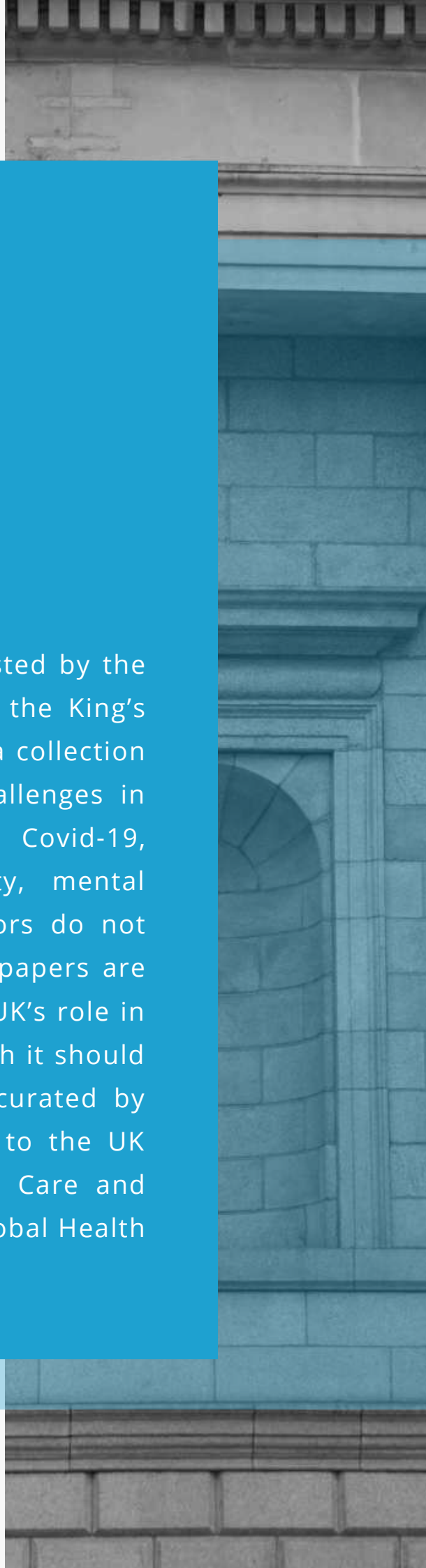
FUTURE HEALTH

KING'S ThinkTank

# GLOBAL BRITAIN AND HEALTHCARE

## A COLLECTION OF PAPERS ON DELIVERING GLOBAL LEADERSHIP IN HEALTH BEYOND THE PANDEMIC

MAY 2021



# ABOUT THIS COLLECTION OF PAPERS

In advance of the G7 meeting in June hosted by the United Kingdom (UK), Future Health and the King's Think Tank have collaborated to develop a collection of papers that explores some major challenges in global health, including: responding to Covid-19, antimicrobial resistance, health security, mental health and health technology. The authors do not profess to have all the answers, but the papers are designed to provoke thought around the UK's role in global health and the actions and approach it should consider taking. The papers have been curated by Richard Sloggett, former Special Adviser to the UK Secretary of State for Health and Social Care and Gursharan K. Khera, the Director of the Global Health Policy Centre at King's Think Tank.

# ABOUT FUTURE HEALTH

Future Health is a future focused Research Centre with a mission to advance public policy thinking that improves the health and wealth of people, communities and nations.

Healthcare systems around the world are facing significant challenges of demographic, societal and technological change. The importance of prevention and the development of new technologies have long been seen as ways to transform health systems to improve patient outcomes and performance, but progress has often been slow. COVID-19 is an inflection point, demonstrating the need and opportunity for investing in and delivering more effective and efficient healthcare services in the future. In undertaking cutting edge public policy research and generating new insights and solutions, Future Health seeks to shape the global healthcare policy debate and inform the decisions made by Governments and health systems to enable healthier, wealthier people, communities and nations.

Contact Future Health at:
richard@futurehealth-research.com

# ABOUT THE KING'S THINK TANK

The King's Think Tank is the largest student-led policy institute in Europe.

The institution was created in the wake of the student protests in 2010, as a means to empower change through student activism.

The King's Think Tank aims to provide a platform for students to engage with the world of policy and seek out innovative solutions to complex issues.

Through their seven policy centres, their committee strives to address the pressing challenges of today's society through organising policy workshops, panel discussions, and lobbying trips. Critical analyses are published in their online blog and formal policy papers are published in their annual policy-recommendation journal, The Spectrum.

In the decade since their launch, we have grown into a vibrant and diverse community of writers, activists, and leaders.

Contact the King's Think Tank's Global Health Policy Centre at: president@kingsthinktank.org

# CONTENTS



# INTRODUCTION

The UK's decision to leave the European Union (EU) was not met with widespread support from within the domestic or international healthcare communities. NHS leaders feared challenges with staff recruitment, scientists feared losing access to European funding and collaborations, and the pharmaceutical industry warned about difficulties for patients in accessing novel medicines in the future.

The UK has only recently left the EU, and the full implications of this move will not be known for many years. Amongst healthcare leaders there is a fear that Brexit will make healthcare worse, by challenging its delivery and funding in the long-term.

Foreign, economic, social and trade policy implications of COVID-19 have demonstrated the importance of healthcare to the UK's place in the world, highlighting strengths and uncovering weaknesses in the system.

The nation's initial operational response to the pandemic has been hampered by an underfunded and fragmented service, splintered across the public health, NHS and social care sectors. Success has been further hindered by insufficient planning, along with the implementation of measures originally conceived to contain influenza outbreaks, which have been insufficient to meet the challenges posed by COVID-19.

However, the UK has also been at the forefront in responding to COVID-19 and setting a path out of the pandemic. Its progress has been aided significantly by its strong life sciences partnerships. Examples of this, include:

- The research and discovery of new vaccines, such as the Oxford-AstraZeneca COVID-19 vaccine.
- The repurposing of pharmacological and other treatments for COVID-19 patients, including: dexamethasone, tocilizumab and sarilumab.
- The utilisation of genomic testing to analyse and identify novel COVID-19 variants.

The national vaccine programme is moving at pace through a nationwide, yet locally geared system towards mid-June, at which point most restrictions are expected to be lifted. As the UK moves along the path out of lockdown, it should look beyond the pandemic and take an assertive and positive role in global health affairs. The G7 summit, chaired by the UK this summer, is an ideal opportunity to do so.

The UK Secretary of State for Health and Social Care, Matt Hancock, has already been clear about this opportunity: "the pandemic has thrust the G7 health agenda to the centre of global affairs. Health policy is the number one economic policy, security policy and social policy of every country. So we must make G7 leadership count[1]."

This collection of papers, developed through collaborative partnership between Future Health and the King's Think Tank, explores some of the major challenges on the global health agenda in the run up to the G7.

[1] https://www.gov.uk/government/speeches/reinvigorating-our-system-for-international-health

**Richard Sloggett** lays out how the UK can play a leading role in global healthcare in the years to come. He explores how the UK can use its G7 platform this summer, along with the recent Integrated Security and Foreign Policy Review, to begin efforts to reform the World Health Organisation. This paper also suggests ways to 'power-up' Official Development Assistance (ODA) to support global healthcare recovery post-Covid-19 and examines how the UK's life sciences and health technology sector can grow and develop both domestically and internationally.

**Enya Khan** uses her paper to set out strategies to tackle anti-microbial resistance. Estimates report this could be responsible for up 10 million deaths per year by 2050, with 2.4 million deaths between 2015 and 2050 taking place in high-income countries if the issue is not tackled effectively[4]. This paper outlines the emergence of an opportunity for the UK to take the lead in tackling substandard and counterfeit medicines using blockchain and other technologies.

**Gursharan K. Khera** and **Rupali Lav** set out ways for the UK to utilise its leadership of the G7 to extend opportunities presented by the development of novel and integrative healthcare technologies. This paper outlines mechanisms for the UK to share data and intelligence on elements of the pandemic response with other countries, in a globally collaborative and constructive exchange. In addition, they argue that the UK can harness technology to play a leading role in health education and implement legislation to lead global health technology standards worldwide.

**Coralie Belair** focuses her article on the impact of lockdown restrictions on the mental health of young people, particularly students. This paper sets out how depression, anxiety and other mental health conditions have risen in this population and access to adequate care can often be difficult. Coralie presents five key recommendations for improving mental health care: tackling stigma, increasing community and peer support, providing financial aid for students, unlocking digital health options and tailoring support.

**Pedra Rabiee** presents a framework for building more secure and resilient healthcare systems. The framework covers how healthcare systems can prepare for, manage (absorb, adapt and transform) and learn from shocks. The paper covers a series of themes that systems need to focus on, including: governance, information, finance, resources and service delivery. It also references a series of case studies and recommendations for Governments and health service leaders to utilise and build upon.

# GLOBAL BRITAIN AND HEALTHCARE:

# Playing a Leading Role in Global Health After the Pandemic

By Richard Sloggett

# Global Britain and Healthcare: Playing a Leading Role in Global Health After the Pandemic

Prior to COVID-19, and at the start of last year, the World Health Organisation set out a list of the top global health threats for the next decade. The list focused on a set of important and complex issues, including climate change, infectious disease and global health inequality.

*Figure 1: WHO list of top health priorities for next decade*[2]


Shortly after this list was published, COVID-19 broke out and the pandemic has dominated life around the globe ever since.

The virus has highlighted the importance of health to global affairs, prosperity and security more than ever before.

Tackling COVID-19 and the other issues on the WHO's list of key health priorities requires unprecedented international collaboration and coalition-building. However, these efforts have been complicated by the rise of rise of narrow nationalist tendencies (evidenced during the COVID-19 pandemic and the subsequent rush to obtain vaccines), critically testing the cohesion of international institutions. Therefore, major nations must step up to their leadership roles and work collaboratively in order to reach global solutions for global challenges.

## BRITAIN'S ROLE IN THE GLOBAL HEALTH POLICY

Following the UK's decision to leave the European Union, the country is at a crossroads in regard to its place in the world. The recent Integrated Security, Defence, Development and Foreign Policy Review set out four objectives that the Government will seek to meet by 2025[3]:


*Figure 2: Four objectives proposed by the Integrated Review of Security, Defence, Development and Foreign Policy[3]*

The importance of healthcare to each of these agendas, together with COVID-19, presents an opportunity for UK global leadership.

The UK has a long and rich history of leadership in healthcare, counting the first ever vaccine and antibiotic amongst important national innovations in life sciences. Over the course of this decade the UK has played a unique role in research and is recognized as the centre of genomic research, following the success of numerous cutting edge research initiatives, including its expanding 100,000 Genome Project.

The UK's commitment to life sciences and research has spanned Governments of different colours. Gordon Brown was a champion for research spending as both Chancellor and Prime Minister, and created Innovate UK, which is now part of UK Research and Innovation (UKRI). His successors have maintained this commitment, from the Sir Paul Nurse review commissioned by the Conservative-Liberal Democrat Coalition government to Theresa May's Industrial Strategy which placed UK science at its epicentre. The current Government has kept life sciences and research high on its agenda and committed to spend 2.4% of total GDP on research and development.

This focus has paid off during the pandemic. From the development of the Oxford-AstraZeneca vaccine, to the sequencing of new virus variants, the UK has stepped up to play a major role in the international response to COVID-19. The partnership between Government and a range of public and private sector partners has delivered tangible benefits to both domestic and global health.

As the UK approaches a summer during which most, if not all, restrictions are set to be lifted, chairing the G7 Summit presents a pivotal point for its role in global healthcare leadership.

Indeed, this has already started. In April the Government and Chief Scientist Sir Patrick Vallance announced a new £16 million partnership focused on improving global pandemic preparedness:

“The £16 million investment will fund global vaccine manufacturing capacity and critical research and development to rapidly respond to the threat of new strains, supporting the development of new variant-specific vaccines. CEPI’s work to coordinate research, development and manufacturing of vaccines will aid efforts to have millions of doses of vaccine available for emergency use 100 days from a variant of concern being identified[3].”

In addition to the G7, the UK is also set to host the 26th UN Climate Change Conference of the Parties (COP26) in November. As part of efforts to cut climate emissions, the UK has agreed to reduce carbon emissions by 78% on 1990 levels by 2035.

## OPPORTUNITIES FOR GLOBAL HEALTHCARE PARTNERSHIP AND LEADERSHIP

The UK’s recent Integrated Security, Defence, Development and Foreign Policy Review included a series of future priorities for global health including:

- Building health resilience at a national and international level and improving pandemic preparedness;
- Ensuring access to COVID-19 vaccines and funding of the COVAX AMC programme; alongside ongoing funding for Gavi and other vaccines internationally;
- Improving global health surveillance and data sharing;
- Increasing funding for, and reforming, the WHO;
- Developing and enhancing domestic and international action on AMR;
- Using Overseas Development Aid funding to enhance access to new technologies for developing nations[5].

The Integrated Review provides a clear platform for the UK to build a strong role in global healthcare for years to come. The following sets out areas for consideration as the UK considers its future global healthcare commitments through the pandemic, and beyond.

## REFORMING THE WHO

Attempts to reform the WHO are not new. In trying to respond to the needs of 194 countries, with limited resources and a potentially unlimited mandate of issues, the pandemic has exposed challenges faced by the member states in the event of a global health emergency. Arguably, the greatest challenge is found in the tension between politics and science.

The UK should champion a package of reforms to improve the WHO, including:

- The development of a new alert level system for pandemics;
  *This could build from the UK's own COVID-19 pandemic alert system and alternative systems utilised in areas such as security and counter-terrorism.*
- Tightening the remit of the WHO;
  *Increased funding for the WHO be provided alongside a more focused and clearer set of priorities for WHO.*
- New compliance powers and sanctions against member states who fail to follow the International Health Regulations;
  *Lessons in this arena could be learned from other powerful and effective international organisations, such as the World Trade Organisation (WTO).*
- Exploring methods to establish independent scientific committees to explore evidence on priority issues and making publications and findings transparent;
- Bringing in non-state actors, including civil society, to advise and provide input into relevant areas of policy work;
  *The International Labour Organisation offers examples on how effectively to achieve this goal.*

Interestingly, the UK Government is itself exploring methods to restructure its own public health system following the decision to abolish Public Health England. As a result of this change, the Government will return public health to the Department of Health and Social Care and closer to Ministers. However, independent evidence on public health will be commissioned from the Chief Medical Officer. This integrated but split model could have broader applications at a global level.

## POWERING UP OVERSEAS DEVELOPMENT AID

The UK's decision to abandon its target of delivering 0.7% of GDP to overseas aid is regretful. Whilst the existing economic climate has been cited as the reason for reducing contribution, this move jars with the ambition for a 'global Britain'.

However, in bringing the development budget closer to the Foreign Office through a merged departmental structure with the former Department for International Development, there are new opportunities to drive a more co-ordinated and positive foreign policy agenda with healthcare at its centre. Opportunities and recommendations include:

- Restoring the Official Development Assistance (ODA) budget urgently from 2022 to 0.7% of GDP;
- Placing improved healthcare at the heart of the new international development strategy, to be announced in the integrated review;
- Setting-up an International healthcare development commission in the UK following COVID-19, that would include representatives from developing countries. The commission would advise on healthcare innovations that can deliver on-the-ground benefits and post pandemic recovery initiatives through relatively small and targeted research grants.

## BUILDING A GLOBAL HEALTHCARE AND LIFE SCIENCES HUB

The UK's life sciences sector has played a major role in the global response to COVID-19. The Government's decision to announce the New Variant Assessment Platform, and therefore share genome sequencing capabilities more widely, is a welcome step alongside the creation of the Pandemic Preparedness Partnership (PPP). The UK also continues to lead on the issue of anti microbial resistance under the leadership of Envoy and former Chief Medical Officer Dame Sally Davies.

