



Cutting cardiac arrest death rates

The case for ensuring vehicles have defibrillators

Abstract

The installation of defibrillators by car manufacturers in all new vehicles in the UK would dramatically improve cardiac arrest survival rates by ensuring rapid access to defibrillation for the vast majority of the population, given the country's widespread vehicle ownership and common cardiac arrest scenarios.

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Foreword

In Berkhamsted, a small market town in Hertfordshire, there is a publicly accessible defibrillator. But it lives in a box screwed to the wall of the Town Hall. To access it, someone will need to know the combination of the lock. To get the combination they have to make a phone call from the emergency phone in its own box. And someone has to pick up the phone at the other end and have the number to hand. They could phone 999 on their mobile and hope they get through quickly to a responder who would tell them the code. But does everyone know that facility exists? Given that, without treatment, death can occur between three to five minutes after a cardiac arrest, this seems an inadequate system to say the least.

My wife and I are in our eighties, and we live approximately 600 metres away from our nearest publicly available defibrillator. Should we need it, that is at least a 16 minute round trip by foot or five minutes by car just to retrieve it, not accounting for the extra time in trying to access it and know what to do. In essence, there is no practical way we would benefit from that public defibrillator if we actually needed it. It might as well be 100 miles away.



This is not to criticise anyone in this or any other specific case; it is merely the way the system is set up. Just as someone suffering cardiac arrest needs a defibrillator's electric charge administered quickly, so the whole system for averting deaths needs a reboot. I believe that there is a clear case for car manufacturers to seize that opportunity.

The need for some innovation is certainly great. The 1,770 deaths annually that result from car accidents receive a lot of attention from the media and other observers, as do the 330

fatalities in fires in the home — both quite rightly. But so far, the estimated 27,000 fatalities each year associated with out-of-hospital cardiac arrests seem to fall under the radar. And even that number pales into insignificance compared with the worldwide totals. Not only is each and every lost life a waste, but some of those deaths may result from the fact that bystanders could not access a defibrillator machine quickly enough.

There have been laudable efforts by charities, state schools and individual companies to increase the number of publicly accessible defibrillators. While this has led to an estimated 100,000 machines available across Britain, that is nowhere near enough for a population of 67 million people.

If every home in Britain, and across the world, could retrieve and use a defibrillator within just one or two minutes, we could save thousands if not hundreds of thousands of lives every year. This is far from the reality today, and the current approach of incremental increases and focusing on locating defibrillators in public areas is totally insufficient to achieve this aim. A paradigm shift in the production and distribution of defibrillators is therefore needed.

My proposal is that car manufacturers install portable defibrillators as a standard feature within new cars sold in Britain. Given that 1.94 million cars were sold in 2022, after just five years as many as 5 million could be available — a 50-fold increase. By the end of the decade there could thus be 5 million “mini ambulances” on our roads.

For car owners and their loved ones, the advantages are clear — a defibrillator would be close to hand, whether they are at home or out and about. The device can be kept safe and damage-free in a dedicated area of the car, and it would be checked regularly as part of routine servicing. It would do away with the accessibility issues surrounding defibrillators in locked cabinets and instil a whole new education about the devices for a large section of the population. By incorporating defibrillators as standard equipment in their cars, the manufacturers would be further demonstrating their dedication to the safety and wellbeing of their customers while extending this to the health of local communities. Their actions will save lives.

— Jonathan Harris CBE, FRICS

Executive Summary

Cardiac arrests are shocking, life-threatening events when the heart suddenly stops pumping blood effectively. Around 30,000 people suffer cardiac arrests outside of hospitals each year in the UK. Tragically, fewer than one in 10 survives. The key to increasing survival rates is receiving immediate defibrillation within three to five minutes. This can increase survival chances by up to 70 per cent. However, defibrillators are often not available or accessible in the critical first few minutes after a cardiac arrest occurs.

This report makes a compelling case for car manufacturers to equip all new cars made or sold in the UK with defibrillators. This would make them immediately accessible in three common cardiac arrest scenarios: in vehicles themselves; at homes where the vehicle is parked nearby; and in public spaces where multiple vehicles would be in the vicinity. With over 90 per cent of the UK population having access to a vehicle, this could dramatically improve survival rates.

