

UK Solutions to pandemic response and resilience



Table of Contents

UK Solutions to pandemic response and resilience	1
Foreword	4
A global life sciences leader & partner:	5
The UK is a science superpower	5
Why partner with the UK	7
Sub offer A – Solutions for infection prevention and control:	8
Diagnostics: Innovative and agile	8
Sharing genomics expertise to grow capability and capacity globally	9
Sub offer B – Disease prevention and management: research and development	10
British scientists brought a vaccine to the world	10
Biological insights to fuel global R&D	11
A prime destination from clinical research to commercialisation of C-19 therapeutics	12
Sub offer C - Supporting healthcare systems	13
UK Digital Health companies supporting the fight against pandemics	13
Ventilators, Cold chain, Health system strengthening	14
References	17

Disclaimer and Intended use

Purpose:

- This brochure provides an overview of examples of solutions and innovations that the UK life sciences sector can offer for export and investment, to enable pandemic response and preparedness.
- The Department for International Trade (DIT) has produced this brochure in consultation with UK industry and the wider health system.
- This brochure is intended as an initial engagement tool to support dialogue with other countries, health systems, companies, and industries to encourage these parties to take a closer look at the UK.

Scope:

- This document is not a policy position paper from UK Government
- It includes illustrative examples of UK suppliers capable of exporting. It is not meant to be an exhaustive, complete representation of all UK suppliers.
- The level of detail contained is not tailored to a particular market.
- Parties interested to learn more about the UK and solutions, or suppliers tailored to their needs should contact their local Embassy, High Commission or Consulate to start a discussion.

Foreword



Pandemics are a recurring global public health challenge. The UK is well positioned to contribute to global preparedness and response thanks to our strong heritage in the healthcare and life sciences sector. Our effective cross-government, industry and academic collaboration ensures rapid development and adoption of health innovations at speed and at scale.

In addition, rapid identification of lifesaving interventions such as the AstraZeneca-Oxford University vaccine or the world's first COVID-19 treatment dexamethasone demonstrates the breadth and depth of our global COVID-19 pandemic response leadership is much wider. The UK's solution set covers three core areas: *infection prevention and control*, *disease prevention and management* and *wider support to healthcare systems*.

The UK is playing a key role to end this current pandemic and prepare for future global health security. We invite other governments, businesses, and health systems to work with us to develop and deploy solutions internationally. This is driven by our established and entrepreneurial sector, our world-renowned research base, new long-term Life Sciences Vision, and our G7 presidency initiatives and our international commitments including forward-thinking policies and pandemic preparedness strategies.

The UK will continue to be a fertile ground for innovative suppliers and is a prime destination for R&D to grow and innovate your business and connect with new markets. I am pleased to introduce this brochure on *UK Solutions to pandemic response and resilience* and invite you to start a conversation with the UK via your local British Embassy, High Commission or Consulate.

Dr Aphrodite Spanou

**Director Healthcare, Life sciences and Chemicals Directorate,
Department for International Trade (DIT)**



A global life sciences leader & partner:

The UK is a science superpower

The 2021 *UK G7 Presidency* leveraged the UK's established global leadership in life sciences, innovation, trade and public health. The UK united partners to help the world fight and build back better from COVID-19, and create a greener, more prosperous future.

On the leadership of Sir Patrick Vallance, the Government's Chief Scientific Adviser, the *pandemic preparedness partnership* was established. This brought together industry, international organisations, philanthropic bodies, academia, government and leading experts to advise the UK's G7 Presidency on developing safe and effective diagnostics, therapeutics and vaccines within 100 days of a Public Health Emergency of International Concern being declared by the WHO. This is through greater global co-operation and innovation in research and development, manufacturing, clinical trials, and data-sharing and financing.

G7 leaders and global life science industry leaders welcomed the *100 Days Mission* in June 2021. Since then, the UK, as G7 President, has worked with G7 Chief Scientific Advisers, or their equivalents, and 100 Days Mission implementing partners to mobilise action, including to encourage investing in R&D, embedding best practice between pandemics, and agree rules of the road ahead of a PHEIC being declared.



