VECMOS
Victorian
Extracorporeal
Membrane Oxygenation
Service

The Victorian ECMO Services Initiation Site Resource

Email: info@vecmos.org.au
Website: vecmos.org.au

1 Contents

1. Executive Summary 3
2. Introduction 4
3. The ECMO Service Establishing Process 5
   3.1. A guide for establishing an ECMO service 6
4. Initiation and Accreditation 7
   4.1. Capability requirements 7
   4.2. Equipment 8
      4.2.1. Managing equipment 8
   4.3. Quality assurance and improvement 8
   4.4. Clinical staff 9
      4.4.1. ECMO Clinical Lead 9
      4.4.2. ECMO Nurse Lead 10
      4.4.3. Local Hospital Network Staffing 11
   5. Education and Training 14
6. Capital and Resources – as per 2023 figures table 16
   6.1. Non-clinical staffing requirement and clinical staff rostering 17
      6.1.1 Non-clinical staffing requirement 17
      6.1.2 Clinical staff rostering 17
   6.2. Education and training 18
   6.3. Equipment 18
      Estimated total start-up costs and yearly costs ..... **Error! Bookmark not defined.**
7. Initiation Site Executive Support 19
8. Resources 19

1. Executive Summary

The Victorian Extracorporeal Membrane Oxygen Service (VECMOS) was formally initiated in early 2020 with funding from the Victorian Department of Health (DHS). The service was established following a Safer Care Victoria review of clinical practice and outcomes for Victorian patients who were receiving ECMO support. The service was established as a Tiered, Networked and Accredited program to provide equitable access to high quality care for an intervention that is low volume and high risk for patients.

The service was initiated with 7 hospitals participating. Other hospitals in Victoria are now seeking support to develop ECMO services and to join VECMOS. This document provides an overview of the requirements for developing a new ECMO program as part of VECMOS. This document outlines the process and requirements of becoming an initiation site and obtaining accreditation as part of the VECMOS tiered structure.

Establishing an ECMO service requires a financial commitment from the hospital, including for equipment, consumables, appointment of ECMO leads, staff rostering, education and training, as well as an ongoing commitment for continued training for re-credentialing purposes.

Sites seeking to establish an ECMO service, should assess their case load potential and submit a formal letter to the VECMOS executive with the supporting data. If the site meets capacity requirements, the VECMOS executive will seek approval from the DHS prior to issuing a supporting letter to the site's Chief Executive Officer. The requesting site and VECMOS clinicians will then collaborate to develop the next steps for service development.

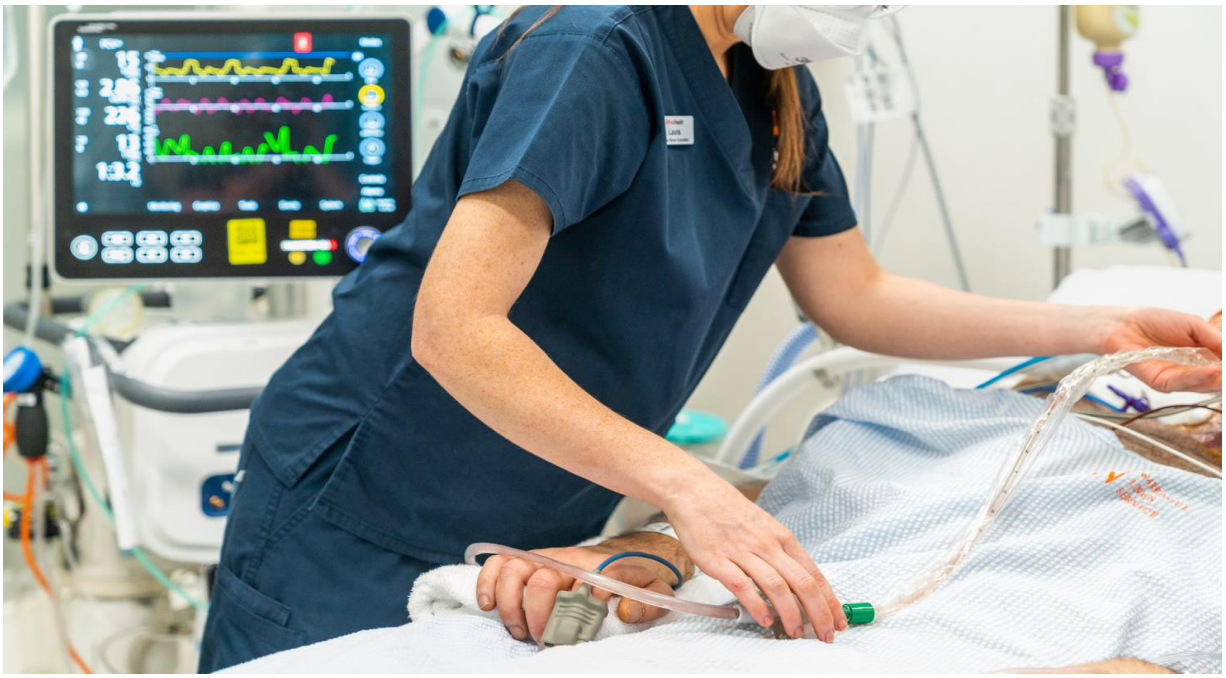
Key staff positions for an ECMO service include an ECMO Clinical Lead and an ECMO Nurse Lead. Training and credentialing processes should align with the VECMOS Education and Minimum Standards Framework. The service conducts site accreditation visits to ensure compliance with initiation centre requirements.

