# Design Challenge: $O_2$ Concentrator

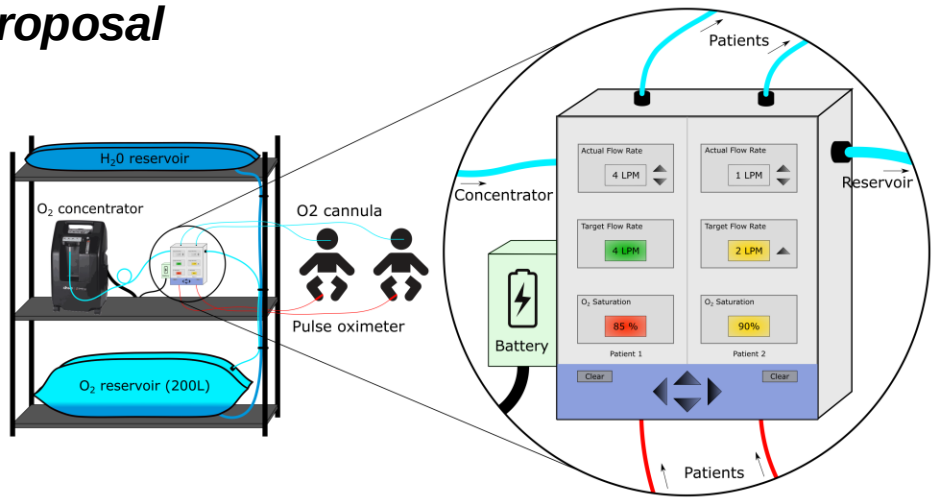
## Drive Device

- Small, compact 10L concentrator
- Filters nitrogen from ambient air and produces concentrated oxygen
- Low operating costs
- Needs power supply ➡ $O_2$ cylinders used to overcome power outage (higher operating costs)(1)
- Extensive training needed for appropriate use

*Device rating of appropriateness in low-resource settings:*

Cost: **$ $**
Effectiveness: ★★★☆☆
Durability: ★★★☆☆
Usage: ★★☆☆☆

## Design Proposal




### Reservoir

- Lower bag: one internal chamber for oxygen storage, one filled with water
- Excess oxygen from therapy stored in the chamber which pushes the water to the upper reservoir
- Power outage: Pressure of the water from above provides force to move the oxygen out of the reservoir to the patient
- Provides 200 min of supply at a demand of 1 L/min or 67 min at 3 L/min
- Only dependent on pressure difference between water and $O_2$; no power needed
- >2 years of operation without complete failure(1)

### easyl$O_2$op

- Integrated pulse oximeter connected to patients
- Provides information about $O_2$ saturation, actual $O_2$ flow and target $O_2$ flow
- $O_2$ target flow calculated by *easyl$O_2$op*
- Actual rate flow adjusted by medical staff depending on target rate flow
- Check in first after 5 min, 1 hour later and then every 4 hours
- When $O_2$ saturation below 92% ➡ alarm rings
- Oxygen can be split in min. 2 tubes

*Design Proposal rating of appropriateness in low-resource settings:*

Cost: **$ $ $**
Effectiveness: ★★★★☆
Durability: ★★★★☆
Usage: ★★★★☆

(1) Rassool, R. P., Sobott, B. A., Peake, D. J., Mutetire, B. S., Moschovis, P. P., & Black, J. F. (2017). A low-pressure oxygen storage system for oxygen supply in low-resource settings. Respiratory Care, 62(12), 1582–1587. https://doi.org/10.4187/respcare.05532

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