These are though other opportunities for the UK to lead global efforts on life sciences and healthcare innovation:

- Healthcare UK should be given greater resource and cross government commitment to explore opportunities for building healthcare trade and alliances overseas. Development of a new NHS Export Collaborative, as set out in the NHS Long Term Plan, would offer an exciting opportunity to scale UK innovation globally, and share the benefits in order to improve health service delivery and outcomes internationally.
- The UK Government should refresh its 2019 life sciences strategy and build a robust healthcare and life sciences strategy, adopting an approach that co-ordinates investment into cutting edge science and research, and greater international collaboration. This would further translate into tackling health inequalities and outcomes domestically and internationally[5].
- The UK has a major role in the Global Digital Health Partnership[6]. It should utilise this position to champion the implementation of new international standards on health data governance and sharing. More immediately, the G7 presents an opportunity for the UK to lead the way in seeking to align COVID-19 vaccine certification for cross border travel.

Adopting and building upon these policy recommendations would enable the UK Government to continue to push forwards and approach challenges as a leader in global health.

This is a pivotal juncture for the UK to establish its place in the world, including its role in international institutions and alliances. Through investing in and reforming the WHO, re-committing and targeting overseas aid effectively and building a global healthcare hub, the UK can put health at the heart of its foreign policy agenda.

The following papers in this publication explore four specific areas for action and consideration.

## REFERENCES


1. https://www.who.int/news-room/photo-story/photo-story-detail/urgent-health-challenges-for-the-next-decade
2. https://www.gov.uk/government/publications/global-britain-in-a-competitive-age-the-integrated-review-of-security-defence-development-and-foreign-policy
3. https://www.gov.uk/government/news/new-global-partnership-launched-to-fight-future-pandemics#:~:text=The%20Government%20will%20launch%20a,and%20prevent%20another%20global%20pandemic.&text=The%20Government%20will%20today%20(20,and%20prevent%20another%20global%20pandemic.
4. https://www.futurehealth-research.com/future-health-launches-major-report-on-the-economics-of-the-health-sector/
5. https://gdhp.org/home/index/white-paper-2020

# COUNTERFEIT MEDICINES AND THEIR INSIDIOUS CONTRIBUTION TO GLOBAL ANTI-MICROBIAL RESISTANCE

By Enya Khan

# Counterfeit Medicines and their Insidious Contribution to Global Anti-Microbial Resistance

## CURRENT ISSUE

It is estimated that 1 in 10 medicines in circulation globally are counterfeit or inadequate[1]. The consequences of this are far reaching and devastating, from the impact on individual health, to the strain poor quality medicines put on health systems through a variety of channels. Aside from counterfeit medicines constituting a critical public health issue in their own right, the part they play in catalysing another global health crisis – anti-microbial resistance (AMR) – is momentous. AMR, an umbrella term for resistance to a range of therapeutics including antibiotics, has been named by the World Health Organization as one of the top ten public health crises facing humanity[2]. Contributing drugs tend to be grouped in two ways: counterfeit and substandard[3]. Substandard drugs are defined as those which do not meet quality requirements and guidelines, while counterfeit or falsified drugs are those which are intentionally mislabelled with respect to their composition. In fact, the composition of falsified drugs can vary from containing no effective ingredient to containing harmful substances such as toxins. Morbidity and mortality results from inadequate treatment, adverse outcomes, and treatment resistance.

## BACKGROUND

AMR is well recognised as a key issue on policy agendas globally and has been for a number of years due to the threat it poses not only to health, but more widely to all areas of societal functioning, economic and food security and development. It has been estimated that if proper action is not taken, AMR could be responsible for 10 million deaths per year by 2050, with 2.4 million deaths between 2015 and 2050 taking place in high-income countries[4]. The concern is discernible, with key players in global health such as the WHO, the CDC and various departments of health across the world dedicating teams of researchers and analysts to tackle the problem.

The UK government's most recent publication on their 20-year vision for AMR was published in 2019[5] and emphasises the need for collaboration across private and public industries, professionals, academics, international organizations and other governments – including G7 partners. The one-health approach addresses antimicrobial use not just in humans, but also in animals and in the environment, and has been a useful tool thus far. However, it is clear from rising disease resistance that more needs to be done. Within this 20-year plan there is reference to the issue of substandard and falsified medicines and the need to understand their link to AMR[5]. This is important, as this connection has often been neglected in the fight against AMR[6]. Given the current, unique position of the UK in terms of Brexit and the cessation of usual EU regulation for falsified medicines, an opportunity has presented itself for the UK to tackle this challenge head-on.

The link between substandard and falsified medicines and AMR occurs through subtherapeutic dosages in the drugs. Essentially, an incorrect dosage of an active ingredient in the falsified medication means disease-causing pathogens are not killed, leaving some to mutate against the low doses of the drug present[7]. This results in common infections such as pneumonia, gastroenteritis or urinary tract infections being caused by disease resistant pathogens and the formation of superbugs,

against which most current antibiotics are ineffective. For example, ciprofloxacin, an antibiotic commonly used for urinary tract infections, has shown increased resistance rates from 8.4% up to 92.9% in some countries[2]. As genetic changes in organisms means that a degree of AMR occurs naturally[2], the variables that contribute to resistance that can be controlled through human behaviour must be addressed. As the pipeline of new antibiotics is parched, being unable to combat previously easily-treated infections will have immense consequences for individual and population health, as well as already strained health systems. Furthermore, routine medical procedures that utilise antibiotics prophylactically, such as surgery and chemotherapy, will become increasingly dangerous. Thus, the potential rise in morbidity and mortality if this issue goes unaddressed, is huge.

Unfortunately, the true burden of counterfeit medicines is difficult to estimate due to poor surveillance systems and disconnect in pharmaceutical supply chains, which tend to be global. However, early studies demonstrate that the largest proportion of counterfeit medicines are anti-microbial drugs[5]. Data modelling has tended to focus on low- and middle-income countries, and one such model estimates deaths from childhood pneumonia up to 72, 430 if antibiotic activity is reduced from substandard drugs, and 169, 271 if there is no antibiotic activity from falsified drugs[5].

Aside from the damage to individual health, the wider impact of subtherapeutic counterfeit medicines includes loss of trust in health systems, medications and healthcare workers[1]. In fact, this lack of confidence in medical treatments can translate to public apprehension and extend to other cost-effective health interventions such as vaccine programmes[7]. Socio-economic impacts manifest from increased costs of additional testing, staffing requirements and additional treatment expenses which must be absorbed either by individuals or the wider health system[7]. Despite the evidence pointing to increased burden of these medicines in low-and-middle income countries, the WHO Global Surveillance and Monitoring System notes no region of the world is untouched by the phenomenon[1]. Disease-resistance and super bugs are not limited by international borders and the emergence of such patterns in one area of the world pose a threat everywhere in today's globalised society. Furthermore, the increase in online purchasing of medicines and the international nature of supply chains and networks means there are multiple entry points for substandard and falsified medicines to enter circulation in high income countries as well. The current COVID-19 pandemic has only fuelled this problem, through straining regulatory systems with novel treatments and vaccines, and the disrupting global supply chains via changing demands for medicines and medical devices[6].

## WHAT'S NEXT?

Globally, the key opportunity for collaborative action in order to eliminate the threat of substandard and falsified medications lies in strengthening pre-existing surveillance and data collection systems. This will raise awareness and increase advocacy power to address the causative mechanisms behind their production and procurement. Filling these gaps will enrich understanding on the issue, and open dialogue among relevant actors and stakeholders to help map and identify key trends globally and identify pertinent areas for intervention. The UK has expressed its commitment to the WHO Global Surveillance and Monitoring System[5], which was set up to address the data shortage on substandard and falsified medicines. However, scrutiny is required on how this is used in practical terms. While no studies on physician awareness have been completed within the UK, a pilot study from Sweden showed that physicians lacked awareness on reporting systems and how to deal with situations in which they suspected patients had taken falsified medication[8]. There is a strong likelihood the case is the same in the UK. Engagement and cooperation across national and supranational organizations, the private sector and civil society driven forward with strong political will, is needed for an effective AMR strategy. The issue of falsified and substandard medicines is no exception.

An area of particular interest to the UK is that of the Falsified Medicines Directive (FMD). This is EU legislation that was created to secure supply chains and protect the EU and UK from circulating substandard or falsified medicines. Delegated regulation on this came into practice in February 2019[9]. The safety checks compromised unique identifiers on medicine packaging that needed to be checked and scanned at different levels of the supply chain. However, following the end of the transition period for Brexit on 31st December 2020 this EU regulation is no longer in effect in the UK[10]. This gap in regulation processes has led some to question the increased exposure the UK market now has to substandard and falsified medicines, an issue raised by the Royal Pharmaceutical Society[11].

Careful and efficient policy implementation is vital to ensure robust and regulated supply chains for patient safety and future sustainability of the healthcare system in relation to AMR, whilst also ensuring that new regulatory burden doesn't offset the attractiveness of the UK market for pharmaceutical innovation. This careful balance requires calculated policy implementation while also providing an exciting opportunity for the UK to be one of the global leads in innovative practice to address the challenges counterfeit medicines, and subsequently, AMR. This is where the innovative and promising technology blockchain comes into play.

Blockchain solutions are a technology on which the cryptocurrency Bitcoin was based on, but are being increasingly implemented within other areas, it has recently been used by the NHS to monitor the temperature of COVID-19 vaccines in cold storage to reduce the chance of wastage from spoiled vaccines[12]. The blockchain is a decentralised system of information storage in which data is spread across a network. The chain will track all and any information or exchange and allow this to be viewed by all those involved, whilst preventing deletion or tampering within the data chain[13]. Essentially, this technology allows transparent transactions between two parties, so there is an unchangeable record of delivery, from origin to end-point. The decentralised nature of the system is an improvement on the current centralised FMD, that is more liable to infiltration or attack from other sources[14]. Additional benefits include increased security, reduction in drug errors and increased recall ability, should this be needed. By nature, the supply chains involved in pharmaceutical manufacturing and distribution are complex, and the billion-dollar industry[15] of counterfeit medicines means that the methods used to conceal the identity of these falsified products are more advanced, leading them to being notoriously

difficult to trace. Thus, the value of a technology that allows tracing, transparency and resistance to manipulation in data is incontrovertible.

The last couple of years have seen an increase in the literature regarding novel blockchain models to tackle the issue of counterfeit medicines[14] [16] [17], all of which conclude highly positively in regard to the future of this approach. Whilst this is a novel and exciting area, it is recognised in the pharmaceutical and life sciences sector as the next big thing. A survey of 120 officials in the sector found 83% expected blockchain to be adopted within the coming five years[18]. Relevant actors in the field such as FarmaTrust, a UK based medical authentication provider, have identified the potential for the UK to become a leader in medicines security by adopting blockchain, allowing the UK to surpass the current 'gold standard' system of the US[19]. Furthermore, pursuing such policy would be a major push toward achieving wider aspirations. This includes reaching the goal to become a leading global hub for life sciences post Brexit, as laid out in the Conservative manifesto of 2019[20]. If the UK can lead on this initiative and have other nations follow the safety of medicines worldwide will be strengthened. This would result in positive benefits for all countries, due to a reduction in the counterfeit medicines trade worldwide. Furthermore, adoption of such a system fits in with the global push for harnessing technology and artificial intelligence for healthcare and wider global health security[21].

The removal of the FMD regulation as a result of Brexit, has provided the UK with the opportunity to explore what many consider to be the future of pharmaceutical safety, especially in regard to counterfeit drugs. This means the UK has the chance to create a blueprint for other nations in this area, whilst also making great strides towards the future of global health and technology. Adopting such policy would make a huge impact on the countless health, economic and developmental consequences resulting from the counterfeit drug market. Finally, this provides the chance to address an often-neglected contributor to AMR - an insidious global health crisis which requires a robust and all-encompassing approach.

## REFERENCES


1. World Health Organization, 2018. Substandard and falsified medical products. [Online] Available at: https://www.who.int/news-room/fact-sheets/detail/substandard-and-falsified-medical-products [Accessed 25 February 2021].
2. World Health Organization. 2020. Antimicrobial resistance. [online] Available at: <https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance> [Accessed 29 March 2021].
3. Newton, P. N., Green, M. D. & Fernández, F. M., 2010. Impact of poor-quality medicines in the 'developing' world. Trends in Pharmacological Sciences, 31(3), pp. 99 - 101.
4. Interagency Coordination Group on Antimicrobial Resistance, 2019. NO TIME TO WAIT: SECURING THE FUTURE FROM DRUG-RESISTANT INFECTIONS. REPORT TO THE SECRETARY GENERAL OF THE UNITED NATIONS. [online] Available at: <https://www.who.int/antimicrobial-resistance/interagency-coordination-group/IACG_final_report_EN.pdf?ua=1> [Accessed 29 March 2021].
5. HM Government. Contained and controlled. The UK's 20-year vision for antimicrobial resistance. January 2019. Available from: https:// www.gov.uk/government/publications/ uk-5-year-action-plan-for-antimicrobialresistance-2019-to-2024
6. Qualitymatters.usp.org. 2021. Breeding a superbug: how poor-quality medicines fuel AMR | Quality Matters | U.S. Pharmacopeia Blog. [online] Available at: <https://qualitymatters.usp.org/breeding-superbug-how-poor-quality-medicines-fuel-amr> [Accessed 29 March 2021].
7. World Health Organization. A study on the public health and socioeconomic impact of substandard and falsified medical products. Geneva, Switzerland: World Health Organization; 2017 https://www.who.int/medicines/regulation/ssffc/publications/se-study-sf/en/.
8. Funestrand, H., Liu, R., Lundin, S. and Troein, M., 2019. Substandard and falsified medical products are a global public health threat. A pilot survey of awareness among physicians in Sweden. Journal of Public Health, 41(1), pp.e95-e102.
9. https://www.rpharms.com/resources/ultimate-guides-and-hubs/fmd
10. https://fmdsource.co.uk/2020/11/16/future-of-the-safety-features-measures-under-fmd-in-great-britain-and-northern-ireland/
11. Rpharms.com. 2021. Falsified Medicines Directive | RPS. [online] Available at: <https://www.rpharms.com/resources/ultimate-guides-and-hubs/fmd> [Accessed 29 March 2021].
12. CoinDesk. 2021. UK's NHS Taps Blockchain Tech to Monitor Coronavirus Vaccine Cold Chain - CoinDesk. [online] Available at: <https://www.coindesk.com/uks-nhs-taps-blockchain-tech-to-monitor-coronavirus-vaccine-cold-chain> [Accessed 29 March 2021].
13. Anand R., Niyas K., Gupta S., Revathy S. (2020) Anti-Counterfeit on Medicine Detection Using Blockchain Technology. In: Ranganathan G., Chen J., Rocha Á. (eds) Inventive Communication and Computational Technologies. Lecture Notes in Networks and Systems, vol 89. Springer, Singapore. https://doi.org/10.1007/978-981-15-0146-3_119
14. Saxena, N., Thomas, I., Gope, P., Burnap, P. and Kumar, N., 2020. PharmaCrypt: Blockchain for Critical Pharmaceutical Industry to Counterfeit Drugs. Computer, 53(7), pp.29-44.
15. The Skeptical Chemist. 2018. The Money-Spinning Billion-Dollar Counterfeit Drug Industry | TSC. [online] Available at: <https://theskepticalchemist.com/billion-dollar-counterfeit-drug-industry/#:~:text=The%20World%20Health%20Organization%20(WHO,to%20US%2430%20billion2.&text=Patients%20who%20then%20take%20these,even%20sicker%20because%20of%20it> [Accessed 29 March 2021].
16. Sahoo, M.; Singhar, S.S.; Sahoo, S.S. A blockchain based model to eliminate drug counterfeiting. Adv. Intell. Syst. Comput. 2020.
17. Jamil, F., Hang, L., Kim, K. and Kim, D., 2019. A Novel Medical Blockchain Model for Drug Supply Chain Integrity Management in a Smart Hospital. Electronics, 8(5), p.505.
18. Channels.theinnovationenterprise.com. 2021. How blockchain could eliminate counterfeit medicine | Articles | Chief Data Officer. [online] Available at: <https://channels.theinnovationenterprise.com/articles/how-blockchain-could-eliminate-counterfeit-medicine> [Accessed 29 March 2021].
19. European Pharmaceutical Review. 2021. UK could be "world's foremost nation for drug security," says FarmaTrust. [online] Available at: <https://www.europeanpharmaceuticalreview.com/news/139540/uk-could-become-the-worlds-foremost-nation-for-drug-security-says-farmatrust/> [Accessed 29 March 2021].
20. The Conservative and Unionist Party, 2019. The Conservative and Unionist Party Manifesto 2019. p.40.
21. Chatham House – International Affairs Think Tank. 2021. Harnessing New Technologies for Global Health Security. [online] Available at: <https://www.chathamhouse.org/events/all/research-event/harnessing-new-technologies-global-health-security> [Accessed 29 March 2021].

