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## ARC West Midlands News Blog



# Guidelines on How to Change Services for the Better

Richard Lilford, ARC WM Director;  
Krysia Dziedzic, Director of the Impact Accelerator Unit

## Theory of Change

If you want to improve care at the front line against a standard (e.g. kindness to clients, implementing cancer treatment, etc.) then you have to intervene at the service level. The development of service interventions is stock in trade for service managers/clinicians; they are doing so all the time. But how should an intervention be developed? As you might expect this subject of *how* is an immense one, but there is broad agreement on the process, recently described by Wight et al., and detailed below.[1]

1. Define and understand the problem.
2. Identify things that might change.
3. Come up with a causal change mechanism/theory of change.
4. Identify how to deliver the change.
5. Test and refine on a small scale.
6. Roll out and evaluate (summative evaluation).

Well that's pretty basic and fits well with the Medical Research Council guidance referred to in a previous CLAHRC West Midlands News Blog. [2]

## Different Approaches

For a much more extensive discussion see a recent paper by Alicia O'Cathain, which discusses different approaches.[3] In fact the approaches are not hermetically sealed from each other and many have overlapping

constraints. The emphasis, of course, varies. Few do not highlight the importance of involving service users in the development and design. No one thinks that an intervention should not be preceded by "*diagnosis of the causes of a developed problem.*" Piloting before widespread application is widely supported if not always adhered to. Some (intervention mapping for example) are more elaborate and formulaic than that. However, it is hard to insist a one-size-fits-all approach. Having an explicit theory does not increase the probability of success, but it does make it easier to explain the intervention to others.

## Behavioural Psychology

One way to obtain change is to mandate certain behaviours and to enforce compliance. Such coercion is often justified, but in the grey area of healthcare in general, and medical care in particular, few activities are governed by hard rules. Mandating correct clinical diagnosis, for example, does not make a lot of sense. So we are into more subtle methods to change behaviour.

Some interventions are truly straightforward and do not require conscious behaviour change—certain engineering solutions, such as forced function to prevent misconnecting anaesthetic gas pipes, for example. But most require those annoying creatures, human beings, to change their behaviours in some way. Perhaps the greatest single greatest contribution to providing a framework comes from the development of

the trans-theoretical model [4] and its further distillation in the form of the COM-B model. [5] These models are built up from analysis and categorisation of the myriad preceding psychological theories that seek to explicate behaviour change. Of course, one way to obtain change is to mandate certain behaviours and to enforce compliance. Such coercion is often justified, but in the grey area of healthcare in general, and medical care in particular, few activities are governed by hard rules. Mandating correct clinical diagnosis, for example, does not make a lot of sense. So we are in to more subtle methods to change behaviour.

A recent article published by the Council for Allied Health Professions Research highlights Krysia Dziejdzic's top tips for implementation.[6] Krysia is part of our Long-term conditions theme and directs the Impact Accelerator Unit in the School of Primary, Community and Social Care at Keele University. Here I give my own tips for service change.

## Some Frequently Flouted 'Rules' of Behaviour Change When Service Intervention are Designed and Implemented:

Rule	Explanation
Incentives (expectancy theory)	Never use an incentive, positive or negative, when the people at whom it is targeted do not believe they can achieve it under their own volition.[7] [8]
Even if an intervention is targeted at the frontline of operations, intervene also at 'higher' levels	In general, when intervening at the operational level, also activate higher levels, not only to liberate resource but also to create the right social environment in line with Social Expectancy Theory. [9] [10]
Political work	Do not intervene when people are not expecting it and when it may change patterns of work, without first doing political work to 'win hearts and minds'. People might not oppose what you are attempting, but you need active support. I think it is worth considering compensating the first generation of losers after Aneurin Bevan's " <i>I stuffed their mouths with gold</i> " dictum.[11]
Be persistent, but also patient	Expect prolonged resistance if skill substitution or material disruption of work is involved.[12] Elinor Ostrom's emphasis on developing personal relations and providing lots of time for dialogue – cheap talk.[13] It also takes time for people in different roles to share the same intellectual map or 'logics'. [12]
Piloting	Whenever possible pilot interventions to iron out problems. If possible, alpha test them before they are rolled out. Incremental change is generally better than re-engineering business process, which involves greater risk than more incremental approaches. [14]

