



National Institutes of Health  
*Clinical Center*

# When the Lights Go Out...

## Battery-powered Medical Devices: Healthcare Provider Perspectives

CDR Mike Krumlauf, RN, BSN

Nurse Consultant

National Institutes of Health, Clinical Center

Nursing Department

Research and Practice Development

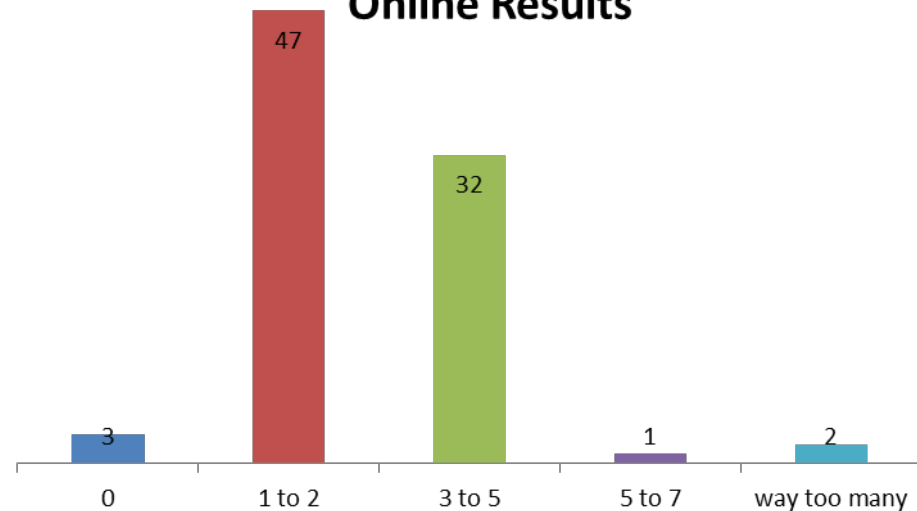
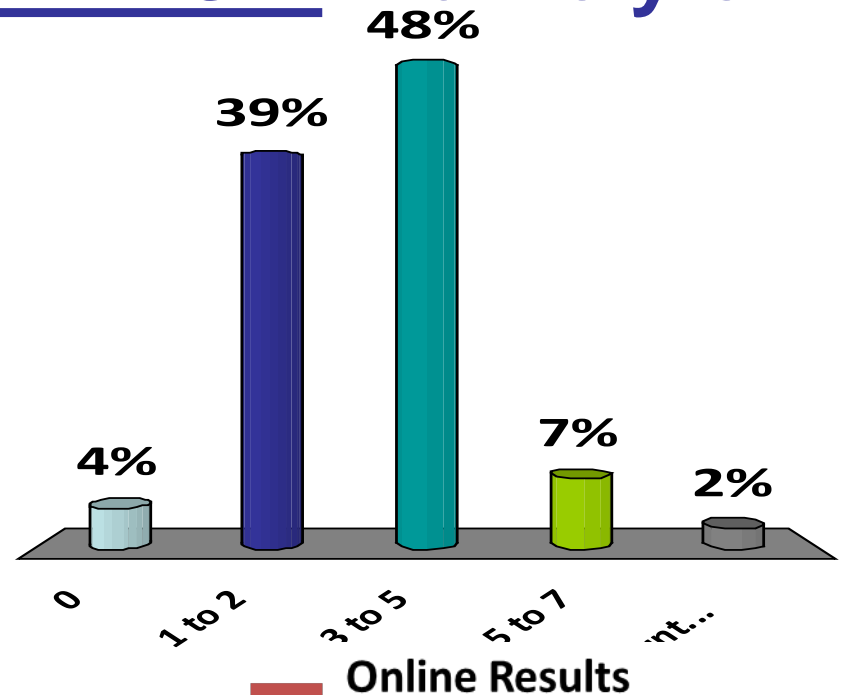


Discover What's Next in Nursing.  
The NIH Clinical Center Nursing Department



How many devices are you carrying *RIGHT NOW* that rely on batteries?

