

ECMO EXTRAHOSPITALIERE EXPERIENCE LYONNAISE

Dr. M. Pozzi

Praticien Hospitalier

**Chirurgie Cardiovasculaire de l'Adulte
Assistance et Transplantation Cardiaque**

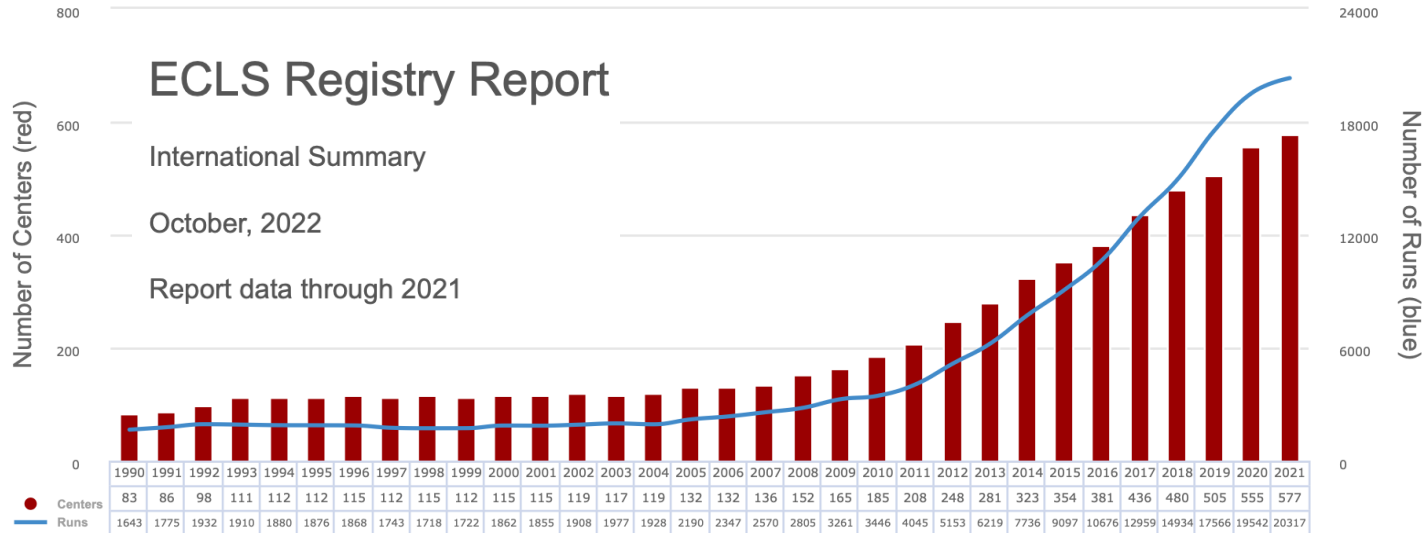


Aucun conflit d'intérêt à déclarer

INTRODUCTION

Centers

Centers by year



INDICATIONS



European Heart Journal (2021) 00, 1–128
doi:10.1093/eurheartj/ehab368

ESC GUIDELINES

2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

Developed by the Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC)

With the special contribution of the Heart Failure Association (HFA) of the ESC

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ESC Clinical Practice Guidelines Committee (CPG) listed in the Appendix.

ESC subsidiary communities having participated in the development of this document:

Associations: Association for Acute Cardiovascular Care (ACC), Association of Cardiovascular Nursing & Allied Professions (ACNAP), European Association of Cardiovascular Imaging (EACVI), European Association of Preventive Cardiology (EAPC), European Association of Percutaneous Cardiovascular Interventions (EAPCI), European Heart Rhythm Association (EHRA), Heart Failure Association (HFA).

Councils: Council of Cardio-Chronology, Council on Basic Cardiovascular Science, Council on Valvular Heart Disease.

Working Groups: Adult Congenital Heart Disease, Cardiovascular Pharmacotherapy, Cardiovascular Regenerative and Reproductive Medicine, Cardiovascular Surgery, e-Cardiology, Myocardial and Pericardial Diseases, Myocardial Function.

