Extracorporeal Life Support Organization (ELSO)

ELSO Registry Data Definitions
04/15/2026

For all comments, questions and concerns please email
registrysupport@elso.org

Table of Contents

PREFACE 4

Descriptions of Fields 4
Mandatory Fields and Major complications 5
When is it Extracorporeal Life Support? 6

1. ADD PATEINT 7

Patient Information 7
First Run Information 15
Neonatal Information 20
CDH Information 21

2. RUN INFORMATION 22

Run Number 22
Support Type 22
Admission Weight 22
Admission Height 23
Intubation 23
Bridge to Transplant 28
Pre-ECLS Cardiac Arrest 29
Patient Transported to your center 29
Hospital Admit Date/Time 30

3. PRE-ECLS ASSESSMENT 31

Pre-ECLS Arterial Blood Gas 31
Pre-ECLS Ventilator Settings 36
Pre-ECLS Hemodynamics 42

4. PRE-ECLS SUPPORT 50

Mechanical Support Codes 50
Renal, Pulmonary and Other Support Codes 52
Medications (excluding vasoactives) 55
Vasoactive Infusions 56
Pre-ECLS Support Types no Longer Collected 57

5. ECLS ASSESSMENT 58

24 Hour ECLS Arterial Blood Gas 58
24 Hour ECLS Ventilator Settings 63
24 Hour ECLS Hemodynamics 68
Blood Pump Flow Rates 77
ECLS Care 78

6. MODE 83

Initial Mode Information 83
Mode 86
Mode Conversion 88

7. CANNULATIONS 91

Initial Cannulation Information 91
Cannulation Conversions 94

8. EQUIPMENT 97

Membrane Lung 97
Blood Pump 100
Heat Exchanger 102
Temperature Regulation 103
Hemofilter 103
Consoles 104

9 DIAGNOSES 106

9.1 NEONATAL RESPIRATORY DIAGNOSES 107

10. CPT PROCEDURE CODES 120

11. ECLS COMPLICATIONS 121

Mechanical Complications 123
Patient Hemorrhage Complications 125
Patient Neurologic Complications 127
Patient Renal Complications 130
Patient Cardiovascular Complications 132
Patient Pulmonary Complications 133
Patient Metabolic Compications 134
Patient Limb Complications 135

11. INFECTIONS 137

12. OUTCOMES 139

12. SUBMISSION 143

APPENDIX A – INFECTIOUS ORGANISMS 144

Preface

This document is intended to assist data entry and identify definitions for each field. This document is organized into the sections and subsections that exist on the database registry. We also attempt to identify if fields will be incorporated in mandatory fields or major complication fields by highlighting those data elements.

Descriptions of fields in this document

Field Name is the name of the variable as it appears in the online application at www.ELSO.org.

Definition/ Explanation/ Example provides the definition of the variable with an explanation of the how to collect the variable and, when appropriate, an example of choosing the correct data collection

Data Entry Rules refers to formatting rules for data entry and any warnings or restrictions on data entry. For example, the user will receive a **Soft Notification** or warning when entering data that falls outside common values or if that value could represent a more common entry in a different unit. The warning does not necessarily mean data has been entered incorrectly; it is just an opportunity for the user to double check data entry. The data enterer will receive a **Hard Limit** when data is restricted from entry. This means ELSO assesses the value to be incorrect. For example, the entry of ECLS Start Time after the Date of Death is not allowed. Occasionally it is necessary for Data Entry Rules to vary by age group in ELSO. There are three mutually exclusive ELSO age groups: **Neonate** (0-28 days), **Pediatric** (29 days- 17 years), and **Adult** (≥ 18 years). The **Soft Notification** for the **Field Name** "Admission Weight" is different for each age group. (The possibility of error exists; please email RegistrySupport@elso.org if an unwarranted Hard Limit is received).

Collection / Modification describes the dates during which the data has been collected. If there was a modification of the method by which a variable is collected, the date when that modification occurred is noted here.

Table Name is a descriptor that provides the name of the table in which a given variable is stored. ELSO data is a relational database, meaning that different data elements are stored in different tables with common rows that allow merging of tables.

Column Name / Stored Values describes the column or variable name and stored values for a given variable. For example, the data field "**Hand Bag Valve Ventilation**" is stored under Column Name (or variable name) "**HandBagging.**" Handbagging has the and is stored with values "**No = 0**", "**Yes = 1** ", and "**Unknown = -1.**"

Historical dates

Hard and Soft Limits were first added to data elements October 16, 2018

ECPR Addenda was updated from Version 1 to Version 2 January 21, 2020

SARS-CoV-2 Addenda was added March 2, 2020

*Please see the **ELSO Registry Change Document** for more details:*
https://www.elso.org/Portals/0/Files/PDF/January%202020%20ELSO%20Registry%20Change%20Document.pdf

Mandatory Fields and Major Complications

We indicate mandatory fields in two ways. First, the box for the **Field Name** has a red background (see below). Second, the **Definition/ Explanation/ Example** includes the sentence "**This is a required field.**" See example below:

Mandatory Data Field

Major complications
We indicate major complications by shading the background of the **Field Name** yellow. See example below:

Major Complication

Changes for this rollout

We indicate items that have been added or changed usingn this green highlighted box throughout this document to bring your attention to what is new and changed in this version. See example below:

Changes Highlighted

Extracorporeal Life Support Organization (ELSO) Registry Data Definitions

When is it Extracorporeal Life Support?

- ECLS is a collective term for extracorporeal therapies used for the support of various presentations of cardiac and/or pulmonary failure through the use of an extracorporeal circuit. *ECLS includes therapies focusing on oxygenation, carbon dioxide removal, cardiac support, or a combination thereof. It excludes cardiopulmonary bypass for cardiothoracic or vascular surgical procedures*.

- ECMO is the provision of oxygen and carbon dioxide exchange through the use of an extracorporeal circuit consisting minimally of a blood pump, artificial lung, and vascular access cannulae, using blood flows sufficient to support oxygenation and concomitantly enhance carbon dioxide removal. *The term ECLS has been used interchangeably with the term ECMO, but ECMO is the preferred term when the goal is oxygen and carbon dioxide exchange by means of a pumped extracorporeal circuit*. *ECMO is a type of ECLS.*

- ECLS begins when extracorporeal flow is established through the ECLS cannulas and circuit.

- Cardiopulmonary bypass may be converted to ECLS support. In this case ECLS begins when extracorporeal support is moved from the cardiopulmonary bypass circuit to an ECLS circuit.

- If a patient is on a Ventricular Assist Device and an oxygenator is placed in line, this designates the beginning of ECLS and more specifically ECMO.

- ECLS may be for short periods of time, for example to support a surgical procedure, where the patient is reliant upon the ECLS circuit.

When is it not ECLS?

- The use of a Ventricular Assist Device *without* an oxygenator is not considered ECLS.

- Currently ELSO is not collecting data on those patients who are placed on an extracorporeal circuit for organ donation.

Notes

- It is essential that every ELSO member center submit all cases that meet our definition of ECLS.
- The ELSO Registry Data Definitions is a working document. If your Center has a question or requires clarification, please contact ELSO. The answer will be found for your question and the document updated as needed.
- If you find a mistake, please contact ELSO.
- If you have an unusual patient occurrence and require assistance with categorizing or determining which forms to complete, please detail the situation to ELSO.

1. ADD PATIENT

Arrive here by clicking "Quick add." Only select "Quick add" to enter a new patient with no previous runs. If the patient has had a previous run, select the patient and "Add new run."

Patient Information

This section is used for starting a form and holding a form for an individual patient. These fields are required.

Field Name	Definition/ Explanation/ Example	Data Entry Rules	Collection / Modification	Table Name	Column Name / Stored Values
Center ID	The Center ID is a 3 digit number assigned to your center when you join ELSO. This number will not change as long as you are an ELSO center. You do not need to enter your Center ID during data entry as it is linked to your account. Please note, however, that the Center ID is a component of the Unique ID below. Example Center ID 008		01/01/1989-present	Registry.CenterPatients (links CenterId and Patient Id only) Rgistry.Centers (contains all CenterNo's)	CenterNo
Unique ID	The Unique ID is a number that uniquely identifies every patient in the ELSO registry. **This is a required field.** The format that must be used for this field is a ten or eleven-character identifier. **The first 3 or 4** characters are the Center ID. **The next 4** characters are the year the patient went on ECLS for their first run. **The following 3** characters is the sequence number of that patient for that year within your center. For those patients with multiple runs, this number will be the same. *Please use leading zeros if any of the components are less than 3 digits*. For example, if your center ID is 008, the year the patient went on for their first run of ECLS is 2011, and they are the third patient to go on ECMO the Unique ID would be: 0082011003.	10 or 11 characters	01/01/1989-present 4 digit center number allowed 2022	Registry.Patients	UniqueID

Patient Information (continued) This section is used for starting a form and holding a form for an individual patient. These fields are required.					
Field name	Definition/ Explanation/ Example	Data Entry Rules	Collection / Modification	Table Name	Column Name / Stored Values
Birthdate	This field collects the date of birth of the patient. For neonatal patients, it also collects the time of birth. **This is a required field.** Enter the patient's date of birth in format MM/DD/YYYY. If the patient is a new neonate, use the format MM/DD/YYYY HH:MM. The dates and times can be typed in or selected from a drop down menu. For example, if your patient was born January 9th, 2020, you would enter 01/09/2020. If they were a neonate born on October 15th, 2020 at 03:00 AM then you would enter 10/15/2020 03:00 AM.	Neonates (0-28 d) MM/DD/YYYY HH:MM Pediatric (29 d – 17 yrs) & Adult (≥ 18 yrs) MM/DD/YYYY **Soft Notification** You can leave this patient's birthdate as is, but please double check the entry as this patient is over 70 years old. **Hard Limit** The date of birth must be before the date and time on ECMO. The patient cannot be more than 100 years old.	01/01/1989-present	Registry.Patients	Birthdate
Sex	This field collects the gender of the patient at birth. Select the patient's gender at birth as **Male, Female**, **Unknown.** For example, if the patient was born male, then you would select "Male" from the dropdown menu.	This field is limited to a single value. **This is part of the minimum dataset because it is incorporated into risk adjustment models.**	01/01/1989-present 8/9/2018-present Sex made part of the min dataset	Registry.Patients	Sex 0 = Unknown 1 = Male 2 = Female

Patient Information (continued) This section is used for starting a form and holding a form for an individual patient. These fields are required.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Race	This field indicates the patient's race, as determined by the patient or family and can fall into one or more of the categories below. Check all that apply: **Asian**: This includes a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, Vietnam, Japan, etc. **Black**: This includes a person having origins in any of the black racial groups, for example African American, Jamaican, Haitian, Nigerian, Ethiopian, Somali, etc. **Hispanic, Latino, or Spanish origin** – This includes a person having origins identified as Mexican or Mexican American, Puerto Rican, Cuban, Salvadoran, Dominican, Colombian, etc. **Middle Eastern or North African** for example, Lebanese, Iranian, Egyptian, Syrian, Moroccan, Algerian, etc. **Native American:** A person having origins in any of the original peoples of North and South America (including Central America), for example, Navajo Nation, Blackfeet Tribe, Mayan, Aztec, Native Village of Barrow Inupiat Traditional Government, Nome Eskimo Community, etc. **Native Pacific Islander:** A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands, for example, Native Hawaiian, Samoan, Chamorro, Tongan, Fijian, Marshallese, etc. **White**: A person having origins identified German, Irish, English, Italian, Polish, French, etc. **Other**: Persons who define their race differently than the above choices. **Unknown:** The race of the patient is unknown *If a patient identifies their race as a combination of white and black, then please check both white and black.*	Check all that apply	01/01/1989-12/01/2017 defined as ● Asian ● Black ● Hispanic ● White ● Other 12/01/2017-present Added: ● Middle Eastern or North African ● Native American ● Native Pacific Islander ● Unknown Changed data field from “pick one” to “check all that apply”	ECLS.PatientsRaces	Race 0 = Unknown 1 = Asian 2 = Black 3 = Hispanic 4 = White 5 = Middle Eastern or North African 6 = Native American 7 = Native Pacific Islander 9 = Other

First Hospitalization Information					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Admission date/time	This field collects the date and time a patient was admitted to the ECLS center entering data. Enter the date and time (DD/MM/YYYY HH:MM) the patient was admitted to your ECLS Center. The admission date/time may be the same as the time of admission for a transfer on ECLS. This may be the time your hospital assumed care if the patient was already cannulated and your hospital picked the patient up for transport to your hospital. **Patient T** was admitted to Hospital on A on 02/12/2022. She was placed on ECLS at Hospital A on 02/14/2022 at 11:57 PM. Subsequently, she transferred to your Hospital B on 02/15/2022 at 02:00 AM for continued ECLS care. Hospital B will enter Hospital Admit Date 02/15/2022, for time example see below: For transports where Hospital B receives the patient already cannulated: enter the time of arrival to the Hospital B For transports where your team retrieves an already cannulated patient and brings back to Hospital B: enter the time your hospital assumed care.	**Hard Limit:** Hospital Admit Date cannot be earlier than the Date of Birth. Hospital Admit Date cannot be after the Date of Death. Hospital Admit Date cannot be after ECLS Stop Time. If **Patient Transported to your center** = "**transported not on ECMO**" or "**not transported**" or "**unknown**"; then Hospital Admit Date must be BEFORE ECLS start time **This is part of the minimum dataset because it is incorporated into risk adjustment models.**	04/15/2026	ECLS.Hospitalizations	AdmitDate
Discharge date/time	**Hospital discharge date/time** Please enter the date and time the patient was discharged from your hospital. If the patient died during the patient's admission to your hospital please enter the Hospital Discharge date/time as the Death date/time.	**Soft Notification** Discharge date should be after time off date **Hard Limit**	04/15/2026	ECLS.Hospitalizations	DischargeDate

	If **patient YY** was admitted to your Hospital A and transferred from your Hospital A to outside Hospital B on 2/1/2017 at 1:15 PM, then enter date of ICU discharge as 2/1/2017 at 1:15 PM.	If brain death is not selected: Date/Time of Hospital Discharge cannot be after Death Date/Time Discharge date cannot be before the time on date If brain death is selected: Date/Time of Hospital Discharge cannot be more than 7 days after Death Date/Time If **Discharged on ECMO** is selected, the discharge Date/Time will auto-populate as the ECLS Stop Date/Time			
Discharged alive	**Yes, No** or **Discharged on ECMO** If **Discharged on ECMO** is selected, choose whether the patient was discharged to an ELSO Center or Non-ELSO Center. Discharged to an ELSO Center will require the entry of the Center ID/Name of Center. These names will autopopulate. Discharged to a non-ELSO Center will require the entry of the Name of Center.	**Soft Notification** If brain death is selected and Discharged Alive is "Yes" or "OnEcmo": "A patient cannot have brain death and be discharged alive. Please remove brain death or set discharged alive to No." Selection of Discharged on ECMO will drop	04/15/2026	ECLS.Hospitalizations	DischargedAlive

		down choice of ELSO Center or Non ELSO Center. Once type of center selected, enter name of center. ELSO Centers will autopopulate.			
Death date/time	Please enter the date and time the patient died. This may be the date and time that Brain Death occurred, but brain death as a complication must be selected.	**Hard Limit** Death date is required when discharged alive is set to no Death date cannot be before the ECLS Start Time	04/15/2026	ECLS.Hospitalizations	DeathDate
Discharge location	Select the location the patient was discharged to from your hospital: **Home** **Transferred to another hospital** – patient left your hospital to go to another hospital **Transfer to LTAC**– Long Term Acute Care (LTAC) either outside facility or associated with institution including Skilled Nursing facilities **Transfer to Rehab –** Rehabilitation center either outside facility or associated with institution **Transfer to Hospice** – Transferred to a hospice or palliative care facility where the goals of care are comfort, not cure **Other, Unknown**	if Discharged Alive is On ECMO, then the only allowable Discharge Location is Transferred to another hospital	04/15/2026	ECLS.Runs	DischargeLocation ECLS.DischargeLocationCodes 1 = Home 2 = Other, Unknown 3 = Transferred to another hospital 5 = Transfer to hospice 6 = Transfer to LTAC 7 = Transfer to Rehab
Patient transported to your center	This field collects if a patient was transported on ECLS Select **transported on ECMO, transported not on ECMO, not transported** or **unknown** to indicate how the patient was admitted to your center, whether or not on ECLS, from another ECLS institution.		04/15/2026	ECLS.Hospitalizations	Transported 0 = Transported not on ECMO 1 = Transported on ECMO 2 = Not transported

	Transported refers to between hospitals. Transport be EMS to the ED not on ECMO does not constitute a transport. If **transported on ECMO** is selected, choose whether the transport was received from an ELSO Center, Non-ELSO Center or cannulated with mobile ECMO. **Cannulated with Mobile ECMO** refers to cannulations by a mobile ECMO team either outside a hospital or within a separate hospital from the mobile ECMO team's home hospital. If your hospital B goes to hospital A and retrieves a patient already cannulated on ECMO, choose **transported on ECMO,** but the ECLS date/time will be the time care is assumed. Transported from an ELSO Center will require the entry of the Center ID/Name of Center. These names will autopopulate. Transported from a non ELSO Center will require the entry of the Name of Center. **Patient T** was admitted to Hospital A on 02/12/2022. She was placed on ECLS at Hospital A on 02/14/2022 at 11:57 PM. Subsequently, she transferred to your Hospital B on 02/15/2022 at 02:00 AM for continued ECLS care. Hospital B will select dropdown for **Transported on ECMO**. **Patient S** was admitted to Hospital A on 2/12/2022. She was transferred to Hospital B on 2/15/2022 and went on ECLS at 20:15 on 2/16/2022. Hospital B will select **Transported not on ECMO**				-1 = Unknown TransferFromCenter 1 = Transferring run from ELSO center 2 = Transferring run from non-ELSO center 3 = Cannulated with Mobile ECMO TransferFromELSOCenter Valid center number TransferFromNonElsoCenter Free text
Transfer	This field collects the data if a patient was transported to another hospital. Data is also collected if the patient is transported back to your hospital from the hospital the patient was sent to . **For transports out to another hospital:** The date and time the patient was transferred to the receiving hospital equipment will be the date/time of transfer. Select if the ELSO run is transferring to an ELSO center or a non-ELSO center.		04/15/2026	ECLS.Hospitalizations	TransferToCenter 1 = Transferring run to ELSO center 2 = Transferring run to non-ELSO center TransferToELSOCenter Valid center number TransferToNonELSOCenter

	If transferring to an ELSO center, a valid center number must be entered. **Receiving a previously transported patient back to your hospital or Transfers In:** The date and time the patient was transferred to the receiving hospital equipment will be the date/time of transfer. Select the ELSO center number if applicable.				

First Run Information This section includes further details regarding the patient demographics. Verify previously entered data when starting the form.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
ECLS Start Time	Enter the Date/Time ECLS was initiated. **This is a required field.** This field specifically refers to the time that extracorporeal blood flow was established through cannulas attached to an ECLS circuit when ECLS was initiated at your organization or via your mobile ECMO team at another location. The ECLS Start time may refer to the date and time a patient was previously placed on ECLS at another institution if the run was initiated or switched to your institution's device by your mobile ECMO team. If the patient was initiated by another institution and then transferred to your facility, the ECLS Start time will be recorded as the date and time the patient arrives at your institution (admission date and time). Please include transfer details in the field labeled "Patient Transported on ECMO" under Pre-ECLS Support. VAD circuits that have an oxygenator: consider the start time of ECLS as the time the oxygenator was added. Patient X was transported on ECLS to My State Hospital B on January 12, 2021 16:00. Patient X was cannulated for ECLS at University Hospital A and ECLS flow was established on January 11, 2021 at 14:00. My State Hospital B is filling out the ELSO data entry form and will record ECLS start time as 01/12/2021 4:00PM.	DD/MM/YYYY HH:MM **Hard Limit** Time On cannot be earlier than the Date of Birth. Time On cannot be after than the Date of Death.	01/01/1989-present	ECLS.Run	TimeOn (computed by IGD as TimeOn for earliest RunDetail record)
Run No	The number reflecting how many ECLS runs this patient has had in their lifetime. **This is a required field and it is auto-populated if you click new run.** The first time a patient is placed on ECLS is considered Run #1. Patients should have additional Runs entered due to cessation of ECMO support for a time period greater than 12 hours. For example,when a VAD is in use, cannulas may be left in once the oxygenator is removed. A second run should be entered after 12 hours has elapsed from the removal of the oxygenator.	If this is the first run click “Quick Add” and Run No 1 will be auto-populated. If this is Run No 2 or greater then select the desired patient and click “Add New Run”. The next consecutive run will be auto-populated.	01/01/1989-present	ECLS.Runs	RunNo

	Temporary transition of ECLS Support to cardiopulmonary bypass (CPB) for cardiac surgery would not be categorized as an additional run. Nor do changes in "ECLS Mode" such as from VA to VV do not constitute a new run in isolation. **Patient X** was discontinued from ECLS on March 4, 2022 at 03:00 AM and the cannulas were removed. He required ECLS again on March 4, 2022 at 4:00 PM (13 hours later). This is a new run because it was greater than 12 hours later.				

First Run Information (continued)

This section includes further details regarding the patient demographics. Verify previously entered data when starting the form.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Support Type	This field defines the Support Type of ECLS received. ECLS Support Types are (pulmonary, cardiac and ECPR). **This is a required field.** Select the best choice. **Pulmonary:** The use of extracorporeal membrane oxygenation with a primary indication for support of respiratory failure by providing gas exchange support. Does not imply any specific ECLS mode or cannulation configuration. (Synonym for respiratory ECMO.) **Cardiac:** The use of extracorporeal membrane oxygenation with a primary indication for support of left and/or right ventricular failure by providing cardiac and gas exchange support. Does not imply any specific ECLS mode or cannulation configuration. **Extracorporeal cardiopulmonary resuscitation (ECPR):** ECPR is the application of rapid-deployment venoarterial extracorporeal membrane oxygenation, to provide circulatory support in patients in whom conventional cardiopulmonary resuscitation (CPR) is unsuccessful in achieving sustained return of spontaneous circulation (sustained ROSC). Sustained ROSC is deemed to have occurred when chest compressions are not required for 20 consecutive minutes and signs of circulation persist (Jacobs et al, Cardiac arrest and CPR outcome reports: Utstein templates from ILCOR. *Circulation*. 2004;110(21):3385-972004). **Patient X**, a 3 year-old, suffered a cardiac arrest during intubation for an asthma exacerbation. He achieved return of spontaneous circulation (ROSC). He was on continuous albuterol and 0.1mcg/kg/min of epinephrine and echocardiogram demonstrated hyperdynamic cardiac		01/01/1989-present	ECLS.Runs	SupportType 1=Pulmonary 2=Cardiac 3=ECPR

	function. He was placed on VA ECMO through the neck for respiratory support. Choose support type **Pulmonary**. **Patient Y**, a 55 year-old, suffered a cardiac arrest after a myocardial infarction. He achieved ROSC, but an hour later had poor LV function and rapidly progressive needs for inotropic support. He was cannulated VA through the groin for cardiac support. Choose support type **Cardiac**. **Patient Z**, a 50 year-old, suffered ventricular fibrillation cardiac arrest. In the next 60 minutes, he required a cumulative of 55 minutes of CPR interrupted by moments (< 5minutes) of ROSC. When ECLS cannulas were placed, he was not receiving CPR, but arrested again immediately after placement. He was cannulated VA. Choose support type **ECPR**.				

First Run Information (continued)

This section is further details regarding the patient demographics. Verify previously entered data when starting the form.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
ECLS Mode	This field defines the mode of drainage and return of blood in the extracorporeal system. **This is a required field.** Select the primary cannulation configuration even if multiple cannulas are placed. **VV: Venovenous** support is the application of extracorporeal circulation primarily for respiratory support, in which the extracorporeal circuit drains blood from the venous system and reinfuses into the venous system (or pre-lung). VV ECMO operates in series with the heart and lungs and does not provide bypass of these organs. **VA**: **Venoarterial** is the application of extracorporeal circulation often for cardiac or circulatory support, in which the extracorporeal circuit drains blood from the venous system and returns into the systemic arterial system. Without qualification, VA ECMO refers to support that returns blood to the systemic arterial system, operating in parallel with and providing partial, or complete, bypass of the heart and lungs. **VVA Venovenoarterial** is a hybrid configuration of VV and VA extracorporeal support in which the extracorporeal circuit drains blood from the venous system and reinfuses into both the venous and systemic arterial systems. VVA ECMO provides both pulmonary (VV component) and cardiac support (VA component) in patients with combined cardiopulmonary failure.		01/01/1989-present Venopulmonary Mode 07/12/2020 - present	ECLS.RunDetails (Reporting Notes: 1. We will consider a Run VV à VA if and only if there are two run detail records: the first having VV, the second having VA. 2. We will consider a Run VA à VV if and only if there are two run detail records: the first having VA and the second having VV. 3. Any situation having more than 2 run details with different values of Mode will be considered as Support Mode = Other}	Mode (See ECLS.ModeCodes for X-Walk table) 1 = VA 2 = VV 3 = VVA 4 = AVCO2R 5 = VVECCO2R 6 = VP 9 = Other

	VP: Venopulmonary is the application of extracorporeal circulation for combined respiratory and right heart support in which the extracorporeal circuit drains blood from the venous system and reinfuses into the pulmonary artery. VP ECMO provides partial or complete bypass of the right heart but operates in series with the lungs. *Conrad, S, et al (2018) The Extracorporeal Life Support Organization Maastricht treaty for nomenclature in extracorporeal life support. Am J Respir Crit Care Med, 198(4), 447-451*				

First Run Information (continued)

This section is further details regarding the patient demographics. Verify previously entered data when starting the form.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
ECLS Mode	*Broman LM, et al (2019) The ELSO Maastricht Treaty for ECLS nomenclature: abbreviations for cannulation configuration in extracorporeal life support. A position paper of the Extracorporeal Life Support Organization. Crit Care 23(1), 36. Doi: 10.1186/s13054-019-2334-8.* **AVCO$_2$R** Arteriovenous carbon dioxide removal (AVCO$_2$R) is the provision of pumpless carbon dioxide exchange through the use of an extracorporeal circuit consisting of an artificial lung, and venous and arterial vascular access cannulas using lower blood flows. Blood flow is driven by the patient's arterio-venous pressure gradient. **VV ECCO$_2$R** Venovenous extracorporeal carbon dioxide removal (VV CO$_2$R) is the provision of carbon dioxide exchange through the use of an extracorporeal circuit consisting of a blood pump, artificial lung, and venovenous vascular access cannulas using lower blood flows. **Other** Indicates a support not listed **Patient W**, a 10-year old requiring ECMO for respiratory support was placed with a dual-lumen ECMO cannula in the right internal jugular vein, and a second single lumen draining cannula. **Choose VV**. **Patient X**, returns from the Cardiovascular Operating Room (CVOR) after scheduled RVAD implantation (right atrium to pulmonary artery). Because the patient's implantation was complicated by pulmonary				

	hemorrhage, the patient requires an oxygenator to be placed in line with the RVAD circuit. **Choose VP**.				

