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Reflections of an ARC Director: Overview

Richard Lilford, ARC WM Director

I have been Director of an Applied Research Collaboration (ARC) for over 13 years in total – I well remember the day that NIHR Director Sally Davies phoned me to say we had secured the Birmingham and Black Country CLAHRC; a forerunner of the ARCs. I was, and remain, an ardent advocate of the CLAHRC/ARC model. This is the first in a series of News Blog articles based on reflections over thirteen constructive years.

So, what is the ARC model, and in what way does it differ from an applied research collaboration anywhere in the world? There is more than one answer to the question, but I give the answer that my peer director, Peter Jones, gave when Chris Whitty, Sally's successor, posed the question – the difference lies in the need to obtain service co-funding in order to qualify.

Service co-funding is central because it taps into the idea of an applied research programme deeply embedded in the service – a research centre *'in the service, of the service, for the service.'* This idea of a research service close to the beating heart of the health and social care services had a long provenance, and owes much to the thinking of a Canadian health service researcher, Jonathan Lomas.[1] A further influence on the thinking behind CLAHRCs/ARCs came from the notion of implementation research and the 'translational gap' between the generation of knowledge and its application in practice – the so-called T-2 gap – an idea to which I will return in the next article in this series.

The idea of a research centre co-funded by the service appealed to me strongly because this model opens up opportunities for *prospective* evaluations of service interventions. There are good reasons, that we shall explore more deeply in a later article, to prefer prospective over retrospective service evaluations. A corollary of this premise is that researchers need to be closely linked to service managers. In this way they can help shape service interventions, *and/or* they can discern when an intervention is imminent and then collect baseline data so that effects (intended and unintended) can be tracked over time. As stated above, prospective evaluations are methodologically stronger than purely retrospective evaluations, other things being equal.

This line of argument leads to a clear conceptualisation of what service co-funding should be spent on – service change.

This logic led to a fault line between myself and the civil servant responsible for the invitations to tender, because the invitation insisted that the matched funds "*should be under the control of the Director*." This requirement is problematic for the following reasons:

1. It is not natural for service managers to spend money allocated for patient care on research. It is therefore not a sustainable model outside the CLAHRC/ARC footprint and time horizon.
2. It is arguably *ultra-vires*, as acknowledged by Health Service Guidance 97/32; service and research expenditure should be separately accountable to parliament.
3. Decisions on expenditure on service change (and indeed research) are not 'controlled' by the Director. The Director is supposed to consult widely to establish mechanisms to determine priorities for service design and hence evaluation.
4. Above all, funds under the director's control does not mean service staff under the director's control. Service managers need to control funds to create services that the ARC can help shape and/or evaluate.

Our ARC WM is therefore built on a very simple funding model, represented in the figure.

Figure: ARC Funding Model

In the next article in this series, I shall explore the distinction between Intervention and Research in more detail; what the 'research' might entail; the distinction between an ARC and a management consultancy; and the role of the so-called Implementation Lead. Here I add a disclaimer. These are personal reflections, albeit based on my experience as an applied researcher (one of three still standing from the first tranche of CLAHRCs).

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Reflections of an ARC Director 2: The Role of ARCs in Research and in Implementation

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Richard Lilford, ARC WM Director

How Can an ARC Contribute to Service Improvement?

In our previous News Blog[1] I described the essence of an ARC as I see it. I pointed out that close embedding of the ARC *in* the services, exemplified by co-funding *from* the services, lies at the heart of an ARC. Such a model distinguishes an ARC from the generality of applied research collaborations across the world. In this, the second article in the series, I examine the nature of ARC service collaboration in more depth. To frame this discussion, I start by reflecting on what services Health and Social Care services strive to achieve.

What are Services Trying to Achieve?

The idea is that an ARC should improve the ability of the services to reach their objectives. So, let's start with objectives; adapting the US Institute of Medicine Quality Framework, a service should be:

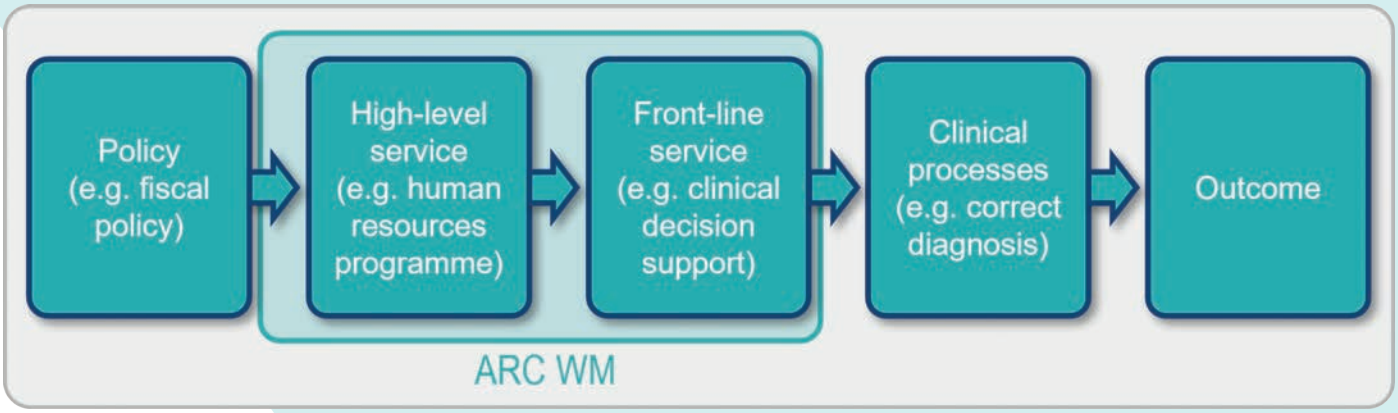
1. Effective.
2. Safe.
3. Empathetic (patient-centred; respectful; compassionate; acceptable).
4. Efficient.
5. Equitable.
6. Accessible.

