The impact of COVID-19 on medical research careers beyond the immediate term

A report of a workshop held on 15 July 2020

The Academy of Medical Sciences

The Academy of Medical Sciences

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Executive Summary

The biomedical and clinical research workforce are integral to the UK's world leading life sciences research base. From discovery stage biomedical science to clinical research involving patients, our medical researchers and their teams drive the translation of research into benefits for society through improved patient outcomes. However, COVID-19 has caused immense disruption to biomedical and clinical researchers in various forms, with many disproportionate and uneven impacts across careers stages and disciplines. Furthermore there is a risk of these effects continuing for months and years beyond the acute phase of the pandemic. Some impacts are novel and require targeted actions, whilst others risk **widening the existing cracks and exacerbating the inequalities in research careers**.

The Academy of Medical Sciences held a virtual workshop on 15 July 2020, to explore the challenges, opportunities and priorities for the biomedical research workforce in overcoming recent disruption, mitigating against medium and longer term impacts, and realising the potential for a more sustainable, adaptable and compelling research arena in future.

Immediate and longer-term actions were identified for funders, Higher Education Institutions and others across the sector. Key themes and next steps which emerged included:

Actions for the short term:

- **Flexibility and agility:** With the impact of disruption significant and varied, it will be vital for funders to demonstrate flexible approaches and processes for months and years beyond. To support this, **funders should integrate a 'COVID-19 crisis memory' into their practices**, to account for individual circumstances and ensure the needs of the community remain central in decision-making.
- **Funder communication:** Whilst funders are already taking action to protect current and future awardees, improved communication with the community is required, to reassure cohorts that these issues are understood and will be taken into account wherever possible in future. A **cross-funder consensus statement, recognising the challenges across the landscape, and committing to take action**, could provide much value in rebuilding researcher confidence.
- **Prioritising disproportionately affected cohorts to prevent widening cracks:** Early career researchers and those at key career transition points are amongst those likely to be disproportionately impacted. Higher Education Institutions should prioritise the distribution of funds from sustainability loans to support these individuals and protect the talent pipeline in the longer term.
- **Greater provision of 'soft' skills:** Mentoring, networking and development opportunities will be increasingly important in addressing feelings of demoralisation and isolation and promoting resilience. Funders and employers should preserve the provision of these opportunities wherever possible, particularly for junior cohorts, those at transition points, and under-represented groups, in order to ensure their continued development.

Actions for the medium-longer term:

- **Increased focus on developing the pipeline of talent:** to protect and develop future cohorts, a longer-term view is required. This must strike a balance between supporting individuals throughout their career trajectories; investing in training and development; and encouraging more multi-disciplinary approaches, to create a more agile and sustainable future workforce.
- **Greater efforts to improve research culture and promote equality, diversity and inclusion:** improving research culture and promoting greater equality, diversity and inclusivity should be central in order to overcome progress lost in recent months. **Better data collection by funders and institutions,** as well as the public availability of this information, will be fundamental in understanding issues and identifying appropriate interventions.

- **Partnerships and collaboration:** increased cross-sector partnerships between charities and HEIs, and improved industry-academia links, for example, via co-funding models, could provide a number of positive outcomes for the sector in the longer-term. Benefits will include improved sustainability of the sector as a whole, a better understanding between different parts of the sector, and leveraging of different sources of investment to drive innovation.
- **Highlighting inspiring careers in research:** the long-term benefits and rewards of engaging in research should be highlighted, to ensure that talented people continue to embark upon careers in research. The Government's recent *Research & Development Roadmap,* and the expected R*&D People and Culture Strategy,* provide a promising base for increasing investment in medical research, attracting global talent and investment, and better supporting a more diverse and sustainable workforce. The sector must come together to realise this potential and create an inspiring vision for careers in biomedical and clinical research.

Introduction

Medical researchers have played a leading role in the efforts against COVID-19.[1] Enabling such efforts has required largescale remobilisation in the form of: redeployment of clinical academic staff to frontline services; reallocation and prioritisation of resources for diagnostic testing and vaccine development research; rapid roll-out of clinical trials; and provision of direct scientific advice to the Government.[2]

Alongside these efforts, COVID-19 has caused significant disruption to both medical research and the UK life sciences ecosystem overall, with impacts across the sector both significant and varied. Individuals, institutions and organisations have all been affected in different ways, however every part of the system has been impacted in some way, including: disruption to careers and training of the individuals underpinning the UK's research base; delivery of research outputs, reporting and other activities; long-term financial sustainability of institutions;[3] and an increasingly severe outlook for medical research charities.[4]

Whilst many measures have already been put in place to address the immediate impacts of disruption such as costed-extensions to grant awards (where possible) and a University Support Package[5], it will be increasingly important for the sector to consider how to mitigate against effects in the longer-term, which could pose risks to the development, resilience and retention of biomedical researchers in future.

To consider these lasting impacts and identify possible solutions, the Academy of Medical Sciences convened biomedical and clinical researchers across career stages, along with funders and employers in a virtual forum on 15 July 2020, chaired by Professor Paul Stewart FMedSci.

The meeting coincided with the timely emergence of the Government's *Research & Development Roadmap,* its offer to the sector of a promising uplift in future investment, and a commitment to publish an *R&D People and Culture Strategy* to support these ambitions, both with implications of new opportunities for biomedical researchers in the coming years.[6]

The first session of the workshop looked to explore potential impacts arising over the next 6-36 months; identify specific groups, careers stages and types of research likely to be disproportionately affected; and consider potential targeted mitigations across the sector. Following this, a latter session considered potential areas where the sector could learn from COVID-19 disruption and build on the opportunities posed by the R&D Roadmap and other existing and linked agendas. Discussions identified opportunities to re-evaluate the ways in which medical research careers are supported, in order to both address the weaknesses exposed by the pandemic and create a stronger and more sustainable UK research base.