The need for immediate defibrillation. When a cardiac arrest strikes, the brain is deprived of oxygen-rich blood within minutes, leading to unconsciousness, disability or death unless there is prompt treatment. Even for survivors, delayed assistance risks severe neurological damage. Rapid defibrillation is critical — the chance of survival increases by 70 per cent with immediate on-site defibrillation compared to just 7.8 per cent for out-of-hospital cardiac arrests currently.

Challenges in accessing defibrillators. Despite the existence of around 100,000 public defibrillators in the UK, accessibility remains a huge barrier: 80 per cent of cardiac arrests occur in homes, yet defibrillators are rarely located in residential areas. Deprived and rural areas have particularly poor access. Even in public spaces, people are on average over 700 metres from a device. Tragic cases are avoidable with quicker defibrillator access.

Advantages of in-vehicle defibrillators. Installing defibrillators in all new cars would create a vast network of publicly accessible defibrillators. Since more than nine out of 10 households have access to a car, they would likely have a defibrillator nearby. That would provide vital rapid access for cardiac arrests in homes, public spaces and in transit. This approach would be in line with the installation of seatbelts first in the front seats and then in the back, which reduced vehicle fatalities by around 30 per cent when introduced. Like seatbelts, the cost per vehicle would be modest, thanks to economies of scale achieved across millions of new cars annually. It would improve accessibility and increase public education about using the devices.

Overcoming cost challenges. While quality defibrillator models currently cost £800-£2,500 each because of the current low volumes, mass production for 1.94 million new UK vehicle sales annually would significantly reduce per-unit costs. Despite the earliest consumer defibrillators having been available for decades, the price of a quality defibrillator has remained stubbornly high, especially when compared to the price of many consumer electronics like computers, TVs and microwaves, which share many of the same underlying components. Lack of supply side innovation means that price is still high and supply is low.

Reforming the market. The current model for producing and distributing defibrillators will never achieve the necessary volume and widespread access required to save lives. Individuals are unlikely to purchase an expensive device they hope never to use. Businesses locate defibrillators on their premises with restricted public access. Public institutions face financial constraints, purchasing only the minimum required. None of these models create enough demand to drive innovation and reduce costs through economies of scale.

The solution is to package defibrillators as a standard component in new cars, “piggybacking” on the immense demand for automobiles rather than relying on inadequate consumer demand for the devices themselves. Just as seatbelts and airbags shifted from optional extras to expected safety standards, defibrillators could follow a similar path when included by default.

The demand would then come from auto manufacturers themselves. This would lead to vertical integration in the defibrillator supply chain, unleashing the same product innovation and cost reductions seen in other industries. Quality and safety standards would improve. Economies of scale could finally be realised, driving down per-unit costs. Rather than pursuing the current fragmented, low-demand approach, mandating defibrillators as standard automobile equipment could create a viable market. Leveraging the scale of the automobile industry holds the key to improving access and saving lives.

Overcoming legal issues. Legal protections under the Social Action, Responsibility and Heroism Act 2015 provide reassurance that bystanders assisting in an emergency cannot be held liable provided they demonstrate a reasonable approach. Courts have historically treated those attempting resuscitation favourably, as the alternative of non-intervention guarantees death.

In summary, this innovative move by car manufacturers would save thousands of lives annually by ensuring rapid defibrillator availability for cardiac arrest emergencies anywhere in the country. The significant lifesaving potential greatly outweighs the modest implementation costs for the automotive industry. It is a moral and ethical imperative for car manufacturers to adopt this straightforward but transformative public health measure.

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1. Introduction

For the victim, their family and any bystanders, a cardiac arrest is a shocking event. According to one person who suffered a serious event, they simply “keeled over”ⁱ. In simple terms, your heart suddenly stops pumping blood around your body. A sudden cardiac arrest can happen during another medical emergency, such as a heart attack or choking, but can also seemingly happen out of nowhere.

Although it is sometimes mistaken for a heart attack, a cardiac arrest is different. When someone has a heart attack, the blood supply to the heart muscle is cut off. The heart is still pumping blood around the body during a heart attack and the person will often still be conscious and breathing. For a cardiac arrest, the victim is highly likely to die without immediate treatment. Medically it is seen as an emergency, and anyone nearby should call 999 at once.

