Health Technology Management and Maintenance of Medical Equipment

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What Is Health Technology Management?

Definition

- ***HTM*** is defined as the ***systematic*** process in which qualified healthcare professionals, typically ***clinical engineers***, in partnership with other healthcare leaders, plan for and manage health technology assets to the highest quality care at the best cost.

(Clinical Engineering Handbook, 2004)


Clinical Engineering
relationship with
Clinical Engineering
Medical Companies
İnsurance Companies
Leasing Agencies
Regulation Agencies
Clinical İnvestigation
Hospital Administration
Hospital Environment
Patients
Allied Health Personnel
Doctors
Nurses

Definitions

- ***Clinical engineering*** is a specialty within biomedical engineering responsible primarily for ***applying and implementing medical technology*** to optimize health care delivery.
- ***Biomedical engineering (BME)*** is the ***application of engineering principles and design concepts*** to medicine and biology for health care purposes (either diagnostic or therapeutic).

Are HTM & Clinical Engineering Important in Hospital Care? And Why ?

Importance of Clinical Engineering

- Technology is an integral part of health care nowadays.
- Use of technology and engineering principles has been increasing in both diagnostic and curative health services.
- Many devices are using to ensure hospital care quality.
- Quality of medical devices relates to patient safety.
- Research and development in health care is much depends on use of technology.
- All departments of hospitals are interconnected through the use of technology.

Steps in HTM

- Strategic Technology Planning
- Technology Assessment
  - Risk Assessment
  - Life Cycle Analysis
- Technology Procurement & Implementation
- Technology Utilization & Servicing
- Technology Risk Management & Quality Improvement
- Technology Replacement Planning

Strategic Technology Planning

- Based on available technology, delivering services & departmental policies
- Consider
  - Performance Efficiency
  - Safety
  - Quality
  - Cost

Technology Assessment

- Assessment of Need
  - clinical effectiveness
  - risk & safety concerns (regulations)
  - device evaluation
- Assessment of Impact
  - Infrastructure
  - Users
  - Maintenance

Technology Assessment Cont:

- Assessment of Cost
  - ROI (return on investment)
  - life cycle analysis
  - standardization
- Assessment of Benefit
  - Clinical
  - Financial
  - Technical

Technology Procurement & Implementation

- Procurement
  - Specifications, Options, TOR
  - Training & Service Needs
  - Request for Proposal, Review of Proposal & Negotiations
  - Contracting
- Implementation
  - Equipment Inspections
  - Training
  - Technology Deployment & Clinical Acceptance

Technology Utilization & Servicing

- Maintenance Support
  - Inventory
  - Parts, Supplies & Upgrades
- Procedures
- Scheduling
- Monitoring
- Clinical & Technical Partnership
- Vendor Relationship – service contracts

Technology Risk Management & Quality Improvement

- Patient Outcomes
- User Satisfaction
- Risk Assessment
- Incident Investigations
- Recalls & Hazard Alerts

Technology Replacement Planning

- Safety
- Regulations
- Clinical Benefit
- New & Emerging Technologies
- Technical Support
- Standardization
- Budget (cost-benefit analysis)

Responsible Person & Department Cont;

Clinical Engineering on the Hospital Organizational Chart

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Responsibility of Department

- Respond to work request from equipment user within established time frame. (***Corrective Maintenance***)
- Make regular check up and maintenance of medical equipments. (***Preventive Maintenance***)
- Inform hospital manager of operational and financial aspects of clinical engineering services.
- Work with other departments for new equipment procurement, installation, renovation, modification and removal.
- Determine training needs for staff technician and engineers.
- Participate in organizational development activities.

Medical Equipment Management in Hospitals

Medical Equipment Management

- It is planning and implementing a program(s) for ***inspecting, testing, and maintaining*** medical equipments and ***documenting*** the results to ensure that medical equipment remains ***safe*** for its intended use, that equipment ***life is maximized***, and that total lifetime ***costs are minimized.***

Scope of Management

- *Procurement*
- *Preventive Maintenance*
- *Corrective Maintenance*
- *Training*
- *Replacement Program*
- *Assessment & Planning - ??KPI*
- *???CMMS – Computerized Maintenance Management System*
- *Environment Audit*

Implementation

- **Procedure**
  - Procurement Procedure
  - Acceptance / Inspection Procedure
  - Preventive Maintenance Procedure
  - Corrective Maintenance Procedure
  - Retirement / Remove From Service Procedure
  - Medical Equipment Incident Procedure
  - Hazard Alert Procedure
  - Emergency Procedure
  - Records