Quality assurance, improvement, and data reporting are essential aspects of an ECMO service. Potential sites will be required to collect and report data through various databases including the Clinical Information System (CIS) managed by Ambulance Victoria.

By following the framework outlined in this document, health services can contribute to the tiered, networked and accredited Victorian ECMO service and provide high level care to adult patients requiring ECMO in their hospitals.

2. Introduction

In late 2017, Safer Care Victoria (SCV) was asked by the Department of Health and Human Services to review the evidence for adult patients who received ECMO and the outcomes of those patients within Victoria. The review, published in May 2019, produced 13 recommendations for the optimal delivery of ECMO. In response to the evidence review, SCV established the Victorian ECMO Service (VECMOS) to develop a plan to implement a tiered, networked and accredited state-wide ECMO service. The VECMOS was commissioned in 2020 and has become an important state-wide collaboration focused on improving the quality of ECMO care in Victoria.



All health services in Victoria have the capability to refer patients to the VECMOS team for advice and ECMO initiation. Larger sites, who are not yet accredited by VECMOS, may wish to develop their own ECMO service as part of the tiered, networked program. However, establishing an ECMO service is a complex process and requires a significant commitment of personnel and institutional support. As laid out by SCV, initiation sites should have the capacity to initiate ECMO within 60 minutes. All potential patients who meet referral criteria should be referred to VECMOS. Initiation centres require facilities and staffing resources to manage a patient on ECMO for up to 48 hours while awaiting retrieval. The goal of this document is to provide an overview of the requirements to consider when planning to develop a new ECMO service as part of the tiered, networked VECMOS.

3. The ECMO Service Establishing Process

Requesting initiation sites should be aware that the DHS designated the number of hospitals within each tier of the VECMOS network based on geography and projected patient numbers.