Neonatal Information This section is completed for all neonatal patients. Neonatal is a patient defined as less than or equal to 28 days of age at ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Birth Weight	This field collects the weight of the patient at the time of birth. **This is a required field if the patient age is ≤ 28 days at ECLS Start Time.** Enter the patient's weight at birth in kilograms to the nearest hundredth. Baby A was born at 3.157kg and went on ECMO weighing 3.210kg. Please enter Birth Weight 3.16 kg	Values can be entered to two decimal points (hundredths) **Soft Notification:** **< 2.00 kg or > 6.00 kg** **Hard Limit:** **<0.20 kg or > 10.00 kg**	01/01/1989-present	Registry.Patients	BirthWeight
Gestational Age	Enter the patient's estimated gestational age at birth in weeks. **This is a required field if the patient age is ≤ 28 days at ECLS Start Time.** Enter the gestational age at birth in weeks to the nearest tenth. Baby B was born October 10, 2022 at 38 and 2/7th weeks gestation. Enter 38.3 because 2/7 = 0.286	Values can be entered to one decimal points (tenths) **Hard Limit:** **<12 weeks or** **> 50 weeks**	01/01/1989-present	Registry.Patients	GestAge
Apgar 1	This field collects the 1 minute Apgar scores. One minute Apgar scores can have a value from 0 through 10. Baby B was born with Apgar scores 7/9 (common short hand for Apgar score at 1 minute = 7 and Apgar score at 5 minute = 9). Please enter 7 for the Apgar 1.	Integer values only **Hard Limit:** **< 0 or** **> 10**	01/01/1989-present	Registry.Patients	Apgar1
Apgar 5	This field collects the 5 minute Apgar scores. Five minute Apgar scores can have a value from 0 through 10. Baby B was born with a five minute Apgar score of 9. Please enter 9 for the Apgar 5.	Integer values only **Hard Limit:** **< 0 or > 10**	01/01/1989-present	Registry.Patients	Apgar5
Delivery	This field collects the patient's delivery type. Select one: **Vaginal**, **Emergency Caesarian Section**, **Elective Caesarian Section** or **Unknown**		01/01/1989-present	Registry.Patients	Delivery 0 = Unknown 1 = Vaginal 2 = Emergency C-Section 3 = Elective C-Section

	Baby A was emergently delivered via Caesarian section due to non-reassuring fetal heart tones. Select **Emergency Caesarian Section.**				

CDH Information					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
CDH	This field collects if a neonate had a congenital diaphragmatic hernia (CDH)**.** CDH is a developmental defect of the diaphragm that allows abdominal viscera to herniate into the chest. This defect is present from the time of birth. **Select one:** **Yes,** if the patient has a CDH **No,** if the patient did not have a CDH **Unknown,** if it is not known whether the patient has a CDH Baby A was born with a left sided CDH. Select **yes** from the drop down for CDH.		01/01/1989-present	Registry.Patients	CDH -1 = Unknown 0 = No 1 = Yes Missing = Null
Repair of CDH	This field describes the timing of the surgical repair of the CDH. **Select** the best choice from the drop down that identifies the first surgical attempt to correct the CDH. **Pre-ECLS**: CDH surgical repair performed prior to the ECLS Start Time. **On ECLS**, CDH surgical repair performed after the ECLS Start Time. **Post-ECLS**: CDH surgical repair performed after ECLS Stop Time. **None**: The patient did not receive surgical repair of the CDH.		01/01/1989-present	Registry.Patients	CDHRepair 0 = None 1 = Pre-ECLS 2 = On ECLS 3 = Post-ECLS
CDH Repair Timing	Available when 1 = Pre-ECLS or 2 = On ECLS or 3 = Post-ECLS		04/15/2024	Registry.Patients	CDHDateTime

2. RUN INFORMATION

This section details a specific run on ECLS and may be repeated for different runs.

Run Info

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Run No	Enter the number reflecting how many ECLS runs this patient has had in their lifetime. **This a required field.** **First Run Information** under **Run No**		01/01/1989-present	ECLS.Runs	RunNo
Support Type	This field defines the Support Type of ECLS received. ECLS Support Types are (pulmonary, cardiac and ECPR). **This is a required field.** **First Run Information** under **Support Type**		01/01/1989-present	ECLS.Runs	SupportType 1 = Pulmonary 2 = Cardiac 3 = ECPR
Admission Weight	This field collects the patient's weight at the time of admission to the hospital providing ECLS. Use admission weight at the time of admission to the ECMO institution. Enter the weight in kilograms to the nearest hundredth of a kilogram for neonates. Enter the weight to nearest tenths for pediatric and adult patients. As this is part of the minimum dataset, if this information is unknown or unavailable check the appropriate box. Neonate admitted to your hospital 4.57 kg and weighing 3.95 kg at birth. Record the admission weight of 4.57 kg.	**Neonate (0-28 d)** Values can be entered to two decimal points **Soft Notification:** **< 2.00 kg or > 6.00 kg** **Hard Limit:** **<0.20 kg or > 10.00 kg** **Pediatric** (29 d - 17 yr) Values can be entered to one decimal point **Soft Notification:** **< 2.0 kg or > 125.0 kg** **Hard Limit:** **< 1.0kg or > 500.0 kg** **Adult (≥ 18 yr)** Values can be entered to one decimal point **Soft Notification:** **< 35.0kg or > 125.0 kg** **Hard Limit:** **< 10.0 kg or > 500.0 kg** **This is part of the minimum dataset because it is incorporated into risk adjustment models.**	01/01/1989-present 8/9/2018-present Admission Weight made part of the minimum dataset	ECLS.Runs	Weight
Weight Unknown			04/15/2024	ECLS.Runs	weightUnknown

Run Info (continued)					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Admission Height	This field collects the patient's height at the time of admission to the hospital delivering ECLS Enter the height in centimeters to one decimal place. Patient J's admission height was 60 inches. In this case, convert to centimeters (152.4 cm). Record Height = 152.4 cm.	Values can be entered to one decimal point. **Neonate (0-28 d)** **Soft Notification:** **< 45 cm or > 55 kg** **Hard Limit:** **< 30 cm or > 70 cm** **Pediatric** (29 d - 17 yr) **Soft Notification:** **< 45 cm or > 190 cm** **Hard Limit:** **< 30 cm or > 250 cm** **Adult (≥ 18 yr)** **Soft Notification:** **< 150 cm or > 190 cm** **Hard Limit:** **< 70 cm or > 250 cm**	10/01/2016-present 04/15/2024	ECLS.Runs	Height This is now required field (changed the color in first cell)
Height Unknown			04/15/2024	ECLS.Runs	heightUnknown
Intubation	This field collects information on the placement of an artificial airway (naso/oral endotracheal tube or new tracheostomy tube) at any point during the patient's hospitalization. **Please select best choice:** **No:** If the patient never had an endotracheal tube during hospitalization. The hospitalization refers to the time spent at the hospital providing ECLS and any other preceding hospitals during the episode of care that led to ECLS. **Yes date/time known, or Yes date/time estimated, or Yes date/time unknown:** If this patient had a newly placed endotracheal tube or a new tracheostomy tube during the hospitalization. The hospitalization refers to the time spent at the hospital providing ECLS and any other preceding hospitals during the episode of care that led to ECLS.		12/01/2017-present 8/6/2018-present No value, known date/time, Pre-existing invasive ventilation, Unknown date/time, Estimated date/time or No intubation added 04/15/2024 Since this run has conventional, HFO, or	ECLS.Runs	IntubationSelected New date/time known = 1 Pre-Existing invasive ventilation = 2 Yes, date/time unknown = 3 Yes, date/time estimated = 4 No = 0

	Select **Yes date/time known** if the date and time is known. Select **Yes date/time estimated** if the date and time can be estimated to within a day but the exact time is unknown. Select **Yes date/time unknown** if the date and time is not known and cannot be estimated. **Pre-existing invasive ventilation:** If patient was admitted to the hospital with a pre-existing invasive ventilation such as via a tracheostomy tube. **Patient T** has a past medical history of airway stenosis and tracheostomy dependence. He is on room air at home. Select **pre-existing tracheostomy tube** from the drop down. **Patient S** was admitted to Hospital A and intubated on 10/01/2022 before being transported to Hospital B for ECLS evaluation on 10/06/2022. Select **yes** from the drop down.		HFV in use, you should indicate the intubation on the run info tab (when IntubationSelected = 0 and VentType = 1 or 2 or 3)		
BMI	**Body Mass Index (BMI):** A standardized metric used to assess a patient's body weight relative to their height. It is calculated by dividing a person's weight in kilograms by the square of their height in meters. This is a calculated metric to validate the height and weight entered fall within an appropriate range for the age of the patient. You do not enter the BMI but the system calculates BMI based on the height and weight of the patient.	**Neonate (0-28 d)** **Soft Notification:** **< 10 or > 22** **Hard Limit:** **< 8 or > 32** **Pediatric** (29 d - 17 yr) **Soft Notification:** **< 18 or > 40** **Hard Limit:** **< 10 or > 100** **Adult (≥ 18 yr)** **Soft Notification:** **< 18 or > 40** **Hard Limit:** **< 10 or > 100**			

Run Info (continued)					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Intubation Date/Time	This field collects the date and time of the newly placed artificial airway (naso/oral tracheal tube or new tracheosomy tube) in a patient who did not previously have an artificial airway. Enter the date and time (DD/MM/YYYY HH:MM) that the patient had an artificial airway placed. This may be pre- or on ECMO. Intubation refers to placement of an artificial airway, whether it is an endotracheal, nasotracheal or tracheostomy tube. **Patient O** had an orotracheal intubation on 10/01/2017 11:30 AM and a tracheostomy on 10/7/2021 at 12:45 PM. Please enter 10/01/2021 11: 30 AM.	**Soft Notification:** You can leave Intubation Date as is, but it is unusual for this date to be AFTER the time on ECLS Start Time. You can leave Intubation Date as is, but it is unusual for this date to be more than a month before the time on ECLS Start Time. **Hard Limit:** Intubation Date cannot be earlier than the Date of Birth. Intubation Date cannot be later than the extubation Date/Time. Intubation Date cannot be after the ECLS Stop Time. Intubation Date cannot be after the Date of Death.	01/01/1989-present	ECLS.Runs	IntubationDate
Invasive ventilation	This field gathers information on the use of invasive ventilation through an		12/01/2017-present	ECLS.Runs	InvasiveVentilation

	artificial airway (for more details, see the Run Infofield regarding Intubation). Please select the best option: - New: Choose this if the patient received invasive ventilation during this hospitalization but is not on daily invasive positive pressure ventilation at home. The hospitalization includes the time spent receiving ECLS and any previous hospital stays related to the episode of care leading to ECLS. - No: Select this option if the patient has never received invasive ventilation during this hospitalization . - Pre-existing invasive ventilation: Choose this if the patient depends on daily invasive ventilation at home. For example, Patient V has a history of chronic lung disease and uses a Trilogy ventilator at night. Therefore, for invasive ventilation, you should select "Pre-existing invasive ventilation."				
Invasive Ventilation Date/Time	This field collects the date and time that invasive ventilation was initiated during the hospital stay. Enter the date and time (DD/MM/YYYY HH:MM) that the patient was placed on invasive ventilation during the hospital stay. If the patient had a newly placed artificial airway and is not on home invasive ventilator support, then this will be the same date and time as Intubation Date/Time. If the patient had a pre-existing tracheostomy tube, but was not on invasive ventilation, then this field will need to be entered separately. If the	**Soft Notification:** You can leave Invasive Ventilation Date as is, but it is unusual for this date to be AFTER ECLS Start Time. You can leave this date as is, but it is unusual for this date to be more than 1 month BEFORE the time on ECMO date	12/01/2017-present	ECLS.Runs	InvasiveVentilationDT

	patient was on home invasive ventilation, this field is not applicable. Patient S had an orotracheal intubation on 10/01/2017 11:30 AM. Enter 10/01/2017 11: 30 AM for Invasive Ventilation Date/Time. Patient T has a past medical history of airway stenosis and tracheostomy dependence. He is on room air at home. He was placed on a ventilator on 10/2/2017 at 12:00 PM. For Invasive Ventilation Date/Time 10/2/2017 at 12:00 PM.	You can leave this date as is, but it is unusual for this date to be more than 3 months AFTER the time off ECMO date **Hard Limit:** Invasive Ventilation Date cannot be earlier than the Date of Birth. Invasive Ventilation Date cannot be after the Intubation Date if Intubation=Yes Invasive Ventilation Date cannot be after the Date of Death.			
Is Trauma the underlying reason the person went on ECLS?	Use this field to indicate if the need for ECLS is due to a traumatic injury. Select **yes, no or unknown**. **Patient C** was in a car accident on 10/01/2022. He suffered bilateral pulmonary contusions and developed severe post-traumatic acute respiratory distress syndrome and was paced on ECLS 1 day after admission. Select **Yes** from the dropdown for Is Trauma the reason the person went on ECLS? **Patient Z** was in a car accident on 09/11/2022. She suffered bilateral		12/01/2017-present	ECLS.Runs	Trauma 0 = No 1 = Yes -1 = Unknown

	pulmonary contusions and developed severe post-traumatic acute respiratory distress syndrome. She recovered with conventional mechanical ventilator support and was extubated on 09/20/2022 and transferred to the floor. While recovering, three days later she had an aspiration pneumonia with brief cardiac arrest and return of spontaneous circulation. She again developed ARDS and this time required ECLS. Is Trauma the underlying reason the person went on ECLS? Select **No** from the dropdown.				
Bridge to Transplant	This field collects if a patient received ECLS as a pre-ECLS decision to bridge the patient to transplant. **Yes** indicates the patient was placed on ECLS as a method of 'bridging' the patient to transplant. **No** indicates a patient was placed on ECLS without consideration of need for transplant and later received a transplant select. **Unknown** **Patient X** was placed on ECLS for myocarditis with hope for recovery but a recognition that he could need a transplant if his heart function failed to recover. His heart function did not recover and he received a heart transplant from ECLS. Bridge to Transplant select **N**o from the drop down. **Patient Y** went on ECLS with cystic fibrosis and expected bridge to lung transplant but during the course of his run he died before he could receive a		10/01/2016-present 04/15/2024	ECLS.Runs	Transplant 0 = No 1 = Yes -1 = Unknown

	lung transplant. Bridge to Transplant select **Yes** from the drop down.				
Pre-ECLS Cardiac Arrest	This field collects if a patient experienced a cardiac arrest prior to ECLS support. Select **yes, no or unknown** to indicate if the patient experienced a cardiac arrest within 24 hours prior to ECLS. Cardiac arrest is defined as any event(s) that require the use of cardiopulmonary resuscitation (CPR) with the administration of external cardiac massage. **Patient C** had a cardiac arrest on July 7th 2022 at 12:00PM. He went on ECLS on July 9th 2022 at 1:00PM. He had no further cardiac arrest in between. Select **no** from dropdown for Pre-ECLS Cardiac Arrest.	**This is part of the minimum dataset because it is incorporated into risk adjustment models.** Pre-ECLS is not mandatory if the patient was transferred to your center on ECLS	01/01/1989-present 8/9/2018-present Pre-ECLS Cardiac Arrest made mandatory data field. 02/09/2023-present Pre-ECLS Cardiac Arrest is not mandatory if the patient was transferred to your center 04/15/2024	ECLS.Runs	PreECLSArrest 0 = No 1 = Yes -1 = Unknown
This patient was transferred OUT of my Center On ECMO and transferred back IN to my Center On ECMO	This field collects the data if a patient was transported to another hospital and then transported back. Select Yes or No		04/15/2026	ECLS.Runs	TransferOutAndBackToCenter 1 = yes 0 = no
Transfer	This field collects the data if a patient was transported to another hospital on ECMO and transported back to your hospital on ECMO. **Examples:** Transferred to another hospital for a procedure.		04/15/2026	ECLS.TransfersOutOfAndBackToCenter	TransferToCenter 1 = To an ELSO center 2 = To a non ELSO center TransferToELSOCenter TransferToNonELSOCenter

	Transferred to another hospital for a transplant work up and deemed not a candidate so the patient was returned to the sending hospital. Select if the ELSO run is transferring to an ELSO center or a non-ELSO center. If transferring to an ELSO center, a valid center number must be entered.				
Start Time	Enter the date/time the patient was sent to the other hospital	**Hard Limit:** Start Time must be before Stop Time!	04/15/2026	ECLS.TransfersOutOfAndBackToCenter	StartTime
End Time	Enter the date/time the patient returned to your hospital.		04/15/2026	ECLS.TransfersOutOfAndBackToCenter	EndTime

3. PRE-ECLS ASSESSMENT

This section details the values for a patient closest to initiation AND before the initiation of ECLS. The data at maximum should be no more than 6 hours before the ECLS Start Time

Pre-ECLS Arterial Blood Gas

Choose the arterial blood gas that meets the following 3 criteria:

1. Drawn prior to the ECLS Start Time
2. Drawn no more than 6 hours before the ECLS Start Time
3. If multiple arterial blood gases exist in this time period, choose the pre-ECLS arterial blood gas closest to AND before the ECLS Start Time
4. If the patient is on cardiopulmonary bypass immediately preceding ECLS please use a blood gas prior to cardiopulmonary bypass

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Pre-ECLS Blood Gas Date/Time	This field collects the date and time of the arterial blood gas that meets the timing criteria for the **Pre-ECLS Arterial Blood Gas** defined above. Patient M had an ECLS start time of 03/29/2017 02:00AM He had the following 4 blood gases following shorthand: pH/$PaCO_2$/PaO_2/HCO_3/SaO_2 Lactate=X, FiO_2 delivered=X ABG at 03/28/2017 7:00PM 7.13/48/42/18/76% Lactate 5 FiO_2 delivered = 100% ABG at 03/28/2017 10:00PM 7.06/58/35/16/61% Lactate 11 FiO_2 delivered = 100% ABG at 03/29/2017 1:00AM 7.07/55/40/16/71% Lactate 10 FiO_2 delivered = 100% ABG at 03/29/2017 at 02:05 AM 7.06/58/160/16/99% Lactate 12 FiO_2 delivered = 30% ABG on 03/28/2017 at 7:00PM is ineligible because it was collected more than 6 hours before the ECLS Start Time. ABG on 3/29/2017 at 2:05AM is ineligible because it is after ECLS Start Time. Enter Pre-ECLS Blood Gas Date/Time ABG at 03/29/2017 1:00AM because it is the ABG closest to the start of ECMO. Use all values for pH, $PaCO_2$, PaO_2, HCO_3, SaO_2, Lactate, from the same ABG and report the FiO_2 at the time the ABG was drawn.	**Soft Notification:** Pre- ECLS Blood Gas Date/Time must be BEFORE the ECLS Start Time but not more than 6 hrs before ECLS Start Time. **Hard Limit:** Pre- ECLS Blood Gas Date/Time must be BEFORE the time on ECMO. Pre- ECLS Blood Gas Date/Time cannot be earlier than the Date of Birth. Pre- ECLS Blood Gas Date/Time cannot be after the Date of Death.	01/01/1989-1/15/2017 Collect worst 1/15/2017-present Closest to ECLS start AND pre-ECLS	ECLS.BloodGases	Time

Pre-ECLS Arterial Blood Gas (continued)

Choose the arterial blood gas that meets the following 3 criteria:

1. Drawn prior to the ECLS Start Time
2. Drawn no more than 6 hours before the ECLS Start Time
3. If multiple arterial blood gases exist in this time period, choose the pre-ECMO arterial blood gas closest to AND before the ECLS Start Time

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
pH	This field collects the pH on that meets the timing criteria for the **Pre-ECLS Arterial Blood Gas** defined above. Potential of hydrogen (negative of the base 10 logarithm of the activity of the hydrogen ion) in the arterial blood sample. As this is part of the minimum dataset, if this information is unknown or unavailable check the appropriate box.	Precision 2 decimal points **Soft Notification:** **< 6.90 or > 7.50** **Hard Limit:** **<6.00 or > 8.00** **This is part of the minimum dataset because it is incorporated into risk adjustment models.**	01/01/1989-1/15/2017 Collect worst 1/15/2017-present Closest to ECLS start AND pre-ECLS 8/9/2018-present pH made mandatory data field, unknown checkbox added/unavailable	ECLS.BloodGases	pH 0 = No 1 = Yes
$PaCO_2$	This field collects the arterial partial pressure of carbon dioxide ($PaCO_2$) that meets the timing criteria for the **Pre-ECLS Arterial Blood Gas** defined above. Arterial partial pressure of carbon dioxide in mm Hg	**US units of Entry** Precision whole number **Soft Notification:** **< 30 mm Hg or > 100 mm Hg** **Hard Limit:** **< 10 mm Hg or > 250 mm Hg** **International Units** Precision 2 decimal points **Soft Notification:** **< 4.00 kPa or > 13.33 kPa** **Hard Limit:** **< 1.33 kPa or > 33.33 kPa**	01/01/1989-1/15/2017 Collect worst 1/15/2017-present Closest to ECLS start AND pre-ECLS	ECLS.BloodGases	PCO2

Pre-ECLS Arterial Blood Gas (continued)

Choose the arterial blood gas that meets the following 3 criteria:

1. Drawn prior to the ECLS Start Time
2. Drawn no more than 6 hours before the ECLS Start Time
3. If multiple arterial blood gases exist in this time period, choose the pre-ECMO arterial blood gas closest to AND before the ECLS Start Time

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
PaO_2	This field collects the arterial partial pressure oxygen (PaO_2) that meets the timing criteria for the **Pre-ECLS Arterial Blood Gas** defined above. Arterial partial pressure of oxygen in mm Hg	**US units of Entry** Precision whole number **Soft Notification:** **< 20 mm Hg or > 300 mm Hg** **Hard Limit:** **< 0 mm Hg or > 760 mm Hg** **International Units** Precision 2 decimal points **Soft Notification:** **< 2.66 kPa or > 40.00 kPa** **Hard Limit:** **< 0 kPa or > 101.31 kPa**	01/01/1989-1/15/2017 Collect worst 1/15/2017-present Closest to ECLS start AND pre-ECLS	ECLS.BloodGases	PO2
HCO_3	This field collects the arterial standard bicarbonate (HCO_3) that meets the timing criteria for the **Pre-ECLS Arterial Blood Gas** defined above. As this is part of the minimum dataset, if this information is unknown or unavailable check the appropriate box. Standard bicarbonate concentration **mEq/L** or **mmol/L**	**US units of Entry** Precision whole number **Soft Notification:** **< 10 mEq/L or > 40 mEq/L** **Hard Limit:** **< 0 mEq/L or > 70 mEq/L** **International units** Precision whole number **Soft Notification:** **< 10 mmol/L or > 40 mmol/L** **Hard Limit:** **< 0 mmol/L or > 70 mmol/L** **This is part of the minimum dataset because it is incorporated into risk adjustment models.**	01/01/1989-1/15/2018 Collect worst 1/15/2018-present Closest to ECLS start AND pre-ECLS 8/9/2018-present HCO3 made mandatory data field, unknown checkbox added/unavailable	ECLS.BloodGases	HCO3 0 = No 1 = Yes

Pre-ECLS Arterial Blood Gas (continued)

Choose the arterial blood gas that meets the following 3 criteria:

1. Drawn prior to the ECLS Start Time
2. Drawn no more than 6 hours before the ECLS Start Time
3. If multiple arterial blood gases exist in this time period, choose the pre-ECMO arterial blood gas closest to AND before the ECLS Start Time

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
SaO_2 (%)	This field collects the arterial oxyhemoglobin saturation that meets the timing criteria for the **Pre-ECLS Arterial Blood Gas** defined above. Arterial blood oxyhemoglobin saturation from arterial blood gas in %.	**Units of measure** for **US** and **International** is % Precision whole number **Soft Notification:** **<50% or > 100%** **Hard Limit:** **<1% or > 100%**	01/01/1989-1/15/2018 Collect worst 1/15/2018-present Closest to ECLS start AND pre-ECLS	ECLS.BloodGases	SaO2
SpO_2 (%)	This field collects the peripheral oxyhemoglobin saturation that meets the timing criteria for the **Pre-ECLS Arterial Blood Gas** defined above. However, this is not a blood gas measurement, it is the noninvasive pulse oximeter measured oxyhemoglobin saturation.	**Units of measure** for **US** and **International** is % Precision whole number **Soft Notification:** **<50% or > 100%** **Hard Limit:** **<1% or > 100%**	1/15/2017-present Closest to ECLS start AND pre-ECLS	ECLS.BloodGases	SpO2

Pre-ECLS Arterial Blood Gas (continued)

Choose the arterial blood gas that meets the following 3 criteria:

1. Drawn prior to the ECLS Start Time
2. Drawn no more than 6 hours before the ECLS Start Time
3. If multiple arterial blood gases exist in this time period, choose the pre-ECMO arterial blood gas closest to AND before the ECLS Start Time

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Lactate	This field collects the highest serum lactate concentration from an arterial blood gas arterial oxyhemoglobin saturation that meets the timing criteria for the **Pre-ECLS Arterial Blood Gas** defined above. If the lactate was drawn from a venous sample it is ok to enter. Highest serum lactate concentration drawn in the 6 hours preceding ECLS. If not all blood gases collect lactate, it can be drawn separately from the other arterial blood gas values, but it still needs to fall in the above described time period for **Pre-ECLS Arterial Blood Gas.**	**Units of measure** for **US** and **International** is mmol/L **Soft Notification: <0mmol/L or >20 mmol/l** **Hard Limit: <0mmol/L or >40 mmol/l**	1/1/2017 Collect worst 1/15/2018-present Closest to ECLS start AND pre-ECLS	ECLS.BloodGases	Lactate LactateUnknown
FiO2	This field collects the percentage of inspired oxygen at the time the **Pre-ECLS Arterial Blood Gas** was drawn**.** Percentage of inspired oxygen at the time the blood gas was obtained	**Units of measure** for **US** and **International** is % Precision whole number **Soft Notification: <21% or > 100%** **Hard Limit: <10% or > 100%**	01/01/1989-1/15/2018 Collect worst 1/15/2018-present Closest to ECLS start AND pre-ECLS	ECLS.BloodGases	FiO2

Pre-ECLS Ventilator Settings

Choose the Ventilator Settings that meet the following 3 criteria:

1. Ventilator settings used prior to ECLS Start Time
2. Exclude ventilator settings used more than 6 hours before the ECLS Start Time
3. If multiple ventilator settings exist, report the last reported ventilator settings before the ECLS Start Time. If the patient was receiving hand delivered bag valve ventilation immediately prior to going on ECMO please use the ventilator settings just prior to hand delivered bag valve ventilation unless the patient was hand delivered bag valve ventilation for the entire time prior to the ECLS Start Time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Pre-ECLS Vent Settings Date/Time	This field collects the date and time of the ventilator settings that meet the timing criteria for **Pre-ECLS Ventilator Settings** defined above criteria. Patient M had an ECLS start time of 03/29/2017 02:00AM He had the following 4 reports of ventilation support. All pressure measurements are reported in cm of water. Settings at 03/28/2017 7:00PM Conventional Mechanical Ventilator (CMV) in Pressure Control (PC) with Assist Control (AC) with settings: set ventilator rate 30, PIP 35, PEEP 20, FiO_2 100% and measured Mean Airway Pressure (MAP) 28. Settings at 03/28/2017 10:00PM High Frequency Oscillatory Ventilation (HFOV) with settings: MAP 40, Hertz (Hz) 8, Amplitude 75, FiO_2 100% Settings at 03/29/2017 1:00AM Hand Delivered Bag Valve Ventilation Rate 25-35, PIP 40-50, PEEP 25, FiO_2 100% Settings at 03/29/2017 at 02:05 AM CMV PC/AC with settings: rate 10, PIP 25, PEEP 10, FiO_2 30% Pre-ECLS Vent Settings at 03/28/2017 7:00PM and 03/29/2017 at 02:05 AM are ineligible because they are more than 6 hours before ECLS Start Time and after ECLS Start Time, respectively. Do not enter the and Delivered Bag Valve Mask Settings. Instead choose HFOV with settings: MAP 40, Hertz (Hz) 8, Amplitude 75, Enter Pre-ECLS Vent Settings Date/Time 03/28/2017 10:00PM.	**Soft Notification:** Pre- ECLS Vent Settings Date/Time must be BEFORE the ECLS Start Time but not more than 6 hrs before ECLS Start Time. **Hard Limit:** Pre- ECLS Vent Settings Date/Time must be BEFORE the time on ECMO. Pre- ECLS Vent Settings Date/Time cannot be earlier than the Date of Birth. Pre- ECLS Vent Settings Date/Time cannot be after the Date of Death.	01/01/1989-1/15/2018 Collect worst 1/15/2018-present Closest to ECLS start AND pre-ECLS	ECLS.VentSettings	Time

Pre-ECLS Ventilator Settings (continued)

Choose the Ventilator Settings that meet the following 3 criteria:

1. Ventilator settings used prior to ECLS Start Time
2. Exclude ventilator settings used more than 6 hours before the ECLS Start Time
3. If multiple ventilator settings exist, report the last reported ventilator settings before the ECLS Start Time. If the patient was receiving hand delivered bag valve ventilation immediately prior to going on ECMO, please use the ventilator settings just prior to hand delivered bag valve ventilation unless the patient was hand delivered bag valve ventilation for the entire time prior to the ECLS Start Time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Ventilator Type	This field collects the type of mechanical ventilation at the timing that meets the criteria for **Pre-ECLS Ventilator Settings** defined above. Select one from the drop down **Other** if type known but unspecified **Conventional** = Conventional mechanical ventilation includes pressure control, pressure regulated volume control, volume control, and inverse ratio ventilation such as airway pressure release ventilation. **HFO =** High frequency oscillatory ventilation **Other HFV =** other high frequency ventilator = High frequency jet ventilation, percussive ventilation **No Ventilator** = No ventilator was in use **Unknown** if type unknown	**This is part of the minimum dataset because it is incorporated into risk adjustment models.** **Soft Notifica** Since this run has conventional, HFO, or HFV in use, you should indicate the intubation on the run info tab (when vent type is 1, 2 or 3) and IntubationSelected = 0	01/01/1989-1/15/2018 Collect worst 1/15/2018-present Closest to ECLS start AND pre-ECLS 8/1/2018 Collect None 8/9/2018-present Ventilator Type made mandatory data field 04/15/2024	ECLS.VentSettings	VentTypeId VentTypeUnknown As defined on X-Walk Table VentTypes 0 = Other 1 = Conventional 2 = HFO 3 = Other HFV 4 = No Ventilator
Conventional Rate	This field collects the set respiratory rate in breaths per minute for **conventional ventilation** that meets timing criteria for **Pre-ECLS Ventilator Settings** defined above**.** You can only record a conventional rate if you choose the type of ventilator to be **conventiona**l, **other HFV** or **other**.	**Units of measure** is breaths per minute (bpm) Precision whole number **Soft Notification: < 10 bpm or > 40 bpm** **Hard Limit: < 0 bpm or > 150 bpm**	01/01/1989-1/15/2018 Collect worst Only collected one rate field. Separated. 1/15/2018-present Closest to ECLS start AND pre-ECLS. Separated conventional and HFV rate.	ECLS.VentSettings	Rate

Pre-ECLS Ventilator Settings (continued)

Choose the Ventilator Settings that meet the following 3 criteria:

1. Ventilator settings used prior to ECLS Start Time
2. Exclude ventilator settings used more than 6 hours before the ECLS Start Time
3. If multiple ventilator settings exist, report the last reported ventilator settings before the ECLS Start Time. If the patient was receiving hand delivered bag valve ventilation immediately prior to going on ECMO, please use the ventilator settings just prior to hand delivered bag valve ventilation unless the patient was hand delivered bag valve ventilation for the entire time prior to the ECLS Start Time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
HFV Rate	This field collects the set high frequency ventilation rate in Hertz (Hz) = breaths per second**.** that meets the **Pre-ECLS Ventilator Settings** above. You can only record a HFV rate if you choose **HFV**, **other HFV** or **other.**	**Units of measure** is Hertz (Hz) Precision one decimal point **Soft Notification:** **<3 Hz or > 17 Hz** **Hard Limit:** **<3 Hz or > 17 Hz**	01/01/1989-1/15/2018 Collect worst. Only collected one rate field. Separated. 1/15/2018-present Closest to ECLS start AND pre-ECLS. Separated conventional and HFV rate.	ECLS.VentSettings	HighFrequencyRate
MAP	This field collects the Mean Airway Pressure (MAP) in centimeters of water at the timing that meets the criteria for **Pre-ECLS Ventilator Settings** defined above. The MAP is a measured variable in conventional mechanical ventilation and set variable in HFOV.	**Units of measure** is cm H_2O Precision whole number **Soft Notification:** **< 10** cm H_2O or **> 30** cm H_2O **Hard Limit:** **< 0** cm H_2O or **> 60** cm H_2O	01/01/1989-1/15/2018 Collect worst 1/15/2018-present Closest to ECLS start AND pre-ECLS	ECLS.VentSettings	MAP

Pre-ECLS Ventilator Settings (continued)

Choose the Ventilator Settings that meet the following 3 criteria:

4. Ventilator settings used prior to ECLS Start Time
5. Exclude ventilator settings used more than 6 hours before the ECLS Start Time
6. If multiple ventilator settings exist, report the last reported ventilator settings before the ECLS Start Time. If the patient was receiving hand delivered bag valve ventilation immediately prior to going on ECMO, please use the ventilator settings just prior to hand delivered bag valve ventilation unless the patient was hand delivered bag valve ventilation for the entire time prior to the ECLS Start Time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
PIP	This field collects the Peak Inspiratory Pressure (PIP), that meets the timing criteria for **Pre-ECLS Ventilator Settings** defined above. Peak Inspiratory Pressure (PIP) for **conventional** pressure control, pressure regulated volume control, volume control and the Phigh in inverse ratio ventilation such as airway pressure release ventilation.	**PIP is displayed for conventional, other HFV, and other** **Units of measure** is cm H_2O Precision whole number **Soft Notification:** **< 10** cm H_2O or **> 45** cm H_2O **Hard Limit:** PIP must be greater than or equal to MAP PIP must be greater than or equal to PEEP **< 0** cm H_2O or **> 80** cm H_2O	01/01/1989-1/15/2018 Collect worst value. Amplitude and PIP in same data entry field. 1/15/2018-present Closest to ECLS start AND pre-ECLS. Separated data fields for PIP and Amplitude.	ECLS.VentSettings	PIP

Pre-ECLS Ventilator Settings (continued)

Choose the Ventilator Settings that meet the following 3 criteria:

1. Ventilator settings used prior to ECLS Start Time
2. Exclude ventilator settings used more than 6 hours before the ECLS Start Time
3. If multiple ventilator settings exist, report the last reported ventilator settings before the ECLS Start Time. If the patient was receiving hand delivered bag valve ventilation immediately prior to going on ECMO, please use the ventilator settings just prior to hand delivered bag valve ventilation unless the patient was hand delivered bag valve ventilation for the entire time prior to the ECLS Start Time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Amplitude	This field collects the Amplitude or Delta Pressure (DP), that meets the timing criteria for **Pre-ECLS Ventilator Settings** defined above. High Frequency Amplitude for **high frequency oscillatory ventilation or other high frequency ventilation** or **other.**	**Amplitude is displayed for HFO, other HFV, and other** **Units of measure** is cm H_2O Precision whole number **Soft Notification:** **< 30** cm H_2O or **> 90** cm H_2O **Hard Limit:** **< 10** cm H_2O or **> 100** cm H_2O	01/01/1989-1/15/2018 Collect worst value. Amplitude and PIP in same data entry field 1/15/2018-present Closest to ECLS start AND pre-ECLS. Separated data fields for PIP and Amplitude.	ECLS.VentSettings	DeltaP
PEEP	This field collects the positive end-expiratory pressure (PEEP) that meets the timing criteria for **Pre-ECLS Ventilator Settings** defined above. PEEP can only be collected when a patient is in **conventiona**l, **other high frequency ventilation** or **other.**	**PEEP is displayed for displayed for conventional, other HFV, and other** **Units of measure** is cm H_2O Precision whole number **Soft Notification:** **< 5** cm H_2O or **> 25** cm H_2O **Hard Limit:** **< 0** cm H_2O or **> 40** cm H_2O	01/01/1989-1/15/2018 Collect worst 1/15/2018-present Closest to ECLS start AND pre-ECLS	ECLS.VentSettings	PEEP

Pre-ECLS Ventilator Settings (continued)

Choose the Ventilator Settings that meet the following 3 criteria:

1. Ventilator settings used prior to ECLS Start Time
2. Exclude ventilator settings used more than 6 hours before the ECLS Start Time
3. If multiple ventilator settings exist, report the last reported ventilator settings before the ECLS Start Time. If the patient was receiving hand delivered bag valve ventilation immediately prior to going on ECMO, please use the ventilator settings just prior to hand delivered bag valve ventilation unless the patient was hand delivered bag valve ventilation for the entire time prior to the ECLS Start Time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Hand Bag Valve Ventilation	This field collects if the patient could no longer be supported with mechanical ventilation and needed to convert to hand bag valve ventilation. Only select this if the patient received hand bag valve ventilation through an invasive airway beginning in the 6 hours prior to the ECLS Start Time AND continuing until the time the patient went on ECLS. **Select yes, no or unknown** from the drop down menu **Patient Y** went on ECLS on 10/1/2022 at 8:00PM. At 3:00 PM on 10/1/2022 he was transitioned to hand bag ventilation because his CO2 climbed to 100 mm Hg. His mechanical ventilator settings were adjusted and he was placed back on the mechanical ventilator at 3:15 PM. Select No. **Patient Z** went on ECLS at 10/2/2022 at 2:00PM. At 1:00 PM she could no longer maintain oxygen saturations above 70% on 100% FiO_2. She was disconnected from mechanical ventilation and received hand bag valve ventilation until she was on ECLS support. Select Yes.		01/01/1989-1/15/2018 Collect worst 1/15/2018-present Closest to ECLS start AND pre-ECLS	ECLS.VentSettings	HandBagging 0 = No 1 = Yes -1 = Unknown

Pre-ECLS Hemodynamics This section details hemodynamic values for a patient closest to initiation AND before the ECLS Start Time. The data, at maximum, should be from no more than 6 hours before the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Pre-ECLS Hemodynamics Date/Time	This field collects the date and time that the Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP) and Mean Blood Pressure (Mean BP) were simultaneously collected in accordance with **Pre-ECLS Hemodynamics** timing criteria defined above. The Pre-ECLS Hemodynamics Date/Time should refer to the date and time of the Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP) and Mean Blood Pressure (Mean BP) which all should be measured at the same time. If a patient has an invasive arterial line that is measuring blood pressure please report values from the arterial line. If the patient does not have invasive arterial blood pressure monitoring in the 6 hours prior to the ECLS Start Time, then use noninvasive blood pressure monitoring values that fall in that time frame. **Patient M** had an ECLS start time of 03/29/2017 02:00AM He had the following 4 reports of blood pressure. Reported as SBP/DBP (Mean BP) in mm Hg At 03/28/2017 7:00PM **Arterial BP** 60/40 (53) At 03/28/2017 10:00PM **Arterial BP** 70/40 (58) At 03/29/2017 1:00AM **Noninvasive BP** 62/42 (55) At 03/29/2017 at 02:05 AM **Arterial BP** 80/50 (65) Enter **Pre-ECLS Hemodynamics Date/Time** 03/29/2017 1:00AM and enter the **Arterial BP** with Systolic 70 mm Hg, Diastolic BP 40 mm Hg and Mean BP 58 mm Hg	**Soft Notification:** Pre- ECLS Hemodynamics Date/Time must be BEFORE the ECLS Start Time but not more than 6 hrs before ECLS Start Time. **Hard Limit:** Pre- ECLS Hemodynamics Date/Time must be BEFORE the time on ECMO. Pre- ECLS Hemodynamics Date/Time cannot be earlier than the Date of Birth. Pre- ECLS Hemodynamics Date/Time cannot be after the Date of Death.	01/01/1998-12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS	ECLS.Hemodynamics	Time

Pre-ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to initiation AND before the ECLS Start Time. The data, at maximum, should be from no more than 6 hours before the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Systolic BP	This field collects the systolic blood pressure (SBP) that meets the **Pre-ECLS Hemodynamics** timing criteria defined above. Enter the systolic of a single measurement of blood pressure. If an arterial blood pressure and non-invasive cuff pressure exist, please choose the arterial pressure monitor reading. As this is part of the minimum dataset, if this information is unknown or unavailable check the appropriate box.	**Units of measure** are mm Hg Precision: whole number **Neonate** (0-28 days) **Soft Notification:** < **30** mm Hg or > **90** mm Hg **Hard Limit:** < **0** mm Hg or > **150** mm Hg **Pediatric (**29 days – 17 yrs) **Soft Notification:** < **50** mm Hg or > **180** mm Hg **Hard Limit:** < **0** mm Hg or > **250** mm Hg **Adult** (≥ 18 yrs) **Soft Notification:** < **50** mm Hg or > **180** mm Hg **Hard Limit:** < **0** mm Hg or > **300** mm Hg **This is part of the minimum dataset because it is incorporated into risk adjustment models.**	01/01/1998-12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS 8/9/2018-present SBP made mandatory data field, Unavailable/unknown checkbox added	ECLS.Hemodynamics	SBP

Pre-ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to initiation AND before the ECLS Start Time. The data, at maximum, should be from no more than 6 hours before the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Diastolic BP	This field collects the diastolic blood pressure (DBP) that meets the **Pre-ECLS Hemodynamics** timing criteria defined above. Enter the diastolic of a single measurement of blood pressure. If an arterial blood pressure and non-invasive cuff pressure exist, please choose the arterial pressure monitor reading. As this is part of the minimum dataset, if this information is unknown or unavailable check the appropriate box.	**Units of measure** are mm Hg Precision: whole number **Neonate** (0-28 days) **Soft Notification:** < **15** mm Hg or > **80** mm Hg **Hard Limit:** < **0** mm Hg or > **150** mm Hg **Pediatric (**29 days – 17 yrs) **Soft Notification:** < **20** mm Hg or > **150** mm Hg **Hard Limit:** < **0** mm Hg or > **200** mm Hg **Adult** (≥ 18 yrs) **Soft Notification:** < **30** mm Hg or > **180** mm Hg **Hard Limit:** < **0** mm Hg or > **250** mm Hg **Hard Limit:** The Diastolic BP cannot be greater than the Systolic BP. **This is part of the minimum dataset because it is incorporated into risk adjustment models.**	01/01/1998-12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS 8/9/2018-present Diastolic BP made mandatory data field, Unavailable/unknown checkbox added	ECLS.Hemodynamics	DBP

Pre-ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to initiation AND before the ECLS Start Time. The data, at maximum, should be from no more than 6 hours before the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Mean BP	This field collects the mean blood pressure (Mean BP) that meets the **Pre-ECLS Hemodynamics** timing criteria defined above. Enter the mean of a single measurement of blood pressure. If an arterial blood pressure and non-invasive cuff pressure exist please choose the arterial pressure monitor reading.	**Units of measure** are mm Hg Precision: whole number **Neonate** (0-28 days) **Soft Notification:** < **20** mm Hg or > **70** mm Hg **Hard Limit:** < **0** mm Hg or > **150** mm Hg **Pediatric (**29 days – 17 yrs) **Soft Notification:** < **30** mm Hg or > **150** mm Hg **Hard Limit:** < **0** mm Hg or > **200** mm Hg **Adult** (≥ 18 yrs) **Soft Notification:** < **30** mm Hg or > **180** mm Hg **Hard Limit:** < **0** mm Hg or > **250** mm Hg **Hard Limit:** The Mean BP must be greater than or equal to the Diastolic BP The Mean BP must be less than or equal to the Systolic BP	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS	ECLS.Hemodynamics	MeanBP

Pre-ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to initiation AND before the ECLS Start Time. The data, at maximum, should be from no more than 6 hours before the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
SvO2	This field collects the mixed venous oxygen saturation (SvO_2) of the patient's blood that meets the **Pre-ECLS Hemodynamics** timing criteria defined above. Enter the lowest SvO_2 measured, ideally from the pulmonary artery or secondarily right atrium, but it is acceptable to enter SvO_2 from any central line.	**Units of measure** % of hemoglobin oxygen saturation Precision: whole number **Soft Notification:** < **20%** or > **80** % **Hard Limit:** < **0** % or > **100** %	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS	ECLS.Hemodynamics	SvO2

Pre-ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to initiation AND before the ECLS Start Time. The data, at maximum, should be from no more than 6 hours before the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
PCWP	This field collects the Pulmonary Capillary Wedge Pressure (PCWP) that meets the **Pre-ECLS Hemodynamics** timing criteria defined above. Enter the **highest** PCWP measured with an indwelling pulmonary artery catheter.	**Units of measure** mm Hg Precision: whole number **Neonate** (0-28 days) **Soft Notification:** < **0** mm Hg or > **30** mm Hg **Hard Limit:** < **0** mm Hg or > **100** mm Hg **Pediatric and Adult (**> 29 days) **Soft Notification:** < **0** mm Hg or > **45** mm Hg **Hard Limit:** < **0** mm Hg or > **100** mm Hg	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS	ECLS.Hemodynamics	PCWP
Systolic PAP	This field collects the Systolic Pulmonary Arterial Pressure (Systolic PAP) that meets the **Pre-ECLS Hemodynamics** timing criteria defined above. Enter the **highest** systolic PAP measured with an indwelling pulmonary artery catheter	**Units of measure** mm Hg Precision whole number **Neonate** (0-28 days) **Soft Notification:** < **5** mm Hg or > **50** mm Hg **Hard Limit:** < **0** mm Hg or > **100** mm Hg **Pediatric and Adult (**> 29 days) **Soft Notification:** < **5** mm Hg or > **90** mm Hg **Hard Limit:** < **0** mm Hg or > **150** mm Hg	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS 1/01/1989-present	ECLS.Hemodynamics	SPAP

Pre-ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to initiation AND before the ECLS Start Time. The data, at maximum, should be from no more than 6 hours before the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Diastolic PAP	This field collects the Diastolic Pulmonary Arterial Pressure (Diastolic PAP) that meets the **Pre-ECLS Hemodynamics** timing criteria defined above. Enter the **highest** diastolic PAP measured with an indwelling pulmonary artery catheter.	**Units of measure** mm Hg Precision: whole number **Neonate** (0-28 days) **Soft Notification:** < **1** mm Hg or > **40** mm Hg **Hard Limit:** < **0** mm Hg or > **80** mm Hg **Pediatric and Adult (**> 29 days) **Soft Notification:** < **2** mm Hg or > **80** mm Hg **Hard Limit:** < **0** mm Hg or > **130** mm Hg **Hard Limit:** Diastolic PAP cannot be greater than Systolic PAP.	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS	ECLS.Hemodynamics	DPAP

Pre-ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to initiation AND before the ECLS Start Time. The data, at maximum, should be from no more than 6 hours before the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Mean PAP	This field collects the Mean Pulmonary Arterial Pressure (Mean PAP) that meets the **Pre-ECLS Hemodynamics** timing criteria defined above. Enter the **highest** Mean PAP measured with an indwelling pulmonary artery catheter.	**Units of measure** mm Hg Precision: whole number **Neonate** (0-28 days) **Soft Notification:** < **2** mm Hg or > **45** mm Hg **Hard Limit:** < **0** mm Hg or > **85** mm Hg **Pediatric and Adult (**> 29 days) **Soft Notification:** < **2** mm Hg or > **80** mm Hg **Hard Limit:** < **0** mm Hg or > **140** mm Hg **Hard Limit:** The Mean PAP must be greater than or equal to the Diastolic PAP The Mean PAP must be less than or equal to the Systolic PAP	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS	ECLS.Hemodynamics	MPAP
Cardiac Index	This field collects the cardiac index that meets the **Pre-ECLS Hemodynamics** timing criteria defined above. Enter the l**owest** Cardiac Index calculated: Cardiac Output / Body Surface Area = L/min/m^2 or measured.	**Units of measure** L/min/m^2 Precision: one decimal point **Soft Notification:** < **1** L/min/m^2 or > **10** L/min/m^2 **Hard Limit:** < **0** L/min/m^2 or > **20** L/min/m^2	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS	ECLS.Hemodynamics	CI

Mechanical Cardiac Support Codes Select each support type that was employed prior to the ECLS Start Time. These generally refer to supports received within the 24 hours leading up to ECLS, though many of these supports may have been initiated days, or even months, prior to ECLS.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Mechanical Cardiac Support Codes	This field collects if any mechanical cardiac support was used prior to ECLS	Yes or No response mandatory for category	08/21/2018 – Present		
Cardiac pacemaker	This field collects if a patient had a permanent pacemaker placed prior to ECLS. Check permanent pacemaker if patient had a permanent pacemaker prior to ECLS **Patient Y** had congenital heart surgery and received temporary pacing wires. Subsequently he went on ECLS and before hospital discharge received a permanent pacemaker. Do **not** check cardiac pacemaker.		01/15/2018-present	ECLS.Support	SupportCodeId 104
Cardiopulmonary bypass	This field collects if the patient received cardiopulmonary bypass (CPB) in the **24 hours prior** to going on ECLS. Check cardiopulmonary bypass if the patient received CPB within the 24 prior to ECLS. **Patient C** had cardiac surgery on CPB on 01/12/2021 at 2:00PM. She then came out of the operating room on vasoactive support. On 01/13/2021 at 2:00 AM she went on ECLS for cardiac support. Check cardiopulmonary bypass.		07/01/2001 - present	ECLS.Support	SupportCodeId 201
Intra-aortic balloon	This field records if a patient had an intra-aortic balloon pump utilized in the **24 hours** prior to ECLS Start Time. Check Intra-aortic balloon pump if patient had one within 24 hours prior to ECLS Start Time. **Patient Z** had ECPR and was placed on ECPR then immediately after ECLS Start Time an intra-aortic balloon pump was placed. Do not check intra-aortic balloon pump as this was not a Pre-ECLS support.		01/15/2018-present	ECLS.Support	SupportCodeId 103

Mechanical Cardiac Support Codes (continued) Select each support that was employed prior to the ECLS Start Time. These generally refer to supports received within the 24 hours leading up to ECLS, though many of these supports may have been initiated days, or even months, prior to ECLS.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Percutaneous Ventricular Assist Device	This field collects if a patient had a percutaneously placed Ventricular Assist Device (VAD) support prior to ECLS. Check yes if patient had a percutaneously placed VAD such as Impella 2.5, Impella 5.0, PHP, Tandem Heart. Temporary ventricular assist device, is usually inserted percutaneously via a peripheral artery. **Patient Y** had a surgically placed VAD and then had an oxygenator cut in, converting him to ECLS. This patient did have Pre-ECLS VAD support, but Do NOT check yes for percutaneous Ventricular Assist Device, as the device was not percutaneous.		02/01/1998-present	ECLS.Support	SupportCodeId 701
RVAD	This field collects if a patient had a Right Ventricular Assist Device (RVAD) support prior to ECLS. Check **RVAD** if the right ventricle is supported with an implanted ventricular assist device.		02/01/1998-present	ECLS.Support	SupportCodeId 203
LVAD	This field collects if a patient had a Left Ventricular Assist Device (LVAD) support prior to ECLS. Check **LVAD** if left ventricle is supported with an implanted ventricular assist device.		02/01/1998-present	ECLS.Support	SupportCodeId 202
BiVAD	This field collects if a patient had a BiVentricular Assist Device (BiVAD) support prior to ECLS. Check **BiVAD** if both the right and left ventricles are supported with an implanted ventricular assist device.		02/01/1998-present	ECLS.Support	SupportCodeId 204
Berlin Heart	This field collects if a patient had a Berlin Heart Ventricular Assist Device support prior to ECLS. Check **Berlin Heart** if it is used for ventricular support prior to ECLS		02/01/1998-present	ECLS.Support	SupportCodeId 205

Renal, Pulmonary and Other Support Codes Select each support that was employed prior to the ECLS Start Time. These generally refer to supports received within the 24 hours leading up to ECLS, though some of these supports may have been initiated days prior to ECLS.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Renal, Pulmonary and Other Support Codes	This field collects if any renal, pulmonary or other support codes were used prior to ECLS	Yes or No response mandatory for category	08/21/2018 – Present		
Renal Replacement Therapy	This field collects if a patient required renal replacement therapy any time prior to ECLS. Check **Renal Replacement Therapy** if the patient requires renal replacement therapy (RRT) during the hospitalization or at baseline (this includes hemodialysis, continuous renal replacement therapy and peritoneal dialysis). **Patient Y** is dependent on chronic Hemodialysis at home and was admitted and went on ECLS prior to receiving hemodialysis in hospital. **Patient Z** is on home peritoneal dialysis (PD) and came in with septic shock and went on ECLS without receiving PD in hospital. **Patient X** has no baseline renal failure but developed acute kidney injury during the hospitalization and received RRT during the hospitalization prior to ECLS. For Patient X, Y and Z check **Renal Replacement Therapy**		01/01/1989-present	ECLS.Support	SupportCodeId 502
Inhaled anesthetic	This field collects if a patient inhaled anesthetic as a therapy within the 24 hours prior to the ECLS Start Time. Check **inhaled anesthetic** if it is used as a therapy such as for bronchodilation in the 24 hours prior to ECLS Start Time.		02/01/1998-present	ECLS.Support	SupportCodeId 307

Renal, Pulmonary and Other Support Codes (continued) Select each support that was employed prior to the ECLS Start Time. These generally refer to supports received within the 24 hours leading up to ECLS, though some of these supports may have been initiated days prior to ECLS.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Inhaled Nitric Oxide	This field collects if a patient inhaled nitric oxide (iNO) as a therapy within the 24 hours prior to the ECLS Start Time. Check **iNO** if the patient received inhaled nitric oxide in the 24 hours period prior to the ECLS Start Time for **at least 6 hours**.		02/01/1998-present	ECLS.Support	SupportCodeId 302
Prone Positioning	This field collects if a patient received prone positioning as a respiratory therapy within the 24 hours prior to the ECLS Start Time. Guerin C, et al. Prone positioning in severe ARDS. *N Engl J Med.* 2013;368(23):2159-2168 described prone positioning as being placed "in a completely prone position for at **least 16 consecutive hours."** Select Yes for Prone Positioning if these conditions are true for the patient within the 24 hours prior to ECLS Start Time. **Patient A** went on ECLS on 10/11/2022 at 2:00 PM. She was placed in the prone position from 10/09/2022 at 10:00 PM until 10/10/2022 at 4:00 PM, then she was placed supine and was not replaced in the prone position prior to going on ECLS. Select Yes. **Patient Z** went on ECLS on 10/11/2022 at 2:00 PM. He was placed in the prone position from 10/09/2022 at 10:00 PM until 6:00 AM on 10/10/2022. He was placed back in the prone position on 10/10/2022 at 10:00 PM until 6:00 AM on 10/11/2022. Select No.		12/01/2017-present	ECLS.Support	SupportCodeId 702
Partial Liquid Ventilation	Select this if the patient had received intra-tracheal perfluorocarbon at any time during the hospitalization.		02/01/1998-present	ECLS.Support	SupportCodeId 304
High frequency ventilation/oscillation			01/01/1989-present		301

Renal, Pulmonary and Other Support Codes (continued) Select each support that was employed prior to the ECLS Start Time. These generally refer to supports received within the 24 hours leading up to ECLS, though some of these supports may have been initiated days prior to ECLS.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Plasmapheresis	This field collects if the patient received therapeutic plasmapheresis within the 24 hours prior to ECLS Start Time. Check plasmapheresis if the patient's plasma was removed by filtration or centrifugation and replaced with other volume.		02/01/1998-present	ECLS.Support	SupportCodeId 501
Surfactant	This field collects if the patient received intra-tracheal surfactant within the 24 hours prior to ECLS Start Time. Check **Surfactant** if exogenous pulmonary surfactant directly delivered into the trachea.		02/01/1998-present	ECLS.Support	SupportCodeId 303
Therapeutic hypothermia < 35 degrees C	This field collects if the patient received therapeutic hypothermia within the 24 hours prior to the ECLS Start Time. Select yes if there was intentional cooling of the patient to < 35 C prior to the ECLS start time.		10/10/2011-present	ECLS.Support	SupportCodeId 306

Medications (excluding vasoactive infusions) Select each that were employed within the 24 hours prior to placing the patient on ECLS.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Medications (excluding vasoactive infusions)	This field collects if any medications (excluding vasoactive infusions) were used prior to ECLS	Yes or No response mandatory for category	08/21/2018 – Present		
Bicarbonate (Intravenous)	This field collects if the patient received intravenous bicarbonate within the 24 hours prior to the ECLS Start Time. Check if **sodium bicarbonate** was administered intravenously as a bolus for metabolic acidosis.		02/01/1998-present	ECLS.Support	SupportCodeId 403
Narcotics	This field collects if the patient received continuous intravenous narcotics within the 24 hours prior to the ECLS Start Time. To qualify, the infusion must have been administered for at least 6 hours, or for at least 30 minutes if ECMO was initiated within the first 6 hours of life Check **narcotics** if the patient had continuous infusion of narcotics.		01/01/1989-present	ECLS.Support	SupportCodeId 401
Neuromuscular blockers	This field collects if the patient received continuous intravenous neuromuscular blockade within the 24 hours prior to the ECLS Start Time. To qualify, the infusion must have been administered for at least 6 hours, or for at least 30 minutes if ECMO was initiated within the first 6 hours of life Check **neuromuscular blocker** if the patient had continuous infusion of neuromuscular blockade.		02/01/1998-1/15/2018 1/15/2018-present specified infusion	ECLS.Support	SupportCodeId 402
Systemic Steroids	This field collects if the patient received systemic steroids within the 24 hours prior to the ECLS Start Time. Check **systemic steroids** if the patient received systemically glucocorticosteroids 24 hours prior to putting the patient on ECLS.		02/01/1998-present	ECLS.Support	SupportCodeId 613
THAM	This field collects if the patient received **THAM** within the 24 hours prior to the ECLS Start Time.		02/01/1998-present	ECLS.Support	SupportCodeId 404
Pulmonary Vasodilators	This field collects if the patient received inhaled, intravenous, or PO pulmonary vasodilators within the 24 hours prior to the ECLS Start Time. Examples, but not limited to: epoprostenol (Flolan, Veletr), treprostinil (Remodulin, Tyvaso, others), Iloprost (Ventavis) and selexipag (Uptravi), sildenafil, tadalafil, inhaled nitric oxide (iNO), Angiotensin II (GIAPREZA).				SupportCodeId 714

Vasoactive Infusions Select each infusion that was employed for at least 6 hours within 24 hours of the ECLS start time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Vasoactive Infusions	This field collects if any vasoactive medications were used prior to ECLS within the 24 hours prior to the ECLS Start Time To qualify, the infusion must have been administered for at least 6 hours, or for at least 30 minutes if ECMO was initiated within the first 6 hours of life	Yes or No response mandatory for category	08/21/2018 – Present 09/17/2022 – Present Select Yes if vasocactive medication infused for at least 30 minutes and ECMO initiated within the first 6 hours of life		
Dobutamine			02/01/1998-present	ECLS.Support	SupportCodeId 602
Dopamine			02/01/1998-present	ECLS.Support	SupportCodeId 601
Enoximone			1/15/2018-present	ECLS.Support	SupportCodeId 703
Epinephrine			02/01/1998-present	ECLS.Support	SupportCodeId 603
Esmolol			02/01/1998-present	ECLS.Support	SupportCodeId 705
Levosimendan			02/01/1998-present	ECLS.Support	SupportCodeId 704
Metaraminol			1/15/2018 - present	ECLS.Support	SupportCodeId 712
Metoprolol			02/01/1998-present	ECLS.Support	SupportCodeId 706
Milrinone			02/01/1998-present	ECLS.Support	SupportCodeId 608

Vasoactive Infusions (continued) Select each infusion that was employed for at least 6 hours within 24 hours of the ECLS start time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Nicardipine			02/01/1998-present	ECLS.Support	SupportCodeId 707
Nitroglycerin			02/01/1998-present	ECLS.Support	SupportCodeId 708
Nitroprusside			02/01/1998-present	ECLS.Support	SupportCodeId 605
Norepinephrine			02/01/1998-present	ECLS.Support	SupportCodeId 604
Phenylephrine			1/15/2018-present	ECLS.Support	SupportCodeId 713
Vasopressin			1/15/2018-present	ECLS.Support	SupportCodeId 709

Pre-ECLS Support Types *no longer collected*					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Abdominal compression			01/01/1989-12/01/2017		105
AVCO2R			01/01/1989-12/01/2017		206
ECMO			101/01/1989-12/01/2017		207
Hyperventilation			01/01/1989-12/01/2017		305
Vasopressor/inotropic drug			01/01/1989-12/01/2017		101

4. ECLS ASSESSMENT

This section details the values for a patient on ECLS closest to 24 hours after the ECLS Start Time. If data at 24 hours is not available, then give the data closest to 24 hours after initiation of ECLS (no less than 18 after the ECLS Start Time and no more than 30 hours after ECLS Start Time).