Acceptance & Inspection Testing

Acceptance Test for New Equipment before Using

- Specification Check
- Inspection Test
- Function Test
- Safety Test

Acceptance & Inspection Testing

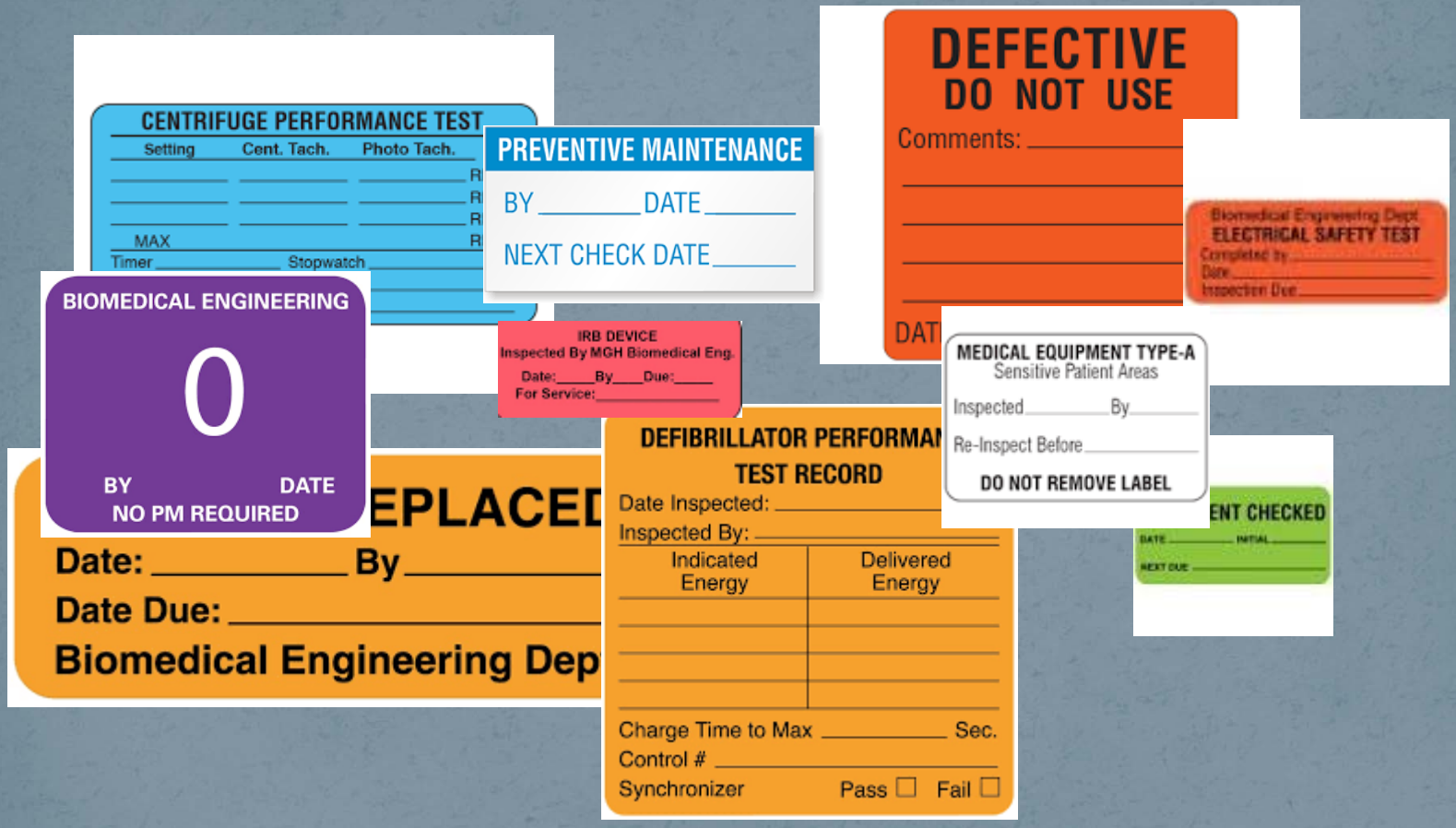
Routine Inspection Test

- By User
- Alarm Test
- Check List

Preventive Maintenance

- Recording & Labeling
- Calibration
- PM/Cal Report or Certificate
- Preventive Maintenance Interval
- PM Master Plan

Inspection Stickers



Inspection Sticker have power

Training

- ***Training Participants***
  - Management Level
  - Operation Level
- ***Training Documents***
  - Training Need Assessment
  - Training Record
  - Training Evaluate

