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ARC West Midlands News Blog





What Kind of Questions Can We Answer Through the Hospital Episode Statistics Database?

Richard Lilford, ARC WM Director; Kamlesh Khunti, ARC EM Director

ARC West Midlands carries out some of its research by analysing large databases through the [Margaret Peters Centre](#). This Centre is a joint venture with [ARC East Midlands](#). The Centre is focused mainly on two sources of data: first the rich database in our host hospital, University Hospitals Birmingham NHS Foundation Trust (UHBFT); second, the Hospital Episode Statistics (HES) database, which can be linked to the small area deprivation database and the Office for National Statistics. We are increasingly aligned to the new [Health Data Research PIONEER hub](#) at UHBFT. This centre is a national resource linking the hospital dataset, West Midlands Ambulance and the Society for Acute Medicine. ARC WM also has access to general practice databases, notably the THIN database.

In this article we showcase some of the studies we have carried out or which are underway. Our purpose is to pique the interest of potential

collaborators by showing the sorts of questions that can be tackled through the Margaret Peters Centre.

Clinical Questions

Our exhibit here is the question of the effect of removing or retaining the ovaries at the time of a hysterectomy for benign disease. We carried out the largest study ever of this topic, showing that removal of the ovaries was associated with an increase in cardiovascular disease. This propensity score matched study was published in the BMJ and attracted media interest.[1]

Randomised Trials Using Routine Data Only

Our exhibit here is an opportunistic individual factorial RCT of over 8,000 frontline staff, who were given different types of 'nudge' in

an attempt to increase uptake of seasonal flu vaccines. We showed with high precision that the interventions were totally ineffective and the findings were published in the BMJ Quality and Safety within a year of the initial idea.[2] We are looking for further imaginative ideas to test in this way.

Emergency Transport & Admission

During first COVID lockdown no less than 16 newspaper articles stated that there were less ambulance transfers for patients with acute stroke or confirmed heart attack. We were able to disprove this claim and published the findings in a Lancet letter.[3]

Comparing the Results of RCTs with Routine Practice

Clinical trials suggest better outcomes when the gall bladder is removed during an acute admission than when it is removed as an elective procedure once the acute phase is over. Our large database study found that these results were not replicated in routine practice.[4] You used an inaccurate method to judge an accurate one, do I hear you say? Check the article.

Health System Policy

Here our exhibit is the policy of using independent hospitals to carry out elective surgery. In by far the largest study of its type, and across 18 operation types, we showed that NHS-funded patients had shorter stays and were less likely to be re-admitted after discharge, when their operation took place in an independent hospital than when it took place in an NHS hospital. This paper has been submitted for publication.

Monitoring the Uptake of Results of Surgical Trials

The HTA programme has published three RCTs on the management of different fractures. In all three trials the findings favoured a less invasive method over a more invasive method. In none of these trials did the publication of the findings change practice, but in two of them there was a change in practice that anticipated the eventual trial result.[5] We are now examining the uptake of the findings of other surgical trials.

Assessing Trends in Hypoglycaemia Outcomes in Era of New Therapies

This study of trends in all hospital admissions for hypoglycaemia showed despite safer therapies with lower risk of hypoglycaemia, over 10 years rates of admission increased by 39% in absolute terms and 14% considering the general increase in hospitalisation.[6] Within this programme of work, we also demonstrated that HES data can be used to develop pragmatic risk prediction tools to predict in-hospital death and 24 hour discharges to reduce mortality and improve discharge plans in people admitted with hypoglycaemia.[7]

Comparing Outcomes in Trials with Those in Real World Data

Linked HES data to routine primary care were used to determine differences in cardiovascular outcomes and mortality in people following hypoglycaemia in people with Type 2 diabetes. The study showed that rates of severe outcomes were similar to those found in randomised trials and also confirmed that events occurred within similar timeframes.[8] The study also extended findings to a population with Type 1 diabetes which hadn't been compared previously.

