

PanSurg: The COVID-19 Aftershock Report

The PanSurg Collaborative



Imperial College
London

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Acknowledgements

PanSurg would like to thank all of our excellent panelists for their time and contributions to the Aftershock live sessions. We would also like to thank Johnson & Johnson Medical Devices for their support in delivering our educational content. Specifically, we would like to thank Hannah Cutting, Leila Mohammed and Camile Alier for their support in coordinating digital peer review sessions.

Executive Summary

The PanSurg Aftershock Symposium was held on September 18th 2020. The goal was **to assess the impact of the Covid-19 crisis on elective surgical and interventional services, and to define the opportunities and barriers for the re-structuring of surgical services within the NHS in the COVID-19 ‘aftershock’ landscape.** This was achieved by hosting three semi-structured interactive sessions; questions and topics for discussion were proposed to the panel prior to each session however the sessions were highly interactive and audience members were invited to actively participate and ask questions. **These panels highlighted the scale of the challenge, but also identified a strong will to create surgical services in the post-pandemic phase that are more efficient and leaner.** Their responses and shared learnings have been integrated with primary PanSurg data and publications that have been delivered during the pandemic to inform this report.

On the basis of this analysis, the PanSurg team have made some independent recommendations:



1 Surgeons have a critical role to play in defining the national response to COVID-19 and for future health crises. There should be representation of surgical specialties within national advisory committees (e.g. the Strategic Advisory Group for Emergencies) and within those setting national pandemic research response priorities (e.g. NIHR). Surgical research during COVID-19 has been underrepresented in the national portfolio and this should be urgently addressed.



2 We propose the creation of an NHS surgical pandemic operating model based on an integrated crisis management framework (ICMF) to

augment existing surge initiatives, such as the development of NHS Nightingale capacity. This approach recognises the interdependent nature of being part of a highly complex healthcare system. An enhanced approach is needed to bring together all available NHS operating resources to serve one clear strategic aim – to minimise harm to all patients.



3 All hospitals performing elective surgical practice must therefore now have a strategy for maintaining surgical activity in the event of further surges or future pandemics. The private sector has played a significant role in maintaining our national operative output and where this has been performed successfully this should be continued in future surges.



4 PanSurg data suggests that for some interventions, even short cessations of elective care may have exponential impact on waiting lists. We propose pooled waiting lists for low risk elective procedures and patients across integrated, expanded natural surgical community networks. These have the potential to increase efficiency by innovatively flexing existing supply to better match demand.



5 Local plans for maintaining operative capacity must be communicated consistently and effectively to all team members and patients.



6 Macro incentives to deliver operational efficiencies in response to the COVID-19 aftershock should be reconsidered. Surgical efficiency should be locally led through engagement with clinical leaders.



7 Surgical associations and bodies must establish novel cross specialty working groups to limit the influence of siloed working between trusts and between specialties. These groups should actively engage with NHS England and wider policy makers to ensure that key learnings from future crises can be rapidly disseminated.

8



Current national surgical audit mechanisms have been too slow to respond to the pandemic. The government must reduce the barriers to accessing national health data on surgical services and it should establish novel data sets that provide greater granularity. Future data should be collected with international cooperation where possible and these data should be available as an open source for emergent scientific research in times of crisis.

9



Surgical and clinical leaders should be trained and supported to adopt innovations in an agile manner at a local level. Where barriers have come down to surgical innovation during

COVID-19 they should remain down.

10



NHS Trusts should offer routine COVID-19 testing to staff. This is fundamental to maintaining trust in our systems for staff and patients. Staff should be further prepared and resourced to perform the functions within an integrated operating model with particular regard to PPE requirements, and surgical working patterns should be managed longterm to minimise fatigue, viral impact and lessen further spread.

11



Healthcare providers must acknowledge the high rates of burnout and the stress caused

by re-deployment and disrupted working conditions. We propose that NHS organisations establish COVID-19 rotas that provide appropriate rest, and should consider introducing freedom to speak up officers and mental health first aiders if not already available.

12



Surgical training must be urgently prioritized. Digital technologies that improve the quality and safety of surgical training should be adopted, and new national initiatives are implemented to improve the quality and consistency of training, and reduce its duration.

13



Diagnostics – screening for chronic disease and access to urgent diagnostics should have the same importance as COVID-19 testing. The government should adopt the findings of Professor Mike Richard’s report; increasing capacity and efficiency in services such as endoscopy is now a national priority. These diagnostic pathways however require much more integration with primary care and should be moved out of hospital wherever possible.

Background

The SARS-CoV-2 pandemic was declared by the WHO on the 11th March 2020. Paucity of information on how the virus was affecting surgical patients, slow dissemination of effective clinical practice across international borders and confusion on how to best re-organise services all created significant delay and confusion in preparations to address the unprecedented challenge to surgical services.

The COVID-19 pandemic put a halt to the majority of global elective surgery in order to manage the surge in patients requiring acute hospital services and intensive care⁽¹⁻⁴⁾. It has been estimated that worldwide 28 million elective operations have been cancelled or postponed due to the pandemic.⁽⁵⁾ Although the focus of public health organisations globally was rightly mounting an effective emergency response to the COVID-19 pandemic, **the surgical ‘aftershock’ has been unprecedented and it is not yet fully appreciated. Millions of patients in the UK are already waiting for treatment, and numbers increase daily as the diversion of resources continues.**⁽⁶⁾ Elective surgical services are gradually being re-introduced, aiming to treat waiting patients without risking the spread of COVID-19. Work in the UK is currently being done to undertake life-saving cancer operations in “clean” COVID-19 free hospital sites, away from the acute care sites where COVID is more prevalent.^(7, 8) However, this remains a significant challenge due to the fluctuating nature of the pandemic and the heterogenous nature of institutional resilience.

An immediate response to “catch up” and clear caseloads is being undertaken and this has been termed the “new normal”. Waiting list numbers vary widely across the country and to add complexity, there is also regional variation in the number of COVID-19 infections and burden of COVID-19 related workload^(9, 10). Therefore, in order to respond to the needs of a particular population, balancing the reintroduction of services with careful COVID-19 management, flexible, regional solutions will be required. The Royal College of Surgeons of England has now launched guidance on the return of surgical services during and after COVID-19 and this outlines nine practical considerations and checklists.⁽¹¹⁾

However, despite these pragmatic responses, there is very limited data that can be used to inform surgical planning for COVID-19.⁽¹²⁾ PanSurg is an academic project launched by the Department of Surgery at Imperial College London on 15th March 2020 in response to the COVID-19 pandemic.⁽¹³⁾ Its goal was to create data that could support the creation of health policy and to create a knowledge-sharing platform to deliver education for surgeons responding to the crisis. The first educational webinar hosted our colleagues at Humanitas hospital in Milan. The objective was to create a digital platform that could expedite learning from clinicians experiencing the pandemic “ahead of the curve” in the UK.