Around 30,000 people suffer cardiac arrests outside of hospitals each year in the UK. According to the British Heart Foundation, fewer than one in 10 people in Britain survives such an eventⁱⁱ. Even these awful numbers pale into insignificance compared with the totals worldwide and in countries such as the United States (see Box 1). To improve the chances of survival, a key piece of equipment — and often the difference between life and death — is having a defibrillator nearby and being able to access it quickly. A defibrillator is a device that delivers a high-energy shock to the heart of someone suffering a cardiac arrest and gets it beating again. If it is used within three to five minutes of a cardiac arrest, it can increase survival chances as much as 70 per centⁱⁱⁱ.

Box 1: Cardiac arrests deaths vs other causes, by country/region

United Kingdom

Deaths from motor car accidents (2022)	1,711
Deaths from fires at home (2022)	276
Deaths from out-of-hospital cardiac arrests (a year)	c.27,000

European Union

Deaths from motor car accidents (2022)	20,653
Deaths from fires at home (2022)	c. 5,000
Deaths from out-of-hospital cardiac arrests (2012-27)	c.306,000

United States

Deaths from motor car accidents (2022)	42,795
Deaths from fires at home (2022)	2,710
Deaths from out-of-hospital cardiac arrests:	c.320,400

World

Deaths from motor car accidents (a year)	1.2 million
Deaths from fires at home (2020)	20,700
Deaths from out-of-hospital cardiac arrests (a year)	c.3.7 million

Sources: UK Department for Transport; UK Home Office; author calculations; Eurostat; European Fire Safety Alliance; Empana, J-E et al (2022); US Department of Transportation; National Fire Protection Association; Sudden Cardiac Arrest Foundation; International Association of Fire and Rescue Services; Mehra, R (2007)

But these vital pieces of equipment are often nowhere near the scene or are inaccessible. The example in the foreword of this report, about a defibrillator in a locked cupboard that requires someone to make a phone call — and someone else to answer the phone to get the code — is a graphic illustration of the parlous state of provision at the moment.

This is why this report makes the case for car manufacturers to install a defibrillator in all new vehicles. Only by taking this step, can we as a nation ensure that life-saving defibrillators will be immediately accessible within minutes — 24 hours a day, seven days a week.

2. The Need for Immediate Defibrillation

A cardiac arrest is a potentially life-threatening condition. It happens suddenly and means that the heart stops pumping blood effectively, leading to a lack of blood flow to vital organs, including the brain. The lack of blood flow to the brain can cause the victim to lose consciousness, become disabled or die if not treated immediately. Even if they survive, the consequences of delayed assistance can be awful including risk of neurologic dysfunction, brain injury, disorders of consciousness, neurocognitive deficits, changes in quality of life as well as physical and psychological wellbeing. This is why timely access to a defibrillator is of utmost importance.

Around 30,000 people a year suffer from an out-of-hospital cardiac arrest in the UK. The National Heart, Lung and Blood Institute puts it bluntly: a sudden cardiac arrest is fatal unless treated right away with a defibrillator. The machine sends an electric shock to the heart to help it regain function and beat normally. This treatment should be used immediately to save the person's life and reduce further organ damage from oxygen and blood deprivation. According to the US government's National Library of Medicine, the chance of survival significantly increases when immediate defibrillation with an on-site automated external defibrillator is available.

3. Challenges associated with accessing defibrillators in emergency situations

Despite the wealth of advice and knowledge there is a big gap: defibrillators are not widely available. This means that there are serious challenges associated with accessing defibrillators in emergency situations. According to the Resuscitation Council UK, approximately 80 per cent of cardiac arrests take place in people's homes, and 13 per cent happen in public spaces^{iv}. The use of public-access defibrillators remains low — in fewer than one in 10 cases. There is a clear implication that in 90 per cent of cases public-access defibrillators were not used because there was not one nearby.

The British Heart Foundation has estimated that there are currently around 100,000 machines in the UK.^v One study by the Hull York Medical School (HYMS) found that on average, a public access defibrillator was 726 metres (or half a mile's walk) away from the centre of any given postcode along the road network across Great Britain. The authors concluded that “more

equitable future [defibrillator] placement” would have the potential to save lives and improve neurological outcomes for people with out-of-hospital cardiac arrest, as would extending the hours that existing defibrillators were accessible to members of the public.^{vi}

However, the distribution of defibrillator locations is highly inequitable, leaving large limitations and gaps in coverage. In England and Scotland, the HYMS researchers found that those in the most deprived areas had to travel more than 1 km to their nearest 24/7 accessible machine, which tended to be further away than in less deprived areas. Another study said that defibrillators were more likely to be found in areas with a lower residential but higher workplace population density, with people predominantly from a white ethnic background and working in higher socio-economically classified occupations. Most worryingly, whilst almost 80 per cent of all out-of-hospital arrests occur in residential areas, public access defibrillators are located less frequently in these areas.^{vii}

