# Predictive Maintenance for Scanners, Ventilators and Pumps Course: Alert Rules, Spares, Vendors

31 January – 4 February 2027
Kuala Lumpur

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## Programme Summary

Predictive maintenance for hospital devices is the subject of this one-week training course for hospital directors and clinical engineering managers at managerial level, ending in a device alert and service plan for one equipment group. Scanners, ventilators and infusion pumps generate logs that often go unread until a fault occurs. The programme moves from the equipment register and device data to diagnosis of failure signals, then to alert rules and service design, and finally to a plan that a hospital leadership team can adopt. Mars Training Centre UK delivers this programme on predictive maintenance for hospital devices to mixed-organisation cohorts.

## The Business Case

Hospitals and diagnostic networks depend on devices whose failure delays treatment. Models can read device logs, usage counts and service history to flag units likely to fail, but they can also raise false alarms or miss rare faults. Managers who test alerts against past breakdowns can focus service where it protects patients most.

- Unplanned Downtime: Falls as likely failures are flagged before they interrupt clinical use.
- Spares and Service Cost: Becomes easier to plan as demand for parts follows failure signals.
- Record Reliability: Improves as every alert, action and result is logged against the device.

## Principles and Evidence Base

- WHO Medical Equipment Maintenance Programme Overview: Frames maintenance as a managed programme with inventory, planned work and records, applied in Sessions 1 and 3 to the register and service plan.
- ISO 13485 Quality Management for Medical Devices: Ties service activity to documented records, applied in Session 4 to alert handling and evidence.
- Pareto Analysis: Shows that a few device groups cause most failures, applied in Session 2 to ranking.

## Intended Participants

- Hospital directors who approve service budgets and accept device risk.
- Clinical engineering managers who run planned maintenance and repairs.
- Biomedical equipment managers who hold the register and service records.
- Contract leads who negotiate vendor service terms.

Typical settings include public hospitals, private hospital groups, imaging centres and dialysis providers.

## Learning Outcomes

1. Participants will be able to evaluate which devices and failure modes suit data-based prediction.
2. Participants will be able to diagnose failure signals in device logs, usage counts and repair history.
3. Participants will be able to prioritise device groups by failure impact on patient care.
4. Participants will be able to construct alert rules with defined thresholds and response duties.
5. Participants will be able to design a service and spares plan linked to the alerts.
6. Participants will be able to justify the plan and its record controls to a hospital leadership team.

## Programme Structure

### Day 1: Predictive Maintenance for Hospital Devices and the Equipment Register

Which devices and failure modes can data help predict?

- Equipment Register Audit
- Device Criticality Grid
- Failure Mode Inventory
- Device Data Source Map
- Prediction Suitability Screen

### Day 2: Diagnosing Failure Signals in Device Records

Where do the records show a device drifting towards failure?

- Log Pattern Reading
- Repair History Review
- Usage Count Analysis
- Pareto Ranking of Failures
- Data Gap and Quality Check

### Day 3: Alert Rules and Service Planning

How are alerts defined, and how do they drive service?

- Alert Threshold Sheet
- False Alarm Trade-Off Table
- Alert Response Duty Chart
- Planned Service Calendar
- Spare Parts Demand Estimate

### Day 4: Vendors, Patient Safety and Records

How are vendor terms, patient safety and records kept sound?

- Vendor Service Terms Review
- Patient Safety Impact Screen
- ISO 13485 Record Mapping
- Model Drift Watch Sheet
- Alert Audit Trail Template

## Day 5: Device Alert and Service Plan for One Equipment Group

Do the earlier tools combine into a plan that leadership can adopt?

- Applying the Session 1 Device Criticality Grid
- Testing the Session 2 Pareto Ranking of Failures
- Checking the Session 3 Alert Threshold Sheet
- Rehearsing the Session 4 Alert Audit Trail Template
- Completing the Device Alert and Service Plan

## Methodology

The programme uses a data workshop built on prepared extracts for two equipment groups, one imaging fleet and one set of ventilators and infusion pumps, each with logs, repair records and service contracts. Participants work in small groups, test alert rules against past breakdowns, and defend thresholds to peers acting as a hospital leadership team.

- Suggested activity: Reading a device log and naming the signal that preceded a past failure.
- Suggested activity: Changing an alert threshold and judging the effect on false alarms and missed faults.
- Suggested activity: Reviewing a vendor service term and marking gaps.

## Capstone Output

Each participant completes a device alert and service plan for one equipment group. It holds a criticality ranking, a failure signal reading, alert rules, a service calendar, a spares estimate and a record control note. The plan is used at work to brief a hospital leadership team, agree duties with clinical engineering and set terms with vendors.

## Frequently Asked Questions

### Is a course on predictive maintenance for hospital devices suitable for managers without a data background?

Yes. Predictive maintenance for hospital devices is taught through prepared extracts and templates. It assumes experience in a hospital or clinical engineering unit, but no coding.

## Which guidance does predictive maintenance for hospital devices rest on?

Predictive maintenance for hospital devices rests on the WHO medical equipment maintenance programme overview, ISO 13485 for documented service records and Pareto analysis for ranking failures.

## How is the plan from predictive maintenance for hospital devices used at work?

You use the device alert and service plan to brief your hospital leadership team, agree duties with clinical engineering and set service terms with vendors.

## How does predictive maintenance for hospital devices differ from a general medical equipment management course?

Predictive maintenance for hospital devices concentrates on reading device data to warn of failures and plan service, while a general medical equipment management course covers acquisition, installation and the whole equipment lifecycle.