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ARC West Midlands News Blog



3 November 2023

Embedded Research

Richard Lilford, ARC WM Director

Background

The NIHR have removed the requirement to secure co-funding contributions from Service Organisations for the extension to Applied Research Collaborations (ARCs). We think this is a pity, but for our ARC, it matters little. The considerable co-funding we achieved represents goodwill and collaborations that will endure. Moreover, our USP remains the extent to which we are embedded in the services and the steps we are planning for yet further integration in both health and social care. But this begs the question of why we integrate and how we do it. Since form should follow function, let us start with aims – what is achieved by service/research collaboration in the service?

Aims of Service/Research Collaboration

The literature on integration of research and services focuses mainly on one particular advantage of integrated research – increasing uptake of research findings (a concept frequently captured by the term ‘achieving impact’). In our opinion this knowledge brokerage/ co-assimilation is too narrow an aim, though it is the dominant theme in the literature, such as a recent narrative review of the subject published in the NIHR Journals Library.[1] Building on a previous News Blog article,[2] there are four potential aims of integrated research:

1. **Inform.** Providing the knowledge needs of an organisation through knowledge brokerage of some type.
2. **Implement.** Providing academic support in implementing innovations/change in practice. Here, researchers deploy the panoply of organisational sociology,

behaviour psychology/economics, and logistics/patient flow analysis. This function turns knowledge into action.

3. **Evaluating** implementations of interventions to improve outcomes (quality, safety, efficiency, patient centredness, accessibility, equity) of health care.
4. **Education** – either through shared educational events or as a spillover effect of the above three activities.

As said, most of the literature on academic service integration focuses (explicitly and implicitly) on the first – knowledge brokerage / management function. The literature on service/research integration includes (or mentions) education (‘capacity generation’), which we do not consider further here, but which is an important fourth aim.

A theme running through much of the literature on service/research integration is the need for knowledge to be ‘co-produced’. Co-production is applicable to all four above functions. The box below contains a quote from the NIHR article cited above,[1] which seems to be arguing for this approach, albeit in a rather elaborated style.

“Radical knowledge co-production, rejecting the object-and-transfer conceptualisation, imagines knowledge instead as a valued attribute of people located in time and place, a process performed and embodied, a presence that empowers and includes, a pervasive energy in movement and change, and a collective and communal good.”

That said, it is worth acknowledging that the three functions above are not hermetically sealed from each other. Moreover, they can be arranged

in a causal chain consistent with the first MRC Guidance on Complex Interventions,[3] as in Figure 1 below.