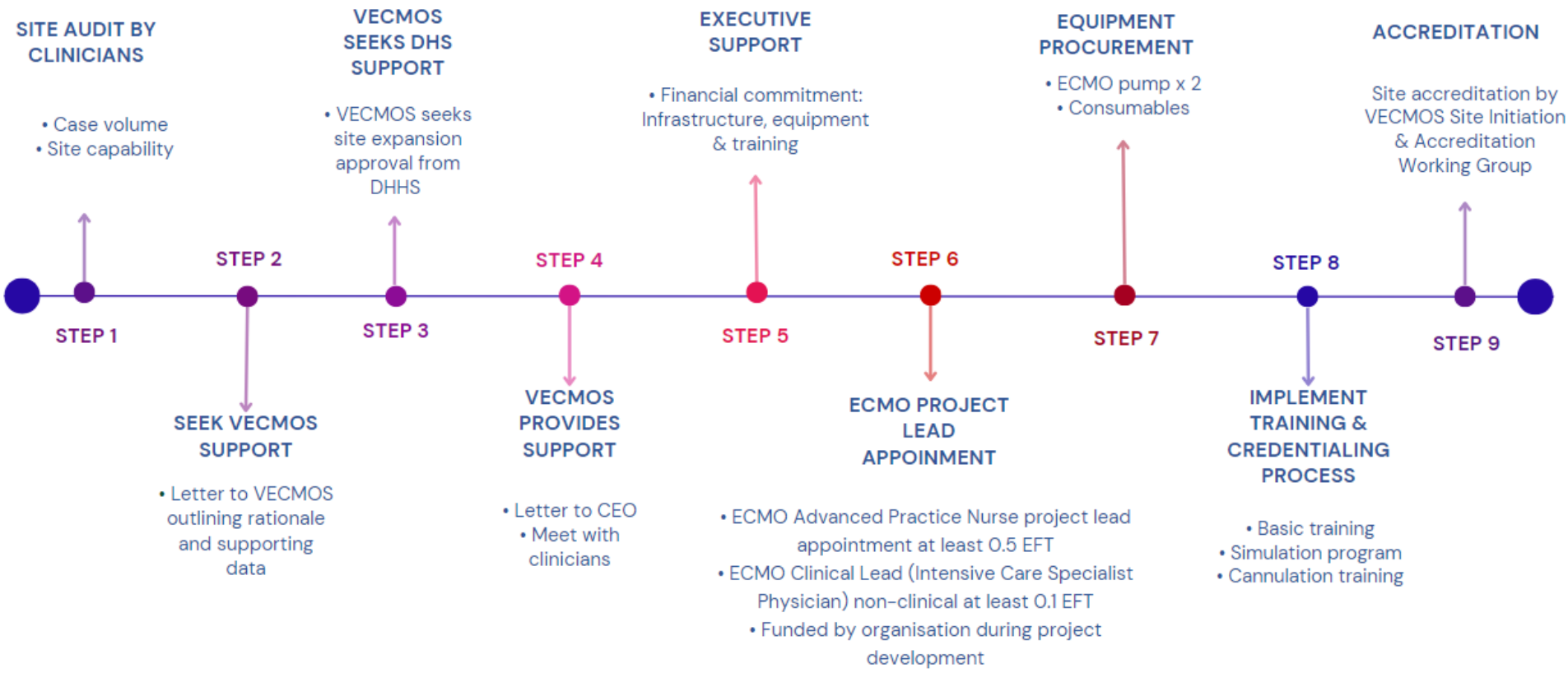
The first step to establishing an ECMO service as part of VECMOS is to audit the potential case load expected at the hospital. A potential VECMOS hospital should provide a formal letter to the VECMOS executive outlining their rationale with the supporting data. Following this, VECMOS will review the data and the site's capacities. If the site meets the capacity to fulfil the requirements and demands of an initiation centre, the VECMOS executive will issue a supporting letter to the requesting site's Chief Executive Officer. Once the site has support of their CEO, a meeting between VECMOS and the site's relevant clinicians can be arranged to assist with establishing the next steps for service development.

An important aspect of becoming an initiation site is having sufficient available capital to accommodate the appropriate equipment, education, training and workforce requirements. Requesting sites should have their hospital's Executive support for the financial commitment of establishing a service. The capital expenditure related to establishing an initiation site encompasses at least two ECMO pumps and relevant consumables. It also includes sufficient staffing, rostering, education, and training requirements as well as adequate facilities to perform training. Commitment should also include ongoing funding for consumables and training. It should be clear how these will be funded by the individual health service or charitable partners. Please refer to section 5 for relevant initial and ongoing costs required to run an ECMO service.

An ECMO Nurse Lead (at least 0.5 FTE) and an ECMO Clinical Lead (medical specialist, at least 0.1 EFT non-clinical) should be appointed. It is important to develop a training and credentialing process for basic training, simulation programs and cannulation training. The local hospital training program and credentialing process should be in line with the VECMOS Education and Credentialing Document.

Once the above has been established, the Victorian ECMO Service will conduct a Site Accreditation. This is performed by the VECMOS Site Initiation and Accreditation Working Group. Please see below comprehensive overview of the establishment process.

3.1. A guide for establishing an ECMO service



4. Initiation and Accreditation

Requesting health services will need to meet the requirements set out for Initiation Centres (Tier 3) by Safer Care Victoria, including staff credentialing and hospital capability. The accreditation process involves a site visit with members of the VECMOS initiation and accreditation working group.

Hospitals will be expected to actively participate in the Victorian ECMO Service and undertake self-audits annually to maintain accreditation. Renewal of accreditation will be required after 2 years from the first accreditation, with re-accreditation occurring 3 yearly thereafter. Re-accreditation will follow a process similar to the initial accreditation in line with the VECMOS quality and governance process.