Training

Training Program

- Law / Statute
- Management Knowledge
- Risk
- Safety
- Maintenance
- Operating
- Metrology
- Ethics

Working Space

- Engineering Areas
  - Repair Zone
  - PM Zone
  - Cleaning Zone
- Documentation
- Parts Inventory
- Equipment Awaiting Zone
- Supporting Facilities
- Safety & Environment

Replacement Program

- Unsafe Equipment
- No Longer Support Equipment
- Outdated Technology
- Cost of Ownership
- Back-up Equipment
- Disposal Plan
- Replacement Plan

Assessment and Planning

- KPI Report
  - % PM Completion
  - Average Repair Time
- Balanced Score Card
- Quality Report
  - Monthly
  - Quarter
  - Semi-Annually
  - Annually

Assessment and Planning Cont:

Improvement Planning

- Training Plan
- Replacement Plan
- Investment Plan
- Etc.

Incident Investigation and Failure Analysis

Type of Incidents

- Malfunction
- Misuse
- Repeat Repair
- Etc.

Failure Analysis

- Repair Database
- PM Database

Incident Investigation and Failure Analysis Cont;

- Hazard Alerts
- Law / Statute
- Safety Committee
- Quality Record
- Preventive Plan

Safe Medical Devices Act

- Report to FDA when.....

  incident in which a medical device may have caused or contributed to the ***death***, ***serious illness or serious injury*** to a patient

Implementation Cont;

- **Equipment Inventory**
  - ✓ List
    - Hospital-owned Equipment
    - Leased Equipment
    - Rented Equipment
    - Donated Equipment
    - Research Equipment
    - Patient-owned Equipment

Medical Equipment Inventory

- An ***inventory*** is a detailed itemized list of assets held by an organization or institution
- ***Medical equipment inventory*** is a list of the technology on hand, including details of the ***type and quantity*** of equipment and the current operating ***status***
- ***Accessories, consumables*** and ***spare parts*** inventories are directly correlated with the main medical equipment inventory

Importance of Medical Equipment Inventory

Equipment inventory is an essential part of an effective health-care technology management (HTM) system and may be used to:

- Develop budgets for capital purchases, maintenance and running costs
- Build and support an effective clinical engineering department
- Support a medical equipment management programme
- Plan the stock of spare parts and consumables
- Support equipment needs assessment
- Record equipment purchase, receipt, retirement and discard

Data Included in An Medical Equipment Inventory

- Inventory identification number
- Type of equipment/item
- Brief description of item
- Manufacturer
- Model/part number
- Serial number
- Physical location within facility
- Condition/operating status
- Power requirements
- Operation/service requirements
- Date inventory updated
- Maintenance service provider
- Purchase supplier
- Other info as needed

Key Elements

- An inventory is effective only when it is ***comprehensive*** and ***accurate***
- Inventory is ***updated*** whenever there is any change or addition of information and during annual audits and reviews
- Three stages of inventory management:
  - Initial data collection
  - Information update (due to any change in information)
  - Annual audit/review

Key Elements Cont;

- Inventory may be paper- or computer-based

  Keeping a paper-based record back-up is good practice

- Once the inventory has been established, it can be a very helpful tool within the clinical engineering department and the health-care facility as a whole

- Inventory can be used as a tool in:
  - Forecasting and developing budgets
  - Planning and equipping a technical workshop
  - Determining required staffing
  - Identifying training needs

Key elements

Inventory can be used as a tool in (cont'd):

- Managing service contracts
- Running an effective medical equipment management programme
- Planning for spare parts and consumables orders
- Performing needs assessment
- Developing replacement and disposal policies and goals
- Performing risk analysis, management and mitigation
- Making a case for equipment standardization

Challenges

Change of mind-set

- Any change will always be met with resistance
- Collecting and updating data may be seen as ‘extra work’
- Workers might be unclear on the purpose or benefit of the work
- Staff leading inventory data collection should encourage workers and explain benefits for collecting and maintaining inventory data

Lack of manpower or time for initial data collection

- Need at least one person and a certain amount of time for data collection

Challenges Cont;

Lack of budget

- Equipment management may involve extra costs for supplies, such as paper, inventory stickers/labels, computers, files
- Evaluate ‘bare minimum’ Vs ‘nice-to-have’
  - Ex: paper-based Vs. computer-based inventory system
- Responsible department should evaluate current budgets and attempt to re-allocate funds or request

Thanks For Your Attention