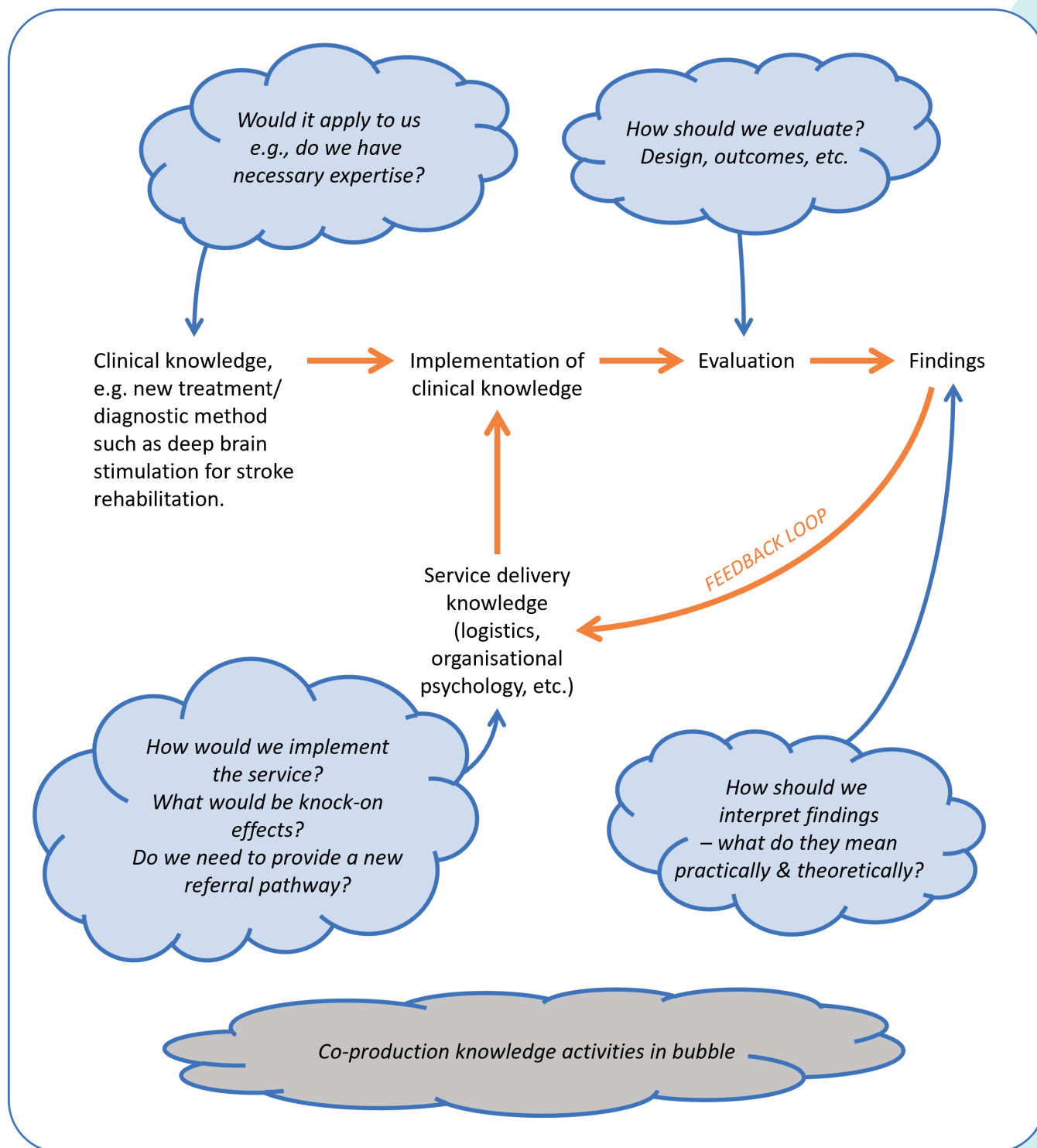


Figure 1: Representation of the Development of New Service Delivery Knowledge

A great deal is written about boundary spanning, development of trusted relationships, mutual respect, and other self-evident requirements for research/service collaboration. Much has been written about the limitations of simple knowledge transfer models and the importance of co-production summarised in a recent NIHR

library publication. It goes without saying that such work should be complemented by collaboration with members of the public and service users, in which we support a triad structure – researchers, public contributors and service managers / policymakers (see Figure 2).[4]