4.1. Capability requirements

The below requirements cover all Victorian ECMO Service sites:

- Coronary angiography suite and high-volume interventional angiography service and emergency STEMI management capability available 24 hours a day, seven days a week
- Operating theatre and surgical services with vascular capability
- ICU with Fellow of College of Intensive Care Medicine exclusive on- call within 30 minutes response time 24 hours a day, seven days a week
- Emergency department with Fellow of Australasian College of Emergency Medicine exclusive on call within 30 minutes response time 24 hours a day, seven days a week
- Blood bank and pathology services available 24 hours a day, seven days a week
- Ultrasound capable critical care clinicians available 24 hours a day, seven days a week
- Echocardiography service including reporting available 24 hours a day, seven days a week
- Radiology service including reporting available 24 hours a day, seven days a week
- Telehealth facilities available for use for ECMO patients

4.2. Equipment

ECMO equipment should be aligned with the state-wide service and be available immediately onsite. Currently, ECMO consoles and circuits are standardised across the Victorian service with the preferred provider Getinge. The coordination of interchangeable equipment assists with patients who require transportation between initiation, intermediate and comprehensive ECMO centres. Currently there is no tender process as there is only one supplier for Australia, however this may change in the future as more companies come onto the Australian market. If this were to happen, the Victorian service will notify all sites of additional equipment suppliers who have been endorsed by the service.

More information on Getinge and the Cardiohelp system can be found at https://www.getinge.com/anz/.

The minimum required equipment encompasses:

- Two ECMO pumps (including cleaning and maintenance records)
- Adequate number of cannulae and associated consumables (these can be purchased from multiple suppliers including Medtronic, Arrow and Getinge.)
- Ultrasound for vascular access and echocardiography
- Mechanical CPR device if ECPR is to be provided

4.2.1. Managing equipment

Managing equipment, both consumable and non-consumables is the responsibility of individual hospitals. The ECMO coordinator or perfusion department at each hospital will be responsible for ensuring adequate equipment is available and maintained according to manufacturer requirements.

4.3. Quality assurance and improvement

To ensure quality of care and ongoing education, the Victorian ECMO Service expects the requesting site to collect and report their data through different databases. This includes the VECMOS CIS, which was developed between the DHS and Ambulance Victoria, for both logistical processes and for quality improvement purposes. It is also expected that sites enter data into other local databases: ANZICS, EXCEL and ELSO.

A local case review process should be in place, which will review and report on sentinel event and other complication findings. In addition, each site should establish a special interest group and develop local guidelines.

Ideally at least one staff member from each VECMOS site is encouraged to participate in one of the VECMOS working groups or governance structure. Collaboration in the state-wide equipment management process is encouraged to limit waste within the service and to support all units in times of equipment shortages.

4.4. Clinical staff

The State-wide training framework was developed to create a unified naming convention for roles within VECMOS, standardisation of minimum educational requirements, and standardisation of credentialing and recredentialing processes across all sites.

The ECMO Clinical Lead and ECMO Coordinator roles, as defined in the Implementing the Victorian ECMO Service document (appendix 5), encompass a large quantity of leadership and management responsibilities, which requires both roles to work closely together as a collaborative team. The roles should be filled by those with a minimum credentialing of *ECMO Specialist* in their given profession. Accredited sites may choose to set higher credentialing requirements for these positions to best align with their service.

4.4.1. ECMO Clinical Lead

Each ECMO accredited site should have an ECMO Clinical Lead. This is an Extracorporeal Life Support Organization (ELSO) defined role, equivalent to a 'head of service'. In Australia generally, the position is occupied by an intensivist, but alternatives could include a cardiologist, cardiac surgeon or emergency physician. It is recommended that this role is filled by a consultant ECMO specialist, who also participates in the site's ECMO lead roster, demonstrates advanced practice in the field to ensure a high standard of practice at the site and shares sound ethical values to the organisation.

The ECMO Clinical Lead is responsible for:

- The education, training, service delivery and performance and quality improvement
- Assuring appropriate training and performance and the credentialing of clinicians who care for ECMO patients or manage ECMO circuits
- Maintaining records of credentialing and re-credentialing of staff
- Directing quality improvement and projects
- Assuring valid data submission as required for the program
- Representing the hospital on the Victorian ECMO Service governance committee