Rule	Explanation
Involve service users in the design of interventions at all stages	Co-design not only makes sense, but is supported by experimental evidence.[15] [16] The ARC WM approach is to involve public contributors simultaneously in intervention design and evaluations.
Address multiple barriers to implementation	Interventions are more likely to succeed if all material barriers are identified and addressed.[17] Frameworks, such as COM-B / trans-theoretical model can help identify ‘lurking’ barriers.
Seek risk-sharing agreements when purchasing equipment	Equipment often fails and repair can be very expensive because the vendor is in a monopoly position. Build in service contracts or even re-imburement by hours of trouble-free service.
Do not overload the intervention description	Be parsimonious by describing the essential features of a service intervention. Consider ‘essential’ and optional elements. Remember, if a compound intervention has $n$ components, and the probability of successful implementation of each is $p$ , then only $pn$ will get the complete bundle.[18]
Encourage innovation	Mentor front-line staff to be the architects of their own destiny, rather than prescribe solutions – try to be an ‘invisible leader’.
Always read the previous literature concerning the proposed intervention	Failure to do so is scientific and management malpractice. Yes, contexts vary, but not to the degree that systematic analysis of previous experience can be jettisoned.
Evaluations	Conduct (and distinguish between) intra-mural (formative) and extra-mural (summative) evaluations. The former are necessary to identify unanticipated problems and probe the limits of what may be achieved.[19] [20] Intra-mural evaluations are an integral part of Plan-Do-Study-Act (PDSA) cycles, Total Quality Management (TQM), and so on.

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18. Resar R, Griffin FA, Haraden C, Nolan TW. [Using Care Bundles to Improve Health Care Quality. IHI Innovation Series white paper](#). Cambridge, Massachusetts: Institute for Healthcare Improvement; 2012.
19. Lilford RJ, Foster J, Pringle M. [Evaluating eHealth: How to Make Evaluation More Methodologically Robust](#). *PLoS Med*. 2009; **6**(11): e1000186.
20. Lilford RJ. [The MRC Framework for Complex Interventions – The Blind Spot](#). NIHR CLAHRC West Midlands News Blog. 7 June 2019.

# Reducing Healthcare Inequalities for People with Learning Disabilities



## Theme 3: Integrated Care in Youth Mental Health

Hayley Crawford, Assistant Professor

**M**y niece, Imojen, was diagnosed with autism and moderate learning disability a few years ago. She is in a wonderful school that she loves, and has received timely, sensitive and effective care from NHS Speech and Language Therapists, Occupational Therapists and Paediatricians. It's hard to say how much of this support is based on the latest research and how much is accounted for by warm-hearted people with a passion for caring for others, but nevertheless I'm continually grateful that she's one of the lucky ones.

When I was studying for my undergraduate psychology degree in 2010, Professor Chris Oliver, who would later become my PhD supervisor, showed his students a shocking image of a boy in a hospital ward who had been tied to a pillar in an effort to contain his head-banging. The image was from '*The Silent Minority*', a documentary aired in 1981. At the time I thought that this type of treatment was confined firmly to the history books, given how far we had come in our understanding of learning disabilities. Then one year later, in 2011, the neglect and ill-treatment of people with severe learning disabilities residing at Winterbourne View care home was uncovered.[1] The gap

between evidence and practice is one that still needs focussed effort to be overcome, and is today being pursued within the Integrated Care in Youth Mental Health theme in ARC West Midlands.

People with learning disabilities have higher physical and mental health needs but these needs can often go unmet. This results in poorer health than those without a learning disability. Compared to the general population, people with learning disabilities have shorter life expectancy and increased risk of early death, as well as heightened rates of coronary heart disease, gastrointestinal cancer, respiratory disease, psychiatric disorders, behaviours that challenge, dementia, epilepsy, ...and so the list of potentially avoidable or treatable health concerns goes on.[2] Annual health checks, which were introduced to provide timely identification of unmet physical and mental health needs, have an uptake rate of less than 50%. At ARC West Midlands, we are focussing research efforts on improving the quality and uptake of annual health checks through an integrated care model with primary care, secondary care, and education services.