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Impacts of COVID-19 on medical research careers

Summary of key impacts on medical research careers

- **Widening the cracks –** exacerbating pre-existing challenges and inequalities in research careers including those relating to gender, race, career stage and region.
- **Particular impacts on those at transition points in their careers -** including challenges and disadvantages for early career researchers; increasing uncertainties around career progression and job security; and loss of progress with equality, diversity and inclusion and research culture agendas.
- **Impacts of COVID-19 prioritisation on other areas of scientific research –** including concerns of gaps in support for longitudinal research, non-COVID related diseases, and basic biomedical science.
- **Specific challenges for the clinical academic workforce -** particularly linked to the continuation of frontline clinical duties, disruptions to training and academic rotations, difficulties in restarting research involving patients and generating pilot data.
- **Specific challenges for the lab-based scientific workforce** – including PhD students at preliminary stages, who have been unable to access labs to progress studies; barriers to restarting research with animals; and effects of restricted lab access for months to come.
- **Uneven impacts due to discrepancies between the impact of COVID-19 on different funders** – with significant disparities in the abilities of funders across the sector to support current awardees and continue funding calls, and major knock-on impacts for some individuals within the research workforce.

The first section of this report provides a summary of discussions taking place on COVID-19 impacts that could continue into the medium-longer term without mitigations. This includes general, wide-reaching challenges for medical research careers along with some of the more specific impacts likely to be faced by certain cohorts across the sector.

A summary of proposed actions and potential opportunities to support the sector in overcoming these impacts is provided later on page 14.

Widening the cracks: Exacerbation of pre-existing issues

Prior to the COVID-19 pandemic, many barriers and challenges pertaining to biomedical and clinical research careers existed across the landscape, including: issues around career progression and stability, such as a lack of funding availability at certain career stages inhibiting progression opportunities;[7] diversity and inclusion, such as gender disadvantages and disparities;[8] and exacerbated barriers for Black, Asian and Minority Ethnic (BAME) individuals engaging in research.[9,10]

Participants agreed that recent disruption had acted as a compounding factor in many, if not all, of these pre-existing issues, resulting in a broad 'widening of cracks' across the sector. They reflected that many cohorts, particularly early careers researchers (ECRs), harboured major concerns around effects on peer review, publications records, and non-linear career paths amongst other factors, with the potential for these impacts to stretch into the medium-longer term.

Early Careers Researchers and career transition points

Early Careers Researchers (ECRs) and those at key transition points (e.g. individuals moving between PhD's and post-doctoral positions, or from post-doc to research independence), who are particularly reliant on securing future funding to enable career progression, are two examples of those likely to be disproportionately affected.

Participants raised concerns about the longer-term effects of the recent pause in almost all non-essential research activities[11] - and resulting reduction in outputs for some - on future funding prospects. They noted concerns for and amongst ECRs that periods of reduced lab access may lead to gaps in publication records and could count against them in future applications. Conversely, some have been able to maintain or increase outputs by pivoting to COVID-related research and undertaking activities whilst working from home, which in turn has both generated new - and highlighted prior - disparities across the landscape.

Whilst many funders find themselves in difficult and uncertain positions, it was noted that postponements to funding calls will also pose the risk of gaps at vital career points and may create bulges in applications for future funding rounds.

Equally, university recruitment freezes could exacerbate this uncertainty for post-doctoral researchers on short-term fellowships, as key research positions and promotion opportunities may be limited. Concerns were expressed that tenured positions and other routes to funding were already beginning to disappear as a result of the financial outlook. However, whilst this may be realised to some extent, participants emphasised that the perception of narrowed opportunities could be as damaging as the reality if ECR's become demotivated and discouraged from remaining in research.

Overall, delegates cited low morale amongst young scientists, with feelings of exclusion and disillusionment for those not able to continue research activities, and further gaps and pressures - and perceptions of such - as delays and postponements arise. Concerningly, delegates shared examples of some ECRs having already left research activities due to the disruptive effects of COVID-19.

Equality, Diversity and Inclusion

A lack of diversity in the medical research workforce already poses challenges for individuals from under-represented demographics in pursuing research careers, and represents a major loss of talent for the sector. In this context, concerns were raised that recent progress to improve equality and diversity in biomedical research may be jeopardised by the unequal and disproportionate impacts of COVID-19.

For example, those with existing or new caring responsibilities (e.g. childcare) may face specific disadvantages, where such commitments have created gaps in research activity and publication records over this period. Female academics in particular are likely to be disproportionately – though not uniquely - affected, with pre-COVID data suggesting that up to

78% of the academic workforce felt managing parenting and/or caring responsibilities had an impact on women's retention and career progression.[12] Moreover, disparities in if, or how, individuals have been able to maintain research activities and outputs during home working - and balancing of other commitments- will also be important in determining impact.

Delegates stressed the huge impacts of caring responsibilities in general, with researchers facing major decisions on how best to manage conflicting obligations, and questions raised over the existence of sufficient guidance from funders and institutions to support individuals in navigating these decisions.

