Imperial College London

Our year, our progress 2021

INSTITUTE OF GLOBAL HEALTH INNOVATION

Foreword

Launching our first annual report last year was a very proud moment for us. The many pages were testament to an exceptional response to an exceptional time. Despite the tumultuous state in which we were existing, our community showed more dedication and tenacity than we could have ever imagined under such circumstances. Their determination to just keep going was palpable. Every project launched, idea coalesced, partnership forged held our mission at its core: transforming health and care for all. Adjusting to the new normal has meant that this year has been no easier, yet the efforts of our community have not faltered.

Through these pages we share examples of care, innovation and ingenuity, focussing on persistent problems such as patient safety, and emerging issues like the interplay between climate change and mental health. With the virus showing no signs of going away, we have maintained our momentum, enabling people to get the upper hand. We have been monitoring the epidemic in England, tracking how people across the world are responding to evolving situations, and exploring ways to minimise adverse impacts. We have also launched interventions aimed at boosting vaccine uptake, evaluated ways to safely monitor patients, and explored the mental health toll of the pandemic.

The pandemic has led to rapid accelerations in the implementation of digital health and care technologies, so this has been an important emphasis in all our activities. We are identifying gaps in health services that could be filled by digital tools, developing, piloting and evaluating our own digital solutions, and exploring the wider impact of these technologies on care delivery. In recognition of their potential to accelerate improvements in healthcare, we are also collaborating on a number of exciting initiatives to support the digital transformation of health systems.

Although the past 18 months have driven a physical distance between us, never before has our community shown a greater commitment to inclusion, involvement and engagement, ensuring that we listen to and learn from those whose experiences and thoughts are vital to tackling problems in health and care.

These are just some of our highlights from the past 12 months, all of which we are proud and honoured to share once more. We are truly grateful to and inspired by our people for their tireless efforts to make healthcare better, safer, and more equitable.

Professor Ara Darzi, Professor David Nabarro,
Co-Directors, Institute of Global Health Innovation

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About our Institute

One of Imperial's Global Challenge Institutes, IGHI is a multidisciplinary team of pioneering people who break traditional research silos to tackle some of the greatest global health challenges facing the world today.

Our mission is to transform health for all through evidence-based innovation.

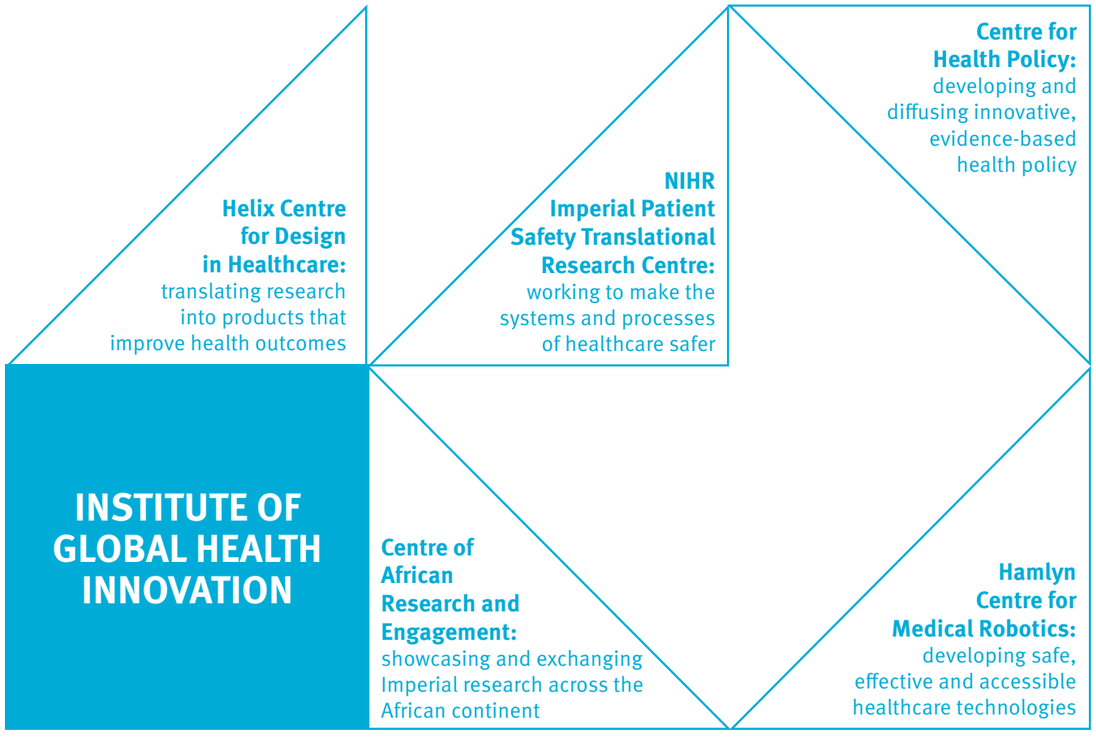
Our vision is to support the identification, development and widespread diffusion of healthcare innovation, and in doing so to sustainably reduce inequalities in global health for generations to come.

We're working towards a future where healthcare is better, safer and more equitable across the globe. Our approach is to identify, develop and implement evidence-based innovations, leading to sustainable improvements in health and care.

To achieve our ambitions, we:

- design and diffuse high-impact global healthcare innovations to improve the quality and safety of care
- deliver world-class educational programmes to establish the next generation of leaders in healthcare
- translate cutting-edge research to drive real change in areas in need of transformation
- put people at the heart of everything we do, involving patients, the public and healthcare professionals in every stage of our work.

Our work is made possible through our core Centres of Excellence that innovate across medicine, policy, technology and design. Our Centres collaborate to share knowledge, skills and expertise so that we can solve bigger problems and accelerate progress in healthcare.



Leadership

Professor Ara Darzi, IGHI co-director, Paul Hamlyn Chair of Surgery

Professor Ara Darzi has continued in a variety of national and international leadership roles, including as a Member of the Life Sciences Council, Non-Executive Director of NHS England and Chair of the Accelerated Access Collaborative (AAC). Under his leadership, the AAC has continued to deliver some incredible achievements in 2020/21 against the backdrop of COVID-19, including:

- providing more than 320,000 patients with access to proven health and care innovations
- helping over 3,400 innovators, including 675 health professionals as part of the Clinical Entrepreneur training programme
- delivering patient benefits – an estimated 17,000 fewer hospital admissions and 140,000 fewer days spent in hospital
- achieving significant savings for the NHS that are estimated to exceed £100m
- making a significant contribution to wider economic growth, with programmes attracting over £250 million of investment and creating or safeguarding over 1,400 jobs.

His work in relation to COVID-19 has continued under the auspices of the ongoing REACT study, one of the country's largest coronavirus surveillance studies, and in planning for national recovery as part of the Oversight Group for the cross-sector Recovery, Resilience and Growth Programme. This aims to take forward an ambitious plan to revolutionise UK clinical research.

In November 2021, Prof Darzi was invited to speak at a G7 meeting on Patient Safety, co-sponsored by the World Health Organization. This was convened to demonstrate the continued importance of patient safety as a global endeavour, facilitate international collaboration, and support strategic initiatives designed to eliminate avoidable harm in healthcare globally.

In 2021, he was appointed Chair of the Health Security and Pre-emptive Medicine Initiative for Flagship Consulting and has given a number of lectures throughout the past year including at the Future of Health Interdisciplinary Summit at the Technical University of Munich.

Professor David Nabarro, IGHI co-director

Professor David Nabarro was at the heart of the preparations for the first-ever UN Food Systems Summit in September 2021. The inaugural event focused on the transformations that need to occur for the achievement of the 2030 Sustainable Development Goals, a plan for equitable, sustainable and resilient development of all people and the planet by 2030.

As a member of the Summit Advisory Committee and Senior Adviser responsible for Food Systems Summit Dialogues, Prof Nabarro and his colleagues have taken responsibility for supporting 148 countries that have organised Dialogues, which offer stakeholders a platform to come together to share their roles in food systems. 108 of these countries have produced strategic pathways to sustainable national food systems of the future based on the Dialogue.

Prof Nabarro has continued to serve as Special Envoy on COVID-19 for the World Health Organization with the ongoing challenge of encouraging continued attention to personal protective measures, public health services for case detection, isolation and treatment, and ensuring equitable access to vaccines for those at greatest risk.

Prof Nabarro has also continued work on nature-based solutions within the context of climate action, and the impacts of climate change on health, both of which were highlighted in COP26, the 2021 United Nations Climate Change Conference.

In October, he received the Royal Society of Public Health's Outstanding Contribution to International Public Health Award and Honorary Fellowship of the Royal Society for Public Health (HonFRSPH).