Much could and has been said about the items on this list. For example, there is no sharp distinction between safe and effective care. [1] And there are two types of efficiency – technical efficiency (doing things right) and allocative efficiency (doing the right things). The important points are that: 1) the services strive to reach multiple objectives; 2) implementing effective clinical care (closing the T2 gap [2]) is but one of those objectives; and 3) ARCs should concern themselves with all service objectives. Service delivery research is frequently described in terms of the above service objectives, for example quality research or safety research or effectiveness research or patient centred research. These descriptions are of limited value for the simple and obvious reason that in pursuing one objective it is possible, indeed likely, that there will be spill over effects on other objectives.

Service Delivery Research and a Causal Chain

Donabedian produced the famous *structure* → *process* → *outcome* model, which we have previously extended [3] to the model shown in Figure 1 on the next page.

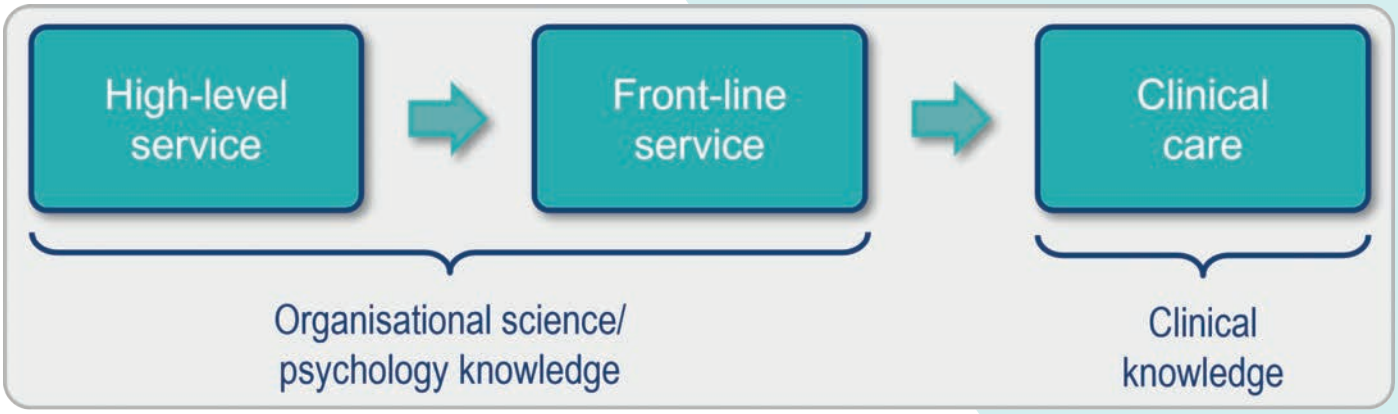
Figure 1: Extended Donabedian Model



In ARC WM we major on high-level service processes and front-line service interventions (the blunt-end and the sharp-end of clinical care) in the rectangle in Figure 1. The high-level service includes the WHO Health System Building Blocks (leadership & governance, human resources, supply chains, information infrastructure, service configuration, and finance). Frontline services include guidelines, decision support, forced-functions, standardised procedures, and so on.

The types of knowledge needed to strengthen the service at both the sharp and blunt ends includes behavioural psychology and organisational science, including operations research (or flow modelling). This is the sort of knowledge ARCs implement and *one* reason for doing so is to implement clinical knowledge (Figure 2).

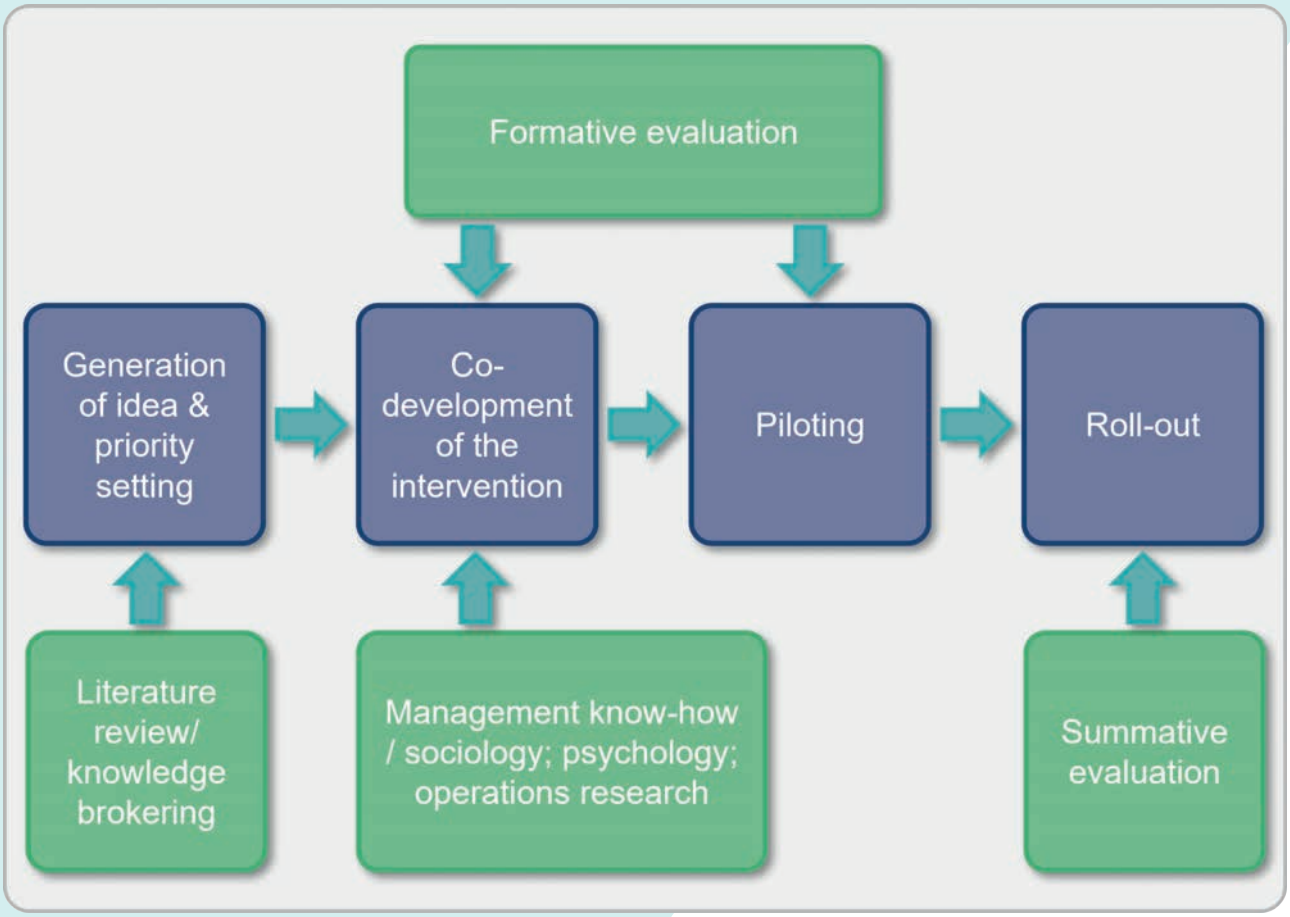
Figure 2: Two-stage implementation to improve clinical care



