

Summary

- The Academy of Medical Sciences applauds the UK's research and development response to the COVID-19 pandemic.
- The UK research community has made key contributions towards understanding the biology and nature of the virus, modelling its spread, developing candidate vaccines and therapeutics, testing and tracing the virus, and informing public health interventions. The rapidity of the response of the research community to the COVID-19 pandemic has presented its own challenges.
- Public health science must be better utilised to manage future outbreaks, with improved surveillance and diagnostic capacity at an early stage.
- A less centralised approach to testing and tracing should be adopted in future, with increased capacity in local diagnostic hubs.
- The UK's response to the pandemic has clearly been informed by scientific evidence, including that provided by the Academy and its Fellows.¹ The research community must continue to ensure that politicians, civil servants and the public hear the latest science and are supported in decision making. However, the way that scientific evidence feeds in to government decision-making needs to be made clearer to the public going forward.
- International science communication and collaboration has been strong, but more should be done in the future by Government to learn from international experiences of the pandemic.
- There is a critical need to ensure patient and public involvement and co-development is embedded in both research and policymaking in response to the COVID-19 pandemic.
- COVID-19 will have impacts on UK researchers, and the research landscape, which will need to be mitigated by funders, employers and organisations like the Academy.

Introduction

1. The Academy of Medical Sciences is the independent body in the UK representing the diversity of medical science. Our mission is to promote medical science and its translation into benefits for society. The Academy's elected Fellows are the UK's leading medical scientists from hospitals, academia, industry and the public service. We work with them to promote excellence, influence policy to improve health and wealth, nurture the next generation of medical researchers, link academia, industry and the NHS, seize international opportunities and encourage dialogue about the medical sciences.
2. As the UK responds and adapts to the evolving coronavirus pandemic, we continue to support the UK's medical and health researchers to ensure that their voices and research findings are included in important discussions and decision-making. The Academy strongly supports the Science and Technology Committee's aim to learn from what has happened in the pandemic so far to inform and refocus our efforts on initiatives to have the greatest future impact. The following response draws on the expertise of the Academy's Fellowship to provide evidence on the role of UK research, science and technology in the national and global response to the virus, and what lessons should be learned for the future. Here we have chosen to focus on the key findings from the Academy's COVID-19 rapid response work, as well as areas highlighted by our Fellowship.¹ Our response aims to be

¹ <https://acmedsci.ac.uk/policy/uk-policy/coronavirus>

constructive in the current context of the pandemic to inform the UK's preparedness for any resurgence of COVID-19 cases, and any future outbreaks of other pathogens. We would be pleased to expand on any of the points raised.

The role of research and development in understanding and responding to the virus

3. The Academy has been impressed with the important contributions from research and development in the UK's response to the pandemic. The scientific community has responded rapidly to focus on this problem in a short time scale, with a real sense of collegiality and collaboration, and many research groups applying their expertise to the COVID-19 response.
4. Some areas that the Academy views as key contributions are highlighted below, along with several important lessons to learn for the future.

Biology and nature of the virus

5. The Academy has been impressed by the swift SARS-CoV-2 viral sequencing release and genomic analysis, which has facilitated follow-up and action by the UK scientific community.² With over 38,000 viruses sequenced, the establishment of the COVID-19 Genomics UK (COG-UK) Consortium has provided a valuable interface for the NHS and UK Government to support public health decisions.³ However, as a new virus with a range of presentation and severity, SARS-CoV-2 is unusual and there is much yet to understand. The degree to which immunity is conferred by past infection, and the mutation potential of the virus are not yet clear.⁴ A better understanding of the impact of protective or harmful interactions between SARS-CoV-2 and other infections will also be important in responding to any winter resurgence of COVID-19 infection.

Modelling

6. Major contributions have been made by the UK scientific community in terms of modelling the spread of the virus, although the disparities between different modelling approaches highlight the difficulties in forecasting new and emerging diseases with limited or unclear data.
7. In future, it will be important for Government to clearly communicate the links between modelling and the mitigation strategies it has adopted to the public. It may be useful to clarify that multiple models may be developed in parallel by different research groups, and that there will be different underlying assumptions and uncertainties to encompass the range of possible scenarios. This may aid the understanding of why events can divert from a particular model, and retain public understanding and trust in the use of complex modelling in policymaking.