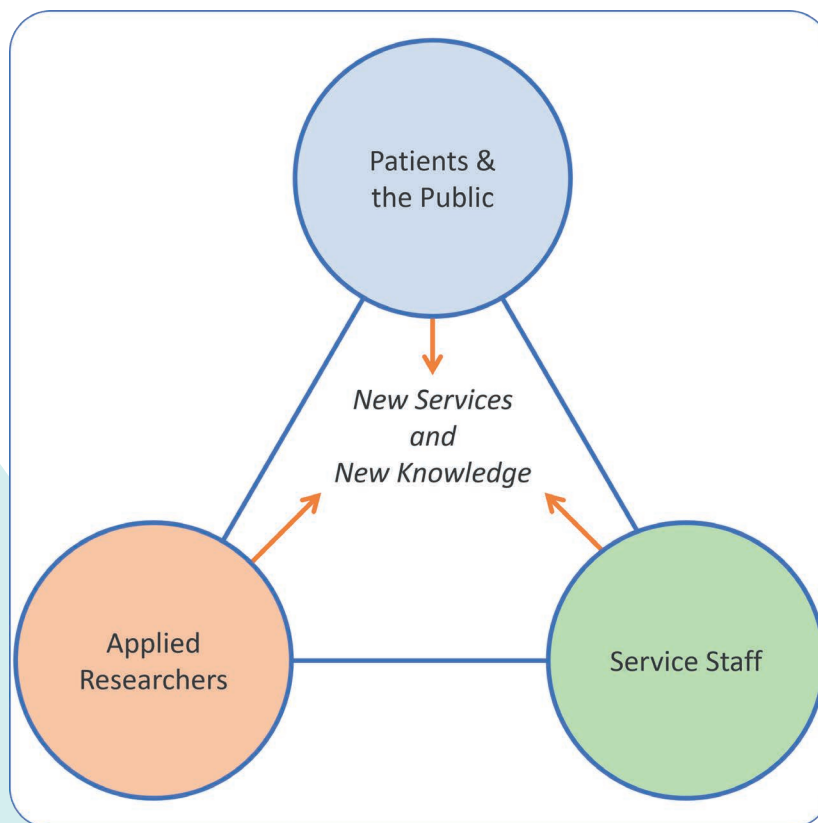


Figure 2: Triad Structure

Methods to Achieve Service/Research Collaboration

The co-funding requirement mentioned above was a method of achieving, or at least demonstrating the existence of, service/research collaboration. However, the most widely cited method to achieve service/research collaboration, both in the literature and in personal conversation, is through embedded posts. There are many types of embedded post, varying across many dimensions. These dimensions include type of person required; who should employ the person; and the 'dose' in terms of time commitment to combined activities.

🔗 Skills required

The task of an embedded researcher is somewhat open-ended and elides into activities that (should) occur naturally in service and academic institutions – for example, reviews of evidence in academic institutions, and complying with guidelines/ government instructions in service

institutions. In the early days of the evidence-based practice movement there was an emphasis on supply-led demand. That is to say, 'knowledge brokers' would try to broker evidence into action – a 'push' function. Alternatively, a service practitioner may be minded to implement a service or clinical innovation, and might want to know whether the proposal is generally a good idea and, if so, how it might best be implemented – a 'pull' function. Some insight into this process was provided by the work of John Lavis, which showed that service managers are mostly influenced by directions from their controlling (central) organisations, e.g. NHS England in the UK.[5] It is certainly the case that endorsement from a central organisation (think NICE, or the Agency for Healthcare Research and Quality) is a necessary condition for adoptions of many types of clinical/service innovation. However, adoption of recommended practices can be facilitated by academic collaboration.

For example, our ARC WM worked with NHS England to promote the now nearly universal adoption of Statistical Process Control (SPC)

methodology in English NHS hospitals,[6,7] while NIHR ARC West promoted nationwide uptake of use of magnesium sulphate for premature infants.[8] However, in addition to promoting service-wide initiatives, embedded researchers can facilitate local innovation. These activities often entail rapid knowledge transfer based on literature review. For example, the ARC WM Director was able to advise service leads that the expected effectiveness of a proposed intervention to reduce hospital readmissions was unlikely to meet expectations, as those expectations exceeded the proportion of readmissions that are preventable according to previous literature. Such helpful advice is unlikely to produce an academic dividend (in terms of a published paper). However, embedded researchers are in a position to glean early intelligence regarding interventions that the service plans to introduce. In that case, a prospective evaluation can be implemented in a scenario where, without embedded researchers, only a (weaker) retrospective evaluation would be possible. Such prospective evaluations are made possible under three sets of conditions:

1. The researchers and the service personnel are working on the design and implementation of a suite of interventions, such that development of the evaluation can follow the MRC pathway above. For example, we are working on the design, implementation, piloting and evaluation of artificial intelligence solutions to reduce clinical error,[9,10] and to triage maternity admissions according to medical urgency.[11]
2. Researchers become aware of a problem that service managers face and propose both a solution and evaluation. For example, ARC WM researchers helped a local hospital to meet a service target regarding staff vaccination.[12]
3. The service plans to implement a fully worked-up intervention, but wishes to collaborate on a prospective evaluation. We call this opportunistic research.[13] An

example from our ARC WM concerns falls prevention in hospitals,[14] and evaluation of General Practitioner based hospital emergency services.[15]