Patient Forum

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CHOC CARDIOGÉNIQUE RÉFRACTAIRE

Recommendations	Class ^a	Level ^b
Short-term MCS should be considered in patients with cardiogenic shock as a BTR, BTD, BTB. Further indications include treatment of the cause of cardiogenic shock or long-term MCS or transplantation.	Ila	C

McDonagh

Eur Heart J 2021;42:3599-3726

INDICATIONS



Adult Advanced Life Support 2020 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations^{*}

Jasmeet Soar, Katherine M. Berg, Lars W. Andersen, Bernd W. Böttiger, Sofia Cacciola, Clifton W. Callaway, Keith Couper, Tobias Cronberg, Sonia D'Arrigo, Charles D. Deakin, Michael W. Donnino, Ian R. Drennan, Asger Granfeldt, Cornelia W.E. Hoedemaekers, Mathias J. Holmberg, Cindy H. Hsu, Marljin Kamps, Szymon Musiol, Kevin J. Nation, Robert W. Neumar, Tonia Nicholson, Brian J. O'Neil, Quentin Otto, Edison Ferreira de Paiva, Michael J.A. Parr, Joshua C. Reynolds, Claudio Sandroni, Barnaby R. Scholefield, Markus B. Skrifvars, Tzong-Luen Wang, Wolfgang A. Wetsch, Joyce Yeung, Peter T. Morley, Laurie J. Morrison, Michelle Welsford, Mary Fran Hazinski, Jerry P. Nolan, on behalf of the Adult Advanced Life Support Collaborators¹

Abstract

This 2020 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations for advanced life support includes updates on multiple advanced life support topics addressed with 3 different types of reviews. Topics were prioritized on the basis of both recent interest within the resuscitation community and the amount of new evidence available since any previous review. Systematic reviews addressed higher-priority topics, and included double-sequential defibrillation, intravenous versus introsseous route for drug administration during cardiac arrest, point-of-care echocardiography for intra-arrest prognostication, cardiac arrest caused by pulmonary embolism, postresuscitation oxygenation and ventilation, prophylactic antibiotics after resuscitation, postresuscitation seizure prophylaxis and treatment, and neuroprognostication. New or updated treatment recommendations on these topics are presented. Scoping reviews were conducted for anticipatory charging and monitoring of physiological parameters during cardiopulmonary resuscitation. Topics for which systematic reviews and new Consensus on Science With Treatment Recommendations were completed since 2015 are also summarized here. All remaining topics reviewed were addressed with evidence updates to identify any new evidence and to help determine which topics should be the highest priority for systematic reviews in the next 1 to 2 years.

Keywords: AHA Scientific Statements, arrhythmias, cardiopulmonary arrest, cardiopulmonary resuscitation and emergency cardiac care, echocardiography, post-cardiac arrest care, postresuscitation care, prognostication, sudden cardiac arrest, ventricular fibrillation

^{*} This article has been co-published in Circulation.
¹ The list of collaborators is given in the Acknowledgements.
<https://doi.org/10.1016/j.resuscitation.2020.09.012>

ARRÊT CARDIAQUE RÉFRACTAIRE
L'ECMO VA pourrait être considéré
comme une solution de sauvetage pour
les arrêts cardiaques pour lesquels la
RCP s'avère inefficace

Soar

Resuscitation 2020;156:A80-A119

Outcome of acute respiratory distress syndrome patients treated with extracorporeal membrane oxygenation and brought to a referral center *Intensive Care Med* 2014;40:74-83

MARSEILLE / 77 ECMO VV / Survie 44%

Retrieval of severe acute respiratory failure patients on extracorporeal membrane oxygenation: Any impact on their outcomes? *J Thorac Cardiovasc Surg* 2018;155:1621-9

PITIÉ / 118 ECMO VV / Survie 53%

Acceptance and transfer to a regional severe respiratory failure and veno-venous extracorporeal membrane oxygenation (ECMO) service: predictors and outcomes^{*†} *Anaesthesia* 2018;73:177-86

LONDON / 219 ECMO VV / Survie 72%

UMAC: ECMO VA

Retrieval of critically ill adults using extracorporeal membrane oxygenation: the nine-year experience in New South Wales

SYDNEY / 42 ECMO VA / Survie 60%
Anaesth Intensive Care 2018;46:579-88

Extracorporeal membrane oxygenation retrieval factors and survival to intensive care unit discharge

MELBOURNE / 51 ECMO VA / Survie 49%
Emerg Med Australas 2019;31:280-2

Inter-hospital transfer of extracorporeal membrane oxygenation-assisted patients: the hub and spoke network