Professor David Nabarro (left), Professor Ara Darzi (right)

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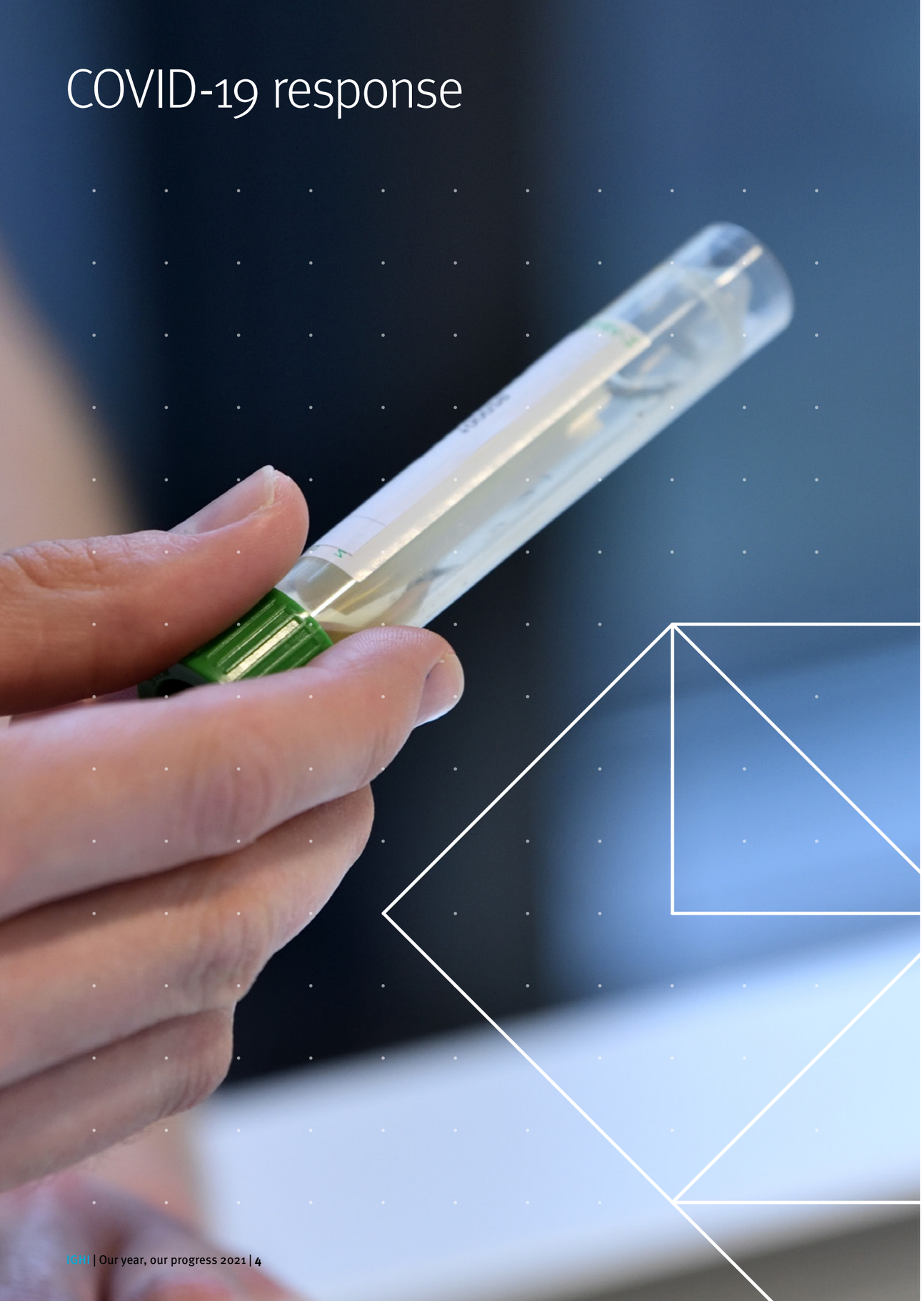
Advancing health and care: Our major activities and impact

We focus on health and care challenges that have the greatest need, and where we believe we can make the greatest impact. From mental health to COVID-19, explore our progress in some of our major areas of work in healthcare innovation and education.

COVID-19 response



The REACT study

We've continued to help lead the REACT (REal-time Assessment of Community Transmission) Programme, one of the world's biggest studies of community COVID-19 testing. Working with our partner Ipsos MORI, we've been tracking the progress of England's epidemic by detecting past and present infections through self-testing and swabbing carried out at home.

Around three million volunteers across the country have taken part to date, offering decision-makers timely and granular data on infection trends, which have continued to inform and shape policy. Throughout this year, the programme has also been tracking the impact of the COVID-19 vaccination programme, revealing crucial insights into vaccine efficacy that will help to guide ongoing efforts including booster jabs.

In early 2021, REACT was also expanded to investigate Long COVID, launching a major effort that's using in-depth biological studies and patient interviews to better understand the causes and consequences of the condition.

Alongside regularly reporting our data to Government, we share REACT findings with researchers, media and the public and achieve excellent engagement. Our news reports are approaching a million cumulative views and our announcements consistently generate wide national and international media coverage. As of November, six of the UK's top 20 most downloaded working papers on the College's open access research repository, Spiral, over the past 12 months were REACT pre-prints.

> **"The REACT study became incredibly important when governments were having to make very very difficult, life-changing choices."**
>
> - Sir Patrick Vallance,
> Government Chief Scientific Advisor

To date, the REACT team has:

written
31
PRE-PRINT REPORTS

published
7
PEER-REVIEWED PAPERS

swab tested over
2.2 million
PEOPLE

held
22
SCIENCE MEDIA CENTRE PRESS BRIEFINGS

and created
4 VIDEOS,
3 BLOGS AND
2 PODCASTS

Meet the IGHI team:
Ara Darzi
Gianluca Fontana
Lenny Naar
Anna Lawrence-Jones
Sutha Satkunarajah
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Justine Alford
Lily Hoskin
Brian Quan

Monitoring changing health behaviours and attitudes

In March 2020, we convened world-leading experts in epidemiology, mental health, social science, behavioural science, health policy and economics to launch the largest COVID-19 health behaviour study of its kind, in partnership with YouGov.

Our goal has been to offer decision-makers a greater understanding of how their citizens are responding to the crisis, enabling them to tailor their public health strategies based on evidence. To this aim we have published nearly 50 briefing reports. These publicly available reports include country-specific, theme-specific, and global insights.

Highlights from key reports produced in 2021:

COVID-19 Global Behaviours and Attitudes: The Year in Review

This report looked at how attitudes and behaviours had evolved between April 2020 and April 2021 for the 14 countries that had consistently taken part in the survey over the full year. Key findings include identifying an increase in face mask use, people reporting being unhappier or as happy as the year before, and worsening views of how governments and health systems were handling the pandemic.

Since the project's launch:

- **OVER 720,000 PARTICIPANTS INCLUDED**
- **30 COUNTRIES, AREAS AND TERRITORIES SURVEYED**
- **17 COUNTRIES CURRENTLY BEING TRACKED**
- **46 BRIEFING REPORTS PRODUCED**

Meet the IGHI team:
Sarah P Jones
Melanie Leis
Roberto Fernández Crespo
Gianluca Fontana
Hutan Ashrafian

Global attitudes towards a COVID-19 vaccine

This report looked at attitudes towards a COVID-19 vaccine in 15 countries as of May 2021. Key findings include high trust of COVID-19 vaccines, with the UK being the most trusting and South Korea and Japan being the least. Pfizer was the most trusted brand. Apart from not being eligible, concerns about side effects and insufficient testing of COVID-19 vaccines were the main barriers to vaccine uptake in all countries.

"Working on this project has been an incredible opportunity, and I feel lucky to have been a part of it. Since we first started publishing findings on the interactive online dashboard we built for the data, I always found that it had a 'real-world' impact, which is something that sometimes is missing in academia. Knowing that people were accessing our dashboard and showed interest in the reports we published made the effort worthwhile. I hope that going forward this dataset can be used to try to better understand people's behaviours, which measures worked well and which didn't, and hopefully help future planning."

- Roberto Fernández Crespo,
Analytics Fellow, Big Data and Analytical Unit

Exploring the impact of digital remote care

Our inSIGHT study is an international project that aims to evaluate the impact of COVID-19 on the use of digital-first (phone, video, online) technologies in healthcare. The work, led by our Patient Safety Translational Research Centre (PSTRC) is a collaboration between over 30 researchers across more than 20 worldwide organisations.

The programme has two major arms. The first is seeking to explore the perspectives of healthcare professionals on how COVID-19 has impacted the use of digital technologies in primary and secondary care. Our work in primary care surveyed more than 1,600 GPs across 20 countries, highlighting a range of benefits including care access and continuity, alongside challenges such as digital exclusion and clinical uncertainty.

The second is listening to patient voices to understand their perspectives of the use of these technologies. We recruited over 6,300 patients across four European countries, identifying a range of factors that participants commonly reported as being positively impacted by virtual technologies. Our goal is to use these insights to co-create a supportive environment that ensures equitable use across different patient groups.

Meet the IGHI team:
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Niki O'Brien
Felix Machleid
Alay Rangel-Cristales
Erik Mayer
Saira Ghafur
Gianluca Fontana
Ara Darzi

Spotting patients at risk of deterioration

We're leading the RECAP (Remote COVID-19 Assessment in Primary Care) project, a collaboration between Imperial and Oxford Biomedical Research Centres to develop a risk prediction tool to help GPs identify patients with acute COVID-19 at risk of deterioration. Early recognition and treatment are crucial to manage symptoms and facilitate recovery.

So far we have collected over 6,000 acute COVID-19 patients' records from a variety of settings. Our team is using these datasets to develop and validate the tool, and will use an additional set of over 2,000 COVID-19 patients' records for further external validation.

Once developed, GPs will be able to use the RECAP risk prediction tool to assess patients' deterioration risk, either in face-to-face or remote consultations, and escalate their treatment accordingly. By enabling swift treatment response, we hope the RECAP tool will help prevent deterioration and improve patients' outcomes.

Meet the IGHI team:
Ana Espinosa-Gonzalez
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Brendan Delaney

Oximetry at home: remote patient monitoring

Since July 2020, we have been working with NHS Digital and NHS England to evaluate remote monitoring for the care of COVID-19 patients at home. This work began with the evaluation of four different remote monitoring pilot sites where clinicians used pulse oximetry - which measures blood oxygen levels - to identify deterioration in patients with a new diagnosis of COVID-19.

Our findings, which showed that home oximetry monitoring can be a safe pathway for patients with COVID-19, have been published in BMJ Open and contributed to the national implementation of home oximetry across England. We've also carried out a systematic review of the effectiveness and safety of pulse oximetry in remote home monitoring of COVID-19 patients, which is under peer review.

We are currently concluding an evaluation of the impact of the COVID Oximetry @ Home (CO@H) on clinical outcomes, alongside other studies examining the equity of allocation of the pathway and the use of new digital technologies to support remote monitoring. These findings will continue to inform the future implementation of COVID-19 remote monitoring programmes within the NHS.

Meet the IGHI team:
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Paul Aylin
Ana Luisa Neves
Ara Darzi

Boosting vaccine uptake

Coronavirus vaccine uptake in the UK has varied across the country and by certain demographic characteristics, particularly age and ethnicity. To encourage people to get the jab, a national NHS text message service was introduced to invite eligible individuals to book a vaccine appointment.

