Australian Government

UEENEEI115A Trouble shooting in medical equipment control systems

Release: 2

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

UEENEEI115A Trouble shooting in medical equipment control systems

Modification History

		UEENEEI115A	Trouble shooting in medical equipment control systems	
Release	Action	Core/Elective	Details	Points
2	Editorial	N/A	Show full pre-req chain in the unit.	
2	Editorial	N/A	Replace "process control system" in the second paragraph with "medical equipment control system" to align with the outcome.	
2	Editorial	N/A	In Required Skills and Knowledge, insert topic numbering.	
2	Editorial	N/A	Replace "essential knowledge and associated skills" with "required skills and knowledge".	

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers finding and rectifying faults in medical equipment systems. The unit encompasses safe working practices, interpreting process and circuit diagrams, applying knowledge of medical process controls to logical fault finding procedures, effective repairs, safety and functional testing and completing the necessary service documentation.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment-based programs incorporated in

approved contracts of training. It may also be used to augment formally acquired competencies.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace provided equipment is not connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space and lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 4 Writing 4 Numeracy 4

Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to find and rectify faults	1.1 OHS procedures for a given work area are identified, obtained and understood
	1.2 OHS risk control measures and procedures are followed in preparation for the work.

ELEMENT	PERFORMANCE CRITERIA	
	1.3	The nature of the fault is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.5	Sources of materials that may be required for the work are established in accordance with established procedures.
	1.6	Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety
2 Find faults	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures
	2.3	Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures
	2.4	Fault finding is approached methodically drawing on knowledge of medical equipment control systems using measured and calculated values of system parameters.
	2.5	Apparatus components are dismantled where necessary and parts stored to protect them against loss or damage
	2.6	Faulty components are rechecked and their fault status confirmed.
	2.7	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.8	Fault finding activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable

ELEMENT	PERFORMANCE CRITERIA	
		energy principles.
3 Rectify fault.	3.1	OHS risk control measures and procedures for carrying out the work are followed.
	3.2	Apparatus is checked as being isolated where necessary in strict accordance OHS requirements and procedures
	3.3	Materials required to rectify faults are sourced and obtained in accordance with established procedures.
	3.4	Repairs are affected efficiently without damage to other components or apparatus and using sustainable energy principles.
	3.5	Effectiveness of the repair is tested in accordance with established procedures.
	3.6	Apparatus is reassembled, finally tested and prepared for return to customer.
4 Completion and report fault finding and rectification activities	4.1	OHS work completion risk control measures and procedures are followed.
	4.2	Work area is cleaned and made safe in accordance with established procedures.
	4.3	Written justification is made for repairs to apparatus.
	4.4	Work completion is documented and appropriate person(s) notified in accordance with established procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the required skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and finding and rectifying faults in medical equipment control systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EI115A Medical equipment principles and control systems

Evidence shall show an understanding of medical equipment principles and control systems to an extent indicated by the following aspects:

REQUIRED SKILLS AND KNOWLEDGE

T1 Medical equipment safe working practices encompassing:

- Risk management and assessment of risk -
- Principle and purpose of risk management, and
- Processes for conducting a risk assessment
- Hazards associated with medical equipment-
- Infections
- Toxic materials
- Electrical components
- Radiation
- Risks and control measures associated with working with medical equipment

T2 Medical equipment principles encompassing:

- Equipment function and operation
- Hazards and safety procedures
- Causes of failure
- Safety testing requirements and methods

T3 Cardiovascular systems: blood warmers, cardiac catheterisation systems, defibrillators, electrocardiogram(ECG) machines, electrocardiogram(ECG) monitors, heart-lung machines, infusion pumps, intra-aortic balloon pumps, pacemakers, syringe pump and cardiac output measurement equipment.

T4 Respiratory systems: anaesthetic delivery and monitoring units, medical gases, oxygen concentrator, pulse oximeter, respiratory humidifier, respiratory support units and ventilators.

T5 Neurological systems: electroencephalograph (EEG recorder), electromyograph (EMG recorder) and intracranial pressure monitoring (ICP).

T6 Renal systems: haemodialysis machine, CVVH machine and peritoneal dialysis.

T7 Medical imaging including: x-ray equipment, computerised axial tomography (CT scan), magnetic resonance imaging (MRI), nuclear medicine and diagnostic ultrasound equipment.

T8 Physiological equipment: blood pressure monitors, foetal cardio-tocograph, infant care systems, multiparameter systems, thermometry, telemetry, networking and patient warmers.

T9 Miscellaneous equipment: electrosurgery, electric stimulators, and

REQUIRED SKILLS AND KNOWLEDGE

endoscopy and laparoscopy systems, laser, operating microscopes, therapeutic diathermy and ultra sound.

T10 Medical equipment, anatomy and physiology and infection control encompassing:

- Nature of infection
- Control of microbial growth
- Infection control strategies
- Body systems

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being

assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the required skills and knowledge as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling

employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices & workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Find and rectify faults in medical equipment control systems as listed as described in 8) and including:

A	Using methodical fault finding techniques
B	Finding faults efficiently
C	Rectifying faults without damage
D	Providing written justification for the rectifications undertaken
E	Dealing with unplanned events by drawing on required skills and knowledge to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment

9.3)

This unit must be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment,

the conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to finding and rectifying faults in medical equipment control systems.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the required skills and knowledge described in this unit.

Concurrent assessment and relationship with other units **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to finding and rectifying faults in two items of equipment representative of each of the following categories:

- Cardiovascular systems
- Respiratory systems
- Neurological systems
- Renal systems
- Medical imaging
- Physiological equipment
- Miscellaneous medical equipment

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Instrumentation and Control