This initial session provided three strong pieces of advice: 1) Protect your staff 2) Fear the COVID-19 negative war and 3) Maintain your elective practice.⁽¹⁴⁾ That advice remains as important today as it was then. As of 13 October 2020, 196 317 deaths have subsequently been reported in the EU/EEA and the real total may be much higher.

The crisis has in many senses bought out the very best in the NHS, its patients and the people who serve it. We have risen to the challenge; staff have demonstrated resilience; and they have been adaptable, innovative and committed. But it is undeniable that surgical services face big challenges during the “deceleration phase” after COVID-19. The surgical world is for some of us still unrecognizable, and elective surgical services in this country have been undeniably changes; perhaps irrevocably, and with significant consequences for our patients and our staff.

A 'New Normal'

The PanSurg perspective is that we are not yet in a 'new normal'. Normal implies some form of stability or level of certainty. This is an Aftershock.

Globally, secondary COVID-19 surges are now developing, an economic depression is looming and Brexit is still to happen. It is not clear how long COVID-19 will continue to disrupt clinical services and this pandemic must now be considered in the context of other long-term threats to the delivery of a safe and high-quality surgical services.

This Aftershock project is therefore focused on asking three broad questions.

1

What did we do well and what could we have done better to protect elective surgical services? How do we learn from this and build resilience?

2

How do we re-capitulate diagnostic and screening services that have been significantly disrupted and ensure equality for patients with chronic surgical disease?

3

Given the fact that many services were running at capacity prior to COVID-19 and the incoming economic challenges, what should our priorities be for returning to a productive and safe surgical system?

Project Structure

The COVID-19 Surgical Plan

An analysis of surgical service disruption during COVID-19.

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Associate Professor in Clinical Data Science, UCL

Mr. Danny Mortimer
Chief Executive, NHS Employers

Prof. Cliff Shearman
Vice President, Royal College of Surgeons of England

Miss Nicola Fearnhead
Past president ACPGBI and Consultant Colorectal Surgeon at Addenbrooke's Hospital

COVID-19 Diagnostics and Screening

How will diagnostic and prevention strategies for surgical chronic disease change after COVID-19?

Mr. Sheraz Markar (Co-Chair)
CL in surgery, ICL and Co-I Pansurg

Elaine Burns (Co-Chair)
Consultant Surgeon, St. Mark's Hospital.

Dr. Rehan Haidry
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Dr. Alex Carter
Senior Lecturer in Practice (LSE)

Mr. Nick Hulme
Chief Executive, East Suffolk and North Essex NHS trust

Mr. Nishan Sunthares
Chief Operating Officer, ABHI

Future COVID-19 Surgical Pathways

How should we re-design elective surgical services during and after COVID-19?

Mr. Tan Arulampalam (Chair)
Consultant Surgeon, Colchester

Mr. Hugo Breda
Managing Director of Johnson & Johnson Medical Devices

Prof. Katie Urch
Divisional Director for Surgery, Cardiovascular and Cancer, ICL

Mr. Richard Philips
Non-executive director, ABHI

Mr. Mike Farrar
Former Chief Executive of the NHS Confederation

Mr. Sanjay Purkayastha
Senior Lecturer in Surgery, ICL, Co-PI Pansurg

The Aftershock sessions identified 11 common themes on the future of surgical practice during and after COVID-19:

Duty of care

Every institution must have a plan for continuing elective surgery in the event of a second surge or a prolonged pandemic. It is no longer acceptable to stop providing care for chronic conditions purely to meet the needs of COVID-19 patients.

Effective systems

If surgery is to adjust, siloed working within healthcare institutions (private and public), surgical specialties and allied healthcare professionals must be abandoned. Now is the time to work together across healthcare models, specialties and geographical boundaries.

Consistency of biosecurity

Without a testing strategy and rigorous approaches for preventing infection within surgical pathways it will not be possible to return to a level of efficiency that will allow us to address the surgical backlog and meet ongoing need. This is also fundamental to maintaining trust in our systems for staff and patients.

Staff safety

We must acknowledge the high rates of burn out and the stress caused by re-deployment and disrupted working conditions. By investing in staff and promoting better working cultures we can create sustainable working environments in surgery that will promote efficiency.

Innovation

This is essential if we are to adjust to the COVID-19 aftershock. However, the

most critical goal is to have an agile approach to innovation adoption, and to maintain those approaches which have worked well during the initial surge. These may be digital, procedural or technical.

Data

There must now be an emphasis on significantly improving the ability of surgical services to capture data across specialties and disease types, and to do this in real time. Surgical audits have failed to provide us with timely and robust insights that allowed surgeons to rapidly adapt to COVID-19.

Training

The delivery of consistent high-quality training is a marker of the safety and quality of the service we provide. Moreover, we urgently need our trainees to fulfill gaps in the workforce. We must continue to transform how surgical training is delivered to ensure

resilience of surgical services during and after the pandemic.

Incentives

There is a danger that macro incentives to deliver operational efficiencies in response to the COVID-19 aftershock will be counterproductive. Surgical efficiency should be locally led with engagement with clinical leaders and patients.

Surgical techniques

Laparoscopy and all surgery can be safely delivered in a pandemic. However, the risk to the surgeon when performing aerosol generating procedures has to be locally directed and the management of the surgical pathways and process are critical to its success and safety.

Diagnostics

Screening for chronic disease and access to

diagnostics should have the same importance as COVID-19 testing and increasing capacity and efficiency in services such as endoscopy is now a national priority. However diagnostic pathways require much more integration with primary care and should be moved out of hospital wherever possible.

Trust

The pandemic has profoundly disrupted the confidence that our staff and patients have in our ability to manage in a crisis. The re-establishment of this trust requires consistent messaging, the prioritisation of staff and patient safety and ensuring equitable access to care. It must also be based on effective collaborations between surgeons and their wider team and managers, administrators and executives who will collectively take responsibility for delivering surgical care during COVID-19.

An Analysis of Surgical Service Disruption During COVID-19



“We are now inprecedented times. It is essential that every institution has a plan for continuing elective work. It is no longer acceptable to say that this was unexpected”

- Miss. Nicola Fearnhead



What were the major learnings from the initial surgical response to COVID-19?

1. There has been a large variation in surgical activity across the country in response to COVID-19 as a result of variability in disease burden, organisational resilience and capacity, and geographical factors. However, surgical units that have collaborated and established priorities across specialties have fared better. We therefore need to find new ways of working across institutions and specialties. This means that the “post code lottery has to stop”.

