



# Beyond Traditional Borders: Medicine Refrigeration Device



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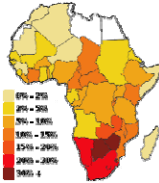
## Objectives

AIDS patients in the developing world need a device to properly refrigerate pediatric anti-retroviral therapy drugs. An effective solution will need to meet the following design criteria:

- Cooling, 2-8°C
- Duration, ~1 month
- Low Cost, < \$75
- Portable, < 10 kg
- Durable
- Concealable

## Refrigeration to Help Treat the AIDS Pandemic

- 24.5 million live with the disease
- 2.7 million new infections occurred last year
- Anti-Retroviral Therapy (ART)
  - Most effective means of combating HIV
  - Pediatric ART drugs
    - Liquids
    - Must be stored at 2-8°C
- Current storage methods inefficient
  - Medicine stored in clay pot underground
- Urgent need for solution
  - Drugs now available for widespread distribution
  - Conventional refrigeration not widely accessible

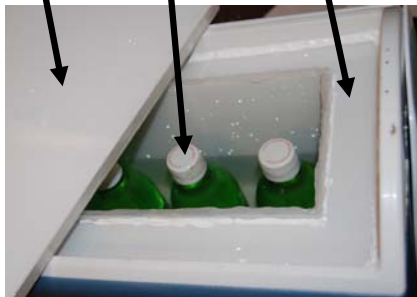


## CoolIMEDS Design



Medicine Cooler    Plastic Tubing    Heatsink/Fan    Movable Cooling Chamber

Double Door    Medicine Bottles    Enhanced Insulation



### How CoolIMEDS works :

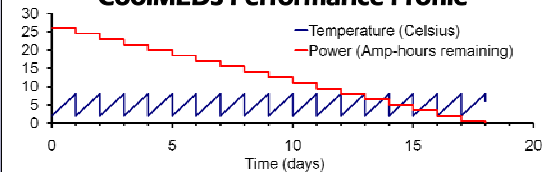
- Water is cooled in chamber by thermoelectric cooler (TEC) to 2°C
- Chamber is lifted, cold water flows into lumen of cooler, surrounding medicine bottles
- When water reaches 8°C, cooling chamber is lowered, and TEC turns on to cool water

Separation of medicine cooler and cooling chamber greatly increases efficiency and reduces run time.

## Prototype Testing Results

- Continuous temperature monitoring
  - Water reservoir cooling
    - Starting temp. of 8°C
    - TEC cools at approximately 1°C every 5 minutes
  - Medicine cooler warming
    - Starting temperature of 2°C
    - Device takes ~24 hours to warm to 8°C

### CoolIMEDS Performance Profile



## Future Work

- Use larger TEC to increase cooling speed
- Add internal thermostat to indicate when to cycle device
- Use switch to automatically activate TEC
- Develop dispensing system through double door

## Conclusion

- Current forms of medicine refrigeration grossly inadequate
- CoolIMEDS is an effective solution
  - Keeps medicine at required temperature for an extended time period
  - Low cost, portable, durable, and concealable.

## Acknowledgements

**Mentors:** Dr. Rob Raphael, Dr. Gordon Schutze, Dr. Mark Kline, Nancy Calles  
**Senior Design Professor:** Dr. Maria Oden  
**Special Thanks:** HHMI Beyond Traditional Borders grant  
 Baylor International Pediatric AIDS Initiative