Trends in Heart Failure

Using linked primary care data with HES, we showed that over 20 years, the difference in age at HF diagnosis between the most affluent and most deprived is widening, with the most deprived group becoming younger at the same rate as the most affluent group are aging, with the most deprived at significantly increasing higher risk than the most affluent. The study also showed that South Asian and black groups are younger at HF onset than whites with higher prevalence of cardiometabolic comorbidities.[9]

These are just a few examples of the sort of study that we can carry out. Previously, we have provided a summary of methodological issues in this kind of database research.[10] We would like to encourage potential collaborators to discuss their ideas with us. We do not have a formal selection process, but treat ideas as an emergent project. That is to say, we like to work with the proposer of an idea in an iterative fashion. Rather than eliciting protocols for selection or rejection, we prefer to work with colleagues to develop and test the feasibility of ideas. But we do ask proposers to carry out a scoping review, to ensure a sufficient degree of originality. We meet regularly with our public advisors who are encouraged to help in prioritisation and to come up with ideas in the spirit of co-production. So here is an invitation to bring forward promising ideas that we can evaluate.

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ARC and BRC Joint Working

Paul Bird (Head of Programmes [Engagement], NIHR ARC WM and Knowledge Mobilisation Lead, WMAHSN);

Clare Jinks (Professor of Health Research, Keele University)

ARC West Midlands and the National Institute for Health Research Biomedical Research Centre (BRC) are close neighbours – *not just alphabetically* – but geographically, with bases at the University of Birmingham and within the Institute for Translational Medicine at University Hospitals Birmingham NHS Foundation Trust. In some ways we operate at opposite ends of the NIHR translational medicine pathway, with the BRC being focussed on developing new biomarkers and treatments specifically for conditions such as Crohn's Disease and Rheumatoid Arthritis (RA), with ARC WM looking much more broadly at service delivery interventions across health and social care. However, we are much closer collaborators than you might expect; indeed in a recent meeting between our organisations, both were pleasantly surprised at how much joint working was and is taking place. We thought our News Blog readers might be interested to learn of some present and future examples of collaboration.

Zoe Paskins and Clare Jinks (Keele University and ARC WM) have overlapping interests with Marie Falahee and Karim Raza (University of Birmingham and BRC) about how people take medications for musculoskeletal conditions like RA and osteoporosis. They both draw on the *Necessity-Concerns Framework* to study how people make decisions about whether or not to start taking medications and whether or not to carry on taking medications. The teams will discuss these mutual areas of interests and possible future collaborations. Christian Mallen and Clare Jinks (Keele University and ARC WM) and Karim Raza (University of Birmingham

and BRC) have collaborated extensively around help-seeking behaviour of patients with early onset RA. This has included the development of the DELAY questionnaire, which provides a tool for researchers to evaluate individual, cultural and health service barriers to help-seeking behaviour at RA onset. This has led to further work exploring the effect of campaigns to promote rapid help-seeking behaviour at the onset of RA, along with more detailed work to better understand the patient pathway and the factors which delay patients from presenting, firstly to their general practitioner, and then onwards to a rheumatologist in secondary care.

ARC WM and BRC are now collaborating on a grant application around the earlier identification of RA. We know from existing studies that there are significant cost savings to be made through the early identification and diagnosis of RA. We are planning a study looking at using community pharmacists to identify patients who may not yet have presented with symptoms to their general practitioner, thus reducing one of the known delays identified in earlier work. This work will also draw on the extensive links to community pharmacy accessed through another of our close collaborators the West Midlands Academic Health Science Network, and builds on the work that Keele University have done with community pharmacists enhancing care for patients with osteoarthritis.

With thanks to Prof Karim Raza (University of Birmingham, NIHR Birmingham Biomedical Research Centre) for helping with this article.