Public health science

8. The UK is a world leader in public health research.⁵ However, public health science has been underutilised in the UK response to the COVID-19 pandemic, and better alignment between public health and clinical practice is urgently needed.⁶

² <https://www.sheffield.ac.uk/news/nr/sheffield-sequence-1000-coronavirus-genomes-1.888702>

³ <https://www.cogconsortium.uk/>

⁴ Academy of Medical Sciences (2020). *Preparing for a challenging winter 2020/21*. <https://acmedsci.ac.uk/file-download/51353957>

⁵ Research Excellence Framework 2014 (2015). *Overview report by main panel A and sub-panels 1 to 6*. <http://www.ref.ac.uk/media/ref/content/expanel/member/Main%20Panel%20A%20overview%20report.pdf>

⁶ Academy of Medical Sciences (2016). *Improving the health of the public by 2040*. <https://acmedsci.ac.uk/file-download/41399-5807581429f81.pdf>

9. In future, the UK will need better characterisation of epidemics in time, place and person. This will need to include better surveillance and capacity to identify outbreaks at an early stage. This may help to avoid public health errors such as discharging infected individuals into society and care homes. The Academy's 'Preparing for a challenging winter 2020/21' report highlights specific measures to improve public health surveillance for COVID-19, influenza and other winter diseases.⁴ The report emphasises the need to prioritise system-wide infection prevention and control measures across the health and care systems to minimise the spread of infection and nosocomial transmission. In the UK, the public health field continues to receive relatively little investment compared with the biomedical sciences. Public health issues experienced in the COVID-19 pandemic may partly be reflected by recent disinvestment in public health surveillance (The King's Fund and the Health Foundation estimate that public health funding per capita has been cut by 25% from the 2015/16 level in real-terms)⁷ and the relocation of public health services and prevention from the NHS to local authorities as a result of the 2012 Health and Social Care Act.⁸
10. Behavioural science will continue to be vital to manage the spread of the virus and the implementation of new behavioural and social interventions. Public health messaging needs to be underpinned by behavioural health science and informed by public engagement for it to be effective, and to avoid unintended consequences such as heightened distress.⁹

Test and trace

11. A centralised approach was taken to testing with the rapid establishment of the UK Lighthouse Labs Network, which enabled a dramatic increase the number of daily COVID-19 tests.¹⁰ A skilled workforce from across the scientific community with the expertise and experience needed to carry out COVID-19 testing and the provision of PCR machines by universities made this mobilisation of testing capability and capacity possible.
12. However, there is strong support for a less centralised approach to testing and tracing using local centres of expertise will be vital to ensure large scale, nationwide rapid and efficient diagnoses in future. As testing capacity is expanded to cope with increasing demands this winter, a less centralised approach to testing will allow for more localised interventions in response to local outbreaks, and help to mitigate the impacts of adverse weather conditions on the logistics of transporting samples.⁴
13. In future, testing capacity will need to be made available earlier in the course of the outbreak, and the UK should increase its diagnostic capability going forward. There is great interest from the diagnostic industry in this area, and in future it will be important to consider how they can better liaise with and support academia and the NHS.

Vaccine and drug development

14. The UK's outstanding life sciences sector will enable it to make a valuable contribution to the global research effort to tackle the COVID-19 pandemic through vaccine development, drug discovery research and alignment with clinical programmes. Considerable progress has been made at good speed, with over 140 candidate vaccines being developed globally, and UK candidates already in clinical trials which could be internationally leading.¹¹ In addition significant progress has been made on the application of Artificial Intelligence to

⁷ <https://www.health.org.uk/news-and-comment/news/urgent-call-for-1-billion-a-year-to-reverse-cuts-to-public-health-grant>

⁸ <https://www.legislation.gov.uk/ukpga/2012/7/contents/enacted>

⁹ Holmes EA, et al. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *The Lancet Psychiatry* **7(6)**, 547-560.