Effects on Black and Minority Ethnic (BAME) researchers are a major concern, with some reporting increased anxieties related to career progression and support. Specifically, a reduction in outputs and potential narrowing of funding opportunities risks exacerbating pre-existing challenges of funding bias, under-representation, caring responsibilities, and a lack of access to mentorship for BAME researchers.

A loss of funding for networking and development opportunities poses further concerns, with participants reflecting that the severe financial outlook could see a longer term scale back in provision, with increased competition for opportunities which do remain. Whilst this would not be unique to BAME communities they may be hit hardest - due to the factors outlined above and already hindered access prior to the pandemic. This would pose a huge barrier to career advancement and act as a further source of demotivation, particularly for those at earlier career stages, where opportunities such as CPD activities and networking time are crucial steps for progression.

Research Culture

Similar sentiments were echoed for efforts around research culture more generally, with some feeling that the traction gained over recent years risks being undone. In particular, supportive structures for more junior staff members may be assigned as lower priority provisions - or even neglected all together - amidst disruption. Some also voiced concerns that a perceived narrowing of funding opportunities over the coming months could catalyse an environment which focuses on publications at any cost.

COVID-19 specific issues

A number of issues unique to the unprecedented challenges of COVID-19 disruption were also highlighted, which risk both immediate and longer-term impacts.

Following the halt of much other activity to prioritise COVID-19 research,[13] delegates expressed concerns that a continued focus on acute impacts may be at the expense of other types of studies, with basic biomedical science and disease areas unrelated to COVID-19 being de-prioritised. A perceived lack of funding opportunities for those working in these fields could leave some feeling compelled to pivot towards COVID-related activities, to increase chances of securing funds, and may be already happening in some cases. Participants highlighted that creating incentives to repurpose research could further imbalance activities across the sector with potential for such an environment to lead to suboptimal outcomes, which could be counterproductive for many individuals whose skills and experience may not be best suited to these research areas.

Concerns were raised that this may indirectly distort the careers of those focusing on the longer-term effects of COVID-19 and other important areas such as cancer, cardiovascular and mental health research – in turn posing concerning implications for patient outcomes. Similar sentiments was echoed for public health research, where efforts were perceived to be geared towards acute effects and actions despite major gaps in our understanding of the longer-term impacts of COVID-19 on future public health provision.

Discussions also brought to light disproportionate impacts on global health researchers, with some experiencing disruption due to redeployment to COVID-19 efforts in Low and Middle-Income Countries (LMIC's). There were concerns of global health research losing appeal to prospective talent as a result, which could have knock-on effects for the future pipeline.

Funding discrepancies

Impacts of COVID-19 on research funding have been uneven across the landscape, including discrepancies between different sources of funding. Whilst some funders, such as the Medical Research Council, have been able to continue many ongoing calls, others have been forced to pause and scale back funding opportunities indefinitely.

Impacts may be particularly severe on those working in areas primarily supported by medical research charities who face severe financial impacts and increasing pressures to cut funding. The Association of Medical Research Charities (AMRC) has reported many of its members scaling back, with two-thirds already deferring research plans, upcoming grant rounds and withdrawing future funding.[14] Cancer Research UK, for example, have advised on some live cuts to research awards[15], along with a recently announced cut in research funding of £44 million for 2020/21.[16,17] Conversely, some funder representatives attested that they have been able to continue or prioritise awards in the nearer term, highlighting the significant disparities across the sector.

PhD students are at particular risk of disparities due to differing abilities of funders to offer disruption extensions, and differences in the coverage of these provisions. Whilst final year UKRI funded awardees have received direct support due to delays and risks of non-completion only some charities and foundations, such as the British Heart Foundation, have been able to make similar offers.[18] Moreover, delegates reflected on recent consultation exercises which suggest that severe longer-term challenges were more likely for those at preliminary stages of their studies, with risks of this being exacerbated further without provision of support. They raised concerns that disparities would generate substantial inequalities in the experience of PhD students over the coming months.

Challenges in communicating the issues outlined above may have further compounded these issues. Whilst some were concerned about a lack of funder communication, others felt they had received clear guidance, which had served as a vital form of support amidst disruption.

Clinical research

Disruption has also imposed a number of impacts specific to clinical researchers, who have experienced varied and non-linear effects as a cohort. Moreover, there was broad acknowledgement of the existing barriers, uncertainties, and difficulties, in navigating the clinical academic pathway even prior to COVID-19. Additional barriers and further disincentives could be disastrous for prospective uptake and career retention, with some concerned that individuals would choose to remain solely in medical careers in future given that they offer more secure and linear career routes.

Most pressingly, the response of clinical academic trainees to the COVID-19 health emergency - with estimates of over 90% of all trainees on the Intergraded Academic Training Pathway (IATP) returning to frontline duties – has resulted in considerable disruption to research plans and training rotations.[19] This has included major impacts on abilities to generate preliminary data as a result of paused research, with communities concerned about the longer-term effects on funding prospects, particularly in the face of increased competition. Delegates gave anecdotal examples of such concerns leading to reluctance and even deferral of planned funding applications.

Whilst some clinical academics were returning to research activity at the time of the meeting, continuation of clinical duties and ongoing inclusion on rotas was a concern, particularly that junior clinical academics may be at risk of being retained beyond the acute response to COVID-19. Alongside this, clinical researchers were acutely aware of the possibilities of future waves of COVID-19, which could bring further and potential for further disruption to research activities.

Participants stressed that the longer-term effect of this disruption may increase barriers to returning to research. For example, delays to clinical research projects may impact on viability of existing studies as disruption of data collection may affect validity.