4. Advantages of in-vehicle defibrillators

The picture that the current statistics paint of a society where a cardiac arrest has a regrettably high chance of leading to a fatality due to an insufficient and inequitably dispersed availability of publicly accessible defibrillators is depressing. But that shocking deficiency also provides the inspiration for innovation. The UK is a country with a high level of car ownership. Around three-quarters of households in Great Britain have a car with 71 per cent owning their own vehicle and 4 per cent a company car, according to the data company Statista. And because car-owning households tend to have more than one person (most non car-owning households are single person households) the number of people with access to a car in the house is 91 per cent of the total population.^{viii}

Car manufacturers that either build models in this country or that import them for sale here could easily install a defibrillator in all new cars. In that way it would become as standard as seat belts for all occupants of a car, in both the front and back seats. Installing defibrillators would, in effect, make every car a mini ambulance, which would have potential life-saving implications in three situations that are likely to occur on a regular basis. The first is a cardiac arrest occurring in the car itself: in this case the device would be instantly available for either one of the occupants or a bystander to use. The second situation is where the cardiac arrest takes place at home where a fellow resident or neighbour will be able to access the defibrillator from the car outside. Third, where someone in a public place suffers a cardiac arrest there will be a multitude of “mini ambulances” nearby to aid. In any of those events, the cardiac arrest victim is likely to receive the critical help they need within minutes. Precious time is well used, and a life is saved. Defibrillators are easy to use: once activated they give clear step-by-step voice instructions.

Box 2: The British Heart Foundation summarises a six-step process:

1. Press the green button to switch on the defibrillator and follow the instructions.
2. Remove the person's clothing above the waist.
3. Peel off the sticky pads and attach them to the person's bare skin. Put one pad on each side of the chest as shown in the picture on the defibrillator.
4. Once you have attached the pads, do not touch the person. The defibrillator will then check the person's heart rhythm.
5. The defibrillator will decide whether a shock is needed. If so, it will tell you to press the 'shock' button. An automatic defibrillator will shock the person without you needing to do anything.
6. The defibrillator will tell you when the shock has been given.^{ix}

Installing defibrillators in new cars as standard will also have the benefit of raising the level of the general public's knowledge about cardiac arrests and how to administer emergency medical treatment with a device. This will have a spillover benefit of increasing the likelihood that members of the public will make use of defibrillators, whether in a public access site or in a vehicle. A study based on a survey of 1,000 members of the public in the UK concluded that there was a general lack of knowledge about their use, which might explain why public access defibrillators are only deployed successfully in a small number of out-of-hospital cardiac arrests. The researchers said that confidence in using a defibrillator and the inability to locate a nearby device might be more significant barriers than a lack of defibrillators themselves — something this report would argue that mass in-car installation would likely improve.^x

Box 3: Harrowing examples of lives lost

In 2023 the All Party Parliamentary Group (APPG) for Defibrillators heard evidence from people who had suffered a bereavement after a death as a result of a cardiac arrest, or whose relative only just survived. These summaries are taken from the APPG's reports:

— Oliver King, aged 12, had a sudden fatal cardiac arrest while competing in a swimming race in 2011. His father Mark told MPs that more needed to be done to improve access to ensure that defibrillators were as commonplace as fire extinguishers.^{xi}

— Jamie Issitt, aged 18, died because a defibrillator was not available when he collapsed at two o'clock in the morning. Ambulances did not arrive within the required response time, and the police car was not equipped with a defibrillator despite the force believing it had one.^{xii}

— Ryan Nelson, a fit and healthy 43-year-old, without any warning, had a sudden cardiac arrest on his doorstep which caused him to drop dead for 26 minutes. After the ambulance service was contacted, it took 14 minutes for Ryan to receive his first shock from a defibrillator, Thankfully his heart was eventually brought back into rhythm.^{xiii}

As well as giving an exponential boost to the sheer number of defibrillators available, this new practice will also massively improve their accessibility. As discussed above, many of the devices are held in locked boxes. This is because of a regrettably large number of instances of vandalism, which means they must be kept secured. However, the downside is that this often means that a bystander or medical professional will have to get hold of a combination to unlock it. Often that should be straightforward: once someone calls 999, the responder will share the location of the nearest device and the key code to unlock the box.^{xiv} But as Resuscitation Council UK has pointed out, lockable cabinets inevitably introduce delay in obtaining a defibrillator and applying it to a person in cardiac arrest.^{xv,xvi} And not every member of the public knows that 999-responders know the code for all locked cabinets.