Framing the Development Process for Intervention Development and Implementation

The question for ARCs is: what can they contribute to the implementation of both social science and clinical knowledge. We conceptualise ARC activities according to the MRC [4] or Pena-Rosas [5] implementation frameworks that track an intervention through its archetypal stages: prioritisation, iterative development and (beta) testing, piloting in the services, and broader roll-out across a system. This development chain, and the points where ARCs can gain purchase, are represented in Figure 3 on the next page.

Figure 3: Role of ARCs (green) in the conceptualisation, development and implementation phases of a Service Delivery Intervention (blue)



ARC Contributions at Various Points on the Implementation Development Pathway

1. Intervention Selection. Researchers can compile the evidence that the service needs to decide what service interventions to implement and how to implement them. For example, ARC West Midlands carried out an umbrella review of 80 systematic reviews on methods to provide more medical care in the community to inform the development of integrated care models.[6] In our experience it is often sufficient to assemble existing reviews rather than the conduct of systematic reviews *de novo*. Service leads often determine what they want to implement in collaboration with ARCs, but academics in the ARC may prompt service managers to intervene. For example, at ARC WM our Maternity theme lead decided that something should be done in response to national enquiries showing that babies and mothers were dying while pregnant women waited to be seen in turn when they presented to maternity services with serious symptoms. She therefore worked with local services to develop and implement a system of triage that is now used routinely in the UK and increasingly in Australia.[7] Many ARCs are also expert in database studies, which may also reveal a need for service improvement. For example, a recent ARC WM study showing that NHS-funded elective surgery in independent hospitals is associated with reduced emergency readmission compared to NHS-owned hospitals, suggests that the independent sector has a role in clearing the post-COVID back log.[8] If necessary, ARCs can inform priorities by carrying out a 'value of investment analysis' using tools developed by ARC WM researchers.[9, 10]

2. Intervention Development. Since ARCs work with behavioural science and organisational scientists, they can help ensure that interventions are informed by the latest '*state of the science*'. Service interventions to

promote uptake of evidence are most successful when implemented at more than one 'level', as described in a previous news blog.[2, 3] For example, at the organisational level, it could be the absorptive capacity of the organisation,[11] or how leadership is distributed,[12] or how its human resource policies and practices support brokering of knowledge across academic-practice boundaries,[13] which influences prospects for implementation and scale up of evidence-based interventions, or how service development tools such as 'lean' support better clinical outcomes in a value-based manner.[14] ARCs therefore draw on schools of management/business, which have expertise in models of knowledge mobilisation, such as knowledge brokering that emerged as a template that many of the pilot CLAHRCs followed.[15] One should not confuse such input from schools of management/business as replicating management consultancy; we claim that ARC input is more theoretically informed and more methodologically robust. After all, we educate the people who work in management consultancy! Likewise, co-production of services, involving the people who use services, results in better outcomes than interventions developed by service providers alone.[16] As such, ARCs might embed their researchers closer to the frontline of service delivery, and NHS and social care providers reciprocate in supporting frontline practitioners to become embedded in research teams. Such knowledge brokering arrangements are evident in ARC WM, particularly in its organisation science theme, so that evidence is translated at scale into frontline practice. The researchers seek to understand the barriers and facilitators to intervention success and also observe how well the intervention is being implemented. Such observations can be seen as *formative* evaluations, in contrast to *summative* evaluations; a distinction which we have discussed elsewhere,[17] and to which we will return in the next article in this series.

3. Evaluation. Perhaps most obviously, ARC researchers can study the effectiveness of interventions. The nuance here is that the interventions are complex and hence need to be studied both formatively and in a summative way using flexible tools, as per recently updated MRC guidance.[4] ARC West Midlands has written articles in the NIHR Encyclopaedia about the importance of causal pathway analysis in such evaluations.[9, 18] In following these guidelines and methods, evaluations have salience; not just for evaluation of *particular* problems, such as safer prescribing, but also for generic methods for the introduction of interventions generally, such as understanding the motivations of staff involved and ways incentives can backfire.[19]

The Implementation Lead

The above analysis informs ARC WM's understanding of the role of the Implementation Lead; a post that must be included in any ARC. We conceptualise this post as informing service change with the latest organisational thinking and, in the process, learning more about the psychology and sociology of organisations through formative research.[4] It is no surprise, therefore, that Graeme Currie, our Implementation Lead at ARC WM, is based at the Warwick Business School, one of the leading schools in the UK.

In this article I have discussed the role of an ARC in relation to implementation of interventions to improve the outcomes of the health service. I thank Graeme Currie for his critique of the article. ARCs have a crucial role in informing, supporting and evaluating interventions designed to improve services. In the next article I will discuss in more detail the form that these evaluations may take, drawing on the most recent MRC guidance on Complex Evaluations,[4] guidelines on different types of Implementation Trial,[20] and on our ARC experience.

