

2 April 2020 – For immediate release

British taskforce reinvents trusted technology to help solve NHS crisis

A body of British citizen scientists, medical clinicians, academics, manufacturers and engineers has developed an alternative model of ventilator to support the Government's drive to equip the NHS.

The new model, the **exovent**, is a cutting-edge reinvention of the archetypal iron lung which saved the lives of countless polio victims during the last century.

Marshall Aerospace & Defence Group, the UK's leading privately owned Aerospace and Defence business, is exploring the technical aspects of the scheme ahead of rapid production and roll-out of the Negative Pressure Ventilator (NPV). The **exovent** concept is also supported by WMG at the University of Warwick and representatives from Imperial NHS Trust and The Royal National Throat Nose and Ear hospital. Two leading intensive care units have agreed to trial the prototype ventilator support devices.

With only a small number of moving parts, the components are readily available now in the UK and are not required by other manufacturers currently commissioned by the Government to build conventional Intermittent Positive Pressure Ventilators (IPPV). More types of ventilator can then be built simultaneously – with the aim of 5000 **exovents** a week being produced – and more options can be provided to clinicians choosing the most appropriate device for each patient.

exovent is non-invasive, which means that patients do not need to have their windpipes intubated, so they don't need to be sedated or paralysed. Instead, they can remain conscious, take medication and nutrition by mouth, and talk to loved ones on the phone. It can be used on a normal ward, keeping patients out of intensive care.

The device works by being fitted over the patient's torso and taking over their breathing through gentle and repeating pressure. It increases the heart's efficiency by up to 25% compared to conventional ventilators which squeeze the chest and may actually reduce cardiac function.

The ventilation support device is supported by Sir John Burn, professor of Clinical Genetics at Newcastle University, who is leading the development of a Covid-19 antigen test:

"The exovent team has cleverly adapted the old concept of the iron lung which was used for treating polio. This device is cheap, simple and it will work. I am convinced it provides a real alternative and is worthy of support."

Speaking on the concept, the task force's leading clinician Dr Malcolm Coulthard said:

"The team has been working flat out for the last 10 days. We started out looking at negative pressure ventilator technology thinking that it would allow us to produce literally thousands of ventilators very quickly and cheaply to cope with the tsunami of people with pneumonia that may be upon us because of the Covid-19 virus."

"However, as soon as we looked into the science and the literature it immediately became apparent that this will allow us to produce less-invasive devices than the conventional units in current use, possibly better for patients' hearts, at a fraction of the price, using off-the-shelf parts."

*“**exovent** can provide an alternative choice to using Continuous Positive Airways Pressure (CPAP) by delivering continuous Negative End Expiratory Pressure (NEEP). This method does not require to be driven by pressurised air or oxygen, and additional oxygen that the patient needs can be provided with tubing or a face mask as required.”*

Margot James, Executive Chair, WMG University of Warwick said:

*“We are delighted to be working with **exovent** to help scale up their non-invasive ventilator from prototype to volume manufacturing. Our engineers and researchers are collaborating with the **exovent** team on the design, engineering, component sourcing and assembly of the ventilator. I am extremely proud of the unstinting and dedicated efforts of our research team, led by Archie MacPherson at WMG, and glad that we are able to apply our expertise to this important project.”*

The family of Stephen Hawking said:

“As the family of a ventilated man, we know the life and death difference that access to this kind of medical technology makes. The COVID 19 epidemic has caused worldwide demand for ventilators vastly to outstrip supply. We are so proud to support the technological and manufacturing innovation involved in producing low cost, effective ventilators swiftly and in large numbers and hope the combined efforts of everyone who has answered this call will mean the NHS receives the equipment it needs to save lives at this terrible time.”

- **ENDS** -

exovent media enquiries

Kate Miller/Fflur Sheppard

exovent@drdpartnership.com

07720 593428 / 07890 857982

Marshall Aerospace and Defence Group media enquiries

Sarah Oakes

Sarah.Oakes@marshalladg.com

07765 221168

WMG media enquiries

Lisa Harding

Lisa.Harding@warwick.ac.uk

07824 540845

Note to Editors

Medical benefits

- **exovent** can provide an alternative choice to using continuous positive airways pressure (CPAP) by delivering continuous negative end expiratory pressure (NEEP). This method does not require to be driven by pressurised air or oxygen, and additional oxygen that the patient needs can be provided with tubing or a face mask as required
- **exovent** gives excellent oxygen and carbon-dioxide transfer because replacing PPV+PEEP with NPV+NEEP has been shown to give equal or improved gas transfer when treating ARDS
- **exovent** increases the heart's efficiency by up to 25% compared to conventional PPV which squeezes the heart and veins in the chest and may actually reduce cardiac function. This is especially important because Covid-19 can make heart function worse
- **exovent** is non-invasive, which means that patients do not need to have their windpipes intubated, so they don't need to be sedated or paralysed. Instead, they can remain conscious, take medication and nutrition by mouth, and talk to loved ones on the phone
- Being non-invasive and simple to use, **exovent** could be used in intensive care or on an ordinary ward
- **exovent** only covers the torso so monitoring is still possible, and patients can be easily treated while prone (lying on their front) which is more effective in treating pneumonia. Oxygen can be delivered direct to the patient by mask or tubing as required
- **exovent** is less likely to cause a pneumothorax (burst lung) as negative pressure ventilation produces less micro-trauma to the lung

Manufacturing benefits:

- Can be rapidly mass produced
- Uses parts currently available in the UK
- Has a small number of moving parts
- Does not compete for the same resources required by the commissioned manufacturers of PPVs
- Unlike PPVs or CPAPs, **exovent** does not require medical-grade compressed gases, which are at risk of shortage in the NHS due to heavy levels of demand for oxygen
- Less expensive than other forms of ventilation
- Can be assembled at speed

About Marshall Aerospace and Defence Group:

- Marshall Aerospace and Defence Group has specialised in protecting people in critical situations for more than 100 years. Today the company continues to deliver its global customers world-leading applied engineering services across its core capabilities of managed services, integration and technologies.
- MADG comprises a team of more than 1,800 highly skilled colleagues, located across UK, Canada, Europe and Middle East, dedicated to setting the highest standards across the industry.
- Marshall Aerospace and Defence Group is part of Marshall of Cambridge (Holdings) Limited, the private holding company of the Marshall family. Founded in 1909, the Group had a turnover of nearly £2.5bn in 2018, and more than 5,500 employees.

About WMG, University of Warwick

- WMG is a world leading research and education group, transforming organisations and driving innovation through a unique combination of collaborative research and development, and pioneering education programmes.
- As an international role model for successful partnerships between academia and the private and public sectors, WMG develops advancements nationally and globally, in applied science, technology and engineering, to deliver real impact to economic growth, society and the environment.
- WMG's education programmes focus on lifelong learning of the brightest talent, from the WMG Academies for Young Engineers, degree apprenticeships, undergraduate and postgraduate, through to professional programmes.
- An academic department of the University of Warwick, and a centre for the HVM Catapult, WMG was founded by the late Professor Lord Kumar Bhattacharyya in 1980 to help reinvigorate UK manufacturing and improve competitiveness through innovation and skills development.