The PREDICTsurg study was commenced by PanSurg at the beginning of the crisis. It has recruited 5,300 patients from 54 global centres. Further data was collected from 43 UK centres regarding surgical capacity reorganization. Data from this work has demonstrated that ITU and HDU capacity was variably upscaled in the 29 centres studied and there was reciprocal drop off in operating theatre capacity (Figure 1).

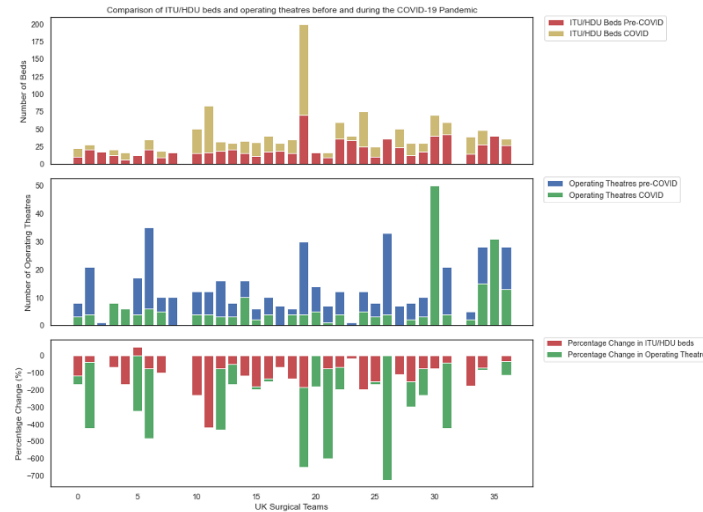


Figure 1. Data from the Predict Service level data. Panel 1: The data shows a comparison between ITU/HDU bed levels pre and during the first wave of COVID-19. Panel 2: The data shows operating theatre capacity pre and during the first wave of COVID-19 in UK centres surveyed. Panel 3: The figure shows the percentage change of ITU/HDU capacity pre and during COVID and also the percentage change in theatre capacity.

2. Outcomes from patients who contracted COVID-19 after surgery during the pandemic have been reported as being poor with mortality ranging from 10 to 25%, and data suggesting postoperative pulmonary complications occur in half of patients with perioperative SARS-CoV-2 infection.^(15, 16) However, we are lacking detailed national data and some of these analyses suffer from reporting bias.

3. Based on the national response we need new physical facilities and more efficient processes – Units which have maintained activity have had access to “Covid light facilities” – Physically separated units with adequate PPE, testing and barrier nursing.

For example, Oxford and High Wycombe – were able to collaborate and maintain cancer care on a separate site throughout the initial surge with good clinical outcomes.

4. During lockdown not all surgical teams have deployed efficiently. Some consultant surgeons did not operate or operated at low volume which was an inefficient use of their skills. During the post-covid phase efficient use of the available theatre resources needs to be assisted to allow surgeons to operate and deal with backlog. We need to invest in digital and technological solutions and mobile physical facilities to address this.

During COVID19, PanSurg have innovated through the adoption of digital technologies to protect staff and improve clinical efficiency.



Figure 2. The HoloLens 2 Headset. It consists of a mounted computer (at rear of the head), a visor which projects holographic images on the user’s eye. It also contains a forward-looking camera in the centre of the headset and sensors mounted at the front on each side. Finally, it possesses a noise cancelling microphone for voice communication.

Mixed-reality (MR) technology is the latest iteration of telemedicine innovation; it is a logical next step in the move toward the provision of digitally supported clinical care and medical education. This prospective, observational, nested cohort evaluation of the HoloLens2™ (Figure 2) was undertaken across three distinct clinical clusters in a teaching hospital in the United Kingdom. Data pertaining to staff exposure to high-risk COVID-19 environments and personal protective equipment (PPE) use by clinical staff (N=28) were collected, and assessments of acceptability and feasibility were conducted. The deployment of the HoloLens2 led to a 51.5% reduction in time staff were exposed to potential harm while looking after COVID-19 patients (3.32 vs 1.63 hours/day/staff member; P=.002), and an 83.1% reduction in the amount of PPE used (178 vs 30 items/round/day; P=.02). This represents 222.98 hours of reduced staff exposure to COVID-19, and 3100 fewer PPE items used each week across the three clusters evaluated. The majority of staff using the device agreed it was easy to set up and comfortable to wear, improved the quality of care and decision making, and led to better teamwork and communication. In total, 89.3% (25/28) of users felt that their clinical team was safer when using the HoloLens2™.

(17)

5. Conversations between NHSE and individual hospital trusts are currently happening in silos. There is also limited collaboration between and within surgical specialties and with our colleagues in allied specialties such as anaesthetics, critical care and medicine. We need to urgently break down barriers between silos to establish best practice for COVID-19 response and future working.

6. The job of a hospital is to be secure and keeping infection rates down is critical. Testing is a key component of reducing the burden of infection and returning to normal operating. A rising infection rate and low testing cannot be sustainable. Testing and tracing is essential because the safety of patients and staff is paramount and

it may also allow us to reduce isolation times and maintain services.

7. Phase III surgical recovery⁽¹⁸⁾ – This document provides a strategy for implementing changes that address the wider health inequalities during COVID-19 and it places an emphasis on working collaboratively with local communities and partners. However, reaching an 80-90% activity target within the proposed timeline is over optimistic. We have learned a lot but we are not there yet. Surgeons and surgical team's need to be supported by administrative staff and improved pre-assessment pathways if we are to reach this goal.

8. Long term pain and quality-of-life issues related to chronic disease now need to be prioritised equally to COVID19 and this means ensuring all surgical specialties are given equal access to care for their patients.

9. The World Health Organisation safe surgery checklist should be fully embraced.⁽¹⁹⁾ It has been of significant importance in ensuring unfamiliar teams work safely and it is a useful tool for team bonding.

PanSurg evaluated the impact of COVID-19 on safety culture. The Safety Attitudes Questionnaire (SAQ) was used to investigate safety culture at a large UK NHS Trust during the pandemic and compared with baseline data from 2017. Incident reporting from the year preceding the pandemic was also examined. SAQ scores of doctors and "other clinical staff", were relatively higher than the nursing group. During COVID-19 on univariate analysis female gender, age 40-49 years, non-White ethnicity, and nursing job role were all associated with lower SAQ scores. Training and support for redeployment were associated with higher SAQ scores. On multivariate analysis, non-disclosed gender (-0.13), non-disclosed ethnicity (-0.11), nursing role (-0.15), and support (0.29) persisted to a level of significance. A significant decrease ($p < 0.003$) was seen in error reporting after the onset

of the COVID-19 pandemic. This is the first study to investigate safety attitudes during COVID-19. Differences in SAQ scores were observed during COVID-19 between professional groups when compared to baseline. Reductions in incident reporting were also seen. These changes may reflect perception of risk, changes in volume or nature of work. High-quality support for redeployed staff may be associated with improved safety perception during future pandemics.⁽²⁰⁾

How do we maintain and optimise the workforce post Covid19? Many are keen to get going but feel constrained.