The UK was instrumental in establishing the COVAX Facility and is one of the biggest donors to the initiative to provide vaccines to developing countries. The UK has helped to raise US\$1 billion for COVAX's Advance Market Commitment (AMC) through match-funding other donors. This combined with the £548 million of UK aid pledged will help distribute at least 1.8 billion doses of coronavirus vaccines to up to 92 developing countries by early 2022¹.

UK science also brought the world a *COVID-19 vaccine* through a partnership between the University of Oxford, its spin-out company Vaccitech, and AstraZeneca. As of November 2021, it has delivered more than 2 billion doses to more than 170 countries, including almost two thirds to low- and lower-middle-income countries². UK experience developing vaccines for other global health outbreaks was key in helping to pivot quickly and apply the same science and expertise to the development of a vaccine for SARS-CoV-2. This was further helped by a supportive policy environment including access to government funding and infrastructure, as well as agile and innovation-friendly regulation.

Because of the UK's international leadership, domestic science capabilities and long-standing approach to partnership working with industry, the UK was able to *develop and deploy effective*

vaccines and treatments to support its healthcare system through the pandemic and to deliver insights and solutions for the world.

The UK will be hosting *the Coalition for Epidemic Preparedness Innovations (CEPI)* – a leading scientific coalition – to raise funds for vaccine research and development. The 2022 summit will support the UK and CEPI's goal of cutting vaccine development time by two-thirds, to 100 days, which could avert future pandemics, help equitable delivery of global vaccines and save millions of lives. The UK already committed £250m to CEPI in March 2020 to support its important work to accelerate vaccine development, scale-up, and access, as part of CEPI's core funding.

In 2021, the UK also launched *the UK Life Sciences Vision*, which sets our 10-year strategy for the sector to build on successes of COVID-19 response and accelerate delivery of innovations to patients. This will ensure the UK continues to maintain itself as a global leader in pandemic response and beyond.

UK solutions can broadly be broken down into three areas; the next pages look at examples of UK successes in each:

A. Solutions for infection prevention and control:

Diagnostics testing

Genomic sequencing and surveillance

B. Disease prevention and management:

Research & Development

Manufacturing

Clinical trials

C. Supporting healthcare systems:

Digital health

Ventilators

Cold chain

Health system strengthening

Why partner with the UK

UK life sciences has a forward-thinking ecosystem with key features that empower it to have a track record of scientific breakthroughs. These features have helped the UK to respond to the pandemic.

01 SIGNIFICANT LIFE SCIENCES FUNDING

Highest government spend on health R&D in Europe and 2nd largest global hub for private equity and venture capital in life sciences, predisposing the UK research community to make strides in existing and new public health challenges.

*C-19: UKRI and NIHR invested £554m in >3,600 new C-19 R&I initiatives globally on top of £6bn investment by UK Government in vaccines.*³

02 R&D PLATFORMS AND DATASETS

UK ranks 1st in Europe for early-stage clinical trials in specialised research infrastructure and world-leading longitudinal datasets.

*C-19: UK scientists leading world-first trials (Recovery, Cov-Boost, Human Challenge) to identify lifesaving interventions in record time. 1st participants in Janssen and Novavax global vaccine trials recruited in UK.*⁴

03 AGILE MANUFACTURING CAPACITY

Established network of medicines manufacturing innovation centres which makes the UK a world leader in complex manufacturing methods at competitive costs.

*C-19: UK has committed £380m to boost life sciences manufacturing capabilities and capacity. Three C-19 vaccines are UK made to export-ready standards thanks to cell & gene pioneers like Oxford Biomedica repurposing their lentivector expertise.*⁵

04 FREE TRADE AND MARKET ACCESS

We have trade deals with 68 countries plus the EU and aim to secure agreements with countries accounting for 80% of UK total trade within three years of having left the EU.

*C-19: At the G20, UK committed to support the continued flow of vital medical supplies. UK is one of the earliest and largest donors to the COVAX AMC, providing £548 million for the scheme to ensure access to C-19 vaccines in 180 countries.*⁶

05 FORWARD-THINKING REGULATORY POLICIES

Globally respected medicines regulator, which facilitates the introduction of novel technology and manufacturing processes, with simplified entry and engagement in advanced therapies

*C-19: UK 1st country to approve C-19 vaccines developed by Pfizer-BioNTech and Oxford-AstraZeneca with deployment equally fast, large and impactful guided by JCVI.*⁷

06 SKILLS AND EXPERTISE

The UK is the biggest life sciences cluster of talent in Europe with over 250,000 employees and 220,000 STEM graduates in 2019. UK is home to three of the top ten universities in the world for life sciences.