KING'S ThinkTank

FH FUTURE HEALTH

# HEALTHCARE TECHNOLOGY IN THE NEW NORMAL: Opportunities for Advancement and Global Collaboration

By Gursharan K. Khera & Rupali Lav

# Healthcare Technology in the New Normal: Opportunities for Advancement and Global Collaboration

## INTRODUCTION

The emergence of novel health technologies is changing the landscape of healthcare for providers and consumers alike. A year into the COVID-19 pandemic, it is clear that the shift to digital has been catalysed at an unprecedented rate across multiple sectors. This is certainly the case for digital health, defined by the World Health Organisation as “the field of knowledge and practice associated with the development and use of digital technologies to improve health[1].”

The umbrella of digital health encompasses categories such as mobile health, health information technology, wearable devices, telehealth and personalised medicine[2]. Beyond meeting the requirement for flexible solutions, digital health technologies offer scope to improve health care access, delivery and quality whilst reducing the cost of health services in the longer term.

## WHERE ARE WE NOW?

At present, healthcare systems across the world are grappling with extraordinary challenges. The COVID-19 pandemic has caused massive disruption, on a background of mounting pressures due to the increasing prevalence of chronic diseases and an ageing population. Well-integrated health technologies have the potential to help alleviate the massive healthcare burden faced domestically and further afield through innovation and collaboration.

The need for digital transformation across global health systems is more apparent than ever before. In addition to offering flexible solutions in a world governed by pandemic-related restrictions, health technology offers significant value to population health and the economy. Clear and decisive strategy must be implemented in regard to identifying and investing in promising digital health technologies, promoting innovation and partnering with other nations in order to realise the full benefits of digital transformation.

This year’s G7 summit is a prime opportunity for the United Kingdom to unite with leading democracies in order to set a robust agenda for global health and technology in a post-pandemic world. The need for global collaboration is supported by the United Nations 2030 Agenda for Sustainable Development, which cites the spread of information and communications technology and global interconnectedness as integral to human progress, to bridge the digital divide and develop knowledge in societies[4].

## KEY ADVANCEMENTS IN HEALTH TECHNOLOGY

### E-LEARNING

E-learning is defined as the delivery of education electronically over the internet. The last decade has witnessed increasing adoption of various e-learning platforms across numerous industries. In the United Kingdom, e-Learning for Healthcare (e-LfH) is a digital platform that enables education and training of the health and social care workforce on a national level. This modality enables the NHS to partner with professional colleges and other bodies to deliver role-specific training at reduced human and financial resources and on a flexible basis. e-LfH has revolutionised UK healthcare training by providing 24/7 access to nationally quality-assured resources. This was vital during the COVID-19 pandemic, during which time current and new healthcare professionals and volunteers could be contemporaneously trained in rapidly evolving initiatives such as the COVID-19 vaccination program via this one-stop platform.

Digital education and training platforms provide a framework for the public and private sector healthcare organisations to train, assess and update their clinicians rapidly, remotely and reliably[5]. The success of e-LfH has the potential to be extrapolated out at a global level. Initiatives such as the WHO e-learning platform, OpenWHO[6], which provides free and accessible training to healthcare personnel worldwide has the potential to fill this gap. Given adequate investment and collaboration between nations, e-learning platforms have the potential to transform and standardise the training and assessment of healthcare workers around the world.

### WEARABLE DEVICES

Wearable devices are outfitted with sensors that enable personal health data to be recorded and transmitted to connected devices such as smartphones[7]. Wearable technology available in the market allows monitoring of vital physiological metrics such as blood oxygen saturation, temperature, electrocardiogram, respiratory and heart rates[42] [8] [9], without visiting a medical facility or undertaking formal monitoring. The utility of remote monitoring is especially significant during the COVID-19 pandemic, during which time many nations have imposed physical lockdowns and restrictions on freedom of movement.

Wearable technology can help provide monitoring for large population cohorts, which could be vital in controlling disease outbreaks. South Korea and Singapore have utilised App-based solutions, made available to citizens through smart phones, for digital contact tracing in order to monitor the spread of COVID-19 cases[40]. The USA is also exploring potential growth in this area and is currently conducting a study to record resting heart rate with a smart watch application with the aim of identifying emerging outbreaks[41].

Wearable digital health technology can help save on healthcare costs by allowing implementation of early targeted disease interventions, harmonising patient-doctor ratios and reducing costs associated with preventable patient hospitalisations and rehabilitation. Although the majority of wearable device use is currently within the commercial space, governments should evaluate how these devices might help them meet goals for delivering flexible and cost-effective health care.

## ARTIFICIAL INTELLIGENCE (AI) PREDICTIVE MODELLING AND DIAGNOSTICS

AI diagnostics refers to the utilisation of machine-learning algorithms and software to emulate human cognition in the analysis and interpretation of medical data in clinical modelling and decision making. It is used by both providers and consumers in order to inform diagnostic conclusions. For providers, AI programmes have emerged as particularly helpful in analytical and diagnostic capabilities in the fields of radiology and oncology[10], steering the path towards precision-based medicine. The success of AI in these fields is in part due to the adequate quality and quantity of data available to build database systems and train algorithms. Similar impact is seen in preventative medicine, with the use of predictive modelling tools and calculators. They function by amalgamating personalised patient data in order to predict individuals' risk of experiencing a clinical event, or developing a clinical condition, over a set period of time. The QRISK® calculator, for example, predicts an individuals' risk of developing a heart attack or stroke within the next 10 years, and recommends clinical interventions based on the calculation[11].

Such tools have become integral to clinical practice and decision-making in both primary and secondary care, aiding precision pharmacotherapy and primary prevention[12]. The use of predictive modelling enables equitable decision-making and distribution of clinical resources[19]: principles that are particularly pertinent to public health care systems. Although predictive modelling is usually limited by data quality and quantity, within the UK in particular, the National Health Service and affiliated research institutions have the opportunity to harness data in order to better inform preventative strategies in a manner that may be unavailable to nations in which private healthcare providers hold a larger market share. Whilst these algorithms do not account for patient choice and human factors, they enable healthcare professionals to identify and treat at-risk patients pre-emptively, supported by clinical evidence, in a way that was previously impossible. The economic and clinical utility of AI predictive modelling and diagnostics is potentially vast and largely untapped.

## CLOUD-BASED AND ELECTRONIC HEALTH RECORDS (EHRS)

Cloud-based, or electronic health records (EHRs) are longitudinal, electronic records holding patients' health information and are generated by one or more encounters in any healthcare-delivery setting. The scope for EHRs is wide and includes patient demographics, notes, medication history, clinical parameters (including laboratory data), imaging and past medical history[5]. Benefits of this technology include increased accessibility to patient information and more coordinated care: particularly between different settings[20]. Studies have also found that EHRs yield more complete and accurate documentation by healthcare professionals and improve overall efficiency by reducing administrative requirements for documentation and record-keeping when their use is fully integrated into a medical organisation[7]. Beyond benefitting healthcare providers, evidence suggests that giving patients access to EHRs increases overall quality of care through patient empowerment and involvement their health[8].

However, despite the clear advantages of EHRs, inadequate securitisation of such data remains a significant risk. In addition to considerations around consent, regulations governing patient data (i.e. General Data Protection Regulation in the European Union and European Economic Area[9]) are complex and may be difficult to navigate and adhere to on a large scale. Nationwide adoption of EHRs would necessitate additional provision of resources for monitoring and compliance purposes. The adoption and implementation of EHR systems often involves a large financial outlay and significant logistical considerations for organisations, in addition to ongoing maintenance costs, thus posing a barrier to uptake[10].

## TELEHEALTH

Telehealth, or the remote provision of healthcare information and services using advanced telecommunications and digital technologies[11], is an area of rapid growth with immense potential. Beyond health provision, telehealth also encompasses wearable recording devices, mobile health applications, remote patient monitoring and provider-to-provider communication[12]. Studies have demonstrated the benefits of Telehealth to include: increased access to health services, cost-efficacy, enhanced educational opportunities, superior health outcomes, better quality of care, improved quality of life and enhanced social support[13]. Furthermore, as demonstrated by changes to primary and secondary care provision during the COVID-19 pandemic, Telehealth provides flexibility to healthcare providers and consumers alike[14].

However, despite benefits, a shift toward Telehealth also poses potentially detrimental consequences. Primarily, a reliance on Telehealth may deepen the digital divide for socio-economically deprived, vulnerable or technologically underserved patients if adequate protective measures are not put in place to mitigate against this. Further risks may arise in the context of doctor-patient communication, with barriers to assessing nuance in behavioural cues, confidentiality and reduced opportunity for clinical examination[15]. In terms of compliance and data-security, consideration must be given to patient consent and cybersecurity. E-consultation platforms and applications must be compliant with data protection regulations and contain adequate security to protect against breaches[16]. This would require specific legislation and ring-fenced funding.

## ELECTRONIC PRESCRIPTION SERVICES (EPS)

Electronic prescriptions allow physicians and other medical practitioners to issue prescriptions to linked pharmacies electronically instead of using handwritten or faxed notes. Digitizing prescriptions not only affords convenience to prescribers and patients, it enables the repeat dispensing of prescriptions, reducing the need for in-person appointments. The use of EPS have been fueled by the use of telehealth services and therefore decreased ambulatory care visits during COVID-19.

Although adoption of EPS in England has been fairly successful, it is dependent on the provision of adequate IT systems across primary and secondary care facilities and the pharmacies that serve them. Inadequate IT training[17] has been identified as a hurdle to widespread adoption. This, along with the provision of suitable IT systems may be a barrier for implementation in low-income nations. Governmental policy must recognise digital health solutions as essential tools for healthcare delivery and fund them accordingly.

## STAKEHOLDER ENGAGEMENT AND ADVANCEMENT

Advancement of health technology has the potential to benefit major stakeholders in global health systems through innovation and collaboration.

### GOVERNMENTS

Governments with public, or universal elements to their healthcare systems set an annual budget for healthcare. This finite sum is allocated with the aim of providing optimal and equitable patient care18. However, demand for services is rapidly outstripping supply in many nations. The COVID-19 pandemic has placed unprecedented demand on healthcare systems across the world, which are already buckling under the pressures of an ageing population[19]: two thirds of whom live in developing nations. Under these circumstances, cost-saving and efficiency are more important than ever before. Therefore, identifying and investing in digital health solutions and robust technological infrastructure that would help nations meet their healthcare goals, and offer flexibility in periods of operational restrictions, is essential.

Data from McKinsey estimates that improving and sustaining digitisation could reduce health expenditure by 7 to 11.5 percent, whilst improving quality[20]. Another study estimates that effective investment in health technology could yield savings of over £10 billion pounds[21] in the UK in a single year. Beyond huge cost savings, investment in technological infrastructure holds the key to enhancing organisational efficiency: a quality that is often difficult to attain in large and bureaucratic public healthcare systems. Ageing infrastructure[22] and a lack of interoperability between information systems and software applications have been cited as key culprits contributing to systemic inefficiencies[23]. Data captured through digital technologies has the potential to contribute to both cost savings and efficiency. Accessible and robust population data would enable more tailored service commissioning and allocation of resources in line with demand, whilst reducing superfluous expenditure in other areas[24].

### PATIENTS AND CONSUMERS

Patients, or healthcare consumers, are the focal beneficiaries of medical services and stand to benefit the most from effective investment in health technology. As we enter a digital age, patients are seeking digital solutions for their health in line with those options available to them in other areas of life[25]. The requirement for digital solutions has been driven by a paradigm shift in the culture of healthcare, particularly in the global north, from a paternalistic to collaborative model between patients and healthcare professionals[26]. The latter model is promoted by digital health solutions, which generally allow patients an opportunity to engage with their health personally and more easily.

The transition to digital has been accelerated by the COVID-19 pandemic and associated governmental restrictions. The need for remote and flexible solutions has catalysed the rapid adoption and implementation of tools such as Telehealth, symptom and disease tracking applications (i.e Track and Trace[27]) and web-based logistics for COVID-19 testing. Interconnected web - based platforms such as Influenzanet® link country-specific European websites and provide a platform for proactive voluntary citizen engagement to support influenza surveillance whilst providing access to reliable and related information, thereby serving as a complementary tool to measure influenza vaccine efficacy and disseminate information[45]. Technological advancements have proven to be flexible and invaluable to patients, and their uptake shows no signs of abating.

In terms of patient engagement, evidence shows that most individuals want full access to their health records and view this as a tool for themselves as well as their doctor. The majority would also use video consultations in order to consult their GP regarding minor ailments and long term conditions[28]. Furthermore, use of apps and wearables has significantly increased in recent years, with data indicating that individuals are willing to track health data and share this information with healthcare professionals[25]. Integrated and robust health technologies offer the opportunity to engage and empower patients, placing them in control of their own health and care[29]. Certain digitised health solutions such as telemedicine and remote monitoring also offer patients the advantage of increased flexibility and accessibility[30], parameters that are key to delivering effective patient-centred care.

### HEALTHCARE PROFESSIONALS

Healthcare professionals, tasked with delivery of health services, bear the brunt of structural and logistical inefficiencies. Inadequate provision and quality of technological resources has been cited as a significant barrier to efficient work flows within the UK's health service. Reduced efficiency has downstream impacts on time constraints, workload, job satisfaction and error rates[31]. Such impediments impact day-to-day working for healthcare professionals and ultimately affect the delivery of optimal patient care.

In addition to addressing logistical inefficiencies, investment in effective digital technology has the potential to alleviate issues with recruitment and retention, through offering more flexible working solutions[32]. Reports show that remote working has enabled healthcare professionals to work more flexibly, including from home, which has resulted in improved productivity and greater work-life balance[33]. Implementing and rolling-out remote working solutions across health systems domestically and globally would expand the benefits of this technology further.

## HOW CAN GOVERNMENTS EXTEND THE BENEFITS OF HEALTH TECHNOLOGY TO MORE PARTS OF THE SYSTEM?

Health technology is essential to the success and progress of health systems globally. Governments must take steps to ensure that they foster digital progress both domestically and internationally through adequate investment, strategic collaboration and decision making. Setting a shared agenda for the advancement of global health technology offers the opportunity to explore new methods to fight global inequalities and tackle challenges in this space. This includes developing a global roadmap out of the COVID-19 pandemic: the most pressing threat to health and economy at the present time.

### NATIONAL AGENDA

In terms of the United Kingdom's agenda on health technology, it is imperative that national policies continue to drive innovation and the development of infrastructure in this space. The inception of NHSX[35], along with the publication of the NHS' Long Term Plan and an agreed funding strategy[36] are firm steps toward digital transformation.