Prospective evaluations are generally stronger than retrospective evaluations because they enable more robust designs and collection of non-routine data. In all of the above three scenarios, an academic output can be expected, and this in turn can lead to overall gains for society. In the shorter term, simply alerting service managers to existing evidence can improve services and avoid wasting resources, but may not provide academic output. Prospective evaluations include economic modelling to answer 'what if' questions. For example, how effective would a hospital-at-home intervention need to be to be cost-effective at a known (or assumed) cost and willingness-to-pay threshold? Indeed, we argue that such prospective evaluations are under-used in health services research.[13,16]

✦ **Skill set for embedded posts**

We have seen that embedded posts can achieve four types of goal: providing/brokering knowledge, improving intervention implementation, evaluating interventions, and contributing to education. The question is what type of person can fulfil these functions? Our starting point is that many of the required skills already exist in service and academic organisations, and few (or any) of the skills needed are the sole preserve of one or another organisation. Two corollaries seem to flow from this stem:

1. The embedded post holder(s) should have an understanding of a wide range of organisational and research skills, even if they are not expert in any one.
2. They should have excellent communication and inter-personal skills.

3. Attention to detail to identify opportunities to inform, implement, evaluate and educate.

In short, they embody availability, affability and ability (perhaps in that order!). They should not be expected to be able to do everything – this is in contrast to some job descriptions cited in the above NIHR review.

Who should employ the above ‘boundary-spanners’?

Embedded posts could be employed in the service or research institution. While we have encountered strong opinions both ways, we find no compelling argument for either option. However, we think the post-holder should have power within the organisation, through seniority or otherwise, or at least be very closely coupled to senior and influential people. This is because they need to be able to articulate the service and research needs in a way that commands influence and respect. To be clear, these roles require an element of ‘marketing’. The risks for an organisation such as an ARC are two-fold; that a service employee may neglect their research portfolio and vice-versa for an academic employee. No-one said this subject is easy. However, we have had successes and failures with both types of post in our ARC/CLAHRCs. The Health Service already employs a number of people with tasks that align to embedded ARC posts. For example, the Clinical Research Network (CRN) already part-funds ‘Clinical Scholars’ (clinicians with a quality improvement mandate) who align well with the role described. Our preference is for embedded posts that play a boundary-spanning role, while also carrying out either a service or research function. That is to say, it seems preferable to have many people performing boundary-spanning roles, rather than just one person who has no role other than boundary-spanning for the following reasons:

1. This way, boundary-spanning functions can diffuse over a large and diverse service organisation.
2. Deeper relationships can be formed in particular services, such as mental health and maternity care, than can be achieved over an organisation as a whole.
3. It is (arguably) a more natural, hence replicable and scalable model.

In keeping with this philosophy of embedding boundary-spanning personnel in both the service and research organisations, post-holders should have ‘desk-space’ in both. A corollary of our approach is that embedded researchers can be thought of as ‘researchers in residence’ (in the service) or ‘service personnel in residence’ (in the university). In the case of clinical personnel, especially doctors, there is a long tradition of such dual appointments.

Dose and coverage

Since the skills of the boundary-spanners are already resident in both organisation types, the time that should be paid specifically for the boundary-spanning role can be modest. The trick is to incorporate such a role in the portfolio of people who have a vested interest in (enhanced) access to the organisation in which they are not employed. How the embedded post-holder is selected and managed is likely to be critical to success. An organisation like an ARC, which is itself a bridging organisation, has an obvious role to play here.

Also important is the readiness of the organisation to act upon the information channelled through boundary-spanners as organisations have varying levels of absorptive capacity.[17] Those which have had less emphasis on research within their development strategy may be starting from a significantly lower baseline, in terms of organisational capacity and capability to act upon information received.

At individual and professional level too there will be variance. Doctors, for instance, can access various sources of funding to potentially release time and so undertake research alongside clinical activities. For other professions, clear pathways or funding mechanisms often do not exist, meaning it is much more difficult to do – this is why ARC WM has a focus on developing pathways for Nurses, Midwives and Allied Health Professionals (NMAHPs). Local Authorities have a workforce within Public Health ideally equipped to assimilate evidence into practice, but a lack of internal resource and external infrastructure support (aside from the NIHR School for Public Health) means the potential here is not being realised to full effect. Implementation of [NIHR-funded Health Determinant Research Collaborations](#) is a welcome step in this regard, and ARC WM is a collaborator in the recently awarded Coventry centre.