*C-19: Skills were pivoted and gaps addressed by creating 3 National Training Centres to train and upskill thousands of professionals in the manufacture of advanced therapy and vaccines at scale.*⁸

07 PUBLIC PRIVATE PARTNERSHIPS

A connected and collaborative industry cluster which fosters and accelerates disruptive innovation throughout the supply chain

*C-19: The Ventilator Challenge is a consortium of exemplary cross-sectoral collaboration which delivered over 13000 ventilators to the NHS in under 12 weeks.*⁹

08 A PRIME BUSINESS ENVIRONMENT

The UK has the highest number of life sciences companies in Europe with 6300 businesses benefiting from R&D tax credits and a 'patent box'.

*C-19: A new super deduction was introduced making the UK more attractive than ever to invest in plants and machinery.*¹⁰

Sub offer A – Solutions for infection prevention and control:

Diagnostics: Innovative and agile

At the start of the pandemic, the UK diagnostics industry had finite testing capacity of just 10,000 tests a day. In April 2020, the Department of Health and Social Care (DHSC) laid out an ambitious 5-pillar COVID-19 testing [strategy](#); a strategic collaboration bringing together public organisations, academia and private suppliers. This enabled the UK to quickly build up a testing capacity which peaked at 1.8 million tests a day. This initial public-private-partnership approach has also helped to stimulate a thriving private diagnostics industry and further solutions for testing in different settings¹¹.

Innovative export-ready UK diagnostics suppliers

The UK is at the forefront of efforts to drive the development and delivery of new diagnostic solutions at the speed and scale required to act in a pandemic, and to address other pressing public health challenges.

UK Diagnostic offers

1. COVID-19 antigen tests
2. COVID-19 antibody tests
3. Consumables, systems & equipment (C-19 Diagnostic & Screening Services)
4. Other tests and support technology
5. Non-COVID-19 and differential diagnostic and screening

DIT can help identify solutions that might be fit-for-purpose for your applications. This includes both established and novel technologies.

Learn about the UK's Diagnostic offer with our partners [here](#).

Case study: [Genefirst](#)

Health ministries around the world have chosen Genefirst's diagnostics test kits

GeneFirst are a UK molecular diagnostics company and developer / supplier of RT-PCR COVID-19 kits, including kits for Variants of Concern.

GeneFirst are expecting to forge long-term relationships with overseas partners to both support and futureproof local testing programs and strategies.

End users include the Ministries of Health in Malaysia, Indonesia, and Sri Lanka, as well as local hospitals in France, Poland, and Czech Republic.



Sharing genomics expertise to grow capability and capacity globally

The UK has built an end-to-end ecosystem that accelerates genomic research to deliver genomic healthcare, benefiting patients and innovation

To detect, prevent and respond to pandemic threats, genomic surveillance is an effective and essential tool. The UK Health Security Agency's (UKHSA) UK's Centre for Pandemic Preparedness was launched to spearhead the UK's contribution to developing a global early warning system to detect new infectious disease threats, alongside the New Variant Assessment Platform (NVAP) offering UK capacity and expertise to detect and assess new variants of SARS-CoV-2.

New Variant Assessment Platform (NVAP) – a global non-commercial offer of UK genomics expertise delivered in-country or via the UK, to detect new variants of concern for SARS-CoV-2. Operational since April 2021, this programme is led by UKHSA together with the UK Department for Health & Social Care (DHSC), Foreign, Commonwealth & Development Office (FCDO) the World Health Organization (WHO).

COVID-19 Genomics UK Consortium (COG-UK): COG-UK is a pioneer in the use of large-scale, rapid whole-genome sequencing of SARS-CoV-2 to understand viral transmission and evolution, and to inform public health responses and vaccine development.