BAD OEYNHAUSEN / 134 ECMO VA / Survie 62%
Ann Cardiothorac Surg 2019;8:62-5

CRITICAL CARE PERSPECTIVE



Position Paper for the Organization of Extracorporeal Membrane Oxygenation Programs for Acute Respiratory Failure in Adult Patients

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Abstract

The use of extracorporeal membrane oxygenation (ECMO) for severe acute respiratory failure (ARF) in adults is growing rapidly given recent advances in technology, even though there is controversy regarding the evidence justifying its use. Because ECMO is a complex, high-risk, and costly modality, at present it should be conducted in centers with sufficient experience, volume, and expertise to ensure it is used safely. This position paper represents the consensus opinion of an international group of physicians and associated health-care workers who have expertise in therapeutic modalities used in the treatment of patients with severe ARF, with a focus on ECMO. The aim of this paper is to provide physicians, ECMO center directors, and coordinators, hospital directors, health-care organizations, and

regional, national, and international policy makers a description of the optimal approach to organizing ECMO programs for ARF in adult patients. Importantly, this will help ensure that ECMO is delivered safely and proficiently, such that future observational and randomized clinical trials assessing this technique may be performed by experienced centers under homogeneous and optimal conditions. Given the need for further evidence, we encourage restraint in the widespread use of ECMO until we have a better appreciation for both the potential clinical applications and the optimal techniques for performing ECMO.

Keywords: extracorporeal membrane oxygenation; acute respiratory distress syndrome; hospital organization; critical care networks; position article

The use of extracorporeal membrane oxygenation (ECMO) for severe acute respiratory failure (ARF) in adults is growing rapidly given recent advances in

technology, although there is controversy regarding the evidence justifying its use (1-9). The recent experience in 2009 using ECMO for pandemic influenza A

(H1N1)-associated acute respiratory distress syndrome (ARDS) revealed that many centers initiated ECMO programs without significant experience and with

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This position article has been endorsed by The Extracorporeal Life Support Organization. See Appendix for the list of physicians who approved the content of this position paper.

Author Contributions: Drafting of the article: A.C. and D.B. Critical revision of the article for important intellectual content: A.C., D.B., R. Bartlett, L.B., R. Brower, S.C., D.D.B., E.F., N.F., J. Fortenberry, J. Fraser, L.G., G.M., W.L., A.M., T.M., M.O., G.P., V.P., A.P., M.R., A.S., and A.V. Final approval of the article: All signatories.

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Mobile ECMO Team

Each ECMO network should ideally create mobile ECMO teams to retrieve patients and to deal with patients who have critical cardiopulmonary failure refractory to conventional therapy. Their coordination would run through the tertiary ECMO referral center. This mobile team should be available 24 hours a day, 7 days a week and employ experienced personnel trained in the transport of critically ill patients, insertion of ECMO cannulae, as well as circuit and patient management. The team variably includes a mix of physicians, transport specialists, nurses, perfusionists, or other ECMO specialists. Imaging requirements at the referring hospital should be considered, and a clinician trained in echocardiography should be considered for some transfers. Portable ultrasound equipment should also be considered. Highly successful transportation of patients on cardiopulmonary support has been described for short and long distances by ambulance, helicopter, and airplane (47-53).

Mobile ECMO teams

High-volume ECMO centers, particularly those serving as the regional referral or comprehensive care centers within hospital referral networks, should ideally establish and coordinate mobile ECMO teams to retrieve patients with severe cardiac failure refractory to conventional therapy. These mobile teams should be available 24 h a day, 7 days a week, and employ experienced personnel trained in transporting critically ill patients, insertion of cannulae (if performed by the mobile team), as well as circuit and patient management. The team should include some combination of physicians, surgeons, transport specialists, nurses, perfusionists, or other ECMO specialists. Imaging requirements at the referring hospital should be considered, including echocardiography or fluoroscopy. Portable ultrasound equipment is essential to aid in vascular access. Checklists should be considered to ensure availability of all necessary equipment and consistency of provider roles and actions before and during transport. After-action reviews are recommended. Successful transportation of patients on cardiopulmonary support by ambulance, helicopter, and fixed-wing aircraft has been described [60–62]. Centers performing ECMO should develop specific guidelines and ensure adequate staff training to provide uninterrupted availability to intrahospital transport of patients receiving ECMO. The equipment used for transport should meet the relevant standards for ground or air transport, with an emphasis on safety and durability.