Digital transformation is essential to enable the United Kingdom to keep up with domestic and global challenges to healthcare, whilst increasing logistical and economic efficiency. Harnessing technological solutions such as Telehealth and e-Learning has the potential to increase capacity within the existing system, whilst providing added flexibility. Increased agility would facilitate out of hours or

remote working, and potentially incur downstream effects on out of hours, outsourced or remote working and consequently benefit employee satisfaction, recruitment and retention. The logistical efficiencies associated with a shift to digital would enable cost savings in the immediate and longer term. For example, the EPS eliminates superfluous GP visits for repeat prescriptions, freeing up more appointments for those with acute need. Data held through AI diagnostic tools and cloud-based medical records also holds huge value, with the potential to enhance resource allocation according to evidence-based need and hone future predictive modelling. Patient empowerment, through access to digital health tools, must not be underestimated either. The introduction of symptom-tracking apps specifically for COVID-19 build on previous evidence[37], to show that individuals are prepared to track and share their data for personal and public health security. Online COVID-19 test booking systems through the government website have also proven both effective and popular. This momentum for digital health solutions must be harnessed and utilised in the United Kingdom's pandemic exit-strategy.

## INTERNATIONAL AGENDA AND COLLABORATION

### Expertise and Data Sharing

Sharing knowledge and expertise should be a key component of international collaboration within the digital health technology arena. The benefits of rapid and open knowledge sharing are most obviously observed in drug and vaccine development. This has been especially evident in the development of vaccines targeting COVID-19. A partnership of nations committed to this cause has been brought together and coordinated by the WHO[34]. However, a robust and formal global alliance on digital health solutions is lacking. The Global Research Collaboration for Infectious Disease Preparedness, the importance of which was highlighted at the 2016 G7, is a good foundation but remains inadequate in scope. This initiative lacks involvement of numerous nations, particularly those in the global south, and leaves room for the development of a robust multinational database to facilitate rapid and comprehensive data access.

In the case of data-sharing, a central repository informed by interoperable databases would enable governments to monitor epidemiological trends in order to better inform national response and restrictions on freedom of movement. Furthermore, access to this data would allow more accurate modelling in the case of infectious disease-spread and strategic preparation. Platforms such as the WHO's EPIBRAIN[38] and Nextrain's SARS-CoV-2 (COVID-19)[39] tracking amalgamate diverse epidemiological data-sets for infectious disease emergencies, and have been useful for these purposes. However, the dispensation of information from these sources is fragmented.

Although questions of intellectual property and conflicts between national and corporate funding may arise, pre-set agreements on commercial return from collaborative endeavours would mitigate against this. Overall, the beneficial effects of a robust consortium could lead to faster drug development, more efficient manufacturing and better service delivery. These factors, in turn, have significant positive potential in terms of both health and economic outcomes.

**Addressing Education & Inequalities**

Collaboration in the health technology space could serve to tackle inequalities in health education and training. Harnessing tools such as e-Learning offers the opportunity to provide flexible yet targeted training across a range of healthcare professions, virtually anywhere across the world. This particular modality offers agility and can be revised and adapted to reflect rapidly changing health environments and new information, such as that seen with COVID-19. The utility of these digital tools is vast and meets the need for both routine and emergency training of healthcare professionals.

Nations with pre-existing, comprehensive e-Learning platforms (i.e. the United Kingdom), may share their platforms and IT packages with partner nations. Thus, extending the intellectual and economic benefits to other countries. This is particularly pertinent to low-income nations. However, adequate pre-existing technological infrastructure will be required and may be a barrier to roll-out. In addition to offering scope for upskilling workforces through health education, remote interoperable digital solutions offer the potential for international outsourcing. Although these solutions will not replace the practical elements of health education and delivery, their potential is vast and should be considered in planning international health policy and resource-sharing.

**Digital Collaboration in Practice**

As we approach the frontier of a post-pandemic world, novel challenges in international policy are emerging. Primarily, in terms of containing virulent transmission whilst reintroducing freedom of movement both domestically and internationally. The human and economic impact of failing to act is huge: estimates suggest the global economy shrank by 4.3% in 2020, largely due to effects of the COVID-19 pandemic. Health technology and international collaboration will be key in the word's emergence from restrictions going forward.

Building robust, interoperable systems supported by international digital partnerships is the first step in creating a workable vaccine passport model. A single, global vaccine passport, with digital elements to enable verification against a central information database could be revolutionary in lifting restrictions whilst maintaining health security. Nations who currently hold their own data in applications or online servers would contribute user data securely and in accordance with privacy regulations.

Global digital collaboration will also enable early identification of disease outbreaks affording the chance for Governments to take timely action to curb spread and safeguard their people. For instance, the web-based platform HealthMap[43] and the coronavirus dashboard44 established by Johns Hopkins University both provide current information on COVID-19 cases and deaths around the globe. Digital data sharing tools such as these will help governments and public health bodies around the globe make more informed decisions about travel and other restrictions and help to predict disruptions in global medical supply chains.

## RECOMMENDATIONS

In order for digital health solutions to realise their full potential, three factors must be addressed:

1. Primarily, G7 nations must commit ring-fenced, protected funding for developing domestic and international health technology and information exchange.
2. This is contingent on stakeholder buy-in and recognition of the value that properly integrated health technology can add at a domestic level and beyond. The downstream effects span a range of industries, with huge potential to impact domestic and global GDP. The government must drive stakeholder engagement from the top, to ensure that consumers and healthcare professionals are adequately informed and equipped to support the adoption and implementation of relevant technologies. Furthermore, governments must ensure global collaboration and information exchange is at the core of this agenda.
3. Legislative agreements on data-sharing for global health care initiatives are vital for success. Laws such as GDPR regulations exist within regional and economic partnerships, however a centralised global legislative framework is required so that data sharing and extended benefits can be realised more easily and efficiently, whilst protecting individual privacy and freedoms. It is essential that progress is not stifled by fragmented bureaucratic barriers or political agendas, particularly in the case of global health emergencies such as COVID-19.

The inception of a G7 steering committee on digital and collaborative health solutions would be best placed to initiate and oversee the implementation of these goals.

## CONCLUSION

Digital solutions will be an integral part of care delivery in a rapidly evolving healthcare sector enabling broader access, personalised care and a better experience for both patients and provider overall. This will require extensive process and behavioural change alongside sizeable monetary investment towards upgrading and enhancing the IT systems across all NHS platforms. While the NHS has set ambitious targets to achieve uniform digitisation of all provider platforms by 2024, funding and implementation so far has fallen short. The government needs to take urgent steps to harness the accelerated pace of digital adoption set in motion by the current COVID-19 health crisis and implement targeted strategic stimuli through investment and policy to reinforce the NHS for current and future health crises. The G7 summit will provide a critical opportunity for post-Brexit Britain to forge international alliances for technology sharing and joint development initiatives with member-nations for a much-needed impetus to the digital overhaul agenda. With global health taking precedence in a pandemic-struck world, the UK is poised to lead by example in agile digital adoption strategies. The UK should leverage its strength in research and innovation, to establish its position as a leader in the evolving global healthcare landscape.

## REFERENCES


1. World Health Organization. Global strategy on digital health 2020-2025. Available at: https://cdn.who.int/media/docs/default-source/documents/gs4dhdaa2a9f352b0445bafbc79ca799dce4d_02adc66d-800b-4eb5-82d4-f0bc778a5a2c.pdf?sfvrsn=f112ede5_68.
2. U.S. Food & Drug Administration. What is Digital Health? Available at: https://www.fda.gov/medical-devices/digital-health-center-excellence/what-digital-health
3. Wachter RM. (chair). Making IT work: harnessing the power of health information technology to improve care in England. London: Department of Health, 2016. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/550866/Wachter_Review_Accessible.pdf
4. Lee BX, Kjaerulf F, Turner S, Cohen L, Donnelly PD, Muggah R, et al. Transforming our world: implementing the 2030 agenda through sustainable development goal indicators. Journal of Public Health Policy. 2016; 37(1):13–31.
5. NHS England 2020. Education and training framework for staff supporting the NHS response to COVID-19. [online] Available at: https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/04/C0237-education-and-training-framework.pdf [Accessed 15 April 2021].
6. OpenWHO. Available at: https://openwho.org
7. Beans C. Science and Culture: Wearable tech meets tattoo art in a bid to revolutionize both. Proceedings of the National Academy of Sciences [Internet]. 2018;115(14):3504-3506.
8. Bandodkar A, Jia W, Yardımcı C, Wang X, Ramirez J, Wang J. Tattoo-Based Noninvasive Glucose Monitoring: A Proof-of-Concept Study. Analytical Chemistry [Internet].2014;87(1):394-398.
9. Sen-Gupta E, Wright D, E, Caccese J, W, Wright Jr. J, A, Jortberg E, Bhatkar V, Ceruolo M, Ghaffari R, Clason D, L, Maynard J, P, Combs A, H. A Pivotal Study to Validate the Performance of a Novel Wearable Sensor and System for Biometric Monitoring in Clinical and Remote Environments. Digit Biomark 2019;3:1-13.
10. Davenport T, Kalakota R. The potential for artificial intelligence in healthcare. Future Healthc J. 2019 Jun;6(2):94-98.
11. QRISK®3-2018 risk calculator. Available at: https://qrisk.org/three
12. Dorajoo SR, Chan A. Implementing clinical prediction models: pushing the needle towards precision pharmacotherapy. Clinical Pharmacology & Therapeutics. 2018 Feb;103(2):180-3
13. Jennett PA, Hall LA, Hailey D, Ohinmaa A, Anderson C, Thomas R, Young B, Lorenzetti D, Scott RE. The socio-economic impact of telehealth: a systematic review. Journal of telemedicine and telecare. 2003 Dec;9(6):311-20.
14. Fisk M, Livingstone A, Pit SW. Telehealth in the Context of COVID-19: Changing Perspectives in Australia, the United Kingdom, and the United States. J Med Internet Res 2020;22(6):e19264
15. Miller EA. The technical and interpersonal aspects of telemedicine: effects on doctor–patient communication. Journal of telemedicine and telecare. 2003 Feb 1;9(1):1-7.
16. Blandford A, Wesson J, Amalberti R, AlHazme R, Allwihan R. Opportunities and challenges for telehealth within, and beyond, a pandemic. The Lancet Global Health. 2020 Nov 1;8(11):e1364-5
17. Imambaccus N, Glace S, Heath R. Increasing the uptake of electronic prescribing in primary care. BMJ Quality Improvement Reports. 2017;6(1):u212185.w4870
18. The King's Fund. The NHS budget and how it has changed. Available at: https://www.kingsfund.org.uk/projects/nhs-in-a-nutshell/nhs-budget
19. United Nations Department of Economic and Social Affairs Population Division. World Population Ageing 2017 – Highlights (ST/ESA/SER.A/397) (2017). Available at: http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2017_Highlights.pdf
20. London T, Dash P. Health Systems: Improving and sustaining quality through digital transformation [Internet]. McKinsey & Company. 2016 [Accessed 30 April 2021] Available at: https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/health-systems-improving-and-sustaining-quality-through-digital-transformation?cid=digistrat-eml-alt-mip-mck-oth-1608#
21. Dunhill, L (2015) 'NHS England: digital plans "could save £10bn'. Health Service Journal. 17th June.
22. Kraindler J, Gershlick B, Charlesworth A. Failing to capitalise: capital spending in the NHS. Health Foundation; 2019. Available at: https://www.health.org.uk/publications/reports/failing-to-capitalise

23. Honeyman M, Dunn P, McKenna H. A digital NHS? An introduction to the digital agenda and plans for implementation. The King's Fund. 2016. [2018-10-17]. Available at: https://www.kingsfund.org.uk/sites/default/files/field/field_publication_file/A_digital_NHS_Kings_Fund_Sep_2016.pdf
24. Imison C, Castle-Clarke S, Watson R, Edwards N. Delivering the benefits of digital health care. London: Nuffield Trust. Available at: www.nuffieldtrust.org.uk/publications/delivering-benefits-digital- health-care
25. Safavi K., Ratli R., Webb K., MacCracken L. Patients want a heavy dose of digital. [Internet]. Accenture. 2016 Available at: https://www.accenture.com/us-en
26. Meskó B, Drobni Z, Bényei É, Gergely B, Győrffy Z. Digital health is a cultural transformation of traditional healthcare. Mhealth. 2017 Sep 14;3:38.
27. NHS COVID-19 contact tracing app for England and Wales. Available at: https://www.nhs.uk/apps-library/nhs-covid-19
28. Castle-Clarke S. The NHS at 70: What Will New Technology Mean for the NHS and Its Patients? King's Fund. 2018. [2020-12-03]. Available at: https://www.nuffieldtrust.org.uk/files/2018-06/1530028974_the-nhs-at-70-what-will-new-technology-mean-for-the-nhs-and-its-patients.pdf
29. Klasnja P, Pratt W. Healthcare in the pocket: mapping the space of mobile-phone health interventions. Journal of Biomedical Informatics 2012;45(1):184–198.
30. Honeyman M, Dunn P, McKenna H. A digital NHS? An introduction to the digital agenda and plans for implementation. The King's Fund. 2016. [2018-10-17]. Available at: https://www.kingsfund.org.uk/sites/default/files/field/field_publication_file/A_digital_NHS_Kings_Fund_Sep_2016.pdf
31. Waterson P. Health information technology and sociotechnical systems: A progress report on recent developments within the UK National Health Service (NHS). Applied ergonomics. 2014 Mar 1;45(2):150-61.
32. NHS Providers Budget Representation 2020. Available at: https://nhsproviders.org/media/689236/nhs-providers-budget-representation-february-2020.pdf
33. NHS People Plan 2020/21-action for us all. Available at: https://www.england.nhs.uk/wp-content/uploads/2020/07/We-Are-The-NHS-Action-For-All-Of-Us-FINAL-March-21.pdf
34. WHO Public statement for collaboration on COVID-19 vaccine development 2020. Available at: https://www.who.int/news/item/13-04-2020-public-statement-for-collaboration-on-covid-19-vaccine-development
35. NHSX - driving forward the digital transformation of health and social care. Available at: https://www.nhsx.nhs.uk
36. House of Commons Twenty-Second Report of Session 2019–20. Digital transformation in the NHS. 2020. Available at: https://committees.parliament.uk/publications/3315/documents/31262/default/
37. Medford-Davis LN, Chang L, Rhodes KV. Health information exchange: What do patients want?. Health informatics journal. 2017 Dec;23(4):268-78.
38. World Health Organisation EPI-BRAIN. Available at: https://www.epi-brain.com
39. Nextrain. Real-time tracking of pathogen evolution. Available at: https://nextstrain.org
40. Whitelaw S, Mamas MA, Topol E, Van Spall HGC. Applications of digital technology in COVID-19 pandemic planning and response. Lancet Digit Health. 2020 Aug;2(8):e435-e440.
41. The Washington Post. How digital data collection can help track Covid-19 cases in real time. April 10, 2020. Available at: https://www.washingtonpost.com/opinions/2020/04/10/how-digital-data-collection-can-help-track-covid-19-cases-real-time/
42. Seshadri D, Davies E, Harlow E, Hsu J, Knighton S, Walker T et al. Wearable Sensors for COVID-19: A Call to Action to Harness Our Digital Infrastructure for Remote Patient Monitoring and Virtual Assessments. Frontiers in Digital Health. 2020;2.
43. McCall B. COVID-19 and artificial intelligence: protecting healthcare workers and curbing the spread. Lancet. 2020;2:e166–e167.
44. Johns Hopkins University Coronavirus resource center: COVID-19 global cases. Available at: https://coronavirus.jhu.edu/map.html
45. Koppeschaar CE, Colizza V, Guerrisi C,Turbelin C, Duggan J, Edmunds WJ et al. Influenzanet: Citizens Among 10 Countries Collaborating to Monitor Influenza in Europe. JMIR Public Health Surveillance 2017;3(3):e66

# NOT ALL LOCKDOWNS ARE EQUAL:

# Improving the Mental Health of Young People After COVID-19

By Coralie Gauvin-Belair

# Not All Lockdowns Are Equal: Improving the Mental Health of Young People After COVID-19

## INTRODUCTION

Whilst the effects of COVID-19 and related restrictions have been widely discussed in the last 12 months, the foreseeable repercussions of a mental health crisis for future generations and future labour market have been underreported. Younger people, who have been mostly following classes from their computers since early March 2020, facing higher levels of unemployment or forced to return to their parents' homes, are facing a different kind of lockdown.