24-hour ECLS Arterial Blood Gas

Choose the arterial blood gas that meets the following 3 criteria:

1. Drawn after the ECLS Start Time
2. Drawn no less than 18 hours after the ECLS Start Time and no more than 30 hours after ECLS Start Time
3. If multiple arterial blood gases exist in this time period, choose the ECLS arterial blood gas closest to 24 hours after the ECLS Start Time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
24-hour ECLS Blood Gas Date/Time	This field collects the date and time of the arterial blood gas that meets the timing criteria for the **24-hour ECLS Arterial Blood Gas** defined above. **Patient M** had an ECLS start time of 03/29/2017 02:00AM He had the following 4 blood gases following shorthand: pH/$PaCO_2$/PaO_2/HCO_3/SaO_2 Lactate=X, FiO_2 delivered=X ABG at 03/29/2017 7:00PM 7.41/40/80/24/98% Lactate 1 FiO_2 delivered = 30% ABG at 03/29/2017 at 11:30 PM 7.42/41/82/25/99% Lactate 1 FiO_2 delivered = 30% ABG at 03/30/2017 3:00AM 7.39/39/81/25/100% Lactate 1 FiO_2 delivered = 30% ABG at 03/30/2017 8:30AM 7.38/38/82/23/99% Lactate 1 FiO_2 delivered = 30% ABG on 03/29/2017 at 7:00 PM is ineligible because it less than 18 hours after the ECLS Start Time. ABG on 3/30/2017 at 8:30 AM is ineligible because it is > 30 hours after ECLS Start Time. Enter **24-hour ECLS Arterial Blood Gas Date/Time** at 03/30/2017 3:00AM because it is the ABG closest to the 24 hours after the ECLS Start Time. Use all values for pH, $PaCO_2$, PaO_2, HCO_3, SaO_2, Lactate, from the same ABG and report the FiO_2 at the time the ABG was drawn.	**Soft Notification:** 24-hour ECLS Blood Gas Date/Time must be no less than 18 hrs AFTER ECLS Start Time and no more than 30 hrs AFTER the ECLS Start Time. **Hard Limit:** 24-hour ECLS Blood Gas Date/Time must be AFTER the ECLS Start Time. 24-hour ECLS Blood Gas Date/Time can be AFTER the time on ECMO but not more than 48h after the time on ECMO 24-hour ECLS Blood Gas Date/Time cannot be AFTER the Date of Death 24-hour ECLS Blood Gas Date/Time cannot be earlier than the Date of Birth.	01/01/1989-1/15/2018 collect best value 1/15/2018-present collect value on ECLS closest to 24 hours of ECLS	ECLS.BloodGases	Time

24-hour ECLS Arterial Blood Gas (continued)

Choose the arterial blood gas that meets the following 3 criteria:

1. Drawn after the ECLS Start Time
2. Drawn no less than 18 hours after the ECLS Start Time and no more than 30 hours after ECLS Start Time
3. If multiple arterial blood gases exist in this time period, choose the ECLS arterial blood gas closest to 24 hours after the ECLS Start Time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
pH	This field collects the pH that meets the timing criteria for the **24-hour ECLS Arterial Blood Gas** defined above. As this is part of the minimum dataset, if this information is unknown or unavailable check the appropriate box. pH is the potential of hydrogen (negative of the base 10 logarithm of the activity of the hydrogen ion) in the arterial blood sample.	Precision 2 decimal points **Soft Notification:** **< 6.90 or > 7.50** **Hard Limit:** **<6.00 or > 8.00** **This is part of the minimum dataset because it is incorporated into risk adjustment models.**	01/01/1989-1/15/2018 collect best value 1/15/2018- present collect value on ECLS closest to 24 hours of ECLS 8/9/2018-present pH made mandatory data field if available and ECLS duration greater than or equal to 24 hours, Unavailable/unknown checkbox added	ECLS.BloodGases	pH
$PaCO_2$	This field collects the arterial partial pressure of carbon dioxide ($PaCO_2$) that meets the timing criteria for the **24-hour ECLS Arterial Blood Gas** defined above. $PaCO_2$ is the arterial partial pressure of carbon dioxide in mm Hg.	**US units of Entry** Precision whole number **Soft Notification:** **< 30 mm Hg or > 100 mm Hg** **Hard Limit:** **< 10 mm Hg or > 250 mm Hg** **International Units** Precision 2 decimal points **Soft Notification:** **< 4.00 kPa or > 13.33 kPa** **Hard Limit:** **< 1.33 kPa or > 33.33 kPa**	01/01/1989-1/15/2018 collect best value 1/15/2018- present collect value on ECLS closest to 24 hours of ECLS	ECLS.BloodGases	PCO2

24-hour ECLS Arterial Blood Gas (continued) Choose the arterial blood gas that meets the following 3 criteria: 1. Drawn after the ECLS Start Time 2. Drawn no less than 18 hours after the ECLS Start Time and no more than 30 hours after ECLS Start Time 3. If multiple arterial blood gases exist in this time period, choose the ECLS arterial blood gas closest to 24 hours after the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
PaO_2	This field collects the arterial partial pressure oxygen (PaO_2) that meets the timing criteria for the **24-hour ECLS Arterial Blood Gas** defined above. PaO_2 is the arterial partial pressure of oxygen in mm Hg.	**US units of Entry** Precision whole number **Soft Notification:** **< 20 mm Hg or > 300 mm Hg** **Hard Limit:** **< 0 mm Hg or > 760 mm Hg** **International Units** Precision 2 decimal points **Soft Notification:** **< 2.66 kPa or > 40.00 kPa** **Hard Limit:** **< 0 kPa or > 101.31 kPa**	01/01/1989-1/15/2018 collect best value 1/15/2018- present collect value on ECLS closest to 24 hours of ECLS	ECLS.BloodGases	PO2
HCO_3	This field collects the arterial standard bicarbonate (HCO_3) that meets the timing criteria for the **24-hour ECLS Arterial Blood Gas** defined above. As this is part of the minimum dataset, if this information is unknown or unavailable check the appropriate box. HCO_3 is the Standard bicarbonate concentration **mEq/L** or **mmol/L**	**US units of Entry** Precision whole number **Soft Notification:** **< 10 mEq/L or > 40 mEq/L** **Hard Limit:** **< 0 mEq/L or > 70 mEq/L** **International units** Precision whole number **Soft Notification:** **< 10 mmol/L or > 40 mmol/L** **Hard Limit:** **< 0 mmol/L or > 70 mmol/L** **This is part of the minimum dataset because it is incorporated into risk adjustment models.**	01/01/1989-1/15/2018 collect best value 1/15/2018- present collect value on ECLS closest to 24 hours of ECLS 8/9/2018-present HCO3 made mandatory data field if available and ECLS duration greater than or equal to 24 hours, Unavailable/unknown checkbox added	ECLS.BloodGases	HCO3

24-hour ECLS Arterial Blood Gas (continued)

Choose the arterial blood gas that meets the following 3 criteria:

1. Drawn after the ECLS Start Time
2. Drawn no less than 18 hours after the ECLS Start Time and no more than 30 hours after ECLS Start Time
3. If multiple arterial blood gases exist in this time period, choose the ECLS arterial blood gas closest to 24 hours after the ECLS Start Time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
SaO_2 (%)	This field collects the arterial oxyhemoglobin saturation that meets the timing criteria for the **24-hour ECLS Arterial Blood Gas** defined above. SaO_2 is the percent arterial blood oxyhemoglobin saturation from arterial blood gas.	**Units of measure** for **US** and **International** is % Precision whole number **Soft Notification:** **<50% or > 100%** **Hard Limit:** **<1% or > 100%**	01/01/1989-1/15/2018 collect best value 1/15/2018-present collect value on ECLS closest to 24 hours of ECLS	ECLS.BloodGases	SaO2
SpO_2 (%)	This field collects the peripheral oxyhemoglobin saturation that meets the timing criteria for the **24-hour ECLS Arterial Blood Gas** defined above. However, this is not a blood gas measurement, it is the noninvasive pulse oximeter measured oxyhemoglobin saturation.	**Units of measure** for **US** and **International** is % Precision whole number **Soft Notification:** **<50% or > 100%** **Hard Limit:** **<1% or > 100%**	1/15/2017-present Closest to ECLS start AND pre-ECLS	ECLS.BloodGases	SpO2
Lactate	This field collects the highest serum lactate concentration from an arterial blood gas arterial oxyhemoglobin saturation that meets the timing criteria for the **24-hour ECLS Arterial Blood Gas** defined above. If not all blood gases do not collect lactate, it can be drawn separately from the other arterial blood gas values, but it still needs to fall in the above described time period for **24 hour Arterial Blood Gas.**	**Units of measure** for **US** and **International** is mmol/L **Soft Notification:** **<0mmol/L or >20 mmol/l** **Hard Limit:** **<0mmol/L or >40 mmol/l**	01/01/2017-1/15/2018 collect best value 1/15/2018-present collect value on ECLS closest to 24 hours of ECLS	ECLS.BloodGases	Lactate

24-hour ECLS Arterial Blood Gas (continued) Choose the arterial blood gas that meets the following 3 criteria: 4. Drawn after the ECLS Start Time 5. Drawn no less than 18 hours after the ECLS Start Time and no more than 30 hours after ECLS Start Time If multiple arterial blood gases exist in this time period, choose the ECLS arterial blood gas closest to 24 hours after the ECLS Start Time.					
Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values	
FiO_2	This field collects the percentage of inspired oxygen at the time the **24-hour ECLS Arterial Blood Gas** was drawn**.** FiO_2 is the percentage of inspired oxygen from the ventilator or other supplemental oxygen at the time the blood gas was obtained.	**Units of measure** for **US** and **International** is % Precision whole number **Soft Notification:** **<21% or > 100%** **Hard Limit:** **<10% or > 100%**	01/01/1989-1/15/2018 collect best value 1/15/2018-present collect value on ECLS closest to 24 hours of ECLS	ECLS.BloodGases	FiO2

24-hour ECLS Ventilator Settings

Choose the Ventilator Settings that meets the following 3 criteria:

1. Collected after the ECLS Start Time
2. Collected no less than 18 hours after the ECLS Start Time and no more than 30 hours after ECLS Start Time
3. If multiple ventilator settings exist in this time period, choose the Ventilator Settings closest to 24 hours after the ECLS Start Time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
24-hour ECLS Vent Settings Date/Time	This field collects the date and time of the ventilator settings that meet the timing criteria for the **24-hour ECLS Ventilator Settings** defined above. **Patient M** had an ECLS start time of 03/29/2017 02:00AM He had the following 4 reports of ventilation support. All pressure measurements are reported in cm of water. Settings at 03/29/2017 7:00PM Conventional Mechanical Ventilator (CMV) in Pressure Control (PC) with Assist Control (AC) with settings: set rate 10, PIP 25, PEEP 15, FiO_2 30% measured MAP 18. Settings at 03/29/2017 at 11:30 PM CMV PC/AC with settings: rate 10, PIP 25, PEEP 15, FiO_2 30% measured MAP 18. Settings at 03/30/2017 3:00AM CMV PC/AC with settings: rate 10, PIP 25, PEEP 15, FiO_2 30% MAP 18. Settings at 03/30/2017 8:30AM CMV PC/AC with settings: rate 10, PIP 25, PEEP 15, FiO_2 30% measured MAP 18. **24-hour ECLS Ventilator Settings** at 03/29/2017 7:00PM and at 03/30/2017 8:30AM are ineligible because they are less than 18 hours after the ECLS Start Time and more than 30 hours after the ECLS Start Time, respectively. Choose 03/30/2017 3:00AM for the 24-hour ECLS Vent Date/Time and enter the appropriate settings from that date and time in the fields below.	**Soft Notification:** 24-hour ECLS Vent Settings Date/Time must be no less than 18 hrs AFTER ECLS Start Time and no more than 30 hrs AFTER the ECLS Start Time. **Hard Limit:** 24-hour ECLS Vent Settings Date/Time must be AFTER the ECLS Start Time. 24-hour ECLS Vent Settings Date/Time can be AFTER the time on ECMO but not more than 48h after the time on ECMO 24-hour ECLS Vent Settings Date/Time cannot be earlier than the Date of Birth. 24-hour ECLS Vent Settings Date/Time cannot be after the Date of Death.	01/01/1989-1/15/2018 collect best value 1/15/2018-present collect value on ECLS closest to 24 hours of ECLS	ECLS.VentSettings	Time

24-hour ECLS Ventilator Settings (continued)

Choose the Ventilator Settings that meets the following 3 criteria:

1. Collected after the ECLS Start Time
2. Collected no less than 18 hours after the ECLS Start Time and no more than 30 hours after ECLS Start Time
3. If multiple ventilator settings exist in this time period, choose the Ventilator Settings closest to 24 hours after the ECLS Start Time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Ventilator Type	This field collects the type of mechanical ventilation at the timing that meet the criteria for the **24-hour ECLS Ventilator Settings** defined above. Select one from the drop down **Other** if type known but unspecified **Conventional** = Conventional mechanical ventilation includes pressure control, pressure regulated volume control, volume control, and inverse ratio ventilation such as airway pressure release ventilation. **HFO =** High frequency oscillatory ventilation **Other HFV =** other high frequency ventilator = High frequency jet ventilation, percussive ventilation **No Ventilator** = No ventilator was in use **Unknown** if type unknown	**This is part of the minimum dataset because it is incorporated into risk adjustment models.** **Soft Notification:** Since this run has conventional, HFO, or HFV in use, you should indicate the intubation on the run info tab (when vent type is 1, 2 or 3) and IntubationSelected = 0	01/01/1989-1/15/2018 collect best value 1/15/2018- present collect value on ECLS closest to 24 hours of ECLS 8/9/2018-present Ventilator Type made mandatory data field if ECLS duration greater than or equal to 24 hours 04/15/2024	ECLS.VentSettings	VentTypeId VentTypeUnknown As defined on X-Walk Table VentTypes 0 = Other 1 = Conventional 2 = HFO 3 = OtherHFV 4 = No Ventilator
Conventional Rate	This field collects the set respiratory rate in breaths per minute for **conventional ventilation** at the timing criteria for **Pre-ECLS Ventilator Settings** defined above**.** You can only record a conventional rate if you choose the type of ventilator to be **conventiona**l, **other HFV** or **other**.	**Units of measure** is breaths per minute (bpm) Precision whole number **Soft Notification:** **< 10 bpm or > 40 bpm** **Hard Limit:** **< 0 bpm or > 150 bpm**	01/01/1989-1/15/2018 collect best value. Only one rate field 1/15/2018- present collect value on ECLS closest to 24 hours of ECLS. Separated conventional and HFV rate.	ECLS.VentSettings	Rate

24-hour ECLS Ventilator Settings (continued)

Choose the Ventilator Settings that meets the following 3 criteria:

1. Collected after the ECLS Start Time
2. Collected no less than 18 hours after the ECLS Start Time and no more than 30 hours after ECLS Start Time
3. If multiple ventilator settings exist in this time period, choose the Ventilator Settings closest to 24 hours after the ECLS Start Time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
HFV Rate	This field collects the set high frequency ventilation rate in Hertz (Hz) = breaths per second**.** at the timing criteria for **Pre-ECLS Ventilator Settings** defined above**.** You can only record a HFV rate if you choose **HFV**, **other HFV** or **other.**	**Units of measure** is Hertz (Hz) Precision one decimal point **Soft Notification:** **<3 Hz or > 17 Hz** **Hard Limit:** **<3 Hz or > 17 Hz**	01/01/1989-1/15/2018 collect best value 1/15/2018- present collect value on ECLS closest to 24 hours of ECLS. Separated conventional and HFV rate.	ECLS.VentSettings	HighFrequencyRate
MAP	This field collects the Mean Airway Pressure (MAP) in centimeters of water at the timing that meets the criteria for **24-hour ECLS Ventilator Settings** defined above. The MAP is a measured variable in conventional mechanical ventilation and a set variable in HFOV.	**Units of measure** is cm H_2O Precision whole number **Soft Notification:** **< 10** cm H_2O or **> 30** cm H_2O **Hard Limit:** **< 0** cm H_2O or **> 60** cm H_2O	01/01/1989-1/15/2018 collect best value 1/15/2018- present collect value on ECLS closest to 24 hours of ECLS	ECLS.VentSettings	MAP

24-hour ECLS Ventilator Settings (continued)

Choose the Ventilator Settings that meets the following 3 criteria:

1. Collected after the ECLS Start Time
2. Collected no less than 18 hours after the ECLS Start Time and no more than 30 hours after ECLS Start Time
3. If multiple ventilator settings exist in this time period, choose the Ventilator Settings closest to 24 hours after the ECLS Start Time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
PIP	This field collects the Peak Inspiratory Pressure (PIP), at the timing that meets the criteria for **24-hour ECLS Ventilator Settings** defined above. The Peak Inspiratory Pressure (PIP) used in **conventional** pressure control, pressure regulated volume control, volume control and the Phigh in inverse ratio ventilation such as airway pressure release ventilation.	**PIP is displayed for conventional, other HFV, and other** **Units of measure** is cm H_2O Precision whole number **Soft Notification:** **< 10** cm H_2O or **> 45** cm H_2O **Hard Limit:** PIP must be greater than or equal to MAP PIP must be greater than or equal to PEEP **< 0** cm H_2O or **> 80** cm H_2O	01/01/1989-1/15/2018 collect best value. Amplitude and PIP in same data entry field. 1/15/2018- present collect value on ECLS closest to 24 hours of ECLS. Separated data fields for PIP and Amplitude.	ECLS.VentSettings	PIP
Amplitude	This field collects the Amplitude or Delta Pressure (DP), at the timing that meets the criteria for **24-hour ECLS Ventilator Settings** defined above. High Frequency Amplitude used in **high frequency oscillatory ventilation or other high frequency ventilation** or **other.**	**Amplitude is displayed for HFO, other HFV, and other** **Units of measure** is cm H_2O Precision whole number **Soft Notification:** **< 30** cm H_2O or **> 90** cm H_2O **Hard Limit:** **< 10** cm H_2O or **> 100** cm H_2O	01/01/1989-1/15/2018 collect best value. Amplitude and PIP in same data entry field. 1/15/2018- present collect value on ECLS closest to 24 hours of ECLS. Separated data fields for PIP and Amplitude.	ECLS.VentSettings	PIP

24-hour ECLS Ventilator Settings (continued)

Choose the Ventilator Settings that meets the following 3 criteria:

1. Collected after the ECLS Start Time
2. Collected no less than 18 hours after the ECLS Start Time and no more than 30 hours after ECLS Start Time
3. If multiple ventilator settings exist in this time period, choose the Ventilator Settings closest to 24 hours after the ECLS Start Time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
PEEP	This field collects the positive end-expiratory pressure (PEEP) at the timing that meets the criteria for **24-hour ECLS Ventilator Settings** defined above. PEEP can only be collected when a patient is in conventional, **other high frequency ventilation** or **other.**	**PEEP is displayed for displayed for conventional, other HFV, and other** **Units of measure** is cm H_2O Precision whole number **Soft Notification:** **< 5** cm H_2O or **> 25** cm H_2O **Hard Limit:** **< 0** cm H_2O or **> 40** cm H_2O	01/01/1989-1/15/2018 collect best value 1/15/2018-present collect value on ECLS closest to 24 hours of ECLS	ECLS.VentSettings	PEEP
Hand Bag Valve Ventilation	This field collects if the patient received hand bag valve ventilation through an invasive airway, between 18 hours and 30 hours after ECLS Start Time. **Select yes, no or unknown** from the drop down menu		01/01/1989-1/15/2018 collect best value 1/15/2018-present collect value on ECLS closest to 24 hours of ECLS	ECLS.VentSettings	HandBagging 0 = No 1 = Yes -1 = Unknown Missing = "Null"

24-hour ECLS Hemodynamics This section details hemodynamic values for a patient closest to 24 hours after the ECLS Start Time. The data must be collected at least 18 hours after the ECLS Start Time and no more than 30 hours after the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
24-hour ECLS Hemodynamics Date/Time	This field collects the date and time that the Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP) and Mean Blood Pressure (Mean BP) were simultaneously collected in accordance with **24-hour ECLS Hemodynamics** timing criteria defined above. The Pre-ECLS Hemodynamics Date/Time should refer to the date and time of the Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP) and Mean Blood Pressure (Mean BP) which all should be measured at the same time. If a patient has an invasive arterial line that is measuring blood pressure, please report values from the arterial line. If the patient does not have invasive arterial blood pressure monitoring during the specified time period, then use noninvasive blood pressure monitoring values that fall in the correct timeframe. **Patient M** had an ECLS start time of 03/29/2017 02:00AM He had the following 4 reports of blood pressure. Reported as SBP/DBP (Mean BP) in mm Hg On 03/29/2017 at 7:00PM **Arterial BP** 60/40 (53) On 03/29/2017 at 11:30 PM **Arterial BP** 70/40 (58) On 03/30/2017 at 3:00AM **Noninvasive BP** 62/42 (55) On 03/30/2017 at 8:30AM **Arterial BP** 80/50 (65) Enter **24-hour Hemodynamics Date/Time** 03/29/2017 11:30 PM and enter the **Arterial** Systolic BP 70 mm Hg, Diastolic BP 40 mm Hg and Mean BP 58 mm Hg. blood pressure on 03/29/2017 at 7:00 PM was 17 hours after the ECLS Start Time and the blood pressure on 03/30/2017 at 8:30AM was 30.5 hour after the ECLS Start Time and therefore both were ineligible. Even though the noninvasive BP was closer to 24 hours after the ECLS Start Time, we prioritized the blood pressure that was arterial and also fell in the window.	**Soft Notification:** 24-hour ECLS Hemodynamics Date/Time must be no less than 18 hrs AFTER ECLS Start Time and no more than 30 hrs AFTER the ECLS Start Time. **Hard Limit:** 24-hour ECLS Hemodynamics Date/Time must be AFTER the ECLS Start Time. 24-hour ECLS Hemodynamics Date/Time can be AFTER the time on ECMO but not more than 48h after the time on ECMO 24-hour ECLS Hemodynamics Date/Time cannot be earlier than the Date of Birth. 24-hour ECLS Hemodynamics Date/Time cannot be after the Date of Death.	01/01/1998-12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS.	ECLS.Hemodynamics	Time

24-hour ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to 24 hours after the ECLS Start Time. The data must be collected at least 18 hours after the ECLS Start Time and no more than 30 hours after the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Systolic BP	This field collects the systolic blood pressure (SBP) that meets the **24-hour Hemodynamics** timing criteria defined above. Enter the systolic of a single measurement of blood pressure. If an arterial blood pressure and non-invasive cuff pressure exist, please choose the arterial pressure monitor. As this is part of the minimum dataset, if this information is unknown or unavailable check the appropriate box.	**Units of measure** are mm Hg Precision: whole number **Neonate** (0-28 days) **Soft Notification:** < **30** mm Hg or > **90** mm Hg **Hard Limit:** < **0** mm Hg or > **150** mm Hg **Pediatric (**29 days – 17 yrs) **Soft Notification:** < **50** mm Hg or > **180** mm Hg **Hard Limit:** < **0** mm Hg or > **250** mm Hg **Adult** (≥ 18 yrs) **Soft Notification:** < **50** mm Hg or > **180** mm Hg **Hard Limit:** < **0** mm Hg or > **300** mm Hg **This is part of the minimum dataset because it is incorporated into risk adjustment models.**	01/01/1998-12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS. 8/9/2018-present SBP made mandatory data field if available and ECLS duration greater than or equal to 24 hours, Unavailable/unknown checkbox added	ECLS.Hemodynamics	SBP

24-hour ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to 24 hours after the ECLS Start Time. The data must be collected at least 18 hours after the ECLS Start Time and no more than 30 hours after the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Diastolic BP	This field collects the diastolic blood pressure (DBP) that meets the **24-hour Hemodynamics** timing criteria defined above. Enter the diastolic of a single measurement of blood pressure. If an arterial blood pressure and non-invasive cuff pressure exist please choose the arterial pressure monitor. As this is part of the minimum dataset, if this information is unknown or unavailable check the appropriate box.	**Units of measure** are mm Hg Precision: whole number **Neonate** (0-28 days) **Soft Notification:** < **15** mm Hg or > **80** mm Hg **Hard Limit:** < **0** mm Hg or > **150** mm Hg **Pediatric (**29 days – 17 yrs) **Soft Notification:** < **20** mm Hg or > **150** mm Hg **Hard Limit:** < **0** mm Hg or > **200** mm Hg **Adult** (≥ 18 yrs) **Soft Notification:** < **30** mm Hg or > **180** mm Hg **Hard Limit:** < **0** mm Hg or > **250** mm Hg **All Ages** **Hard Limit:** The Diastolic BP cannot be greater than the Systolic BP. **This is part of the minimum dataset because it is incorporated into risk adjustment models.**	01/01/1998-12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS. 8/9/2018-present DBP made mandatory data field if available and ECLS duration greater than or equal to 24 hours, Unavailable/unknown checkbox added	ECLS.Hemodynamics	DBP