The scale of engagement required to improve the integration of research and service delivery is significant.[18] ARC WM has 28 stakeholders committing co-funding, so a shared post in each organisation is far beyond what could be managed. Across the region more widely, there are literally hundreds of voluntary and third sector organisations, as well as NHS and Local Authority organisations who we collaborate with [19] and so any model of embedded working would undoubtedly have to be a coalition of the willing. One potential solution would be to have embedded posts within the Integrated Care Systems, of which there are six within our region. This would certainly provide access to senior decision makers, but might run the risk of being too far from service delivery teams to realise all of the opportunities for prospective evaluation of service change.

This article attempts to lay-out some of the issues relating to services/research integration. We do not have all of the answers, but we have tried to articulate some of the issues to be considered by those who wish to develop enhanced service/research interaction. In the commercial world, firms that innovate are more profitable than those that do not,[20] so the topic is important. ARC WM will be holding a ‘sand pit’ to consider this topic further, and ‘co-produce’ a solution for the West Midlands that will influence our ARC and a possible successor organisation. We will include considerations about integrated care systems/boards and the roles of voluntary and community organisations in embedded posts, which benefit from integrated care funding. We would be delighted to receive suggestions, evidence and opinions from others as we try to firm-up our ideas.

Acknowledgements: I thank Paul Bird, Alice Turner, Graeme Currie and Laura Kudrna for their helpful insights and contributions to this article.

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Partisan Differences in COVID-19 Mortality

Peter Chilton, Research Fellow

In this cross-sectional study, recently published in *JAMA Internal Medicine*, an association was observed between political party affiliation and excess deaths in Ohio and Florida after COVID-19 vaccines were made available to all adults; namely higher COVID-19 mortality among Republican voters compared to Democratic voters.

The researchers linked voter registration records and mortality data at the individual level. Prior to vaccines being available to all adults, there was no significant difference in excess mortality between Republican and Democratic voters. However, after May 2021 (when vaccines were offered to all adults) the gap widened – from April to December 2021, the excess death rate was 43% higher for Republican voters compared to Democrats (adjusted for age groups, time and state of residence). It was not possible to link individual vaccination status to the mortality outcomes. However, data were available for county-level vaccination rates, and an ecological study showed that counties with high excess death rates for Republican voters had lower overall vaccination rates, while the counties with highest vaccination rates had minimal differences between voter groups. Taken together, the individual-based study linking affiliation to COVID death and the ecological study linking vaccination rates to death, the

data suggests that differences in vaccine uptake contributed to the divergence in death rates. This would have influenced the severity and trajectory of the pandemic in the US.

These findings have profound implications moving forward. The COVID-19 pandemic is still ongoing globally, with new variants continuing to emerge. Without continued vigilance and vaccination, there is a risk of creating partisan divides that significantly affect health outcomes during any future waves.

Public health officials must continue working to improve vaccine uptake across all groups. Efforts to engage conservative leaders to promote vaccination acceptance have shown promise. Ultimately, bringing a population together to fight COVID-19 remains critical to averting preventable deaths in the years ahead.

Some readers might reflect that Enlightenment values, based on empirical data, scientific understanding and logical analysis, offer the best hope for individuals and societies alike.

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Female Surgeons Better Outcomes

Richard Lilford, ARC WM Director

There are now numerous articles showing that female surgeons either have the same or better outcomes compared to male surgeons. The existing literature is reinforced by three recent papers in JAMA.[1-3]

One of the above articles suggests a potential mechanism.[3] Females had longer operating times than men, followed by shorter hospital stays. This suggests that greater intra-operative vigilance may explain the difference.

The ARC WM Director has an alternative, or additional, explanation; that this could be the result of [Berkson's paradox](#). This is collider (selection) bias that would arise if less able women were less likely to become surgeons, than equally-abled men. It is certainly the case that, while the medical workforce as a whole is over-represented by women, the surgical workforce is under-represented by women, meaning that selection bias is plausible.