¹⁰ <https://www.lighthouselabs.org.uk/>

¹¹ <https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines>

identify candidate vaccines.¹²

15. In terms of treatments, the RECOVERY trial has also been highlighted as a valuable contribution to the identification of treatments which benefit COVID-19 patients.¹³ A particular success has been the rapid demonstration from an initial large-scale randomised clinical trial that dexamethasone can reduce mortality in patients who are critically ill with COVID-19.¹⁴ The work of the Medicines and Healthcare products Regulatory Agency (MHRA) and HRA to support and authorise the development of vaccines, and the initiation of clinical trials to find new medicines is welcome.¹⁵

Rapid response

16. Overall, whilst the Academy has been impressed with the speed of the scientific community's rapid response to the pandemic, there are certain challenges worth highlighting.
17. In places, the pivoting of research priorities to COVID-19 has been seen as counterproductive where it has been at the expense of other important research with health and wealth benefits.
18. Many rapid response funding calls have prioritised short-term proposals that contribute to the urgent phase of the pandemic, with impacts within 12-18 months. This had made it challenging for researchers to obtain funding for studies to investigate the longer-term impacts of the pandemic, which still need to be initiated and gathering data in the early phases of the pandemic.
19. Another limitation raised by Fellows is that there is currently an abundance of pre-print scientific papers which are not peer reviewed, making it difficult to rapidly identify the most rigorous and pertinent studies. However, it is acknowledged that this is balanced by the need to share research findings and data quickly, and the Academy has been impressed by the effort of journals to ensure that research related to COVID-19 is reviewed and published as quickly as possible.¹⁶
20. The community's rapid response to COVID-19 has also presented challenges to ensuring that patient and public involvement (PPI) is embedded in the research response (discussed further below).

The role of research and development in advising decision making

21. There has never been a more important time for science to inform policymaking, and the Academy has been pleased to see the UK's response has clearly been informed by scientific experts. The research community must continue to ensure that politicians, civil servants, the public, patients and carers hear the latest science, and are supported in decision making where needed. Equally, scientists should be supported where they may face reputational risks or public and professional criticism. It should be the role of the Academy and the scientific community to, where possible, provide the most useful analysis and insight possible through the pandemic and in its aftermath. There are several lessons to be learned from the COVID-19 pandemic about how this relationship can be improved going forward, and in future outbreaks.

¹² Vaishya R, et al. (2020). Artificial Intelligence (AI) applications for COVID-19 pandemic. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews* **14 (4)**, 337-339.

¹³ <https://www.recoverytrial.net/>

¹⁴ <https://www.ox.ac.uk/news/2020-06-16-dexamethasone-reduces-death-hospitalised-patients-severe-respiratory-complications>

¹⁵ <https://www.gov.uk/government/collections/mhra-guidance-on-coronavirus-covid-19>

¹⁶ <https://royalsociety.org/blog/2020/05/covid-19-rapid-review-update>

22. Some Fellows have raised concerns that the scientific advice sought was not broad-based enough and did not capture all the specific expertise required in a complex fast moving pandemic situation. It has also been suggested that more could be done in future to engage front line healthcare staff who are delivering relevant components of the health service, as well as patients and carers, in deciding and formulating policy. The Academy is pleased that the government has committed to conduct an independent review of the COVID-19 pandemic response, and hopes this will feature an examination of the way that scientific evidence was gathered and utilised.¹⁷
23. Retaining public trust in science in the way that scientific evidence feeds in to policymaking is essential. This relies on communicating evidence with the public, and presenting science which is:
- Accessible and relatable
 - Transparent and trustworthy
 - Considered in its scientific and social context

Accessible and relatable

24. It is important to make the research findings and advice given to policy makers by the scientific community accessible to the public. This allows society to decide for itself if Government is following scientific advice. To this end, all of the reports that the Academy has produced to inform policy makers through the pandemic have been published on our website, and we have ensured that they sit alongside plain English, accessible summaries. The Academy has appreciated the efforts of the Chief Medical Officer and Government Chief Scientific Advisor to solicit and channel scientific advice to the government in an open and transparent way, and hopes this will have been apparent to the public.
25. The work of trusted traditional and digital media sources has been essential in enabling public access to accurate, evidence-based scientific information in a measured way throughout the pandemic. The work of the Science Media Centre has been vital in ensuring journalist have access to credible experts.¹⁸ The public dialogue work which informed the Academy's 'Preparing for a challenging winter 2020/21' report highlighted the importance of such media sources in the uniquely fragmented information landscape of the COVID-19 pandemic, with relatively few trusted and high-attention sources.¹⁹