24-hour ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to 24 hours after the ECLS Start Time. The data must be collected at least 18 hours after the ECLS Start Time and no more than 30 hours after the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Mean BP	This field collects the mean blood pressure (Mean BP) that meets the **24-hour Hemodynamics** timing criteria defined above. Enter the mean of a single measurement of blood pressure. If an arterial blood pressure and non-invasive cuff pressure exist, please choose the arterial pressure monitor.	**Units of measure** are mm Hg Precision: whole number **Neonate** (0-28 days) **Soft Notification:** < **20** mm Hg or > **70** mm Hg **Hard Limit:** < **0** mm Hg or > **150** mm Hg **Pediatric (**29 days – 17 yrs) **Soft Notification:** < **30** mm Hg or > **150** mm Hg **Hard Limit:** < **0** mm Hg or > **200** mm Hg **Adult** (≥ 18 yrs) **Soft Notification:** < **30** mm Hg or > **180** mm Hg **Hard Limit:** < **0** mm Hg or > **250** mm Hg **Hard Limit:** The Mean BP must be greater than or equal to the Diastolic BP The Mean BP must be less than or equal to the Systolic BP	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS.	ECLS.Hemodynamics	MeanBP

24-hour ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to 24 hours after the ECLS Start Time. The data must be collected at least 18 hours after the ECLS Start Time and no more than 30 hours after the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
SvO2	This field collects the mixed venous oxygen saturation (SvO_2) of the patient's blood that meets the **24-hour Hemodynamics** timing criteria defined above. Enter the lowest SvO_2 measured, ideally from the right atrium, but it is acceptable to enter SvO_2 from any central line.	**Units of measure** % of hemoglobin oxygen saturation Precision: whole number **Soft Notification:** < **20%** or > **80** % **Hard Limit:** < **0** % or > **100** %	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS.	ECLS.Hemodynamics	SvO2

24-hour ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to 24 hours after the ECLS Start Time. The data must be collected at least 18 hours after the ECLS Start Time and no more than 30 hours after the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
PCWP	This field collects the Pulmonary Capillary Wedge Pressure (PCWP) that meets the **24-hour Hemodynamics** timing criteria defined above. Enter the **highest** PCWP measured with an indwelling pulmonary artery catheter.	**Units of measure** mm Hg Precision: whole number **Neonate** (0-28 days) **Soft Notification:** < **0** mm Hg or > **30** mm Hg **Hard Limit:** < **0** mm Hg or > **100** mm Hg **Pediatric and Adult (**> 29 days) **Soft Notification:** < **0** mm Hg or > **45** mm Hg **Hard Limit:** < **0** mm Hg or > **100** mm Hg	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS.	ECLS.Hemodynamics	PCWP
Systolic PAP	This field collects the Systolic Pulmonary Arterial Pressure (Systolic PAP) that meets the **24-hour Hemodynamics** timing criteria defined above. Enter the **highest** systolic PAP measured with an indwelling pulmonary artery catheter.	**Units of measure** mm Hg Precision: whole number **Neonate** (0-28 days) **Soft Notification:** < **5** mm Hg or > **50** mm Hg **Hard Limit:** < **0** mm Hg or > **100** mm Hg **Pediatric and Adult (**> 29 days) **Soft Notification:** < **5** mm Hg or > **90** mm Hg **Hard Limit:** < **0** mm Hg or > **150** mm Hg	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS.	ECLS.Hemodynamics	SPAP

24-hour ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to 24 hours after the ECLS Start Time. The data must be collected at least 18 hours after the ECLS Start Time and no more than 30 hours after the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Diastolic PAP	This field collects the Diastolic Pulmonary Arterial Pressure (Diastolic PAP) that meets the **24-hour Hemodynamics** timing criteria defined above. Enter the **highest** diastolic PAP measured with an indwelling pulmonary artery catheter.	**Units of measure** mm Hg Precision: whole number **Neonate** (0-28 days) **Soft Notification:** < **1** mm Hg or > **40** mm Hg **Hard Limit:** < **0** mm Hg or > **80** mm Hg **Pediatric and Adult (**> 29 days) **Soft Notification:** < **2** mm Hg or > **80** mm Hg **Hard Limit:** < **0** mm Hg or > **130** mm Hg **All Ages** **Hard Limit:** Diastolic PAP cannot be greater than Systolic PAP.	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS.	ECLS.Hemodynamics	DPAP

24-hour ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to 24 hours after the ECLS Start Time. The data must be collected at least 18 hours after the ECLS Start Time and no more than 30 hours after the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Mean PAP	This field collects the Mean Pulmonary Arterial Pressure (Mean PAP) that meets the **24-hour Hemodynamics** timing criteria defined above. Enter the **highest** Mean PAP measured with an indwelling pulmonary artery catheter.	**Units of measure** mm Hg Precision: whole number **Neonate** (0-28 days) **Soft Notification:** < **2** mm Hg or > **45** mm Hg **Hard Limit:** < **0** mm Hg or > **85** mm Hg **Pediatric and Adult (**> 29 days) **Soft Notification:** < **2** mm Hg or > **80** mm Hg **Hard Limit:** < **0** mm Hg or > **140** mm Hg **Hard Limit:** The Mean PAP must be greater than or equal to the Diastolic PAP The Mean PAP must be less than or equal to the Systolic PAP	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS.	ECLS.Hemodynamics	MPAP

24-hour ECLS Hemodynamics (continued) This section details hemodynamic values for a patient closest to 24 hours after the ECLS Start Time. The data must be collected at least 18 hours after the ECLS Start Time and no more than 30 hours after the ECLS Start Time.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Cardiac Index	This field collects the cardiac index that meets the **24-hour Hemodynamics** timing criteria defined above. Enter the l**owest** Cardiac Index calculated: Cardiac Output / Body Surface Area = L/min/m^2 or measured.	**Units of measure** L/min/m^2 Precision: one decimal point **Soft Notification:** < **1** L/min/m^2 or > **10** L/min/m^2 **Hard Limit:** < **0** L/min/m^2 or > **20** L/min/m^2	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS.	ECLS.Hemodynamics	CI

Blood Pump Flow Rates					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Pump flow at 4hrs (L/min)	This field seeks to collect the ECLS blood flow rates at 4 hours after the ECLS Start Time. Enter the pump flow at 4 hours in L/min. Blood Pump Flow rates should be collected closest to 4 hours after the ECLS Start Time. The data should be collected at least 2 hours after the ECLS Start Time and no more than 6 hours after the ECLS Start Time.	**Units of measure** L/min Precision: three decimal points **Neonate** (0-28 days) **Soft Notification:** < 0.**100** L/min or > 0.**600** L/min **Hard Limit:** < 0.05**0** L/min or > **1.5** L/min mm Hg **Pediatric** and **Adult (>** 29 days) **Soft Notification:** < **0.500 L/min** or > **6 L/min** **Hard Limit:** < **0.050 L/min** or > **10** L/min	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS.	ECLS.Runs	PumpFlow4
PumpFlow4Unknown			04/15/2024	ECLS.Runs	PumpFlow4Unknown
Pump flow at 24 hrs (L/min)	This field seeks to collect the ECLS blood flow rates at 24 hours after the ECLS Start Time. Enter the pump flow at 24 hours in L/min. Blood Pump Flow rates should be closest to 4 hours after the ECLS Start Time. The data should be collected at least 22 hours after the ECLS Start Time and no more than 26 hours after the ECLS Start Time.	**Units of measure** L/min Precision: three decimal points **Neonate** (0-28 days) **Soft Notification:** < 0.**100** L/min or > 0.**600** L/min **Hard Limit:** < 0.05**0** L/min or > **1.5** L/min mm Hg **Pediatric** and **Adult (>** 29 days) **Soft Notification:** < **0.500 L/min** or > **6 L/min** **Hard Limit:** < **0.050 L/min** or > **10** L/min	01/01/1998- 12/1/2011 data recommended for collection on neonates only though it was collected on non-neonatal patients 12/1/2011-1/15/2018 data recommended for all age groups and recommended to be collected as worst value. 1/15/2018-present Closest to ECLS start AND pre-ECLS.	ECLS.Runs	PumpFlow24
PumpFlow24Unknown			04/15/2024	ECLS.Runs	PumpFlow24Unknown

ECLS Care					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Unit where ECLS received	This field is intended to collect the intensive care unit (ICU) where ECLS care was delivered. This is the unit in your hospital where the patient received the majority of their ECLS care. This variable is added so hospitals can receive ECLS reports clustered by unit. We recommend you give careful consideration to the unit who decided to place the patient on ECLS as patient selection is an important part of ECLS. However, the selection is at the hospital's discretion. Please select one of the following: neonatal, pediatric, pediatric cardiac, adult medicine, adult surgical, adult cardiac, adult cardiovascular, mixed ICU ECLS, emergency department or operating room / catheterization lab.		1/15/2018-present 12/12/2018-present Operating Room added with procedural ECLS prompt	ECLS.Runs	PreSuppICU 0 = Neonatal 1 = Pediatric 2 = Pediatric Cardiac 3 = Adult Medicine ICU 4 = Adult Surgical ICU 5 = Adult Cardiac ICU 6 = Adult Cardiovascular ICU 7 = Mixed 8 = ECLS 9 = Emergency Department 10 = Operating Room / Cath Lab 11 = Burn ICU
Operating room	Was ECLS initiated and discontinued in the operating room for the primary indication of supporting patient instability during a procedure (e.g. ECMO for PCI, Lung Transplant, etc.)? (This does not refer to the use of, or conversion from, cardiopulmonary bypass)		12/12/2018-present	ECLS.Runs	OperatingRoom 0 = No 1 = Yes

ECLS Care (continued)					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Procedural ECLS	If "Operating Room / Cath Lab" is chosen as the Unit Where ECLS Received, you will be prompted to verify or deny if the ECLS was initiated for the primary indication of supporting patient instability during a procedure. Please select **Yes** if ECLS was initiated and discontinued in the operating room or catheterization lab for the primary indication of supporting patient instability during a procedure. Please select **No** if ECLS was either initiated or discontinued in the ICU, if the primary ECLS indication was not to provide patient support during a procedure or if the patient was supported by cardiopulmonary bypass. **Patient X** is cannulated in the hybrid catheterization lab to support gas exchange during scheduled whole lung lavage. The patient is decannulated prior to returning to the ICU. Please enter **Operating Room / Cath Lab** as the unit where ECLS received and answer **Yes** to the confirmatory question. **Patient Y** is cannulated to V-V ECLS in the CVOR to support repair of a tracheal laceration. Due to continued respiratory failure the patient is transported to the Adult Surgical ICU following repair and ultimately decannulated the next day. Please enter **Operating Room / Cath Lab** as the unit where ECLS received and answer **No** to the confirmatory question.	**Confirmatory question is mandatory** only if Operating Room / Cath Lab is selected as the unit where ECLS was received	12/12/2018-present		0 = No 1 = Yes Without Operating Room / Cath Lab="NULL"

ECLS Care (continued)					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Enteral Feeding Date/Time	This field is collects data on enteral (gut) feeding during ECLS This section is relevant if, during ECLS, enteral feeds started and continued for at least 2 days. This does not need to be full enteral nutrition. **Patient X** was started on ECLS on 11/20/2022. He started enteral nutrition on 11/21/2022, but it was stopped later on 11/21/2022, and then restarted on 11/24/2022 and continued for the next three days. Enter Date/Time Enteral Feeding 11/24/2022. **Patient Y** was on enteral feeds prior to ECLS and they were not interrupted for the start of ECLS. Enter date of ECLS Start Time.	**Hard Limit:** Enteral Feeding Date/Time must be AFTER ECLS Start Time. Enteral Feeding Date/Time cannot be earlier than the Date of Birth. Enteral Feeding Date/Time cannot be after the Date of Death.	1/15/2018-present	ECLS.Runs	EnteralFeeding

ECLS Care (Continued)					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Level of Mobilization at 7 days	This field collects the level of mobilization for patients 7 days after the ECLS Start Time using the ICU Mobility Scale. Tipping CJ, Bailey MJ, Bellomo R*, et al*: The ICU Mobility Scale Has Construct and Predictive Validity and Is Responsive. *Ann Am Thoracic Soc*. 13 (6): 887-93, 2016. **This field is only intended for patients who are 8 years old or older.** Whether the patient is on ECLS or off ECLS please fill this out 7 days after ECLS Start Time. **0 Nothing (lying in bed)** Passively rolled or passively exercised by staff, but not actively moving **1 Sitting in bed, exercises in bed** Any activity in bed, including rolling, bridging, active exercises, cycle ergometry and active assisted exercises; not moving out of bed or over the edge of the bed **2 Passively moved to chair (no standing)** Hoist, passive lift or slide transfer to the chair, with no standing or sitting on the edge of the bed **3 Sitting over edge of bed** May be assisted by staff, but involves actively sitting over the side of the bed with some trunk control **4 Standing** Weight bearing through the feet in the standing position, with or without assistance. This may include use of a standing lifter device or tilt table **5 Transferring bed to chair** Able to step or shuffle through standing to the chair. This involves actively transferring weight from one leg to another to move to the chair. If the patient has been stood with the assistance of a medical device, they must step to the chair (not included if the patient is wheeled in a standing lifter device) **6 Marching on spot (at bedside)** Able to walk on the spot by lifting alternate feet (must be able to step at least 4 times, twice on each foot), with or without assistance **7 Walking with assistance of 2 or more people** Walking away from the bed/chair by at least 5 m (5 yards) assisted by 2 or more people **8 Walking with assistance of 1 person** Walking away from the bed/chair by at least 5 m (5 yards) assisted by 1 person **9 Walking independently with a gait aid** Walking away from the bed/chair by at least 5 m (5 yards) with a gait aid, but no assistance from another person. In a wheelchair bound person, this activity level includes wheeling the chair independently 5 m (5 years) away from the bed/chair **10 Walking independently without a gait aid** Walking away from the bed/chair by at least 5 m (5 yards) without a gait aid or assistance from another person **Patient M** was placed on ECMO on 01/01/2022. She came off ECMO on 01/05/2022 and was still intubated. Her mobilization on day 7 was sitting over the edge of the bed. Please enter Level of Mobilization at 7 days = **3.**		1/15/2018-present	ECLS.Runs	LevelofMobilization

ECLS Care (Continued)					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Maximum Level of Mobilization during ECLS	This field collects the maximum level of mobilization for ECLS patients achieved while they were on ECLS using the ICU Mobility Scale. Tipping CJ, Bailey MJ, Bellomo R*, et al*: The ICU Mobility Scale Has Construct and Predictive Validity and Is Responsive. *Ann Am Thoracic Soc*. 13 (6): 887-93, 2016. **This field is only intended for patients who are 8 years old or older.** Please use the below scale to record the maximum level of mobilization during ECLS. **0 Nothing (lying in bed)** Passively rolled or passively exercised by staff, but not actively moving **1 Sitting in bed, exercises in bed** Any activity in bed, including rolling, bridging, active exercises, cycle ergometry and active assisted exercises; not moving out of bed or over the edge of the bed **2 Passively moved to chair (no standing)** Hoist, passive lift or slide transfer to the chair, with no standing or sitting on the edge of the bed **3 Sitting over edge of bed** May be assisted by staff, but involves actively sitting over the side of the bed with some trunk control **4 Standing** Weight bearing through the feet in the standing position, with or without assistance. This may include use of a standing lifter device or tilt table **5 Transferring bed to chair** Able to step or shuffle through standing to the chair. This involves actively transferring weight from one leg to another to move to the chair. If the patient has been stood with the assistance of a medical device, they must step to the chair (not included if the patient is wheeled in a standing lifter device) **6 Marching on spot (at bedside)** Able to walk on the spot by lifting alternate feet (must be able to step at least 4 times, twice on each foot), with or without assistance **7 Walking with assistance of 2 or more people** Walking away from the bed/chair by at least 5 m (5 yards) assisted by 2 or more people **8 Walking with assistance of 1 person** Walking away from the bed/chair by at least 5 m (5 yards) assisted by 1 person **9 Walking independently with a gait aid** Walking away from the bed/chair by at least 5 m (5 yards) with a gait aid, but no assistance from another person. In a wheelchair bound person, this activity level includes wheeling the chair independently 5 m (5 years) away from the bed/chair **10 Walking independently without a gait aid** Walking away from the bed/chair by at least 5 m (5 yards) without a gait aid or assistance from another person. **Patient M** was placed on ECMO on 01/01/2022. She came off ECMO on 01/05/2022 and was still intubated. On 01/04/2022 she achieved her maximum ECMO mobilization. She passively moved to chair. Her Maximum Level of Mobilization during ECLS = **2.**		1/15/2018-present	ECLS.Runs	MaxLevelofMobilization

5. Mode

In this section please detail the initial ECLS Mode as well as any mode conversions during the run.

Initial Mode Information

In the Initial Mode, please specify the run start time and stop date/time.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Initial ECLS Mode Start Date/Time	This field collects the ECLS Start Time for a given ECLS Run. If this is the patients Run No 1, then this information is automatically populated from the ECLS start time in the **First Run Information.** If this is Run No > 1, then you will need to Enter the Date/Time (DD/MM/YYYY HH:MM) ECLS was initiated. This specifically refers to the time that blood flow was established through the ECLS circuit and cannulas. VAD circuits that have an oxygenator: the initial start time of ECLS is the time the oxygenator was added. **Patient X** required ECLS post-cardiotomy on 02/16/2022 at 09:00AM, Run No 1. He recovered, was sent to the floor and had a cardiac arrest requiring ECPR on 03/15/2022 at 10:00 AM, Run No 2 during the same hospitalization. You are now entering ECLS data for Run No 2. Please enter Initial ECLS Mode Start Date/Time for Run No 2 03/15/2022 10:00 AM.	**Hard Limit** Time On cannot be earlier than the Date of Birth. Time On cannot be after than the Date of Death.	01/01/1989 - present	ECLS.RunDetails and ECLS.Runs	StartTime and TimeOn

Initial Mode Information (continued) In the Initial Mode, please specify the run start time, stop date/time and ECLS Mode.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Initial Mode Stop Date/Time	This field collects the ECLS Stop Date/Time for a given ECLS Run. Enter the Date/Time the initial ECLS mode ended. If only one mode occurred then this will also be the ECLS end time. The ECLS end time specifically refers to the time that ECMO flow is stopped for the final time during a given run. If ECMO blood flow is stopped and then restarted within 12 hours, this constitutes continuation of the same ECLS run. When a VAD is in use, cannulas may be left in once the oxygenator is removed. The Initial Mode Stop date/time is the removal of the oxygenator, and that oxygenator removal is for a time period greater than 12 hours. Temporary transition of ECLS Support to cardiopulmonary bypass (CPB) for cardiac surgery would not encompass an additional run. Changes in "ECLS Mode" such as from VA to VV do not constitute a new run in isolation. **Note:** Extended VV ECMO weaning or capping trials where the sweep gas is turned off do not signify the end of an ECMO run if blood flow is maintained and the oxygenator remains in place. Even if the sweep is off for more than 12 hours, the run is considered continuous unless ECMO flow is discontinued or the oxygenator is removed for a period greater than 12 hours. These capping trials may feel like a pause in support and can appear similar to the above VAD scenarios—where the oxygenator is removed and blood flow continues—but they are fundamentally different in both intent and classification. In VAD cases, oxygenator removal represents a definitive transition away from extracorporeal gas exchange and marks the end of ECMO support. In VV ECMO, capping trials are temporary assessments of gas exchange readiness and do not reflect cessation of ECMO support. **Patient Y** has been supported by RVAD since 10/5/2021. Due to new-onset respiratory failure, an oxygenator was placed in line on 2/12/2022 at 10:30 and removed 2/20/2022 at 22:15. The patient was ultimately removed from all mechanical circulatory support 4/8/2022 during successful heart transplant. ECLS Start Date/Time should be 2/12/2022 10:30 and ECLS Stop Date/Time should be 2/20/2022 22:15	**Soft Notification:** Time off is not usually after the Date of Death. This run is longer than 30 days. It is okay to have a run longer than 30 days, but please check the ECLS start and stop times. **Hard Limit** Time Off cannot be earlier than the Date of Birth. Time Off cannot be before Time On. The Time Off must be before any conversion mode Time On	01/01/1989 - present	ECLS.RunDetails ECLS.Runs	EndTime and TimeOff

	Patient Z was placed on VV ECMO for ARDS on 3/1/2025 at 14:00. On 3/5/2025 at 09:30, the clinical team began a capping trial by turning off the sweep gas while maintaining active blood flow through the oxygenator. The sweep remained off for 30 hours, during which time the oxygenator stayed in place and blood flow was uninterrupted. On 3/6/2025 at 15:00, the patient exhibited signs of CO_2 retention and the sweep was resumed. ECMO support continued until 3/12/2025 at 11:45, when the patient was decannulated. This entire course represents **a single ECMO run**. Despite the prolonged sweep-off period, the presence of uninterrupted blood flow through a functioning oxygenator means that ECLS support was never fully discontinued.				

Initial Mode Information (continued) In the Initial Mode, please specify the run start time, stop date/time and ECLS Mode.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
ECLS Mode	This field defines the mode of drainage and return of blood in the extracorporeal system. **This is a required field.** Select the primary cannulation configuration even if multiple cannulas are placed. **VV: Venovenous** support is the application of extracorporeal circulation primarily for respiratory support, in which the extracorporeal circuit drains blood from the venous system and reinfuses into the venous system (or pre-lung). VV ECMO operates in series with the heart and lungs and does not provide bypass of these organs. **VA**: **Venoarterial** is the application of extracorporeal circulation often for cardiac or circulatory support, in which the extracorporeal circuit drains blood from the venous system and returns into the systemic arterial system. Without qualification, VA ECMO refers to support that returns blood to the systemic arterial system, operating in parallel with and providing partial, or complete, bypass of the heart and lungs. **VVA Venovenoarterial** is a hybrid configuration of VV and VA extracorporeal support in which the extracorporeal circuit drains blood from the venous system and reinfuses into both the venous and systemic arterial systems. VVA ECMO provides both pulmonary (VV component) and cardiac support (VA component) in patients with combined cardiopulmonary failure. **VP: Venopulmonary** is the application of extracorporeal circulation for combined respiratory and right heart support in which the extracorporeal circuit drains blood from the venous system and reinfuses into the pulmonary artery. VP ECMO provides partial or complete bypass of the right heart but operates in series with the lungs. *Conrad, S, et al (2018) The Extracorporeal Life Support Organization Maastricht treaty for nomenclature in extracorporeal life support. Am J Respir Crit Care Med, 198(4), 447-451*		01/01/1989 – present VP Mode 07/12/2020 - present	ECLS.RunDetails (Reporting Notes: 1. We will consider a Run VV à VA if and only if there are two run detail records the first having VV the second having VA. 2. We will consider a Run VA à VV if and only if there are two run detail records the first having VA and the second having VV 3. Any situation having more than 2 run details with different values of Mode will be considered as Support Mode = Other}	Mode (See ECLS.ModeCodes for X-Walk table) 1 = VA 2 = VV 3 = VVA 4 = AVCO2R 5 = VVECCO2R 6 = VP 9 = Other

Initial Mode Information (continued) In the Initial Mode, please specify the run start time, stop date/time and ECLS Mode.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
ECLS Mode (cont'd)	*Broman LM, et al (2019) The ELSO Maastricht Treaty for ECLS nomenclature: abbreviations for cannulation configuration in extracorporeal life support. A position paper of the Extracorporeal Life Support Organization. Crit Care 23(1), 36. Doi: 10.1186/s13054-019-2334-8.* **AVCO$_2$R** Arteriovenous carbon dioxide removal (AVCO$_2$R) is the provision of pumpless carbon dioxide exchange through the use of an extracorporeal circuit consisting of an artificial lung, and venous and arterial vascular access cannulas using lower blood flows. Blood flow is driven by the patient's arterio-venous pressure gradient. **VV ECCO$_2$R** Venovenous extracorporeal carbon dioxide removal (VV CO$_2$R) is the provision of carbon dioxide exchange through the use of an extracorporeal circuit consisting of a blood pump, artificial lung, and venovenous vascular access cannulas using lower blood flows. **Other** Indicates a support not listed **Patient W**, a 10-year old requiring ECMO for respiratory support was placed with a dual-lumen ECMO cannula in the right internal jugular vein, and a second single lumen draining cannula. **Choose VV**. **Patient X**, returns from the Cardiovascular Operating Room (CVOR) after scheduled RVAD implantation (right atrium to pulmonary artery). Because the patient's implantation was complicated by pulmonary hemorrhage, the patient requires an oxygenator to be placed in line with the RVAD circuit. **Choose VP**.				

Mode Conversion Some patients will have multiple 'Conversions' during a given Run. A new 'Conversion' is required when and only when there is a change from one mode to another mode within a single ECLS run. Temporary transition of ECLS Support to cardiopulmonary bypass (CPB) for cardiac surgery would not encompass an additional run or new run detail unless there was a conversion in the ECLS mode.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Conversion Mode Start Date/Time	Enter the Date/Time ECLS mode was initiated. This specifically refers to the time that blood flow was established through the newly placed cannulas.	**Hard Limit** Conversion Start Date/Time cannot be BEFORE the Date of Birth. Conversion Start Date/Time cannot be BEFORE Time On. Conversion Start Date/Time cannot be BEFORE the Initial Mode Stop Date/Time. Conversion Start Date/Time cannot be more than 12 hours after the previous Mode Stop Time Conversion Start Date/Time cannot be before Initial or Previous Mode Stop Time.	01/01/1989 – 10/01/2016 as a check box for VV to VA. Specific date/time of conversion collected as a run detail 01/20/2017 10/01/2016-01/20/2017 collected as 'other'	ECLS.RunDetails And ECLS.Runs	StartTime in ECLS.RunDetails table

Mode Conversion (continued) Some patients will have multiple 'Conversions' during a given Run. A new 'Conversion' is required when and only when there is a change from one mode to another mode within a single ECLS run. In the **Conversion** section you can document the addition or removal of ECLS cannulas. Temporary transition of ECLS Support to cardiopulmonary bypass (CPB) for cardiac surgery would not encompass an additional run or new run detail unless there was a conversion in the ECLS mode.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Conversion Mode Stop Date/Time	Enter the Date/Time the ECLS mode ended. If this is the final mode then it will also be the ECLS end time. The ECLS end time specifically refers to the time that the cannulas are removed (unless cannulas are left in place to facilitate non-ECLS support such as VAD support). The final ECLS stop time may also refer to the date/time a patient was transported out of your institution on ECLS.	**Soft Notification:** Stop Date/Time is not usually after the Date of Death. **Hard Limit** Stop Date/Time cannot be earlier than the Date of Birth. Stop Date/Time cannot be before Time On.	01/01/1989 – 10/01/2016 as a check box for VV to VA. Specific date/time of conversion collected as a run detail 01/20/2017 10/01/2016-01/20/2017 collected as 'other'	ECLS.RunDetails ECLS.Runs	EndTime TimeOff

Mode Conversion (continued) Some patients will have multiple 'Conversions' during a given Run. A new 'Conversion' is required when and only when there is a change from one mode to another mode within a single ECLS run. In the **Conversion** section you can document the addition or removal of ECLS cannulas. Temporary transition of ECLS Support to cardiopulmonary bypass (CPB) for cardiac surgery would not encompass an additional run or new run detail unless there was a conversion in the ECLS mode.					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Conversion Mode	For a new conversion you must enter a new ECLS mode. It cannot be the same as the immediately previous mode or it is not a conversion. Please select **V-V, V-A, V-VA**, **A-VCO2R, V-V ECCO2R, VP** as described in **ECLS Mode** in **First Run Information.**	**Hard Limit** Conversion Mode will NOT allow 2 of the same modes in a row	01/01/1989 – 10/01/2016 as a check box for VV to VA. Specific date/time of conversion collected as a run detail 01/20/2017 10/01/2016-01/20/2017 collected as 'other'	ECLS.RunDetails (Reporting Notes: 1. We will consider a Run VV à VA if and only if there are two run detail records the first having VV the second having VA. 2. We will consider a Run VA à VV if and only if there are two run detail records the first having VA and the second having VV 3. Any situation having more than 2 run details with different values of Mode will be considered as Support Mode = Other }	Mode (See ECLS.ModeCodes for X-Walk table) 1 = V-A 2 = V-V 3 = V-VA 4 = A-VCO2R 5 = V-VECCO2R 6 = VP 9 = Other

6. Cannulations

This section details the cannulae associated with Run. You will select "Add New Cannula" for each new cannula placed and "Replace This Cannula" for each cannula replaced (if applicable).

