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**MLS 304**

An automated analyser is a medical laboratory instrument designed to measure different chemicals and other characteristics in a number of biological samples quickly, with minimal human assistance. These measured properties of blood and other fluids may be useful in the diagnosis of disease.

Various procedures and routines will ensure that the automated analysers used in the multisystem teaching hospital is well-maintained and cared for, this includes;

* Developing standard operating procedures for all lab equipment.
* Preparing documentation on each specific equipment, outlining the repairs and maintenance undertaken.
* Outlining a preventive maintenance program for each equipment.
* Training both technical and managerial staff on proper use and care of lab equipment.

**A. Standard Operating Procedure for Maintenance of Automated analysers**

Standard operating procedures (SOPs) are a must for all complex lab equipment. This ensures that the correct use and maintenance of the equipment is integrated within routine work. Detailed instructions of equipment use should be sourced from the manufacturer’s operator manual. The SOP can be written by the lab manager, an equipment officer, or staff that frequently works with the specific equipment. The SOP should also be easily accessible at the workbench.

A proper SOP should contain the following;

* The title and description of the content/scope of the SOP.
* Definitions of all abbreviations used.
* An outline of the personnel responsible for the equipment or involved in its use, including their qualifications and training requirements.
* Detailed instructions for the use of equipment, containing the do’s and don’ts of operating them.
* A description of quality control and maintenance.
* Instructions on waste management, where applicable.
* Reference documents, such as manuals used to prepare SOP and manufacturer’s websites, should be outlined for use when further information is required.

**B. Equipment Maintenance Documentation**

This is a centralized collection of all the information regarding the auto analyser. It is a reference archive for equipment maintenance that can be used to understand the history of the equipment. It is usually organized by the lab manager or the lab’s equipment officer. The maintenance log outlines equipment identification and descriptions like equipment name, model number, manufacturer, purchase date, warranty, model, etc as shown in **the table below**. It also contains description of repair work, parts replacements, tests, measurements, adjustments, or deep cleaning done on the equipment.

|  |  |  |
| --- | --- | --- |
| **Item identification** | | |
| Equipment: | Brand: | |
| Purchase date: | Model: | |
| Storage/position in lab: | Serial No. | |
| Warranty expiration: |  | |
| Manufacturer: | | Tel. No. |
| Address: |  | |
| Contact person: | | Tel. No. |

Example of an identification and maintenance log.

A regularly updated equipment maintenance log can help to;

* Highlight trends like repair costs and equipment durability and efficiency. Therefore, helping lab managers to make decisions on equipment models and brands that are best suited for the lab.
* Point out the equipment that undergoes wear and tear frequently. If the cause of malfunction is operation related, it can highlight the need for re-training of laboratory staff.

**C. Preventive Maintenance Program**

A preventive maintenance program ensures that the equipment is functioning with minimal interruptions and within the manufacturer’s specifications. It maximizes the equipment operational efficiency and reduces overall costs. It is mainly recommended for equipment with moving parts, gas or liquid flow, optical systems and filters.The maintenance and quality control is performed under an outlined schedule and results are documented.

A preventive maintenance file should detail;

* Error alerts on the equipment and subsequent action to be taken.
* Basic troubleshooting when the equipment malfunctions.
* Logs for error reports and failure events;
* The servicing and calibration done on the equipment and the dates for subsequent calibrations.

Stickers should be used for equipment labelling to summarize the preventive maintenance actions undertaken, the date, and the personnel involved.

|  |  |  |  |
| --- | --- | --- | --- |
| **Failure Events** | | | |
| Date | Event | Corrective action | Operator |
|  |  |  |  |

**Table 2**: Example of a failure event log for a preventive maintenance program.

**D. Training Laboratory Staff on Equipment Maintenance**

Training of both technical and managerial staff is not a one time activity. It should be regular with additional courses given when new equipment or improved models are bought. The initial induction training should be elaborate with an expert-guided discussion and demonstration, while follow-up training can be done in-house to refresh the staff technique. The lab manager or lab quality control officer are responsible for ensuring all staff are well trained.

For proper staff training on equipment care and maintenance;

* Provide all necessary documentation including SOPs, maintenance logs, service manuals etc.
* Ensure that the staff have, along with theoretical presentation, a practical on-the-job training on use and maintenance of lab equipment.
* Train all staff on preventive maintenance, where they learn the general care of equipment like lubrication and checking for possible damage.
* At the end of the training, a scoring system should be availed to evaluate the effectiveness of the training.

**E. General Care Tips for Lab Equipment**

1. **Cleaning**

Regular cleaning of lab equipment ensures that it is ready for use when needed, that stubborn stains/substances do not get a firm hold, and that experiments are not contaminated by impurities carried over from previous experiments.

Make certain that;

* The equipment is always cleaned before and after each use.
* Cleaning reagents and cleaning aids used are specific for laboratory equipment care.
* In addition to cleaning lab equipment before and after each use, a schedule is required for more in-depth cleaning. This might involve dissembling certain machines to clean hard-to-reach parts.
* Always follow instructions from the manufacturer on cleaning policy. Certain parts of the equipment might require very specific solvents, cleaning materials, or drying procedure.

1. **Calibration**

Calibration involves comparing the measurements of an auto analyser against the standard unit of measure, for the purpose of verifying its accuracy and making necessary adjustments. Regular calibration of laboratory auto analyser should be done because over time, biases develop in relation to the standard unit of measure. This guards against invalid data and ensures safety during experimentation. An independent specialist, that can provide calibration certificates where necessary, should be engaged in the process.

Calibration should be done when;

* The recommended time by the manufacturer elapses.
* The equipment is hit by a force, dropped on the ground, or involved in any accident or an event of safety concern.
* There are unusual patterns or sounds while the equipment is in use.
* Measurements obtained are questionable.
* Highly critical measurements, where data accuracy is of utmost importance, are to be carried out.

1. **Repairs and Refurbishments**

The automated analyser is generally costly and repairs and refurbishment prolong the lifespan of equipment, saving the lab the expense of new purchases.

The following are points to consider;

* Repair and/or refurbish faulty or worn out automated analysers without any delay. Faulty machines may stop working suddenly in the middle of an experiment leading to loses and they can also be a source of safety concerns.
* Minor repairs can be done by a dedicated staff, while major repairs should be directed to specialist with knowledge on the specific machine or equipment.
* Refurbish old equipment to give them a new lease of life by cleaning thoroughly, polishing where necessary, lubricating movable parts, and replacing small worn out bits.

1. **Quality Replacement**

Auto analysers that cannot be repaired or refurbished should be replaced. It is advisable to buy them from well known sources that can guarantee quality and offer technical support. High-quality lab auto analysers is easier to maintain and its durability translates to reduced costs in the long term. Non-faulty auto analysers that is too old should also be replaced, while some wear and tear might not be noticeable during its operation, outdated machines are not reliable and technical support in terms of servicing and acquisition of spare parts may be limited.

The care and maintenance of laboratory auto analysers should be a routine and embedded within the standard operating procedure of the lab. This will ensure that the life span of the equipment is prolonged and data collected within the laboratory is reliable.