Centre for Pandemic Preparedness – as world leaders in pandemic preparedness, the UK and US are partnering through the UKHSA and US Center for Disease Control and Prevention (CDC) to harness their strengths in genomic surveillance of human and animal infections in collaboration with a range of scientific and academic partners and share these globally.

International Pandemic Surveillance Network – an initiative under the UK's G7

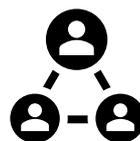
presidency, with WHO as a key implementation partner, to set up network of surveillance hubs to significantly improve global health security.

The UK also offers **non-pandemic expertise and solutions in genomic research, diagnostics, technology, training and medicine**, enabling both population health and more precision medicine approaches.



DNA

Discovery of the structure of DNA



100,000

Genomics England project which achieved its 100,000 target in 2018



1st

1st country worldwide to apply whole genome sequencing at scale in direct healthcare



500,000

Aim to sequence 500,000 whole genomes as part of the NHS England Genomics Medicine Service

Sub offer B – Disease prevention and management: research and development

British scientists brought a vaccine to the world

In 2020, University of Oxford's Jenner Institute and Oxford Vaccine Group spin-out company Vaccitech in partnership with British pharmaceutical giant AstraZeneca co-invented the Vaxzevria™ (formerly AZD1222) vaccine for COVID-19.

The UK government played an important role in funding and supporting underlying R&D, clinical production, process development, bringing production partners together, and enabling bilateral and multilateral support for global access. This made it possible for AstraZeneca to rapidly take the vaccine to the world.

The National Institute for Health Research (NIHR) provided support for the development of the Oxford/AstraZeneca vaccine, and continue to support trials of a number of other vaccines, developed by Novavax, Janssen and Imperial College London. These studies help to ensure that data is available on a number of different vaccines and their safety and effectiveness, in order to protect the population

Vaxzevria™ was the first vaccine, authorized by UK's Medicines and Healthcare products Regulatory Agency (MHRA) in December 2020, and has been granted conditional marketing authorisation or emergency use in more than 90 countries, as well as a WHO Emergency Use Listing which accelerates the pathway to access in 142 countries via the COVAX Facility.

As of November 2021, this approach has helped to deliver more than 2 billion doses to more than 170 countries, with almost two thirds of doses going to low and low-to-middle income countries. The vaccine is estimated to have helped to prevent 50 million COVID-19 cases, five million hospitalisations, and has helped save more than one million lives¹².

Case Study: [Diamond Light Source](#)

Diamond Light Source is the UK's national synchrotron and helped resolve the initial SARS CoV-2 virus as well as other major findings shared with the world notably on immune responses to new variants. The facility's C-19 research programme has supported more than 60 international collaborations contributing to drug development.

Diamond is working with its valued users to look at fundamental interactions of the virus such as basic understanding of how the virus works, drug design from scratch, repurposing of current drugs, new therapy development and vaccine design. Applications to use the facilities at Diamond are welcome from researchers across the world.

Biological insights to fuel global R&D



AstraZeneca is at the forefront of the response to COVID-19, and we are proud to be working with Oxford University to help make this vaccine available as quickly as possible. I would like to thank HM Government for its commitment to the vaccine and welcome its leadership and generosity for its help in expanding access beyond the UK”.

Pascal Soriot, Chief Executive Officer, AstraZeneca

The UK’s biopharmaceutical industry is collaborative, mature and dynamic, facilitating growth of the global industry. The UK is ranked #1 for number of life sciences FDI projects among European comparator projects and #2 globally, behind the US¹³. This ecosystem was crucial to the scientific breakthroughs during the pandemic. The UK Vaccine Taskforce now has a focus on further growing capacity and capabilities in the UK as part of a legacy of this pandemic, and to enable resilience in the face of future health emergencies.

The UK’s vaccines ecosystem consists of researchers, developers, supply chain companies, innovators in areas such as vaccine formulation/delivery, and manufacturing networks.

COVID-19 vaccines will drive growth to an estimated \$19.5bn global market value for vaccines by 2026¹⁴. The UK is a prime location to invest in vaccines development and deliver solutions for both UK and global markets, enabled by a network of UK trade support in more than 100 countries.