Some Pictures Are Worth More Than 1,000 Words: Using Control Charts to Decrease Adverse Events in Surgical Care



Kelly Ann Schmidtke (Assistant Professor), Laura Kudrna (Research Fellow)

While some pictures are worth 1,000 words, others may be more valuable. Here we are concerned with pictures used to monitor performance in health and social care. A basic time series chart can reveal upward and downward trends, see Figure 1. Additional lines may be added to demark targets, e.g., 85% of patients should wait a maximum of 62 days to begin their first definitive treatment following an urgent referral for suspected cancer. Such targets are often used by regulators to impose penalties on organisations that do not achieve them, but once a target is achieved there is little incentive for further improvement. An even more valuable chart would include control lines set at two or three standard deviations from a central trend, the right side of Figure 2.[1] Control lines allow readers to distinguish between common and special cause variations for continuous quality improvements. Common cause variations are more likely the result of a general process that underlies all the data; Adjusting that general process may shift trends

up or down. Special cause variations are more likely the result of an unexpected event disrupting the general process and can be identified through investigation; adjustments can then be made to root out deteriorating variations and to increase improving variations. Time series charts with control lines are called control charts.

The potential for control charts to reduce adverse surgical outcomes was recently demonstrated by Duclos, et al.[2] In their trial, major adverse events occurring after digestive tract surgery were monitored across 40 hospitals' surgical departments for two years before and after randomisation into either

a control and intervention group. The 20 hospitals in the control group did not receive any intervention. The 20 hospitals in the intervention group received a quarterly set of control charts for each adverse event to display on their operating room walls. The control and warning limits were set at three standard deviations and two standard deviations around the central line respectively. Special cause variations were defined as a single point sitting outside the control limits, or two of three successive points outside the warning limits. To facilitate implementation, local champions were instructed on how to interpret the control charts. Local champions were also instructed to lead

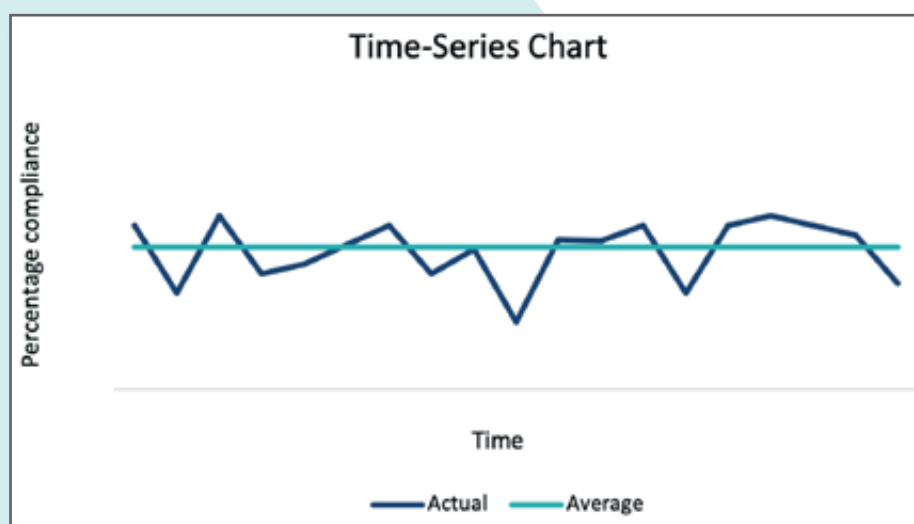


Figure 1: Time Series Chart

discussions with their wider surgical teams around those control charts that including collaboratively devising plans for improvement. Compliance with the training was also captured.

Compared to the control group, the intervention group experienced significant decreases in major adverse events, patient deaths, and intensive care stays. The improvement effect size was proportionally related to training compliance, such that highly compliant hospitals experienced greater benefits. The researchers also compared the rate of deterioration and improvement special case signals before and after the intervention. Encouragingly, the intervention group experienced greater increases in improvement signals than the control group.

Research within ARC West Midlands is already tracing implementation of a national training programme in the United Kingdom called “Making Data Count”.[3] This scalable programme aims to build capacity and motivation of people in NHS Trusts to construct, interpret, and then use control charts from the department to the board room. As our previous research suggested that use of control charts across NHS trusts was very low,[4] our current research focuses on a process variable – how often control charts are used in board paper across trusts that have and have not experienced this training. Reassuringly, the training programme appears to increase the number of control charts that appear in board papers. Encouraged by our findings and Duclos, et al.’s trial findings, our future research may trace the organisational or health benefits of control chart use. Alternatively, the more

nuanced factors that influence how and why control charts are used in different areas of clinical care could be examined by asking people about their experience using these charts.