Transparent and trustworthy

26. The role of science in decision making has not always been clear during this pandemic, and some members of the public have associated leading scientists with politicians.¹⁹ In future there needs to be more transparency about how science advice reaches decision makers and what evidence is being utilised, as well as greater clarity around the strengths and limitations of research findings. How economic considerations or societal values are considered alongside the scientific evidence to inform decisions should be made clear (e.g. keeping the transmission rate of the virus low balanced against the risks of keeping children out of school, closing cancer clinics or widespread unemployment). Not doing this may put at risk the high level of public compliance with guidelines seen to date.
27. The government should keep the public informed of scientific evidence around the likelihood of a second peak of infections in winter.¹⁹ In order to avoid causing unnecessary

¹⁷ <https://hansard.parliament.uk/Commons/2020-07-15/debates/8EB241F4-52D1-4AAD-9A64-D1D544FEE903/Engagements>

¹⁸ <https://www.sciencemediacentre.org/>

¹⁹ Ipsos MORI (2020). *Covid-19 winter preparedness: An online dialogue project for the Academy of Medical Sciences*. <https://acmedsci.ac.uk/file-download/28843909>

anxiety among a worried public, this should be framed by the steps the country is taking to prepare for this scenario.

Considered in its scientific and social context

28. It will be important to ensure science is not 'oversold' by the scientific community or decision makers, and that the challenges and timeframes involved in research are made clear, for example in the area of vaccine development. Scientific evidence can be confusing and conflicting, and it is debate and the interaction of conflicting views that often drives progress. Science has not been able to offer certainty and clear reassurance to the public through the course of the pandemic. We have previously stressed the importance of being transparent about the limitations and uncertainties linked to evidence about medicines – this is also true in the case of the pandemic.²⁰

Communication of scientific evidence internationally

29. It is essential that the UK collaborates with, and learns from, other countries around the world during the course of this pandemic, and in the future.
30. In June 2020, the Academy convened an international virtual workshop on the response to the current COVID-19 pandemic in collaboration with eight Academies and organisations from low- and middle- income countries (a report of the meeting will be published in due course).²¹ This workshop focussed on encouraging the sharing of experiences, identifying key unanswered questions, and exploring how evidence has been used to guide pandemic responses. The participants identified that the establishment and maintenance of collaborations across global research networks with relevance to COVID-19 can help to address gaps in clinical evidence. The launch of the SOLIDARITY trial has demonstrated this interest for an international approach to COVID-19 research.²² It was also noted that the implementation of strategies to promote international research will help to strengthen public health guidance and responses.
31. Some suggested that in future, the UK should further explore mechanisms to engage with the European Centre for Disease Prevention and Control. Enhancing these international connections will be especially important for the UK following its departure from the EU.
32. The current period of low COVID-19 transmission that the UK is experiencing is making it difficult to determine the efficacy of trial vaccines due to the low chances of volunteers coming into contact with infected people. International collaborations will be essential here to support data sharing and facilitate the continuation of research.²³

Patient and public involvement in research and decision making

PPI in research

33. There is a critical need to ensure patient and public involvement is embedded across the research environment to understand the direct and indirect impacts of COVID-19 on health.
34. Prior to the pandemic, much progress was being made in the UK to incorporate patient and public involvement (PPI) into biomedical and health research, with initiatives developing

²⁰ Academy of Medical Sciences (2020). *Enhancing the use of scientific evidence to judge the potential benefits and harms of medicines*. <https://acmedsci.ac.uk/file-download/44970096>

²¹ <https://acmedsci.ac.uk/policy/policy-projects/addressing-the-challenge-of-the-covid-19-pandemic-in-low-and-middle-income-countries>

²² <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/global-research-on-novel-coronavirus-2019-ncov/solidarity-clinical-trial-for-covid-19-treatments>