We ran a randomised controlled trial to investigate the most effective text message strategy to inform local, regional and national practice. We tested the impact of two different text messages on COVID-19 vaccine uptake for 18-49-year-olds in the Central London Clinical Commissioning Group (CCG), which at the time experienced the lowest rates of uptake nationally. We also ran a second study for people aged 50+ residing in the same area, to whom we sent a behavioural insight-informed letter invitation so that we could measure and compare uptake with neighbouring CCGs.

The results of these studies, which are undergoing analysis, will help inform future SMS message content to invite individuals for future COVID-19 vaccination rounds.

Meet the IGHI team:
Sarah Huf
Roberto Fernandez Crespo
Gianluca Fontana
Alix Brazier
Ara Darzi

Understanding the impact of COVID-19 on young people's mental health

We've been exploring how COVID-19 has impacted young people's mental health and how they have been coping (COVID-19 Coping in Young People, CCopeY). We worked together with young people with lived experience of mental health difficulties as research partners throughout all research stages, which has involved online surveys, in-depth interviews and both qualitative and quantitative data analyses.

Published findings from our first study revealed that around a third of young people surveyed had poor mental health during the first lockdown. It also identified factors that were linked with poor mental health alongside useful coping strategies young people were using. With young people, we co-produced a series of "after school" virtual workshops focused on key elements of the CCopeY study findings (like how to ask for help, and get it), providing support for other young people.

Building on this work, we've been carrying out further in-depth studies to see how young people's mental health has changed throughout the pandemic, in addition to comparing how they coped during the first and third national lockdowns. We're also working with young co-researchers and UK and international collaborators to better understand the impact of COVID-19 on the mental health and wellbeing of young people across Europe, the first qualitative systematic review of its kind. This synthesis of evidence will help to inform policy and practice during pandemic recovery.

Meet the IGHI team:
Lindsay Dewa
Anna Lawrence-Jones
Cat Kilkenny
Paul Aylin
Lily Roberts

Mental health

Addressing knowledge gaps and driving evidence-based innovation in mental health, so we can transform understanding and treatment for people experiencing poor mental health.

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Exploring the relationship between climate change and mental health

Climate Cares

Through our Climate Cares programme, a collaboration between IGHI and the Grantham Institute, we aim to understand and support mental health in the current climate and ecological crises. Our work spans policy, research and intervention design.

This year we published a briefing paper that presents substantial evidence for climate change's detrimental and multi-faceted impact on mental health, with significant costs to individuals, health systems and economies that are currently unaccounted for in policy and practice. We presented this report, alongside its recommendations for stimulating greater knowledge, awareness and action, at two UK-focussed and international launch events, which generated worldwide media coverage.

We also grasped a major opportunity to share the findings of our report as part of our live event at COP26, the 2021 UN Climate Change Conference. COP26 has been the first to have any official events dedicated to the mental health impacts of climate change, with ours one of the first in history. Our Climate Cares team convened an international panel of experts in the field for the event, chaired by Prof David Nabarro, to discuss actions needed in this arena while also using immersive storytelling to share people's diverse experiences of climate change, and hopes and concerns for climate action.

Changing Worlds

Our Changing Worlds study is the first to explore and compare young people's thoughts and feelings, including distinct patterns of distress and different emotions, in response to the COVID-19 pandemic and climate change.

We conducted an online survey of young people in the UK in 2020, which found that although respondents reported more life disruption and concern for their future due to COVID-19, climate change was associated with significantly greater distress overall. This trend was particularly striking for individuals who don't otherwise have a tendency to be anxious.

This work has been expanded globally with collaborators in different countries (India, USA, the Philippines and four Caribbean countries) running an adapted survey amended for their local contexts, including face-to-face interviews with 550 people living in Indian slums. We will compare the results across areas to understand the impacts of climate change and COVID-19 on young people in different global settings.

Developing interventions

Co-designed with young people, we've developed a guided journal to support young people to explore, understand and respond to their thoughts and feelings about the climate and ecological crises, and to develop a sense of agency and purpose. In collaboration with Force of Nature, we are trialling this as both an intervention and a research tool for data collection.

Another project with Force of Nature and Common Vision, commissioned by the Natural Environment Research Council, also aims to develop a support tool for young people with eco-anxiety. This digital platform will share hopeful messages about positive work happening in climate change research and innovation, and enable them to connect with other young people to exchange thoughts and feelings and drive action.

Meet the IGHI team:
Emma Lawrance
Pip Batey
James Diffey
Justine Alford
Nicolette Davies
Gianluca Fontana
David Nabarro
Nikita Rathod
Lauren Dowling

Meet the IGHI team:
Lindsay Dewa
Paul Aylin

Detecting deterioration of mental health

We've launched a number of studies to find new and effective ways to detect mental health deterioration in different settings and contexts, including the role that technology could play in identifying signs of worsening mental health in young people.

One predictor of deterioration we are exploring through our new SWAY (Sleep disturbance as an early warning sign of suicidality) study is poor sleep during transitions from inpatient psychiatric care. With our collaborators across London and in Israel, we're analysing existing data to find out whether sleep disturbance could be linked with suicide or suicidal behaviour in people discharged from inpatient care. The programme is also using a wearable device to measure the sleep-wake cycle and find potential links with suicidality in young people.

The importance of forming connections in digital interventions

A major review of evidence led by our researchers showed that building a good connection with others is important for digital tools and services to help improve young people's mental health. Funded by Wellcome, the systematic review and meta-analysis found that having a good social connection within digital tools or interventions, for example digital therapy sessions or social networking sites, reduced symptoms of depression in young people by as much as 26%. This research is of vital importance against the backdrop of the pandemic, which has shifted interactions away from face-to-face and towards digital.

We also identified a series of key factors that show social connection is there between two people, such as feeling safe and being able to be open. The researchers now plan to work with young people to use this framework to co-design and evaluate a new tool focussed on digital social connection.

Meet the IGHI team:
Lindsay Dewa
Emma Lawrance
Lily Roberts
Hutan Ashrafian

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Improving support for people experiencing crisis

Our partnership with Mental Health Innovations, the digital charity behind 24/7 crisis text line Shout, is helping to develop vital insight into the mental health needs of people in the UK. Working with our collaborators across the College, we've been using Natural Language Processing to analyse hundreds of thousands of conversations between service texters and volunteers. We've applied this technique to predict texter risk of suicide, texter demographics, and how helpful they found the conversation.

We're also working to predict how many texters will contact Shout on a particular day based on external events. In addition, we're analysing Shout conversations to better understand the impact on young women and healthcare workers, and to identify characteristics of helpful and unhelpful conversations. Such insights will help Shout and the mental health sector respond to the large and rising mental distress faced by many, and we will work in partnership to do so.

"In our changing world, as we all grapple with the impacts of COVID-19, a changing climate, disconnection and increasing uncertainty, our mental health and emotional wellbeing can be understandably impacted. Many people need support as they face overwhelming distress, anxiety, addictions, or other challenges, but struggle to access existing services, or face a myriad of barriers to care. Our work is actively working to better understand and respond to such needs so that anyone can find the support and opportunities to thrive and contribute to the changes they want to see. We are using holistic, diverse research approaches and co-design principles to tackle multiple problems together, ensuring we seek the 'win-wins', in building a fairer, healthier, safer climate future."

- Emma Lawrance,
IGHI Mental Health Innovations Fellow

Meet the IGHI team:
Emma Lawrance
Lisa Gould

Artificial intelligence

Harnessing the potential of AI to bring improved, more equitable health and care.

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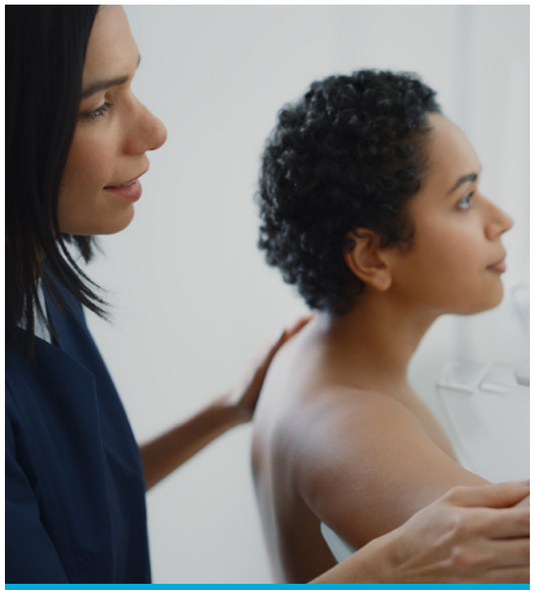
Trialling AI to help spot breast cancer

A team led by IGHI has won government funding to explore the use of artificial intelligence for breast cancer screening in NHS hospitals. The work builds on our previous research that showed AI was as good as trained experts at detecting breast cancer in mammograms.

Backed by funding through the Artificial Intelligence in Health and Care Award, the next stages of the project will further assess the feasibility of the AI system to see how the technology could be integrated into the national screening programme in the future to support clinicians. We will analyse historical data to determine the accuracy and fairness of the AI model, examine how radiologists and clinicians interact with the AI system, and carry out an observational study to examine how well it works in a clinical setting.

The work is being carried out by a collaboration between Imperial College London, Google Health, Imperial College Healthcare NHS Trust, St George's Hospitals NHS Foundation Trust, and the Royal Surrey NHS Foundation Trust.



Meet the IGHI team:
Ara Darzi
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Anna Lawrence-Jones
Inês Baptista
Steve McAteer
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AI training for clinical researchers

The National Institute for Health Research (NIHR) commissioned IGHI to develop an e-learning course that can be offered to their Clinical Research Network (CRN), providing an opportunity to learn more about AI and its applications in clinical research.

We led the creation of an online, 12-hour course that we co-developed with Imperial's UKRI Centre for Doctoral Training in AI for Healthcare and experts across the College. The course covers examples of successful AI in healthcare, commonly used clinical data, and the practical, ethical, and regulatory considerations of the development and deployment of AI in clinical settings.

The content of the course has been reviewed by an extensive number of NIHR CRN colleagues with a diverse range of backgrounds and skillsets. Their feedback has ensured that the course is relevant and accessible to a broad range of professionals involved in clinical research, from research nurses and research managers to full-time clinicians and academics.