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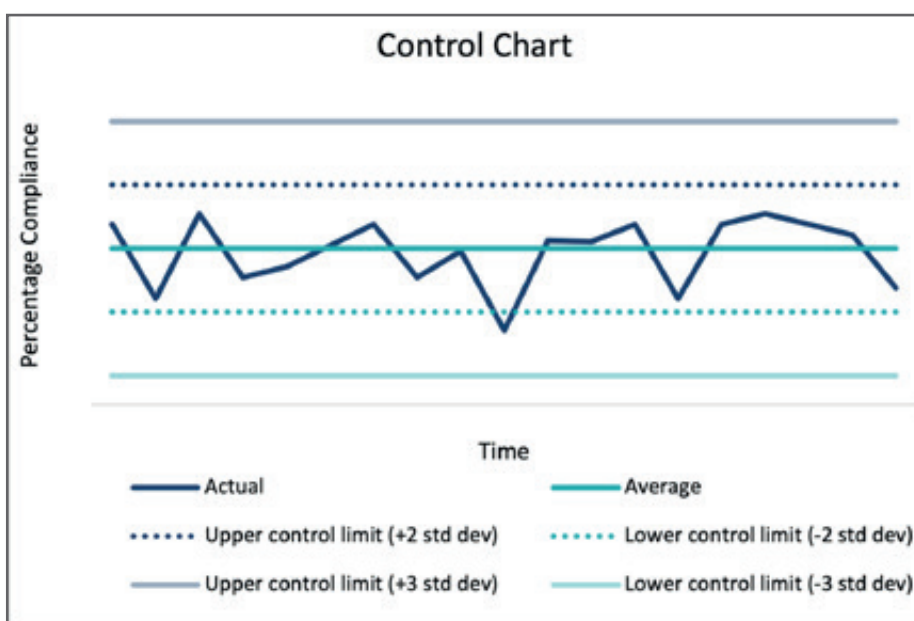


Figure 2: Control Chart

Populism and the Flight from Science

Russell Mannion, Prof of Health Systems, University of Birmingham

Whether it's the '[QAnon shaman](#)', climate change skeptics, anti-vaxxers or COVID-19 deniers, social media is replete with conspiracy theories seeking to undermine trust in science and scientific institutions. While it is tempting to dismiss these as the delusions of an extreme fringe, we do so at our peril. Recent blogs have highlighted the genetic and psychological factors that predispose individuals to hold anti-science beliefs.[1-3] Here we move beyond behavioural explanations to consider the political context of science denial – in particular the rise of Populism, which over the past decade has provided a fertile breeding ground for anti-science sentiment to take root and flourish.[4] There are copious explanations for the upsurge in Populism.[5] One interpretation is that increased economic inequality, especially among communities 'left behind' by the forces of global capitalism, has fuelled popular resentment against liberal elites who are perceived as having turned their backs on them. An alternative reading is that Populism is a symptom of a retro-backlash against successive waves of progressive cultural change. This, it is argued, has created a dissatisfied pool of potential voters susceptible to populist appeals exploiting anxieties around multiculturalism and promising a return to a 'golden age' of traditional values (MAGA; Take back Control).

Against this background, Populism frames politics as a morally charged struggle between two antagonistic groups: 'the people' understood to be fundamentally virtuous and the 'elite,' understood to be fundamentally corrupt and estranged from everyday life. Populists leaders believe that they—and they alone—represent the true voice of the people. Crucially, anti - elitist populist sentiment targets not only political

elites but also extends to technocratic elites who are viewed as representing the establishment, including, scholarly institutions, scientific experts, medical authorities and the like.[6,7] Populism valorises folk wisdom' over scientific expertise,[8] with the refrain 'the people have had enough of experts'. In eschewing expertise, forms of knowledge based on authentic first-hand experience are seen as being a more legitimate basis for political decisions than evidence generated by academic experts. For Populists, 'the people' and 'the elites' hold competing claims to epistemic authority - 'popular' truths against 'elite' lies -propagated by establishment' institutions and the mainstream media. This explains why Populist politicians are often not embarrassed by their poor comprehension of the scientific consensus and even proud of making factually incorrect statements. Confronted with the perceived arrogance of the experts, Populists respond with the 'arrogance of ignorance'. [9] But what are the implications of this anti-science populism for public health in the time of pandemic?