While this report focuses on the installation of defibrillators by car manufacturers in new models as standard, it is notable that there has been a much more intense debate over installing them in public service vehicles such as taxis and emergency services vehicles. The All Party Parliamentary Group of MPs looking at defibrillators used Freedom of Information requests to find out that only one in 11 police cars had access to a defibrillator, with many forces having them in fewer than 1.5% of vehicles.^{xvii} This opens up the potential for a shocking outcome — someone flags down a passing police car to help after their partner suffers a cardiac arrest only to discover it is the “wrong” vehicle that does not carry a defibrillator. In light of its findings, the committee in March 2024 called for installation to be mandatory in all emergency service vehicles, a plea echoed by a campaign in the *Mirror* newspaper.^{xviii}

Within the arena of passenger transport there are some positive signs. A taxi firm in Glasgow installed defibrillators in 15 of its city cabs six years ago, while in 2018 London Ambulance Service worked with the Licensed Taxi Drivers’ Association to fit their vehicles with defibrillators^{xix, xx}. Although they have not been installed on trains, one train company has mounted them in its 164 railway stations and 17 depots.^{xxi} Another useful comparison is the eagerness with which vehicle fleet operators and car retailers have responded by installing defibrillators in their vehicles or showrooms, respectively. Here are a few examples out of many across the industry:

- Speedy Hire, a provider of tools, specialist equipment and services has already equipped 18 engineer vans with defibrillators and is rolling the initiative out to more than 320 of its vans across the country in 2024.^{xxii}
- Defibrillators have been installed at 60 Hendy Group sites across the south and southwest of England.^{xxiii}
- TrustFord, the UK’s largest Ford dealer group, has invested £90,000 to install defibrillators across all of its 65 dealership locations.^{xxiv}
- In 2019, Evans Halshaw agreed a deal with St John Ambulance for the installation of defibrillators at all dealerships, service centres, accident repair body shops and preparation centres across its network.^{xxv}

While all the examples in this section are one-offs, they show the ease with which companies can install defibrillators in vehicles when there is a clear commitment from the managers.

5. Cost, regulatory and practical issues

Like any revolutionary proposal, installing defibrillators will raise concerns over the cost and any legal and practical issues.

5.1 Rationalising the cost of this initiative

Defibrillators are currently quite expensive. According to the charity St John Ambulance, which provides a range of first aid services, defibrillators can cost between £800 and £2,500 exc. VAT each depending on the model and its features.^{xxvi} One reason is the small scale of the market: as discussed earlier, there are only around 100,000 defibrillators in the UK for a population of around 67 million people. But this is dwarfed by the number of new cars sold and registered every year: in 2022, around 1.94 million motor vehicles were sold in the UK.^{xxvii} If installation was made mandatory for new cars, that would raise the production needed for the UK alone by almost 20-fold. The logic of economies of scale would mean that the per unit price would fall as more equipment manufacturers compete to provide cheaper models.

Of course, whatever the scale of the fall of the per unit price, the costs will have to be paid for either by the manufacturer absorbing it within the cost of the vehicle, or the buyer as the cost is passed on. Car manufacturers have consistently responded quickly to innovations aimed at boosting safety, whether to install seatbelts or airbags while competing with each other on price. It is likely that no car manufacturer will want to be known as the one that sought to pass on the full cost of a public good arising from having an easy-to-access defibrillator installed in their vehicles. By swallowing the cost, they will be able to say that they are acting to save the lives, not only of the car owner but potentially of a large number of people who happen to fall suddenly ill near to where one of their cars is passing by. In fact, by taking that step they would be delivering a benefit to the wider community, something that would fit within their corporate social responsibility agenda and thus enhance their reputation.

5.2 Why the current defibrillator market will never achieve the scale required — and the solution

A basic understanding of demand and supply illustrates why the current way we produce and sell defibrillators will never achieve the volume and distribution required to ensure universal, rapid access when needed. Defibrillators are currently purchased either by private individuals for their home, by businesses that are large enough and centrally located enough to “warrant” it in their eyes, and by public institutions like the police, local councils etc. that feel a responsibility to help contribute to the public defibrillator network. Each of these approaches cannot achieve the quantity required and will not create enough demand that would lead suppliers to innovate and improve their supply chain to reduce unit cost.