10. The Lansley Act of 2012 was a last gasp at a centrally managed workforce, and there is now a move to greater collaboration; with recognition of importance by NHS England and the NHS People Plan.

During the pandemic, PanSurg surveyed teams submitting data to the PREDICTsurg data set. Responses from 22 different countries demonstrated that the pandemic caused significant variation in workforce availability with respondents reporting staffing capacity changes ranging from +5 and -140% over the course of the pandemic (Figure 3).

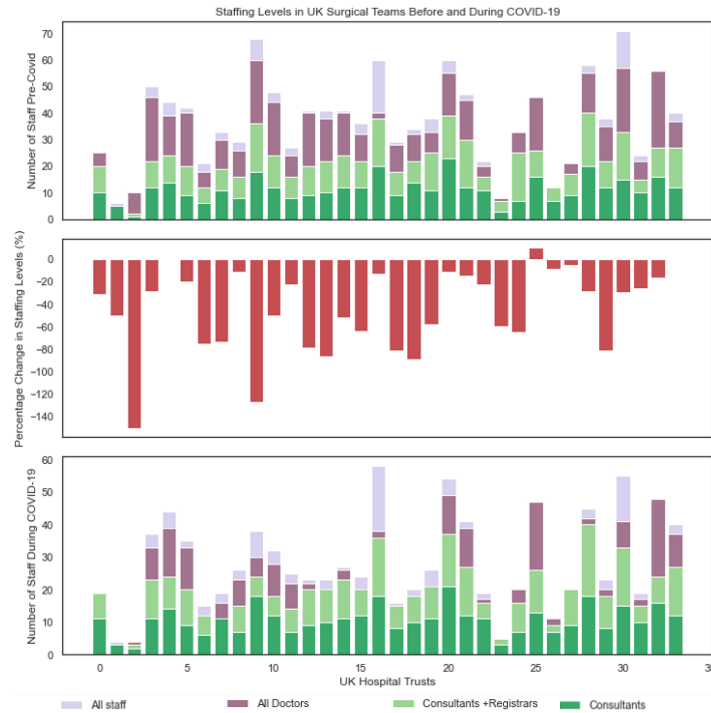


Figure 3. Changes in workforce availability during COVID-19 as reported by the PREDICTSurg study

11. The NHS was short of 40,000 nurses short prior to COVID-19. There has been a commitment from the government to fill these posts, but this will take time.

12. We must now acknowledge the surgical team in its broadest context and that many members of the surgical team have had a very difficult time with redeployment, childcare and training issues. We need to develop new patterns of working that are flexible and efficient for our staff. Many staff are burnout. New approaches are needed to manage this.

13. Training is a critical process through which we can

adapt and we need clarity about how education will sustain surgeons and also allied professions such as dietitians. We need more training places nationally. We also have to acknowledge priorities in social care and their importance in maintaining surgical pathways. Ultimately there is a need for additional investment in training and we can't lapse on this again.

14. Surgical training in the UK is amongst the longest globally. This could be shortened and we need to examine novel technologies to enable this. But we also acknowledge that surgical trainees are a critical part of service provision and during COVID-19 many were 'repurposed' to ICU etc. If training is to be shortened, this must be factored in to service provision.

15. Team collaboration is now more important than ever. However, so is effective team leadership.

16. Trainees have had a very challenging experience of COVID-19 – we need to acknowledge this and get them back to training. This may require training in the independent sector, recalibrating completion of training targets and highlights the need for sustainable and realistic models.

The CONSULT-19 study was online survey was distributed between 4th May and 11th June 2020 through social media channels and emails to surgical trainees of all specialties from grade ST1 and above in the UK. Areas of interests examined were procedure numbers before the pandemic, loss of training opportunities, redeployment and support for trainees. Overall 319 trainees carried out the survey, with a completion rate of 73.4%. Trainees were typically attending two elective sessions per week before the pandemic. The majority of trainees (73%) reported they had lost at least three-quarters of the expected procedure numbers, and 41.7% were redeployed to other departments entirely. Only 40% felt they would be able to progress to the next level of training given the disruption

to their surgical experience. On the whole trainees felt supported, although recurring themes regarding a lack of childcare and remuneration were identified. The COVID-19 pandemic has had a significant disruptive effect on surgical training (Figure 4). To mitigate further impact to training, deaneries and local trusts should apply an adaptive process of managing the surgical workload which takes into consideration the training needs of the individual.

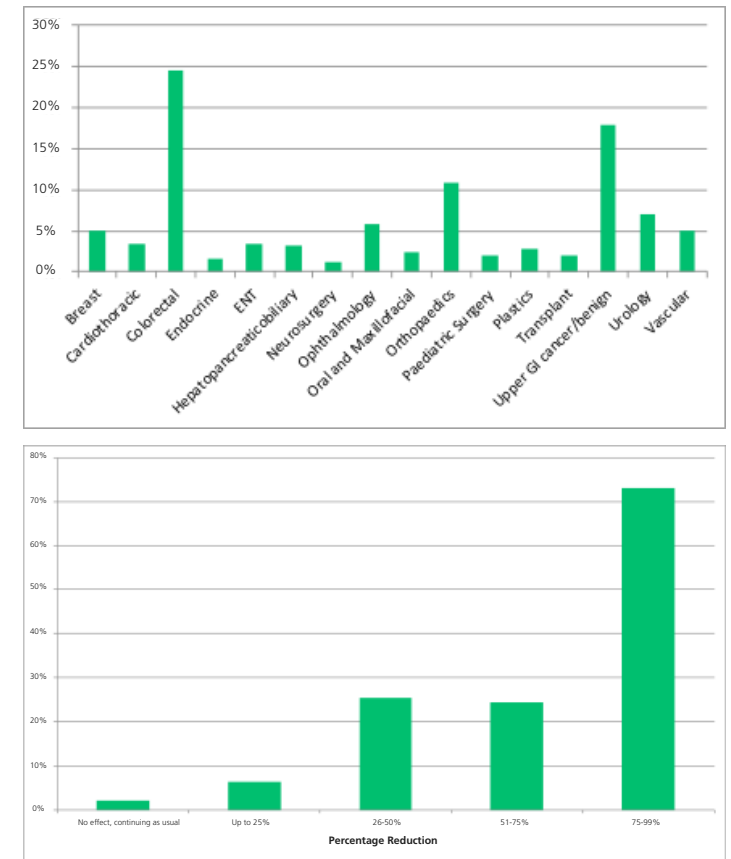


Figure 4. (a) Training specialities across 319 respondents. **(b)** Percentage reduction in training activity during covid compared to normal activity.