Across the globe young people's mental health has undergone a severe decline as they have faced significantly more mental distress than documented in pre-COVID-19 times.

This paper aims to outline the sources compromising wellbeing in students and younger people; the paper focuses on the United Kingdom and borrows examples from outside the UK to demonstrate the pervasive nature of this issue.

Findings show that isolation caused by COVID-19 related lockdowns and restrictions, has had a significant impact on the experiences and wellbeing of youth. More specifically, isolation and repetitive daily events, have led to: lack of motivation, feeling of inadequacy within one's course, and higher rates of anxiety, stress, and depression amongst students. Anxiety and stress were found to be further aggravated by financial hardship that threatened certain students' ability to pay their tuition fees. Unemployment has also contributed to this stress, and worsened students' ability to focus on their studies as they struggled to find employment to make up for a lack of financial support. Finally, inadequate access to mental health support, along with the challenges set out above, must be addressed in order to ameliorate the effects of COVID-19 restrictions on the mental health of younger people.

## COVID-19 RELATED RESTRICTIONS

Restrictions instituted by the UK government throughout the COVID-19 pandemic, such as social distancing and lockdowns have had a significant impact on young people's mental health. A typical young person's day while in lockdown is characterised by the repetition of the same tasks with very little diversity. This repetition is exacerbated by social distancing rules that make it difficult for young people to have social contact other than for exercise or essential shopping: among a short list of other reasons for any outing. Students are also increasingly lonely[1]. As Williams et al. (2020) explain, participants' loss of in-person social and other interaction has led to "psychological and emotional 'losses' such as loss of motivation, loss of meaning and loss of self-worth[1]." This is especially worrying for students who were encouraged to return to their campuses prior to September 2020 and found themselves residing in half-empty residences, with little opportunity to socialise with others[2].

Isolation and the social distancing have been shown to dramatically increase feelings of loneliness, anxiety, and depression that are more prevalent in groups of young people and women: mainly because they "already had lower levels of mental health before COVID-19[3]." In fact, the same report shows that women saw a greater increase in mental health problems than men, and the proportion of women with severe problems "increased by 6 percentage points more than men[3]."

A testimonial from a student at King's College London:

*"Sometimes I wake up and wonder why I should bother doing uni work. You know, I'm alone in this tiny student room, paying way too much, and I can barely see my friends without being shamed for seeing more than one person at a time… I'm alone all the time, things never change, and there's no way to imagine that it'll get better any time soon…"*

## PARTICIPATION REQUIREMENTS FOR STUDENTS

Alongside the repetitive nature of days, the feeling that university lectures and seminars are optional in certain cases have further fuelled the lack of motivation and the feeling of inadequacy felt by students. This is outlined in a report by the National Union of Students[4]. This is aggravated by work-from-home schemes that may leave students living at home in situations that are not conducive to concentration, focus, and therefore educational success. Similarly, online teaching is widely described as "not the same", because students have little access to practical resources and support, which might hinder students' ability to learn. Group-work and other collaborative initiatives are also difficult to navigate as students struggle to stay focused.

Study areas that were made available to those in need of dedicated space have been limited and unwelcoming for many. Furthermore, the lack of accountability of various institutional departments has put students at risk of being left behind and falling behind. Reduced educational assignments and face-to-face contact has created a feeling of "optionality" in students' study experiences.

A testimonial from the National Union of Students (2020)[4]:

*"My mental ability to stay focused and calm whilst completing assessments at home in an environment I struggle to work in. As normally I would spend a great deal of time in the library[4]."*

Students' motivation is further hampered by an unstable labour market that is predicted to hire 40% fewer interns and placement students, and 12% fewer graduate students than prior to COVID-19[5]. Ultimately, key themes reported by the NUS refer to a lack of time and motivation to prepare for classes, struggle to obtain desired grades, an increase in the stress felt by students when working from home, trouble focusing and difficulty accessing resources.

Another testimonial from a student at King's College London:

*"I feel like there's no point anymore. I can keep my camera off, my microphone on mute, and still be marked as present. So why should I even bother doing the readings and watching my lectures?"*

## DEPRESSION, ANXIETY, AND HIGH STRESS: GLOBAL STUDIES ON STUDENT MENTAL HEALTH

Reports of mental distress including feelings of depression, anxiety, and severe stress became significantly more prevalent following COVID-19.

For example, a study conducted with 195 students in an American university reported that over 71% had experienced increased stress and anxiety due to COVID-19[6]. Similarly, a study of young individuals in Poland has shown that over 65% reported mild to severe anxiety, while over 56% suffered from increased stress. In a study conducted with over 8004 students in France, 43% reported suffering from depression while 42.94% reported distress[7]. Similarly, in a YoungMind survey, over 83% of the 2111 survey respondents reported that their mental health conditions had worsened since the beginning of the pandemic[8].

A study of students in China outlined that while acute stress had decreased, rates of depressive and anxiety symptoms had increased[9]. Interestingly, the same study reported that being engaged in paid work was associated with lower levels of depression, thus indicating a lack of motivation could contribute to mental distress. Another American university study reported that over 18% of the 2031 participants had reported having had suicidal thoughts since the beginning of COVID-19[13]. Moreover, a review of 43 studies investigating mental health "revealed lower psychological well-being and higher scores of anxiety and depression compared to before COVID-19[11]."

In the United Kingdom, Savage et al. (2020) report that during the first lockdown, "mental wellbeing and physical activity decreased", while "stress and time spent sedentary increased[12]." This can be attributed to a number of factors, including financial hardship among others. More specifically, Moreno et al., (2020) outline that the "downturn in the economy caused by COVID-19 will lead to unemployment, financial insecurity, and poverty." This will have downstream effects on access to health services (especially in insurance-based systems), thereby compromising physical and mental health and quality of life[13]. The economic impact of COVID-19 has the potential to cause mental health problems in those who are healthy and "negatively affect those with pre-existing mental disorders[13]." Moreover, the Mental Health Foundation[14] mentions that certain groups have reported mental distress in a larger proportion. These groups include single parents, unemployed individuals, and young adults among others[5]. With a predicted fall in employment in the near future, young people's vision of opportunities is limited, thus contributing to the anxiety and high-stress they are already experiencing.

The National Union of Students Report identifies unemployment as a factor in some students' inability to pay fees[4], and reports that over 80% of students are worried about their financial situation following COVID-19. Over 53% of the 9872 students who undertook the survey responded that someone who provided them with financial assistance had been financially impacted by COVID-19. Furthermore, over 38% mentioned cutting back expenses on necessities such as food as a response to the pandemic. A healthy diet is essential to well-being and good mental health, thus this is incredibly concerning[16].

## LONG-TERM IMPLICATIONS

The long-term implications of poor mental health are concerning. Studies have shown that governments should expect that depression, PTSD, substance abuse, and domestic violence among others will see spikes in prevalence attributed to social isolation[17]. Moreover, an additional 75, 000 deaths linked to alcohol and drug use (as well as suicide) were predicted[18] in line with Covid-19 related restrictions. Continued uncertainty is likely to worsen pre-existing mental distress[19], as this has been

closely linked to a reduction in wellbeing[20] and countries who remain in intermittent lockdowns are likely to be affected the worst. The use of substances to cope with mental illness is likely to lead to increased dependency and therefore detrimental mental and physical health outcomes. One in six adults had noticed an increase in their own consumption of alcohol whilst in lockdown and consequently saw their mental health decrease[21]. This is particularly applicable to students who have been reported to drink heavily, both prior to COVID-19[22] and once in lockdown. Students who live at home are less likely to drink heavily, whereas those who live alone or who struggle with depressive feelings are at greater risk[23].

Mental illness has the potential to be debilitating and can therefore inhibit an individual's capacity to join the labour market or to be productive at their job. Cornwell et al. (2009) support that "lower rates of participation in the labour market, higher rates of unemployment and employment in low-skill or low-earning occupations relative to qualifications" can be consequences of mental illness[24]. These effects have further consequences. Bubonya et al. (2017) explain that workers' reduced productivity is a major economic cost of mental distress in the labour market[25], and that absenteeism is more prevalent in those with poor mental health. Considering these factors, it can be postulated that poor mental health following COVID-19 will impact on the productivity of young workers, with significant economic cost.

## POLICY RECOMMENDATIONS

### 1. DESTIGMATISE MENTAL HEALTH

As a result of the stigma surrounding mental health, individuals are much less likely to report mental illness or distress[26], and therefore eradicating stigma is key to providing help and addressing this challenge[27]. Reducing the mental health stigma can be achieved through creating awareness campaigns in educational institutions[33]. These should aim to normalise mental health issues and related help-seeking from early years in order to maximise the potential for the message to be retained. Similarly, employers should be obligated to offer support and encouraged to "check in" with their employees as standard. This is conducive to increased employee productivity and employers should provide endeavour to provide adequate resources accordingly.

### 2. IMPLEMENT CROSS-BORDER COLLABORATION

Countries should collaborate with one another to provide mental health support, share good practice and to support efforts by local health systems. More specifically, alleviating the barriers to non-nationals accessing health care, should be emphasised as a priority. This would require agreements for the provision of basic health care and medication.

### 3. COMMUNITY AND PEER SUPPORT

As social isolation has been established as a key factor influencing rates of depression, anxiety, and high stress, continuing community support with young people through efforts such as online activities, community development initiatives and peer support groups in educational settings is crucial. Young people have often been forgotten in regards to COVID-19 and its effects on mental health[29], and as such special efforts should be made to ensure that this generation is considered as an at-risk group in

policy making. As a number of universities have already begun doing so, continuing community activities held online can provide lonely individuals with a platform and community to fall back on in hard times. Similarly, peer support and community initiatives should ensure that all individuals have access to at least one designated person they can speak to about their mental distress. Efforts should be taken, however, to ensure that these contacts are also aware of when to refer and reach out to professionals for serious cases. Educational institutions should implement mechanisms to avoid seeing students "fall through the cracks."

### 4. STUDENT FINANCE AND FLEXIBILITY

Many students have a very limited financial safety net. COVID-19 has limited opportunities for employment, putting pressure on students where access to finance and loans is more limited. Improving access to student finance and hardship grants should be a priority for universities. Furthermore, universities should endeavour to ensure payment plans for fees are more flexible to reduce anxiety and distress. Tuition fee loans should also become more accessible for students who previously were unable to access them, such as those with previous degrees. Financial stress may also affect individuals' ability to access psychological support, and thus mental health counselling and related services should be provided to students who are unable access public sector help in time. Universities might consider employing professionals from the private sector in order to bridge this gap.

### 5. IMPROVE ACCESS TO DIGITAL MENTAL HEALTH INTERVENTIONS AND PROVIDE GREATER MENTAL HEALTH SUPPORT

Given the increased mental health need of young people during and after the pandemic, there is a requirement to increase support. Digital mental health solutions, for example online counselling and coaching, applications and online support groups, can play a role alongside face-to-face counselling to ensure that supply matches demand. However, for this to work effectively, more streamlining is required, as the efficiency of programmes may impede their success. As an example, rather than sharing dozens of programmes and links with young people regarding where they can access help; it will be better to create a clear path for people to follow so it can be more promptly and clearly accessed. The increased need for mental health support should be met by the provision of more counsellors in schools and universities. These institutions must provide faster and more accessible services, as current waiting times have been reported to be as long as eight weeks[30].

### 6. UNDERSTAND DIFFERENT NEEDS FOR DIFFERENT COMMUNITIES

Young people are not part of one single group. Different communities also face unique mental health challenges and risk profiles. Financial strain is a major trigger for anxiety and depression[13], and socioeconomically deprived groups should be supported accordingly. Racism is also a significant driver of stress[31] and should therefore be considered an added anxiety trigger for individuals. Unemployment can impact some communities more heavily than others, therefore increasing risk for mental distress[32]. Anxiety can also be worse in refuge and asylum communities which face exclusion, marginalisation and discrimination. These factors can increase the risk of depression in this group[33]. Therefore, the unique needs of different groups must be considered in order to provide effective and adequate mental health services. To achieve this, commissioning bodies should partner with representatives from communities in order to offer targeted services needed that are culturally and socially appropriate. Moreover, robust data collection should be undertaken in order to provide more tailored and cost-effective service provision.

## REFERENCES


1. Williams, S. N., Armitage, C. J., Tampe, T., & Dienes, K. (2020). Public perceptions and experiences of social distancing and social isolation during the COVID-19 pandemic: A UK-based focus group study. BMJ open,10(7), e039334.
2. Kenelly, L. (2020). Coronavirus: 'I paid for my student house, now all my lectures are online'. Retrieved April 20 2021 from https://www.bbc.co.uk/news/education-54025181
3. Banks, J., & Xu, X. (2020). The mental health effects of the first two months of lockdown and social distancing during the Covid-19 pandemic in the UK (No. W20/16). IFS Working Papers., 1
4. National Union of Students. (2020). Coronavirus and students survey. Retrieved April 17 from www.tinyurl.com/4b3v6ffm
5. Down but not out. how the student labour market is responding to covid-19. (2020, September 02). Retrieved April 19, 2021, from https://insights.ise.org.uk/policy/blog-down-but-not-out-how-the-student-labour-market-is-responding-to-covid-19/
6. Son, C., Hegde, S., Smith, A., Wang, X., & Sasangohar, F. (2020). Effects of COVID-19 on College Students' Mental Health in the United States: Interview Survey Study. Journal of medical Internet research, 22(9), e21279.https://doi.org/10.2196/21279
7. Essadek, A., & Rabeyron, T. (2020). Mental health of French students during the Covid-19 pandemic. Journal of affective disorders, 277, 392–393. https://doi.org/10.1016/j.jad.2020.08.042
8. Young Minds. (2020). Coronavirus: Impact on young people with mental health needs. Retrieved on 15 April from https://youngminds.org.uk/media/3708/coronavirus-report_march2020.pdf
9. Li, Y., Zhao, J., Ma, Z., McReynolds, L. S., Lin, D., Chen, Z., Wang, T., Wang, D., Zhang, Y., Zhang, J., Fan, F., & Liu, X. (2021). Mental Health Among College Students During the COVID-19 Pandemic in China: A 2-Wave Longitudinal Survey. Journal of affective disorders, 281, 597–604. https://doi.org/10.1016/j.jad.2020.11.109
10. Wang, X., Hegde, S., Son, C., Keller, B., Smith, A., & Sasangohar, F. (2020). Investigating Mental Health of US College Students During the COVID-19 Pandemic: Cross-Sectional Survey Study. Journal of medical Internet research, 22(9), e22817. https://doi.org/10.2196/22817
11. Vindegaard, N., & Benros, M. E. (2020). COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. Brain, behavior, and immunity, 89, 531–542.https://doi.org/10.1016/j.bbi.2020.05.048
12. Savage, M. J., James, R., Magistro, D., Donaldson, J., Healy, L. C., Nevill, M., & Hennis, P. J. (2020). Mental health and movement behaviour during the COVID-19 pandemic in UK university students: Prospective cohort study. Mental Health and Physical Activity, 19, 100357.
13. Moreno, C., Wykes, T., Galderisi, S., Nordentoft, M., Crossley, N., Jones, N., ... & Arango, C. (2020). How mental health care should change as a consequence of the COVID-19 pandemic. The Lancet Psychiatry. 188.
14. Mental Health Foundation. (2020). Mental health in the COVID-19 pandemic: Recommendations for prevention. Retrieved 17 April from: https://www.mentalhealth.org.uk/sites/default/files/MHF%20Mental%20Health%20in%20the%20COVID-19%20Pandemic.pdf
15. Office for National Statistics. (2020). Labour Market Overview, UK; September 2020 Overview. Retrieved on 16 April 2021 fromhttps://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/uklabourmarket/september2020.
16. About food and mood. (n.d.). Retrieved April 19, 2021, from https://www.mind.org.uk/information-support/tips-for-everyday-living/food-and-mood/about-food-and-mood/
17. World Economic Forum. (2020). COVID-19 will have longterm effects on mental health. This expert explains how to limit the damage. Retrieved 18 April from https://www.weforum.org/agenda/2020/10/covid-19-will-have-longterm-effects-on-mental-health-this-expert-explains-how-to-limit-the-damage/
18. Wellbeing Trust & Robert Graham Center. 2020. “The COVID Pandemic Could Lead to 75,000 Additional Deaths from Alcohol and Drug Misuse and Suicide.” Wellbeing Trust. https://wellbeingtrust.org/areas-of-focus/policy-and-advocacy/reports/projected-deaths-of-despair-during-covid-19/.
19. Harvard School of Public Health. (2020). “COVID-19 pandemic may cause long-term mental health issues.” Harvard News, d. n., 2020. https://www.hsph.harvard.edu/news/hsph-in-the-news/covid-19-pandemic-may-cause-long-term-mental-health-issues/.
20. Pollard, T. M. (2001). Changes in mental well-being, blood pressure and total cholesterol levels during workplace reorganization: the impact of uncertainty. Work & stress, 15(1), 14-28.