²³ <https://www.bmj.com/content/369/bmj.m2612>

tools and resources to support PPI, and promote and share best practice.^{24,25,26,27,28} The Academy has been pleased with the Health Research Authority's (HRA) efforts to promote PPI in COVID-19 research to applicants of their fast track approval process, by offering to establish connections between researchers and public involvement groups, networks, and individuals.²⁹ However, despite such initiatives, PPI was lacking from COVID-19 research efforts in April 2020 (this was subsequently discussed in our May workshop on PPI, discussed below), with the HRA estimating in April 2020 that only 20% of COVID-19 research applications that it reviewed included PPI in their research plans (compared to 80% of applications prior to the pandemic).³⁰ The ongoing COVID-19 pandemic has highlighted that there is much to do in future research to embed and scale the role of patient, carer and public partners.

35. Public awareness of science and research has been high during the pandemic, and this appetite for engaging with and contributing to the scientific effort against COVID-19 should be harnessed by the research community. This is especially true for initiatives such as test and trace, which have significant trust and privacy concerns, and the success of which is dependent on the cooperation and support of the public. PPI needs to be an integral part of all Government initiatives related to the pandemic and central decisions should be informed by robust PPI.
36. On 19 May 2020 the Academy held a virtual FORUM workshop in partnership with the Association of the British Pharmaceutical Industry, the Association of Medical Research Charities and the National Institute for Health Research (NIHR), to explore what can be learnt from the COVID-19 pandemic on system-wide implementation of patient and public involvement in life science research (a report of the meeting will be published in due course).³¹ Participants emphasised the immediate needs for public involvement throughout the pandemic, and outlined the ways to ensure these opportunities are seized.

Public dialogue and engagement in policy making

37. Public dialogue is essential in using research to make decisions. In the COVID-19 pandemic, decision making should involve the perspectives of the public, patients, carers and those shielding.
38. The Academy's rapid response project on 'Preparing for a challenging winter' was informed by online workshops with the general public.¹⁹ A patient and carers reference group was integral to the project and two of its members sat on the expert group that developed the final report. The reference group published a 'People's perspective' report, written by patients and carers that calls for actions to be developed through engagement with patients, carers and the public to ensure services, guidelines and communications work for people.³² The final report of this project emphasised that involvement of patients and communities leads to better research and subsequent decision making. PPI in research and decision making needs to include underrepresented voices, and the voices of those who may be disproportionately affected. Our public workshops included people who had been advised to 'shield' and those from black, Asian and minority ethnic backgrounds to

²⁴ <https://www.hra.nhs.uk/planning-and-improving-research/best-practice/public-involvement/>

²⁵ <https://www.gov.uk/government/consultations/how-should-we-engage-and-involve-patients-and-the-public-in-our-work>

²⁶ <https://www.amrc.org.uk/Pages/Category/partnering-for-patients>

²⁷ <https://sites.google.com/nihr.ac.uk/pi-standards/home>

²⁸ <https://www.cancerresearchuk.org/funding-for-researchers/patient-involvement-toolkit-for-researchers>

²⁹ <https://www.hra.nhs.uk/planning-and-improving-research/best-practice/public-involvement/>

³⁰ <https://www.hra.nhs.uk/about-us/news-updates/involving-public-covid-19-research-quest-blog-bec-hanley-and-maryrose-tarpey/>

³¹ <https://acmedsci.ac.uk/more/events/patient-and-public-involvement-covid-19>

³² Academy of Medical Sciences (2020). *People's Perspective: Preparing for a challenging winter 2020/21*. <https://acmedsci.ac.uk/file-download/39133546>

understand how they think and feel about the problems expected this winter.¹⁹

39. In order to inform the Academy's work on mental health and neuroscience research priorities in response to the COVID-19 outbreak (discussed further below), an online survey which was promoted to MQ's supporter network, collected data on people's two biggest concerns about the mental health and wellbeing implications of the COVID-19 pandemic, as well as coping strategies.³³
40. The Academy has also been working with Vocal at Manchester University NHS Foundation Trust and Wowbagger Productions to create a comic called 'Planet Divoc-91' to help young adults (16-25 year olds) better understand the coronavirus pandemic through an engaging story. This project was coproduced with a group of young adults, and has facilitated engagements between them and scientific experts involved in the COVID-19 response.³⁴³⁵³⁶