4.4.2. ECMO Nurse Lead

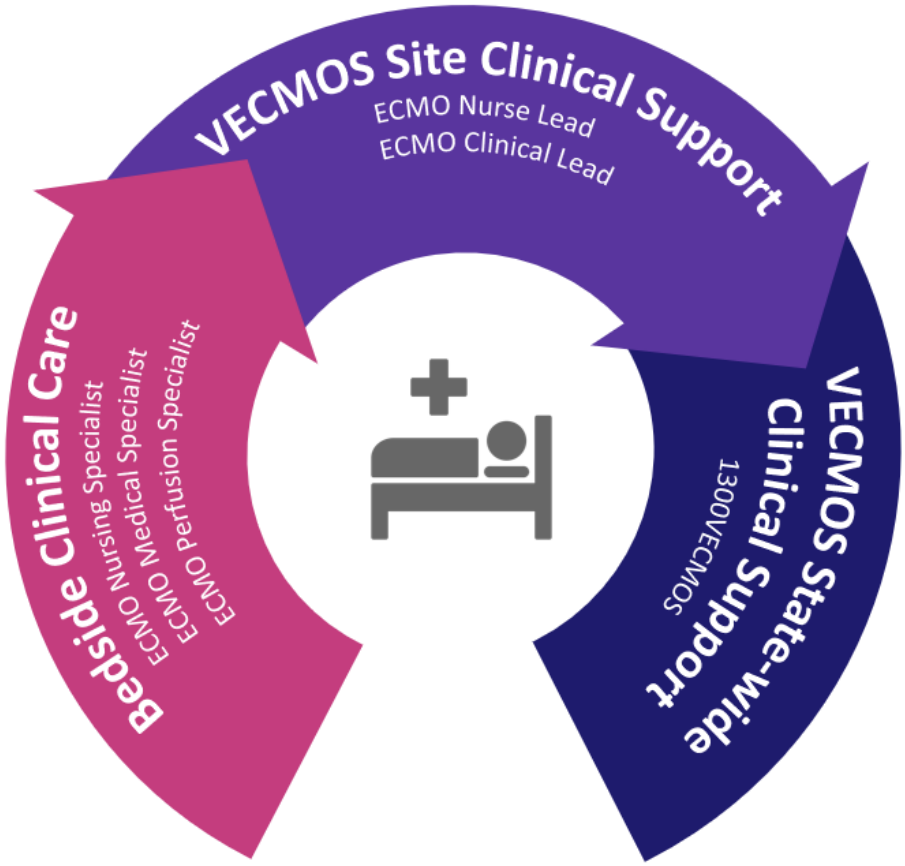
Each ECMO accredited site should have an ECMO nurse lead. ELSO defined this role as an "ECMO coordinator", that manages the operations of the ECMO program. This role is usually filled by an intensive care nurse ECMO specialist or perfusionist ECMO specialist.

The ECMO Nurse Lead is responsible for:

- education, training, equipment management, service delivery and collection of patient and clinician experience data
- assisting the program director in maintaining records of credentialing and re-credentialing of staff
- undertaking valid data collection and submission as required for the program including patient and staff experience surveys
- being the primary contact for families and clinicians, together with the ECMO lead.

4.4.3. Local Hospital Network Staffing

There are multiple roles that are specific to VECMOS and are used to provide a unified naming convention for the purposes of standardisation of minimum educational requirements, credentialing and recredentialing processes across sites. The roles defined in the state-wide training framework are specific to VECMOS and have no bearing on an individual's professional title or grade at a particular health service. In this document, we briefly outline the different roles but refer to the original document for a full overview of the different roles and their minimum requirements.



ECMO Medical Specialist

An ECMO Medical Specialist is a clinician with specialist registration, who has undergone additional ECMO training, they provide care to ECMO patients on a day-to-day basis with the assistance from the ECMO Clinical Lead, ECMO Coordinator, ECMO Advanced Specialist (if applicable), ECMO Coordination & Retrieval Specialist as required. This role is primarily undertaken by Intensive Care specialists, but may extend to Cardiologists, Cardiothoracic Surgeons and Emergency Physicians.

Any medical specialist, irrespective of discipline, who is involved in the decision making for ECMO initiation, bedside care and weaning, must meet the credentialing and recredentialing requirements for an ECMO Medical Specialist. ECMO Medical Specialists *do not* need to be a credentialed ECMO Cannulator.

ECMO Medical Advanced Specialist

An ECMO Medical Advanced Specialist is an Intensive care clinician who has demonstrated an ongoing commitment to ECMO clinical practice, education, and quality improvement. They have gained further ECMO proficiency, particularly in the areas of patient selection, ECMO initiation and cannulation.