Firstly, most private individuals are unlikely to go out of their way to spend a large sum of money on a device that they are unlikely to and hope never to use. There are very few examples where “public goods”, would be adequately demanded by individuals. Secondly, businesses will locate their devices on their premises, which may have restricted access to the public as well as not being located near to where people live. Finally, for public institutions where financial constraints are high, many organisations will opt only to have the minimum number of defibrillators required so as not to be criticised for not having any. Once a minimum number

have been purchased, the organisation will then soon look to allocate their resources to other areas more aligned to their primary objectives. It is impossible that public institutions alone would purchase and distribute enough defibrillators to achieve the coverage required.

Each model faces the same fundamental flaw — not enough demand, so the industry does not scale and improve. This would be solved by my proposal to “package” them into new cars, where the individual demand for defibrillators would no longer be a constraining factor. Instead, this proposal “piggy-backs” onto the much larger demand for new cars. As a comparison, if seatbelts or airbags were an optional “extra” for a car or sold separately, then undoubtedly some customers may choose not to have them. Whereas, by making it a default part of the car, the cost is factored in and absorbed across both the manufacturer and customer, where the individual “demand” for seatbelts is no longer relevant, instead the supply is driven by the greater overall demand for a new car. Over time, it becomes baked into customer expectations and what will at first be seen as a novel extra will soon become an expected standard.

I envisage a similar outcome is possible for defibrillators. If they were a default component of the car, then the system would no longer rely on the inadequate consumer demand. Now the demand being exerted on suppliers would be from car manufacturers themselves. This would lead, as has been shown in many other areas, to vertical integration, product innovation and safety standards — all driving supply and quality up and price down.

Once the argument for including defibrillators as part of the "package" as described above has been won, the challenge would be to leverage the manufacturing expertise of carmakers to massively scale up supply, while maintaining safety standards. The experience of the Covid-19 pandemic sheds some light on this. As the death toll started to rise sharply in spring 2020, the Department for Health and Social Care sent a document detailing specifications for the medical devices to 60 manufacturers including automakers to help address a potential shortage of equipment.^{xxviii} As a result, over 14,000 ventilators were delivered by the end of July that year.^{xxix} The UK’s Medicines & Healthcare products Regulatory Agency swiftly issued specification for ventilators as medical devices to be used in UK hospitals during the coronavirus outbreak.^{xxx}

5.2 Overcoming legal issues

While installing a defibrillator in every new car would be a huge step forward, the initiative will only deliver results if people use the machines. Unlike a seatbelt or an airbag that does its job automatically without the need for any human intervention, a defibrillator must be used to be effective. This will understandably cause concern among people who do not want to subsequently be accused of making a situation worse or even contributing to someone’s death by attempting to help.

There is evidence to suggest that people are deterred from volunteering, helping others or intervening in an emergency due to the fear of risk and/or of incurring liability.^{xxxi} A national survey of volunteering and charitable giving in 2006/2007 found that this was one of the significant reasons deterring people from helping others or intervening in an emergency cited by 47 per cent of respondents to the survey who did not currently volunteer.

In 2016 Parliament passed the Social Action, Responsibility and Heroism Act 2015 (Sarah Act) to address these concerns and provide reassurance if something goes wrong when people intervened to help in an emergency, by stating that if someone is sued, the courts must “have regard to whether the person, in carrying out the activity in the course of which the alleged negligence or breach of statutory duty occurred, demonstrated a predominantly responsible approach towards protecting the safety or other interests of others”.^{xxxii} The court must also have regard to whether the alleged negligence or breach of statutory duty occurred when the person was “acting heroically” by intervening in an emergency to assist an individual in danger.

While there is no obligation on a passerby to come to someone’s aid, once they do intervene, they are then considered to have a duty of care to assist the person as far as they are able. However, a detailed report by Resuscitation Council UK says that the courts have always looked benevolently on those who have gone to the assistance of others.^{xxxiii} This means that anyone attempting resuscitation would only be legally liable if it could be shown that the intervention had left a person in a worse position than they would have been in had no action been taken. In the case of a cardiac arrest, it points out that this would be “virtually impossible”, since without intervention death is inevitable.