Key findings from the Academy's rapid response work

41. The Academy has focused its attention on areas where we saw gaps in the evidence being collated or presented.

Immunology

42. The UK is at the forefront of immunological research globally and is contributing at the highest level to tackling the pandemic. Despite this, some Academy Fellows have raised concerns around the representation of immunology expertise in the scientific advice to government over the course of the pandemic.
43. In February 2020, The Academy and the British Society for Immunology rapidly convened an expert group to collate what is currently known about the immunology of COVID-19 and develop a set of research priorities for immunology research. The expert advisory group published their outputs in May 2020 where they identified 13 priority areas where immunology research could deliver significant public health impacts.³⁷ This was done with a view to enhancing collaboration within the immunological research community, and to galvanise researchers around some targeted outcomes to strengthen grant applications to rapid response funding calls. The expert group noted the advantage of having platforms already funded and able to start research immediately, such as the International Severe Acute Respiratory and emerging Infection Consortium (ISARIC), and being able to mobilise existing research networks. They suggested that funding between pandemics would allow for greater preparedness for future pandemics.³⁸

Preclinical drug discovery

44. There are currently several issues which need to be addressed for the sector to accelerate progress around the development of new therapeutics further, and the Academy has focussed specifically on preclinical drug discovery. The majority of effort so far has been on vaccines and repurposing existing therapeutics due to the urgent need to identify effective treatments. There is a need for a pipeline of potential novel drugs, should vaccines or drug repurposing not be as effective as hoped and a suite of therapies are needed to control COVID-19 in the long-term. Issues of pre-publication, confidentiality and intellectual

³³ MQ: Transforming Mental Health and the Academy of Medical Sciences (2020). *Survey results: Understanding people's concerns about the mental health impacts of the COVID-19 pandemic.*

<https://acmedsci.ac.uk/file-download/99436893>

³⁴ <https://www.wearevocal.org/>

³⁵ <https://www.wowbaggerproductions.co.uk/>

³⁶ https://www.webtoons.com/en/challenge/planet-divoc-91/list?title_no=462975&page=1

³⁷ Academy of Medical Sciences (2020). *COVID-19 immunology research.* <https://acmedsci.ac.uk/file-download/24858714>

³⁸ <https://isaric.tghn.org/>

property can mean that researchers are often unaware of others working in similar preclinical spaces – therefore missing opportunities for collaboration and knowledge sharing. Competition between studies is also posing challenges to clinical trial recruitment. The rapid drop in patients being admitted to hospitals with COVID-19 means that there are fewer patients to participate, leading to recruitment issues in large phase 3 trials. Furthermore, many researchers who do not traditionally work on coronaviruses or viral drug development are currently repurposing their skills and expertise to work on COVID-19, but may need additional support from the wider research community.

45. To help address these issues, the Academy is currently undertaking a project to map the landscape of COVID-19 preclinical drug discovery and development across the UK and beyond. We have developed an online resource that will provide a comprehensive overview of preclinical research into developing novel therapeutic targets, new molecular entities and repurposing existing medicines.³⁹ This resource will enable researchers and funders to quickly identify opportunities for collaboration, avoid duplication of effort and prioritise the most promising research.

Mental health sciences

46. The COVID-19 pandemic is having a profound effect on all aspects of society, including mental health as well as physical health. Mental health science must therefore be central to the response to the current pandemic, especially given the potential for long-term impacts on individual and population mental health.
47. Mental health research has not been sufficiently prioritised at the start of the pandemic, despite its potential impact. Researchers have faced challenges in obtaining mental health research funding where rapid response funding calls have prioritised short-term proposals that contribute to the urgent phase of the pandemic. Much mental health research is likely to have longer-term deliverables, but would still rely on early data collection during the pandemic. Better high level coordination between funding agencies, researchers and people with lived experience is needed to ensure mental health science research priorities are addressed swiftly, and that a firm evidence base is established for long-term studies. NIHR and UK Research and Innovation (UKRI) highlight notice to incentivise more mental health research applications was welcome.⁴⁰
48. In April 2020, the Academy and MQ convened a multi-disciplinary expert group to define the mental health research priorities for the COVID-19 pandemic. These priorities were published in The Lancet Psychiatry paper, '*Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science*'.⁹
49. Key priorities included:
 - Systematic collection of high-quality data on the mental health and psychological impacts of the COVID-19 pandemic across vulnerable groups and the whole population.
 - Research into how mental health consequences for vulnerable groups can be mitigated under pandemic conditions, as well as into the impact of repeated media consumption and health messaging around COVID-19.
 - Rapid discovery, evaluation and refinement of research-driven interventions to address the psychological, social and neuroscientific aspects of this pandemic.
50. Following this work, the Academy and MQ jointly organised two virtual workshops to take forward some of the mental health science research priorities identified. These workshops resulted in consortia bids focused on coordinating the collection of high-quality data on the

