Unit 113: Medical Engineering in Practice

Level:	**4**
Unit type:	**Optional (Equipment Management and Clinical Engineering)**
Credit value:	**15**
Guided learning hours:	**120**

Unit summary

In this unit, you will develop the knowledge and skills to work as a Healthcare Science Associate within a clinical engineering department working in medical engineering. You will be able to work safely in the medical engineering environment. You should be able to perform a range of risk assessments and tasks within the equipment management life cycle. You will also be introduced to equipment management and quality management systems, and their use in the medical engineering environment to manage the range of equipment used within a healthcare setting. You will be expected to build your professional practice and use critical reflection to review and improve your performance in the workplace and develop skills to promote continuous professional development.

All learners must complete all generic health and safety and mandatory training contextualised to own area of practice.

Unit assessment requirements

There are no specific assessment requirements for this unit. Please refer to the assessment strategy in *Annexe B*.

Additional information

All procedures must be undertaken in accordance with Standard Operating Procedures (SOPs) and legislation.

Medical engineering covers a wide range of equipment shown in the table below. Learners should be competent to perform medical engineering activities on a minimum of **three** categories of medical equipment from the table below and a minimum of **three** devices within each category. Further guidance is given in the assessment criteria.

Types of medical equipment	Medical devices
Beds and electromechanical equipment	• Wheelchairs (including scooters) • Patient trolleys • Stair lifts; hoists; seating systems • Walking aids; commodes; bathing equipment; patient trollies • Adjustable beds; pressure redistribution and relief devices • Other specific AT equipment
Cardiovascular equipment	• Blood pressure devices (excluding mercury sphygmomanometer) • Pulse oximeters; electrocardiography (ECG) machines; external temporary pacemaker box
Physiological monitoring	• Foetal heart monitoring devices • Apnoea devices • Physiological monitoring equipment • Ophthalmoscopes • Thermometers
Infusion equipment	• Infusion pumps • Syringe drivers • Patient-controlled analgesia • Feeding pumps (including breast pump)
Therapeutic equipment	• Phototherapy devices • Radiant heater warmers • Oxygen delivery and monitoring devices
Resuscitation equipment	• Defibrillators • Suction equipment for airway clearance • Oxygen equipment – pipeline and cylinders • Capnography • Miscellaneous equipment, e.g. laryngoscopes, intraosseous drills
Operating theatre and surgical equipment	• Tourniquet devices • Gas monitoring devices; flow and pressure gauges • Surgical lighting equipment/examination lamps • Pneumatic drilling/sawing devices • Blood warmers; patient warmers; operating tables; patient beds
Therapeutic equipment	• Nerve stimulating devices • Nebulisers; continuous positive airway pressure devices • Interferential therapy devices; therapeutic ultrasound devices • Traction devices; heater lamps; exercise equipment

Types of medical equipment	Medical devices
Laboratory equipment	• Centrifuges; coulter counters; particle counters • Blood and gas analysers; ion selective analysers • Flame photometers; chloride meters; pH meters • Spectrophotometers; roller beds; colorimeters
Dental equipment	• Suction units; drilling units; dental air compressors • Descalers; dental hand pieces; polymerisation units • Floor utility service units; dental lighting • Amalgamators; amalgam separators
Renal equipment	• Haemodialysis machines; haemofiltration machines • Reverse osmosis units; water treatment plants • Water quality equipment; patency monitoring
Non-ionising radiation	• MRI scanners • Lasers • Optical light sources
Ionising radiation equipment **Imaging and therapeutic equipment**	• Imaging equipment: • Diagnostic x-ray • Nuclear medicine • CT scanners • Radiotherapy equipment: • Linear accelerators • Radiation monitoring equipment • Mould room

AC1.1 includes:

- regulatory frameworks, including the Health and Safety at Work etc Act 1974
- legislation
- policy.

AC1.2 includes:

- quality management systems and good practice.