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Reflections of an ARC Director 3: How Can ARCs Deliver on Their Manifold Objectives?

Richard Lilford, ARC WM Director

Introduction

The story is told of a head of the NIHR who, while visiting a seaside town, was aghast to hear that local health service managers were blissfully unaware of their regional ARC. In this, the third article in the series, I examine the scale and hence potential reach of an ARC, and gently ask whether too much is expected of an ARC; there is always a risk that if jam is spread too thinly, then its impact will be diminished. I also ask how ARCs can be configured to maximise impact when so much is expected of them.

Let's Do the Maths

When follow-on grants for which ARCs are uniquely eligible are added to the £9m core grant, the total quantum of an ARC grant is about £2m per year. This is a sturdy number from a researcher point of view. However, the total planned spending for the Department of Health and Social Care in England is £190 billion in 2021/22. The 15 ARCs will receive around £30m over that time; ARCs thus receive 0.016% of the NHS budget. To put this another way, ARCs receive little more than one six-thousandth the total health and social care budget. Perhaps it is not that surprising, after all, that managers in the seaside town had not heard of ARCs. So let us see what ARCs are required to deliver in return for £2m per annum.

Coverage of Health & Social Care Organisations

Applicants for ARCs are instructed to engage with the full range of NHS and Social Care organisations. This is a fine aim, and ARC WM has extensive links with organisations of all types. However, a reality check is in order. We have previously mapped the health and social care organisations across the West Midlands.[1] At that time there were 27 Provider Organisations, 24 Primary Care Federations, 14 local authorities, numerous regional bodies (such as Public Health England, Health Education England, the West Midlands Combined Authority, and our AHSN partner), and 12 Health & Wellbeing Boards. The West Midlands region is home to six Integrated Care Systems. This amounts to over 80 NHS and Social Care organisations. It is not logistically possible to have detailed interactions or collaborative projects with all potential regional partners. And that is before we come over 11,000 voluntary sector organisations, over 100,000 small- and medium-sized enterprises, and 11 universities.

Maximising Impact

So how can an ARC maximise geographical impact and meet the reasonable expectations of services?

A distinction can be drawn between organisations that contribute co-funding (and with whom we therefore engage in collaborative projects), organisations we consult so that their particular

needs can be taken into account in setting ARC priorities, and organisations who may benefit from our findings and dissemination activities.

In ARC WM we have a four-pronged strategy:

1. Continue collaboration with organisations with whom we have an established relationship and from whom we receive co-funding, accepting that these partnerships will evolve over time.

2. Reach out to organisations that represent provider types, such as Health & Wellbeing Boards, and Association for Directors of Adult Social Care. This is a strategy to maximise impact among the large number of organisations listed above, given the logistic challenges of interacting with each and every institution. Previously we engaged with Sustainability & Transferability Partnerships, and increasingly, we are engaging with the successor organisations of STPs, Integrated Care Services. Relationships with the latter are crucial since they are statutory organisations with responsibility for regional budgets, which they have the power to flex. They also have oversight of hospitals, communities and interfaces in care.

3. Communicate via social media and our monthly ARC WM News Blog and Twitter feed.

4. Perhaps above all, join forces with other NIHR infrastructure. In West Midlands this includes other centre grants, such as our Biomedical Research Centre and Schools of Public Health, Social Care and Primary Care. We are actively working on mechanisms to strengthen collaboration so that together we can achieve greater impact. We will return to this point below.

Geographic Coverage

I sense that ARCs are going to be increasingly called on to widen geographic coverage to include areas so far little affected by research – seaside towns, for example. Let me disclaim at once that I entirely applaud this policy. The reason I am a strong supporter of such a policy is that it is economically efficient. To create a centre of excellence is quite easy. The communist USSR was quite capable of creating Sputnik, nuclear bombs and even a world-leading eye disease centre. The problem for the Soviet Union was that it could not spread such excellence. Likewise, the problem with the NHS is not that it cannot create excellence – the problem lies in massive variations, for example in use of digital technologies, across the service. There are thus good reasons to support a policy of multi-focal excellence. A particular issue for ARCs going forward relates to the latest crop of new medical schools where students are no less deserving of scientific opportunities. In theory then, there are good (indeed excellent) arguments for ARCs to expand geographically and follow centrifugal policies. But this takes us back to the analogy of jam spread on toast – the zeal to do everything can lead to achieving little.

Topic Coverage

The ARC application form requires applicants to specify research themes. Deciding how many and what themes to include is, necessarily, a topic for much debate and negotiation when bringing an application together. In our first CLAHRC we had nine themes, dropping to six in the second CLAHRC. In the ARC we originally specified six (four substantive and two cross-cutting), but added two further themes (social care and public health) when our funding was made conditional on strengthening these two topics. At eight themes, that amounts to £1m per theme or £200k per year (allowing £1m for administration and other cross-theme activities). What can £200,000 per year buy? Two research fellows, a PhD and some senior investigator

time. If geographical coverage is to widen, the number of service partners to increase, and new medical schools to be embraced, then that seems to be an argument to rationalise the number of themes going forward.

There is another issue to be considered in theme selection. If themes are based on clinical conditions, two problems arise. First, this leaves the majority of topics uncovered. For example, a four theme ARC may prioritise cardiovascular disease, mental health, musculo-skeletal disease, and maternity. But then what about neurological disease, skin disease, child health and orthopaedic surgery? Second, specialising in a segment of the medical nosology risks solipsism, whereas ARCs are more about shared learning across conditions and contexts. So, from my perspective there is a compelling case for generic themes, such as chronic disease, long-term care and acute disease, or community care, acute care and interfaces in care. The knowledge expertise in ARCs is generic; behavioural psychology; organisational, sociology and epidemiology, rather than specialist-based. I make an exception of mental health, which is pervasive across all of clinical practice – specialist and generalist.

