0119. ECPR Could Prevent Many More Cardiac Arrest Deaths. ECPR 可以防止更多的心脏骤停死亡

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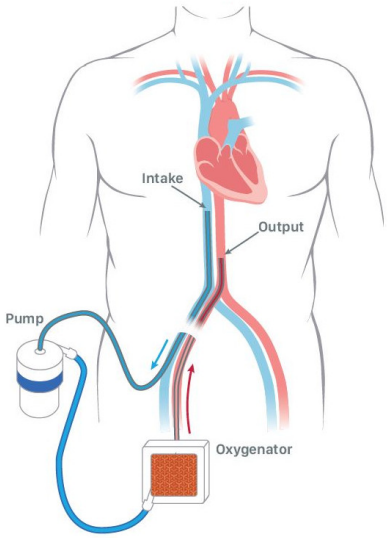
1. ECPR Could Prevent Many More Cardiac 心脏的；心脏病的 Arrest 阻止；中止;心跳停止 Deaths. ECPR 可以防止更多的心脏骤停死亡

ECMO (extracorporeal（位于或发生在）体外的 membrane（身体内的）膜 oxygenation 以氧处理，氧化作用) machines like this one **can save the lives of people** after a **cardiac arrest** 心脏停搏, in a process called ECPR.
像这样的 ECMO（体外膜肺氧合）机器可以在心脏骤停后挽救人们的生命，这一过程称为 ECPR。

Example 1. 案例

ECMO

体外膜肺氧合（Extracorporeal Membrane Oxygenation，ECMO）主要用于对重症心肺功能衰竭患者，提供持续的体外呼吸与循环，以维持患者生命。
"体外膜肺氧合"（ECMO）的核心部分是**膜肺（人工肺）和血泵（人工心脏）**，可以对重症心肺功能衰竭患者进行长时间心肺支持，**为危重症的抢救赢得宝贵的时间。**
ECMO主要包括血管内插管、连接管、动力泵（人工心脏）、氧合器（人工肺）、供氧管、监测系统等部分。
→ 动力泵（人工心脏），提供动力驱动血液在管道中流动。
→ 氧合器（人工肺），**将输入的血液进行"氧合"，输出氧合后的"动脉血"。**



采集

ECPR = extracorporeal cardiopulmonary (a.)心肺的; 与心肺有关的 resuscitation 苏醒，复活；复兴

体外心肺复苏

Every year more than 300,000 people in the U.S. **die from an out-of-hospital cardiac arrest**, making it **a leading cause** of death.

每年, 美国有超过 300,000 人死于院外心脏骤停，使其成为死亡的主要原因。

主 **Improved access** to **cardiopulmonary resuscitation** (CPR) 心肺复苏术 and defibrillators 除颤器(心脏病发作之后，电击心脏使其再次跳动的器械) — devices **that use (v.) an electric shock** to restore a person's heartbeat — 谓 have helped **increase (v.) survival rates** somewhat 有点；有几分；稍微, but **about 90 percent of cases** are still fatal.
心肺复苏 (CPR) 和除颤器（使用电击来恢复人的心跳的设备）的普及, 在一定程度上有助于提高存活率，但约 90% 的病例仍然是致命的。

Example 2. 案例

defibrillator

-→ de-, 不，非，使相反。fibrillate, 颤抖。即使心脏不再颤抖，除颤。

Recent studies have found that **combining** traditional CPR **with** a process called **extracorporeal membrane oxygenation** (ECMO) 体外膜式氧合, which helps **deliver** (v.) oxygen **to** the brain and other vital organs **via a device** similar to a heart-lung **bypass 绕过；避开 machine** 旁路机, can significantly boost **a person's chances of survival** after cardiac arrest.
最近的研究发现，将传统的"心肺复苏"与"体外膜肺氧合" (ECMO) 相结合，通过类似于心肺旁路机的设备, 帮助向大脑和其他重要器官输送氧气，可以显着提高一个人的生存机会心脏骤停后。

Example 3. 案例

bypass machine

旁路机：一种医疗设备，用于维持心脏手术期间的血液循环，将血液从心脏引出，经过机器过滤氧合后, 再输回体内。

In 2020 **a randomized clinical trial** of this approach, known as **extracorporeal cardiopulmonary resuscitation** (ECPR) 体外心肺复苏, at the University of Minnesota **showed that** the technique resulted in **a survival rate** of 43 percent,

compared with 7 percent **in standard care**.
2020 年，明尼苏达大学对这种方法（称为体外心肺复苏 (ECPR)）进行的一项随机临床试验表明，该技术的存活率为 43%，而标准护理的存活率为 7%。
The result was deemed (v.)认为；视为；相信 **so** successful **that** the National Institutes of Health **terminated (v.)（使）停止，结束，终止 the study early**, arguing that **it would be unethical** 不道德的 to **deprive** eligible people **of** the treatment.
结果被认为非常成功，以至于美国国立卫生研究院提前终止了这项研究，认为剥夺符合资格的人接受治疗的权利是不道德的。