Although Populist government responses to the pandemic differ, there are clear similarities, which coalesce around four common themes: initial denial and then mismanagement of the pathogen; the pandemic being framed as primarily an economic rather than a public health crisis; a contempt for scientific and professional expertise; and the 'othering' of marginal groups for political ends.[10] Populist politicians have aligned with anti-vaccination groups and used social media platforms to promote conspiracy theories - chiefly that pharmaceutical companies and political elites are covering up the truth that vaccines are unsafe and cause autism, in order to protect their profits.[11] A study based on

national-level data from 14 European countries found a highly significant positive association between the percentage of people in a country who voted for populist parties and the percentage who believe that vaccines are not important and not effective.[12] In the largest global survey of its kind, more than 25,000 people across almost two dozen countries found that people with strongly held populist views were on average almost twice as likely to believe that supposed harmful effects of vaccines were being deliberately hidden from the public.[13] They were similarly more likely to believe that man-made global warming was a hoax and regard the media and mainstream sources of knowledge as biased and dishonest.

Of course, science should be open to challenge in regard to the benefit it yields to society. But in a polarised political environment which fosters a conspiratorial mind-set, truth claims become symbolic of entrenched tribal identities. Experts are deemed to be wrong not only in terms of knowledge, but also in terms of their morals and underlying motivations – *ad hominem*. Social media fact checking which challenges the spread of false and malicious information has a role to play. When conspiracy theories are harmful to the public good, legal safeguards may also be required, as in Germany where Holocaust denial is a crime. But the populist revolt against expertise may be difficult to resolve unless the underlying cause of populism - an iniquitous economic system - is addressed.

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Initial Thoughts on Health and Social Care Reform

Paul Bird (Head of Programmes [Engagement], NIHR ARC WM and Knowledge Mobilisation Lead, WMAHSN)

Earlier this month the Secretary of State for Health outlined the new [draft White Paper on health and social care reforms](#). To a system still stretched fighting the acute phase of COVID-19 pandemic, with a very long recovery phase still to begin, the idea of further reform and reorganisation would usually prompt howls of protest. There were indeed some of these, but rather less than perhaps might have been expected. Rather than being due to system leaders being consumed with fighting the pandemic, this generally seems to be because the reforms, if not perhaps the timing of them, have been broadly welcomed by reliable barometers such as the NHS Confederation and the King's Fund.

Of course, strategy can easily become broad platitudes to which everyone can subscribe, and the 'devil lies in the detail'. At this point I will defer to my learned colleagues Prof Aileen Clarke (Public Health Theme Lead) and Prof Robin Miller (Social Care Theme Lead) whose areas of expertise will be most affected for their views on reform. However, I will offer some initial thoughts on the outline proposals and the presentation thereof by the Secretary of State in Parliament.

The most prominent headline is the greater integration of health and social care, which will be almost universally welcomed. With greater multi-morbidity and an ageing population, integration of services has become more important to the individual experience of quality of care. However, it should be noted

that the evidence of the cost-effectiveness of the integration of services is limited, with many proposals which look attractive on paper failing to deliver the true savings or reductions in health care usage promised.[1]

Also, whilst the Secretary of State noted that "health and care are part of the same ecosystem", he acknowledged that decision making should be integrated "as much is practically possible". Herein lies the problem that is not laid out explicitly; whilst all might agree integration is a good idea, the ability to deliver this is severely constrained. Health care is funded through national taxation, social care through local taxation. Healthcare is free at the point of care, much of social care is means tested. Healthcare is overwhelmingly delivered through the public sector, social care largely through the private sector. So to encourage greater friendship between the two is to be commended, but whilst they might share an ecosystem, health and social care remain quite distinct species at present. This, of course, may change with a badly overdue long-term strategy to fund social care. But without this integration is more likely to be cooperation, although this will still be welcomed by many.