ECMO Medical Advanced Specialists need to be credentialed ECMO Cannulators.

ECMO Medical Coordination and Retrieval Specialist

An ECMO Medical Coordination & Retrieval Specialist is an Intensive care clinician who has significant ECMO experience and works at a VECMOS site that offers a state-wide retrieval service and long-term destination therapies for Cardiac & Respiratory conditions. They have demonstrated an ongoing commitment to ECMO clinical practice, education, and quality improvement and gained clinical proficiency in all aspects of ECMO patient care, including patient selection, cannulation, ECMO initiation, ongoing management and weaning. They are able to provide care to ECMO patients on a day-to-day basis and provide advice and patient retrieval via the coordinated VECMOS / Adult Retrieval Victoria (ARV) service. ECMO Coordination & Retrieval Specialists need to be credentialed ECMO Cannulators.

ECMO Cannulator

Many different medical specialists will have the opportunity to develop the skills required to cannulate for ECMO, including Intensivist, Cardiologists, Cardiothoracic or Vascular Surgeons, Emergency Physicians, Anaesthetists and Interventional Radiologists. Whilst it is preferred, ECMO cannulators are not required to be credentialed as an ECMO Medical Specialist, if the technical role of cannula placement is their only

role as part of the ECMO program. ECMO cannulators as required to attend a specifically designed ECMO cannulation course which includes theoretical and practical components. As with other VECMOS roles, recredentialing will be required on a three-yearly basis and should be evaluated by the site ECMO Clinical Lead and Coordinator.

ECMO Nursing Specialist

An ECMO Nursing Specialist is a clinician who has undergone post graduate training in critical care and has completed additional introductory ECMO training. They provide care to ECMO patients on a day-to-day basis with assistance from ECMO Medical Specialists, the ECMO Program Director and Coordinator, and ECMO Advanced Nursing Specialist (if applicable).

ECMO Nursing Advanced Specialist

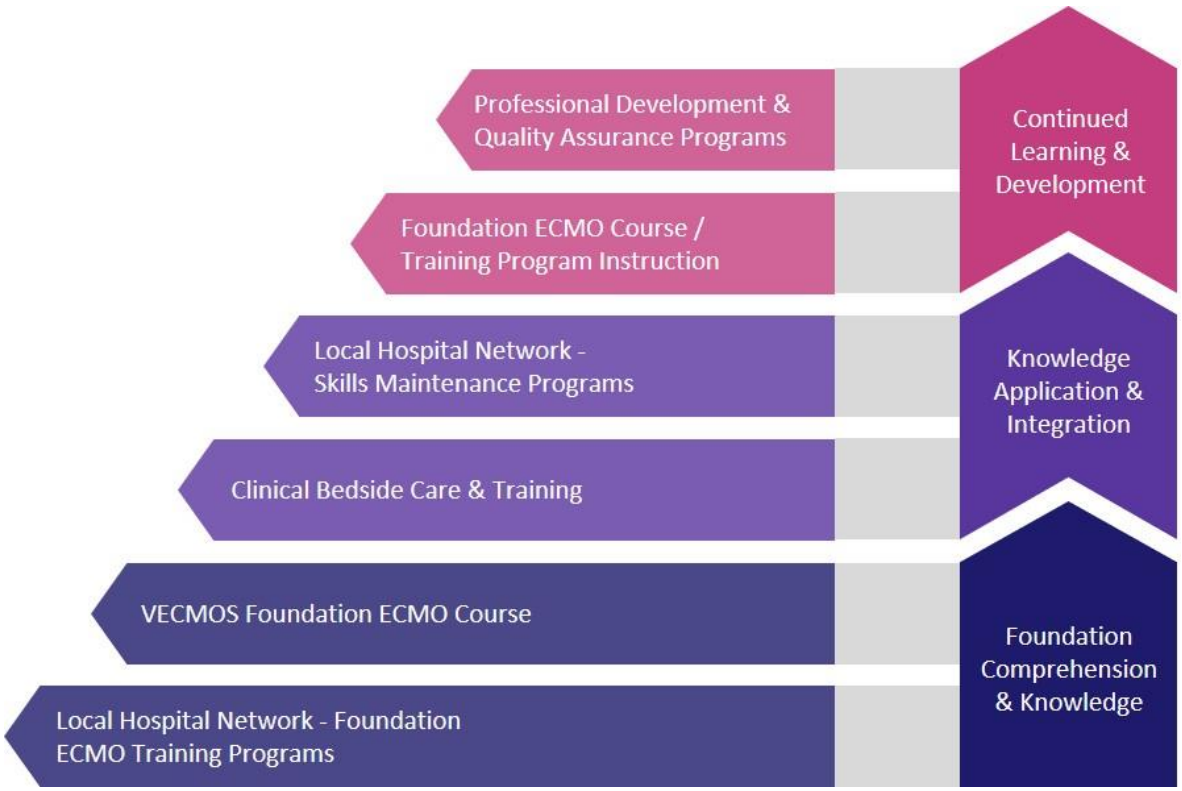
An ECMO Nursing Advanced Specialist is a clinician who has demonstrated an ongoing commitment to ECMO clinical practice, education, and quality improvement. They have gained further ECMO proficiency, particularly in the areas of ECMO initiation and management. In addition to providing care to ECMO patients on a day-to-day basis, they may fulfil supervisory, education and assessment roles.