³⁹ <https://covidpipeline.acmedsci.ac.uk/>

⁴⁰ <https://mrc.ukri.org/documents/pdf/highlight-notice-covid-19-and-mental-health/>

mental, cognitive and neurological health impacts of COVID-19 on digital and remote mental health interventions in relation to COVID-19.^{41,42}

Winter preparedness

51. The need for health and social care undergoes large seasonal fluctuations, peaking in the winter. The NHS and social care systems typically operate at maximal capacity in the winter months, with bed occupancy regularly exceeding 95% in recent years.⁴³ Four additional challenges have great potential to exacerbate winter 2020/21 pressures on the health and social care system, by increasing demand on usual care as well as limiting surge capacity:
- A large resurgence of COVID-19 nationally, with local or regional epidemics.
 - Disruption of the health and social care systems due to reconfigurations to respond and reduce transmission of COVID-19. This has had knock-on effects on the ability of the NHS to deal with non-COVID-19 work.
 - A backlog of non-COVID-19 care that has accumulated as routine clinical care has been suspended during the first outbreak.
 - A possible influenza epidemic that will be additive to the challenges above.
52. At the request of the Government Office for Science, in June 2020, the Academy established an Expert Advisory Group to define our reasonable worst-case scenario for winter 2020/21 and identify actions to mitigate the impact of COVID-19 on the expected seasonal surge in healthcare demand.⁴⁴ Patient and public engagement was a key feature of this project (as outlined above).
53. The report sets out a need for urgent preparation in July and August 2020 to mitigate the risks of a particularly challenging winter 2020/21, including: minimising community SARS-CoV-2 transmission and impact; organising health and social care settings to maximise infection control and ensure that COVID-19 and routine care can take place in parallel; improving public health surveillance for COVID-19, influenza and other winter diseases; and minimising influenza transmission and impact.
54. Since publication of the report, the Academy is pleased to have had the opportunity to discuss the findings with the Scientific Advisory Group for Emergencies (SAGE) and the Welsh Government's Technical Advisory Group (TAG). We have also welcomed the Prime Minister's announcement of an extra £3 billion for the NHS in England to support the NHS's preparations for a possible resurgence of COVID-19 this winter.⁴⁴

Impact of COVID-19 on research

Impact on researchers

55. On 15 July, the Academy convened a workshop bringing together Fellows, funders, charities and early career researchers to consider the medium term challenges to careers

⁴¹ Academy of Medical Sciences (2020). *Coordinating the collection of high-quality data on the mental, cognitive and neurological health impacts of COVID-19*. <https://acmedsci.ac.uk/file-download/68532659>

⁴² <https://acmedsci.ac.uk/more/events/covid19-remote-and-digital-mental-health-interventions-workshop>

⁴³ The King's Fund (2020). *NHS hospital bed numbers: past, present, future*.

<https://www.kingsfund.org.uk/publications/nhs-hospital-bed-numbers>

⁴⁴ <https://www.gov.uk/government/speeches/pm-statement-on-coronavirus-17-july-2020>

and explore opportunities to embrace longer term opportunities. A report will be available in due course, however, the key concerns raised at this workshop are summarised below:

- Those at earlier stages of their careers are likely to be disproportionately affected.
- Progress on Equality, Diversity and Inclusion, research culture, research career structures, Team Science and a range of other issues may be jeopardised.
- Competition may increase due to anticipated decline in charitable research funding and increased rates of application in future years.
- Academia and industry partnerships and joint-placements for PhD students may be threatened.
- Clinical academic trainees may face ongoing challenges as they transition back to research from frontline clinical duties.⁴⁵

56. A number of possible actions to mitigate these issues were discussed, including:

- Flexibility from funders in existing processes to take account of disruption caused by COVID-19.
- Consensus and clarity in communications to provide reassurance that the issues faced by researchers are recognised
- An ongoing commitment from Higher Education Institutes (HEIs), funders, charities and industry to work in partnership.
- The importance of mentorship to help guide those groups most affected by disruption to their careers and to address the feelings of isolation and demoralisation.

