Take-aways 2/18/24 meeting with Ted Bloomenstein (Sadie Forbes - thoughts and direct policy recommendations)

We learned a lot of safety information that we can make available to A^2 members - relevant also to facility operations as well as our immediate policy decisions. I think we can use this to help all of our membership be safer outside of Asylum context.

Li-ion batteries above ~500 watt hours cannot be made safe for general indoor use or storage.

- Risks posed by larger Li-ion batteries can be substantially mitigated with safe battery boxes either located outdoors (practical) or vented outdoors (expensive)
- Energy density and formation of dendrites / metallic Li within cobalt-bearing batteries makes them prone to spontaneous combustion In essence they consist of fuel and oxidizer separated by electrolyte layers. This renders fires extremely hard to extinguish as all components of combustion are contained within the structure.
- There are several complicating factors
    - Most batteries being used for transport are Li-Co-Ni or variations on that, the cobalt bearing chemistries are higher energy density, and more prone to failures
    - Even small physical damage reduces the safety factor greatly, by making contact of fuel/oxidizer more likely
    - Same goes for batteries damaged by heat/cold/poor charging practice and charging with power supplies not supplied by manufacturer
    - Off-brand batteries with poor manufacturing procedures / QA make this worse and can't be distinguished by users.

- Additional health risks: LI battery fires will evolve HF gas. The only bright side here is that HF has good warning properties (most people can smell it at 0.1 ppm, and it doesn't begin to be acutely hazardous until it exceeds 10 ppm.
- Unless diluted in extinguishing a fire, fire residue will likely contain hydrofluoric acid, which is uniquely hazardous even in small quantities.
- Generally, lower power Li-ion batteries are using safer lithium-iron-phosphorus chemistry, and the lower energy density also reduces degree of risk exposure
    - This does not mean Li-ion batteries may be taken for granted.
        - Charging should be monitored, and not performed in extreme heat or cold
        - Charging batteries must not be covered in heat-insulating materials (e.g. causing over-heating).

Side Notes:

1. e.g. at MIT policy is clear that staff are not to attempt to fight a fire, the only exception is staff who've been properly trained in use of fire extinguishers
    a. (this usually comes with commonsense suggestion that if one can put out a fire or amend other hazardous situations without risk of self harm, it's not a bad idea to do so)

2. Observing better charging regimens will help avoid degradation of batteries, resulting in longer / safer life. Nonetheless, as batteries lose charge-holding capacities, their likelihood of failure increases