Moreover, disruption poses major detrimental impacts for prospective research talent, through disruption to clinical training and inability to complete clinical rotations, reduced access to medical student placements, and exposure to clinical research for undergraduate trainees.

Meanwhile many research active Nurses, Midwives, and Allied Health Professionals were placed in clinical roles unrelated to their training or specialisms. This has created challenges for an already disadvantaged cohort, with ongoing issues related to productivity and potential longer-term ramifications for morale, disillusionment and continued research engagement.

Impediments to research involving patients will bring added challenges. Questions were raised over abilities to restart this type of activity even with the reopening of labs as restrictions remain in place, and with much pre-COVID patient data likely to be unusable. As such, uncertainty around the ability to carry out research involving patients is likely to prevail for many months, leaving many clinical academics unclear on research plans and career trajectories.

Furthermore, some warned that this combination of effects may result in a perceived decline in opportunities for clinicians to re-engage in research, and could reduce the incentive for some clinical academic trainees to return to research at all.

Case study 1: Impacts on clinical researchers – Dr Virginia Newcombe, Consultant in Critical Care and Emergency Medicine at the University of Cambridge

Dr Virginia Newcombe described her experiences of the impacts on clinical researchers as a result of the COVID-19 pandemic.

She highlighted that much pre-planned research activity had been unable to take place both as a result of clinical duties and pauses in research activity. Consequently, pilot data collection has been severely affected, with knock-on effects for junior team members and their supporting paper publications. This has resulted in PhD studentship applications from Academic Clinical Fellows (ACF) being placed on hold due to this lack of preliminary data. She also noted that funder guidance and clarity in communications had been a much welcomed form of support, but had not been equally visible or available from all funders.

Moreover, Dr Newcombe highlighted the difficulties in carrying out patient and public involvement in the face of disruption and restrictions; she noted the difficulties of being able to follow up with patient cohorts remotely, including the inability of patients to return who required in person assessment due to the nature of the study. She also highlighted the challenges of integrating new team members whilst working remotely, although noting that access to formal lab meetings had served to support this.

However, she felt that some positives were presenting themselves in the face of COVID-19 disruption, including cross-disciplinary collaborations. This has included an emerging rapid response Magnetic Resonance Imaging (MRI) programme looking at both the acute and longer-term neurological consequences of COVID-19, which has presented a welcome opportunity for the study group to return to research activity.

Non-clinical researchers

Non-clinical researchers - those carrying out research at pre-clinical stages, or studies separate to testing involving humans - are also at risk of specific and severe impacts in the immediate and medium-longer term. This includes disproportionate effects on those conducting research using animals, with most animal experiments having been ceased or deferred where possible. Moreover, in some cases the culling of animals as a last resort has resulted in associated long-term delays to research projects, and knock-on impacts for individuals looking to restart their activities.

Those conducting non-clinical research may also have increased reliance on access to labs, equipment and materials for continuation of research activities. Participants were therefore concerned about the effects of sustained lab closures or limited access to such settings over the coming months, emphasising increasing levels of uncertainty around abilities to fulfil research plans and generate publications. As alluded to above, non-clinical PhD students, particularly in early years of studies who are reliant on collecting data, may be most severely disadvantaged.

Industry challenges

Industry-based researchers are also experiencing disruption in several areas, with many external collaborations and partnerships being placed on hold, including planned opportunities to train junior scientists in developing cross-sector skills.

Case study 2: Dr Shoba Amarnath, Newcastle University Research Fellow

Dr Shoba Amarnath offered her thoughts on the immediate and longer-term challenges faced by non-clinical researchers as a result of COVID-19.

She highlighted a potential worst case scenario for research programmes in the next 12-18 months, with the likelihood of only a small percentage of researchers able to return to laboratories. Programmes may still be need to continue spending against researcher salaries whilst supporting some reduced animals costs, resulting in grants being used despite a significant reduction in activity.

More concerning, this could have huge implications for future funding success, with lack of access to labs and inabilities to generate publications leaving major gaps in track records for future applications. Dr Amarnath noted the disproportionate effects this would have on ECR's, which combined with disillusionment would have severe impacts over the coming 36 months.

In conclusion, Dr Amarnath suggested some potential mitigations to avoid such scenarios; she highlighted the need for the sector to maintain a COVID crisis memory in processes and practices in future and suggested that one potential mechanism would be the involvement of junior scientists in decision-making processes within HEIs and funders.

Disruption has also impaired abilities to provide supervision and support for industrial placements across the sector. For example, many collaborative placement opportunities, which are crucial opportunities for developing future leadership skills and key links across sectors, have been placed on hold. Participants expressed concern of increasing competition for such schemes over the coming months, with decreased opportunities for those at earlier career stages, and potential detriment to the strength and adaptability of future cohorts.

Moreover, delegates noted that whilst industry researchers were beginning to return to labs, organisations remained very much in 'prioritization mode', raising questions over how re-start operations will be fair and equal and increasing risks of some being excluded or disadvantaged by phased returns.

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Mitigations: A compelling vision for future research careers

Throughout the workshop, participants stressed the need for immediate and informed action to address identified impacts; enhance funder communications; and instil longer-term, evolving and future focused mitigations in order to preserve the world-leading UK research base. A number of existing efforts could act as platforms to build on, along with further opportunities to better meet the needs of research community and ensure biomedical research remains an attractive and rewarding career path. Care should be taken to future-proof supportive action, with a critical need to tension efforts against the threat of further disruption onset by secondary waves of COVID-19, and to establish safeguards against similar crises in future.