The Minnesota trial **focused on** a subset of **cardiac arrests** that initially **responded to** defibrillation 心脏除颤（用电击）, but **other studies indicate that** ECPR can help **in nonshockable cases**, too.
明尼苏达州的试验, 侧重于最初对除颤有反应的一部分心脏停跳病例，但其他研究表明, ECPR也可以在非可除颤的病例中发挥作用。

Still, technical and logistical 后勤上的，安排协调方面的 challenges may **keep** the procedure （正常）程序，手续，步骤;手术 **from** becoming **the standard of care for cardiac arrest** outside of large academic hospitals.
尽管如此，技术和后勤方面的挑战, 可能会阻碍该手术成为大型学术医院之外心脏骤停的护理标准。

The basic technology behind ECPR **has existed** since the 1950s, when both CPR and the first heart-lung machines were developed.
ECPR 背后的基本技术自 20 世纪 50 年代以来就已存在，当时 CPR 和第一台心肺机均已开发出来。

Although 主 **the ECMO process**, during which a person's blood is removed, oxygenated(v.) 供氧；输氧 and pumped back into their body, 谓 **became simpler** over time, it was mostly used (v.) in **operating rooms** and **neonatal 新生儿的 intensive care units** 重症监护室.
尽管随着时间的推移，ECMO 过程（将人的血液取出、充氧并泵回体内）变得越来越简单，但它主要用于手术室和新生儿重症监护室(ICU)。

Example 4. 案例

intensive care unit

That changed (v.) in 2009 when physicians in Asia began using ECMO to treat people who were hospitalized with H1N1 influenza, and the technology became more widely available.
这种情况在 2009 年发生了变化，当时亚洲的医生开始使用 ECMO 来治疗因 H1N1 流感住院的患者，并且该技术得到了更广泛的应用。

主 **Use of ECMO** during the COVID pandemic 谓 further increased (v.) interest in the approach.
在新冠病毒大流行期间使用 ECMO, 进一步增加了人们对该方法的兴趣。

But **treating cardiac arrest with ECMO** can be expensive — costing hospitals **tens of thousands of dollars** per patient — and technically challenging.
但使用 ECMO 治疗心脏骤停, 可能非常昂贵，医院为每位患者花费数万美元，而且在技术上也具有挑战性。

Other hospitals **have failed** to find a clear benefit from ECPR.
其他医院未能从 ECPR 中发现明显的好处。

主 A study **published earlier this year** by a group in the Netherlands 谓 found no significant difference in survival rates **between** people who received ECPR after a cardiac arrest **and** those who didn't.
荷兰的一个小组今年早些时候发表的一项研究发现，心脏骤停后接受 ECPR 的人和未接受 ECPR 的人的生存率没有显着差异。

主 None of the hospitals **involved in the study** 谓 had much experience **administering ECPR**, however, and **it took them considerably 非常；很；相当多地 longer**, on average, **than** the University of Minnesota hospital **to complete the procedure successfully** — a **crucial factor** 关键因素, given **the time-sensitive nature** 基本特征；本质；基本性质 of cardiac arrest.
然而，参与这项研究的医院都没有太多实施 ECPR 的经验，而且平均而言，他们比明尼苏达大学医院花费的时间要长得多, 才能成功完成该程序——考虑到抢救"心脏骤停"的时间敏感性，这就是一个关键因素。

主 **One of the main reasons** cardiac arrest is so deadly 系 is that **it occurs rapidly**.
心脏骤停如此致命的主要原因之一, 是它发生得很快。

Unlike a heart attack, **which can develop gradually** over hours, cardiac arrest typically **occurs suddenly** and **without warning**.
与心脏病发作不同，心脏病发作可能会在数小时内逐渐发生，而心脏骤停通常会突然发生且没有任何警告。

Within seconds, the heart stops (v.) beating, and blood stops circulating, cutting off the brain's oxygen supply.
几秒钟之内，心脏停止跳动，血液停止循环，大脑的氧气供应被切断。

Chest compressions 压紧，压缩 **can restore blood circulation** but only partially.
胸外按压可以恢复血液循环，但只能部分恢复。

CPR is not perfect.
心肺复苏并不完美。

It circulates blood **far less effectively than** regular circulation.
它的血液循环效率, 远远低于常规的人体中的自然循环。