Broad Range of ARC Activities

The requirements of an ARC are considerable – they are certainly not just to do research. ARC applicants must specify what they will do to strengthen UK competitiveness and industry; how (beyond simply learning by doing) they are going to strengthen capacity (in both academia and the services); how they are engaging under-served communities; working with public and patients; and supporting equality in diversity.

In summary, a lot is expected of ARCs for about £2m per year; cover health and service organisation; ensure geographic reach; engage with diverse communities; include a number of themes; build capacity; strengthen the supply-side of the economy; engage with the public and communities promoting diversity.

Squaring the Circle

ARC funding has not increased from the time of the first round of CLAHRCs and demands have increased. The ARC request for applications specified that not all NIHR / Health & Social Care priorities should be prioritised by each ARC, but when we took that literally we were asked to strengthened Public Health and Social Care – something we have actually had great pleasure in doing. Nevertheless, my first request to commissioners is to ask them to pull back from heaping ever more requirements onto a fixed budget. That said, the NIHR is itself under great pressure to meet national policy objectives embracing all those listed above. I understand this imperative all too well, having myself worked as a senior civil servant. So ARCs will need to develop their own strategies to thrive in a political world.

A perennial difficulty for ARCs is how to strike a balance between reaching out to service stakeholders while avoiding 'over-promising' and thereby generating demand that can't be satisfied. Another is to specify deliverable projects while maintaining capacity to respond to new needs and opportunities as they arise. These are nice problems to have, but it is important to plan ahead and maintain capacity to respond. At the limit some CLAHRCs ran an internal bidding system. This enabled the CLAHRC to remain responsive, but the policy has serious drawbacks. First, it makes capacity development hard because money is moved from one set of researchers to another, so it has limited power to build careers. Second, it is extremely inefficient as it involves a bidding process inside a bidding process. Third, to make it fair and transparent, the process requires time which vitiates the possibilities to respond rapidly and conduct opportunistic research, as I will describe in the following article in this series. In ARC WM we try to address this problem of flexibility by appointing a team with fairly generic skills in subjects cognate to Service Delivery research (first article in the series [2]), and then maintain

capacity to flex this human resource across the most propitious projects.

A small number of themes allows greater geographic reach, since each theme could afford to locate researchers in more than one place. I think this is preferable to small themes concentrated in one place – e.g. mental health, University of Warwick; maternity care, University of Birmingham. If themes are small in number, it may be preferable to make them generic rather than condition specific. For example, hospital care, social & community care, and interfaces in care, rather than maternity, old age, musculo-skeletal, etc. As stated, an advantage of a more generic approach is that no condition or disease is thereby excluded.

Perhaps the most important point to make is that many ARC functions are shared with other NIHR infrastructure. Therefore, the ARC does not need to shoulder all responsibility for outreach to diverse groups, capacity development, methodology support, etc. By combining forces with the university infrastructure and other NIHR capacity the sum can genuinely be greater than its parts. To put this another way, the time is propitious to develop a combined policy, integrating these numerous functions across the NIHR infrastructure in local health and social care economies. That way, when it comes to completing an application form, applicants can describe the combined policy and identify the particular activities that their Centre or School will contribute. This policy aligns well with 'One NIHR' principles currently promoted by the Department of Health and Social Care.

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Reflections of an ARC Director 4: ARCs and Their Role in Service Evaluation

Richard Lilford, ARC WM Director

Introduction

In the first article in this series [1] I showed how the co-funding principle of an ARC ensures that research is embedded in the services (health and social care). In the second,[2] I explicated the role of an ARC in the selection, development and evaluation of service delivery improvements. In the third article I described the tricky issue of meeting all the expectations of an ARC, and suggested ways to make the money go further.[3] In this article I discuss evaluations in particular.

The MRC Framework for Complex Interventions

The MRC Framework [4, 5] provides a development pathway for a service intervention, starting with identifying the need for a service change, co-development, piloting and then larger scale roll-out, accompanied by an evaluation. Such a framework is analogous to the development of medicines: identify a promising molecule from the science base → produce the medicine → in vitro test → scale up → animal tests → pilot trials (phase I & II) → large scale trial (phase III). The MRC process was designed to reduce the problem of evaluating interventions that did not have a sound evidential and theoretical basis or that were not designed to overcome barriers or exploit facilitators to implementation.

The Pathway in ARCs

Sometimes an ARC may follow the complete pathway. For example, we were asked to find a way to improve uptake of staff influenza vaccine, and within a year we had reviewed relevant literature, co-developed an intervention based on nudge theory, implemented the intervention, conducted a factorial randomised trial on 8,400 frontline staff, and published the results.[6] However, it is more usual to complete only part of the chain. For example, a review may show that a study is not necessary, as in the example in the second article in this series.[2] Often the service has already developed an intervention but wishes it to be evaluated in practice – we call this *opportunistic evaluations*.[7] For example, we conducted a time-series analysis of a fully-fledged intervention to reduce falls at University Coventry & Warwick.[8]

Reality Check

ARC funding amounts to £9-10m over five years, or about £2m per year. Since large trials typically cost one to two million pounds, it is not feasible for an ARC to carry out many such trials. For example, an ARC with six themes would be limited to about one trial per theme. It follows from this limitation, that most ARC evaluations are conducted at the formative and pilot stages. These evaluations can then form the basis for a larger scale subsequent study. For example, the pilot work on computerised decision support

for prescribing in our first CLAHRC [9] led to an influential NIHR Programme grant of e-prescribing across other NHS hospitals during our second CLAHRC, and this in turn, formed the basis for a further NIHR Programme grant that is currently underway on use of Computer Decision Support to promote antibiotic stewardship. However, there are exceptions to this rule that arise when outcomes from a large-scale evaluation can be based solely on routinely collected data (as in the influenza vaccination example above). As a general rule, however, the ARC grant will be the foundation for, rather than the basis of, your next New England Journal of Medicine paper.