How have surgical patients responded to COVID-19 and how do we maintain trust?

17. There is an urgent need for prioritisation of surgical cases and patient care – patients were initially supportive in recognising that treatment was delayed, however this status cannot be maintained.

18. Patients need to be able to decide what surgical treatment they want, and where they want to have that treatment. We have to facilitate this and remove some of the restrictions enforced by COVID-19.

19. Surgeons have approached the pandemic with a ‘can do’ attitude but need to be supported in order to continue this. Patients are no longer happy to be deferred and we need to look after them safely.

20. Local and national messaging has to be consistent to avoid public skepticism. However, we also need to build in a conversation with our patients about how their care will be different because of COVID-19 and what to realistically expect. Individually patient contracts are a powerful tool for rebuilding trust. This should include a description of baseline risk of COVID-19 and the very real consequences of contracting COVID-19 during surgery or not having surgery at all.

What data do we need to respond to future COVID-19 surges?

21. Data has not been a core component of our emergency preparedness and it should be – data on non-communicable disease is as critical to the national response as data on infection rates. Indirect effects of COVID-19 on cancer outcomes may outweigh the direct effects of the disease.⁽²¹⁻²⁴⁾ National audits are not geared up to look at data across diseases and we need to think beyond COVID-19 infections and include wider impacts on the provision of care

22. More accurate data is needed to inform practice in real time. We don’t have a risk chart of professionals and procedures and this is currently limited because we either don’t have access to data or data is not collected in an accessible format.

23. We don’t need cohort studies in times of pandemic and we should look to create new models of collecting robust data at scale and in real-time.

COVID-19 Diagnostics & Screening



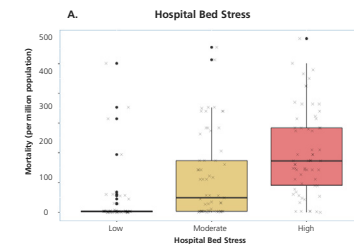
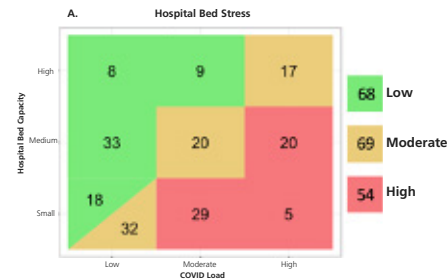
“We can no longer continue with a one size fits all approach for screening and diagnostics. We need to invest our technologies in those who are at greatest risk”

Mr. Nick Hulme

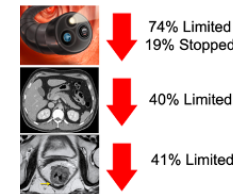
Global Reach



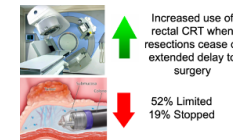
High Bed Stress Associated with National Mortality



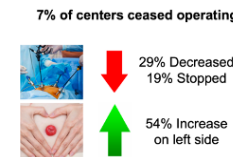
Diagnostics Change



Non-Surgical Rx



Surgical Technique



live SARS-CoV2 virus. However, investigations of other viruses have demonstrated aerosolisation through the use of energy devices. Measures to reduce potential transmission include appropriate personal protective equipment, evacuation and filtration of the surgical plume, limiting energy device use if appropriate, and adjusting endoscopic and laparoscopic practice such as lowering CO2 pressures and the use of ultrafiltration systems. A systematic review conducted by PanSurg concluded that the risk of transmission of SARS-CoV2 through aerosolised surgical smoke associated with energy device use is not fully understood, however transmission is biologically plausible. Caution and appropriate measures to reduce risk to healthcare staff should be implemented when considering intraoperative use of energy devices.⁽²⁵⁾

2. Indeed, laparoscopy may be safer for the surgical team than a laparotomy where up to 1.5 litres of fluid evaporates / hr. Laparoscopy with exsufflation channel through a filter further reduces the risks. There is a clear benefit from minimally invasive surgery and shorter hospital stay and reduced post-operative morbidity although local risk assessments will need to be made.

Evaluation of SARS-CoV-2 surface and air contamination during the COVID-19 pandemic was performed at Imperial College London in collaboration with the PanSurg team. Air and surface samples were collected from seven clinical areas occupied by patients with COVID-19, and a public area of the hospital. This included ICU and theatres during tracheostomy formation. Multiple 1.0m³ air samples were collected in each area using an active air sampler. Surface samples were collected by swabbing items in the immediate vicinity of each air sample. SARS-CoV-2 was detected by RT-qPCR and viral culture; the limit of detection for culturing SARS-CoV-2 from surfaces was determined. Viral RNA was detected on 114/218 (52.3%) of surfaces and 14/31 (38.7%) air samples but no virus was cultured. The proportion of surface samples contaminated with viral RNA varied by item sampled and

PanSurg performed qualitative research to determine how elective colorectal surgical services were disrupted by COVID-19 (Figure 5). A prospective questionnaire study of 159 centers across 46 countries, demonstrated widespread service reduction with significant global variation. Diagnostic endoscopy was reduced in 93% of centers, even with low hospital stress and mortality; whilst rising critical care bed stress triggered complete cessation of such services ($p = 0.02$). Availability of CT and MRI fell by 41%, with MRI significantly reduced in those hospitals with high COVID-19 burden. Neoadjuvant therapy use in rectal cancer changed in 48% of responses, with centers that ceased surgery increasing its use (62 vs 30%, $p = 0.04$) as did those with extended delays to surgery ($p < 0.001$). High hospital and critical care bed stresses were associated with surgeons forming more stomas ($p < 0.04$) when undertaking resections, using more experienced operators ($p < 0.003$) and decreased use of laparoscopy (critical care bed stress only, $p < 0.001$). Patients were also more actively prioritised for resection, with increased importance of comorbidities and ICU need.⁽²¹⁾

Figure 5. Summary of data from COLOQ study on how COVID-19 has disrupted the care of patients with colorectal cancer.

Should we have abandoned laparoscopic surgery during COVID-19?

1. It has to be a balance of risk and there was little information in March. There is now more data that suggest laparoscopy is safe.

There are conflicting stances on the use of energy devices and laparoscopy by different surgical governing bodies and societies. There is no definitive evidence that aerosol generated by energy devices may carry

by clinical area. Viral RNA was detected on surfaces and in air in public areas of the hospital but was more likely to be found in areas immediately occupied by COVID-19 patients than in other areas (67/105 (63.8%) vs. 29/64 (45.3%) (odds ratio 0.5, 95% confidence interval 0.2-0.9, $p=0.025$). The high PCR Ct value for all samples (>30) indicated that the virus would not be culturable. When air was sampled during tracheostomy formation, only 15.4% of samples were positive. Our findings of extensive viral RNA contamination of surfaces and air across a range of acute healthcare settings in the absence of cultured virus underlines the potential risk from environmental contamination in managing COVID-19, and the need for effective use of PPE, physical distancing, and hand/surface hygiene.⁽²⁶⁾

3. The overall case management is likely to be the most important factor in determining risk of COVID-19 transmission e.g. patient pathway, testing, PPE, and we need more data to support the importance of these factors.