Summary of proposed mitigations

Funders should seek to:

- **Be as flexible as possible** by integrating a 'COVID-19 crisis memory' into their practices so that future applications and cohorts are judged fairly.
- **Communicate** as clearly as possible with the research community, demonstrating that the issues they are facing are understood, and outlining how these issues will be addressed.

Funders and Employers should seek to:

- **Prioritise support measures for those most impacted**, including those at early or precarious stages in their careers.
- **Continue and enhance provision of 'soft' skills** through mentoring, networking, and development opportunities wherever possible.
- **Improve data collection** on impacts on career stages, gender, ethnicity and other protected characteristics, to understand the effects of COVID-19 and the effectiveness of support measures put in place.
- **Increase cross-sector partnerships and collaboration** between charities and HEIs, and enhance industry-academia links – for example, via co-funding models, which could provide a number of positives outcomes for the sector in the longer-term.

Overall the sector must come together to present a compelling and inspiring vision for careers in medical research. This should learn from the disruption caused by COVID-19 whilst demonstrating the benefits and opportunities of a career in research. Importantly, it must present a credible, accessible and attractive narrative of how diverse people can excel in research careers.

Immediate Mitigations

Funder agility and flexibility

Participants agreed the vital need for funders to display evolving flexibility in response to ongoing disruption, both in supporting current cohorts and the assessment of prospective awardees. To appropriately mitigate against disproportionate impacts and account for individual circumstances, actions should be driven by the needs of the community and reflected in all forms of guidance and support.

Many measures are already in place across the landscape to support cohorts at the greatest risk, with examples of recognition and adaption including:

- Prioritisation for continued Fellowship funding by medical research charities -including active calls from Versus Arthritis[20], Epilepsy Research UK Fellowships[21], and for LifeArc awardees[22], to maintain support for cohorts at the highest risk of longer-term impacts.
- Updates to Medical Research Council (MRC) Fellowship assessment criteria and guidance around career breaks to adequately reflect unequal and disproportionate impacts of COVID-19 on specific groups, including those with caring responsibilities.[23]
- A review of the COVID-19 Grant Extension Allocation to capture penultimate year PhD students as well as final year students, following a consultation cohort with funders, which highlighted the challenges for those in earlier stages of their studies.[24]
- The Clinical Academic Training Forum's '*Progressing clinical academic careers: Addressing the challenges of COVID-19*' and '*Addressing the challenges of COVID-19 second wave or another pandemic*' documents, which set out principles and practice actions in response to the disruption faced by clinical academic trainees, to guide trainees, supervisors and postgraduate deaneries in assessing a trainee's educational needs. This is with the aim of facilitating optimal research and clinical outcomes and mitigating against future impacts.[25]

Delegates also called for efforts to prevent a bottleneck in future grant applications, with some advocating that funders, where possible, avoid further postponements to upcoming funding calls. This will be crucial in supporting existing cohorts across all career stages and disciplines, and allowing talent to continue entering the pipeline. In the absence of mitigating action, specific cohorts may see future application bulges and increased competition for funding and posts in both clinical and biomedical careers.

Flexibility, and clear guidance around expectations for preliminary data to support applications, will also serve to mitigate this possible surge in future applications, and avoid scenarios where individuals delay funding proposals unnecessarily. Funder representatives acknowledged this need, with many across the sector, such as Cancer Research UK, already issuing guidance committing to adjusted expectations, in order to take into account periods of inactivity and disruption.[26]

Participants also highlighted the importance of capturing data from funding panels on the impact of any changes to pilot data ground-rules - for example, to trial recruitment targets and outcome data assessment - to ensure such efforts are translated into practice.

Cross-funder collboration will be crucial in providing opportunities for researchers to remain active, adapt research, and encompass new areas amidst continued disruption. The recently developed NIHR-BHF Cardiovascular partnerships[27] **[see box 3]** are one such example which could act as a benchmark for other initiatives across the sector.

Box 3 – NIHR-BHF cardiovascular partnerships

The National Institute of Health Research (NIHR) and the British Heart Foundation (BHF) cardiovascular partnership is a flagship collaboration to develop large-scale projects that will help address many important questions regarding COVID-19 and cardiovascular diseases. It brings together experts funded by NIHR and BHF to utilise existing funding in exploring areas that both interact with COVID-19 and advance the scientific and research agenda in cardiovascular disease.

The purpose of the scheme has been to utilise existing structures and involve communities at scale in the COVID-19 response, catalysing multi-disciplinary collaboration and bridging the gap between lab-based science and new treatments for patients.

COVID-19 'crisis memory'

Participants called for funders to ensure that a **flexible approach and COVID-19 'crisis memory' are built into future decision-making processes** and support in the months and years. This should ensure existing and future cohorts are not disadvantaged in the long-term.

Communications

Throughout, delegates highlighted a need for clear and improved communications between funders and the research community. They called for a **cross-funder consensus statement to recognise these challenges, and a commitment to do more to tackling them**. This communication could act as an important step in rebuilding researcher confidence, especially for those at precarious career stages who may be in need of reassurance that disruption will not negatively impact future applications.

Alongside this, participants agreed there was a duty for host institutions to maintain good internal communications with staff, particularly in supporting ECR's to understand and navigate the changing research landscape.

Moreover, it will be important to emphasise the wealth of positive contributions made by researchers during the COVID-19 crisis, and to celebrate the achievements of the community as a whole.