Formative vs Summative Evaluations

By formative evaluations we mean evaluations that provide rapid feedback to guide the service in the development and implementation of interventions. As I have described in previous articles, feedback of findings on a rapid cycle, with the aim of influencing the intervention over its implementation phase, is a feature of action research.[10, 11] Summative evaluations are carried out by an independent research team and are fed back over longer time-scales. A summative evaluation by one research team may overlap with formative evaluation by another team. In that case, the formative evaluation is, from the perspective of the summative evaluation, a part of the intervention (Figure 1). I lay out the logic behind this point in more detail elsewhere.[12]

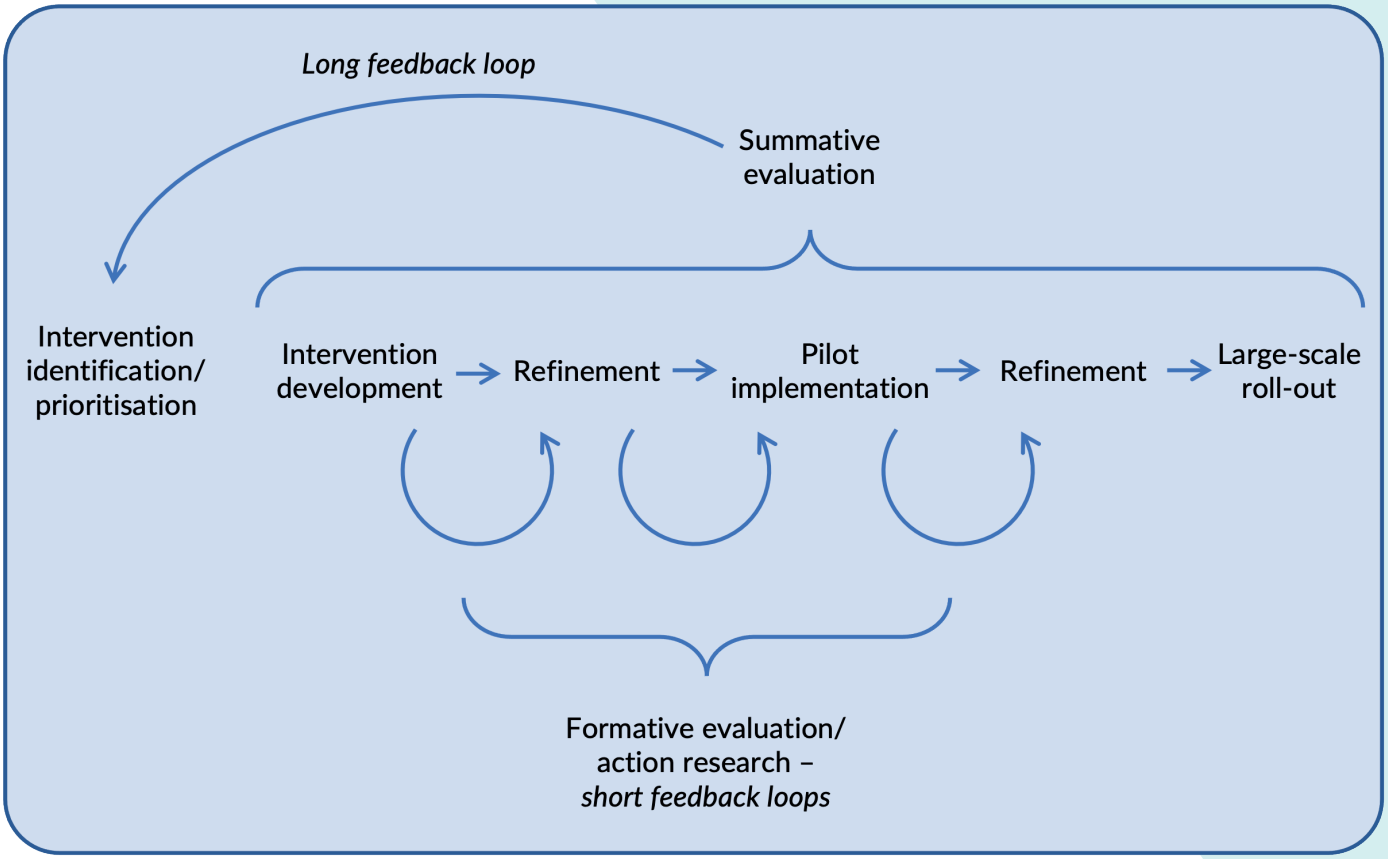

Figure 1: *Diagram to represent the complementary, but distinct roles of summative and formative research. (Figure based on Lilford, et al. Action research: A way of researching or a way of managing? J Health Serv Res Policy. 2003;8(2):100-4).*

Mixed Methods Research

ARC-funded studies are seldom entirely quantitative; they are usually mixed methods (i.e. harness both qualitative and quantitative data), or they are purely qualitative. While I encourage mixed methods whenever possible, qualitative work may show that something is simply not working and that there is no point in pursuing it further – my CLAHRC colleague Gill Coombes abandoned a study of an alternative emergency service because early, purely qualitative, findings showed that the proposed intervention simply could not gain traction in the service. '*Good money should not be sent after bad*' in the pursuit of a '*deliverable*' as we shall discuss in a forthcoming article. Qualitative research can show that the necessary, if not sufficient, conditions for safety and effectiveness are satisfied. In a previous paper I showed that many high level (blunt end), inexpensive interventions, like staff development programmes, are not likely to show up in quantitative changes in outcomes at the patient level (see second article in this series [2]). This is because a worthwhile (cost-effective) signal is unlikely to be distinguishable from 'noise'. For example, evaluation of the effect of Coventry City of Culture status is not likely to show up in an accurate and precise way in the public health statistics, and so it is being evaluated qualitatively and in a formative way. Readers who would like further discussion on these points are directed to our previous articles on action research [10, 11] and formative research.[13, 14]