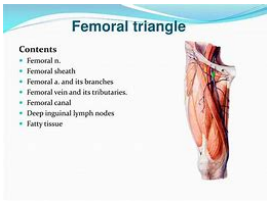
In contrast, ECPR can fully restore a person's circulation.
相比之下，ECPR 可以完全恢复人的血液循环。

It's also invasive (a.)侵入的；侵袭的; 切入的；开刀的 and more complicated to execute, however.
然而，它也是侵入性的，并且执行起来更加复杂。

A clinician 临床医师 — usually a physician 医师；（尤指）内科医生 with specialized training — has to **insert** large tubes **into** a patient's femoral 股骨的；大腿的；大腿骨的 blood vessels while that person receives chest compressions.
临床医生（通常是受过专门培训的医生）必须在患者接受胸部按压时, 将大的管子插入患者的股骨血管中。

Example 5. 案例

femoral



The procedure can also cause (v.) **excess bleeding** because people are often given **blood thinners**（涂料、清漆等的）稀料，稀释剂 to prevent clots, **which can clog (v.) the ECMO device** that oxygenates (v.) the blood.
该手术还可能导致出血过多，因为人们经常服用血液稀释剂来防止血栓形成，而血栓可能会堵塞为血液供氧的 ECMO 装置。

All the while 在整个时间内，一直, the clock is ticking 发出滴答声, with the likelihood of **survival dropping (v.) by about 20 percent every 10 minutes**.
时间一直在流逝，每 10 分钟生存率就会下降约 20%。

For many people **who have a cardiac arrest**, ECPR **is not even an option** because they live (v.) too far away from a large hospital, where, until recently, ECPR had to be performed.
对于许多心脏骤停的人来说，ECPR 甚至不是一种选择，因为他们住的地方离大医院太远，直到最近，ECPR 还必须在医院进行。

Experts have been working (v.) to change that, though.
不过，专家们一直在努力改变这一现状。

In 2019 a team at the University of New Mexico debuted (v.)（演员、运动员）首次亮相；初次登台（或上场） an ambulance 救护车 **outfitted (v.)装备；配置设备；供给服装 with** a hand-crank 用曲柄转动（或启动）-powered ECMO machine, **which makes the device easier to set up** and **more affordable 便宜的，付得起的 to use**.
2019 年，新墨西哥大学的一个团队, 首次推出了一辆配备手摇曲柄驱动的 ECMO 机器的救护车，这使得该设备更易于设置, 且使用起来更便宜。

Example 6. 案例

debut

-→ de-, 向下，离开。-but, 击，打，目标，词源同beat, butt. 即打向目标的，词义引申富家女子首次亮相，登上社交舞台。

Eventually, perhaps in the next 10 years, the ECPR process **may become simple enough** that nonphysicians 非医生的人 will be able to perform it, which could greatly expand the procedure's use.
最终，也许在未来 10 年里，ECPR 过程可能会变得足够简单，非医生也能执行，这可能会大大扩展该程序的用途。

主 Even hospitals that have an ECMO program 谓 may **not be prepared** to care for people **who've had a cardiac arrest** after they've received ECPR.
即使拥有 ECMO 项目的医院, 也可能没有准备好照顾接受 ECPR 后发生心脏骤停的患者。

Complications, including **internal bleeding** and **multiple organ failure** 失败, may necessitate (v.)使成为必要 surgery and other interventions.
并发症，包括"内出血"和"多器官衰竭"，可能需要手术和其他干预措施。

Additionally, people have to **be treated** for **the underlying problems** that led to their cardiac arrest.
此外，对于导致"心脏骤停"的潜在的其他问题, 人们也必须接受治疗。

Clinicians **want to ensure that** people get adequate time to recover.
临床医生希望确保人们有足够的时间康复。

There are also concerns, however, that ECPR could **leave people in an untenable 难以捍卫的；站不住脚的；不堪一击的 state** if, for example, **they survive** (v.) but **are left (v.) with severe brain damage** or **are unable to survive (v.) outside the hospital**.
然而，也有人担心 ECPR 可能会让人们处于一种难以维持的状态，例如，如果人们幸存下来，但脑部严重受损，或者无法在医院外生存。

Example 7. 案例

> *untenable*
>
> (a.)(formal) (of a theory, position, etc. 理论、地位等) that cannot be defended against attack or criticism 难以捍卫的；站不住脚的；不堪一击的

That is absolutely **a problem with ECMO**, but it's a problem with **every new technology** that offers (v.) life support.
这绝对是 ECMO 的问题，也是所有提供生命支持的新技术的问题。

Ultimately, ECPR is not a cure (n.)药物；疗法 for cardiac arrest.
最终，ECPR 并不能治愈心脏骤停。

It's basically **a salvage（对财物等的）抢救 intervention** — perfusing (v.)使…布满(液体、颜色等) and giving the body time to recover, if it can.
这基本上是一种挽救干预措施——如果可以的话，给身体灌注并给身体时间恢复。

Yet for now, **it may be the best chance of survival** for people whose life would otherwise be cut short.
但就目前而言，对于那些生命可能会缩短的人来说，这可能是最好的生存机会。

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2. ECPR Could Prevent Many More Cardiac Arrest Deaths

ECMO (extracorporeal membrane oxygenation) machines like this one can save the lives of people after a cardiac arrest, in a process called ECPR.