Actions for Higher Education Institutions

A number of mitigating actions that could be developed within Higher Education Institutions (HEIs) in support of research staff were also discussed.

Emphasis was placed on the need for HEIs to consider how to fairly deploy the funds allocated via the Government's recent *University research support package*, which granted £280 million in sustainability loans for the sector.[28] Some called for institutions to prioritise ECRs in the use of these loans, in order to offset some of the disproportionate impacts on this cohort, relieve some of the gaps left by funding postponements and cuts, and prevent losses from the pipeline going forwards. Efforts could potentially build on the NIHR Integrated Academic Training Network's close partnership between the NIHR, Health Education England (HEE), Medical Schools and NHS organisations[29], as a framework for engaging HEI leadership in supporting ECRs in future.

Other suggestions included better engagement between University leadership teams and the ECR community, perhaps via representation of junior staff within faculty executive boards, to both ensure that needs are communicated and promote decisions with a COVID crisis memory intact.

As with funders, delegates felt there was much benefit to be had in HEIs working collectively to address issues and support staff amidst severe financial losses. They called for unified efforts across institutions, to prevent competing messages, avoid discrepancies and minimise uncertainty in the coming months.

Greater provision of soft skills for ECRs

Discussions also conveyed an urgent need for continued or even increased provision of 'soft' skills. Delegates stressed that more than ever, access to mentorship, networking, and other forms of soft support were crucial for junior scientists, those at career transition points, and groups underrepresented in biomedical research. It was felt that increased availability of mentorship could to help to address feelings of demoralisation and isolation, and potentially prevent avoidable losses from the researcher pool.

Similarly, efforts should look towards tackling barriers to networking, by **leveraging the recent shift to remote working and digital resources as opportunities to find new ways of delivering support**. There is scope for organisations such as the Academy to play a leading role in providing such opportunities, for example by building on its recent work with the COVID-19 careers support space and online PILLAR event (Promoting Innovation, Learning, Leadership And Resilience in the research community), a co-developed resource aiming to offer longer-term, evolving support to the research community. [30,31]

Medical Schools should also maintain development opportunities for future and prospective talent wherever possible, through continued clinical training placements for medical students and maintaining early exposure to research in undergraduate settings.

Increased advocating for junior scientists

Delegates felt there was a responsibility for individuals across the sector, particularly those in senior and decision-making positions, to advocate for ECRs more broadly, in order to garner traction in addressing issues, enhance communication, and ensure the sector evolves in a way which is appropriate to stakeholder needs.

A compelling vision for future research careers

The workshop also considered opportunities to learn from COVID-19 disruption to adapt the way medical research careers are supported in future. Discussions explored how a range of initiatives could be consolidated to improve the environment for researchers, including through the initiatives and ambitions outlined in the UK Government's Research & Development Roadmap[32] **[see Box 4]**.

UK R&D Roadmap and a compelling vision for biomedical careers

Participants agreed that the recently published UK Government's R&D Roadmap **[see box 4]** posed huge potential for the future research arena, with positive reflections on it's promise of increased funding for the sector, reinforcement of the Government's commitment to invest £22 billion in R&D by 2024/25, and the inclusion of talent and skills as a core component throughout the document.

Delegates agreed that whilst the strategy would provide much value in boosting awareness and visibility of UK R&D and could play an important role in attracting and developing UK and global research talent, greater efforts would be required to utilise these offerings in inspiring research careers, especially in the face of current challenges.

Box 4– UK Research and Development Roadmap

The Government's *Research and Development Roadmap* acts as the start of a conversation on what is needed to realise the government's ambitions in making the UK a science superpower and invest £22 billion in the sector by 2025, to deliver economic growth and societal benefits across the nation. It sets out preliminary steps to identify: strengths and challenges facing the sector; issues to be addressed; and how to work with universities, business and other stakeholder to realise these ambitions.

- Key themes and messages within the document include:
- Publishing a dedicated *R&D People and Culture Strategy* in 2020 – to put the UK at the forefront of attracting and retaining talented individuals
- Launching of a major review of bureaucracy in research funding – to assess and remove unnecessary bureaucracy and ensure that institutional funding and international collaboration can support ambitions
- Emphasising interdisciplinary research- and remove barriers to such, realising the benefits of diverse perspectives and technologies
- Targeted measures to improve research culture – addressing issues around levels of public and private investment, bureaucracy, work culture and careers, development and innovation, regional imbalances, and international context
- Establishing an ARPA-style agency with a budget of £800 million - to trial new models of long-term funding for high-risk research
- A new deal for Postgraduate students - including increased financial support, and changes in the format of training and terms and conditions

Developing the pipeline of talent

Changes in funder practices could spearhead efforts to protect communities against future impacts and allow continued development of biomedical research talent. Most importantly, a longer-term view should be integrated into decisions affecting the future workforce, particularly in supporting training across the full spectrum of roles, disciplines and career stages, and the development of the skills required for disciplinary and interdisciplinary research. Mounting demand for data science and its associated skills was cited as one area that must be addressed.

To emphasise and support multi-disciplinary way of workings and drive inter-disciplinary research, it will be important to strike a good a balance between individual support and encouraging collaborative 'Team Science' approachesm particularly to avoid siloes and segregated practices. It was acknowledged that both the R&D Roadmap and the Research Excellence Framework (REF), recognise the importance of a Team Science approach, and will be crucial to driving this agenda forwards.