The other reason these reforms will be welcomed is they quietly dispose of the "third way" of improving quality of care through competition promoted by New Labour health reforms early in the millennium and cemented in the [Health and Social Care Act 2012](#) that was, in policy terms, largely regarded as a disaster. Competition felt

intrinsically uncomfortable to many in healthcare and the opportunity to build services based on collaboration rather than competition will surely prove popular. The vehicle to deliver greater collaboration is the newly created Integrated Care Systems (ICS), which bring together healthcare providers and commissioners to provide capitated health systems similar to those seen in the USA. Essentially this creates a geographic area within which there is a single budget for healthcare provision which can be prioritised according to local or regional need. Many within Public Health will welcome this greater emphasis on 'place' but how much local discretion truly exists when there are a plethora of national guidelines and recommendations around treatments remains to be seen.

There was also a welcome focus on workforce within healthcare which has tended to be dominated by short term thinking in recent decades. Perhaps the experience of Nightingale hospital helped to bring in to sharp focus that facilities are helpful but of limited utility without the workforce to underpin them.

Overall, these reforms are being broadly greeted

as a positive step in the right direction, even if the timing is less universally welcomed. However, in this regard as a former NHS operational manager I have some sympathy for policy makers here, as if you believe the benefits are significant there is unlikely to be a universally acceptable time to introduce change and if so then the right time is probably now.

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ARC WM Quiz

Which medical student made a discovery that would be particularly important to you if you were a diabetic?

email your answer to: ARCWM@warwick.ac.uk



Answer to previous quiz: The Haber Process, for which Fritz Haber was awarded the Nobel Prize in Chemistry, is a means to **produce ammonia** from nitrogen and hydrogen.

Congratulations to Alan Hargreaves who was first to answer correctly.



The Impact of Greenspace in Prisons

Peter Chilton, Research Fellow

In a previous CLAHRC WM news blog we reported on a paper that showed an association between greater exposure to greenspaces while growing up and lower risk of mental health problems in adulthood.[1, 2] A recent study conducted by the Universities of Birmingham and Utrecht brought this back to mind.[3] In this recent study, the authors used geographic information systems (GIS) mapping to calculate the percentage of greenspace (grass, bushes, trees, etc.) within a cross-section of English and Welsh prisons and compared this to various measures of interest – incidents of self-harm, assaults on staff by prisoners, and violence between prisoners. After adjusting for capacity, level of security, prisoner demographics, and type of prison, they found a significant positive association – those prisons with more greenspace had lower rates of violence and self-harm amongst the prison population.

Not only could providing more greenspace improve the mental and physical health of prisoners and prison staff, it could also help in other areas, such as managing costs – according to the authors’ research there were ~61,000

incidents of self-harm in the 12 months till June 2019, with an average hospital cost of around £800. Further, there are around ~30,000 incidents of prisoner violence, and ~10,000 assaults on staff annually, with over £85 million being paid out in litigation claims by Her Majesty’s Prison and Probation Service between 2016 and 2019.

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Effectiveness of Mobile Stroke Units

Peter Chilton, Research Fellow

We know that the effectiveness of thrombolysis for patients who have suffered an acute ischaemic stroke is time-dependent. To this end, ambulances equipped with a computed tomographic (CT) scanner (mobile stroke units [MSUs]), which are able to administer thrombolysis while transporting the patient to hospital, will be able to shorten the time to treatment. Researchers in Germany recently set out to look at whether such actions were associated with improved clinical outcomes, using a non-randomised controlled intervention study.[1]

During the intervention period (Feb 2017 – Oct 2019) emergency service dispatchers sent both a conventional ambulance and, where possible, a MSU if there was suspicion of a stroke (n=749). Data on outcomes were then compared with outcomes from patients who were attended by a conventional ambulance only (n=794) (where the MSU was unavailable). Those patients to whom an MSU was also dispatched had a lower median disability score at three months post

incident (measured using modified Rankin Scale [mRS]) (odds ratio 0.71; 95% CI 0.58-0.86, $p < 0.001$), as well as lower co-primary disability scores (OR 0.73, 95% CI 0.54-0.99, $p = 0.04$).