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Percutaneous	This field records if the specific cannula on which you are entering data was placed percutaneously. If the cannula was placed percutaneously (without incision and dissection of the vessel), then select yes from the drop down. **Patient Y** had a cut down to expose the vessel, then the vessel was accessed with a needle and Seldinger technique was used to place the cannula. Select **No** from dropdown for Percutaneous.		05/01/1998 - present	ECLS.Cannulations	Percutaneous 0 = No 1 = Yes -1 = Unknown
Pre-Existing	This field records if the cannula on which you are entering detail was pre-existing. Select if this cannula was already present at the beginning of this run. **Patient G** is converted from VV to VA ECMO. The venous drain cannula is the one that was placed for the first run detail and is still in place for this run detail. The arterial return cannula would be the new cannula placed. Select pre-existing for the venous cannula, but not for the newly placed arterial cannula. **Patient Y** was transferred to your institution on ECLS. The cannulae were pre-existing.		10/01/2016 - Present	ECLS.Cannulations	Preexisting 0 = No 1 = Yes -1 = Unknown
Manufacturer	This field collects the manufacturer name for a given cannula. Select the manufacturer name from the drop down box. This will generate the specific devices associated with that manufacturer. If the manufacturer and/or device is not listed, please email ELSO at RegistrySupport@elso.org.		09/1993 - present	ECLS.Manufacturers	ManufacturerID, Name
Cannula	This field collects model/name and size of cannula. Every cannula that is connected to the ECLS circuit should be listed. This includes reperfusion cannulas that may direct a small amount of return blood to a distal limb.		09/1993 - present	ECLS.Cannulations	CannulationId (tracked using RunId) This is where initial mode conversion information is stored)

Cannulations (continued)

This section details the cannulae associated with Run. You will select "Add New Cannula" for each new cannula placed and "Replace This Cannula" for each cannula replaced (if applicable).

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Site	This field collects the site where a cannula was placed Select from the drop down box the site in which the cannula was placed. Includes: **RCCA** – Right Common Carotid Artery **LCCA** – Left Common Carotid Artery **RIJV** – Right Internal Jugular Vein **RIJVC** – Right Internal Jugular Vein Cephalic **LIJV** – Left Internal Jugular Vein **RFA** – Right Femoral Artery **LFA**- Left Femoral Artery **RFV** –Right Femoral Vein **LFV** – Left Femoral Vein **RA** – Right Atrium **LA** – Left Atrium **LV** – Left Ventricle **LPV** – Left Pulmonary Vein **PA** – Pulmonary Artery **Aorta** **LSA** – Left Subclavian Artery **LSV** – Left Subclavian Vein **RSA** – Right Subclavian Artery **RSV** – Right Subclavian Vein **RAA** – Right Axillary Artery **LAA** – Left Axillary Artery **IA** – Innominate **RPTA** – Right Posterior Tibial Artery **LPTA** – Left Posterior Tibial Artery **RSFA** – Right Superficial Femoral Artery **LSFA** – Left Superficial Femoral Artery **IVC –** Inferior Vena Cava **SVC –** Superior Vena Cava **Other** – Indicates a vessel not listed **LIJVC**		01/01/1989 – present 10/31/2018 – present RPTA, LPTA, RSFA, LSFA added 04/15/2024 LIJVC	ECLS.Cannulations	SiteId 0 = Unknown 1 = Aorta 2 = LA 3 = LCCA 4 = LFA 5 = LFV 6 = LIJV 8 = PA 9 = RA 10 = RCCA 11 = RFA 12 = RFV 13 = RIJV 14 = RIJVC 15 = LSA 16 = LSV 17 = RSA 18 = RSV 19 = LPV 20 = LV 21 = RAA 22 = LAA 23 = IA 24 = RPTA 25 = LPTA 26 = RSFA 27 = LSFA 28 = IVC 29 = SVC 30 = LIJVC 99 = Other

Was the carotid artery ligated or repaired Was the jugular vein ligated or repaired		Required for non adult patients. Only available for non adult patients. with cannulation site RCCA OR LCCA ('Was the carotid artery ligated or repaired') Or cannulation site LIJVC, LIJV OR RIJVC RIJV ('Was the jugular vein ligated or repaired') Cannula Repaired Ligated wont be visible if patient is Transferred Out and Cannulation EndTime is within one hour from TimeOff/DischargeDate/DeathDate	04/15/2024	ECLS.Cannulations	JvCaLR 1 = Repaired 0 = Ligated -1 = None
Cannula Size			04/15/2026	ECLS.Cannulations	CannulaSize

Cannulations (continued)

This section details the cannulae associated with Run. You will select "Add New Cannula" for each new cannula placed and "Replace This Cannula" for each cannula replaced (if applicable).

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
New Device Start Time	This field collects the start date and time for each cannula use.	**Soft Notification:** Cannulation Start Time is not usually before run Time On **Hard Limit:** Cannulation Start Time cant be after patient Death Date Cannulation Start Time must be after patient Birth Date Cannulation StartTime must be after EndTime of replaced cannulation	01/13/2020 - present	ECLS.Cannulations	StartTime
New Device End Time	This field collects the end date and time for each cannula use	**Soft Notification:** Cannulation End Time is not usually after run Time Off **Hard Limit:** Cannulation End Time cant be after patient Death Date Cannulation end time cannot be after than the date of discharge Cannulation cant have carotid artery/jugular vein ligated or repaired value when run is transferred to another hospital and cannulation end time is within run time off Cannulation cant have carotid artery/jugular vein ligated or repaired value when run is transferred to another hospital and cannulation end time is within run discharge date Cannulation EndTime must be before StartTime of replacement cannulation	01/13/2020 - present	ECLS.Cannulations	EndTime

Cannulations (continued) This section details the cannulae associated with Run. You will select "Add New Cannula" for each new cannula placed and "Replace This Cannula" for each cannula replaced (if applicable).					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Cannula(s) Used for Entire ECLS Mode and Run	If the start and end times of the new cannula are the same as the time on and time off ECLS for that ECLS mode and run, select the appropriate checkbox.	Selecting the checkbox, if applicable, avoids redundancy of data entry.	01/13/2020 - present	ECLS.Cannulations	StartEndAsRun 0 = NULL 1 = Checkbox selected
Initial Purpose	This field records if the cannula was used to drain blood from the body, return blood to the body, both drain blood from and return blood to the body or used to return blood to a specific area of the body as a distal reperfusion catheter		10/01/2016 – 02/06/2023 Select if cannula was used for drainage 02/06/2023-present Select cannula purpose	ECLS.CannulationPurposes	PurposeId 1= Drainage 2= Return 3= Both drainage and return 4= Distal reperfusion catheter (DPC)
Change Cannulation Purpose	If the purpose of the cannula changes over the life of the cannula, enter the new purpose of the cannula and the date and time for change in purpose	**Hard Limit:** Cannulation purpose start time must be before end time Purpose start time cant be before cannulation start time Cannulation purpose start time is not usually before run time on Cannulation purpose start timemust be after patient birth date Purpose end time cant be after Cannulation end time	10/01/2016 – 02/06/2023 Select if cannula was used for drainage 02/06/2023-present Select cannula purpose	ECLS.CannulationPurposes	StartTime EndTime

Cannulations (continued)

This section details the cannulae associated with Run. You will select "Add New Cannula" for each new cannula placed and "Replace This Cannula" for each cannula replaced (if applicable).

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Device Replacement Reason	This field collects the primary reason for cannula replacement, if applicable. Select from the drop-down box the **primary reason for cannula replacement** (removal of old cannula and addition of new cannula): **Thrombosis:** Cannula exchanged primarily due to clot burden within the cannula **Hemolysis:** Cannula exchange primarily indicated by center-specific markers of hemolysis (for example, plasma free hemoglobin, lactate dehydrogenase, haptoglobin or bilirubin) believed to be related to cannula selection or position **Cannula(s) removed for attempted ECLS separation:** Cannulas removed for expected recovery or trial separation (with new cannulas replaced within 12 hours during the same ECLS run) **Change in cannulation strategy:** Cannulas exchanged due to change in cannulation site(s) during a single ECLS run and mode (for example, change from thoracic to neck cannulation during a V-A ECLS run) **Structural integrity:** cannula exchanged for impaired structural inegrity **Other**		01/13/2020 - present	ECLS.Cannulations	ReplaceReasonId Lookup Table: ECLS.CannulaReplacementCodes 1 = Thrombosis, 2 = Hemolysis, 3 = Cannula(s) removed for attempted ECLS separation, 4 = Change in cannulation strategy, 5 = Other 6 = Structural integrity

7. EQUIPMENT

This section details the equipment the patient was on during the ECMO Run.

Membrane Lung

Please specify details regarding membrane lung use, including membrane lung replacements or additions

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Membrane Lung	This field collects the type of membrane lung a patient has. A membrane lung is a gas exchange device for transfer of oxygen and carbon dioxide by diffusion across a membrane between a blood phase and a gas phase. Select from the drop-down box the manufacturer. This will generate the specific devices associated with that manufacturer. If the manufacturer and/or device is not listed, please email ELSO at RegistrySupport@elso.org.	If an integrated piece of equipment is entered for the Membrane Lung, the same piece of equipment must also be entered for the Blood Pump.	01/01/1989 - present	ECLS.Equipments Lookup Table: ECLS.MembraneLungs	MembraneLungId and Name
Replace existing Membrane Lung	Selecting this field denotes that the existing Membrane Lung was replaced with a new Membrane Lung, please enter new membrane lung details.		01/13/2020 - present	ECLS.EquipmentHistory	AddedReplaced
Add additional concurrent Membrane Lung	This selection denotes that MORE THAN ONE Membrane Lung are used concurrently. If additional membrane lung(s) are added to the ECLS circuit for concurrent use, please enter details of additional membrane lung(s) added.		01/13/2020 - present	ECLS.EquipmentHistory	DeviceId
New Device Start Time	This field collects the start date and time for each membrane lung used.	**Hard Limit** Initial device for Membrane Lungs must have same device Start Time as run Time On Membrane lung device start time can be before replaced device end time but not more than 15 minutes before.	01/13/2020 – present	ECLS.EquipmentHistory	StartTime

New Device End Time	This field collects the end date and time for each membrane lung used.	**Hard Limit** Last device for Membrane Lungs must have same device End Time as run Time Off Membrane lung device end time can be after replacement device start time but not more than 15 minutes after.	01/13/2020 - present	ECLS.Equipment History	EndTime
Device Replacement Reason	This field collects the primary reason for membrane lung replacement, if applicable. Select from the drop-down box the **primary reason for membrane lung replacement** (removal of old membrane lung and addition of new membrane lung): **Structural integrity:** Membrane lung exchanged for suspected impaired structural integrity such as suspected plasma or blood leak, etc. **Decreased efficiency of gas exchange:** Membrane lung exchanged for the primary reason of compromised oxygenation and/or ventilation. This is typically a consequence of clot burden over time. **Acute obstruction to blood flow:** Membrane lung exchanged in response to a sudden loss or clinically significant decrease in blood flow resulting in emergent equipment exchange. **Increasing resistance to blood flow:** Membrane lung exchanged in response to increasing trans-membrane pressures or decreasing blood flow of over time. **Coagulopathy with membrane lung as known source:** Device exchange primarily indicated by clot burden or coagulation derangement within the membrane lung. **Hemolysis with membrane lung as known source:** Device exchange primarily indicated by center-specific markers of hemolysis (for example, plasma free hemoglobin, lactate dehydrogenase, haptoglobin or bilirubin) believed to be related to the membrane lung. **Entire circuit replaced due to hemolysis of unknown source:** The entire circuit was exchanged due to center-specific markers	Mandatory field only if membrane lung was replaced during the run 12/01/2021-present If structural integrity, decreased efficiency of gas exchange, increasing resistance to blood flow or obstruction to blood flow are selected as the reason for membrane lung exchange, a complication of oxygenator failure must be entered within 4 hours of the equipment exchange if ECMO Stop Date/Time or Date/Time of Death is not within 4 hours If equipment longevity / center protocol, entire circuit replaced due to indicated component change, transition to bypass, entire circuit replaced due to hemolysis of unknown source or entire circuit replaced due to coagulopathy of	01/13/2020 – present 10/17/2021 – present Additional validation added requiring complication to be present if the reason for equipment exchange is indicative of equipment failure.	ECLS.Equipment History	ReplaceReasonId Lookup table: ECLS. MembraneLungReplacementCodes 1 = Structural integrity, 2 = Decreased efficiency of gas exchange, 3=Acute obstruction to blood flow, 4=Increasing reisitance to blood flow 5 = Coagulopathy with membrane lung as known source, 6 = Hemolysis with membrane lung as known source, 7 = Equipment longevity / center protocol 8 = Entire circuit replaced due to indicated component(s) change

	of hemolysis (for example, plasma free hemoglobin, lactate dehydrogenase, haptoglobin or bilirubin) of unspecified source. **Entire circuit replaced due to coagulopathy of unknown source:** The entire circuit was exchanged due to clot burden or coagulation derangement of unspecified source. **Equipment longevity / center protocol:** Device exchange indicated by center-specific protocol regarding longevity of use without evidence of other derangement. May be due to transition to or from a transport ECLS circuit. **Entire circuit replaced due to indicated component(s) change:** Device was exchanged as part of whole circuit exchange primarily for an indication specific to a circuit component other than the membrane lung **Entire circuit replaced following temporary transition to bypass:** Device exchanged during whole circuit exchange following temporary transition of patient mechanical support o cardiopulmonary bypass within a continuous ECLS run **Other**	unknown source, a membrane lung failure associated with this equipment exchange must not be entered at that time.			9 = Entire circuit replaced following temporary transition to bypass 10 =Other 11= Entire circuit replaced due to hemolysis of unknown source 12 = Entire circuit replaced due to coagulopathy of unknown source
Complication failure			04/15/2026	ECLS.Equipment History ECLS.Complications	ComplicationId

Blood Pump Please specify details regarding blood pump use, including blood pump replacements or additions					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Blood Pump	The blood pump is a mechanical device, typically powered by an electric drive motor, that produces blood flow by creating a hydrodynamic pressure gradient between an inlet and outlet port. Select from the drop-down box the manufacturer. This will generate the specific devices associated with that manufacturer. If the manufacturer and/or device is not listed, please email ELSO at RegistrySupport@elso.org.	If an integrated piece of equipment is entered for the Blood Pump, the same piece of equipment must also be entered for the Membrane Lung.	01/01/1989 - present	ECLS.Equipments Lookup Table: ECLS.Pumps	PumpId and Name
Replace existing Blood Pump	Selecting this field denotes thatthe existing Blood Pump was replaced with a new Blood Pump, please enter new membrane lung details..		01/13/2020 - present	ECLS.Equipment History	AddedReplaced
Add adddional concurrent Blood Pump	This selection denotes that MORE THAN ONE Blood Pump are used concurrently. Blood Pump(s) are added to the ECLS circuit for concurrent use, please enter details of additional membrane lung(s) added.		01/13/2020 - present	ECLS.Equipment History	DeviceId
New Device Start Time	This field collects the start date and time for each membrane lung used.	**Hard Limit** Initial device for Blood Pumps must have same device Start Time as run Time On Blood pump device start time can be before replaced device end time but not more than 15 minutes before. Blood pump device start time can be after replaced device end time but not more than 12 hours after.	01/13/2020 - present	ECLS.Equipment History	StartTime

Blood Pump (continued) Please specify details regarding blood pump use, including blood pump replacements or additions					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
New Device End Time	This field collects the end date and time for each membrane lung used.	**Hard Limit** Last device for Blood Pumps must have same device End Time as run Time Off Blood pump device end time can be after replacement device start time but not more than 15 minutes after.	01/13/2020 - present	ECLS.Equipment History	EndTime
Device Replacement Reason	This field collects the primary reason for blood pump replacement, if applicable. Select from the drop-down box the **primary reason for blood pump replacement** (removal of old blood pump and addition of new blood pump): **Mechanical replacement:** Blood pump replaced for failure or presumed failure of normal mechanical operation **Obstruction to blood flow:** Device exchange primarily indicated by clot burden within the blood pump resulting in clinically significant decrease in blood flow. **Hemolysis with blood pump as known source:** Device exchange primarily indicated by center-specific markers of hemolysis (for example, plasma free hemoglobin, lactate dehydrogenase, haptoglobin or bilirubin) believed to be related to the blood pump. **Equipment longevity / center protocol:** Device exchange indicated by center-specific protocol regarding longevity of use without evidence of other derangement. May be due to transition to or from a transport ECLS circuit. **Entire circuit replaced due to indicated component(s) change:** Device was exchanged as part of whole circuit exchange primarily for an indication specific to a circuit component other than the blood pump **Entire circuit replaced due to hemolyis of unknown source:** The entire circuit was exchanged due to center-specific	Mandatory field only if pump was replaced during the run 12/01/2021 – present If mechanical replacement was selected, a blood pump failure complication must be entered	01/13/2020 – present 11/04/2021 - present	ECLS.Equipment History	ReplaceReasonId Lookup table: ECLS. BloodPumpReplacementCodes 1 = Mechanical replacement 2 = Obstruction to blood flow 3 = Hemolysis with blood pump as known source 4 = Equipment longevity / center protocol 5 = Entire circuit replaced due to indicated component(s) change 6 = Entire circuit replaced following temporary transition to bypass 7 = Other

	markers of hemolysis (for example, plasma free hemoglobin, lactate dehydrogenase, haptoglobin or bilirubin) of unspecified source. **Entire circuit replaced due to coagulopathy of unknown source:** The entire circuit was exchanged due to clot burden or coagulation derangement of unspecified source. **Entire circuit replaced following temporary transition to bypass:** Device exchanged during whole circuit exchange following temporary transition of patient mechanical support o cardiopulmonary bypass within a continuous ECLS run **Other**				8 = Entire circuit replaced due to hemolysis of unknown source 9 = Entire circuit replaced due to coagulopathy of unknown source
Complication failure			04/15/2026	ECLS.Equipment History ECLS.Complications	ComplicationId

Heat Exchanger

Please specify details regarding the heat exchanger the patient was on for the majority of the ECMO Run

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Heat Exchanger	The heat exchanger is a device which transfers heat between a recirculating water phase and the blood phase of the ECLS circuit. The heat exchanging material is usually metal or plastic. Modern artificial membrane lungs have heat exchangers integrated into their design. Select from the drop-down box the manufacturer. This will generate the specific devices associated with that manufacturer. If the manufacturer and/or device is not listed, please email ELSO at RegistrySupport@elso.org.		01/01/1989 – 10/15/2020 Equipment category was retired 10/15/2020 with preservation of historical data.	ECLS.Equipments Lookup Table: ECLS.HeatExchangers	HeatExchangerId and Name

Temperature Regulation (Heather/Cooler) Please specify details regarding the temperature regulation device the patient was on for the majority of the ECMO Run					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Temperature Regulation	The temperature regulation device is device that pumps temperature-controlled water to the heat exchanger via lines connecting the heat exchanger and the Temperature Regulation unit. It is often referred to as a recirculating water bath. Setting the temperature in this unit ultimately controls the patient's blood and systemic temperature. Select from the drop-down box the manufacturer. This will generate the specific devices associated with that manufacturer. If the manufacturer and/or device is not listed, please email ELSO at RegistrySupport@elso.org.		01/01/1989 - present	ECLS.Equipments Lookup Table: ECLS.TemperatureRegulations	TemperatureRegulationId and Name

Hemofilter Please specify details regarding the hemofilter the patient was on for the majority of the ECMO Run					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Hemofilter	Select from the drop-down box the manufacturer. This will generate the specific devices associated with that manufacturer. If the manufacturer and/or device is not listed, please email ELSO at RegistrySupport@elso.org.		01/01/1989 - present	ECLS.Equipments Lookup Table: ECLS.Hemofilters	HemofilterId and Name

Consoles					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Console			04/15/2026	ECLS.Equipments Lookup Table: ECLS.Consoles	ConsoleId
Replace existing Console			04/15/2026	ECLS.Equipment History	AddedReplaced
Add adddional concurrent Console			04/15/2026	ECLS.Equipment History	DeviceId
New Device Start Time		**Hard Limit** Initial device for Consoles must have same device Start Time as run Time On Console device start time can be before replaced device end time but not more than 15	04/15/2026	ECLS.Equipment History	StartTime

		minutes before. Console device start time can be after replaced device end time but not more than 12 hours after.			
New Device End Time		**Hard Limit** Last device for Consoles must have same device End Time as run Time Off Console device end time can be after replacement device start time but not more than 15 minutes after.	04/15/2026	ECLS.Equipment History	EndTime
Device Replacement Reason		Mandatory field only if console was replaced during the run	04/15/2026	ECLS.Equipment History Lookup table: ECLS. ConsoleDeviceReplacementCodes	ReplaceReasonId 1 = New system desired 2 = Compatibility for transport 3 = Complications 4 = Malfunction

8. DIAGNOSES

This section details the diagnoses associated with all non-neonatal respiratory patients placed on ECLS (for neonatal respiratory patients, see 9.1 Diagnoses – Neonatal Respiratory below). Diagnoses are listed as ICD-10 codes. Starting entry of the first 3 characters of the code will auto populate the codes, allowing you to select the exact code required. There is no limit to the diagnoses you may enter. Typically, diagnosis that are pertinent to the specific admission for ECLS are entered. Chronic conditions may also be included. Diagnoses after ECLS may also be added, including those associated with discharge and/or death.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Primary Diagnosis	Click box to note the primary diagnosis for why the patient was placed on ECLS. For example, if a **Patient X** was a previously healthy person admitted to the ICU with pneumonia and secondary acute respiratory distress syndrome, the diagnosis for which ECLS was needed would be pneumonia. If **Patient Y** had biventricular congestive heart failure and developed a pneumonia that exacerbated his heart failure leading to cardiac ECLS support for acute on chronic respiratory failure, then the primary diagnosis would be acute on chronic respiratory failure with a secondary diagnosis of pneumonia. If **Patient Z** had AML and developed adenoviral pneumonia as a result, leading to a need for respiratory ECMO, then the primary diagnosis would be pneumonia with AML as a secondary diagnosis. The difference in case Y and Z is the reason for ECMO; in Patient Y, the patient required ECMO support because of their cardiac failure not pneumonia whereas in Patient Z, ECLS was required because of pneumonia though they may have acquired pneumonia due to a pre-existing condition.		01/01/1989-present On 09/15/2016 It changed from ICD 9 to ICD 10	ECLS.Diagnoses	PrimaryDiagnosis 0 = No 1 = Yes
Diagnoses	Select 'Add new diagnosis' for each code to enter. Multiple diagnoses may be added as necessary.	Enter valid ICD 10 code	01/01/1989-present On 09/15/2016 It changed from ICD 9 to ICD 10	ECLS.Diagnoses	DiagnosisId

9.1 DIAGNOSES—NEONATAL RESPIRATORY

This section details the diagnoses associated specifically with the neonatal respiratory patient placed on ECLS. Select the diagnoses from the list below (with as much specificity as possible). This selection will match to the specific ICD-10 code.

1. First select the primary diagnosis starting from the choices in the list below. If a general category is selected, you will be prompted to choose a specific subcategory or causative etiology.
2. Some sub-categories may require additional branching characterization.
3. Finally, list any additional diagnoses. There is no limit to the diagnoses you may enter. Typically, diagnosis that are pertinent to the specific admission for ECLS are entered. Chronic conditions may also be included. Diagnoses after ECLS may also be added if they are relevant, including those associated with discharge and/or death.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Primary Diagnosis (Neonatal Respiratory)	Click box to note the primary diagnosis for why the patient was placed on ECLS. The Primary Diagnosis should be the main reason the patient needs ECMO support and not necessarily the most severe diagnosis. For example, if a **Patient X** was a baby with congenital diaphragmatic hernia who was doing well after repair and then developed sepsis at two weeks of age, the primary diagnosis is sepsis with CDH as an additional diagnosis. If a primary disease state leads to symptoms that result in the need for ECLS (for example **Patient Y** with congenital diaphragmatic hernia (CDH) has pulmonary hypertension, then CDH is the primary diagnosis). Additional examples are detailed below. Select the Primary Diagnosis from the following list of common neonatal respiratory diagnoses below. *If the primary diagnosis is not CDH or MAS, then you must also select a "Specific Causative Etiology" from the list.* If a Specific Causative Etiology is present that is not included in the list, select "Other" and enter the ICD-10 code. Please use neonatal ICD-10 codes if possible (these are typically P codes) If the patient requires ECLS for an etiology not included in the list below, then select "Other" and list the ICD-10 code. Primary Diagnosis List: Congenital Diaphragmatic Hernia (CDH) Q79.0 Meconium Aspiration Syndrome (MAS) P24.01 Pneumonia (PNA) P23 Sepsis (SEP) P36.9	Select one from the list of common NeoResp ECLS Diagnosis. (Associated ICD-10 will autopopulate unless "other" is selected).	Neonatal Respiratory Diagnosis selection tool added 02/06/2023	ECLS.Diagnoses	

	Persistent Pulmonary Hypertension (not due to categories above) (PHTN) P29.3 Pulmonary Hypoplasia (non CDH) (PHYP) Q33.6 Hypoxic Respiratory Failure (not due to categories above) (HRF) P28.5 Airway anomaly, injury, or surgery (AAN) Q32.1 Other (OTH) **<u>Congenital Diaphragmatic Hernia</u>** (CDH) Q79.0 Select CDH as primary diagnosis if patient has a congenital diaphragmatic hernia and it is the primary reason for ECMO *Definition*: Congenital diaphragmatic hernia (CDH) is a congenital anomaly in which during embryonic development, the diaphragm defect forms and abdominal organs herniate through the defect into the thoracic cavity, impeding the normal development of the lungs. Maldevelopment of the terminal bronchioles, alveoli and pulmonary vessels is the result and severe respiratory failure occurs soon after birth because of pulmonary hypoplasia and the presence of pulmonary hypertension. (from Leeuwen L, Fitzgerald DA. Congenital diaphragmatic hernia. J Paediatr Child Health. 2014 Sep;50(9):667-73. doi: 10.1111/jpc.12508. Epub 2014 Feb 17. PMID: 24528549.) Example 1: a 1 day old with CDH and pulmonary hypertension without significant concern for sepsis: select CDH as primary diagnosis Example 2: a 3 week old with CDH who develops E.Coli sepsis post repair: select sepsis as primary diagnosis and CDH as an additional diagnosis rule: If CDH is felt to be the main cause for hypoxic respiratory failure/PHTN at any age, select CDH note: If patient has both CDH and another major diagnosis (such as congenital heart disease), discuss with primary team the main reason for need for ECMO **<u>Meconium Aspiration Syndrome</u>** (MAS) P24.01 Select MAS as primary diagnosis if patient has MAS (meeting all 3 criteria below) and this is the primary reason for ECMO *Definition*: Respiratory distress in an infant born through meconium stained amniotic fluid, with characteristic findings on CXR (hyperinflation with diffuse patchy infiltrates, or significant atelectasis),and no alternate explanations for the respiratory distress (Monfredini, C.; Cavallin, F.;Villani, P.E.; Paterlini, G.; Allais, B.;Trevisanuto, D. Meconium AspirationSyndrome: A Narrative Review. Children 2021, 8, 230. https://doi.org/10.3390/children8030230)				