Meet the IGHI team:
Melanie Leis
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Jonathan Clarke
Kyle Lam
Viknesh Sounderajah
Clarissa Gardner
Emma Lawrance

Assessing nutritional intake in developing countries

Accurate assessment of nutritional intake is essential for identifying the nutritional needs of a population and evaluating the effectiveness of strategies designed to maintain nutritional health. Yet current assessment methods are subjective, inaccurate and can be labour-intensive.

Funded by the Bill and Melinda Gates Foundation, a team from our Hamlyn Centre has developed an intelligent, automated monitoring system for assessing the diets of people living in low- and middle-income countries (LMICs). Based on wearable camera tech, the system is designed to passively capture images of the food intake of every individual in a household. We have developed novel AI-driven methods to detect when people are eating, identify what they're eating, estimate the portion size and deduce the nutrition intake of participants from the images.

The project aims to deploy the passive dietary monitoring system to households in both urban and rural areas in Ghana and Uganda. In parallel, we have been processing and analysing the millions of images collected in the field study. We believe this is the first study to investigate the use of camera technology for quantifying nutritional intakes in LMICs.

Meet the IGHI team:
Benny Lo
Kathryn Maitland
Frank PW Lo
Jianing Qiu

Equitable AI

Data-driven technologies like AI are powerful tools demonstrating potential for diagnosis and treatment. Yet these could worsen the health inequalities experienced by minority ethnic groups if current challenges, such as racially biased algorithms and a lack of diversity in research and development, are not urgently addressed. Following a review of current evidence and policy, coupled with expert cross-sector interviews, we have produced a report that seeks to highlight this issue and offer evidence-based recommendations to better enable AI for minority ethnic communities.

Titled 'Equitable Data-driven Health Technologies for Minority Ethnic Groups', the report presents evidence of this racial bias in AI and challenges across the healthcare and technology sectors. It also explores how we can facilitate an environment across relevant sectors to reduce the risk of bias in data-driven technologies that can impact the treatment, health, and wellbeing of minority ethnic patients.

"AI has tremendous potential for healthcare system delivery. But our work has demonstrated how it can exacerbate existing health inequities in minority ethnic groups. By working across government, healthcare and the technology sector, it is crucial we ensure these communities are not left behind."
- Saira Ghafur, digital health lead

Meet the IGHI team:
Niki O'Brien
Jackie Van Dael
Jonny Clarke
Clarissa Gardner
James O'Shaughnessy
Saira Ghafur

Intelligent surgery

GENIUS: Guiding brain tumour surgery

With our collaborators across the College, Imperial Trust, the National Hospital for Neurology and Neurosurgery and industry, our researchers are developing a new platform that aims to make brain tumour surgery more precise. Called GENIUS, the system integrates multiple imaging and sensing techniques with artificial intelligence to highlight cancer tissue in real-time in the operating theatre, guiding decision-making and therefore leading to more personalised treatment. We have also developed a mixed reality visualisation platform, using Microsoft's HoloLens, which simultaneously projects multiple images to the surgeon in 2D and 3D, creating a map of the tissue to help the surgeon remove as much of the tumour as possible, while sparing precious healthy tissue.

This platform has the potential to drastically advance the outcome and safety of brain tumour surgery, reducing errors and surgeons' mental workload while potentially improving patients' quality of life and life expectancy, and in the future could also transform surgery for other cancers too.

Meet the IGHI team:
Stamatia Giannarou, Samyakh Tukra, Joao Cartucho, Joseph Davids, Alfie Roddan, Chi Xu, Haozheng Xu, Alistair Weld, Alexander Thompson, Dan Elson

Meet the IGHI team:
George Mylonas, Alex Kogkas, Dan Leff, James Kinross, Ravi Naik

MARS: Developing an autonomous surgical robot

We've won an EPSRC Transformative Healthcare Technologies for 2050 grant to develop an AI-powered surgical robotic system that works autonomously to detect and remove small tumours. Called MARS (Molecularly Aware Robotics for Surgery), the technology will couple analytical and imaging techniques with laser dissection to perform both diagnostic and surgical tasks, carried out by simple, easy-to-fabricate robots. The envisioned minimally-invasive system will be capable of scanning skin or epithelial tissue, for example the colon, analysing the data using AI algorithms to spot cancerous cells, and then removing the tumour.

By creating an intelligent autonomous system, we hope to help alleviate staff resourcing issues within the NHS, while also helping to make surgery more precise and improving the outlook for people with cancer.

Meet the IGHI team:
Zoltan Takats, George Mylonas, Stamatia Giannarou, James Kinross, Burak Temelkuran, Mark Runciman

MAESTRO: Multi-sensed AI for Surgical Role and Task Optimisation

We've won an EPSRC Transformative Healthcare Technologies for 2050 grant to lay the foundations for the operating room of the mid-21st Century. Our vision is for a surgical environment powered by trustable AI that is able to continually adapt and learn the best way to optimise safety, efficacy, teamwork, economy, and clinical outcomes. A fitting analogy for MAESTRO is that of an orchestra conductor, a 'maestro', who oversees, overhears, and directs a group of people towards a common goal: a masterful performance. The MAESTRO AI-powered operating room is based on holistic sensing, human-centric AI, and robotics.

Supporting digital transformation of health systems

What Good Looks Like

Our Helix Centre has been supporting NHSX's What Good Looks Like programme, a framework that sets out a common vision for good digital practice, outlining seven success measures for digital transformation. Our team has been conducting discovery research and co-development sessions to inform, draft and iterate the guidance.

As part of this work, we developed three support offer prototypes to help leaders prioritise actions for their team's improvement. One prototype was prioritised and is currently undergoing development as a minimum viable product. The aim of the support offer is to make it easier for NHS executives to stay up-to-date with the latest digital reports, policies, papers and trends, with succinct content that can be consumed on the go. This includes blueprints, standards and real-life examples of best practice, offering a simple way for leaders to learn about digital health.

The ultimate goal is to ensure that NHS leaders have the right information, tools and support to digitally transform services and provide better care. Beyond the NHS, the support offer has the potential to enable digital transformation across the wider public sector.

Meet the IGHI team:
Deborah Szebeko
Didi Thompson
Pip Batey
Lily Hoskin
Lenny Naar
Fiona O'Driscoll

What Good Looks Like for Nursing

Building on the What Good Looks Like (WGLL) programme that our Helix Centre is supporting, we are also working with NHSX on their WGLL for Digitally Enabled Nursing programme. This initiative recognises the fact that nurses are critically positioned to drive digitally-enabled care transformation. Organisations that create the conditions for nurses to influence digital transformation decisions from ward to board will be better placed to have a culture of safer, more effective, efficient, and sustainable care.

Our discovery work aims to inform a co-designed framework of what good looks like for digital nursing, in addition to a self-assessment process to track progress and pinpoint support. It will also guide the development of a support offering, which aligns with the strategy to engage executive-level nurse leaders on how to make a positive impact on the areas of greatest need for the nursing workforce.

Once completed in 2022, the framework and self-assessment guide will offer recommendations for digitally-enabled nursing for executive-level nurse leaders across integrated care systems and provider organisations.

Meet the IGHI team:
Deborah Szebeko
Clarissa Gardner
Claudia Hopkins
Lenny Naar

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Centring new technologies around people's needs

Working with collaborators at Sussex Our Care Connected (OCC) team and Sussex Partnership NHS Foundation Trust (SPFT), a team from our Helix Centre are using systems-thinking approaches and human-centred design to support the development of new technology solutions that are tailored to users' needs.

This work is spread across three programmes. The first is working to support the OCC team to ensure that users - patients, front-line staff, and system stakeholders - are at the core of the digital development of a Shared Care Record, and that the resulting product supports their needs. The second project with the OCC team aims to align all partners within Sussex around a common set of standards, behaviours and new patterns of use for digital virtual consultations. This includes a holistic approach, with a particular focus on accessibility and technology-agnostic patterns of use, led by the service user and service provider needs and an assessment on how the Trust could harness existing best practices.

Working with SPFT, the third programme will identify a range of user needs that will guide the development of a seamless digital user experience for people receiving mental healthcare that is delivered by multiple mental health providers.

Across the three programmes, as well as helping organisations to deeply understand their users' needs and tailor products and services to these, our approach brings core team members together and helps them align around a common purpose.

Meet the IGHI team:
Rachel Marsden
Gianpaolo Fusari
Alice Blencowe
Lenny Naar

Data, health and wealth

The Data, Health and Wealth programme at IGHI seeks to have a tangible impact on how healthcare data is used to maximise health and wealth in the UK and internationally, and how trust and security can be embedded in this practice. As part of this work, we held a roundtable in October where experts in the areas of health data and digital health discussed progress since the launch of our report, 'NHS data: Maximising its impact on the health and wealth of the United Kingdom' last year.

Discussions at the roundtable focused on how to build trust alongside the development of health data collaboration and where IGHI and other stakeholders can seek to have influence on UK policy and legal frameworks. Following the release of several relevant policy documents on health data at the end of 2021, we will develop an updated white paper on the current policy landscape and host a conference in early 2022.

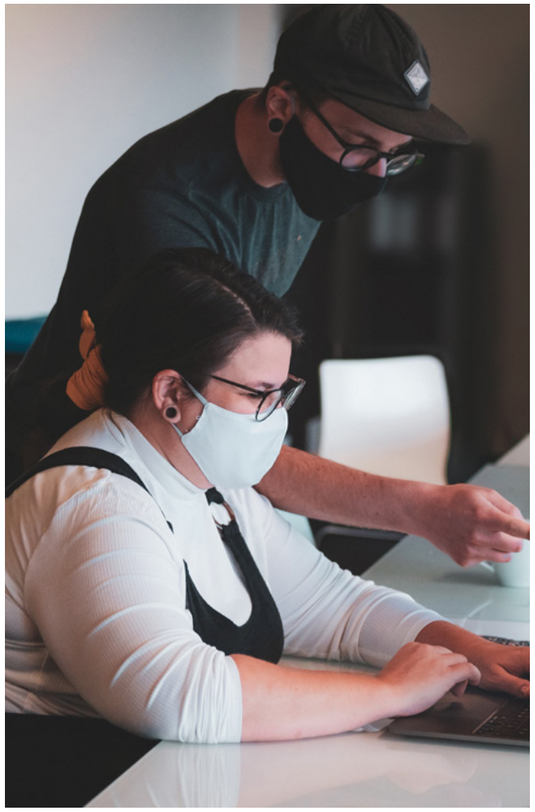
Meet the IGHI team:
Niki O'Brien
Jack Halligan
Gianluca Fontana
James O'Shaughnessy
Saira Ghafur

Education

Developing the next generation of healthcare leaders

Our world-class educational programmes equip future leaders in healthcare with the knowledge and skills to innovate and elicit change in the health system and beyond.