Was stopping endoscopic services the correct response to COVID-19. How do we recover?

4. At the beginning of the pandemic the safety of endoscopy was not established. Endoscopy is an aerosol generating procedure and viral RNA was found to be present in faeces.⁽²⁷⁾ Although the evidence was limited, the Joint Advisory group on Gastrointestinal endoscopy (JAG) rightly moved to protect the workforce and did this by working with NHS England to create guidance; the consequences of this however was a significant reduction in endoscopy capacity across the board.

Data from NHS Digital was retrieved by PanSurg for the number of diagnostic OGDs performed by each hospital trust in England from January-April 2020, this was then compared to a historical cohort from these same organisations from January-April 2019.⁽²⁸⁾ From this

comparison it was possible to calculate the percentage change in diagnostic OGD in each organisation associated with the COVID-19 pandemic. Data regarding the number of COVID deaths per bed for each hospital trust over the four-month study period was used to consider the effects of the burden of COVID-19 upon provision of OGD by Trust. The national oesophago-gastric cancer audit published data [5] from 2016 to 2018, was used to estimate the number of oesophageal and gastric cancers that may have been undiagnosed during this four month study period, associated with the reduction in diagnostic OGD by hospital Trust and cancer Vanguard. Trusts with incomplete data over the study period were excluded.

Trusts who merged during the study period were treated as merged throughout. The total number of diagnostic endoscopies performed from January 2020 to April 2020 in the 122 analysed trusts was 28% lower than in the same period in 2019 (149,043 vs 208,212). Compared to the same period in 2019, activity in January and February 2020 was slightly higher (2.0% and 1.3%). In March and April 2020 activity fell considerably by -30.6% and -88.7% respectively. In April 2020, activity was more than 90% lower than April 2019 in 83 trusts (68%) and in 12 out of 19 Vanguards (63%). There was no significant correlation between the number of COVID-19 deaths per bed and the percentage change in diagnostic OGD during the study period, both at the hospital Trust level (Spearman $R = -0.04$ $p = 0.66$) and at the cancer Vanguard level (Spearman $R = -0.24$ $p = 0.33$) (Figure 1). Based upon the reductions seen in diagnostic OGD, the estimated number of undiagnosed oesophageal and gastric cancers across England was 750, with a median of 47.3 (IQR = 35.7 - 57.5) across the cancer Vanguards studied (Figure 1). The estimated number of undiagnosed oesophageal and gastric cancers that would have been treated curatively across England was 213.⁽²⁸⁾

5. If there is spare physical space and capacity this should be used. The independent sector made

significant contributions in this regard during the pandemic. However, manpower issues must also be urgently addressed as many screening endoscopists are approaching retirement. If trainees are near completion they need to urgently complete their training in order to meet demand.

6. Guidance from JAG and the British Society of Gastroenterology (BSG) was generally welcomed by NHS leadership and endoscopy was postponed indefinitely at the start of lockdown. In specific high-risk populations (e.g. Barrett's) this was a challenge. However, it promoted significant opportunities for improving the clinical validation process – for example for refining who needs a procedure and when. At UCH, Dr. Haidry reported that the upper GI service could remove 12-13% of patient demand (unpublished data).

7. Specialty services (e.g. therapeutic endoscopy) where Aerosol Generating Procedures (AGPs) procedures were common had requirements for full PPE and decontamination between procedures which slowed progress and created inefficiency which had to be managed.

How do screening services become more resilient in face of COVID-19? How do they scale?

8. Current capacity is going to continue to be a problem. However, if we continue to work in clinical and geographical silos, we will not be able to deal with the number of patients requiring screening. There is an urgent need for collaborative working in endoscopy and screening both between and within specialties. Surgeons have an important part to play in the delivery of endoscopy services.

9. There is a need to focus investments in detecting disease such as cancer in communities who have been disadvantaged prior to and during COVID-19 as outlined in

the NHS Long Term Plan.⁽²⁹⁾ We need to develop stratified screening approaches to support this objective.

10. Endoscopy services were under pressure prior to COVID-19. Investment in chronic conditions is needed nationally and clinicians need to be talking to politicians about the severe risk we are creating by reducing screening services.

11. Before COVID-19 JAG was assessing the effectiveness of bowel cancer screening programme, two week wait (2WW) pressures on endoscopy and the changes in screening criteria for NHS England. COVID-19 has expedited the need for this report as the burden on endoscopy is not sustainable.

12. One solution could be the formation of diagnostic hubs.

Since this discussion, the government has formally announced the NHS is set to radically overhaul the way MRI, CT and other diagnostic services are delivered for patients. Community diagnostic hubs or 'one stop shops' will be created and will be 'COVID-19 free', with diagnostic checks in A&E separated from tests taken ahead of routine procedures.⁽³⁰⁾

13. The requirement to invest in new technology and innovation is no longer a luxury. COVID-19 has driven creative thinking in endoscopy e.g. UCH introduced Cytosponge^{TM(31)} as an alternative to screening endoscopy and they were able to put this into clinical use in over 50 patients.

14. Colon capsule endoscopy likely to become more widespread and may be offered to younger patients, to reduce the need for colonoscopy. This also reduces workforce pressures being experienced as many screening endoscopists are retiring.

15. Training in endoscopy is critical to our national response to COVID-19. Training needs to be efficient as possible, and we must focus on how we can produce better trainers. The role of non-medical endoscopists will continue to grow.

How are we going to pay for the required changes in diagnostic services post COVID-19?

16. There needs to be an emphasis on prioritising alternative resources and technologies for the diagnosis of cancer and chronic disease. However, the push towards innovation must also be as prudent as possible, leveraging the evidence based tools we have at our disposal.

17. One option is to adopt translational health economics – this can be defined as the use of theoretical concepts and empirical methods in health economics to bridge the gap between the decision to fund and use a new health technology in clinical practice (the backend of translational medicine) and the decision to invest into its development (the front end of translational medicine). The goal is a ground-up (what do we need to deploy?) rather than top-down (what QALYs do we need?) approach. This means embracing sociotechnical complexities to make better decisions with what we have - process mapping clinical and staff pathways to reaggregate them into a value-based method.

18. A second approach is to organise care to deliver the outcomes that suit the patient. The responsibility for this can be at a local level (e.g. CCGs). That then helps industry orientate around how they help deliver these processes.

