TOPIC: THE VALUE OF BIOMEDICAL ENGINEERS AND TECHNICIANS IN HOSPITAL

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DEFINITION OF BIOMEDICAL ENGINEERING

Biomedical engineering is a discipline that advances knowledge in engineering, physiology and anatomy, and improves human health through cross-disciplinary activities that integrate the engineering sciences with the biomedical sciences and clinical practice. Biomedical engineering (BME) is also the application of engineering principles and design concepts to medicine and biology for healthcare purposes (e.g. diagnostic or therapeutic). This field seeks to close the gap between engineering and medicine.
DUTIES OF A BIOMEDICAL ENGINEERS AND TECHNICIANS IN HOSPITAL

- By combining anatomy and physiology with engineering, biomedical engineers develop devices and procedures that solve medical and health-related problems.

- Install, adjust, maintain (including preventive and corrective maintenance), repair devices designed to monitor and take care of patients, or provide technical support for biomedical equipment.
DUTIES OF A BIOMEDICAL ENGINEERS AND TECHNICIANS IN HOSPITAL

- Computerized maintenance management systems
- Evaluate the safety, efficiency, and effectiveness of biomedical equipment
- Train clinicians and other personnel on the proper use of equipment
- Review technical manuals and product specifications
- Keep maintenance records and do the inventory
- Explain and demonstrate the correct use of medical devices.
BIOMEDICAL ENGINEERS AND TECHNICIANS PLAY A GREAT ROLE IN HOSPITAL FOR:

- Policy framework for health technology
- Medical device regulations
- Health technology assessment
- Medical device data
- Medical device nomenclature
- Medical devices by health-care setting
- Medical devices by clinical procedures
- Medical device innovation, research and development.
HEALTHCARE TECHNOLOGY MANAGEMENT CYCLE
**OBJECTIVE OF MAINTENANCE**

- Equipment maintenance program keeps the medical equipment in a reliable, safe and available for use when it is needed.
- Such a program prolongs the useful life of the equipment.
- Cost efficiency and cost effectiveness of equipment.
- Better utilization results in quality patient care and satisfaction.
- Patient as well as user safety.
- Sophisticated equipment with modern technology.
WORK SCHEDULES OF BIOMEDICAL ENGINEERS AND TECHNICIANS

- Biomedical engineers usually work full time on a normal schedule. However, as with employees in almost any engineering occupation, biomedical engineers may occasionally have to work extra-hours to meet the needs of managers and colleagues.

- In some hospitals Biomedical technicians do most of their work during the day, but they may be on call nights and weekends.
<table>
<thead>
<tr>
<th>PERSONNEL</th>
<th>TITLE</th>
<th>ROLE</th>
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</table>
| Engineer  | Biomedical engineer or clinical engineer | - Management of HTM assets  
-Draft or develop the policies and procedures related to HTM |
<p>| Engineer  | Other related fields (e.g. electrical engineer, mechanical engineer) | Require a training course and certificates to work in the medical device field. Primary focus is on the maintenance of medical equipment and sometimes managerial positions. |</p>
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<thead>
<tr>
<th>PERSONNEL</th>
<th>TITLE</th>
<th>ROLE</th>
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<tbody>
<tr>
<td>Technician</td>
<td>Biomedical equipment technicians</td>
<td>Primary focus on specialized medical equipment repair and maintenance.</td>
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<tr>
<td></td>
<td>Other related fields (e.g. electrical or medical Technologist)</td>
<td>Preventive maintenance and repair of less complex Equipment. It is important that they receive specialized training for high-risk medical devices.</td>
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<tr>
<td>Service provider</td>
<td>Engineer or technician</td>
<td>Provide maintenance that cannot be performed in house. They are product oriented and specialized in a certain field.</td>
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## PROBLEMS OCCURRED DUE TO LACK OF TECHNOLOGY (HTM) IN HEALTH SYSTEM (IN HOSPITAL)

<table>
<thead>
<tr>
<th>PROBLEMS THAT EFFECTIVE HTM COULD AVOID</th>
<th>RESULTING WASTE YOU COULD SAVE</th>
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<tbody>
<tr>
<td><strong>Policy/planning:</strong></td>
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<tr>
<td>◆ lack of standardization</td>
<td>◆ 30–50% additional cost for extra spare parts and extra maintenance workload</td>
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<td>◆ purchase of sophisticated equipment for which operating and maintenance staff have no skills</td>
<td>◆ 20–40% of equipment remains underutilized or unused</td>
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<td><strong>Procurement:</strong></td>
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<tr>
<td>◆ impact on equipment and buildings during installation, unforeseen at the initial tender stage</td>
<td>◆ extra modifications or additions required for 10–30%</td>
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<tr>
<td>◆ inability to correctly specify and foreseen total needs when tendering and procuring equipment</td>
<td>◆ 10–30% additional unplanned costs</td>
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<tr>
<td>Training:</td>
<td>Resulting Waste You Could Save</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
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<tr>
<td>◆ improper use of equipment by operating and maintenance staff</td>
<td>◆ loss of 30–80% of the potential lifetime of equipment</td>
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| Operation and maintenance:                                            |                                 |
|-----------------------------------------------------------------------|                                 |
| ◆ excessive equipment down-time due to absence of preventive maintenance, inability to repair, and lack of spare parts | ◆ 25–35% of equipment out of service |

COMPONENT-SECTION LIFE CYCLE CONDITION CURVE AFTER MAINTENANCE AND REPAIR
RECOMMENDATION

According to the role of Biomedical engineers and technicians in hospital, each district hospital must have at least two trained biomedical technicians, each provincial hospital must have at least four trained biomedical engineers and at least 6 well trained biomedical engineers in teaching hospital
CONCLUSION

Biomedical engineers and technicians have a great value in hospital due to their daily work; problem to resolve including: management of equipment; planning and purchasing work; spare parts; procurements; HTM recycle of equipment; etc
THANK YOU!!

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