Events over the past 18 months have presented both challenges and opportunities for our education team, as we have transitioned our programmes from face-to-face to online and hybrid delivery. This shift has enabled continuity of our offerings throughout the pandemic and opened the doors to a global audience. With greater flexibility, we can better accommodate the needs of professionals working in healthcare or allied with health systems.



Our educational offerings

PGDip/MSc in Digital Health Leadership
Developing a new generation of excellent digital leaders.

MSc in Healthcare and Design
Helping professionals develop the skills needed to advance an entrepreneurial idea.

MSc in Health Policy
Enabling health sector professionals to improve the quality of national and international health policy.

MSc in Patient Safety
Supporting healthcare professionals and decision-makers to deliver safe care and champion safer health systems.

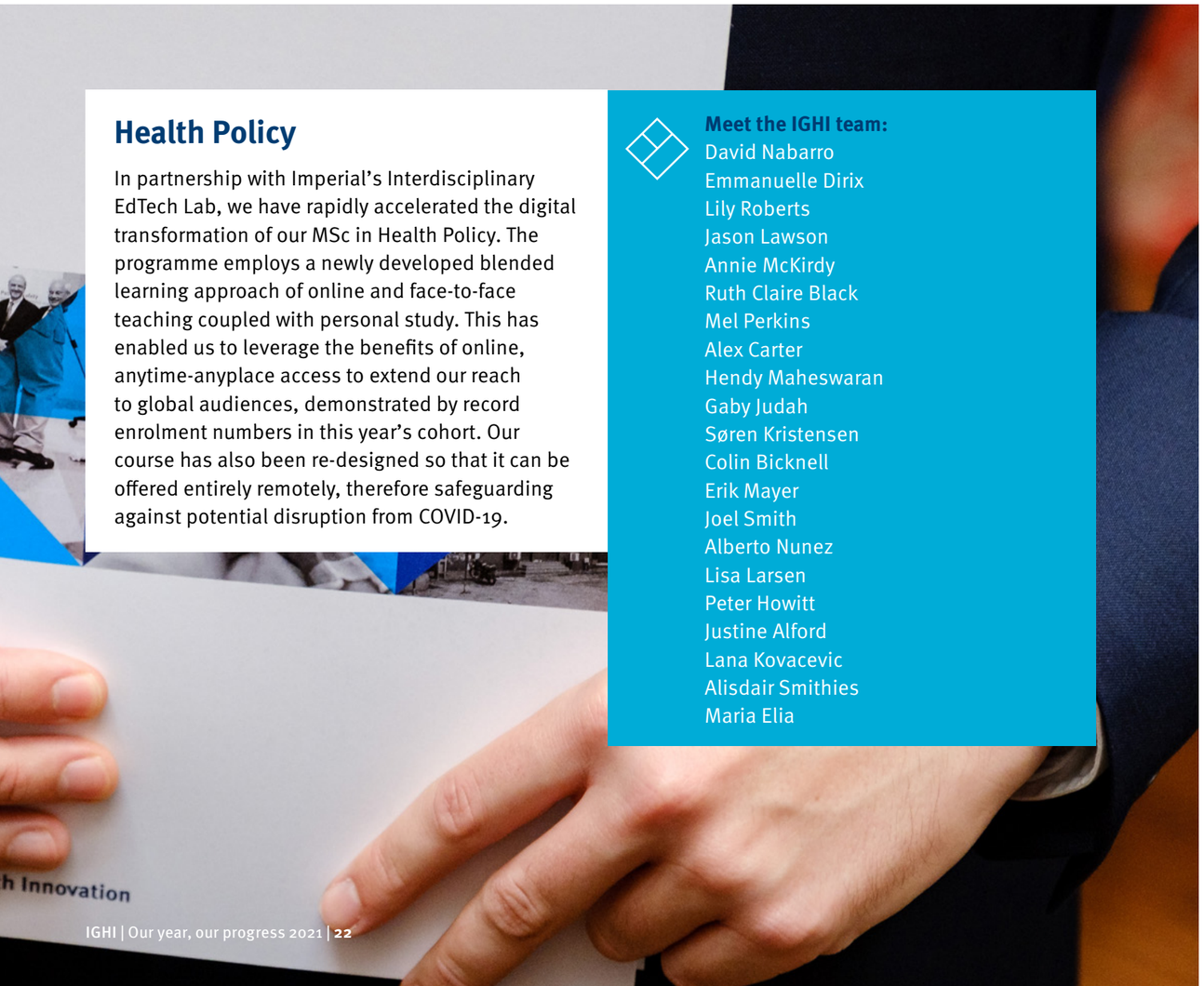
MRes in Medical Robotics and Image-Guided Intervention
Preparing new graduates for employment in medical robotics and surgical imaging.

PhD programme
Undertake intensive research in areas such as healthcare technology and innovation, surgical science, artificial intelligence and digital health, and safety and quality.

Patient Safety

Our MSc in Patient Safety has been revitalised this year, benefitting from a substantial donation from Bayer Pharmaceuticals, which has funded a programme of curriculum redevelopment and digitisation. The Education Team has brought together a wealth of expertise in online learning design, medical education, clinical practice and digital transformation. This has enabled the launch of our refreshed, fully-online MSc that offers a more flexible approach to learning, responding to emerging healthcare needs in light of the coronavirus pandemic, and aligning with the updated World Health Organization's Patient Safety Curriculum. These transformations have played a key role in us welcoming our largest cohort to date this year.

Meet the IGHI team:
Ana Luisa Neves
Hadi Alagha
Joseph Kerr
Ruth Claire Black
Olga Kostopoulou
Alex Carter
Joyce Iwe
Brendan Delaney
Kelsey Flott
Ara Darzi
Don Goldman
John Illingworth
Hendy Maheswaran
Jackie van Dael
Lana Kovacevic
Martine Nurek
Alisdair Smithies
Maria Elia
Lisa Gould



Health Policy

In partnership with Imperial's Interdisciplinary EdTech Lab, we have rapidly accelerated the digital transformation of our MSc in Health Policy. The programme employs a newly developed blended learning approach of online and face-to-face teaching coupled with personal study. This has enabled us to leverage the benefits of online, anytime-anyplace access to extend our reach to global audiences, demonstrated by record enrolment numbers in this year's cohort. Our course has also been re-designed so that it can be offered entirely remotely, therefore safeguarding against potential disruption from COVID-19.

Meet the IGHI team:
David Nabarro
Emmanuelle Dirix
Lily Roberts
Jason Lawson
Annie McKirdy
Ruth Claire Black
Mel Perkins
Alex Carter
Hendy Maheswaran
Gaby Judah
Søren Kristensen
Colin Bicknell
Erik Mayer
Joel Smith
Alberto Nunez
Lisa Larsen
Peter Howitt
Justine Alford
Lana Kovacevic
Alisdair Smithies
Maria Elia

Healthcare and Design

Our Masters in Healthcare Design continues to go from strength to strength. Student intake has more than doubled since we opened the course in 2017, and we have recently cemented our relationship with Royal College of Art through a renewal of the collaboration agreement. Student feedback attests to the quality and excellence of teaching, and has been used constructively to further refine the course and improve the authenticity of assessments. Our notable recent achievements include the award of a £550,000 Imperial Health Charity grant to realise the excellent collaborative work of post-graduate students, faculty, staff and patients in the Breast Unit Re-Design project, which aims to use design innovation to improve patient flow, reduce waiting room anxiety and enhance empathy around bad news diagnoses.

Meet the IGHI team:
Daniel Leff
James Kinross
Hadi Alagha
Annie McKirdy
Joyce Iwe

Medical Robotics and Image-Guided Intervention

Our course blends a mixture of taught modules with a research project, attracting students from a wide range of backgrounds in science, engineering and medicine. Our aim is to equip students with advanced research skills valued both in academia and industry, which is why we have ensured that in-laboratory projects have been maintained throughout the pandemic. Our recent curriculum redesign has placed an increased focus on practical work, even during the taught part of the course. This year we recruited our largest ever cohort, with a high proportion of overseas students.

Meet the IGHI team:
Dan Elson
George Mylonas
Stamatia Giannarou
Benny Lo
Mikael Sodergren
Alexander Thompson
Daniel Leff

"During this year I learned a huge amount that will benefit my professional career. The flipped learning approach that was used in the taught modules helped me understand the course in detail, while the coursework helped me to grasp practical skills points more firmly. The group project helped me to make new friends and future colleagues, but also exercised my abilities to solve practical medical challenges.

It also prepared me with a good foundation for the in-depth individual research project, which improved my self-study and problem-solving skills. In a sentence, this year has been of great benefit for me."

- Milin Wang, MRes in Medical Robotics and Image-Guided Intervention student

NHS Digital Academy

For the fourth year running, we have been selected by Health Education England to lead the delivery of the Digital Health Leadership programme of the NHS Digital Academy, as part of a new consortium with the University of Edinburgh and Health Data Research UK. Our PGDip/MSc in Digital Health Leadership is the academic underpinning of the programme.