5.3 Overcoming practical issues

Car manufacturers will doubtless raise some practical obstacles to installing a defibrillator as standard in new models. These relate to the durability of the device i.e., how “tough” it is; ensuring that it is stored securely; the added weight; and issues raised by raised temperatures within the vehicles. I believe that an industry as innovative as the car manufacturing sector will be able to overcome those, but I delve into each in more detail.

The first concern is **durability**: whether a defibrillator will be able to withstand the rough and tumble of being in a car. Over time these devices have been improved so that most are water resistant and have a battery life of around four years. One measure is an IP Rating (also known as an Ingress Protection Rating or International Protection Rating) that shows the effectiveness of electrical enclosures in blocking foreign bodies such as dust, moisture, liquids and accidental contact^{xxxiv}. It is made up of two digits that rate its effectiveness against solids and liquids on a scale of 1 to 6. For example, St John Ambulance uses two devices: one rated IP24 or “moderately rugged” and the other IP65 or “very” rugged^{xxxv}. This will give any installer confidence in its durability.

As discussed earlier, **security** is an issue for publicly accessible defibrillators because of their vulnerability to vandalism, theft and the weather. This is clearly much less of an issue for devices stored in a car that can be locked and alarmed. Of course, the device will add some **weight** to a car, but modern portable defibrillators start at around just 1.5kg. This is equivalent to the weight of a standard laptop or a couple of medium-sized bottles of water.

Temperature is an important consideration: as the old television advert said “dogs die in hot cars” — and electrical devices can too. With their specialist components, modern defibrillators can become compromised if they experience temperatures below or above their specified range. The standard range is 0 deg C to 50 deg C. As climate change leads to higher temperatures, it

will be possible to use more heat-resistant devices. Indeed, Abu Dhabi's ambulance service uses a defibrillator model that is approved for use in temperatures of up to 55 deg C.

For now, Britain's freezing temperatures may be more of an issue, especially in northern England and Scotland. If cars are in areas below 0 deg C, this poses threats to the operability of the device. Batteries in low temperatures produce a weaker current and mean they are likely to drain power more quickly.^{xxxvi} While bringing it indoors will help, people who understandably want to ensure it is always in the car can use an insulated case to protect the device from extreme cold.^{xxxvii} For added protection, experts recommend storing it in the front of car which is often heated, rather than in the boot. Of course, car manufacturers themselves will have long experience in the effective storage of equipment within the vehicles they design.

6. Conclusion

A cardiac arrest is a sudden, life-threatening medical emergency in which the heart stops pumping blood. Unless treatment is given within three to five minutes, the patient is highly likely to die. Each year around 30,000 people suffer a cardiac arrest away from a hospital, of whom fewer than one in 10 survives. Each death is a tragedy for the family involved but also robs the country of a person who would have continued to have a profound economic, social and cultural impact. As Box 1 showed, some 3.7 million people die a year as a result of a cardiac arrest globally — an incalculable loss.

One of the contributory factors is that there are not enough publicly accessible defibrillators available. This report has laid out the case for car manufacturers to install a defibrillator as standard in all new cars sold in the UK, whether manufactured domestically or imported. With almost 2 million new cars sold every year, this would have the collective impact of creating a fleet of “mini ambulances” available outside homes and on street corners across the country. While the cost of the machines is currently high, that would certainly come down because of the massive increase in production required to meet the new demand.

In summary, poor access to defibrillators is costing thousands of lives per year in the UK that could potentially be saved. Installing them in cars removes the concern over defibrillators in locked cabinets and would be a tool to impart both knowledge about cardiac arrest and also training in using the devices. Their installation in all new vehicles would create an affordable, equitable, and immediate solution to this major public health issue, saving lives and reducing healthcare costs from cardiac arrest related disabilities.

The cost barrier is outweighed by the moral and economic benefits of such a policy. While installing defibrillators as standard will have a financial cost, there are many reasons why manufacturers will be happy to absorb that cost rather than pass it on to the man or woman in the street. Britain's motor manufacturing sector will be seen to be contributing towards the good of the community by reducing the risk of death from cardiac arrests. Investing in such life-saving equipment will be seen as an example of corporate social responsibility in action. It will undoubtedly strengthen their reputation as upstanding and innovative companies.

It only takes a handful of influential people — innovators and pioneers — to set the wheels in motion. Others will then follow. Their actions will save lives.

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