Perfusionist

Perfusionists working in all ECMO accredited sites need to meet similar credentialing and recredentialing requirements as for the ECMO Specialist roles. The Australian and New Zealand College of Perfusion (ANZCP) make specific recommendations about certification and experience. Perfusionists are trained to manage all areas of bypass and do this on a daily basis. However, ECMO comes with a different set of complications that should be considered separately when setting up an ECMO program. Experience is the key to a successful outcome and a perfusionist wishing to become an ECMO specialist should seek further learning and experience from an established program.

5. Education and Training

A state-wide VECMOS training framework has been established with the overall vision for a coordinated state-wide approach to ECMO training, allowing for standardisation of ECMO practice across sites and healthcare disciplines. It is built around a number of key factors, including multidisciplinary involvement, hospital-based learning, standardisation of practice and continual professional development. The framework provides a scaffold approach to ECMO education.



For all clinicians, foundation comprehension and knowledge are built utilising a combination of local hospital network (LHN) training programs and the VECMOS Foundation ECMO course. Whilst LHN training can be used to begin to develop an understanding of ECMO physiology and patient management, attendance at a VECMOS accredited foundation course is an essential component of staff credentialing.

Following foundation training, knowledge is then applied and integrated through clinical bedside care and LHN skills maintenance programs. Advanced clinicians continue with learning and development through engagement with LHN and state-wide quality assurance activities, teaching at foundation courses and ECMO specific professional development.

Local Hospital Networks participating in the Victorian ECMO Service will need to develop scope of practice guidelines and will be responsible for credentialing and recredentialing of their staff members. Recredentialing programs will need to encompass both theoretical and practical or “wet-lab” components. Individual health services will be responsible for the credentialing and recredentialing of their staff members, with the ECMO program director and coordinator being directly responsible for ensuring all staff members caring for patients on ECMO have met the minimum standards required.

6. Capital and Resources

Instituting an ECMO program is an expensive undertaking and sites looking to provide ECMO care need to be prepared for significant set up costs relating to:

- Staffing and rostering
- Education and credentialing
- Equipment and consumables

It is expected that initiation sites should manage 5-10 patients on ECMO per year. Although more consumables are required for sites that provide more patients with ECMO, ongoing education requirements and therefore training costs, are higher for sites that provide less.

Following the initial start-up phase, NWAU funding related to ECMO provision should cover a proportion if not all of the ongoing costs involved in running an ECMO service.

Initial Start Up Costs		
Item	**Quantity Required**	**Cost**
ECMO Console	2 @ $160,000	$320,000
HLS Circuits	3-5 @ $8 000	$40,000
Cannulae	Range of sizes required (arterial x 8, venous x 12) @ $500 to $1500 per cannula.	$20,000k
Foundation training	20 nurses trained @ $800 5-10 medical staff: training usually covered by CME	$16,000
	Total	**$396,000**
Ongoing Costs		
Item	**Quantity Required**	**Annual cost (10 pts)**
HLS circuits	5 to 10 patients per year @ $8,000	$80,000
Cannulae	2 per patient @ $500 to $1500	$20,000
Clinical Staff	0.5 Nursing lead role 0.1 Medical clinical Lead role	$140,000
Training + Education	20 Nursing FTE, 4 days ~ $1600 Per nurse	$32,000
Console Servicing	$12k per console	$24,000
SIMS / training hardware	Potential to share between sites across VECMOS	
	Total	**$296, 000**
NWAU funding model		
Per ECMO initiation	$29-67,000 (average $48,000 per case)	**$480,000 (10 pts)**

* *Please note prices are guides only and may vary per item. Prices are correct as of September 2023.*

6.1. Non-clinical staffing requirement and clinical staff rostering

6.1.1. Non-clinical staffing requirement

- ECMO Nurse Lead appointment, at least 0.5 FTE
- ECMO Clinical Lead (medical physician), at least 0.1 FTE non-clinical
- Funded by organisation during project development. It is unclear if DHS funding will be available to support this funding ongoing.