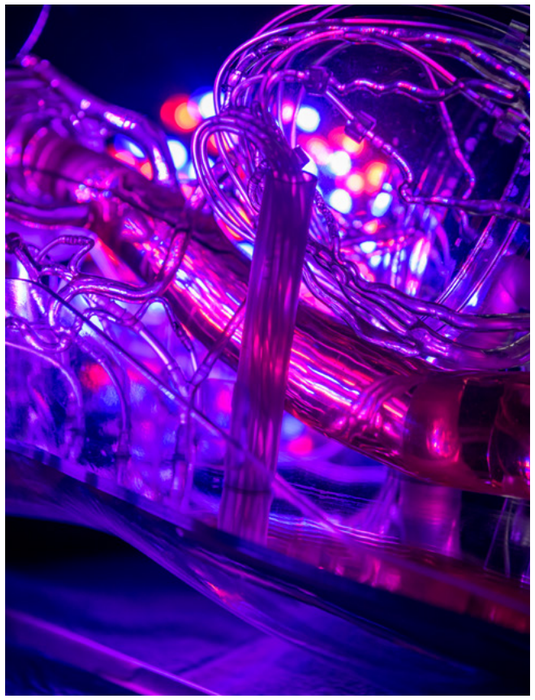
Established in 2018, the Academy trains and empowers health and care leaders to drive digital transformation in the NHS. The partnership will build on the accomplishments of training more than 300 digital health leaders to date, enabling them to implement innovation and applied learning to better their practice, while extending the uses and harnessing the benefits of digital capabilities. Our alumni have gone on to shape policy and practice with national impact, and have championed crucial innovation to meet the challenges that COVID-19 posed over the past year.

PhD research programme

In conjunction with the Department of Surgery and Cancer, IGHI hosts a variety of students undertaking research towards a PhD, from both clinical and non-clinical backgrounds. At present, we have 60 students conducting doctoral studies, either full- or part-time, supervised by Professor Darzi and other academics within IGHI and across the College, with support from the IGHI research management team. 10 students have successfully passed their viva examination and had their PhD degree conferred during 2021, encompassing a diverse range of thesis topics including; soft robotics for minimally invasive surgery; real-time evaluation of patient safety; shared medical consultations; and self-care in those with chronic diseases

Meet the IGHI team:
Ara Darzi, Inês Baptista, Steve McAteer, Hendy Maheswaran, Hutan Ashrafian, Dan Leff, Erik Mayer, Gaby Judah, Ferdinando Rodriguez y Baena, Dan Elson, George Mylonas, Alex Thompson, Stamatia Giannarou, Benny Lo, Zoltan Takats, James Kinross, Emma Carrington, Bryony Dean Franklin, Brendan Delaney, Olga Kostopoulou, Elias Mossialos, Ana Luisa Neves, Stephanie Archer

Meet the IGHI team:
Alisdair Smithies
Scott Payling
Louie Alvarado
Yara Malek
Ruth Claire Black
Lenny Naar
Alex Carter
Jessica Prestt
Gianluca Fontana
Pip Batey



300
NEW STUDENTS FOR OUR 2021 INTAKE

705
STUDENTS ENROLLED IN OUR PROGRAMMES IN 2021

INCREASED INTAKE ON OUR HEALTH POLICY MSC, FOR WHICH DIGITISATION HAS PLAYED A KEY ROLE IN BOOSTING STUDENT NUMBERS

INCREASED INTAKE ON OUR PATIENT SAFETY MSC, FOR WHICH DIGITISATION HAS PLAYED A KEY ROLE IN BOOSTING STUDENT NUMBERS

Involvement and engagement

Putting people at the heart of what we do

Co-producing a symposium for young people's mental health

In collaboration with Newcastle University, we co-produced a virtual symposium that highlighted the impact of COVID-19 on youth mental health and wellbeing in the UK. We received funding from Engage FMS at Newcastle University to run a virtual series about young people's mental health during the pandemic. During this series we worked together with young people to plan and shape the symposium, and also design the format of an "after school" reflection on the co-production journey. Alongside planning and presenting at the event, all of the sessions were chaired by a young person.

"Working as a young person in IGHI projects has been so unbelievably rewarding. I never expected involvement to give me such purpose, confidence, and a broader sense that we, as young people, actually matter. Co-produced projects, like the ones at IGHI, make us active changemakers by listening to our thoughts, opinions and ideas, integrating them into projects and holding us at the centre of research. I believe this is so much more impactful – it ensures the research is answering questions young people want and need answers to in a way that is relevant, beneficial and reflects young people's experiences, with the additional huge personal benefits to the young people involved...

"...My favourite thing about being involved in research is how empowering it feels, and seeing previously sceptical people start to take notice of young people's voices. I feel IGHI's strong emphasis on co-production is the future of mental health research and I feel so lucky to be a part of it."

-Lizzie Mitchell, young co-researcher

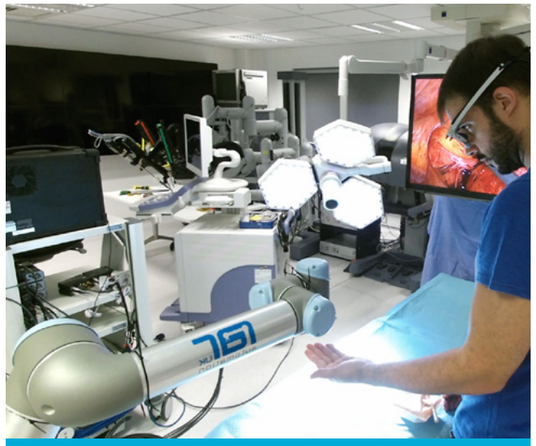
Meet the IGHI team:
Lindsay Dewa
Anna Lawrence-Jones
Cat Kilkenny
Nikita Rathod

Supporting Dementia Care

A team from our Helix Centre has been working with the UK DRI Care Research & Technology Centre to explore how community groups supporting people with dementia could embrace digital technologies to continue their vital work with this demographic, who are reliant on in-person support from family neighbours and professionals. In collaboration with Alzheimer's Society and University of Worcester, we created Community Makers, a network of groups and an online toolkit to help community dementia support organisations to adapt and share knowledge as they moved online.

This work has led to a new project called "Supporting Dementia Care", funded by the London Office of Technology Innovation. Within this project we will develop a person-centred approach to introducing technology to some of the most isolated people in the community.

Meet the IGHI team:
Matt Harrison
Cat Kilkenny
Sophie Horrocks
Clare McCrudden



Would you trust a robot surgeon?

Our Hamlyn Centre created an exciting interactive event for this year's virtual Royal Society Summer Science Exhibition, enabling members of the public to control a real surgical robot from home using their eyes and head movement.

The purpose of the exhibit was to engage the public in our research that's developing smart systems to improve the way that surgical robots interact with surgeons, helping to make surgery safer and more precise.

Our work in this area includes developing "perceptual" interfaces, like brain interfaces and eye-tracking, which could be used to give the surgeon tighter, more seamless control of the robot, while also reducing the burden on surgeons.

Meet the IGHI team:
George Mylonas
Alex Kogkas
Steve McAteer
Eleni Daniels
Justine Alford

Health Innovation Prize: funding the next generation of global health innovators

We run an annual competition that awards budding student innovators a cash prize towards their idea that could improve global health. After six finalists battled it out at our virtual Dragon's Den event in March, team Calidiscope took home the £10,000 prize for their smart mattress topper that uses innovative sensors and machine learning to detect pressure ulcers earlier.

Meet the IGHI team:
Nikita Rathod
Nicolette Davies
Ana Luisa Neves
Justine Alford
Richard Smith
Julia Riley
Leonard Fass
Jack Halligan
Hendy Maheswaran

This year's journey:

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The Hamlyn Symposium on medical robotics

Now in its 13th year, the Hamlyn Symposium on Medical Robotics has provided an annual forum for surgeons and engineers from across the globe to network and explore the latest developments in medical robotics. This year the event ran online between April and July, featuring a range of interactive events and 15 showcase talks from world leaders in their field.

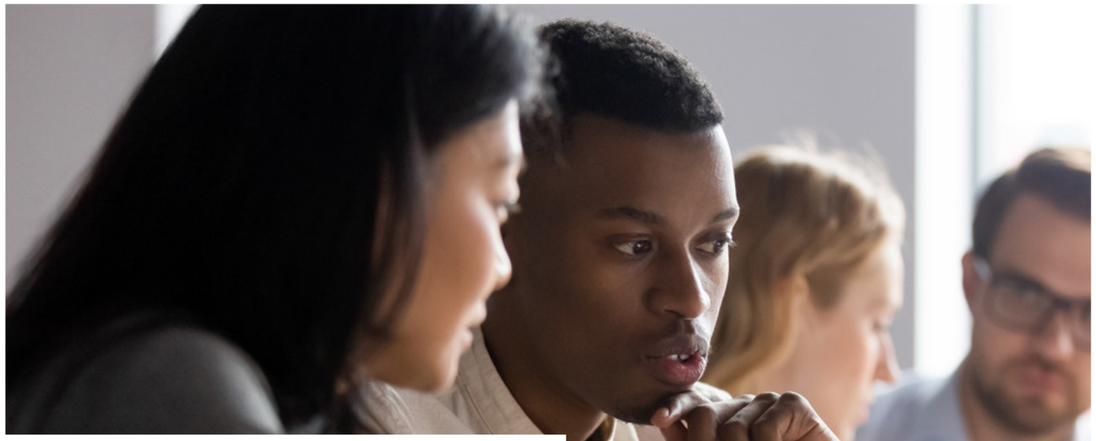
The event also included 13 Royal College of Surgeons CPD-accredited workshops covering topics such as three-hand surgery, robot-assisted endoscopy, and micro and nanomedical robotics. Two robotics challenges, the Surgical Robot and the Medical Robotics for Contagious Diseases Challenges were also held and attracted international entries. All talks and workshops can be accessed online via a dedicated YouTube channel, which we hope to continue to grow into a valuable repository for the field of medical robotics.

Meet the IGHI team:
Ara Darzi
Marianne Knight
Ferdinando Rodriguez Y Baena
Dan Elson
George Mylonas
Alex Thompson
Stamatia Giannarou
Benny Lo
Robert Merrifield

Supporting diversity and inclusion

We seek and listen to a diverse range of voices so that we can better understand and address the issues that affect them, and continue to strive to reduce inequities in healthcare. We're also dedicated to creating a more diverse Institute, because we know that diversity brings with it talent, creativity and fresh ideas.

Although there is still much more for us to do to better support equality, diversity and inclusion, as an increasing priority for us we are working to ensure positive change at our Institute.



