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Universal Medical Technology Service Nomenclature™ (UMTSN™) www.ecri.org/umtsn

Term	Definition*	Comments
Abuse	The status assigned to a device FAILURE when a service representative finds damage attributable to incorrect use (e.g., during operation, cleaning, or transport).	
Acceptance inspection	A detailed INSPECTION performed before a device is put into use either after initial receipt (i.e., the incoming inspection of new equipment) or following other service activities (e.g., a major REPAIR, MODIFICATION, or OVERHAUL) as appropriate.	
Acquisition cost	The total cost, including the purchase price, delivery charges, and training and installation costs, to acquire a single piece of equipment.	(1) For equipment that has annual software license fees, include the fee for the first year. (2) Do not include the cost of prepurchased software upgrades or service in the acquisition cost; prepurchased service should be treated as a contracted service cost.
Annualized failure rate	The number of FAILURES for a device or a group of devices (e.g., a particular model) divided by the product of the number of years being considered and the number of devices in use at a facility. The following are sample annualized failure rate calculations: (A) A facility with 700 units of the same infusion pump model received 84 REPAIR work orders for that model during one year. *84 failures/(700 pumps × 1 yr)= 0.12 failures/pump-yr* (B) For five ultrasound scanners of the same model, there were only two repair requests in three years. *2 failures/(5 scanners × 3 yr) = 0.13 failures/scanner-yr* (C) A single magnetic resonance imaging (MRI) unit required nine repairs over three years. *9 failures/(1 unit × 3 yr) = 3 failures/MRI unit-yr*	(1) This approach to failure rate calculation is practical but also very basic. For example, it does not consider the age of a device or its useful life or account for its operating time, since such information about medical devices may not be readily accessible for failure rate calculations. (2) The calculation should be based on all repair work orders, including those for failures identified as UNABLE TO DUPLICATE, USE ERROR, and ABUSE, since it is not feasible to exclude such failures consistently. It is assumed that failures identified during inspection will result in a repair work order. (3) The failure rate calculation value is not expressed as a percentage because doing so would have little intuitive meaning when applied to a single device. For instance, in the MRI example above, the unit would have a failure rate of 300%.
Calibration	A procedure used to determine a device's accuracy using test equipment whose own accuracy is appropriate and has been verified and, as needed, adjusting that medical device to meet the manufacturer's specifications.	

Term	Definition*	Comments
Contracted service	SERVICE provided under contract by a manufacturer or independent service organization.	(1) Within the clinical engineering community, the term "outsourced service" is sometimes used to refer to what we call "contracted service." (2) The scope of contracted service can vary from full coverage (INSPECTION and PREVENTIVE MAINTENANCE, "24 × 7" REPAIR, and all parts and software upgrades) to lesser options (e.g., parts-only service contract).
Downtime	The time that a device is not available for clinical use because of the need to perform activities such as INSPECTIONS, PREVENTIVE MAINTENANCE, and REPAIRS. Downtime is specified in hours or as a percentage. Note that it is typically calculated only over a specified "use period." A use period is based on when a device is scheduled to be available for clinical use or when a contract's terms specify that a device will be available. For instance, the use period might be eight hours a day for 365 days a year, or eight hours a day, 5 days a week for 52 weeks a year. The use period must be stated when specifying downtime.	(1) Downtime is of greatest concern when a facility has only one or a few units of a high-demand device (such as a computed tomography or MRI scanner). (2) The use period specified in a service contract may not correspond to the time for which the facility schedules the device to be available. For a service contract with 9 a.m. to 5 p.m. coverage, if the department is open for a longer time (e.g., 8 a.m. to 8 p.m.), a FAILURE that is reported at noon and is repaired by 10 a.m. the next day counts as six hours of downtime under the contract (noon to 5 p.m. and 9 to 10 a.m.), even though 10 hours of scheduled use may be lost (noon to 8 p.m. and 8 to 10 a.m.).(3) It is often useful to specify both a short-term and a long-term downtime. For example, a service contract with 9 a.m. to 5 p.m. coverage for five days a week might include a limit of 72 hours of downtime in a year and a maximum of eight hours in any week (corresponding to about 3.5% annually and 20% weekly). (4) Downtime may be specified as scheduled (e.g., for inspection or preventive maintenance) or as unscheduled (e.g., for repair). If not otherwise specified, downtime is taken to include both categories.
Failure	The condition of not meeting intended performance or safety requirements and/or a breach of physical integrity. A failure is corrected by REPAIR and/or CALIBRATION.	
In-house service	The SERVICING of medical equipment performed by the facility's own staff.	