21. Jacob, L., Smith, L., Armstrong, N. C., Yakkundi, A., Barnett, Y., Butler, L., ... & Tully, M. A. (2021). Alcohol use and mental health during COVID-19 lockdown: A cross-sectional study in a sample of UK adults. Drug and alcohol dependence, 219, 108488.
22. Graupensperger, S., Jaffe, A. E., Fleming, C. N., Kilmer, J. R., Lee, C. M., & Larimer, M. E. (2021). Changes in college student alcohol use during the COVID-19 pandemic: Are perceived drinking norms still relevant?. Emerging Adulthood, 2167696820986742.
23. Sallie, S. N., Ritou, V., Bowden-Jones, H., & Voon, V. (2020). Assessing international alcohol consumption patterns during isolation from the COVID-19 pandemic using an online survey: highlighting negative emotionality mechanisms. BMJ open, 10(11), e044276.
24. Cornwell, K., Forbes, C., Inder, B., & Meadows, G. (2009). Mental illness and its effects on labour market outcomes. The journal of mental health policy and economics, 12(3), 107-118.
25. Bubonya, M., Cobb-Clark, D. A., & Wooden, M. (2017). Mental health and productivity at work: Does what you do matter?. Labour economics, 46, 150-165.
26. Bharadwaj, P., Pai, M. M., & Suziedelyte, A. (2017). Mental health stigma. Economics Letters, 159, 57-60.
27. Shim, R., & Rust, G. (2013). Primary care, behavioral health, and public health: Partners in reducing mental health stigma.
28. Kakuma, R., Kleintjes, S., Lund, C., Drew, N., Green, A., & Flisher, A. J. (2010). Mental health stigma: what is being done to raise awareness and reduce stigma in South Africa?. African Journal of Psychiatry, 13(2).
29. British Science Association. (2020). The forgotten generation: The impacts of COVID-19 on young people. Retrieved 16 April from https://www.britishscienceassociation.org/news/the-forgotten-generation-the-impacts-of-covid-19-on-young-people
30. Registering with the Counselling & Mental Health Support Service. (2021). Retrived 14 April 2021, from https://self-service.kcl.ac.uk/article/KA-01094/en-us.
31. Williams D. R. (2018). Stress and the Mental Health of Populations of Color: Advancing Our Understanding of Race-related Stressors. Journal of health and social behavior, 59(4), 466–485. https://doi.org/10.1177/0022146518814251
32. Black, Asian and Minority Ethnic (BAME) communities. (2021). Retrieved 14 April 2021, from https://www.mentalhealth.org.uk/a-to-z/b/black-asian-and-minority-ethnic-bame-communities
33. Fazel, M., Wheeler, J., & Danesh, J. (2005). Prevalence of serious mental disorder in 7000 refugees resettled in western countries: a systematic review. Lancet (London, England), 365(9467), 1309–1314. https://doi.org/10.1016/S0140-6736(05)61027-6

# BUILDING MORE RESILIENT HEALTHCARE SYSTEMS

By Pedra Rabiee

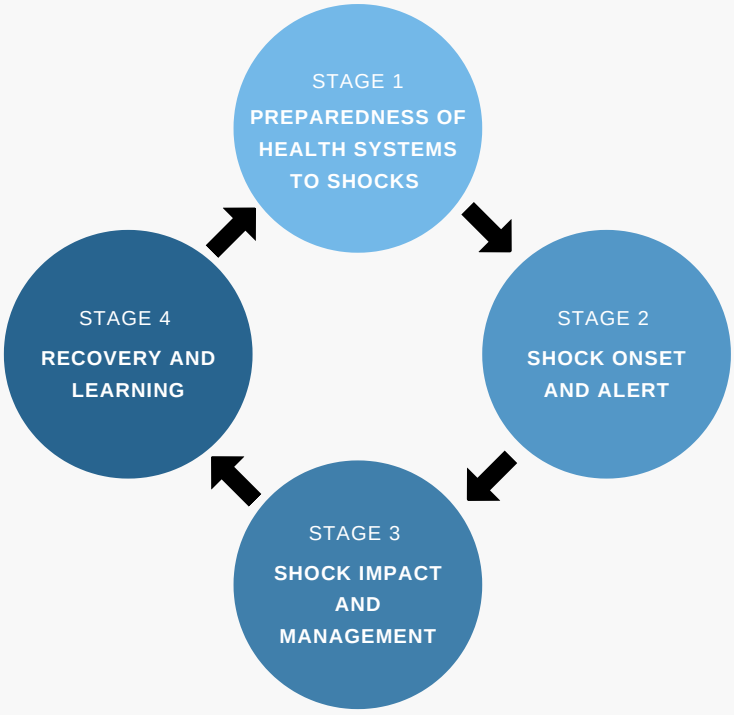
# Building More Resilient Healthcare Systems

Across the globe and in response to COVID-19, healthcare systems have demonstrated they are not as resilient and secure as we were led to believe. Emergency response systems that had been evaluated and appeared secure did not respond promptly and effectively. Radical reimagination is required to pivot underfunded and unstable systems towards more preventative strategies that will mitigate against future catastrophic events.

## DEFINING HEALTH SYSTEM RESILIENCE

Strong, resilient health systems are similar to a mighty ship in the middle of a terrible storm; it stays afloat despite battering waves[1]. To approach resilience in the healthcare system, like the ship, it is important to focus on the ability to anticipate, absorb, recover from, and adapt to a wide arrange of threats[2].

Currently, policymakers, leaders and entrepreneurs are pre-occupied with tackling the urgent day-to-day issues within health services. However, this pandemic has shown it is vital for health systems to also focus on longer-term planning and preparedness for shocks. For this to work in practice, health systems need to explore their ability to respond to the four-stage cycle of a shock[3].




- **Stage 1: Preparedness**, which is related to how vulnerable a system is to various disturbances;
- **Stage 2: Shock onset and alert**, where thefocus is on timely identification of the onset and type of the shock
- **Stage 3: Shock impact and management**, when the system absorbs the shock and, where necessary, adapts and transforms to ensure that health system goals are still achieved;
- **Stage 4: Recovery and learning**, which is when there is a return to some kind of normality but there may still be changes as a legacy of the shock

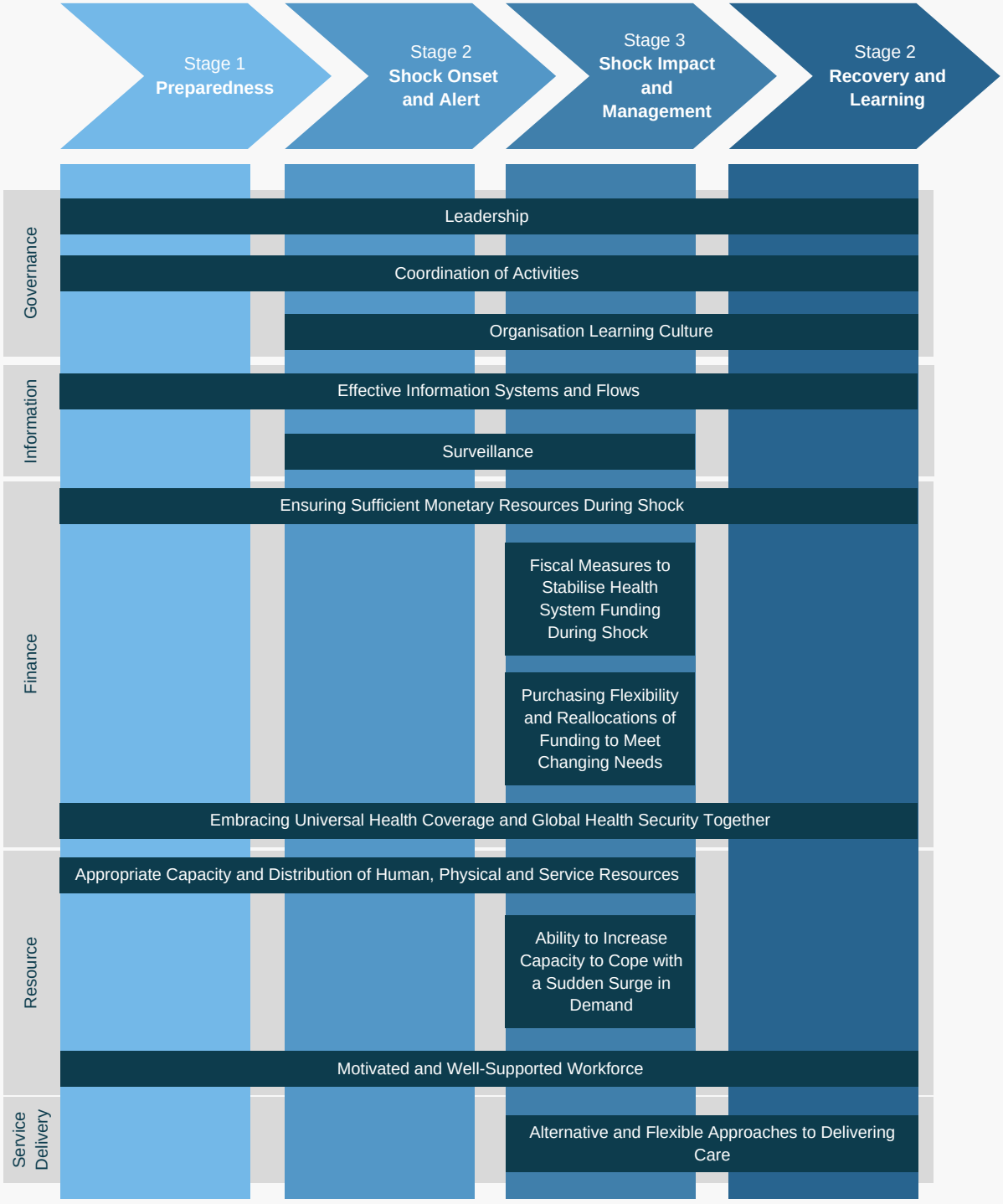
*Source: European Ovservatory on Health Systems and Policies (2020)*

*Figure 1: A shock is the sudden and extreme disturbance to a health system, which include natural disasters, financial crises, and epidemics[3]*

## STRATEGIES THAT MAKE HEALTH SYSTEMS MORE RESILIENT

As noted above, shock introduces complexity in building a more robust healthcare system. To respond to the stages of shock, several strategies must be explored. This policy paper maps out key health strategies, that overlap across shock stages.

*Figure 2: Stages of the shock cycle, adapted from the European Observatory on Health Systems and Policies (2020)*[3]



## GOVERNANCE

Adequate governance is deemed to be a core function of a resilient health system[5]. This ensures institutions shape the power-balance and relationships between actors and their actions constructively[6]. Governance-specific strategies are set out below:

### LEADERSHIP

Healthcare systems require effective and strong leadership for robust decision-making in order to prevent, detect and address local, regional, and national healthcare threats[7]. Leaders need to inspire confidence and generate trust, whilst embracing accountability and transparency[8] [4]. This ensures all actors across systems work towards a common goal[9]. At the same time, leaders need to place clear responsibilities for protocols. This includes establishing and overseeing exercises and stress tests for major events, whilst also evaluating crisis communication lines and agile methods of working.

**Case Study: Costa Rica and COVID-19**

Costa Rica is thought to be one of the most successful nations in the fight against COVID-19. Under the President, Carlos Alvarado Quesada, the government showed great leadership in response to the pandemic by rapidly implementing evidence-based approaches that enabled stakeholders and sectors to collaborate and respond effectively. The implementation of COVID-19 restrictions enabled the country to slow the curve of the spread of the infection. Additionally, the Costa Rican population have demonstrated better adoption of behavioural changes than other countries across the world, through embracing mask usage and social distancing[10].

With its robust, universal health system, this Latin American country was able to put health first whilst tackling this virus[11].

### COORDINATION OF ACTIVITIES

The pandemic highlighted a global need for stronger coordination to ensure effective collaborations in the healthcare sector, across different levels of government, and between different stakeholders. Functional collaboration would ensure healthcare systems at a local and national level are prepared and respond adequately to global threats.

**Case Study: USA and the Global Health Index**

Based on the Global Health Security Index, the USA was deemed to be the best prepared nation to respond to a pandemic. Despite impressive public and private facilities and high capacity, the USA's healthcare system is highly fragmented. Each state funds and operates its own public health and surveillance system, and nationally, the country has faced barriers in creating a publicly funded, unified health system[12] [13]. Lack of clear coordination, a key element of the International Health Regulation, has impacted the ability of the USA and other nations around the globe to respond appropriately and rapidly towards the COVID-19 pandemic[14].

### ORGANISATION LEARNING CULTURE

Embracing a learning culture enables stakeholders and systems to learn, adapt and transform during and after shocks in order to strengthen the system. The current situation means that many healthcare systems do not learn from failure. However, the aviation sector has demonstrated that black-box thinking embraces a culture of positive learning and prevents the same mistakes from happening again[15].

Implementing a culture to learn from each other's failures and mistakes locally, nationally and globally could enable rapid, tangible change. A strong learning culture would aid organisational recovery and improve resilience[16].

## INFORMATION

### EFFECTIVE INFORMATION SYSTEMS AND FLOWS

To make effective decisions, healthcare systems need robust data collection, analysis and sharing capabilities. This would enable governments and leaders to strategise and plan effective responses to shocks[3]. Data is a powerful weapon and must be wielded against systemic shocks.

To build intelligence into a health system, stakeholders need to address data interoperability. Having a streamlined system would enable the healthcare workforce to provide better and more informed decisions in real-time and thus match patient requirements to staffing capacity. This level of data resilience would enable integation between clinical, administrative, and structural partners, that wouldin turn benefit all stakeholders, including those under pressure[17].

**Case Study: UK and Genomic Data**

The UK is striving to be the world leader in genetic research. Since the announcement of the 100, 000 Genomes Project in 2012, Genomics England and the NHS are transforming healthcare by linking patients; genomic data to their medical records[18]. Over time, this data-set has the potential to have a significant impact on healthcare, by integrating public health-led, personalised healthcare to patients whilst also gathering information on new diseases and treatments for different population groups.

### SURVEILLANCE

In the early stages of shock, surveillance systems play a crucial role in ensuring effective detection and dissemination of information. Consequently, enabling reactive and effective transformational decision-making. Good surveillance mechanisms incorporate interventions such as alert mechanisms, which form part of an early warning system[19].