Abrams

Intensive Care Med 2018;44:717-729

Intensive Care Med
https://doi.org/10.1007/s00134-018-5064-5

CONFERENCE REPORTS AND EXPERT PANEL

Position paper for the organization of ECMO programs for cardiac failure in adults

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Abstract

Extracorporeal membrane oxygenation (ECMO) has been used increasingly for both respiratory and cardiac failure in adult patients. Indications for ECMO use in cardiac failure include severe refractory cardiogenic shock, refractory ventricular arrhythmia, active cardiopulmonary resuscitation for cardiac arrest, and acute or decompensated right heart failure. Evidence is emerging to guide the use of this therapy for some of these indications, but there remains a need for additional evidence to guide best practices. As a result, the use of ECMO may vary widely across centers. The purpose of this document is to highlight key aspects of care delivery, with the goal of codifying the current use of this rapidly growing technology. A major challenge in this field is the need to emergently deploy ECMO for cardiac failure, often with limited time to assess the appropriateness of patients for the intervention. For this reason, we advocate for a multidisciplinary team of experts to guide institutional use of this therapy and the care of patients receiving it. Rigorous patient selection and careful attention to potential complications are key factors in optimizing patient outcomes. Seamless patient transport and clearly defined pathways for transition of care to centers capable of providing heart replacement therapies (e.g., durable ventricular assist device or heart transplantation) are essential to providing the highest level of care for those patients stabilized by ECMO but unable to be weaned from the device. Ultimately, concentration of the most complex care at high-volume centers with advanced cardiac capabilities may be a way to significantly improve the care of this patient population.

Keywords: Extracorporeal membrane oxygenation, Extracorporeal life support, Mechanical circulatory support, Cardiac failure, Cardiac arrest, Hospital organization, Critical care networks, Position article

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Darryl Abrams and A. Reshad Garan contributed equally to this work
Alain Combes and Daniel Brodie are co-senior authors.

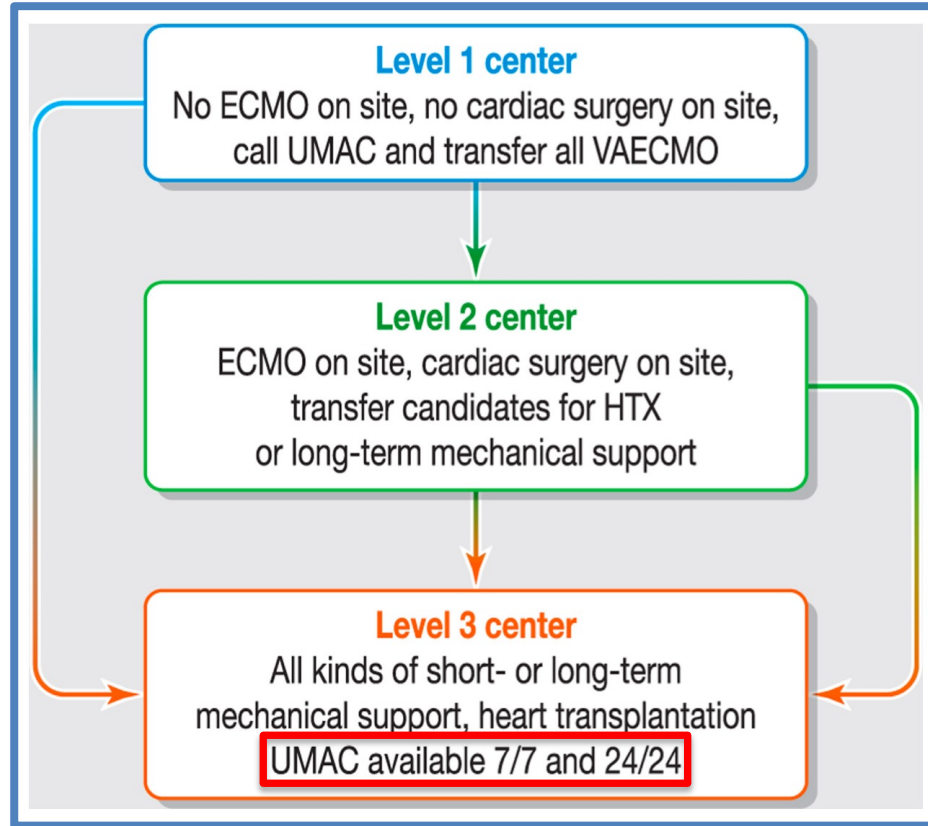
EXPERT CONSENSUS

Extracorporeal membrane oxygenation support in acute circulatory failure: A plea for regulation and better organization

