



TECHNOLOGY

SNAPSHOTS

# PM: Planned Maintenance

## PM

- Preventive Maintenance
- Scheduled Maintenance
- Planned Maintenance

## PM Objectives

- Safe, effective, reliable medical equipment
- Extension of useful lifetime
- Compliance with AHJ (Authority Having Jurisdiction)

## PM Terminology

- PM Activities: What we do.
- PM Frequency: When we do it.
- PM Procedure: Set of PM Activities + PM Frequency

# Types of PM Activities

## Device Restoration

- Genuine *preventive* maintenance
- Intended to reduce the likelihood of failure

## Safety Verification

- Inspect for safe & effective function
- Identify latent failures not obvious to user
- Requires specialized knowledge or equipment

# PM Performance Monitoring

$$\text{PM Completion} = \frac{\text{\#Completed on Schedule}}{\text{\#Scheduled} - \text{\#Unavailable}}$$

## Mean Time Between Failures: MTBF

$$\frac{(\# \text{ devices}) \times (\# \text{ years analyzed})}{(\# \text{ failures of all types})}$$



## PM-related Failures

- Failures that **could have been prevented** by better PM
  - Example: Early failure of infusion pump battery
- Hidden failures that **could have been discovered** by better PM
  - Example: Low defibrillator output

## Mean Time Between PM-Related Failures: MTBF<sup>PM</sup>

$$\frac{(\# \text{ devices})(\# \text{ years analyzed})}{(\# \text{ preventable failures}) + (\# \text{ discoverable failures})}$$

## References

- NFPA 99 Health Care Facilities Code. National Fire Protection Association (2012 or later).
- IEC 62353. Medical electrical equipment – Recurrent test and test after repair of medical electrical equipment. International Electrotechnical Commission (2014).

## References

- AAMI White Paper: Planned Maintenance Compliance and Definitions Guide. AAMI (2021).
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- Medical Equipment Aging: Part III. Wang, et al. Journal of Clinical Engineering 49(4)131-139 (2024).

## References

- AEM Program Guide: Alternate PM for Patient Safety. Baretich. AAMI (2018).
- Computerized Maintenance Management Systems for Healthcare Technology Management. Cohen & Baretich. AAMI (2017).

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# Thank you!