## FINANCE

During any shock, countries will be exposed to, and endure, fiscal repercussions. This is usually evident in GDP rate decreases and rising unemployment rates. These economic effects tend to be larger for countries that experience more severe healthcare disruptions. Therefore, policymakers and governments must understand the importance of ensuring access to high-quality healthcare, without undertaking significant financial burden during a crisis[20].

### ENSURE SUFFICIENT MONETARY RESOURCES DURING SHOCK

In the event of a crisis, it is vital to assess the availability and quantity of funding a health system is able to deploy. Adequate reserves enable healthcare systems to remain flexible in terms of capacity and timely service provision. In some countries, some countries achieve this by accumulating national health emergency reserves, whereas other countries may implement policies to ensure funds are rerouted towards the health system when required.

The government must reassess and implement mitigating strategies to prepare for future shocks. This can be achieved through the following methods:

- **Changing reimbursement methods:** Policymakers and governments can adapt schemes to provide services to compensate for cancelled care and extra shock-related costs when required.
- **Liquidity and financing options:** Identify options to meet health funding requirements, such as creating a national health emergency reserve, along with timescales and cash flow management plans during the shock.
- **Stress testing and forecasting options:** Explore cash-flow forecasts in various shock scenarios to assess stress on the health budget during shock, which can help predict and implement future monetary resources[21].

**Case Study: Lithuania Protects the Public Budget for Health during the 2008 Economic Crisis**

Lithuania was one of the most severely affected countries during the 2008 global economic crisis. In 2009, its GDP dropped by 15% compared to the previous year and unemployment increased by 13.5% in 2010. However, its health system financing remained fairly stable. This is because, before the crisis, the Lithuanian government integrated two main initiatives.

Firstly, Lithuania placed countercyclical fascial policies before the crisis and second, the level of state contributions was to set to increase year-on-year. Thus, when half the population was economically inactive, the public budget for health remained largely protected from the effects of rising unemployment and falling incomes[3].

## FISCAL MEASURE TO STABILISE HEALTH-SYSTEM FUNDING DURING SHOCKS

Across the world, national health systems are funded predominately through taxation and social contributions. However, shocks often affect these funding sources, due to their impact on society. To build a stronger and resilient health system, further support may be required to support financing mechanisms for healthcare thereby protected from any shocks[3].

However, in most cases, governments may need to explore mechanisms that can support both the health and the livelihood of individuals and private companies. These fiscal measures can be grouped into three categories:

1. **Immediate fiscal impulse:** These include additional government spending and foregone revenues, which immediately lead to deterioration of the public finances without any direct compensation later.
2. **Deferrals:** Governments can choose to defer certain payments, such as taxes, social security contributions or utility bills, to be paid back later. These measures can improve the liquidity positions of individuals and companies without cancelling their commitments.
3. **Other liquidity provisions and guarantees:** These measures include 'export guarantees, liquidity assistance and credit lines through national development banks[22]'

Increasing liquidity by various measures can ensure the health system remains resilient and more effective during shock, whilst ensuring 'business as usual'.

**Case Study: Germany's Economic Response During COVID-19**

In the response to COVID-19, Germany rapidly deployed one of the largest financial assistance packages to provide financial security to both its healthcare systems and citizens. Due to strong capital buffers and multi-pronged borrower support policies in place prior to the pandemic, the German banking sector remained resilient throughout the pandemic. In order to maintain this financial stability, further capital relief and restrictions on dividend payouts should remain in place till society reaches recovery from COVID-19[23].

## PURCHASING FLEXIBILITY AND REALLOCATIONS OF FUNDING TO MEET CHANGING NEEDS

When shocks occur within a nation, changes may need to be made in terms of purchasing to ensure an effective operational system. Depending on the type and severity of the shock, shifts may be geared toward certain types of care and require redirection of resources or incentivisation for providers.

### Case Study: Spain and Nationalisation of the Private Health Sector

Due to the rise of COVID-19 cases, and to meet hospital demands, the Spanish government nationalised all private hospitals and healthcare providers to combat the virus[24] [3]. Shortages in medicines, personal protective equipment and other healthcare resources, resulted in concerns being raised across the nation. Private Spanish laboratories used this opportunity to charge inflated prices, causing the government to centralise drug purchasing and introduced price controls for medication in order to secure supplies[25].

## EMBRACING UNIVERSAL HEALTH COVERAGE (UHC) AND GLOBAL HEALTH SECURITY (GHS) TOGETHER

The prominent health goal for all national health systems is to ensure the population has access to good quality, affordable health services. Countries that are closer to attaining UHC are typically more resilient than those without when facing a crisis. However, during global threats, such as the COVID-19 pandemic, vulnerable populations tend to suffer the most[1]. If individuals are unable to access healthcare at the appropriate time, in their local communities, the population faces increased risk of transmissible of infections. This could potentially lead to, accelerate, or prolong an epidemic. Consequently, there is a clear need to link the agendas of UHC and GHS to rapidly provide health services, including public healthcare surveillance and ensure they meet the needs of the population[3].

Another divergence between UHC and GHS agendas is the 'One Health' approach, which recognises the health of individuals is connected to the health of animals and the environment[26]. Further reformation is needed across regional, national, and global pandemic emergency actors to coordinate, collaborate and communicate with animal-environmental sectors in order to tackle the threats from zoonotic diseases, antimicrobial resistance and food safety[27].

Countries need to closely align both of their UHC and GHS frameworks whilst underpinning the 'One Health' approach through multiple sectors. This would better equip nations to deliver high quality universal public healthcare coverage for all, regardless of individuals' ability to pay[28] [29].

### Case Study: The International Health Regulation (IHR)

The IHR is an international legal framework set to strengthen global health security. Its aim is 'to prevent, protect against, control and respond to the International spread of disease while avoiding unnecessary interference with international traffic and trade[3].' Initially, it covered only three infectious diseases: cholera, plague and yellow fever, however, by 2005, the scope was widened to include all events. These events include chemical and nuclear threats which can lead to public health emergencies on International Concern (PHEIC). In terms of implementation, Member States hold responsibility to implement it at a national level.

However, COVID-19 has shown the IHR needs to be improved as it did not succeed in its objectives. Nations failed to adequately respond to, and control the virus. Reporting notifiable events was identified as a major compliance issue, as this can have detrimental effects on a nation's economy[30].

Thus, the world needs to reevaluate the IHR to ensure that local, national and global responses do not negatively impact countries but ensure global health security. Additionally, the IHR need to embrace a higher level of transparency and coordination when managing threats.

## RESOURCES

### APPROPRIATE CAPACITY AND DISTRIBUTION OF HUMAN, PHYSICAL AND SERVICES RESOURCES

Within any healthcare system, there needs to be an adequate distribution of resources across all services. In terms of personnel, this means the workforce must have sufficient and diverse levels of staffing, including doctors, nurses, and other healthcare allied professionals[3]. Within a healthcare system, this means the right number of people, empowered to do the right thing at the right location and the right time. Challenges within the workforce include uneven distribution, insufficient cadre of healthcare professionals, inadequate competence-framed training and the well-being of healthcare workers (discussed later on). These challenges must be addressed during healthcare reforms and long-term transition plans in order to ensure that healthcare professionals can go beyond their traditional roles[28].

As for infrastructure, it is not only limited to beds and hospitals but also the wider service size, to ensure that capacity is appropriate for population needs. Currently, many countries exhibit inadequate health-resource distribution. This issue has forced many governments to choose which specific resources they should increase the capacity of, over others. For example, laboratory capacity maybe increased at the expense of more nurses[31]. The consequences of these imbalanced, fragmented priorities are exacerbated during shocks and the repercussions are not considered until another in-direct health crisis emerges. This was observed during the Ebola outbreak in West Africa.

**Case Study: West Africa Ebola Outbreak and Regional Endemic Diseases**

During the 2014-16 Ebola outbreak, health systems across West Africa were overwhelmed. Countries, including Guinea, Liberia and Sierra Leone, faced a reduction in the access to health services for diagnosis and treating endemic diseases in their regions: include malaria, HIV/AIDs, and tuberculosis. These diseases were exacerbated across the region and contributed to the excess of indirect Ebola mortality rates. It is essential for countries, when facing infection-related shocks, to implement control strategies that provide comprehensive approaches to preventing the spread of the infection, whilst also continuing care and prevention schemes for other prevalent diseases[32].

### ABILITY TO INCREASE CAPACITY TO COPE WITH A SUDDEN SURGE IN DEMAND

When preparing for shock, healthcare systems need to evaluate their ability to cope with surge capacity, in order to ensure they have an effective response to a rapid increase in demand. However, it is worth keeping in mind that too much preparedness can cause 'over-optimisation', which may increase the vulnerability of the healthcare system to unanticipated shocks and stresses[33].

**Case Study: US and PPE**

At the beginning of the pandemic, there were limitations in the global supply chain in terms of PPE. Across the country, 3D printers were used to produce the PPE equipment for hospitals, such as shields, masks and ventilator components, to overcome the surge[34]. Due to the challenges in regulation and liability, along with the significant potential, the Food and Drug Administration (FDA) approved of this creative and flexible approach[35].

**Case Study: Medical and Nursing Students Across the World**

Most countries across the world mobilised their medical and nursing students to work in clinical practice. Those in training were encouraged to assist in the operational aspects of the pandemic, such as contact tracing[36].

**Case Study: UK's Capacity and the COVID-19 Crisis**

The ability of a hospital to cope with a large influx of patients, due to seasonal infections or pandemic illnesses, demonstrates its' flexibility of the hospital. Prior to the COVID-19 pandemic, the UK had faced regular bed crises on a daily basis, and this is usually highlighted during the winter (also known as the 'winter bed crisis')[37]. This has impacted the ability of the workforce to deliver high-quality care, and has created a bottleneck in the emergency care workflow. Ultimately resulting in suboptimal outcomes for patients[38] [39].

When the COVID-19 pandemic was declared, a new level of concern amplified within the UK. Across the world, a large proportion of individuals who contracted COVID-19 were requiring admission to hospitals, for example, due to new oxygen requirements[40]. To tackle this situation, the British government instituted a series of policies, including facilitating the discharge of individuals who had been delayed, cancelling all non-urgent clinical work, opening large field hospitals (Nightingale Hospitals) and increasing technical ventilator availability[41] [42] [43].

Even though the UK tried to increase its capacity at the beginning of the COVID-19 pandemic, many individuals faced disruptions in routine and elective care. This was reported by almost every country across the world[44].

### MOTIVATED AND WELL-SUPPORTED WORKFORCE

Along with healthcare system resilience, it is vital to discuss the resilience of staff in the face of adversity. During most shock events, healthcare works on the front line are amongst the groups who are hit the hardest. The duration of the shock may also affect the ability of the staff to provide patients with optimal care.

During the preparedness stages of the shock cycle, healthcare systems can implement strategies to build resilience services and techniques for their healthcare staff. During the shock process itself, leaders must provide effective tools to embrace a robust, flexible, and well-motivated workforce[46]. This will enable them to be more compliant and motivated to be redeployed in order to meet a surge in demand and take on the extra burdens they may face[3].

**Case Study: Workforce and Sleep Quality**

Studies after SARS, MERS and Ebola outbreaks have shown that persistent exposure to stress and anxiety has led to sleep deprivation and fatigue. This can have detrimental effects, leading to errors in the short term and burn-out, depression and other mental illnesses in the long term[47] [48] [49] [50] [51].

Similar issues are being seen during COVID-19 and these can potentially have a negative affect on the well-being of the workforce, whilst also decreasing its capacity. As a result, leaders must ensure that healthcare professionals have sufficient support to protect their well-being[52].

## SERVICE DELIVERY

### ALTERNATIVE AND FLEXIBLE APPROACHES TO DELIVERING CARE

Along with the imbalance in supply and demand during shock events, there is a need to ensure efficient service delivery for patients.

During the COVID-19 pandemic, many countries took the approach to temporarily postpone their elective care services, in order to enable them to develop and/or expand alternative service delivery routes. This, unfortunately, resulted in an increase in morbidity and mortality due to the reduction of planned and emergency services (e.g. UK, US, Spain, Finland[53] [54]). Leaders across the world realised that service delivery needs to have the flexibility to be able to cope with the unexpected barriers of shock. To build resilience, nations should consider the crisis preparedness and readiness of their service deliveries and ensure that during a shock, these services maintain an optimal level of quality and safety[3].

## CONCLUSION

Overall, COVID-19 has demonstrated that urgent work is needed to strategically shift toward stronger and more resilient health systems. The COVID-19 response has shown that countries across the world need to build their global health security strategies to tackle future shock. Furthermore, health systems need to ensure effective response during outbreaks whilst providing high-quality, effective services to their populations without any financial burden.

| Strategy | Policy Recommendations |
|---|---|
| **Governance** | |
| **Leadership** | • Develop/Reform contingency plans and protocols and emergency legislation<br>• Establish a clear chain of command<br>• Establish accountability across and within the sectors<br>• Clear and feasible plans for response measures<br>• Build public trust towards response agencies<br>• Develop effective health communications on a local, regional and national level |
| **Coordination of Activities** | • Establish and promote collaboration between and within sectors<br>• Set agreements with relevant actors for shock responses |
| **Organizational Learning Culture** | • Promote a positive and innovative culture of learning across the sectors<br>• Integrate feedback and analysis of previous mistakes, including on a hospital and health system level<br>• Carry-out mechanisms to assess, audit and learn from the response to shock and implement change<br>• Continue stress-testing the healthcare system and crisis scenario modelling |
| **Information** | |
| **Effective Information Systems and Flow** | • Robust data collection and linkage systems, including ethnicity<br>• Support of efficient flow of information between stakeholders and sectors<br>• The flow of data, information, and analysis to appropriate stakeholders for decision-making, monitoring and evaluations<br>• Timely dissemination of information<br>• Communication infrastructure across the healthcare system<br>• Strengthen the health informatician departments within the health system to analyze large datasets |
| **Surveillance** | • Development and strengthening surveillance and early warning systems |
| **Financing** | |
| **Ensuring Sufficient Monetary Resources** | • Establishing and integration Emergency Health Reserve Funds for crisis<br>• Optimise health spending to ensure robust health financing mechanisms for the health system<br>• Equitable geographic distribution of health expenditure accordingly to population health needs<br>• Plan financial schemes and identify financing options for the healthcare system for future shocks<br>• Explore cash-flow forecasts and assess the stress of the health budget during shock |

| | |
|---|---|
| **Fiscal Measures to Stabilise Health System Funding During Shocks** | • Financial stability planning and implementation for future shocks for the healthcare system, population, and companies<br>• Deploying financial health reserves to support healthcare systems during shocks |
| **Purchasing Flexibility and Reallocations of Funding to Meet Changing Needs** | • Developing alternative procurement channels across the sectors<br>• Evaluating policies and mechanisms to ensure rapid implementations of these procurement channels |
| **Embracing Universal Health Coverage (UHC) and Global Health Security (GHS) Together** | • Integrating the UHC and GHS frameworks to ensure effective health coverage, especially in regard to antimicrobial resistance<br>• Preventing out-of-pocket payments during shocks<br>• Embracing One Health throughout UHC and GHS frameworks<br>• Building co-operations across sectors to promote one health initiatives |
| **Resource** | |
| **Appropriate Capacity and Distribution of Human, Physical and Service Resources** | • Expanding the capacity of human, physical and service resources<br>• Mapping the services to ensure efficient workforce collaboration<br>• Ensure capacity expansion is on the long-term planning of the country<br>• Immediate model of how staff will be managed in its divided workforce (shock-care vs business as usual)<br>• Explore partnerships with potential supply chain vendors |
| **Ability to Increase Capacity to Cope with a Sudden Surge in Demand** | • Generating annual human reserve lists prior to shocks<br>• Mechanisms to ensure the resilient capacity of health services during shocks, including optimising funding<br>• Effective health communications to prevent excess mortality and morbidities<br>• Encourage innovation implementation into the healthcare system<br>• Explore innovative supply chain solutions<br>• Develop scenarios to help define trigger points for supply needs |
| **Motivated and Well-Supported Workforce** | • Providing resilience training to healthcare workers and students<br>• Implementing and expanding support towards healthcare workers to encourage work-life balance<br>• Ensure the safety of healthcare workers<br>• Implementing health support mechanisms for the healthcare workforce to prevent staff attrition and burnout<br>• Review staffing ratios and scheduling |
| **Service Delivery** | |
| **Alternative and Flexible Approaches to Delivering Care** | • Crisis preparedness training across the healthcare system<br>• Crisis preparedness protocols for healthcare services<br>• Map patient pathways during specific shock types<br>• Future resilience planning on the health initiatives |

