

Using AI to synthesize medical data – v3



Problem

- Can you use AI to take multiple medical data inputs that can help a medical officer determine risk assessment or give medical advice.



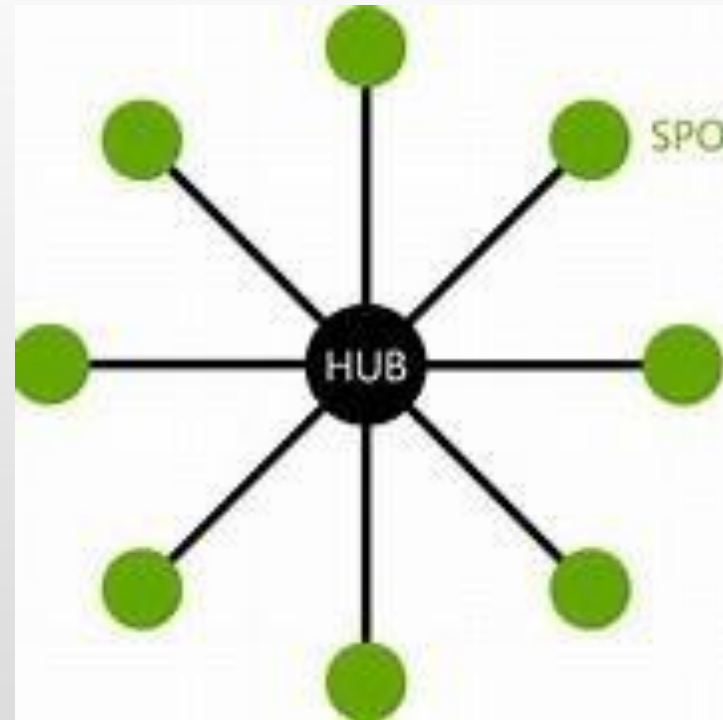
What type of medical data do we want to synthesize?

- Biomonitoring
- Nutrition
- Exercise
- Environmental –like PH of water and CO2 in the air
- Crew personal medical record
- Medical database information



What is synthesizing data?

- Integrated Architecture that can help a medical doctor determine potential outcomes for the patient
- In this case a HUB and Spoke model concept where all data flows toward a central point.
- Use triangulation to take data into consideration



What can AI do after the data is synthesized?

1. Can it create training models?
Crew health and wellness for
“dummies”
Training
 - Pre-flight
 - In-Flight Training
 - Just-in-Time Training
2. Can it give actionable items?
Recommendations for solving
medical issues



Thing to Consider - Disease Types

Please research types of Diseases Astronauts could have to deal with on Long Duration Flights. Below is a starting List.

1. Latent Diseases:

- Astronauts may be at risk of latent diseases reactivating due to the stress of space travel, radiation exposure, and altered immune function in microgravity.
- Conditions like shingles (reactivation of the varicella-zoster virus), herpes, tuberculosis, and other latent infections could resurface during the mission.
- Chronic conditions such as autoimmune diseases may also flare up due to the stress and environmental changes.

2. Kidney Stones:

- Dehydration is a significant concern in space due to limited water availability and altered fluid distribution in microgravity.
- Reduced fluid intake and increased urinary calcium excretion could predispose astronauts to kidney stone formation.
- Lack of gravity may affect the normal passage of kidney stones, potentially leading to more severe complications if stones become lodged in the urinary tract.

3. Gallbladder Issues:

- Changes in diet, particularly a shift to pre-packaged or space-friendly foods, may increase the risk of gallstone formation.
- Reduced physical activity and altered metabolism in space could contribute to gallbladder dysfunction.
- Symptoms of gallstones, such as abdominal pain, nausea, and vomiting, could pose a serious medical issue if they occur during the mission.

4. Appendicitis:

- Appendicitis is a concern for astronauts due to the isolated and confined nature of space missions.
- The exact cause of appendicitis is not fully understood, but factors such as dietary changes, altered gut microbiota, and stress could play a role.
- Prompt diagnosis and treatment are essential, as untreated appendicitis can lead to serious complications, including rupture and peritonitis.

5. Head Trauma:

- Accidental injuries, including head trauma, can occur during space missions due to factors such as equipment malfunction, collisions, or rapid acceleration/deceleration during launch and re-entry.
- Traumatic brain injury (TBI) in space presents unique challenges, including limited medical resources and the need for immediate and appropriate management to prevent secondary complications.
- Long-term effects of head trauma, such as cognitive impairment and psychological issues, could impact the success and safety of the mission.

Things to Consider for Machine Learning and AI

1. Define an overall methodology
2. Look for Reputable Training Data – Research Centers
3. After Training define test cases that identify
 - a. Suspected Illness or Malady
 - b. Unsuspected patient issues
 - c. Neutral Patients
 - d. Test these groups
 - e. Also try sensitivity testing, change single parameters, and see the impact.
4. Provide patient reports and overall Data Reports