AC1.3 includes:

- control of infection risks in accordance with departmental protocols
- maintaining a tidy workplace, with exits and gangways free from obstruction
- using equipment safely and only for the purpose intended
- observing organisational safety rules, signs and hazard warnings
- taking measures to protect others from any harm resulting from the work that they are carrying out
- wearing eye protection and personal protective equipment (PPE)

AC2.1 includes:

- the public
- equipment users.

AC4.2 includes both around the workshop and the specific symbology used on medical equipment and medical device packaging.

AC4.6 should include performing **two** environmental risk assessments.

AC4.7 should include performing **two** risk assessments.

AC6.6 includes:

- regulators
- flow meters
- suction controllers
- pipeline systems and mechanisms designed to ensure system safety.

Learning outcomes and assessment criteria

To pass this unit, learners need to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet **in own area of work and in accordance with Standard Operating Procedures (SOPs)** to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand safe working practices in medical engineering	1.1	Explain the health and safety policies and regulatory framework in medical engineering			
		1.2	Explain the quality-assurance processes underpinning safety and good practice in medical engineering			
		1.3	Identify appropriate sources of information and guidance on health and safety issues			
		1.4	Explain personal responsibilities regarding processes and procedures within own area of practice			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
2	Be able to communicate effectively in the medical engineering environment in own area of work	2.1	Communicate scientific and engineering information at a level appropriate to the audience			
		2.2	Adapt communication to meet varying needs and overcoming barriers to understanding			
		2.3	Explain the importance of effective communication skills within the healthcare environment			
		2.4	Treat every patient/carer with compassion, dignity and respect, maintaining the highest standards of person-centred care			
3	Understand the work of the medical engineering department	3.1	Explain the role of medical engineering in healthcare and healthcare science			
		3.2	Explain the range of procedures undertaken in medical engineering			
		3.3	Explain the phases in the equipment life cycle and how it is used with medical engineering			
		3.4	Explain the potential impact of medical engineering on the patient, patient care, and staff healthcare services			
		3.5	Explain how the principles of patient-centred care are embedded in own area of practice			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to perform a range of routine risk assessments appropriate to medical engineering	4.1	Explain the use of Control of Substances Hazardous to Health (COSHH) Regulations 2002 in own area of practice			
		4.2	Explain the types of symbols found in medical engineering, their meaning and implications			
		4.3	Explain the principles of risk assessment in medical engineering			
		4.4	Discuss potential medical equipment hazards in the patient environment			
		4.5	Perform a Control of Substances Hazardous to Health (COSHH) Regulations 2002 risk assessment			
		4.6	Perform environmental risk assessments in medical engineering			
		4.7	Perform risk assessments covering repair procedures for medical devices			
		4.8	Perform a risk assessment covering decontamination procedure(s)			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
5	Be able to contribute to incident reporting	5.1	Explain the local and national regulatory incident identification and escalation process			
		5.2	Explain the incident reporting process			
		5.3	Critically reflect on incident reports in own area of practice and the causes of the incidents			
		5.4	Contribute to the progress of an incident reporting process			
		5.5	Explain the process of equipment-related warning notice distribution			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
6	Be able to perform routine maintenance on medical gas equipment	6.1	Explain the standards and guidance for the storage, use and maintenance of medial gas equipment in own area of practice			
		6.2	Explain the use of medical gases in own area of practice			
		6.3	Explain the safety features of medical gases, including storage, use and maintenance			
		6.4	Explain the risk of working with medical gases, specifically those around oxygen			
		6.5	Explain the system for identifying gas cylinders and specialist gas mixtures			
		6.6	Explain the principles of medical gas instrumentation that clinical engineering staff are involved with			
		6.7	Follow health and safety regulations and guidelines when working with medical gases, and medical gas equipment			
		6.8	Perform routine maintenance on medical gas equipment in line with local procedures			
		6.9	Seek advice in line with local procedures			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)