	Example 1: An infant born through meconium stained amniotic fluid has severe respiratory distress and a CXR consistent with meconium aspiration, code MAS as primary diagnosis Example 2: An infant with a perinatal history of nonreassuring fetal heart tracing and meconium stained amniotic fluid, is being treated for HIE, has significant PHTN on echo, but does NOT have CXR findings consistent with MAS, code PHTN due to HIE as primary diagnosis Example 3: An infant with MAS by history/CXR also has culture-proven sepsis and pressor resistant hypotension, code sepsis as primary diagnosis, MAS as an additional diagnosis Example 4: An infant with MAS by history/CXR also has features concerning for sepsis but negative cultures, code MAS a primary, culture negative sepsis as additional diagnosis, and use with/without modifiers for pressor resistant hypotension **<u>Pneumonia (PNA)</u>** Select Pneumonia (PNA) as primary diagnosis if patient has PNA and is the primary reason for ECMO *Definition*: Serial chest imaging with consolidation or infiltrate in combination with clinical symptoms of worsening gas exchange and 3 of the following (tempurature instability, Temperature instability, Leukopenia (≤4000 WBC/mm3) or leukocytosis (≥15,000 WBC/mm3); purulent sputum or change in character or increased respiratory secretions; increased work of breathing; wheezing, rales, or rhonchi; or tachycardia (>170 beats/min) (adapted from https://www.cdc.gov/nhsn/pdfs/pscmanual/6pscvapcurrent.pdf) *Definition*: Congenital pneumonia (also early-onset pneumonia) is infection established during fetal life or develops within the first week of life from perinatal pathogen exposure, either intrauterine or during passage through the birth canal. (adapted from Hooven TA, Polin RA. Pneumonia. Semin Fetal Neonatal Med. 2017;22(4):206-213.) note: Patient may well require some degree of inotropic support given illness and to support systemic blood pressure to prevent shunting and hypoxia, but primary illness should be respiratory rule: Aspiration Pneumonia/Pneumonitis should be listed under hypoxic respiratory failure Example 1: A patient with a diagnosis of bronchopulmonary dysplasia (BPD) who has weaned off respiratory support acquires rhinovirus a few weeks				

	later and requires ECMO support. Code Pneumonia due to rhinovirus as a primary diagnosis and BPD as an additional diagnosis. Example 2: A patient with CDH was repaired and weaning on respiratory support then developed E. Coli pneumonia on DOL 10. Code Pneumonia as primary etiology with E. coli as specific causative etiology and list CDH as an additional diagnosis. Also select yes for major congenital anomaly as a contributing modifier. ***<u>Select Specific Sub-category or Causative Etiology</u>*** (select ONE): Select one from list or enter diagnosis if not listed **Bacterial Pneumonia** (list specific organism) congenital pneumonia due to group B strep **P23.3,** congenital pneumonia due to E. coli **P23.4**, congenital pneumonia due to pseudomonas **P23.5**, congenital pneumonia due to staphylococcus **p23.2**, other bacterial agents **P23.6**, Streptococcus pneumonia PNA **J13**, H. influenzae PNA **J14**, Klebsiella PNA **J15.0**, Pseudomonas PNA **J15.1**, Staphyloccus aureus PNA **J15.21**, GBS PNA (non congenital) **J15.3**, E.coli PNA (non congenital) **J15.5**, other gram negative PNA **J15.6**, other specified bacteria PNA (non congenital) **J15.8** **Viral Pneumonia** (list specific organism) influenza A with PNA **J09.X1,** adenoviral pneumonia **J12.0,** RSV (respiratory syncytial virus PNA **J12.1,** parainfluenza PNA **J12.2),** other viral PNA **J12.8,** Covid-19 PNA **J12.82,** congenital pneumonia due to viral agent **P23.0** **Other pneumonia** specific diagnosis resulting in PNA not included in list above such as fungal pneumonia, List specific ICD-10 **<u>Sepsis (SEP)</u>** Select Sepsis as primary diagnosis if patient has SEP and it is the primary reason for ECMO *Definition*: Sepsis is a clinical syndrome defined as life-threatening organ dysfunction caused by a dysregulated host response to infection (Singer M, Deutschman CS, Seymour CW, et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA 2016;315:801-10). A positive culture is not always present. Wynn J. Defining Neonatal Sepsis. Curr Opin Pediatr 2016 Apr; 28(2): 135–140.)" *Definition*: Infant with sepsis will have a documented or strongly suspected bacterial, fungal, or viral infection, along with organ failure of other systems in addition to respiratory failure defined as 1. new vasopressor requirement 2. acute renal failure 3. plt count <100,000 4. lactate >2mmol/L (adapted				

	from https://www.cdc.gov/sepsis/pdfs/Sepsis-Surveillance-Toolkit-Mar-2018_508.pdf) Example 1: A newborn with symptoms of chorioamnionitis develops hypotension (despite 3 inotropes), hypoxia, acidosis and oliguria. Blood cultures are negative but the placental culture grow E. coli. Code Sepsis due to E. Coli as primary diagnosis, list yes for treatment resistant hypotension. Example 2: A patient with congenital diaphragmatic hernia was doing well on low respiratory support was doing well until she developed MSSA sepsis causing septic shock and respiratory failure and requiring ECMO support. Code Sepsis as primary diagnosis, list MSSA sepsis as specific causative etiology, chose yes for major congenital anomaly and list CDH under additional diagnosis. Example 3: A patient on ECMO for pulmonary hypertension develops Candida parapsilosis sepsis while on ECMO, complicating the course. Code PHTN as primary and candida sepsis as additional diagnosis. ***Select Specific Sub-category or Causative Etiology*** (select ONE): Select one from list or enter diagnosis if not listed **Bacterial Sepsis** sepsis of newborn due to streptococcus, group B **P36.0**, sepsis of newborn due to Escherichia coli **P36.4**, sepsis of newborn due to Staphylococcus aureus **P36.2**, other bacterial sepsis of newborn **P36.8**, listeria sepsis **A32.7**, sepsis due to enterococcus **A41.41** **Viral Sepsis** congenital neonatal herpes virus infection **P35.2,** other sepsis **A41** **Fungal Sepsis** candida sepsis **B37.7**, sepsis, unspecified organism **A41.9** **Other Sepsis** (patient meets all the above criteria for sepsis including perinatal risk factors, but no specific organism identified) bacterial sepsis of newborn **P36.9**, sepsis unspecified organism **A41.9** **Persistent Pulmonary Hypertension** (not due to categories above) (PHTN) Select PPHN as primary diagnosis if patient has PPHN and the resulting hypoxia and/or cardiac failure is the primary reason for ECMO *Definition:* Failure of the normal pulmonary vascular adaptation at birth results in persistent pulmonary hypertension of the newborn (PPHN), a condition that is characterized by elevated PVR with right-to-left shunting of deoxygenated blood at the patent foramen ovale (PFO) and/or the patent ductus arteriosus (PDA), and resultant hypoxemia. Although the preliminary diagnosis of PPHN is often based on differential cyanosis and labile				

	hypoxemia, the diagnosis is confirmed by echocardiography. This condition is most often secondary to parenchymal lung disease or lung hypoplasia, it may also be idiopathic. (from Fuloria M, Aschner JL. Persistent pulmonary hypertension of the newborn. Semin Fetal Neonatal Med. 2017 Aug;22(4):220-226. doi: 10.1016/j.siny.2017.03.004. Epub 2017 Mar 23. PMID: 28342684) *Definition:* Elevated pressure in the pulmonary vascular system identified on echocardiogram (systemic or suprasystemic) or seen clinically with a pre/post saturation difference Example 1: Patient with PPHN found on genetic testing or lung biopsy to have alveolar capillary dysplasia with misalignment of the pulmonary veins (ACDMPV): code PPHN due to Structural Alveolar Malformation Example 2: Patient with PPHN due to failure of vessel relaxation from hypoxic ischemic encephalopathy (HIE), without an additional diagnosis of MAS or PNA: code PPHN due to HIE Example 3: Patient with MAS diagnosed by history and Xray findings with an additional diagnosis of HIE: code as MAS with HIE as an additional diagnosis ***Select Specific Sub-category or Causative Etiology*** (select ONE): Select one from list or enter diagnosis if not listed **Hypoxic Ischemic Encephalopathy P91.6** Definition: Moderate or severe HIE by Sarnat staging with associated PPHN (reported in 6%-25% neonates with HIE). Potential mechanisms include fetal hypoxemia, ventricular dysfunction, and acidosis increasing pulmonary vascular resistance (PVR) and result in PPHN, in absence of other primary lung injury (such as MAS or PNA) (adapted from Lakshminrusimha S, Shankaran S, Laptook A, McDonald S, Keszler M, Van Meurs K, Guillet R, Chawla S, Sood BG, Bonifacio S, Das A, Higgins RD. Pulmonary Hypertension Associated with Hypoxic-Ischemic Encephalopathy-Antecedent Characteristics and Comorbidities. J Pediatr. 2018 May;196:45-51.e3. doi: 10.1016/j.jpeds.2017.12.055. Epub 2018 Mar 1. PMID: 29502880; PMCID: PMC6052458.) **Premature Closure of the Ductus Arteriosus P29.38** Definition: in utero closure of the ductus arteriosus resulting in PPHN with or without atrial dilation and hydrops fetalis (documented on pre or postnatal echocardiogram) (Ishida H, Kawazu Y, Kayatani F, Inamura N. Prognostic factors of premature closure of the ductus arteriosus in utero: a systematic literature review. Cardiol Young. 2017 May;27(4):634-638. doi: 10.1017/S1047951116000871. Epub 2016 Jun 20. PMID: 27322829.)				

	Structural Alveolar Malformation Alveolar Capillary Dysplasia with Misalignment of the Pulmonary Veins (ACDMPV) **J84.843**, Acinar Dysplasia (AD) or Capillary Alveolar Dysplasia (CAD) **J84.09**, Other structural malformations of the lung **Q33.8** definition: PPHN due to developmental disorder of the alveoli and/or pulmonary vasculature diagnosed by genetic testing or lung biopsy **Genetic syndromes** including trisomy 21 Definition: PPHN occurring in a patient with a diagnosed genetic syndrome that is known to be associated with PPHN without any other diagnosis causing pulmonary hypertension, such as MAS or HIE (T21 **90.9**, other genetic syndrome **99.9**, or list other ICD-10) **Other** If need for ECMO is pulmonary hypertension from a specific underlying diagnosis that is not otherwise specified in "primary diagnosis" or "specific causative etiologies" list, please list here, with associated ICD-10 **Idiopathic P29.30** Definition: PPHN that is truly idiopathic, where the etiology remains elusive at death or discharge **<u>Pulmonary Hypoplasia</u>** (non CDH) (PHYP) Select PHYP as primary diagnosis if patient has Pulmonary hypoplasia and it is the primary reason for ECMO *Definition*: The development of the pulmonary system depends on months of coordinated, sequential development of multiple types of cells into a structure with adequate surface area, volume, and distensibility to allow efficient gas exchange across tissue with circulating blood cells. Disruptions in development from numerous causes may lead to clinically significant lung hypoplasia. (adapted from Cotten CM. Pulmonary hypoplasia. Semin Fetal Neonatal Med. 2017 Aug;22(4):250-255. doi: 10.1016/j.siny.2017.06.004. Epub 2017 Jul 11. PMID: 28709949.) *Definition*: Pulmonary hypoplasia is the primary reason for ECMO, rather than other factors. Patient should have etiology, CXR findings and clinical course consistent with significant pulmonary hypoplasia. Air leak is common. Example 1: Infant with large CPAM requiring immediate post-natal resection with continuing respiratory failure requiring ECMO support, code pulmonary hypoplasia with CPAM as specific causative etiology Example 2: Infant with in utero bladder outlet obstruction and oligohydramnios with respiratory failure and pulmonary hypertension, code Pulmonary Hypoplasia as primary diagnosis with oligohydramnios due to PUV as specific causative etiology and Yes for PPHN as contributing modifier				

	Example 3: Infant with in utero renal anomaly and oligohydramnios doing well on nasal canula develops E. coli sepsis and requires ECMO, code Sepsis as primary diagnosis and renal anomaly as additional diagnosis Example 4: An infant with a prenatal diagnosis of L CPAM without high risk features (CVR <1.6* or CPAM volume <50% total lung volume) also has thick meconium at delivery, and CXR findings that could be consistent with MAS, code MAS as primary, pick yes under major congenital anomaly and list CPAM as additional diagnosis ***Select Specific Sub-category or Causative Etiology*** (select ONE): Select one from list or enter diagnosis if not listed **Oligohydramnios due to renal anomaly/insufficiency** Definition: Lack of amniotic fluid decreases fetal lung fluid volume, disrupts prenatal thorax development, and restricts fetal breathing. Lung fluid is of importance because it maintains prenatal lung expansion and oligohydramnios results in efflux. (adapted from Cotten CM. Pulmonary hypoplasia. Semin Fetal Neonatal Med. 2017 Aug;22(4):250-255. doi: 10.1016/j.siny.2017.06.004. Epub 2017 Jul 11. PMID: 28709949.) Specific diagnoses: polycystic kidney, infantile type (ARPCKD) **Q61.1**, posterior urethral valves **Q64.2**, bladder neck obstruction **Q64.31**, renal dysplasia or multicystic dysplasic kidney **Q61.4**, prune belly syndrome **Q79.4**, bilateral renal agenesis **Q60.1** **Oligohydramnios due to other causes P01.2** Definition: Pulmonary hypoplasia (PH) is a relatively rare diagnosis that is associated with high rates of mortality and morbidity, in preterm neonates. Most cases occur in association with complications of pregnancy that disrupt lung development, such as oligohydramnios or rupture of membranes at periviable gestational ages. (from Ellsworth KR, Ellsworth MA, Weaver AL, Mara KC, Clark RH, Carey WA. Association of Early Inhaled Nitric Oxide With the Survival of Preterm Neonates With Pulmonary Hypoplasia. JAMA Pediatr. 2018 Jul 2;172(7):e180761. PMID: 29800952. **Congenital Lung Lesion** Definition: Congenital lung lesions (CLL) including congenital pulmonary airway malformations (CPAMs), congenital lobar emphysema, and pulmonary sequestrations (PSs) may form space-occupying lesions during fetal development causing hypoplasia of the lung due and disruption of early lung development which may cause pulmonary hypoplasia or respiratory symptoms at birth. (adapted from Davis RP, Mychaliska GB. Neonatal pulmonary physiology. Semin Pediatr Surg. 2013 Nov;22(4):179-84. PMID: 24331091)				

	Specific diagnoses: congenital cystic lung, includes CPAM **Q33.0**, congenital sequestration of lung **Q33.2**, congenital lobar emphysema; Perinatal interstitial emphysema **P25.0**, congenital malformation of lung **Q33.9** **In utero pleural effusion or chylothorax** Definition: Pleural fluid collection seen prenatally causing compression of pulmonary parenchyma and potentially treated with fetal therapy (unilateral or bilateral), it may present as non-immune hydrops. At birth neonates may have respiratory failure due to chylothorax and pulmonary hypoplasia, causing very high short term mortality rates.In utero pleural effusion may present as non-immune hydrops. At birth neonates may have respiratory failure due to chylothorax and pulmonary hypoplasia, causing very high short term mortality rates. (adapted from Reiterer F, Grossauer K, Morris N. Congenital pulmonary lymphangiectasis. Paediatr Respir Rev. 2014 Sep;15(3):275-80. PMID: 24997116.) Specific diagnosis: chylous effusion **J94.0**, pleural effusion, not elsewhere classified **J90**, hydrops fetalis not due to hemolytic disease **P83.2** **Pulmonary hypoplasia due to giant omphalocele Q 79.2** Definition: Patients with giant omphaloceles have been noted to have markedly reduced chest capacity, the narrower chest and the smaller lung area in these patients results in pulmonary hypoplasia in certain patients, in addition to abdominal pressure and diaphragm elevation. (adapted from Duggan E, Puligandla PS. Respiratory disorders in patients with omphalocele. Semin Pediatr Surg. 2019 Apr;28(2):115-117. doi: 10.1053/j.sempedsurg.2019.04.008. Epub 2019 Apr 10. PMID: 31072459.) **Chest wall or rib cage anomalies restricting lung growth and resulting in pulmonary hypoplasia** Definition: Disruption of thorax development prevents lung growth and restricts fetal breathing and maintenance of lung fluid volume. Genes involved in lung development may also be abnromal. (adapted from Cotten CM. Pulmonary hypoplasia. Semin Fetal Neonatal Med. 2017 Aug;22(4):250-255. PMID: 28709949.) Specific Diagnosis: other congenital deformities of chest **Q67.8**, short rib syndrome, Jeune thoracic dystrophy syndrome **Q77.2** **Pulmonary hypoplasia due impaired fetal breathing movements, due to muscle or central nervous system failure** Definition: fetal breathing movements are essential to maintenance of fetal lung fluid volume and stretching caused by fetal breathing movements stimulates release of growth factors which stimulate epithelial cell proliferation, differentiation, and surfactant production. (adapted from Cotten CM. Pulmonary hypoplasia. Semin Fetal Neonatal Med. 2017 Aug;22(4):250-255. PMID: 28709949.)				

	Specific Diagnosis: neuromuscular respiratory weakness **J98.8**, myoneuronal disorder **G70.9**, congenital myopathies **G71.2** **Other** If need for ECMO is pulmonary hypoplasia from a specific underlying diagnosis that is not otherwise specified in "primary diagnosis" or "specific causative etiologies" list, please list here, with associated ICD-10 **<u>Hypoxic Respiratory Failure</u>** (not due to categories above) (HRF) Select HRF as primary diagnosis if patient has hypoxic respiratory failure NOT due to any of the other categories listed and it is the primary reason for ECMO *Definition*: acute onset respiratory failure (impairment of gas exchange) with severe hypoxemia, despite mechanical ventilation and supplemental oxygen. While HRF may be accompained by some degree of pulmonary hypertension, pulmonary hypertension is not felt to be the primary source of hypoxemia. *Definition*: Hypoxemic respiratory failure (HRF) is a deficiency of oxygenation associated with insufficient ventilation (adapted from: Lakshminrusimha S, Saugstad OD. The fetal circulation, pathophysiology of hypoxemic respiratory failure and pulmonary hypertension in neonates, and the role of oxygen therapy. J Perinatol. 2016 Jun;36 Suppl 2:S3-S11. doi: 10.1038/jp.2016.43. PMID: 27225963.) Example 1: A patient experiences blood aspiration and anemia after uterine rupture and has progressively worse respiratory failure necessitating ECMO. Echocardiogram shows mildly elevated pulmonary pressures but no right to left shunting. Code HRF due to aspiration (blood). As degree of pulmonary hypertension is minimal, list as "no" under modifiers. Example 2: a patient has a CXR appearance consistent with RDS, is cannulated for ECMO due to HRF, but subsequently found to have ABCA3 deficiency. Code HRF due to congenital surfactant production disorder ***<u>Select Specific Sub-category or Causative Etiology</u>*** (select ONE): Select one from list or enter diagnosis if not listed **Respiratory Distress Syndrome (RDS) P22.0** Definition: Respiratory distress and hypoxemia due to inadequate surfactant production in the setting of prematurity or dysmaturity (eg in infants of diabetic mothers), with typical CXR findings including decreased lung inflation, reticulogranular (ground glass) pattern, and air bronchograms. without evidence of an underlying genetic cause for impaired surfactant production. (Holme N and Chetcuti P (2012) The pathophysiology of respiratory distress syndrome. Paediatrics and CHild Health 22(12)507-512.				

	Rule: cases where a source of surfactant inactivation has been identified (eg Meconium or other aspiration event, pneumonia) should NOT be coded as RDS **Congenital Surfactant Production disorder J84.83** Definition: A genetic condition leading to abnormal or impaired surfactant production or excretion. Specific etiologies include ABCA3 deficiency, surfactant Protein B (SPB) deficiency and NKX2-1 mutations (Magnani JE and Donn, SM. "Persistent Respiratory Distress in the Term Neonate: Genetic Surfactant Deficiency Diseases". Current Pediatric Reviews, 2020, 16, 17-25) **Aspiration Pneumonitis/Pneumonia** (non-meconium) Definition: Known aspiration of a fluid or substance (blood, amniotic fluid, gastric contents) leading to parenchymal lung injury and inflammation, and/or surfactant inactivation. CXR appearance may be consistent with neonatal ARDS, with diffuse and irregular infiltrates or complete opacification of the lungs, which are not fully explained other etioloties, or a more focal area may be involved. (adapted from Calcovska A et al. (2019) Clinical considerations when treating neonatal aspiration syndromes, Expert Review of Respiratory Medicine, 13:2, 193-203; and Deluca D et al. (2017) The Montreux definition of neonatal ARDS: biological and clinical background behind the description of a new entity. Lancet 5(8):657-666.) Specific Diagnosis: neonatal aspiration of of clear amniotic fluid and mucus **P24.1**, neonatal aspiration of blood **P24.2**, neonatal aspiration of milk and regurgitated food **P24.3**, other neonatal aspirations **P24.8** **Pulmonary hemorrhage P26.1** Definition: If hypoxic respiratory failure is due PRIMARILY to pulmonary hemorrhage which is not related to another known etiology and NOT thought to be aspiration of maternal blood at delivery **Pulmonary interstitial glycogenosis (PIG) J84.842** Definition: Presents as tachypnea and hypoxemia during the perinatal period with diffuse interstitial infiltrate on CXR. The biopsy shows diffuse expansion of the interstitium by spindle-shaped mesenchymal cells containing abundant monoparticulate glycogen. May be assosciated with congenital heart disease. (Cutz E, Chami R, Dell S, Langer J, Manson D. Pulmonary interstitial glycogenosis associated with a spectrum of neonatal pulmonary disorders. Hum Pathol. 2017 Oct;68:154-165. PMID: 28873355.) **Other** If need for ECMO is hypoxemic respiratory failure from a specific underlying diagnosis that is not otherwise specified in "primary diagnosis" or "specific etiologies" list, please list here, with associated ICD-10 **Unknown/Idiopathic P28.5 (resp failure of newborn)** select if cause of HRF remains unknown at death or discharge.				

	<u>Airway anomaly, injury, or surgery</u> (AAN) Select AAN (Airway anomaly, injury or surgery) as primary diagnosis if this is the primary reason for ECMO *Definition:* Airway anomaly (congenital), injury or surgery resulting in the need for ECMO for respiratory support prior to surgery or during for repair or healing -select this AND list specific etiology Rule: specific diagnosis or condition that requires ECMO for respiratory or cardiac support during treatment or repair but is NOT primarily respiratory in origin Example 1: Patient with Goldenhaar syndrome has a type IV laryngeal cleft along with tetralogy of fallot with mild pulmonary stenosis. ECMO is utilized during surgical repair of the cleft. Code ECMO due to airway anomaly (AAN), specify larygnotracheal anomaly. List yes for major CHD and genetic syndrome and specify under additional anomalies. ***<u>Select Specific Sub-category or Causative Etiology</u>*** (select ONE): Select one from list or enter diagnosis if not listed **Tracheal atresia or stenosis Q32.1** Definition: Congenital narrowing or complete obstruction of the trachea, including from tracheal rings, necessitating ECMO support either preoperatively, during surgery, or subsequently during healing (McMahon CJ, Ayoubi K, Mehanna R, Phelan E, O'Cearbhaill E, Russell J, Nölke L. Outcome of congenital tracheal stenosis in children over two decades in a national cardiothoracic surgical unit. Cardiol Young. 2020 Jan;30(1):34-38. PMID: 31744583.) **Laryngotracheal abnormality** Definition: Congenital anomaly such as a larygnotracheal cleft type IV where patients are placed on ECMO to allow repair (Kawahara I, Maeda K, Samejima Y, Kajihara K, Uemura K, Nomura K, Isono K, Morita K, Fukuzawa H, Nakao M, Yokoi A. Repair of type IV laryngotracheoesophageal cleft (LTEC) on ECMO. Pediatr Surg Int. 2019 May;35(5):565-568. PMID 30783751. Specific Diagnosis: congenital laryngotracheal anomaly **Q32.1**, laryngeal web **Q31.0**, congenital malformation of the larynx **Q31**, congenital subglottic stenosis **Q31.1,** congenital tracheoesophagal fistula **Q39.2** **Tracheal injury S27.2** either as a complication of care (such as intubation) or from trauma or foreign body damage, where ECMO is used either during surgical repair, to allow healing, or both **Oral/Neck Mass**				

	Mass obstructing airway and resulting in need for ECMO support either due to airway compromise/inability to obtain airway or for surgical repair Specific Diagnosis: cystic hygroma **D18.1**, cervical teratoma **D48.9**, supraglottic obstruction, unspecified **J04.31** **Other** specific diagnosis or condition where ECMO is utilized for respiratory or cardiac support during treatment or repair, list ICD-10 **Other** (OTH) Select OTH as primary diagnosis if the primary reason for ECMO does not fit into any of the other categories Definition: specific diagnosis resulting in the need for ECMO for respiratory or cardiorespiratory support Example 1: A patient with an inherited metabolic disease develops cardiorespiratory failure due to acidosis, metabolite accumulation, and end organ damage. Select Other as the primary diagnosis and list the specific metabolic diagnosis as the causative etiology **List Specific Causative Etiology**: List ICD-10 code for diagnosed etiology that resulted in the need for ECMO				

9. CPT PROCEDURE CODES

This section details the procedures associated with the patient placed on ECLS. Procedures are listed as CPT codes. Starting entry of the first 3 characters of the code will auto populate the codes, allowing you to select the exact code required. There is no limit to the procedures you may enter. Typically, procedures that are pertinent to the specific admission for ECLS are entered. Procedures that occur immediately prior to ECLS may be included, if the Center determines they are pertinent to the ECLS run. *However, procedures and testing that are common to all ICU patients, such as arterial line placement are not required.* Procedures performed after ECLS may also be added, including those associated with discharge and/or death.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Date/ Time	Enter the Date/Time for the procedure. This will determine if the procedure was pre-ECLS, on-ECLS, or post-ECLS. Date may not be after the date of death.	**Soft Notification:** CPT Date/Time is not usually earlier than the Date of Birth. CPT Date/Time is not usually more than 24 hours prior to Time on ECLS or 24 hours after Time Off ECLS **Hard Limit** CPT Date/Time cannot be AFTER the time of Death CPT Date/Time cannot be more than 30 days prior to Time on ECLS or 30 days after Time Off ECLS	09/15/2016 - present 01/15/2020 - present: Date/Time soft notification of 24 hours removed from ECLS and hard limit of 30 days removed from ECLS added.	ECLS.Procedures	Date
Estimated	This field collects if the Date/Time of the procedure cannot be known exactly and thus represents best estimation of the complication. Select Yes or No. Check the box if the Date/Time is estimated.		09/15/2016-present	ECLS.Procedures	DateEstimated 1 = Yes 0 = No
Code	Select 'Add new procedure' for each code to enter.	Enter Valid CPT	02/01/1998-present	ECLS.Procedures	CPTCode

10.ECLS COMPLICATIONS

This section details complications that arise during critical illness supported by ECLS. Every complication has 3 fields that are associated with it. A Complication Date/Time, a check box to indicate if the Complication Date/Time is Estimated, and a drop-down box to select the Complication type. The same Complication type can be entered multiple times by selecting different Complication Date/Times for the same Complication type.
In April 2025 we added instructions regarding the frequency of complications and how often they could and should be entered. The purpose of this is to understand the duration of complications, for example, CRRT. Understanding that this means complications need to be entered more frequently, we will be moving to a new system in April 2026 where each complication has a start and stop date (for "long duration" complications). In the meantime, we will working with DOMO / quality reporting to ensure that temporally adjacent complications are not counted as separate complications.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
ECLS Complications	This field identifies if this run has any complications	Yes or No response mandatory for category Complication Date/Time may be entered, if known. **Hard Limit:** ECLS Complication Date/Time may not be more than 14 days after ECLS Stop Date/Time	07/2018 - present 04/03/2021- present		
Date/ Time	Enter the Date/Time for the ECLS complication. This will determine when during the ECLS Run the complication occurred. ECLS complications are intended to collect data on complications that occur during an ECLS run. If a complication occurred to the placing a patient on ECLS and but it occurred before the ECLS Start Time this would still be an ECLS complication. If a complication was recognized after ECLS, and you are confident it was a complication of the ECLS run it is appropriate to mark an estimated time after the ECLS Stop Time. **Patient Z** had a laceration of his right femoral artery requiring 3 units of blood transfusion at 03/11/2022 at 10:00 AM. ECLS start time was 10:15 AM during cannulation. Enter Complication	**Hard Limit:** ECLS Complication Date/Time cannot be earlier than the Date of Birth. Complication Date/Time cannot be AFTER the time of Death Complication Date/Time cannot be AFTER the time Run Time Off (if not verified)	09/15/2016- present 04/21/2022 – present Changed complication cannot to after Run time off – and added complication cannot be	ECLS.Complications	Time

	Date/Time 03/11/2022 10:00 AM. Choose complication peripheral cannula site (see below for description of complications) **Patient Y** had stroke recognized on magnetic resonance imaging (MRI) on 03/18/2022 at 12:00 PM. ECLS Stop Time was 03/16/2022 at 09:00 PM. If you know when it occurred because of a clinical correlate in time, enter that date and time. Otherwise, it is acceptable to enter Complication Date/Time 03/18/2022 at 12:00 PM and check estimated. Complication would be CNS Infarction (US or CT or MRI)	Complication Date cannot be more that 14 days after Run Time Off Complication Time cannot be more than 4 hours prior to ECLS Time On The same complication is not allowed to be entered more than once at the same date/time.	after 14 days Run time off		
Is complication verified			04/15/2024	ECLS.Complications	ComplicationVerified
Estimated	This field collects if the Date/Time of the complication cannot be known exactly and thus represents best estimation of the complication. Select Yes or No. Check the box if the Date/Time is estimated.		09/16/2016-present	ECLS.Complications	Estimated 0 = No 1 = Yes

Mechanical Complications

Mechanical complications are defined as those requiring intervention, such as change of equipment or circuit components. For example: a clot present in the circuit that does not require intervention such as a component change would not be listed. These complications are listed in drop down under the field name complications. For each complication please enter Date/Time and indicate if the Date/Time is Estimated. If you are not sure of the exact time for the procedure, please select Estimated.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Oxygenator failure	Change indicated due to clot formation, gas exchange failure or blood leak	**Soft Notification:** If membrane lung failure is selected, a membrane lung exchange should be entered in most circumstances	01/01/1989 - present	ECLS.ComplicationCodes	Code 101
Pump Failure	Change indicated due to equipment failure	**Soft Notification:** If blood pump failure is selected, a blood pump exchange should be entered in most circumstances	01/01/1989 - present	ECLS.ComplicationCodes	Code 104
Raceway rupture	In a roller pump rupture of the raceway tubing		01/01/1989 - present	ECLS.ComplicationCodes	Code 102
Other tubing rupture	Rupture of ECLS tubing		01/01/1989 - present	ECLS.ComplicationCodes	Code 103
Circuit change	Entire circuit (with exception of cannulae) changed due to clot formation or mechanical failure	**Hard Limit** If circuit change is selected, equipment exchanges must also be entered for both the membrane lung and blood pump Complication frequency: 1 per 1 hour.	01/25/2018 - present	ECLS.ComplicationCodes	Code 132

Cannula problems	Requiring intervention (reposition or exchange) for misplacement, dislodgement, replacement due to clots/fibrin, mechanical failure or inappropriate position	Complication frequency: 1 per 1 hour.	01/011989 - present	ECLS.ComplicationCodes	Code 131
Temperature Regulation (Heater-Cooler) Device Malfunction	Malfunction of temperature regulation device leading to unintentional hypothermia <35C or hyperthermia >39		01/01/1989 - present	ECLS.ComplicationCodes	Code 105
Clots and Air Emboli	If a clot or an air embolus causes a mechanical failure or change out of a circuit component please indicate the complication below.	Complication frequency: 1 per 1 hour.	–01/25/2018 - present	ECLS.ComplicationCodes	Code 133
Thrombosis/Clots: circuit component	Circuit component (e.g. pigtails, connectors, bridge, arterial or venous tubing) requiring change due to clot formation or mechanical failure of the component, not equipment.	Complication frequency: 1 per 1 hour.	01/25/2018 - present	ECLS.ComplicationCodes	Code 134
Clots: hemofilter	Clots in hemofilter causing hemofilter to need to be changed or to fail	Complication frequency: 1 per 1 hour.	–07/01/1997 - present	ECLS.ComplicationCodes	Code 114
Air in circuit	Requiring circuit intervention or circuit clamping for bubble detector alarm, visualized air, air entry into patient	Complication frequency: 1 per 1 hour.	07/01/1997 - present	ECLS.ComplicationCodes	Code 121

Patient Complications

Patient complications are generally defined by their need for intervention, but specific definitions are provided for each Patient Complication below. Complications are those associated with the ECLS run or as a consequence of ECLS. These complications are listed in drop down under the field name complications. For each complication please enter Date/Time and indicate if the Date/Time is Estimated. If you are not sure of the exact time for the procedure, please select Estimated. Major Complications are highlighted in yellow. There are different types of patient complications, broadly: Hemorrhage, Neurologic, Renal, Cardiovascular, Pulmonary, Metabolic, and Organ Limb Ischemia

Patient Hemorrhagic Complications

Hemorrhagic complications requiring packed red blood cell or whole blood (PRBC) transfusion (>20ml/kg/calendar day of PRBCS or ≥3U PRBCs/calendar day in neonates and pediatrics and ≥3U PRBCS/calendar day in adults) or other intervention such as surgical or endoscopic intervention.