The authors plan to conduct future research in this area, including looking at the cost-effectiveness of dispatching MSUs.

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Latest News and Events

Postgraduate Research Opportunity

The Division of Health Sciences at the University of Warwick have a number of postgraduate research opportunities available, including one within the Youth Mental Health theme of our ARC WM - *Reducing health inequalities through increased screening in people with intellectual disability*.

Details, and how to apply are available at: <https://warwick.ac.uk/fac/sci/med/study/researchdegrees/howtoapply/hs>.

Midlands Health Alliance PPIE Event

Midlands Health Alliance are holding a Patient and Public Involvement and Engagement event between **15-17 March 2021** entitled *'Beyond COVID-19: New directions for Public Involvement in Health and Social Care Research in the Midlands.'*

All members of PPIE groups across the Midlands as well as anybody interested in finding out more about this area are invited to join in this first virtual conference that brings together the PPIE community to:

- Learn about the latest developments in PPIE
- Share ideas and best practice for such areas including empowering PPI representatives
- Plan for the future
- Network with PPIE professionals and representative.

For more information, and to register, please visit: <http://bit.ly/2NAjDBa>.

Teenage Scientist Publishes First Academic Paper

Oliver Lawton, a fourteen-year-old schoolboy, has recently had a paper on how young people have accessed information during the COVID-19 pandemic published in [BMJ Pediatrics Open](#).

He was aided by a number of researchers including Prof Christian Mallen, long-term conditions theme lead at NIHR ARC West Midlands. [Click here to read more](#).

National NIHR ARC Newsletter

The February issue of the national NIHR ARC newsletter is now [available online](#), including reports on a data modelling tool to forecast vulnerability of local populations to COVID-19; roll-out of long-COVID clinics; and tackling childhood obesity.

To subscribe to future issues, please visit: <https://tinyurl.com/ARCSnewsletter>.



Artificial Intelligence and Racial and Ethnic Inequalities in Health and Care Call

The *Artificial Intelligence and Racial and Ethnic Inequalities in Health and Care* call will support research to advance AI and data-driven technologies in health in ways that better meet the needs of minority ethnic populations.

The call will fund two categories of research:

- Understanding and enabling the opportunities to use AI to address inequalities.
- Optimising datasets, and improving AI development, testing and deployment.

The call opens on Wednesday 24 March 2021. The deadline for applications is **13:00 on Wednesday 21 April 2021**.

A webinar will be held on Wednesday 10 March 2021, 12:30-14:35, to introduce the NHS AI Lab AI Ethics Initiative. Potential applicants will have an opportunity to hear about the first three projects in the initiative and ask questions about the Racial and Ethnic Inequalities in Health and Care funding call. [Sign up online](#).

Health Services Research UK Conference 2021

Registration is now open for this year's Health Services Research UK Conference, which will take place online from **6-8 July 2021**.

A wide range of live plenaries, workshops and discussion groups are being offered across the three days, as well as over 150 research presentations that which will be accessible on demand.

Plenaries will include:

- Long COVID: patient experience and the developing research agenda.

- Meeting future challenges for the NHS workforce.
- Diversity and inclusion in health and care research.
- Science, evidence and government policy: lessons from the COVID-19 pandemic.

For more information, and to register, please visit: www.eventsforce.net/hsruk2021.

Early Bird rates are available until 15 March.

Development and Skills Enhancement Award: Latest Round

The latest round of the Development and Skills Enhancement Award is now open. This post-doctoral opportunity is available for individuals who meet the criteria to be an NIHR Academy member and is open three times a year. Those wishing to develop skills and experience in entrepreneurship and working with industry; health data science; and/or clinical trials, are particularly encouraged to apply.

Deadline for applications is **31 March 2021** and the maximum duration of the award will be one year and may be taken up on a part time basis of between 50 and 100 WTE%.

Further information, and how to apply, can be found at: nhr.ac.uk/funding/development-and-skills-enhancement-award/26427.

Recent Publications

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