Every year more than 300,000 people in the U.S. die from an out-of-hospital cardiac arrest, making it a leading cause of death. Improved access to cardiopulmonary resuscitation (CPR) and defibrillators—devices that use an electric shock to restore a person's heartbeat—have helped increase survival rates somewhat, but about 90 percent of cases are still fatal. Recent studies have found that combining traditional CPR with a process called extracorporeal membrane oxygenation (ECMO), which helps deliver oxygen to the brain and other vital organs via a device similar to a heart-lung bypass machine, can significantly boost a person's chances of survival after cardiac arrest.

In 2020 a randomized clinical trial of this approach, known as extracorporeal cardiopulmonary resuscitation (ECPR), at the University of Minnesota showed that the technique resulted in a survival rate of 43 percent, compared with 7 percent in

standard care. The result was deemed so successful that the National Institutes of Health terminated the study early, arguing that it would be unethical to deprive eligible people of the treatment.
The Minnesota trial focused on a subset of cardiac arrests that initially responded to defibrillation, but other studies indicate that ECPR can help in nonshockable cases, too. Still, technical and logistical challenges may keep the procedure from becoming the standard of care for cardiac arrest outside of large academic hospitals.

The basic technology behind ECPR has existed since the 1950s, when both CPR and the first heart-lung machines were developed. Although the ECMO process, during which a person's blood is removed, oxygenated and pumped back into their body, became simpler over time, it was mostly used in operating rooms and neonatal intensive care units. That changed in 2009 when physicians in Asia began using ECMO to treat people who were hospitalized with H1N1 influenza, and the technology became more widely available. Use of ECMO during the COVID pandemic further increased interest in the approach.

But treating cardiac arrest with ECMO can be expensive—costing hospitals tens of thousands of dollars per patient—and technically challenging.

Other hospitals have failed to find a clear benefit from ECPR. A study published earlier this year by a group in the Netherlands found no significant difference in survival rates between people who received ECPR after a cardiac arrest and those who didn't. None of the hospitals involved in the study had much experience administering ECPR, however, and it took them considerably longer, on average, than the University of Minnesota hospital to complete the procedure successfully—a crucial factor, given the time-sensitive nature of cardiac arrest.

One of the main reasons cardiac arrest is so deadly is that it occurs rapidly. Unlike a heart attack, which can develop gradually over hours, cardiac arrest typically occurs suddenly and without warning. Within seconds, the heart stops beating, and blood stops circulating, cutting off the brain's oxygen supply. Chest compressions can restore blood circulation but only partially. CPR is not perfect. It circulates blood far less effectively than regular circulation.

In contrast, ECPR can fully restore a person's circulation. It's also invasive and more complicated to execute, however. A clinician—usually a physician with specialized training—has to insert large tubes into a patient's femoral blood vessels while that person receives chest compressions. The procedure can also cause excess bleeding because people are often given blood thinners to prevent clots, which can clog the ECMO device that oxygenates the blood. All the while, the clock is ticking, with the likelihood of survival dropping by about 20 percent every 10 minutes.

For many people who have a cardiac arrest, ECPR is not even an option because they live too far away from a large hospital, where, until recently, ECPR had to be performed. Experts have been working to change that, though.

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Eventually, perhaps in the next 10 years, the ECPR process may become simple enough that nonphysicians will be able to perform it, which could greatly expand the procedure's use.

Even hospitals that have an ECMO program may not be prepared to care for people who've had a cardiac arrest after they've received ECPR. Complications, including internal bleeding and multiple organ failure, may necessitate surgery and other interventions. Additionally, people have to be treated for the underlying problems that led to their cardiac arrest. Clinicians want to ensure that people get adequate time to recover. There are also concerns, however, that ECPR could leave people in an untenable state if, for example, they survive but are left with severe brain damage or are unable to survive outside the hospital. That is absolutely a problem with ECMO, but it's a problem with every new technology that offers life support.

Ultimately, ECPR is not a cure for cardiac arrest. It's basically a salvage intervention—perfusing and giving the body time to recover, if it can. Yet for now, it may be the best chance of survival for people whose life would otherwise be cut short.