6.1.2. Clinical staff rostering

As patients can arrive at any time of day, it is preferable that sites should plan for a 24hr 7 day a week patient management service. This includes rostering that includes access to cannulation staff, medical ECMO specialists and nursing ECMO specialists on weekends. If this is not desirable for the expected 5 to 10 patients per year, then sites should plan for on-call, re-call rostering for weekends and out of hours.

Medical

- 24/7 clinical lead rostered at minimum in an on-call capacity to support patient selection, initiation timing and discussion with the 1300 VECMOS coordination and retrieval clinicians.
- 2 cannulators need to be available to commence ECMO support in a timely manner: usually within 2 hours (for VA ECMO)
- If ECPR support is to be provided (e.g. Mon-Fri 8am to 6pm), two cannulators should be immediately available during the time period: required within 10mins (i.e. on-site).

Nursing

- A minimum of 20 FTE of trained ECMO specialist nurses are required to cover a 365-day roster. Sites need to consider that patients may need to be supported for up to 48 hours whilst awaiting stabilisation and retrieval following cannulation.
- When ECPR support is provided, immediate console set-up support is required by a trained ECMO specialist

6.2. Education and training

Initial training typically constitutes of 2-3 days of education per staff member. This estimation includes the Local Hospital Network Foundation ECMO Training Program and the VECMOS Foundation ECMO course. Cannulation course training is also required for medical staff. In addition to the costs related to the initial training, there will be recurring costs for ongoing training and recredentialing of all staff participating in the care of ECMO patients.

6.3. Equipment

Each ECMO accredited site should maintain a minimum level of equipment aligned to the state-wide service immediately available onsite. It is estimated that each initiation site within VECMOS should expect to manage between 5 to 10 patients on ECMO support each year.

Start-up cost includes the purchase of at least two ECMO consoles and an appropriate stock of consumables, including 3-5 HLS circuits and a variety of cannulae (e.g. 8 arterial cannulae and 12 venous cannulae of varying sizes).

The ongoing yearly costs can vary greatly among sites depending on stock management and patient numbers (1 circuit per patient, 2 cannulae per patient). Some initiation sites prefer to keep a primed circuit, which can last 28 days. If unused, this circuit needs to be discarded (or used for training purposes only).

Required equipment includes:

- Two ECMO consoles, including machine, trolley and heater
- Ongoing service costs (currently around $12,000 per machine)
- Consumables: Circuits (HLS Set) and cannulae (2 required per patient)

6.4. DHS funding

VECMOS is an advisory body for the safe and appropriate provision of ECMO services to patients within Victoria. It does not provide funding for these services. Funding for medical care is managed by the Department of Health.

With the initiation of VECMOS in 2020, hospital who were designated tiered sites with funded for the ECMO nursing lead and medical lead roles. At this point it is unclear if new hospitals will be funded in the same manner and so new sites will need to be prepared to provide the funds to support these roles ongoing.

The department of health funds patients via the NWAU system. ECMO management has a specific DRG code which is in addition to the ICU adjustment. Currently the ECMO DRG code in the NWAU system is funded at $29,000 for a single day, or 67,000 for a 2-day period per patient (average $48,000). After commencement of ECMO patients are either retrieved on the same day, or the following day depending on retrieval resources and patient stability. Therefore, initiation sites expecting to provide care for 5 to 10 patients per year should expect to be funded of around $480,000. This value should cover a large proportion of the costs involved with equipment procurement, staff training and ongoing consumable use.

7. Initiation Site Executive Support

If establishing an ECMO program is of interest to your health service and supported by your organisational Executives, please submit your official application addressing each of the above requirements to the VECMOS state coordinator at admin@vecmos.org.au

8. Resources

Implementing the Victorian ECMO Service – Part 1 (PDF)

Implementing the Victorian ECMO Service – Part 2 (PDF)

https://www.vecmos.org.au/

VECMOS State-Wide Training Framework & Minimum Educational Standards