A calendar day is chosen over a 24-hour period because 24 hours could stop or start at any time and increase the likelihood of an error in data entry. (Mitchell LG, Goldenberg NA, Male C, et al; Perinatal and Paediatric Haemostasis Subcommittee of the SSC of the ISTH: Definition of clinical efficacy and safety outcomes for clinical trials in deep venous thrombosis and pulmonary embolism in children. *J Thromb Haemost* 2011; 9:1856–1858).

Examples:

Patient X is a 4.00 kg 20-day-old who suffered neck cannula site bleeding that required surgical intervention to address the bleeding on 03/11/2017. This is a hemorrhagic complication of the peripheral cannula site.

Patient Y is 55.0 kg 15-year-old who received 3 units (960 mL of PRBC or 17.5mL/kg) on 03/11/2017 for blood recovered from the nasogastric tube. This is a hemorrhagic complication of GI hemorrhage.

Patient Z is 60-year-old 40 kg woman who received 2 units of PRBC transfusion on 03/11/2017 between 8:00PM and 11:39 PM and 1 unit of PRBC on 03/12/2017 between 12:01AM and 2:00AM. This is not a hemorrhagic complication because it was less than 3 units of PRBC in a calendar day in an adult.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
GI hemorrhage	Upper or lower GI hemorrhage requiring PRBC transfusion (>20ml/kg/calendar day of PRBCS or ≥3U PRBCs/calendar day in neonates and pediatrics or ≥3U PRBCS/calendar day in adults), and/or, endoscopic intervention, and/or hemostatic agent deployment	Enter start date/time and stop date and time for each new occurrence.	07/01/1997 –– 1/25/2018 1/25/2018 – Present Specific amounts of blood loss added.	ECLS.ComplicationCodes	Code 201

Patient Hemorrhagic Complications (continued)

Patient complications are generally defined by their need for intervention, but specific definitions are provided for each Patient Complication below. These complications are listed in drop down under the field name complications. For each complication please enter Date/Time and indicate if the Date/Time is Estimated. If you are not sure of the exact time for the procedure, please select Estimated. Major Complications are highlighted in yellow. There are different types of patient complications, broadly: Hemorrhage, Neurologic, Renal, Cardiovascular, Pulmonary, Metabolic, and Organ Limb Ischemia.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Peripheral cannulation site bleeding	Select this complication if there is bleeding from a peripheral cannulation site such as the neck, groin, or axilla. Peripheral cannulation site bleeding requiring PRBC transfusion (>20ml/kg/calendar day of PRBCS or ≥3U PRBCs/calendar day in neonates and pediatrics or ≥3U PRBCS/calendar day in adults) and/or, surgical intervention (includes intravascular hemostatic agent deployment). A reperfusion cannula is a type of peripheral cannulation site.	Enter start date/time and stop date and time for each new occurrence.	01/25/2018 - present 1/25/2018 – Present Specific amounts of blood loss added.	ECLS.ComplicationCodes	Code 222
Mediastinal cannulation site bleeding	Select this complication if there is bleeding from cannulae that are placed across the mediastinum. Mediastinal cannulations are also referred to as central cannulations and are placed via their mediastinum. Mediastinal cannulation site bleeding requiring PRBC transfusion (>20ml/kg/calendar day of PRBCS or ≥3U PRBCs/calendar day in neonates and pediatrics or ≥3U PRBCS/calendar day in adults, and/or surgical intervention.	Complication frequency: 1 per 24 hours. Enter start date/time and stop date and time for each new occurrence. Only 1 per run. Can be after run time off up to 48 hours.	01/25/2018 - present 1/25/2018 – Present Specific amounts of blood loss added.	ECLS.ComplicationCodes	Code 223
Surgical site bleeding	Select this complication if there is bleeding from a surgical site other than mediastinal or peripheral cannulation site. Requiring PRBC transfusion (>20ml/kg/calendar day of PRBCS or ≥3U PRBCs/calendar day in neonates and pediatrics or ≥3U PRBCS/calendar day in adults), and/or surgical intervention	Complication frequency: 1 per 24 hours. Enter start date/time and stop date and time for each new occurrence.	07/01/1997 – 1/25/2018 1/25/2018 – Present Specific amounts of blood loss added.	ECLS.ComplicationCodes	Code 203

Patient Neurologic Complications

Patient complications are generally defined by their need for intervention, but specific definitions are provided for each Patient Complication below. These complications are listed in drop down under the field name complications. For each complication please enter Date/Time and indicate if the Date/Time is Estimated. If you are not sure of the exact time for the procedure, please select Estimated. Major Complications are highlighted in yellow.

Patient Neurologic Complications are central nervous system accidents including brain death, seizures, ischemia, infarcts, and hemorrhage.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Brain death	Select this complication if a patient suffered brain death or neurological determination of death. **Brain Death** The Canadian Neocritical Care Guideline defined brain death as the irreversible loss of the capacity for consciousness combined with the irreversible loss of all brainstem functions, including the capacity to breathe. Brain death is equivalent to death of the individual, even though the heart continues to beat and spinal cord functions may persist *Canadian Neurocritical Care Group. Guidelines for the diagnosis of brain death. Can J Neurol Sci 1999;26(1):64-6.* A detailed description of establishing brain death for adults can be found at this citation *American Academy of N Evidence-based guideline update: determining brain death in adults: report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology. 2010;74(23):1911–8.* **Neurological determination of death (NDD)** is the process and procedure for determining brain death. The Canadian medical standard for NDD is reported in and is described for children. *Shemie SD, et al., Pediatric Reference G, Neonatal Reference G. Severe brain injury to neurological determination of death: Canadian forum recommendations. CMAJ. 2006;174(6):S1–13.* **Ancillary Tests:** The demonstration of the absence of intracerebral blood flow is considered the standard as an ancillary test for brain death. Currently validated imaging techniques are cerebral angiography (1) and radionuclide angiography (2). *(1) Wilkening M,, et al. Validity of cerebral angiography via ve- nous route in the diagnosis of brain death. Bull Acad Natl Med 1995;179(1):41-8. French. (2) Wieler H, et al. Tc-99m HMPAO cerebral scitigraphy. A reli- able, noninvasive method for determination of brain death. Clin Nucl Med 1993;18(2):104-9.* **Apnea Test on ECMO:** The patient should be placed on continuous positive airway pressure (CPAP) while the sweep gas flow rate is set to a maximum of 1.0 liter/minute. If the $PaCO_2$ does not rise above 60 mmHg or change by 20 mmHg, the sweep flow can be incrementally lowered to as low as 0.1 liter/minute while still maintaining adequate oxygenation in most circumstances. *Giani M, et al (2016) Apnea test during brain death assessment in mechanically ventilated and ECMO patients. Intensive Care Med 42:72–81.*	This complication must be selected for those patients whom meet brain death criteria in order to enter a date/time of death before time off ECMO.	07/01/1997 – 1/25/2018 1/25/2018 - present Specific definitions added.	ECLS.ComplicationCodes	Code 301

Patient Neurologic Complications

Patient complications are generally defined by their need for intervention, but specific definitions are provided for each Patient Complication below. These complications are listed in drop down under the field name complications. For each complication please enter Date/Time and indicate if the Date/Time is Estimated. If you are not sure of the exact time for the procedure, please select Estimated. Major Complications are highlighted in yellow.

Patient Neurologic Complications are central nervous system accidents including brain death, seizures, ischemia, infarcts, and hemorrhage.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Seizures: clinically determined	Clinically determined by assessment	If more than one instance occurs on the date, only one date is require, time will default to midnight (0000) Complication frequency: 1 per 1 hour.	07/01/1997 - present	ECLS.ComplicationCodes	Code 311
Seizures Confirmed by EEG	Confirmed by Electroencephalograph	If more than one instance occurs on the date, only one date is require, time will default to midnight (0000) Complication frequency: 1 per 1 hour.	07/01/1997 - present	ECLS.ComplicationCodes	Code 312
CNS diffuse ischemia (CT/MRI)	CT or MRI demonstrating diffuse ischemic changes, this would include anoxic brain injury	Enter date/time of radiologic confirmation **To allow a complication end time after the ECMO stop time check the box verifying the time of complication and is likely a complication of ECMO**	01/25/2018- present	ECLS.ComplicationCodes	Code 325
CNS Infarction (US or CT or MRI)	CT or US or MRI demonstrating localized ischemic change	Enter date/time of radiologic confirmation **To allow a complication end time after the ECMO stop time check the box verifying the time of complication and is likely a complication of ECMO**	07/01/1997 - present	ECLS.ComplicationCodes	Code 321
Intra/extra parenchymal CNS Hemorrhage (US or CT or MRI)	May be intraparenchymal, subdural or subarachnoid	Enter date/time of radiologic confirmation **To allow a complication end time after the ECMO stop time check the**	01/25/2018- present	ECLS.ComplicationCodes	Code 324

		box verifying the time of complication and is likely a complication of ECMO			
Intraventricular CNS hemorrhage (US or CT or MRI)	>= Grade 2 IVH on US, CT or MRI	Enter date/time of radiologic confirmation Can be after run time off up to 48 hours. **To allow a complication end time after the ECMO stop time check the box verifying the time of complication and is likely a complication of ECMO**	01/25/2018-present	ECLS.ComplicationCodes	Code 323
Neurosurgical intervention performed	Neurosurgical procedure performed during ECLS run (e.g. intracranial pressure monitor, external ventricular drain, craniotomy)		01/25/2018 - present	ECLS.ComplicationCodes	Code 326

Patient Renal Complications

Patient complications are generally defined by their need for intervention, but specific definitions are provided for each Patient Complication below. These complications are listed in drop down under the field name complications. For each complication please enter Date/Time and indicate if the Date/Time is Estimated. If you are not sure of the exact time for the procedure, please select Estimated. Major Complications are highlighted in yellow.

Patient Renal Complications are renal complications defined by change in creatinine or requirement for renal replacement therapy.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Creatinine 1.5 – 3.0	After ECMO start time, patient newly acquires a creatinine serum measurement of 1.5- 3.0	Complication frequency: 1 per 24 hours. Enter start date/time and stop date and time for each new occurrence. Can be after run time off up to 7 days. **To allow a complication end time after the ECMO stop time check the box verifying the time of complication and is likely a complication of ECMO**	07/01/1997 - present	ECLS.ComplicationCodes	Code 401
Creatinine > 3.0	After ECMO start time, patient newly acquires a creatinine serum measurement of >3.0	Complication frequency: 1 per 24 hours. Enter start date/time and stop date and time for each new occurrence. Can be after run time off up to 7 days. **To allow a complication end time after the ECMO stop time check the box verifying the time of complication and is**	07/01/1997 - present	ECLS.ComplicationCodes	Code 402

		likely a complication of ECMO			
Renal Replacement Therapy Required	Peritoneal Dialysis (PD), Continuous Venovenous Hemodiafiltration (CVVHD), Continuous Venovenous Hemofiltration (CVVHF) or Continuous Venovenous Hemodiafiltration (CVVHDF) or Hemodialysis (HD) based on the patient's ultimate mode of therapy	Complication frequency: 1 per 24 hours. Enter start date/time and stop date and time for each new occurrence. Can be after run time off up to 7 days. Change to Range: Start Date/Time to Stop Date Time **To allow a complication end time after the ECMO stop time check the box verifying the time of complication and is likely a complication of ECMO**	01/25/2018 – present Prior to 1/25/2018 collected separately as Hemofiltration or SCUF or CAVHD or HD	ECLS.ComplicationCodes	Code 415

Patient Cardiovascular Complications

Patient complications are generally defined by their need for intervention, but specific definitions are provided for each Patient Complication below. These complications are listed in drop down under the field name complications. For each complication please enter Date/Time and indicate if the Date/Time is Estimated. If you are not sure of the exact time for the procedure, please select Estimated. Major Complications are highlighted in yellow.

Patient Cardiovascular Complications include cardiopulmonary resuscitation, cardiac arrhythmias, and tamponade.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
CPR/Chemical Code Required	Chest compressions and cardiopulmonary resuscitation required during ECLS run	Date/time of complication is time of intervention Complication frequency: 1 per 1 hour.	07/01/1997 - present 04/15/2024	ECLS.ComplicationCodes	Code 502
Cardiac arrhythmia	Requiring antiarrhythmic medication infusion, overdrive pacing, cardioversion or defibrillation	Date/time of complication is time of intervention Complication frequency: 1 per 24 hours.	07/01/1997 - present	ECLS.ComplicationCodes	Code 504
Tamponade (not blood)	Tamponade during ECLS run requiring pericardial drain or mediastinal washout	Date/time of complication is time of intervention Complication frequency: 1 per 24 hours.	01/25/2018 - present Prior to 1/25/2018 collected as Tamponade: Air or Tamponade Serious	ECLS.ComplicationCodes	Code 544
Tamponade (blood)	Tamponade during ECLS run requiring pericardial drain or mediastinal washout	Date/time of complication is time of intervention	09/01/1997 - present	ECLS.ComplicationCodes	Code 541

Patient Pulmonary Complications

Patient complications are generally defined by their need for intervention, but specific definitions are provided for each Patient Complication below. These complications are listed in drop down under the field name complications. For each complication please enter Date/Time and indicate if the Date/Time is Estimated. If you are not sure of the exact time for the procedure, please select Estimated. Major Complications are highlighted in yellow.

Patient Pulmonary Complications

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Pneumothorax requiring treatment	Requiring insertion of chest drain		07/01/1997 - present	ECLS.ComplicationCodes	Code 601
Pulmonary Hemorrhage	Requiring pRBC transfusion (>20ml/kg/calendar day of PRBCS or ≥3U PRBCs/calendar day in neonates and pediatrics and ≥3U PRBCS/calendar day in adults)	Complication frequency: 1 per 24 hours.	07/01/1997 - present 01/25/2018 Specific amounts of blood loss added.	ECLS.ComplicationCodes	Code 602

Patient Metabolic Complications

Patient complications are generally defined by their need for intervention, but specific definitions are provided for each Patient Complication below. These complications are listed in drop down under the field name complications. For each complication please enter Date/Time and indicate if the Date/Time is Estimated. If you are not sure of the exact time for the procedure, please select Estimated. Major Complications are highlighted in yellow.

Patient Metabolic Complications include hyperbilirubinemia, hemolysis and severe hemolysis

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Hyperbilirubinemia	For neonatal patients (< 28 days) = conjugated bilirubin >20umol/L (>1.2mg/dL). For pediatric (>30days) or adult patients = total bilirubin >170umol/L (> 10mg/dL) or conjugated bilirubin >51umol/L (>3mg/dL), Or need for extracorporeal purification for elevated bilirubin	Complication frequency: 1 per 24 hours. Enter start date/time and stop date and time for each new occurrence.	07/01/1997-1/25/2018 1/25/2018-present Age definitions added	ECLS.ComplicationCodes	Code 821
Moderate hemolysis	Peak plasma hemoglobin 50-100 mg/dL or 500-1000 mg/L occurring at least once during ECLS run. Sustained for at least 2 consecutive days.	Complication frequency: 1 per 24 hours. Change to Range: Start Date/Time to Stop Date Time	1/1/1989-1/25/2018 1/25/2018-present Collected if plasma free Hgb >50	ECLS.ComplicationCodes	Code 822
Severe hemolysis	Peak plasma hemoglobin > 100mg/dL or >1000 mg/L occurring at least once during ECLS run. Sustained for at least 2 consecutive days or if the level of hemolysis leads to a major component change namely the membrane lung, blood pump or entire circuit.	Complication frequency: 1 per 24 hours. Enter start date/time and stop date and time for each new occurrence.	1/25/2018-present	ECLS.ComplicationCodes	Code 823

Patient Limb Complications

Patient complications are generally defined by their need for intervention, but specific definitions are provided for each Patient Complication below. These complications are listed in drop down under the field name complications. For each complication please enter Date/Time and indicate if the Date/Time is Estimated. If you are not sure of the exact time for the procedure, please select Estimated. Major Complications are highlighted in yellow.

Patient Limb Complications

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Limb: Compartment Syndrome	Compartment syndrome occurs when the pressure within a compartment increases, restricting the blood flow to the area and potentially damaging the muscles and nearby nerves. It usually occurs in the legs, feet, arms or hands.		09/06/2013 01/25/2018	ECLS.ComplicationCodes	Code 902
Fasciotomy	Fasciotomy performed secondary to compartment syndrome from ECLS cannulation (fasciotomy performed during ECLS hospitalization)	Complication frequency: 1 per 1 hour. Max 4 complications per patient. Can be after run time off up to 14 days. **To allow a complication end time after the ECMO stop time check the box verifying the time of complication and is likely a complication of ECMO**	09/06/2013 01/25/2018	ECLS.ComplicationCodes	Code 903
Limb: Amputation	Limb amputation secondary to complications from ECLS run (amputation performed during ECLS hospitalization)	Complication frequency: 1 per 1 hour. Max 4 complications per patient. Can be after run time off up to 14 days. **To allow a complication end time after the ECMO stop time check the box verifying the time of complication**	09/06/2013 01/25/2018	ECLS.ComplicationCodes	Code 904

		and is likely a complication of ECMO			
Limb: Ischemia	Post peripheral cannulation, requiring addition of limb reperfusion cannula >=6 hrs post cannulation	Complication frequency: 1 per 1 hour. Max 4 complications per patient.	09/06/2013 01/25/2018 4/15/2024-10/15/2026	ECLS.ComplicationCodes	Code 901

11.INFECTIONS

This section details the infections associated with the patient placed on ECLS. Infections are those that occur prior to and on ECLS. Multiple infections may be entered by selecting 'Add New Infection' (see Registry Instructions)
Refer to the Appendix for a list of available choices for infections.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Date/Time	Enter the Date/Time of the culture obtained.	**Hard Limit** Infection Date/Time cannot be after run Time Off.	10/10/2011 - present	ECLS.Infections	CultureTime
Estimated	Click the box if the Date/Time is approximate.		10/10/2011 - present	ECLS.Infections	CultureTimeEstimated No=0 Yes=1
Culture Site	Select where the patient sample was taken from: Blood, Bone, Cerebrospinal fluid, Peritoneal fluid, Pleural fluid, Respiratory tract, Skin/soft tissue, Stool, Urine, Wound – surgical (including cannulation site) Wound – traumatic, other than cannulation site, Other, Unknown	Culture sites 101 and 110 can allow Complication Time to be after Run Time Off up to 7 days	10/10/2011 - present	ECLS.Infections	CultureSiteId 101 Blood 102 Bone 103 Cerebrospinal fluid 104 Peritoneal fluid 105 Pleural fluid 106 Respiratory tract 107 Skin/soft tissue 108 Stool 109 Urine 110 Wound - surgical 111 Wound - traumatic 112 Other 199 Unknown
Organism Type	Select from the drop down box the organism type. All, Unknown, Gram + Bacteria, Gram – Bacteria, Mycobacterium, Fungus (yeast and mold), Viruses and Prions, Protozoa This will populate the specific organism associated in the next box.	Set to unknown if not entered	10/10/2011 - present	Registry.OrganismTypes	TypeId, Description 0 - Unknown 1 - Gram positive bacteria 2 - Gram negative bacteria 3 - Mycobacterium 4 - Fungus (yeast and molds) 5 - Viruses and prions 6 - Protozoa

Infections (continued)					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Organism	Select from the drop down box the specific organism.		10/10/2011 - present	ECLS.Infections	OrganismId Please see Appendix A for full list of Infections

12.OUTCOMES

This section details the discontinuation of ECLS and post ECLS outcomes.

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Discontinuation Reason	This field identifies the reason a patient was separated from ECLS. Choose one reason for discontinuing ECLS support: **Expected recovery:** ECLS discontinued because patient improved and is expected to recover. If recovery was due to transplant do not choose recovery; choose appropriate transplant below. **Poor Prognosis Followed by Death:** ECLS discontinued due to poor prognosis or treatment limitations because the medical team anticipated that the patient had irrecoverable disease; or patient experienced organ failure; or a diagnosis that was incompatible with life; or family/patient perceived poor prognosis or undue suffering and requested discontinuation. **Poor Prognosis Follwed by Unexpected Survival**: ECLS discontinued due to poor prognosis or treatment limitations because the medical team anticipated the patient irrecoverable disease; or patient experienced organ failure; or a diagnosis that was incompatible with life; or family/patient perceived poor prognosis or undue suffering and requested discontinuation. Despite this indication for removal of ECLS, the patient unexpectedly survived to hospital discharge. **ECLS complications:** A complication of ECLS care required withdrawal of ECLS (such as intracranial hemorrhage). **Resource Limitations** A lack of equipment, personnel, etc. provided the basis for the decision to discontinue ECLS. **Transition to VAD support:** In anticipation of continued need for extracorporeal support, the patient was taken off ECLS to be transitioned to an LVAD, RVAD, BiVAD, or Berlin Heart. **Pumpless Lung Assist (PA to LA):** In anticipation of continued need for extracorporeal support, the patient was taken off ECLS and placed on lung assist device. **Heart Tx**: Patient was withdrawn from ECLS due to resolved need after new heart transplant. **Lung Tx**: Patient was withdrawn from ECLS due to resolved need after new lung transplant. **Heart/Lung Tx**: Patient was withdrawn from ECLS due to resolved need after new heart and lung transplant. **Unknown**		01/01/1989 – 1/15/2018 1/15/2018 – present **Transition to VAD support;** **Pumpless Lung Assist (PA to LA);** **Heart Tx;** **Lung Tx;** **Heart/Lung Tx** were added 04/03/2022-present **Poor Prognosis** updated to **Poor Prognosis Followed by Death** **Poor Prognosis Followed by Unexpected Survival** added	ECLS.Runs	Discontinuation This field can be looked up on ECLS.DiscontinuationCodes But we need this list refreshed. 0 = Unknown 1 = Expected Recovery 2 = Poor Prognosis Followed by Death 6 = Resource Limitation 10 = VAD 11 = Pumpless Lung Assist (PA to LA) 12 = Heart Tx 13 = Lung Tx 14 = Heart/Lung Tx 15 = Complication 16 = Poor Prognosis Followed by Unexpected Survival

Cannula site repair	Select appropriate: **both carotid and jugular**, **common carotid artery**, **internal jugular vein**, **none**, **other**		01/01/1989 – present	ECLS.Runs	Repair 0 = None 1 = Common Carotid Artery 2 = Internal Jugular Vein 3 = Both Carotid and Jugular 4 = Other

Outcomes (Continued)					
Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Endotracheally extubated >= 48	Select appropriate: Endotracheally (orally and nasally) extubated ,Tracheostomy (including Tracheostomy decannulation during ECLS run), Transferred intubated, Still intubated at time of death, Other Endotracheal extubation indicates that a patient does not require reintubation, a tracheostomy, or any invasive airway device intervention for 48 hours or more.		1/15/2018-present 04/15/2024 04/15/2026	ECLS.Runs	Extubated 0 = Endotracheally (oral and nasal) extubated 1 = N/A Tracheostomy (including Tracheostomy decannulation) 2 = N/A transferred intubated 3 = N/A still intubated at time of death 4 = N/A other
Extubation Date	The date/time the oral endotracheal tube is removed	**Hard Limit** Extubation Date/Time cannot be BEFORE than the Date of Birth. Extubation Date/Time cannot be Before Intubation Date/Time Extubation Date/Time cannot be BEFORE ECLS Start Time Extubation Date/Time cannot be AFTER the time of Death	01/01/1989 – present	ECLS.Runs	ExtubationDate

Date/Time of ICU Discharge	**ICU discharge date** Please enter the date and time the patient was discharged from the ICU in your hospital. If **patient XX** was admitted to your Hospital A ICU and transferred from your Hospital A ICU to outside Hospital B ICU on 1/1/2018, then enter date of ICU discharge as 1/1/2018.	**Soft Notification** Date/Time of ICU Discharge is not often before the ECLS Start Time ICU Discharge Date should be after time off date **Hard Limit** Date/Time of ICU Discharge cannot be BEFORE ECLS time of birth Date/Time of ICU Discharge cannot be AFTER the time of Death	01/31/2018 – present 04/15/2024 Allow ICU discharge date after DeathDate when Brain Death complication is present	ECLS.Runs	ICUDischargeDate

13. Submission

Field Name	Definition / Explanation / Example	Data Entry Rules	Collection/ Modification	Table Name	Column Name / Stored Values
Electronic Signature	Enter your full name in the signature box. Make sure to validate the data for quality before selecting the submission button.			ECLS.Runs	CompletedBy

APPENDIX A: INFECTIOUS ORGANSIMS

To view the complete organisms list, please visit:
https://www.elso.org/registry/supportdocuments/infectiousorganisms.aspx