## REFERENCES


1. Quick, J. and Fryer, B., 2018. The end of epidemics. New York: St. Martin`s Press.
2. OECD, 2020. A systemic resilience approach to dealing with Covid-19 and future shocks. [online] Available at: <https://www.oecd.org/coronavirus/policy-responses/a-systemic-resilience-approach-to-dealing-with-covid-19-and-future-shocks-36a5bdfb/#boxsection-d1e704> [Accessed 4 May 2021].
3. European Observatory on Health Systems and Policies, Thomas, Steve, Sagan, Anna, Larkin, James, Cylus, Jonathan. et al. (2020). Strengthening health systems resilience: key concepts and strategies. World Health Organization. Regional Office for Europe. https://apps.who.int/iris/handle/10665/332441
4. Fridell, M., Edwin, S., von Schreeb, J. and Saulnier, D., 2019. Health System Resilience: What Are We Talking About? A Scoping Review Mapping Characteristics and Keywords. International Journal of Health Policy and Management, 9(1), pp.6-16.
5. PHCPI. 2021. Governance & Leadership. [online] Available at: <https://improvingphc.org/improvement-strategies/governance-leadership> [Accessed 4 May 2021].
6. Blanchet, K., Nam, S., Ramalingam, B. and Pozo-Martin, F., 2017. Governance and Capacity to Manage Resilience of Health Systems: Towards a New Conceptual Framework. International Journal of Health Policy and Management, 6(8), pp.431-435.
7. EU Expert Group on HSPA, 2020. Assessing The Resilience of Health Systems in Europe: An Overview of the Theory, Current Practice and Strategies for Improvement, https://ec.europa.eu/health/sites/health/files/systems_performance_assessment/docs/2020_resilience_en.pdf
8. Newton, K., 2020. Government Communications, Political Trust and Compliant Social Behaviour: The Politics of Covid-19 in Britain. The Political Quarterly, 91(3), pp.502-513.
9. EU Expert Panel on EXPH, 2020, The organization of resilient health and social care following the COVID-19 Pandemic, https://ec.europa.eu/health/sites/health/files/expert_panel/docs/026_health_socialcare_covid19_en.pdf
10. The Costa Rica News, 2021. Experts Explain the Drop in COVID-19 Cases in Costa Rica.. [online] Available at: <https://thecostaricanews.com/this-is-how-experts-explain-the-drop-in-covid-19-cases-in-costa-rica/> [Accessed 4 May 2021].
11. UN News, 2020. 5 reasons Costa Rica is winning plaudits for fighting COVID-19: a UN Resident Coordinator blog. [online] Available at: <https://news.un.org/en/story/2020/05/1064412> [Accessed 4 May 2021].
12. Institut Montaigne, 2020. How Covid-19 is Unveiling US Healthcare Weaknesses. [online] Available at: <https://www.institutmontaigne.org/en/blog/how-covid-19-unveiling-us-healthcare-weaknesses> [Accessed 4 May 2021].
13. Lal, A., Ashworth, H., Dada, S., Hoemeke, L. and Tambo, E., 2020. Optimizing Pandemic Preparedness and Response Through Health Information Systems: Lessons Learned From Ebola to COVID-19. Disaster Medicine and Public Health Preparedness, pp.1-8.
14. Tromberg, B., Schwetz, T., Pérez-Stable, E., Hodes, R., Woychik, R., Bright, R., Fleurence, R. and Collins, F., 2020. Rapid Scaling Up of Covid-19 Diagnostic Testing in the United States — The NIH RADx Initiative. New England Journal of Medicine, 383(11), pp.1071-1077.
15. Syed, M., 2016. Black box thinking. Portfolio Penguin.
16. Jones, C., 2017. Resilience and recovery: What the NHS can learn from the criminal justice and education sectors | The Health Foundation. [online] The Health Foundation. Available at: <https://www.health.org.uk/blogs/resilience-and-recovery-what-the-nhs-can-learn-from-the-criminal-justice-and-education-sectors> [Accessed 4 May 2021]
17. WSP, 2020. After COVID-19: How Can Smart Tech Make Healthcare More Resilient?. [online] Available at: <https://www.wsp.com/en-GL/insights/after-covid-19-how-can-smart-tech-make-healthcare-more-resilient> [Accessed 4 May 2021].
18. Genomics England. 2021. The 100,000 Genomes Project | Genomics England. [online] Available at: <https://www.genomicsengland.co.uk/about-genomics-england/the-100000-genomes-project/> [Accessed 5 May 2021].
19. Hanefeld J. Mayhew S., Legido-Quigley H., Martineau F., Karanikolos M., Blanchet K., Liverani M., Mokuwa E. Y., McKay G. and Balabanova D., 2018. Towards an understanding of resilience: Responding to health systems shocks. Health Policy and Planning, 33(3):355–367.
20. Chang M, Rogers J, Zhou S. (2020). “Modern Pandemics: Recession and Recovery,” International Finance Discussion Papers 1295. Washington: Board of Governors of the Federal Reserve System, https://doi.org/10.17016/IFDP.2020.1295.

20.
21. KPMG. 2020. COVID-19: Recovery and resilience in healthcare. [online] Available at: <https://assets.kpmg/content/dam/kpmg/xx/pdf/2020/09/covid-19-recovery-and-resilience-in-healthcare.pdf> [Accessed 5 May 2021].
22. Anderson, J., Bergamini, E., Brekelmans, S., Cameron, A., Darvas, Z., Jiménez, M., Lenaerts, K. and Midões, C., 2021. The fiscal response to the economic fallout from the coronavirus | Bruegel. [online] Bruegel.org. Available at: <https://www.bruegel.org/publications/datasets/covid-national-dataset/> [Accessed 5 May 2021].
23. IMF.org. 2021. Germany's Post-COVID-19 Recovery in Five Charts. [online] Available at: <https://www.imf.org/en/News/Articles/2021/01/15/na011921-germanys-post-covid19-recovery-in-five-charts> [Accessed 4 May 2021].
24. Business Insider. 2020. Spain has nationalized all of its private hospitals as the country goes into coronavirus lockdown. [online] Available at: <https://www.businessinsider.com/coronavirus-spain-nationalises-private-hospitals-emergency-covid-19-lockdown-2020-3?r=US&IR=T> [Accessed 3 May 2021].
25. Legido-Quigley, H., Mateos-García, J., Campos, V., Gea-Sánchez, M., Muntaner, C. and McKee, M., 2020. The resilience of the Spanish health system against the COVID-19 pandemic. The Lancet Public Health, 5(5), pp.e251-e252.
26. Zinsstag J, Schelling E, Waltner-Toews D, Tanner M. From "one medicine" to "one health" and systemic approaches to health and well-being. Preventive veterinary medicine. 2011;101(3–4):148–56. pmid:20832879
27. Sinclair J. Importance of a One Health approach in advancing global health security and the Sustainable Development Goals. Revue scientifique et technique (International Office of Epizootics). 2019;38(1):145. pmid:31564744
28. Lal, A., Erondu, N., Heymann, D., Gitahi, G. and Yates, R., 2021. Fragmented health systems in COVID-19: rectifying the misalignment between global health security and universal health coverage. The Lancet, 397(10268), pp.61-67.
29. Sinclair J. Importance of a One Health approach in advancing global health security and the Sustainable Development Goals. Revue scientifique et technique (International Office of Epizootics). 2019;38(1):145. pmid:31564744
30. Wilson, K., Halabi, S. and Gostin, L., 2020. The International Health Regulations (2005), the threat of populism and the COVID-19 pandemic. Globalization and Health, 16(1).
31. Erondu, N., Martin, J., Marten, R., Ooms, G., Yates, R. and Heymann, D., 2021. Building the case for embedding global health security into universal health coverage: a proposal for a unified health system that includes public health.
32. Parpia, A., Ndeffo-Mbah, M., Wenzel, N. and Galvani, A., 2016. Effects of Response to 2014–2015 Ebola Outbreak on Deaths from Malaria, HIV/AIDS, and Tuberculosis, West Africa. Emerging Infectious Diseases, 22(3), pp.433-441.
33. Abimbola S, Topp SM (2018). Adaptation with robustness: The case for clarity on the use of 'resilience' in health systems and global health. BMJ Global Health, 3(1):e000758.
34. Manero, A., Smith, P., Koontz, A., Dombrowski, M., Sparkman, J., Courbin, D. and Chi, A., 2020. Leveraging 3D Printing Capacity in Times of Crisis: Recommendations for COVID-19 Distributed Manufacturing for Medical Equipment Rapid Response. International Journal of Environmental Research and Public Health, 17(13), p.4634.
35. U.S. Food and Drug Administration. 2021. 3D Printing in FDA's Rapid Response to COVID-19. [online] Available at: <https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/3d-printing-fdas-rapid-response-covid-19> [Accessed 4 May 2021].
36. European Observatory on Health Systems and Policies, World Health Organization. Regional Office for Europe, Gemma A. Williams, Claudia B. Maier, Giada Scarpetti. et al. (2020). What strategies are countries using to expand health workforce surge capacity during the COVID-19 pandemic?. Eurohealth, 26 (2), 51 - 57. World Health Organization. Regional Office for Europe. https://apps.who.int/iris/handle/10665/336296
37. Allen, L., 2019. The NHS this winter: looking beneath the national view. [online] The Health Foundation. Available at: <https://www.health.org.uk/news-and-comment/blogs/the-nhs-this-winter-looking-beneath-the-national-view> [Accessed 5 May 2021].
38. RCP. (2017) Against the Odds: Experiences from the NHS Front Line. https://www.rcplondon.ac.uk/projects/outputs/against-odds-experiences-nhs-front-line
39. Friebel, R., Fisher, R., Deeny, S., Gardner, T., Molloy, A. and Steventon, A., 2019. The implications of high bed occupancy rates on readmission rates in England: A longitudinal study. Health Policy, 123(8), pp.765-772.
40. Zhou, F., Yu, T., Du, R., Fan, G., Liu, Y., Liu, Z., Xiang, J., Wang, Y., Song, B., Gu, X., Guan, L., Wei, Y., Li, H., Wu, X., Xu, J., Tu, S., Zhang, Y., Chen, H. and Cao, B., 2020. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. The Lancet, 395(10229), pp.1054-1062.

40. Zhou, F., Yu, T., Du, R., Fan, G., Liu, Y., Liu, Z., Xiang, J., Wang, Y., Song, B., Gu, X., Guan, L., Wei, Y., Li, H., Wu, X., Xu, J., Tu, S., Zhang, Y., Chen, H. and Cao, B., 2020. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. The Lancet, 395(10229), pp.1054-1062.
41. Stevens S. (2020) NHS-E and NHS-I letter on next steps on NHS response to COVID-19. NHS England. Available: https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/urgent-next-steps-on-nhs-response-to-covid-19-letter-simon-stevens.pdf [Accessed 4 May 2021].
42. NHS England. (2020) NHS England » New NHS nightingale hospital to fight coronavirus. [online] England.nhs.uk. Available at: <https://www.england.nhs.uk/2020/03/new-nhs-nightingale-hospital-to-fight-coronavirus/> [Accessed 4 May 2021].
43. Gov.UK (2020) UK Government Ventilator Challenge , 2020. Available: https://www.gov.uk/government/topical-events/coronavirus-uk-government-ventilator-challenge/about [Accessed 4 May 2021].
44. WHO.int. (2021). In WHO global pulse survey, 90% of countries report disruptions to essential health services since COVID-19 pandemic. [online] Available at: <https://www.who.int/news/item/31-08-2020-in-who-global-pulse-survey-90-of-countries-report-disruptions-to-essential-health-services-since-covid-19-pandemic> [Accessed 4 May 2021].
45. Manero, A., Smith, P., Koontz, A., Dombrowski, M., Sparkman, J., Courbin, D. and Chi, A., 2020. Leveraging 3D Printing Capacity in Times of Crisis: Recommendations for COVID-19 Distributed Manufacturing for Medical Equipment Rapid Response. International Journal of Environmental Research and Public Health, 17(13), p.4634.
46. Barasa, E., Mbau, R. and Gilson, L., 2018. What Is Resilience and How Can It Be Nurtured? A Systematic Review of Empirical Literature on Organizational Resilience. International Journal of Health Policy and Management, 7(6), pp.491-503.
47. Wu, P., Fang, Y., Guan, Z., Fan, B., Kong, J., Yao, Z., Liu, X., Fuller, C., Susser, E., Lu, J. and Hoven, C., 2009. The Psychological Impact of the SARS Epidemic on Hospital Employees in China: Exposure, Risk Perception, and Altruistic Acceptance of Risk. The Canadian Journal of Psychiatry, 54(5), pp.302-311.
48. Koh, D., Lim, M., Chia, S., Ko, S., Qian, F., Ng, V., Tan, B., Wong, K., Chew, W., Tang, H., Ng, W., Muttakin, Z., Emmanuel, S., Fong, N., Koh, G., Kwa, C., Tan, K. and Fones, C., 2005. Risk Perception and Impact of Severe Acute Respiratory Syndrome (SARS) on Work and Personal Lives of Healthcare Workers in Singapore. Medical Care, 43(7), pp.676-682.
49. Maunder, R., Hunter, J., Vincent, L., Bennett, J., Peladeau, N., Leszcz, M., Sadavoy, J., Verhaeghe, L. M., Steinberg, R., & Mazzulli, T., 2003. The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. Canadian Medical Association Journal, 168(10), 1245–1251.
50. McAlonan, G., Lee, A., Cheung, V., Cheung, C., Tsang, K., Sham, P., Chua, S. and Wong, J., 2007. Immediate and Sustained Psychological Impact of an Emerging Infectious Disease Outbreak on Health Care Workers. The Canadian Journal of Psychiatry, 52(4), pp.241-247.
51. Son, H., Lee, W., Kim, H., Lee, K. and You, M., 2018. Examination of Hospital Workers' Emotional Responses to an Infectious Disease Outbreak: Lessons From the 2015 MERS Co-V Outbreak in South Korea. Disaster Medicine and Public Health Preparedness, 13(03), pp.504-510.
52. Rieckert, A., Schuit, E., Bleijenberg, N., ten Cate, D., de Lange, W., de Man-van Ginkel, J., Mathijssen, E., Smit, L., Stalpers, D., Schoonhoven, L., Veldhuizen, J. and Trappenburg, J., 2021. How can we build and maintain the resilience of our health care professionals during COVID-19? Recommendations based on a scoping review. BMJ Open, 11(1), p.e043718.
53. Illman, J., 2020. Coronavirus response could create 'very serious unintended consequences'. [online] Health Service Journal. Available at: <https://www.hsj.co.uk/policy-and-regulation/coronavirus-response-could-create-very-serious-unintended-consequences/7027321.article> [Accessed 4 May 2021].
54. Nytimes.com. 2020. Where Have All the Heart Attacks Gone? (Published 2020). [online] Available at: <https://www.nytimes.com/2020/04/06/well/live/coronavirus-doctors-hospitals-emergency-care-heart-attack-stroke.html> [Accessed 4 May 2021].

## FOR MORE INFORMATION

Future Health
richard@futurehealth-research.com

The King's Think Tank
president@kingsthinktank.org

FUTURE HEALTH

KING'S ThinkTank