19. The government is understanding that value in our budget needs to be reevaluated. For example, early screening means we save costs down the line. But the standardisation of good quality care (as guided by evidence-based medicine) is the way forward and good

training essential to this as it shortens the proficiency curve and maintains high quality clinical outcomes.

20. Ultimately, we need to invest in innovation – we need to innovate to create more resource.

How do we design new referral and diagnostic pathways post COVID-19?

21. A lot of waste is present in current pathways. This starts in primary care as malignant disease pick-up rates are low. This is a good opportunity to change, and we must engage with primary care to do this and this needs to be applicable nationally.

22. Community diagnostic hubs will have a role. For example, trans-nasal endoscopy does not need to be done in a hospital. These types of technologies may help to deal with the backlog and the oncoming traffic and we urgently need evidence to support their adoption. However, we need tests that work and we must have the science behind them prior to deployment.

23. Patient acceptability issues must be addressed. We need to address the issues of cultural change within organisations so they are flexible and can adjust to rapid adoption of diagnostic technologies.

24. Manpower and training are critical. It is not about healthcare workers losing their jobs to emerging technologies but rather enhancing them to work more efficiently. The negative consequences of not addressing the significant social care challenge is going to be dramatic.

Future COVID-19 Surgical Pathways



“The strategy has been to prioritise patients with COVID-19 over non-COVID patients and this may not have been the best call”

Mr. Mike Farrar



after 1 month of resuming normal service, it will still take more than 6 months to clear the backlog and 30.8% of patients will not undergo surgery within 2 weeks, with an average wait of 20.3 days for the proceeding 2 years (Figure 6). The conclusion from this case study for carotid endarterectomy is that every healthcare system is going to have to make difficult decisions to balance human and capital resources against the needs of patients. It has demonstrated that the timing and size of this effort will critically influence the ability of these systems to return to their baseline and continue to provide high-quality care for all. The failure to sustainably increase surgical capacity early in the post-COVID-19 period will have significant, long-term, negative impacts on patients and is likely to result in avoidable harm.⁽³²⁾

(c) Proportion of patients undergoing surgery within 2 weeks.
 (d) Proportion of patients undergoing surgery within 12 weeks.

How do we maintain elective services in the COVID-19 aftershock?

1. We have a duty of care for our patients. Stopping elective surgical services in the event of a further surge is going to cause significant harm and exacerbate future challenges. The goal now has to be the maintenance of elective surgery.
2. However, the provision of elective care in the aftershock phase requires strong relationships between clinicians and managers and these must be proactively developed and maintained. Moreover, there must be effective collaborations between clinical teams.
3. A local prioritisation matrix and harm system are an effective way to improve capacity⁽³³⁾. These allow individual patients to have their risk and prioritization assessed and for care to be streamlined.
4. Data collection is essential, and this must be shared nationally and locally. The more data we have the more decisions we can make across healthcare systems.

5. Consistency in biosecurity - confidence is key. Some trusts have invested heavily in testing. There is debate on the optimum strategy for achieving this. The first option is rigorous testing for all staff and patients. The second is a “COVID-19 mitigation” hospital rather than “covid protected” hospital. Under this option, biosecurity treats COVID-19 like other infectious diseases as this creates flexibility in the hospital and assets can undergo “lift and shift” to meet needs. This term refers to the rapid re-deployment of services or equipment to new sites.

In response to COVID-19 many institutions chose to restrict access to surgery and reallocate resources. The impact on the provision of surgical services has been profound, with huge numbers of patients now awaiting surgery at the risk of avoidable harm. The challenge now is to understand how hospitals transition from the current pandemic mode of operation back to “business as usual” while ensuring that all patients receive equitable, timely, safe and high-quality surgical care during all phases of the public health crisis. A PanSurg case study examined carotid endarterectomy as a time-sensitive surgical procedure and simulated 400 compartmental demand modelling scenarios for managing surgical capacity in the UK for two years following the pandemic. A total of 7,69 patients will require carotid endarterectomy during this time. In the worst-case scenario, if no additional capacity is provided on resumption of normal service, the waiting list may never be cleared, and no patient will receive surgery within the 2-week target, potentially leading to >1000 avoidable strokes. If surgical capacity is doubled

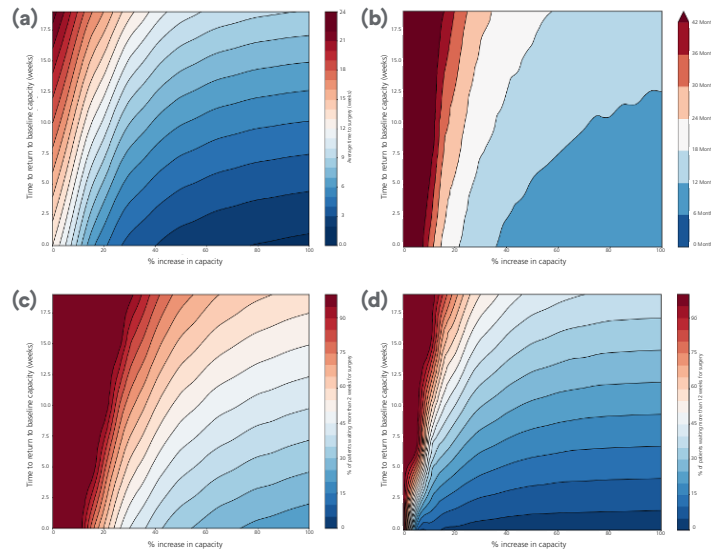


Figure 6. Contour plots showing the performance of simulation models over varying times to return to baseline capacity (TTB) on the y-axis and the eventual additional capacity reached (EC) on the x-axis for patients requiring surgery within 2 years of the onset of the 3-month cessation of surgery.

(a) average wait time for patients to undergo surgery.
 (b) Time to clear waiting list and return to baseline.

Is now the time to re-organise surgical services?

6. Across the country there have been variable rates of standing up services during the aftershock phase of the pandemic. The NHS has been taking a systems wide view. Hot and cold sites are being proposed for winter, but it will be challenging to protect them. Moreover, clinicians are burnt out and services are being diverted – there is a need to replenish and resupply our workforce as this approach requires a surplus.

7. The use of private sector facilities and capacity has made it harder to re-adjust during de-escalation as staff, procurement channels and processes must be completely reconstructed. This must be considered locally if reorganisation is being attempted.

8. Rather than re-organisation, Trusts can leverage mobile units to build additional capacity until more operational certainty can be determined.⁽³⁴⁾

Obesity, a pandemic in itself, is an independent factor for having a worse outcome among COVID-19 patients. PanSurg has examined this dual pandemic which we have termed ‘CoVesity’, which will have a detrimental outcome in the short, medium and long term. We should aim at a phased and safe return of obesity/bariatric services based on expert consensus, guidelines and recommendations from the relevant national and international bodies. There are already safe and reproducible proven interventions for the obesity pandemic that existed prior to COVID-19 and that will continue long after the virus is no longer an issue.⁽³⁵⁾

How do we improve surgical productivity nationally during the COVID-19 aftershock?