In 2019, the UK biopharmaceutical sector, including vaccine manufacturing, consisted of 2,240 companies, employed over 124,000 workers, and generated £55.1 billion in annual turnover¹⁵

A prime destination from clinical research to commercialisation of C-19 therapeutics

The UK is one of the best locations in the world to undertake clinical research and develop international products and services. This is because it offers leading-edge research and talent, established platforms for innovation and clinical trials, world-renowned regulatory expertise and standards, a culture of collaboration and a launch pad to global markets.

The UK Life sciences Vision aims to *"Build on the UK's clinical research, genomic and health Data capabilities to make the UK a highly effective and efficient place in which to test and trial new technologies for the most important healthcare challenges – creating value for industry and early access for NHS patients"*

Out of this ecosystem and in response to the pandemic, the UK Therapeutics Taskforce is responsible for the end-to-end provision of treatments for COVID-19 in the UK. This includes the initial identification of potential therapeutics, working with the National Institute for Health Research (NIHR) who support trialling treatments as part of an advanced programme of clinical trials, and their eventual deployment at scale to the patient population.

The Antivirals Taskforce, which was established in April 2021, is working with the Therapeutics Taskforce and industry experts to identify, develop and procure novel antivirals at pace that can be used at the earliest stage of infection. These treatments will support the current therapeutics and vaccines taskforce by intervening at an earlier stage and augmenting the treatments we already have in place.

The NIHR, the National Institute for Health and Care Excellence (NICE) Medicines and Healthcare products Regulatory Agency (MHRA), NHS England/Improvement (NHSE-I) and representatives from the Devolved Administrations have formed a multi-agency initiative called RAPID-C19 to introduce an accelerated process for achieving licensing and approvals in the UK.

Why Choose the UK for your C-19 therapeutics clinical trials:

- Access to a skilled workforce from leading universities and hospitals.
- Support by the NIHR, Health Research Authority (HRA) and NICE for efficient and effective set up and delivery of clinical trials in the National Health Service.
- Access to pre existing clinical trial cohorts to support recruitment of required population into trials.
- A streamlined and forward-thinking regulatory system providing confidence and assurance
- Expanding access to rich patient data within a national healthcare system including findings from human genomics studies such as GenOMICC¹⁶



Dexamethasone a UK trial discovery

The RECOVERY trial which was set up and running within six weeks of funding and identified one of the world's first COVID-19 treatments, dexamethasone.

This cheap, readily available steroid was shown to reduce deaths of hospitalised COVID-19 patients by one third¹⁷.

Sub offer C - Supporting healthcare systems

UK Digital Health companies supporting the fight against pandemics

The UK is uniquely placed to realise the potential of digital health. This includes access to at scale data in the National Health Service (NHS), real world evidence and novel applications, supported by an ambitious culture and continuously improving system for innovation, and all underpinned by world leading talent.

UK digital health companies have developed solutions and ready to help global clinicians and support patients during the current global pandemic and to adapt to post-pandemic delivery.

UK innovations offer support to healthcare settings in a variety of ways from reporting data in real time to managing staffing at scale and monitoring virtual pathways. There are also solutions to help support people at home by tackling issues such as loneliness and isolation, self-care and remote monitoring and consultation.

Innovative UK companies in the Digital Health landscape can offer support in the following areas:

- Collaborating with patients, workforces and between organisations
- Self-care apps
- Remote monitoring and consultation
- Managing staff at scale

Case Study: [Adviselnc](#)

Adviselnc saved dozens of NHS staff lives when they made the Personal Protective Equipment (PPE) stocks visible

Adviselnc is known for product price benchmarking and spend analytics across the NHS, and internationally. They are ready to help clients get the right PPE stock, to the right place, at the right time.

As part of an agile response to their customer's needs, Adviselnc developed a low-cost and simple tool for tracking PPE products within their client organisations.