ECMO pour défaillance circulatoire aiguë : plaidoyer pour une meilleure régulation et organisation

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Alexandre Ouattara^{d,e}, Guillaume Baudry^f,
Emmanuelle Berthelot^g, Florence Beauvais^h,
Costin Radu^h, Richard Dorentⁱ, Laurent Sebbag^f,
Elena Galli^j, François Roubille^k, Thibaud Damy^h,
Jean Philippe Verhoye^a, Pascal Leprince^l,
Jean-François Obadia^c, Guillaume Lebreton^l

UMAC: ECMO VA





Extracorporeal Life Support Organization Guideline for Transport and Retrieval of Adult and Pediatric Patients with ECMO Support

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 REVIEWERS: THOMAS MULLER,^{‡‡} CHRIS HARVEY,^{§§} GILES PEEK,^{¶¶} PETA ALEXANDER,^{|||} PHILIP MASON,^{##} AND ROBERT BARTLETT^{***}

Disclaimer: This guideline for the preparation for and undertaking of transport and retrieval of patients on extracorporeal membrane oxygenation (ECMO) is intended for educational use to build the knowledge of physicians and other health professionals in assessing the conditions and managing the treatment of patients undergoing ECLS / ECMO and describe what are believed to be useful and safe practice for extracorporeal life support (ECLS, ECMO) but these are not necessarily consensus recommendations. The aim of clinical guidelines are to help clinicians to make informed decisions about their patients. However, adherence to a guideline does not guarantee a successful outcome. Ultimately, healthcare professionals must make their own treatment decisions about care on a case-by-case basis, after consultation with their patients, using their clinical judgement, knowledge and expertise. These guidelines do not take the place of physicians' and other health professionals' judgment in diagnosing and treatment of particular patients. These guidelines are not intended to and should not be interpreted as setting a standard of care or be deemed inclusive of all proper methods of care nor exclusive of other methods of care reasonably directed to obtaining the same results. The ultimate judgment must

be made by the physician and other health professionals and the patient in light of all the circumstances presented by the individual patient, and the known variability and biological behavior of the clinical condition. These guidelines reflect the data at the time the guidelines were prepared; the results of subsequent studies or other information may cause revisions to the recommendations in these guidelines to be prudent to reflect new data, but ELSO is under no obligation to provide updates. In no event will ELSO be liable for any decision made or action taken in reliance upon the information provided through these guidelines.

Introduction

As the indications for extracorporeal membrane oxygenation (ECMO) exponentially expand, transportation of patients on ECMO support or the rescue of patients at outside facilities with ECMO implantation adds an additional degree of complexity to the already complicated task of transporting critically ill patients. Mobile ECMO requires a unique skill set focused on the care of a patient requiring ECMO. This guideline aims to provide ECMO centers with a practical reference for providing primary and secondary mobile ECMO services. The same principles apply to the transport of patients with other modes of extracorporeal life support for example, extracorporeal carbon dioxide removal.

Transport of ECMO patients requires coordination and careful considerations of potential risks and benefits of transport and is typically accomplished via ground or air. In most cases, the circuit and equipment utilized for mobile ECMO are the same as the components used for in-house ECMO support with adaptation for the unique aspects of mobile care. Regardless of transport mode or equipment, safety of the patient, transport team, and public is paramount during ECMO transport. There is little evidence guiding the transport of patients supported with ECMO; however, it is recommended that transport be performed by well-equipped teams acquainted with mobile transport.¹⁻³ Several case series describe safe transportation of patients supported with ECMO using different models and team structures.⁴⁻¹¹ This guideline is predominantly based on expert opinion.

Section 1: Types of ECMO Transportation

There are several types of ECMO transportation defined by where the patient is retrieved from, transported to, and by which facility's ECMO team. This section contains common types with a description of defining criteria. This may be helpful in determining team responsibility, authority, and other policy and operational implications.