Launching the Julia Anderson Training Programme

We're proud to have launched a new paid internship scheme that offers students and recent graduates the opportunity to gain valuable work experience and workplace skills. The programme is aimed at people with limited work experience, in recognition of the difficulties that many face when starting out their career without having worked or interned.

Trainees will have the chance to join one of a range of projects on a short-term basis, from data to digital health, making it the first such programme that the College has offered. We developed the programme in collaboration with Imperial's Equality, Diversity and Inclusion Centre, HR and Imperial as One to ensure that the application process is accessible and attracts a diverse pool of potential applicants from underrepresented backgrounds in academia.

The programme was named in memory of a valued member of the Imperial community, Julia Anderson (former IGHI Senior Advisor and Departmental Manager for Surgery & Cancer), who left a lasting legacy thanks to her dedication to supporting others and encouraging professional development at the College.

"Reflecting on our Institute, I saw IGHI as a place with such a diverse team, both in terms of our professional backgrounds but also our cultural and ethnic backgrounds. In this way, we could lead the way in creating opportunities for the immense talent emerging from schools and universities. My hope is that the launch of this programme will be one of many initiatives at IGHI that create work experience opportunities for people from diverse backgrounds...

"...We hope the programme will be successful in launching the careers of early-career professionals from underrepresented backgrounds in academia, and that in the near future we will see similar initiatives throughout the College."

- Clarissa Gardner, Research Assistant and lead for the development of the programme

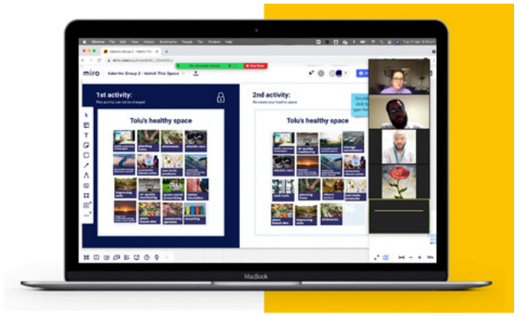
Meet the IGHI team:
Clarissa Gardner
Nikita Rathod
Nicolette Davies
Sophie Pieters
Eleanor Challenger
Justine Alford

Shaping research on healthy environments with diverse voices

A team from our Helix Centre was funded by the Natural Environment Research Council, in partnership with Beard Askew, to develop an innovative online public engagement exercise to better understand people's diverse perspectives on healthy environments, including the issues that matter most to them. We sought to involve people from under-represented groups, including disabled people and ethnic minority groups.

We worked with researchers, designers, videographers, community involvement experts and the public to co-design a creative approach to help participants understand the complexities of healthy environments and share their views about where they would prioritise UKRI and NERC research. This included 360° videos, interactive activities and online workshops. The aim was to ensure that future research on healthy environments is relevant and useful to the lives of many people.

Based on the findings in our report, the Helix team proposed a set of recommendations for NERC when developing future healthy environment research programmes. The patient and public involvement and engagement approach we developed can set the stage for future projects that hope to involve and creatively engage members of the public from under-represented groups.



Meet the IGHI team:
Anna Lawrence-Jones
Pip Batey
Lily Roberts

Working with community members to set data analysis priorities

IGHI, together with Imperial College Health Partners, was successful in being selected as one of the Health Foundation's Networked Data Labs. This initiative brings together analytical teams from across the UK to address health inequities. Our North West London team uses Discover-NOW, a depersonalised, linked dataset covering primary and secondary care, mental health and social services. We use this data to answer key research priorities for health and care since COVID-19, raised by local communities.

We are working with diverse people from North West London, with a focus on seldom heard groups, to establish their priorities across three key themes:

1: Impact of COVID-19 on people who are shielding

2: Children and young people's mental health

3: Social services

Theme 1 identified important differences across the country in terms of shielded patients' demographics and pre-existing health conditions. A further look at our shielding population in North West London suggested a potential increase in this group's mental health needs during the pandemic, which requires further exploration. Analyses on Theme 2 are currently underway, and work on Theme 3 will begin in 2022.

This programme has allowed IGHI to position itself as a leader in analytics and patient and public involvement and engagement (PPIE) across the network of partners. PPIE efforts are central to the work of the NDL and allow us to ensure that we are answering the most pressing questions in our communities. The national reach of this program, combined with its priority-setting at the local level, makes it uniquely positioned to inform decision-making and influence policy.

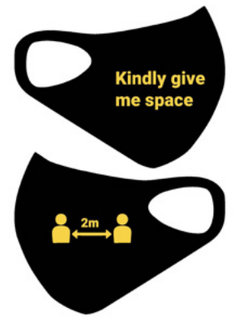
Meet the IGHI team:
Melanie Leis
Anna Lawrence-Jones
Roberto Fernández Crespo
Clare McCrudden

Improving the safety of clinically vulnerable people in North West London

With the lifting of social restrictions this summer, many people who are clinically vulnerable remain concerned about the easing of physical distancing. Proposed by Sandra Jayacodi, a patient and public representative of the Imperial College Research Partners Group, we've been co-designing a face mask for older and/or clinically vulnerable adults in North West London that encourages others around them to maintain a two-metre distance.

Working with patients and public partners, we chose a comfortable, durable mask with a high safety standard, and co-designed the graphic to be printed on the mask. We then partnered with the charity Open Age to provide the masks to a subset of their 4,500 members and ask, via a survey, if their own or other people's behaviour changed as a result.

As part of our strategy, we wanted to ensure we reached those from seldom heard groups in research, including those of minority ethnic backgrounds and



those living with a long-term condition or disability. We are in the process of gathering the survey feedback and will evaluate whether they had the intended effect of encouraging physical distancing.

Meet the IGHI team:
Katelyn Smalley
Anna Lawrence-Jones
Clarissa Gardner
Claudia Hopkins
Clare McCrudden
Alice Gregory

Highlights from our work

Our bread and butter is identifying problems facing global health and care, and developing innovative, people-centred ways to solve them. Our collaborative, multi-disciplinary nature means that we have the ability and agility to respond to a range of existing and emerging health needs.

From digital health to patient safety, the breadth of what we do is one of our defining strengths. Explore highlights from our activities over the past 12 months and find out how we're making a meaningful difference for patients, professionals and healthcare systems alike.

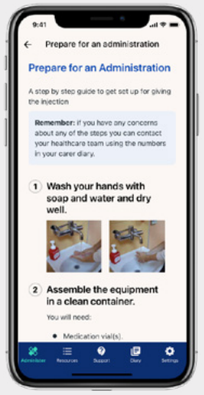
Digital health and care products

Supporting care at home - Palliate

Most people in the UK say that they would prefer to die at home, yet few achieve this wish. This is often due to not being able to manage symptoms at the end.

Our Helix Centre is developing a digital solution – Palliate – to address this need. Palliate seeks to improve the access and quality of training and support for carers to administer as-needed injectable medications in the home. Our goal is to support patient preferences for a home death while also reducing pressure on community care teams. Palliate fulfils this need by providing carers with information and support via an app.

We are currently running a pre-pilot with our partner, Central North West London NHS Trust, and have deployed Palliate to those who have been identified, approved and trained by the Trust team in the administration of anticipatory, 'just in case' medications. The app is being used in conjunction with existing paper policy and training materials, providing us with vital data to inform a more comprehensive pilot in 2022.



Meet the IGHI team:
Ivor Williams
Claudia Hopkins
Imogen Eastwood
Cat Kilkenny
Lily Hoskin
Jonathan Gregory

Keeping stroke rehabilitation OnTrack

Our Helix Centre has developed a digital rehabilitation platform, called OnTrack Rehab, designed with and for stroke survivors to support them through their recovery. Our recently completed feasibility trial, which ran for 18 months with 12 survivors, found excellent adherence to OnTrack at 89%. Arm activity among participants increased by 64%, equating to four extra hours of weekly activity. We also observed a 40% improvement in arm performance.

Although COVID-19 briefly interrupted this study, a positive outcome was that we demonstrated that the intervention can be successfully delivered remotely.

Having secured £30,000 through the ARC Accelerator programme and £100,000 from SBRI Healthcare, we will now focus on finishing development, designing pilot programs with our NHS collaborators and creating a commercialisation vehicle for OnTrack.

Meet the IGHI team:
Gianpaolo Fusari
Daniel Dickens
Ella Gibbs
Brian Quan
Lily Hoskin
Anna Lawrence-Jones
Melanie Leis
Roberto Fernández Crespo

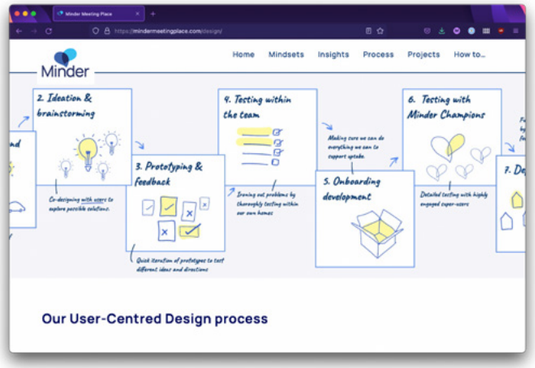
Developing a healthy home environment for people with dementia

The UK DRI Care Research & Technology Centre, based at Imperial and the University of Surrey, is creating a smart-home system to provide remote care and support to people living at home with dementia. It will also serve as a research platform to trial new treatments and technologies in real-world settings.

Designers at our Helix Centre are working across the Centre, understanding the needs and aspirations of the people with dementia, their carers and the professionals interacting with the platform. This year we created a brand identity for the platform, called Minder, designed the monitoring dashboard for clinicians, and developed a companion app.

We have also worked with scientists and engineers within the Centre to understand people's needs for emerging technologies from Imperial labs, including at-home infection diagnostics and voice agents on smart speakers to track wellbeing at home.

The broad aims of this work are to help maintain people's ability to remain living at home, prolonging independence. Reducing hospitalisation due to early detection of infection and falls is vital for the wellbeing of people with dementia. Building carer resilience through sleep and behaviour management can also help families cope better and longer with the demands of dementia.