- A. 0
- B. 1 to 2
- C. 3 to 5
- D. 5 to 7
- E. too many to count



# What happens when the lights go out?





## A Day In the Life...

- Ambulatory Infusion Pumps
- IV Infusion Pumps
- Blood pressure machine
- O2 saturation
- Thermometers
- Glucometers
- Ventilators
- Suction Machines
- Scales
- Portable Telemetry
- Feeding Pumps
- Defibrillators
- Automated External Defibrillators (AEDs)
- Sequential Compression Devices
- Portable EEG/EKG machines
- Patient Transfer Lifts (Hoyer/Golvo)
- Patient beds
- Ultrasound machines
- CPAP/BIPAP machines
- *Etc...*





# A Day In the Life...

Support Point of Care systems\*\*\*

- Portable workstations
  - Laptop computer
  - Bar code scanner
  - Bar code printer
  - PDA scanner
- Unit based Cell phones
- Medication Dispenser/Storage (controlled substances)
- Supply cabinet for stock patient care items



National Institutes of Health  
Clinical Center

# Expectations for devices

- Under both normal use and emergency...
  - Work properly as expected or better than expected when used by staff and/or patients
  - Reliable
  - Safe for patient use and health care provider



National Institutes of Health  
Clinical Center

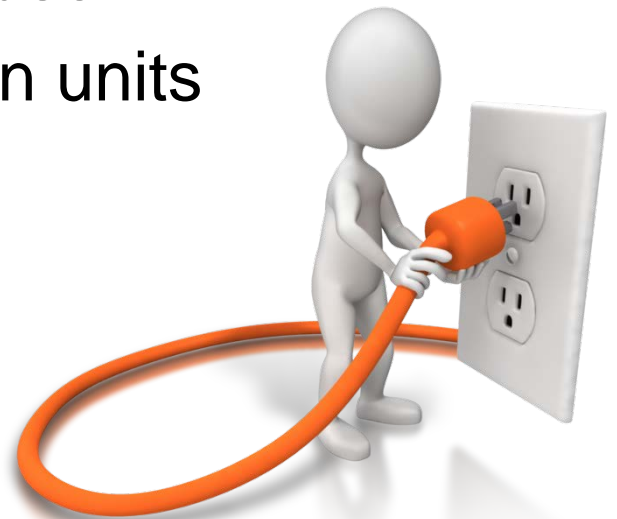


# Benefits

- Efficiency in care
  - Improved accessibility at the bedside
  - Point of care availability
- Allows enhanced bedside and ambulatory monitoring
  - Remote monitoring
  - Patients are able to receive care in ambulatory and home care settings in lieu of inpatient hospital stays.
- Safety during transport

# Challenges

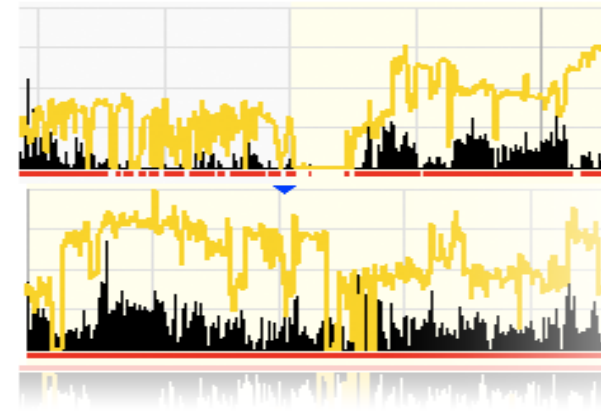
- Frequent use leads to under charging with potential battery loss/failure
- Instructions for battery use, replacement or failure not always on the devices
- Battery indicators
- Storage of equipment when not in use
- Limited troubleshooting available on units
- Unit based education
- Proper disposal of batteries





# Medical Devices in Research

- Actigraphy watches
  - Measures activity and ambient to measure sleep/wake patterns
  - Inpatient, worn daily throughout stay
  - Fully charged prior to placement and programming
  - Early battery failure
    - Missing data
    - Endpoints for subjects not complete



# WHAT HAPPENS WHEN THE LIGHTS GO OUT?



National Institutes of Health  
Clinical Center



National Institutes of Health  
*Clinical Center*