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3 CONTEXTES CLINIQUES



CHOC CARDIOGENIQUE

Nécessité de répondre aux exigences des hôpitaux périphériques

Aucune interférence avec l'activité du bloc opératoire

3 CONTEXTES CLINIQUES

2

ACR EXTRAHOSPITALIER

Survie avec un bon état neurologique décevante

Int J Cardiol 2016;204:70-6

4.4%

Ann Thorac Surg 2019;107:809-16

6.1%

2 actions correctrices

 **Exclusion des rythmes non choquables (depuis Janvier 2015)**

 **Implantation pré-hospitalière (depuis Juin 2017)**

Intérêt de l'équipe du SAMU de Lyon (étude APACAR 2)

3 CONTEXTES CLINIQUES

3 SDRA

Capacité d'accueil de notre Réanimation Chirurgicale

Collaboration avec la Réanimation Médicale du CHU de la Croix Rousse

ORGANISATION D'UMAC: EXPERIENCE LYONNAISE

EXPERIENCE LYONNAISE

depuis 01/01/2017

- Equipe multidisciplinaire

- Disponible H24, 7/7 en parallèle avec l'activité du bloc opératoire

- Logistique du SAMU

Transport du personnel

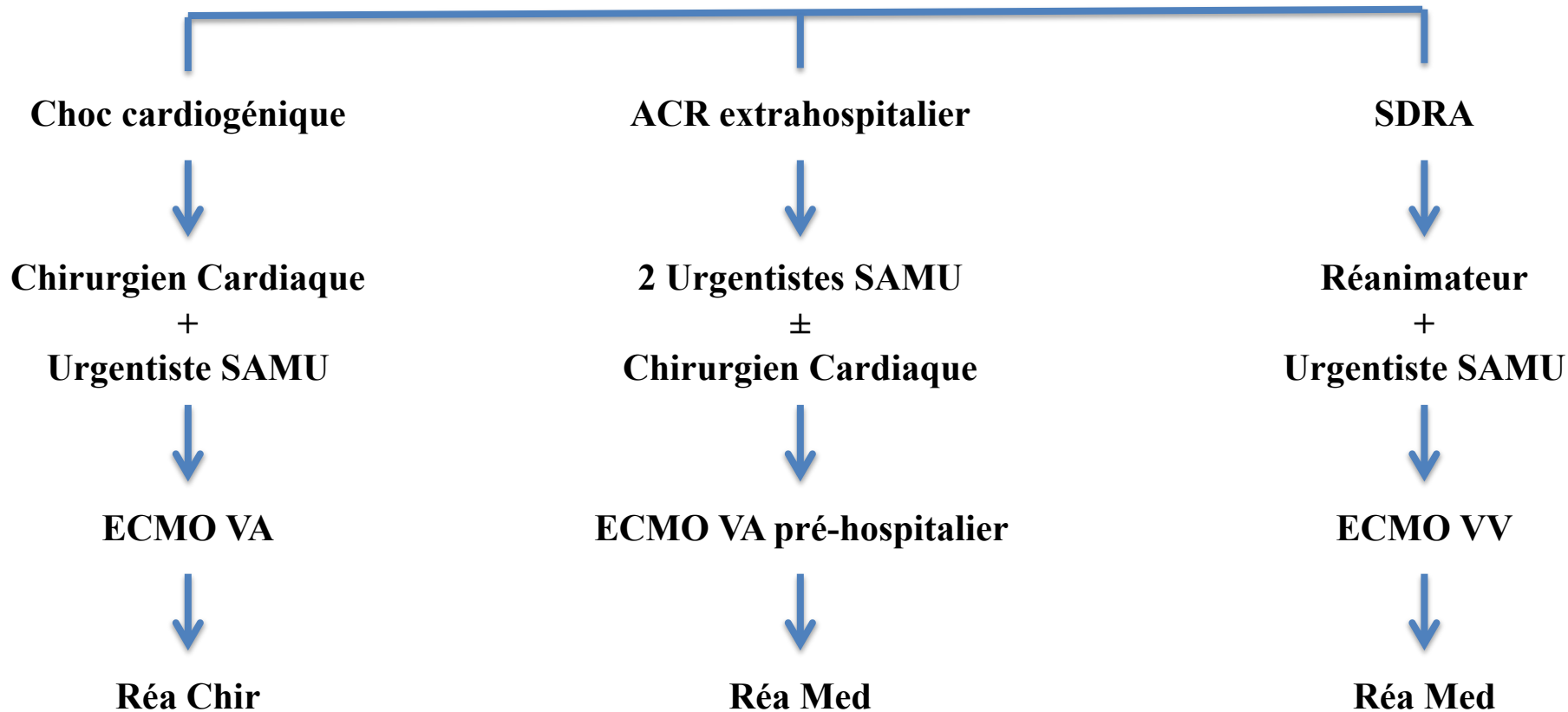
Transport du matériel

Débullage de l'ECMO

Rapatriement du patient sous ECMO

ORGANISATION D'UMAC

UMAC Lyon



ORGANISATION D'UMAC

UMAC Lyon /// 01/01/2017 - 30/11/2022 /// 148 ECMO

Choc cardiogénique



39 ECMO VA



17 DCD

**18 Sevrages
3 LVAD / 1 Greffe**



Survie globale 56.4%

ACR extrahospitalier



57 ECMO VA



Survie CPC 1-2 17.5%



**Rythmes choquables
CPC 1-2 31.0%**

**Rythmes non choquables
CPC 1-2 3.6%**

SDRA



52 ECMO VV



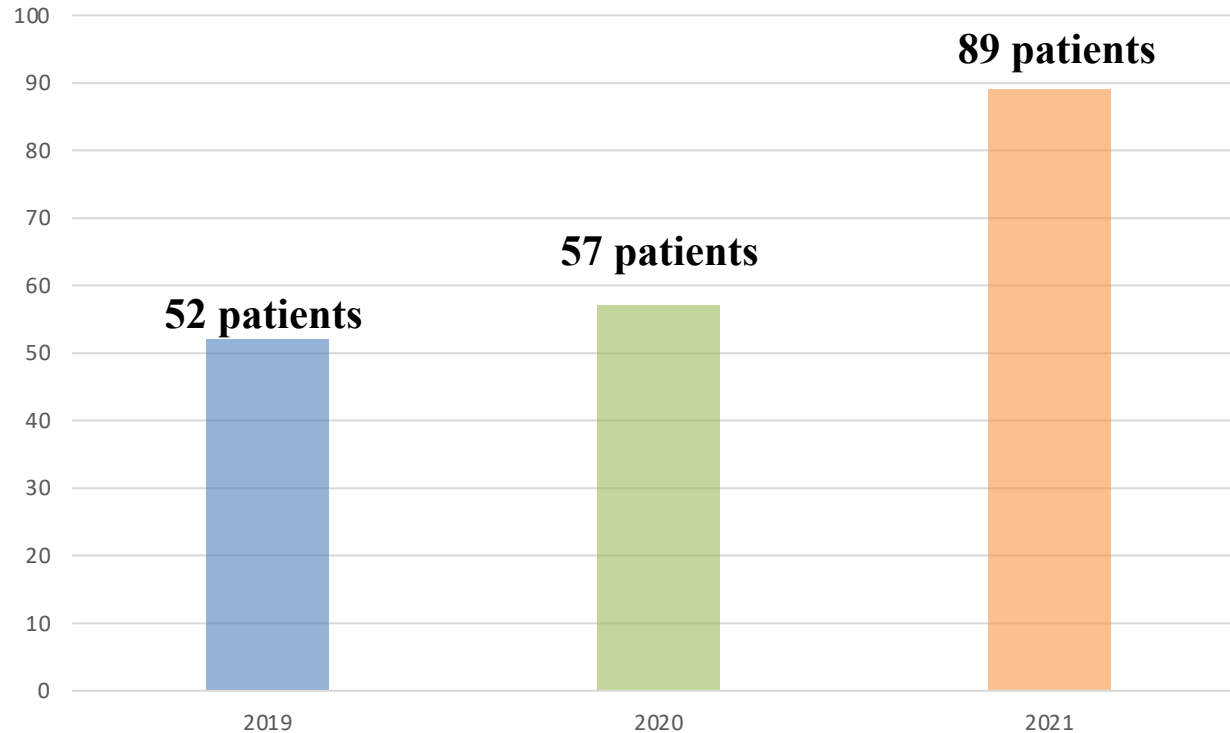
Survie globale 40.4%

UMAC: EXPERIENCE LYONNAISE

RETOMBÉES CLINIQUES

1

ECMO VA - CHOC CARDIOGENIQUE



RETOMBÉES CLINIQUES

2

35,0%

ECMO VA - ACR EXTRAHOSPITALIER

30,0%

ECMO VA préhospitalier + Exclusion des rythmes non choquables (depuis le 01/01/2017)

25,0%

Modification du protocole institutionnel

Exclusion des rythmes non choquables (depuis le 01/01/2015)