Our User-Centred Design process

Meet the IGHI team:
Matt Harrison
Sophie Horrocks
Brian Quan
Pip Batey

Dosium: providing clinical decision support for medication

Dosium uses state-of-the-art technology to provide clinical decision support during the process of prescribing, preparing and administering medication to patients. It was developed by a team of designers, software engineers and clinicians from Helix and our PSTRC, in collaboration with the Royal Pharmaceutical Society. Dosium successfully spun out from Imperial last year, and continues to maintain close research links across multiple areas of collaboration with IGHI.

Dosium's first product is RxConnect, an Application Programming Interface (API) that allows a hospital computer system to make queries of an underlying medication database to generate medicine dosing recommendations. For example, Dosium is integrated with the British National Formulary, enabling RxConnect to deliver this knowledge base to clinicians on the front line via electronic prescribing systems. Dosium is working with BetterMeds to run a clinical pilot of RxConnect in 2022, the evaluation of which will be supported by IGHI.

Dosium continues to support research and development in medication preparation and administration. Dosium's TouchDose app, which provides point-of-care support for medication administration, is expected to receive regulatory approval following the clinical deployment of RxConnect.

Dosium's work is funded by an NIHR Invention for Innovation (i4) award.

Meet the IGHI team:
Nick Appelbaum
Carmen Rodriquez Gonzalvez
John Morrell
Marius Matei
Philip Pratt
Daniel Dickens
Calandra Feather
Bryony Dean Franklin

Innovating children's hospice care

We continue to develop research and innovation projects centred around the future of children's hospice care. Our work in this area is supported by our collaborators, the Fondazione Seràgnoli. We published a systematic review on the impact of digital health interventions on the mental wellbeing of patients and families receiving paediatric palliative care. We concluded that despite the design and development of digital health interventions that span the technological landscape, little research has assessed their psychological and social impact in the paediatric palliative care community.

"The past decade has seen an explosion of digital healthcare products and services and there is growing evidence of their benefits. But their impact on children and their families must not be overlooked. We see this as a huge opportunity as it opens up many avenues for further research and impact in this important but neglected area."

- Ivor Williams, Senior Design Associate and programme lead

We recently completed a comprehensive report that outlines an optimistic vision for the future of paediatric palliative care. It offers a forward-looking perspective on how the development of children's palliative care providers can and should continue over the next decade. It outlines nine key areas of innovation that should be the focus of paediatric palliative care providers looking to accelerate improvement in quality and access.

Meet the IGHI team:
Ivor Williams
Gianluca Fontana
Jonty Roland
Alexandra Shaw
Stephanie Archer

Data science and analytics - exploring applications in health and social care

In 2019, EY commissioned our Big Data and Analytical Unit (BDAU) to write a report looking at the use of data and analytics in health and human services (HHS) across the globe. Alongside an extensive literature review, 49 expert interviews and five international case studies, we partnered with YouGov to commission a multi-country survey of healthcare and social workers to understand their views on these tools.

The insights gathered allowed us to identify generalisable benefits, risks, challenges and enablers of AI in HSS. These, together with a diagnostic tool to identify an organisation's readiness for analytics solutions, were published in the report, 'Harnessing the power of data: can reality catch up with ambition?' A key finding from this project is that there is an immense opportunity for HHS organisations to learn from each other, especially around challenges and enablers of success.

Insights from the YouGov survey were used to produce a second report: 'Embracing digital: is COVID-19 the catalyst for lasting change?' A key finding from this report is that, while data and analytics solutions saw an exponential increase in use during the pandemic, with an associated improvement in care quality and delivery, HHS staff are less certain about their longer-term sustainability. This calls for HHS leaders to carefully consider how momentum around the use of data and analytics can be maintained beyond the pandemic era.

Meet the IGHI team:
Melanie Leis
Didi Thompson
Roberto Fernández Crespo
Lisa Gould
Gianluca Fontana
Saira Ghafur

Identifying drivers of patient safety across London Trusts

In 2020, we worked with NHS England and NHS Improvement - London to look at differences in patient safety across trusts in the London area using machine learning and natural language processing. This year, we followed up the work to explore publicly available data over time (2016-2019) to find out if the differences identified in the first phase held true over a longer time period.

We found that the NHS Staff Survey results, in particular those in the Safety Culture theme, continue to be the best predictors of whether a trust will be classified as safe or not by the Care Quality Commission. This variable has a higher statistical importance than other variables typically associated with patient safety such as National Reporting and Learning System incidents, complaints and claims.

This project illustrates the power of partnerships between academia and the NHS, in which analytics are put to the service of NHS leaders to answer some of their most pressing questions. Findings from Phase 1 and Phase 2 have been shared by patient safety leaders from NHS England & NHS Improvement – London with the London Patient Safety Leadership Forum, and will be translated into peer-reviewed publications.

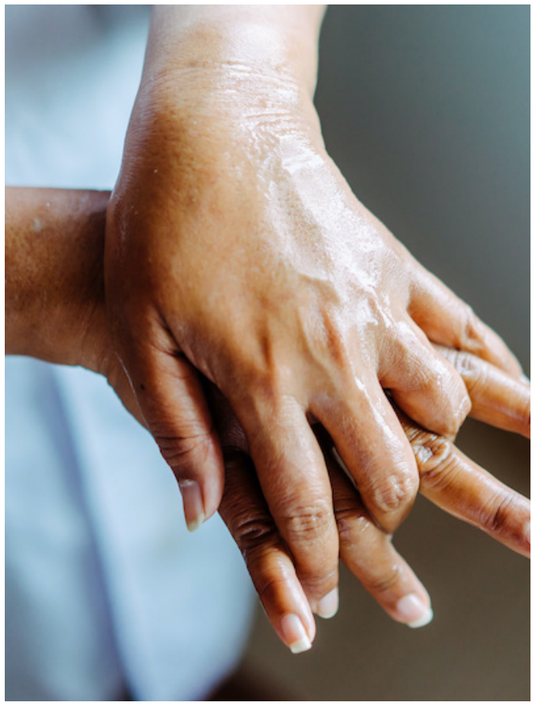
Meet the IGHI team:
Melanie Leis
Roberto Fernández Crespo
Ana Luisa Neves
Gianluca Fontana
Hadi Alagha
Owen Bray

Understanding the impact of COVID-19 on care quality

We partnered with the Royal College of Physicians to understand the quality of care given to COVID-19 patients in the UK. We used natural language processing to analyse 216 care review reports from COVID-19 patients and extract key themes around the quality of care given.

The study identified a number of key factors linked with care quality. While poor care was found to be very uncommon (3.5% of the sample), it tended to be associated with end-of-life care issues, hospital-acquired infections, delays in assessment and the two linked issues of poor communication and poor documentation. These findings were included in the RCP's report, 'Caring for hospital patients with COVID-19: Quality of care in England examined by case record review'.

At the time it was published, this study was the largest on the quality of care given to COVID-19 patients in the UK. It includes actionable recommendations for the NHS and healthcare teams for the care of COVID-19 patients and the broader patient population.



Meet the IGHI team:
Melanie Leis
Roberto Fernández Crespo
Ana Luisa Neves
Mike Durkin

Accelerating innovation in surgery

This year, our Hamlyn Centre launched an accelerator programme for medical device development, sponsored by the Wellcome Trust. The Hamlyn Accelerator for Surgical Innovation (HASI) offers a range of support to funded projects, from project management and coaching geared toward entrepreneurship and business mindset, to financial support for progressing proof-of-concept products into ground-breaking case studies.

The Call was launched in February/March 2021 and received 17 applications across the College. Five teams are currently being funded, including the development of a camera system for fluorescence-guided breast cancer surgery (GLOWII), and a smart tool for the comprehensive assessment of the diabetic foot (SMRTFLO).

Meet the IGHI team:
Dan Elson
Riccardo Secoli

Advancing patient safety

Our Patient Safety Translational Research Centre (PSTRC) continues to drive forward its mission of advancing the scientific evidence base for safe care, bringing improvements in care quality and safety. Over the past year, our PSTRC has been generating new knowledge on a range of pressing and emerging patient safety areas; developing, testing and implementing safety innovations; and building patient safety networks to share knowledge and best practice.

Our work spans the continuum of care, including improving diagnosis, preventing deterioration of health, medication safety, transitions of care, partnering with patients, and ensuring value for money. We are also working to improve patient safety globally as well as nationally. Opposite we have included a selection of our highlights from our global patient safety work, but would like to acknowledge the brilliant work carried out by the entire patient safety team over the past year.

Patient safety in fragile, conflict-affected and vulnerable (FCV) settings

With COVID-19 continuing to strain health systems globally, the number of FCV settings has expanded considerably and this will impact the safety and quality of care provided to millions of people. In 2021, we have continued to move forward with our research in this important area, publishing a commentary on the need to identify and evaluate patient safety interventions in these settings. We have also published a protocol from which we will launch a Delphi study to better understand the interventions that can improve patient safety in FCV settings.

Meet the IGHI team:
Alexandra Shaw
Niki O'Brien
Kelsey Flott
Ana Luisa Neves
Mike Durkin

World Patient Safety Day

On the 17th September, the World Health Organization held the third World Patient Safety Day, this year supporting the theme of "safe maternal and newborn care". In recognition of this occasion, we hosted a virtual event to better understand the impact of COVID-19 on staff burnout and resilience, with a focus on maternity and neonatal staff. We also explored the safety impacts for patients and their families from the changes to maternity and newborn care delivery.

Our event featured a keynote from the former Secretary of State for Health and Social Care and current Chair of the Health and Social Care Select Committee, the Right Honourable Jeremy Hunt MP. We were fortunate to also be joined by UK and international safety leaders and experts in maternal and newborn care for a live panel discussion. To guide the discussion, before the event we held focus groups with people who had used maternity services to understand their experiences and bring the questions this raised into the conversation with panellists.

In conjunction with our event, the PSTRC team produced a BMJ commentary titled 'Striving for equality by putting women at the centre of their maternity care'. This highlighted the need to reduce inequities in outcomes, and the importance of putting women at the centre of their care and including them in decision-making.

Meet the IGHI team:
Alexandra Shaw
Ana Luisa Neves
Mike Durkin
Niki O'Brien
Gianluca Fontana
Mabel Prendergast
Eleni Daniels
Jessica Tingle

Thank you

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Alay Cristales-Rangel

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