Nevertheless, the ARC WM Director is attracted to the vigilance explanation. When he was training as a surgeon, he noted that

some surgeons were more meticulous about haemostasis than others. Being a surgeon (or interventional specialist) is different to other types of medical practice in the sense that the patient is totally dependent (for the duration of the operation) on the actions of one person. The patient is literally in the doctor's hands. Surgery involves a particular type of responsibility – not altogether unlike that of a pilot. Maybe all procedures should be videotaped for quality control purposes, irrespective of the gender of the surgeon. I understand that this practice is routine in some countries, and some patients ask for a copy of the tape.

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Why Burying Bad Thoughts Can Be a Good Idea After All

Peter Chilton, Research Fellow

People who are having negative thoughts are often encouraged to share them with others, with the belief that this is the healthy thing to do. However, a new study published in *Science Advances* challenges this long-held belief. Researchers found that training people to suppress unwanted thoughts related to fears and worries led to improvements in mental health.

Researchers recruited 120 adults from 16 countries to participate in an online thought-suppression training programme. Participants were randomly assigned to either suppress their negative thoughts (about feared, plausible future events) or suppress neutral thoughts (control). Each group were further randomised in a 50:50 split to also imagine either positive or neutral future events, creating a 2x2 trial. Over the three days of the training, participants practiced both actively suppressing negative/neutral thoughts in response to reminder cues, and vividly imagining positive/neutral thoughts, doing a total of 36 repetitions.

Following their assigned training schedule, participants completed a mental health questionnaire, and were tested on their memory and emotions regarding the suppressed thoughts. Researchers found that there was no increased intensity of fears for those who suppressed their negative thoughts. On the contrary, participants reported that their fears were less

vivid, and provoked less anxiety. Suppressing negative thoughts also led to decreased anxiety, depression, and worry, along with increased wellbeing. These mental health benefits were greatest in those participants who had reported higher anxiety and trauma symptoms at the beginning of the study. This suggests the benefits come specifically from controlling distressing thoughts rather than suppression training alone.

The findings contradict the prevailing view in psychology that suppressing intrusive thoughts is unhealthy and could make anxiety disorders worse. The researchers propose suppression may work by inhibiting brain circuits underlying negative rumination. It strikes us that this method may have features in common with Cognitive Behavioural Therapy.

The study demonstrates a potential new intervention to improve mental health and resilience in anxious populations. If suppression training can be delivered remotely, it may offer an accessible option alongside therapy and medication. However, larger and longer studies are needed to verify the results and determine if benefits continue over time. Overall, the research illustrates how suppressing unwelcome thoughts, rather than being inherently maladaptive, may be a skill that protects mental health.

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Large Language Models

Richard Lilford, ARC WM Director

I have posted numerous articles in your news blog on AI – an acronym that no longer needs an explanation! But the method of AI has evolved rapidly with the advent of large language models (LLM). Here the computer creates a new syntax based on breaking language down into small pieces and learning through a neural network to predict from what has been written, what text should follow a statement or question. It is a breath-taking development that, for example, enables the computer to score a high mark on medical licensing exams.[1] The algorithm has seen so many similar cases before, linked to the reference standard (diagnosis), that it can make a reasonable predictive diagnosis.

So a new tool exists. Currently it can throw up lethal errors and even risks breaking anonymity, but it will improve over time, just as aeroplanes and cars have changed almost out of recognition. The development of LLM has spawned a flurry of excitement. JAMA is publishing “a series of interviews in which JAMA Editor in Chief Kirsten Bibbins-Domingo, PhD, MD, MAS, and expert guests explore issues surrounding the rapidly evolving intersection of artificial intelligence (AI) and medicine”. They are fascinating reading and I will cite some in future blogs.

One problem I have is in understanding the technology. I have a grasp, an idea, reflected in the above explanation. However I do not understand it deeply. I discern four kinds of people: those who admit they have only a fuzzy grasp (like me); those who think they understand it, but who don't really (I know a LOT of these); those who pretend they understand it (they know who they are); and those who really do understand it. I only know one, but I am looking for more!