A Realist Epistemology

The call for ARCs gratifyingly made specific mention of the importance of research methodology. Much service delivery research is not suited to a '*hypothesis test of a primary outcome*' paradigm. To a considerable extent this is acknowledged in the latest MRC guidance, which points out that the pattern in the data is important (rather than a 'primary outcome') and that decisions should not be dichotomised on whether the confidence limits do, or do not, intersect the null. However, the MRC guidance do not say *how* the pattern in the data should be interpreted, nor *what* should replace the dichotomous statistical output. Where the MRC stops, the ARC WM gets going! So we have published studies on causal pathway analysis (to interpret the patterns in the data) and Bayesian analysis (to avoid dichotomising study outcomes).[15, 16] In our ARC interview we were asked if our methodological research could interfere with implementation. Far from interfering with implementation, developments in causal chain analysis, probabilistic reasoning and patient preference elicitation aid in the interpretation of our findings, and hence in implementation. In particular, Service Managers have been pleased, even relieved, to find that we do not insist on the hypothesis testing approach to interpretation of data.

Opportunistic Research

Since ARC faculty work closely with the services, they are well positioned to pick up signals of impending service implementations that might be suitable for evaluation, even if they have played no part in development of the intervention. For example, we were made aware of an incentive-based intervention to improve employers' interest in the health of their workforces. We were able to randomise 100 Small and Medium-sized Enterprises into a factorial cluster trial to evaluate this intervention.[17] It can be difficult to orchestrate such an evaluation; resources may already be fully committed at the point where an opportunity to carry out an evaluation arises. Nevertheless, ARCs should try to manage their resources so that they can take advantage of new evaluation opportunities when they occur (see previous article in this series).[3] We have been fortunate to be able to opportunistically evaluate self-help and public health interventions in Nepal and India as part of an NIHR RIGHT grant.

Imaginative Research Design

Many service interventions are hypothecated at the cluster level, and therefore have to be studied at this level, for example in cluster trials. The step wedge trail is a particularly flexible design and is increasingly used in experimental service delivery research. The advantages and drawbacks of the method are described elsewhere.[18] A review of cluster trial methodology showed that ARC WM faculty are the world's most highly cited group on this design.[19] However, we use other designs, including very occasionally cross-over designs and multiple block designs, while we also use instrumental variable analysis and threshold analysis. For example, we have used threshold analysis to show how financial disincentives can distort organisational behaviour.[20] Our colleague Sam Watson holds an MRC Methodology grant to explicate studies over space and time based on a focal intervention point, rather than pre-determined spatial or population clusters.

Conclusion

Carrying out evaluations of service interventions is part of the ARCs 'stock-in-trade'. While ARC funding can seldom support large-scale evaluations, it can both inform local implementations and form the basis for larger (often national) studies funded by competitive grants. We have not reached the end of history and ARCs are in a good position to shape how research is carried out and interpreted in the same spirit of enquiry that motivates our empirical work. The previous ARC call identified methodological research as a priority, and I hope any future call will continue this fine tradition.

[NB. See next page for references]

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Reflections of an ARC Director 5: Feedback for Research Commissioners

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Commissioning Future Arcs; Humble Thoughts from a Seasoned ARC Director

In the first article in this series [1] I covered the history of ARCs and provided an account of the service co-funding model that distinguishes an ARC from just another Applied Research Centre (the article elicited favourable comment from AHSN lead, Gary Ford). In the second article,[2] I dissected the concepts of research and implementation explaining that they are entangled and should not be treated as separate entities. In the third article,[3] which attracted favourable comment from the editor of Milbank Quarterly, I examined the manifold objectives that ARCs are expected to address and concluded that to meet these ARCs would need to collaborate with other NIHR infra-structure (in alignment with 'one NIHR' principles). In the fourth article, we looked in more detail at the type of research and methodologies that ARCs embrace.[4] In this, the fifth and final article in the series, we 'speak truth to power' in suggesting some principles that funders might want to consider in any future funding round for 'ARC like' research centres. These comments are offered under the premise that research is most responsive, effective and fair when objectives are transparent, achievable and specific. It is also the case that the research a nation gets is more a function of commissioning decisions than the design of the research, which is heavily dependent on budgets, time-scales and objectives.

Scope & Co-Funding Model

First, applied research covers clinical research and service delivery research (and perhaps also health systems/policy research). By custom and practice ARCs have gravitated to service delivery research. This makes sense in view of the provenance of the CLAHRC/ARC concept in the implementation science movement.[1] In any event, it would be helpful to spell out the scope of research in any 'Invitation to Tender' (ITT).

Second, in line with service development, the co-funding requirement should be retained – how can an ARC claim to be aligned with service need if the services are not prepared to invest? However, the investment should be, not in research, but in service implementations. Such a policy is consistent with service allocations voted by parliament. The co-funding should represent a commitment to fund the services that the ARC evaluates and/or that it informs/co-designs. It should not be a blank cheque to fund the research component. These arguments are spelled out in more detail in the first two articles in this series.[1, 2]

Implementation & Research

Previous ARC/CLAHRC invitations to tender implied that these are two independent activities for which an ARC is separately responsible. Hopefully, this idea has been extirpated once and for all; for the detailed argument please see

the second article in this series.[2] ARC faculty include expertise in how to implement service change. However, the services are replete with managers whose function is to lead implementation. It follows that the 'implementation lead' is really the 'implementation methods lead'. Synonyms might be the 'organisational science lead' or the 'implementation science lead'. As represented in article two, one can think of the implementation function of an ARC as a type of high-level consultancy. In Australia the network of organisations similar to ARCs have been designated as 'preferred suppliers' along with the 'big four' management consultancy firms. The ARCs work in tandem with an organisation that is academic but not research-based - the Academic Health Science Networks (AHSN). As implied by the word 'network', this organisation has broad reach into the local health and social care economy, and is well positioned to disseminate and support implementation of ARC projects - for example, the use of Statistical Process Control charts and maternity triage in the case of ARC WM. There are other organisations that ARCs may consider partnering with, such as the Commissioning Support Unit in the West Midlands. Thus, a challenge for ARCs is how their offer differentiates them from others with whom they collaborate. The answer is that they do research. However, this research takes different forms. In supporting implementations, ARCs conduct literature reviews and 'formative' or 'action' research.[5-7] Peter Jones, Director of ARC East of England, argues that the latter should incorporate research into implementation of implementation research. When it comes to more formal or summative evaluations, ARCs have at their disposal the full cannon of mixed methods, drawing on a wide range of possible designs, as discussed in article four of this series.[4] Some have argued that social care research has a distinct epistemology, but this ARC Director nails his colours to the mast; research methods should be selected to address the question, not to fit the service within which the question arises.