Impact on the research landscape

57. The pandemic has also posed enormous financial challenges for universities, and medical research charities. In combination, these impacts pose substantial risk to the research base. If not adequately addressed in the long-term, they present substantial risk to the life sciences sector.

Impacts on universities

58. The severe financial impacts to UK HEIs as a result of COVID-19 pose significant challenges to the sector in maintaining research capacity, and with knock-on effects for biomedical and clinical research careers.⁴⁶ Immediate losses of business revenue streams such as catering, accommodation and conference fees for the remainder of the financial year are likely to be compounded by falling income from undergraduate and postgraduate international student fees, with potentially significant impacts on research activities due to cross-subsidy. Recent published analysis from the Institute for Fiscal Studies suggests that that some HEIs may be forced into insolvency by this combination of losses.⁴⁷

Charity funded research

59. Medical research charities make critical contributions to the UK's life sciences research base, with members of the Association of Medical Research Charities (AMRC) providing £14 billion in funding over the past 10 years, with over 17,000 salaries - including 1700 PhDs - across universities, the NHS and other bodies in 2018.^{48,49} However, COVID-19 poses a threat to the viability of charity-funded research, with medical charities expecting drastic reductions in fundraising income. For example, three quarters of the AMRC members anticipate a reduction of 25% or more in fundraising income (and over a third expect a

⁴⁵ <https://acmedsci.ac.uk/file-download/50182747>

⁴⁶ https://universitiesuk.ac.uk/news/Documents/uuk_achieving-stability-higher-education-april-2020.pdf

⁴⁷ <https://www.ifs.org.uk/publications/14919>

⁴⁸ <https://www.amrc.org.uk/Handlers/Download.ashx?IDMF=a9acc0a-f186-4415-bb13-43d04ea9a6d0>

⁴⁹ <https://www.amrc.org.uk/Handlers/Download.ashx?IDMF=a04d5206-ac5d-4649-a115-ce6ef97fc6ec>

reduction of 40% or more).⁵⁰

60. As a result, many AMRC members are scaling back on their research funding. AMRC reports two-thirds of its members are already deferring research plans, upcoming grant rounds and withdrawals of future funding. The British Heart Foundation expect to halve their research budget, in 2020/21, whilst Cancer Research UK, for example, has advised on some cuts to current research awards, and anticipates a reduction of research spend by £150m over the next four to five years.^{51,52} On average, AMRC's member charities anticipate that it will take 4.5 years before their spend on research in UK universities fully recovers to normal levels.

Mitigations

61. The Academy welcomed the two support packages provided by Government on 27 June to protect the jobs of researchers, scientists and technicians working at UK universities during the pandemic.⁵³ This should be a precursor to the additional support required by some charities, which have been hit by enormous drops in fundraising income.

This response was prepared by George Phillips, Policy Officer, and informed by members of the Academy's Fellowship and staff. For further information, please contact: George Phillips (georgephillips@acmedsci.ac.uk; 020 3141 3219)

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⁵⁰ <https://www.amrc.org.uk/Handlers/Download.ashx?IDMF=a04d5206-ac5d-4649-a115-ce6ef97fc6ec>

⁵¹ <https://www.cancerresearchuk.org/funding-for-researchers/applying-for-funding/policies-that-affect-your-grant/coronavirus-covid-19-information-for-grant-applicants-and-granholders>

⁵² <https://www.thirdsector.co.uk/cancer-research-uk-cut-almost-quarter-its-workforce/management/article/1689560>

⁵³ <https://www.gov.uk/government/news/government-to-protect-uk-research-jobs-with-major-support-package>