Participants called upon funders to respond to this need, citing a number of new and existing initiatives which could pave the way for future opportunities, including:

- **MRC Clinical Academic Research Partnerships** – a flexible route for research-qualified NHS consultants to increase their research skills and experience by engaging with groups and centres of biomedical research excellence, enabling the cross-seeding of perspectives, ideas and connections needed to underpin future translational biomedical research.[33]
- **Academy of Medical Sciences Health of the Public 2040 Transdisciplinary Fellowship Schemes** – supporting research to identify the main health challenges faced by the UK population by 2040, with emphasis and recognition of the need for a multidisciplinary approach to solve these issues.
- **UKRI Fellowship Scheme Secondments** – such as the Innovation Scholars Secondments, allowing individuals from any discipline wishing to spend up to 36 months (full or part time) on secondment in the biomedical sciences sector.

Similarly, discussions reflected on the opportunities presented to adapt and improve researcher training and support. Delegates reflected that some elements of the COVID-19 pandemic will create demand for new skills, such as those required to deliver remote clinical studies.

Overall, participants highlighted the value of documents such as the Academy of Medical Sciences FORUM report '*Shaping the future training and employment environment for clinical research*'[34], but they felt there was a need to provide a more comprehensive picture of activities across the sector.

Research culture

Participants emphasised that increased funding would be futile without efforts to improve the attractiveness of biomedical careers, retain current and prospective cohorts and attract new personnel by promoting an open and fair scientific community. The R&D Roadmap, specifically the imminent *R&D People and Culture Strategy*, should look to build on the recent work of the Wellcome Trust and UKRI to increase the attractiveness and sustainability of the workforce across a range of disciplines and skills.[35, 36, 37]

Delegates felt that this should aspire to create a culture which enables bravery amongst young scientists, and where individuals are prepared to flourish in taking risks.

Other supportive efforts could include reviewing the assessment of applicant CVs and the processes for triaging fellowship candidates. Narrative CVs for example, could be explored as one method of enabling fairer assessment of individual records and mitigating concerns of gaps impacting future applications.

Inspiring research careers

The central role played by biomedical research in the COVID-19 pandemic and innovative scientific approaches adopted

in tackling this major health issue, should be used to illustrate the exciting and rewarding nature of careers in medical research. Participants suggested the increased attention on medical research could act as a key lever to inspire future generations of talented people to embark upon careers in medical research. This could be supported by cross-sector and cross-funder collaboration to develop a vision for careers in clinical academia.

Equality, diversity and inclusion

Greater efforts around equality, diversity and inclusion (EDI) are critical so that the sector inspires individuals from all backgrounds to pursue careers in research. In order to identify trends and appropriate interventions, and understand the impact of these interventions, there is a vital need for employers and funders to improve data collection. Delegates also indicated that this data must be publicly available.

Strong mentorship and support to navigate careers in the face of ongoing disruption will also be crucial in overcoming EDI challenges and preventing lasting negative impacts. Providing access for under-represented groups should be urgently prioritised, especially Black and Minority Ethnic (BAME) cohorts, with the current lack of opportunities exacerbating pre-existing issues. Pockets of good practice, such as efforts from Black British Professionals in STEM (BBSTEM) and the Academy of Medical Sciences[38], to provide mental health workshops for black researchers in discussing these issues, could act as an influential basis for future work.

Partnerships and collaboration

Longer-term partnerships between both charities and HEIs, and industry-academia links, will be vital in order to build a more sustainable landscape.

Participants agreed that much had been achieved through partnership working, such as through match-funding (e.g. with funders and host institutions each contributing 50% of salary costs). Existing schemes such as the MRC New Investigator Research Grant[39] have exemplified the potential of this type of structure, with reported increases in applications to recent funding rounds since the introduction of these requirements. However, consideration must be given to the difficult financial situations for many HEIs and charities at present, which could preclude the possibility of introducing match-funding in the short-term.

In this context, discussions highlighted that medical research charities may be limited in their abilities to fully contribute to this vision without tailored Government support to address the anticipated shortfall in fundraising income. The Association of Medical Research Charities' (AMRC) highlighted the proposed Life Sciences Charity Partnership fund aimed at preserving the distinct contributions of charities to the UK's research base, and harnessing their role in supporting the UK's post-Covid-19 economic and social recovery.[40] Some delegates felt that the challenges experienced by charities should provide additional impetus for medical research charities themselves to collaborate better going forwards, so as to optimise the use of limited resources.

Delegates also called for better collaboration and increased co-funding models with industry, citing potential benefits for the longer-term sustainability of the sector as a whole. Priorities for collaborative efforts should include the likes of de-risking leading edge, early stage science. To facilitate this, it will be important for all funders to better understand the needs and wishes of industry partners, in order to drive new opportunities for biomedical research careers in future.

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Concluding Remarks

Professor Paul Stewart FMedSci concluded the workshop by highlighting that, despite ongoing disruption and increasing challenges facing the sector over the coming months and years, there was a prevailing wind of support for research and development in Government, coupled with an increased understanding of the importance of a strong science base amongst the general public.

With this, the sector has a vital opportunity to re-define the vision and structure of biomedical careers through the lens of COVID-19, to: mitigate against the longer-term impacts of recent disruption; shine a light on the inspiring, innovative and rewarding nature of clinical and non-clinical research; and develop a stronger UK Life Sciences base in future.

It will be vital for the sector to come together in realising this, both immediately and looking ahead, to build on the potential offered by increasing investment in research and development and the ambitions set out in the R&D roadmap.