Quantum

As argued in article three in this series,[3] the ARC allocation has not increased in-line with inflation, while the requirements of the scheme have increased. At the risk of special pleading, an increase in funds is likely to represent good value for money. Most ARCs are heavily 'geared', meaning that every pound invested in ARCs by NIHR yields over one pound in further competitive grants. In the case of ARC WM, this gearing is one to nine according to our yearly report. As an infrastructural investment, ARCs represent a good investment. The previous ARC withheld some money for cross-ARC initiatives, and these seem to have been successful. Alternatively, or in addition, applicants may specify what work they have planned in collaboration with other ARCs (and indeed other NIHR-funded research).

ARC Themes

The NIHR contribution to an ARC has hitherto amounted to about £10m over five years. Such an allocation seems to demand some type of organising principle and NIHR has hitherto expected applicants to identify research themes. Most ARCs have identified topics such as 'mental health' or 'access to care', along with cross cutting themes such as 'organisational science' or 'health economics'. Clearly there are more topics of importance than can be accommodated in any one ARC. Indeed, the invitation to tender for the current round of ARCs specifically advised applicants not to attempt all NHS priorities recognising that 'jam can be spread too thin'. Yet, two of the subject experts on the ARC panel were mental health practitioners which may disadvantage any applicant who does not emphasise this topic (important as it undoubtedly is). Likewise, applicants who were judged weak on social science or public health were awarded their grant with conditions, even though these important topics had not been specified as a requirement. Let me be clear, I

would have no trouble with an invitation to tender that made such topics a requirement; my only point is that a reputable procurement process will spell out the essential qualification criteria.

There is another problem that the commissioner and the applicant must wrestle with. This issue concerns how tightly the research plan should be specified. On the one hand, public money cannot be disbursed with no clear objectives/deliverables. On the other hand, an ARC lasts for five years and it is required to remain sensitive to emerging needs and service priorities. Why build in requirements to reach out to diverse organisations and communities if you cannot respond to their expressed needs because the work program has already been crystallised in the application? The way we have 'squared this circle' is to lay out an initial set of activities. We state that these are subject to change if strongly indicated by events arising between application and the commencement of the work programme. However, longer-term projects will build on initial results and emerging service priorities. Our 'deliverables' therefore include a commitment to a certain number of projects over given time periods and that we will demonstrate that these have been prioritised in areas of greatest need. It would be helpful if the invitation to tender could provide some direction on this point, since what we specify in the application will then be the criteria against which we are monitored in our yearly review.

Realism Regarding Engagement & Objectives

In the third article in the series, we did the 'maths' showing that there are way more organisations that could be engaged with than could be reasonably accommodated by an ARC that receives each year less than 0.02% of the local health economy (let alone social services). We said an ARC should show that it had structures to elicit priorities from the service even though it cannot possibly reach out to each and every individual organisation. For example, the organisation Association of Directors of Adult Social Services can inform on priorities and act as a dissemination mechanism. But it would be hubristic to pretend that we could meet the specific research needs for each and every Directorate.

Many ARC objectives, such as engagement with industry capacity development, public and patient engagement and involvement, and improving inclusion and diversity, are also functions of other NHS infra-structure and host institutions. Therefore, in line with 'one NIHR' principles, we think that ARC applicants should be asked to demonstrate the added and special contribution the ARC will make, rather than simply be asked what they are doing in isolation.

Collaboration Across Themes

To use a somewhat overworked phrase, an ARC '*should be more than the sum of its parts.*' Hitherto, we have tried to ensure this through cross-cutting themes (organisational and psychological sciences, and research methods) whose faculty/research fellows work into substantive themes, such as maternity care or mental health. In designing any future ARC we will have a better story to tell about integration of themes and the development of a research culture in the services.

The Application Form

The application form for the ARCs had 26 sections and ran to some 11 pages with a further section for each theme. Our application ran to 171 pages. The committee had to assimilate fifteen such forms. This is a massive cognitive task and it is hard to imagine that members could form clear mental images of the strengths

and weaknesses of each application. I sit on many large grant awarding bodies and I am often appalled by the arbitrariness of the comments committee members make and the extent to which the fate of an application hangs on the few people that have read it thoroughly. The academic literature on grant applications assigned to more than one committee, shows that there is agreement on the hopeless cases, but that inter-committee agreement is terrible across the remaining applications.[5-7] So please try to reduce the size of the application form and, above all, the number of headings which interrupt the narrative and overload the reader. Such a reduction would be in line with government policy which seeks to improve the woeful productivity of the British worker, in part, by streamlining decision making.

Supply-Side Feedback

Some readers may think that there is little value in applicant feedback such as that offered here. Applicant incentives are not well aligned to the public good which is better left to commissioners, you might say. There is, of course, a kernel of truth in that idea. Suppliers (of research) should indeed respond to customer demand (represented by the commissioner and service user). However, this idea does not entail the notion that the supplier cannot offer ideas that may help the commissioner get what the public need. After all, manufacturers engage with their supply chains to understand their problems without relaxing their efforts to elicit value for money. And economics does not turn only on demand induced supply; sometimes suppliers induce demand to good effect. It is in this spirit that these thoughts are offered.

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