Term	Definition*	Comments
Inspection	A procedure used to verify that the physical integrity, safety, and performance of a device meet the necessary requirements.	(1) An inspection is typically guided by a manufacturer's recommendations, the ways that the healthcare facility uses its devices, the facility's experiences SERVICING the equipment, and information from external sources when available (such as technical literature or other data sources). (2) Within the clinical engineering community, scheduled inspections are often referred to as "PMs." This terminology creates confusion between inspections and PREVENTIVE MAINTENANCE. Inspection is also referred to as "safety and performance inspection" (SPI), "performance verification," and "performance assurance."
Inspection time	The average time to perform an INSPECTION for a device or model, excluding the time spent locating and gaining access to a device and traveling to its location.	
Maintenance	A collective term comprising the following activities: ACCEPTANCE INSPECTION, CALIBRATION, INSPECTION, MODIFICATION, OVERHAULS, PREVENTIVE MAINTENANCE, and REPAIR.	MAINTENANCE and SERVICE are interchangeable terms.
Modification	The alteration of a device from its original state to improve performance, reliability, or safety or to add new functionality. (This is distinct from restoring a device from a deteriorated state.) Examples of modifications include installing software with new functionality and adding components to a device.	
Overhaul	An extensive (i.e., far exceeding routine PREVENTIVE MAINTENANCE) replacement or rebuilding of worn parts on a device to significantly extend its life.	Overhauls may be performed at a fixed interval, at intervals determined by the use of an elapsed-time meter, or as needed.
Preventive maintenance	A routine procedure used to minimize a device's risk of FAILURE and to ensure its continued proper operation. Examples of preventive maintenance tasks are lubricating, adjusting, and replacing parts (e.g., batteries, O-rings) as recommended by the manufacturer.	(1) Preventive maintenance may be performed on a regular calendar schedule (e.g., annually), on a schedule based on hours of equipment use, or on an as-needed basis. The term "as needed" here refers to tasks that are determined to be required based on observation or measurement (e.g., during INSPECTION), not based on a device's FAILURE. (2) Preventive maintenance excludes the standard operational maintenance (not defined here) that is carried out by users.
Repair	A process used to restore the physical integrity, safety, and/or performance of a device after a FAILURE.	Within the clinical engineering community, the terms "corrective maintenance" or "unscheduled maintenance" are sometimes used to refer to what we call "repair."

Term	Definition*	Comments
Repair time	The hands-on time needed to REPAIR a device and have it ready for return to use, which is usually the amount of time entered on the associated work order.	The time needed to have a device "ready for return to use" includes the time to verify correct operation (i.e., perform an INSPECTION).
Response time	The time from the initiation of a request for SERVICE until a service representative solves the problem (e.g., by telephone) or arrives to REPAIR a device or to remove it for repair.	
Service	A collective term comprising the following activities: ACCEPTANCE INSPECTION, CALIBRATION, INSPECTION, MODIFICATION, OVERHAULS, PREVENTIVE MAINTENANCE, and REPAIR.	SERVICE and MAINTENANCE are interchangeable terms.
Time-and-materials service	SERVICE, performed by a manufacturer or independent service organization and paid for on the basis of the costs of labor, parts and supplies, and travel time. It may be scheduled or unscheduled.	Within the clinical engineering community, the terms "demand service" and "parts and labor service" are sometimes used to refer to what we call "time-and-materials service."
Total cost of service	The total SERVICE costs for a single unit or the average per-unit cost for all units of the same model; it includes IN-HOUSE SERVICE, CONTRACTED SERVICE, and TIME-AND-MATERIALS SERVICE.	Clinical engineering managers frequently compare the annual total cost of service for a unit (or category of similar units, and/or all serviced equipment) to its ACQUISITION COST.
Unable to duplicate	The status assigned to a device FAILURE when a service representative finds no problem (e.g., when equipment passes INSPECTION) following a report of failure.	Within the clinical engineering community, the term "use error" is frequently used to refer to what we call "unable to duplicate." But while use error is often a speculated cause of a problem that cannot be duplicated, there may be other causes, such as electrostatic discharge or an intermittent component failure.
Use error	The status assigned to a device FAILURE when a service representative finds no problem (e.g., when equipment passes INSPECTION) following a report of failure and the representative determines that the device or an accessory was used incorrectly.	Within the clinical engineering community, the terms "user/operator error," "possible use error," "no problem/fault found," and "could not reproduce problem" are sometimes used to refer to what we call "use error." However, a problem should be characterized as "use error" on a work order only if it can be determined that the device or accessory was used incorrectly.
Vendor service	The SERVICING of medical equipment performed by staff not employed by the facility, either under a contract, on a time-and-materials basis, or under a warranty.	This term may be useful for quantifying the amount of work not performed by in-house staff and the associated total cost.
		**Terms in capital letters are defined in this document, sometimes in an alternate form; for instance, SERVICE is defined, but SERVICING is used when appropriate.*

TERMINOLOGY BY CATEGORY

MAINTENANCE / SERVICE ACTIVITIES	
Acceptance inspection	
Calibration	
Inspection	
Maintenance	
Modification	
Overhaul	
Preventive maintenance	
Repair	
Service	
EQUIPMENT PROBLEMS	
Abuse	
Annualized failure rate	
Failure	
Unable to duplicate	
Use error	
MAINTENANCE / SERVICE TIME AND COST	
Acquisition cost	
Contracted service	
Downtime	
In-house service	
Inspection time	
Repair time	
Response time	
Time-and-materials service	
Total cost of service	
Vendor service	

ALTERNATE TERMS CROSS-REFERENCED TO UMTSN

These commonly used terms have "official" equivalents within the UMTSN.

Common Terms	**UMTSN**
Corrective maintenance	Repair
Could not reproduce problem	Unable to duplicate
Demand and service	Time-and-materials service
No problem/fault found	Unable to duplicate
Outsourced service	Time-and-materials service
Performance assurance	Inspection
Performance verification	Inspection
PM	Preventive maintenance (not "inspection)
Safety and performance inspection	Inspection
Unscheduled maintenance	Repair
User/operator error	Use error