I fly aeroplanes, drive cars, use computers, and do all quite well despite, in all cases, limited understanding of the technology. Nevertheless, I think many of us should try for a better grasp of this new technology and hope to arrange a teach-in through ARC WM. Any volunteers to help me organise it?

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1. Shah NH, Entwistle D, Pfeffer MA. [Creation and Adoption of Large Language Models in Medicine](#). *JAMA*. 2023;**330**(9):866–9.

Latest News and Events

ARCs at Four Years Old



October saw the fourth anniversary of the NIHR ARCs, and to celebrate this milestone, 15 projects of research implementation and impact were compiled from across the country.

These projects illustrate how ARC research improves the quality, delivery and efficiency of health and care services, improving outcomes for patients and the public both locally and nationally.

This document is available online at: <http://eepurl.com/irtVxc>.

Latest National NIHR ARC Newsletter

The October issue of the national NIHR ARC newsletter is now available online at: <http://eepurl.com/izKlxo>.

It features development of a new approach to attract people from diverse backgrounds into research participation; research showing inequalities in flu vaccine uptake widened during the pandemic; and a national mental health nurse study aiming to understand staff shortages.

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



ARC WM Quiz

November 3rd 2023 is the eighth annual One Health Day, which aims to highlight the need for a One Health approach to address shared health threats at the human-animal-environment interface. *What is considered the most common zoonotic infection globally?*

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

Answer to previous quiz: According to research presented at the 2023 British Cardiovascular Society conference, deadly heart attacks are more common on **Mondays**.

Congratulations to Alan B Cohen who was first to answer correctly.



European Social Services Awards 2023- Voting Open

A research project led by Prof Robin Miller (Social Care theme) has been short-listed for a European Social Services award. The project on *Sharing Voices of those who are Institutionalised to Change Practice and Policy* has been nominated in the Research and Evaluation award, which honours research that

provides knowledge leading to the development of evidence-based innovative initiatives in social services. To find out more about all of the projects (and vote if you wish to), please visit: <https://essa-eu.org/vote2023/>

Voting closes on **4 November 2023** at 12 noon CET.

Systematic Reviews of Mixed Methods Evidence CPD Course

University of Exeter are hosting a CPD Course on Systematic Reviews of Mixed Methods Evidence on **25-26 January 2024**. This course will focus on approaches, tool and methodologies; how to formulate mixed methods review questions; and approaches to searching, study selection, data extraction and critical appraisal.

More information is available at: medicine.exeter.ac.uk/cpd/systematicreviews/

To mark the NIHR's 2023 *NHS 75: Shape the Future* campaign, the latest research opportunities for healthcare professionals in the NHS that are available at NIHR ARCs have been collated and are available to view at: <https://>

NHS Shape the Future

arc-w.nihr.ac.uk/news/nihr-arcs-healthcare-professionals-nhs-research-opportunities-nhs75-shapethefuture/.

Integrated Care Conference 2024

Call for papers is now open for the 24th International Conference on Integrated Care (ICIC24), which will take place in Belfast on 22-24 April 2024. This year the overarching theme is *'Taking the leap: making integrated care a reality for people and communities'*.

For more information, including where to submit abstracts, please visit: <https://integratedcarefoundation.org/events/icic24-24th-international-conference-on-integrated-care-belfast>.

NIHR Pre-Application Support Fund

The first round of the NIHR Pre-Application Support Fund scheme has recently opened. This scheme provides extra support for up to 12 months to those who need it to enhance their chances of making a successful application to an NIHR career development scheme in the future.

Further information is available at: nihr.ac.uk/funding/funding-post-for-the-nihr-pre-application-support-fund-round-1/34439

The deadline is 13:00 on **30 November 2023**.

Recent Publications

Alidu L, Al-Khudairy L, Bharatan I, Bird P, Campbell N, Currie G, Hemming K, Jolly K, Kudrna L, Lilford R, Martin J, Quinn L, Schmidtke KA, Yates J; Prevention Workplace Collaboration West Midlands. [Protocol for a cluster randomised waitlist-controlled trial of a goal-based behaviour change intervention for employees in workplaces enrolled in health and wellbeing initiatives](#). *PLoS One*. 2023; **18**(9): e0282848.

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