Efforts should look to focus on several areas, including a need for a strong action plan to realise and address equality, diversity and inclusion issues, as well as cohorts disadvantaged in biomedical science research. In doing so, greater and more inclusive provision of soft support will be fundamental, including mentorship, networking and enhanced communications.

Moreover, it will be vital to place greater emphasis on interdisciplinary approaches; developing cross-cutting skills including data and digital capabilities; and increasing flexibility and resilience. Such emphasis is needed in order to promote innovation, achieve a more adaptable and sustainable pipeline of research talent, and address key science and research challenges in the future. Responding to industry needs with increasing industry-academia partnerships will also create important opportunities to drive this forwards.

Finally, a concerted effort to promote collaboration between funders, to ensure complementary support and the most efficient use of resources is required. The Academy expressed its willingness to support the development a cross-funder consensus statement, and to remain involved in wider conversations and efforts across the landscape. More generally, there was an appetite for next steps following conversations at the meeting, and participants were keen to make use of the forum provided to take discussions forwards.

Annex 1: Agenda

Session 1: Defining and mitigating the impacts of medical research careers beyond the immediate term	
10.00 – 10.05	**Welcome and Introductions**
10.05 – 10.10	**Setting the scene** Describing some of the impacts of COVID-19 on research and outlining which other groups are addressing these issues.
10.10 – 10.20	**Perspectives from two researchers** of the immediate and anticipated impacts on them and their research • Dr Shoba Amarnath, Newcastle University Research Fellow • Dr Virginia Newcombe, Consultant in Critical Care and Emergency Medicine at the University of Cambridge
10.20 – 10.50	**Breakout groups discussion** 1 **Defining challenges over ~6-36 months** Identifying particularly at risk groups 2 **Mitigations** What can be done to alleviate and mitigate the risks
10.50 – 10.55	*Break*
10.55 – 11.25	**Feedback from groups (5 min per group)** **Plenary discussion**
Session 2: Opportunities to adapt the way medical research careers are supported going forwards	
11.25 – 11.30	**Closing remarks**
13.00 – 13.10	**Review of the morning**
13.10 – 13.20	**Perspectives from:** • Dr Jennifer Anderson, Head of Training and Careers, MRC • Professor Moira Whyte FMedSci, Head of College of Medicine and Veterinary Medicine, University of Edinburgh • Rory Duncan, Director of Talent and Skills, UKRI
13.20 – 14.20	**Plenary discussion** • What opportunities does the disruption caused by COVID-19 pose for adapting and evolving the way we support medical research careers? • What opportunities are presented by commitments in the UK Research and Development Roadmap? • How can the proposed R&D People and Culture Strategy utilise learnings from COVID-19 to address long-term failings in the system?
14.20 – 14.30	**Concluding remarks**

Annex 2: Participant list

Professor Paul Stewart FMedSci (Chair), University of Leeds
Professor Philippa Saunders FMedSci (Co-Chair), University of Edinburgh
Dr Shoba Amarnath, Research Fellow, Newcastle University
Jennifer Anderson, Director for Talent and Skills, Medical Research Council (MRC)
Professor Metin Avkiran, Associate Medical Director, British Heart Foundation
Dr Sonya Babu-Narayan, Associate Medical Director, British Heart Foundation
Nicola Carter, UCEA
Dr Vasileios Chortis, Senior Lecturer in Veterinary Virology, University of Birmingham
Andrew Croydon, Skills & Education Policy and Examinations Director, The Association of the British Pharmaceutical Industry (ABPI)
Rory Duncan, Director, Talent & Skills, UKRI
Professor Stuart Elborn FMedSci, Pro-Vice-Chancellor, School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast
Professor Jason Gill, Professor of Cardiometabolic Health, University of Glasgow
Professor David Hawkes FMedSci FREng, Professor of Computational Imaging Science, University College London
Dr Daniel Horton, Senior Lecturer in Veterinary Virology and Research Director, University of Surrey
Professor John Iredale FMedSci, Pro-Vice Chancellor, Health and Life Sciences, University of Bristol
Dr Mehwaesh Islam, Research Policy Manager, Association of Medical Research Charities (AMRC)
Professor Dave Jones, Dean, National Institute for Health Research (NIHR) Academy
Professor Alison Lloyd FMedSci, LMCB Director, LMCB Group Leader, UCL Professor of Cell Biology
Professor Melanie Lee FMedSci, CEO, LifeArc
Professor Mandy MacLean FMedSci, Professor of Pulmonary Pharmacology, University of Stratchclyde
Professor Sara Marshall FMedSci, Head of Clinical & Physiological Sciences, Wellcome Trust
Dr Kinan Muhammed, Clinical Lecturer in Neurology, University of Oxford
Dr Victor Neduva, Clinical Lecturer in Endocrinology and Diabetes, MSD
Dr Virginia Newcombe, NIHR Academic Clinical Lecturer, University of Cambridge
Karen Noble, Head of Research Careers, Cancer Research UK
Kayisha Payne, Founder & Programme Director, Black British Professionals in STEM (BBSTEM)
Dr Katie Petty-Saphon, Chief Executive, Medical Schools Council
James Pickett, Director of Research and Innovation, Epilepsy Research UK
Dr Sheena Ramsay, Clinical Senior Lecturer, Newcastle University
Professor Sarah Richardson, Associate Professor in Cellular Biomedicine, University of Exeter
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Professor Brian Walker FMedSci, Pro-Vice-Chancellor, Research Strategy and Resources, University of Newcastle
Professor Moira Whyte FMedSci, Head of College of Medicine and Veterinary Medicine, University of Edinburgh

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