https://www.cdc.gov/ticks/geographic_distribution.html

Lessons Learned:

- Feels better to be overprepared
  - Hopefully, the MRI tech has forgiven me ☺
- Even if you've asked, still verify

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9pm: Referral line call from outside hospital

Referring hospital is a critical access hospital approximately 60 minutes away

15 mo female, ex-35 week infant, with dehydration and hypoxia

Photo source:

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HPI:

- 8 days ago, first symptoms: non-bloody diarrhea. Decreased PO, ?fever. No vomiting
- 6 days ago, refusing all PO. Admitted to local ED overnight for IV fluids
  - CXR normal, COVID negative
  - Other admit labs: glucose 219, bicarb 17, AG 18. No urine ketones, neg acetone. Repeat labs in AM all WNL
- Doing well after discharge (no fevers, taking PO) until 1 day ago
- Tired, fussy, decreased PO, diarrhea, tactile fevers

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Past Medical, Social Hx:

- 35 weeks due to placental abruption, 17 day NICU stay for respiratory distress (CPAP), sepsis r/p, NAS (bio mother taking opioids and meth in pregnancy)
- Vaccines UTD, except flu vaccine
- Lives with grandmother and grandmother's boyfriend. Grandmother in car accident 1 week prior, boyfriend had stroke 3 weeks ago
- Often watched by a friend who works at a daycare (attends this daycare too)
  - Possibly seen with baby oil in her hand, no witnessed ingestion

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Hospital Course(s):

Admission #1, 4 days

- Tachypnea and tachycardia, fevers.
- CXR this admission: "Patchy bibasilar infiltrates, RLL opacity"
- Treated with Amoxicillin for ?CAP and clear L AOM
- Escalated to max 4L HHF, weaned to room air 1 day prior to d/c
- However, after getting home on day of discharge fever to 104F, ill appearing so family returned to OSH ED

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Hospital Course(s):

Admission #2, 16 days

- Represented tachypneic to 70s, tachycardic, febrile to 103F, hypoxic to 87%
- Prolonged waxing and waning course
- 0.5-1L oxygen supplementation
- CXR: interval worsening of multifocal parenchymal infiltrates on RLL and left lingular areas, concerning for worsening bronchopneumonia

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Hospital Course(s):

Admission #2, 16 days

- Escalated antibiotics
- TB, HIV labs, sweat chloride attempted, ECHO: small ASD
- Chest CT, bronchoscopy with BAL
- Consults:
  - Seattle Children's ID team – via phone
  - Pediatric Pulmonologist – in person
- Showed slow improvement…

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Hydrocarbon Aspiration/ Lipoid pneumonia

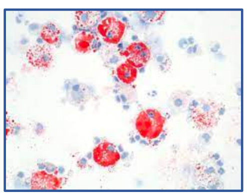

Photo source:
https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2303.2009.00677.x

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Learning Points:

- Being able to keep children in Montana with help of phone and in-person consultation
  - THANK YOU!
- Truly understanding the limitations of "The Outside Hospital"
- Appreciate a Health Unit Coordinator who gets you the outside records

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Summary:

- Montana is a big state, limited pediatric resources
  - Working within general hospitals
  - Patients/Families, as well as pediatric care/specialty care, geographically distanced
- Goal to keep kids as local as possible, with quality care
  - Exceptional connections with providers across the state
  - Exceptional relationships with pediatric unit staff
  - Higher likelihood of patient/family interactions within community
  - Wearing many hats: larger role in care coordination, continued communication, advocacy
- Importance of thinking a few steps ahead/ honing referral call skills
  - Accepting transfers
  - Transferring to tertiary/quaternary centers

Photo credit: https://www.youtube.com/watch?v=KssIYLUu4tQ

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Questions?

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Resources

- Cushing A, Bucholz E, Chien AT, Rauch D, Michelson K. Availability of Pediatric Inpatient Services in the United States. Pediatrics. 2021; 148 (1) e2020041723; **DOI:** 10.1542/peds.2020-041723
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