9. There is concern about the use of macro incentives as adopted by NHSE for the phase III roll-out which may financially penalize Trusts for not meeting operational

standards. Clinicians want to be efficient. Clinicians have undergone trying times, and all staff are facing welfare issues. This needs sensitive treatment and good local management. Otherwise there is a risk that trusts may prioritize low risk and high throughput surgery rather than patients with greatest clinical needs.

10. A return to clinical efficiency requires engagement with local clinicians so that Trusts can get to the right operating capacity quickly while keeping patients safe.

11. High quality multidisciplinary teams (MDTs) should be adopted for benign disease not just for cancer. This also provides local clinicians with an opportunity to look at how they have been operating over the last 10 years and to see if they can be leaner and to find their own solutions that work best for their team.

12. There was a general consensus that it was important for the NHS to maintain strategic relationships with the independent sector. Clean elective capacity is important for scaling in the event of a surge.

13. Innovation is a clear enabler of better and safer healthcare and digital technologies offer significant potential to improving the efficiency of surgical practice during the aftershock. Digital consent is a good exemplar, as it is flexible and can be adapted to communicate COVID-19 risk on a daily basis. However, the key to adopting digital technologies is effective training and improving the digital literacy of staff.

14. There has always been innovation in the medical sector, however it has historically been poor at adoption. Innovation requires a change in mindset – surgeons and clinicians need to be more agile. Both in terms of their clinical roles, but also in management and in the use and adoption of technologies and IT platforms.

15. Training – 80% of surgical trainees are not being adequately trained during COVID-19. Trainees should be given more responsibility, accountability and freedom to operate. They require efficient training programs and technology enhanced training.

How do we maintain the future wellbeing of the workforce?

PanSurg assessed the relationship between safety attitudes and psychological outcomes and the relationship between personal characteristics and psychological outcomes during COVID-19. From 22nd March-18th June 2020, healthcare workers from the United Kingdom, Poland, and Singapore were invited to participate using a self-administered questionnaire comprising the Safety Attitudes Questionnaire (SAQ), Oldenburg Burnout Inventory (OLBI) and Hospital Anxiety and Depression Scale (HADS) to evaluate safety culture, burnout and anxiety/depression. Multivariate logistic regression was used to determine predictors of burnout, anxiety and depression. Of the 3,537 healthcare workers who participated in the study, 2,364 (67%) screened positive for burnout, 701 (20%) for anxiety, and 389 (11%) for depression (Figure 8). Significant predictors of burnout included patient-facing roles: doctor (OR 2.10; 95% CI 1.49-2.95), nurse (OR 1.38; 95% CI 1.04-1.84), and other clinical staff (OR 2.02; 95% CI 1.45-2.82); being redeployed (OR 1.27; 95% CI 1.02-1.58), bottom quartile SAQ score (OR 2.43; 95% CI 1.98-2.99), anxiety (OR 4.87; 95% CI 3.92-6.06) and depression (OR 4.06; 95% CI 3.04-5.42). Factors significantly protective for burnout included being tested for SARS-CoV-2 (OR 0.64; 95% CI 0.51-0.82) and top quartile SAQ score (OR 0.30; 95% CI 0.22-0.40). Significant factors associated with anxiety and depression, included burnout, gender, safety attitudes and job role. Conclusion Our findings demonstrate a significant burden of burnout, anxiety, and depression amongst healthcare workers. A strong association was seen between SARS-CoV-2 testing, safety attitudes, gender, job role,

redeployment and psychological state. These findings highlight the importance of targeted support services for at risk groups and proactive SARS-CoV-2 testing of healthcare workers.⁽³⁶⁾

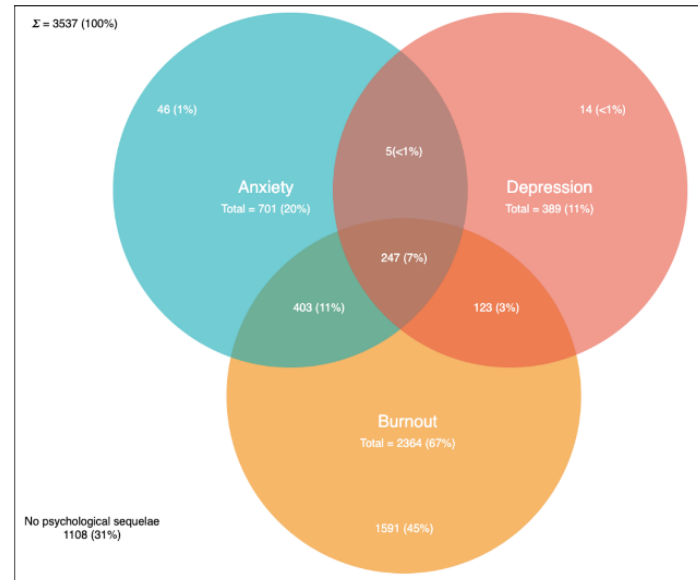


Figure 8: This figure demonstrates the number of respondents meeting the OLBI criteria for burnout, the HADS criteria for anxiety and the HADS criteria for depression. The overlap of sets represent individuals meeting more than one criteria.

16. The NHS should look to partner with industry to support and train staff. Specifically, those who have expertise in staff engagement and dealing with change. Workforce resilience requires engagement from all stakeholders. However, the health tech industry has had its own challenges and a major risk has been staff wellness and these staff are now listed as essential workers which has helped to ensure access to support frontline workers and the production and supply of essential equipment and PPE.

17. Burnout – staff are the most precious resource we have. Leaders must be prepared to listen and it is critical to promote communication between staff members about their experiences. Trusts should consider introducing freedom to speak up officers and mental health first aiders. Executives are also tired as they don't feel that they can take time off and they don't want to be seen to be doing this. They also need adequate rest to lead effectively during the COVID-19 Aftershock.

To Conclude

The PanSurg Aftershock report has highlighted the magnitude of the challenge for maintaining an operational and safe surgical service during ongoing COVID-19 surges and future pandemics. However, the data presented here, and the responses of our panelists and audiences suggests this is both feasible and deliverable. Moreover, it identifies the significant opportunity that COVID-19 has presented to improve the efficiency and quality of surgical services in the NHS moving forwards. Surgeons and surgical teams can now innovate at a speed and scale that was not possible prior to COVID-19 and the potential rewards for our patients and colleagues are significant. A major lesson from this crisis has been that our people are our most important asset, and the surgical workforce must be protected and nurtured if we are to respond to future challenges. These findings are represented in our recommendations and will continue to inform PanSurg's research strategy.

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