- Future tech transforming healthcare
- Reporting data and using AI
- Pre-assessment
- Diagnostics
- Systems management

Learn about the UK's First 100 Digital Companies on our COVID-19 Hub [here](#)



Ventilators, Cold chain, Health system strengthening

Ventilators: A cross-sectoral challenge-based approach to device innovation

The UK Ventilator Challenge (UKVC) initiative has been instrumental in energising the sector. The initiative brought together UK companies from a number of sectors including automotive, engineering and logistics to quickly manufacture ventilations equipment to meet the demands of COVID-19. These companies continue to innovate and offer solutions to health systems, including the following areas:

- Invasive ventilation (Mechanical)
- Non-Invasive ventilation (CPAP)
- O2 concentrators

The UKVC produced over 14,000 new ventilators for the NHS, combining the skills of 33 UK Technology companies¹⁸.

Case Study: [Penlon](#)

Founded in Oxford in 1943, Penlon is an experienced exporter that produces a range of medical devices, including the ESO 2 ventilators widely used in the current pandemic.

Penlon's ESO 2 ventilator has had its CE mark confirmed, meaning that the device, which was newly adapted for the Ventilator Challenge UK, is now available for export.

Penlon scales up to make more ventilators in one day than it used to deliver in ten months, further underlining the success of the scaling up of the device.

Case Study: [Dulas Ltd](#)

Dulas Ltd is a renewable energy company established over 35 years ago with a focus on innovative solutions to support the delivery of successful healthcare to the last mile.

Dulas are pioneers of 'off grid' vaccine storage equipment and specialise in solar powered refrigeration.

They have recently worked on high profile projects supplying humanitarian projects in Madagascar and Yemen and are working with the UK Government to support the international COVID-19 strategy.

UK cold chain distribution specialists address affordability, off-grid, and last mile challenges

The UK has experience in supporting health systems to strengthen medicine distribution, including low-temperature-controlled supply chain. UK expertise falls within three main segments – Artificial Intelligence (AI), Refrigeration equipment and Logistics. The sector is producing technological and biological disruptors to current cold chain processes including warm vaccines, temperature-controlled packaging and robotics led automation.

The sector is small but dynamic and actively exports solutions tailored to developing markets.

Strengthening global health systems against the threat of pandemics

The UK has over 70 years of expertise in delivering a strong health system through its National Health Service (NHS). Much of the NHS strength comes from its organisations, people and care models and this was highly important during the COVID-19 pandemic response.

For example, the success of the UK's vaccine rollout programme was based on UK's existing long-established and successful vaccination programme.

The *UK's Better Health Programme (BHP)* is a UK Government aid initiative to strengthen the health systems middle income countries through UK NHS and global expertise. COVID-19 exposed weaknesses in these health systems and the BHP delivered a range of activities to share UK experiences in vaccine strategy, long-COVID-19, surge medicine and adapting workforce.

The UK has a network of organisations that can provide expertise on health systems strengthening consultancy overseas from NHS organisations to private sector.

Areas that the UK can provide support for the health system on pandemics include:

- Vaccine deployment strategy
- National immunisation management services
- Healthcare workforce education & training
- Clinical services consultancy
- Regulation & guidelines support

Within seven days of issuing COVID-19 invitations:

- 45% of people aged 85+ vaccinated
- Over 1 million invited to book their vaccination¹⁹

Case Study: [NHS South, Central and West CSU](#)

NHS Commissioning Support units (CSU's) have been instrumental in delivering rapid response solutions to the COVID-19 pandemic, working to support all parts of the health and social care system in England.

One part of this response was through the National Immunisation Management Service (NIMS), which supports the NHS enhanced winter flu programme and the national COVID-19 vaccination programme, optimising the uptake of vaccinations for the nation.

The service drew on experience from the successful child health immunisation service to rapidly assemble a multi-disciplinary team and provide a national solution.

This experience is now being shared globally in a range of middle income markets

The UK offers a vast and growing range of public and private sector pandemic healthcare and life sciences know-how, trade and investment solutions for this and future pandemics.

Contact DIT to tell us more about what types of solutions you are looking for, or what challenges you are facing, and we can help to connect you with UK suppliers and capability partners or investment opportunities

Contact Lifescience@trade.gov.uk to discuss how DIT can help you or contact your local British Embassy, High Commission or Consulate to start a discussion.



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UK Government

DIT

The UK's Department for International Trade (DIT) helps businesses export, drives inward and outward investment, negotiates market access and trade deals, and champions free trade.

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