20,0%

15,0%

10,0%

5,0%

0,0%

ECMO VA AU BLOC OPERATOIRE

**ECMO VA
PRE-HOSPITALIERE**

Int J Cardiol 2016;204:70-6

Ann Thorac Surg 2019;107:809-16

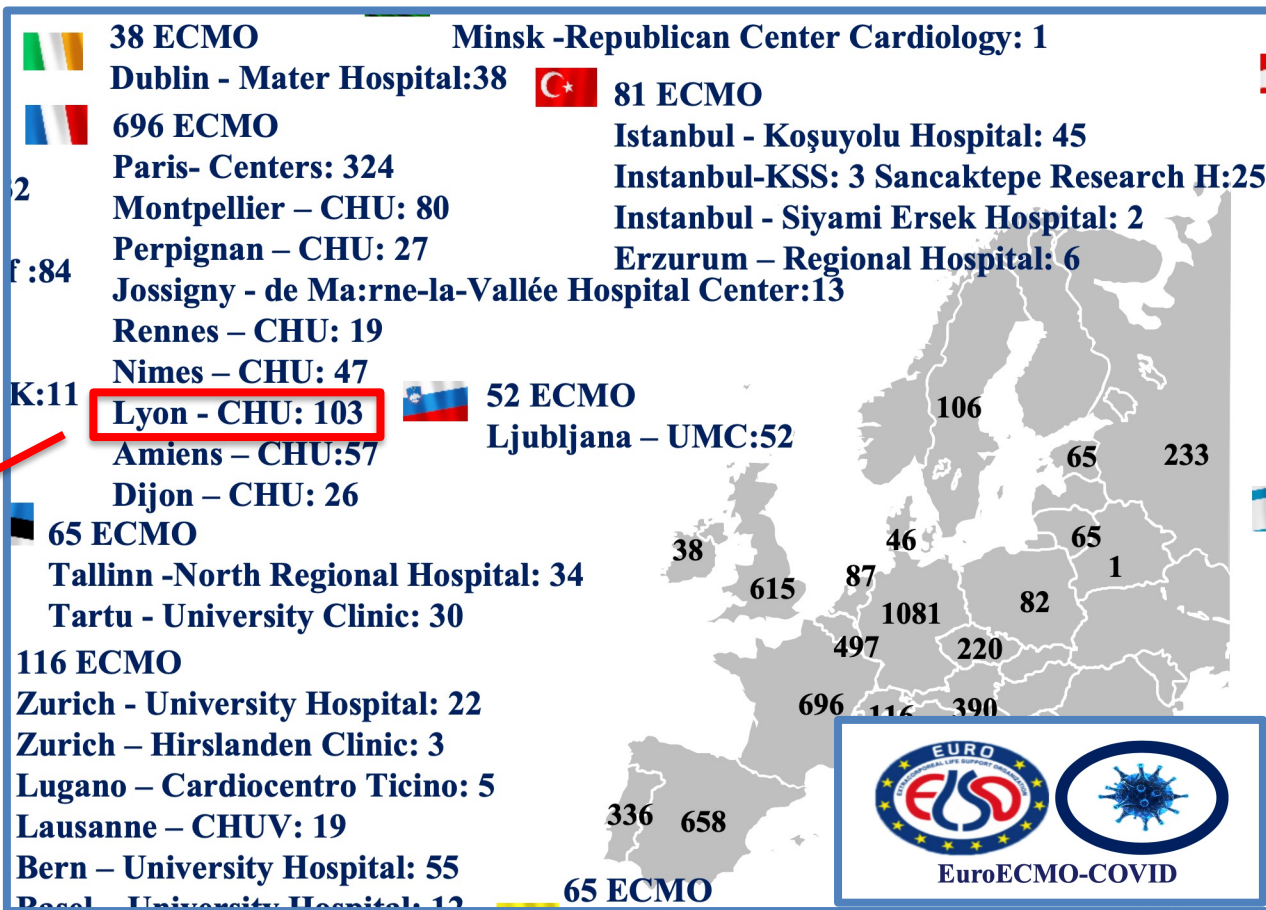
J Cardiothorac Vasc
Anest 2022;36:1670-7

Resuscitation 2022;176:19-20

UMAC: EXPERIENCE LYONNAISE

RETOMBÉES CLINIQUES

3



CONCLUSIONS

UMAC MULTIDISCIPLINAIRE

RESPECT DES COMPETENCES / TACHES

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