People with rare genetic syndromes associated with learning disability are at even higher risk of certain health conditions. For example, clinical levels of anxiety occur in 83% of people with fragile X syndrome,[3] self-injurious behaviour occurs in 100% of people with Lesch-Nyhan syndrome,[4] and congenital heart defects occur in 50% of people with Down's syndrome.[5] Yet many rare genetic syndromes go unheard of even within healthcare settings, which is distressing for families seeking support. Raising awareness is crucial for the 3 million people in England living with a rare disease,[6] but it is a challenge. A press officer recently told me that there would be no media interest in rare genetic syndromes until a celebrity has a child that receives a diagnosis. To date, my research has focussed on understanding autism and anxiety in rare genetic syndromes through describing behaviours, changes with age, causes and predictors. Joining the ARC West Midlands offers an exciting opportunity to continue this research and progress towards raising awareness in healthcare settings and translating evidence into practice, without the assistance of media or celebrity endorsement.

#### References:

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# Loosening vs Tightening Descriptions of Health Service Interventions

*Richard Lilford, ARC WM Director*

**N**ews blog readers will know that I have argued strongly that intervention descriptions should not be highly detailed, nor try to describe all the things that will have to happen for the intervention to work. [1] I have argued this on the following grounds. First, it is quixotic to pretend that all the essential components or ingredients can be identified in advance, as though intervening in complex services is like following a recipe. Second, the intervention components that are necessary are eclectic, varying by context. Thirdly, overly prescriptive interventions are disempowering and fail to exploit local knowledge and insights.

We have argued for a more disciplined approach based on the essence of the intervention. That is to say, the essential or critical ingredients of the intervention theory should be identified and promulgated. These critical features should, of course, be described in detail. For example, in the case of a financial incentive, the factors that would trigger the incentive payment and its

quantum should be specified.

Powerful endorsement of this point of view now comes from the Health Foundation.[2] Their recent report seeks to loosen the description of an intervention by focusing less on specifying the details of each component and more on the need for adopters to formulate their own versions for their own setting. This conclusion is based on interviews with adopters around the world, who do not generally favour a prescriptive approach. The ability to intervene is the managers' stock in trade. Let's get rid of this detailed description and replace it with a description of the necessary detail.

## References:

1. Lilford RJ. [Health Service and Delivery Research – a Subject of Multiple Meanings](#). NIHR CLAHRC West Midlands News Blog. 30 November 2018.
2. Greszczuk C. [Implementing Health in All Policies](#). London, UK: Health Foundation; August 2019.

## ARC WM Quiz

We recently featured an article on Mendelian Randomisation. Gregor Mendel is also known as the 'father of genetics'. In addition to his career as a scientist, what **other profession** did Mendel have?

email your answer to:  
[ARCWM@warwick.ac.uk](mailto:ARCWM@warwick.ac.uk)



*Answer to our previous quiz: [Fernand Lamaze](#) was the French obstetrician who gave his name to a method of drug-free pain-relief childbirth, the [Lamaze technique](#).*



# Scientific Productivity

*Richard Lilford, ARC WM Director*

News blog readers will have seen my previous piece on the overall declining productivity of science.[1] I favour the low hanging fruit explanation for the gradual decline in the productivity of us scientists over the last six decades. However, I do not think the negative role of increasing bureaucracy and almost stifling procedural safeguards should be underestimated. I also think that there is far too much mission creep and that too many objectives are loaded onto single projects. We are expected not just to advance a scientific problem, but educate the workforce, engage widely with our communities, provide services to industry, interact with civil society, influence policy-makers, disseminate our findings and so on. Grant application forms typically devote a substantial minority of space to the scientific question of interest.

Those concerned about this topic will be interested in two things. First, Dominic Cummings, the UK Prime Minister's senior advisor, has turned his attention to the topic. [2] Secondly, he cites evidence from the journal *Nature* that small teams are generally more productive than larger teams.[3] Apparently the evidence suggests that while larger teams are more efficient at exploiting discoveries, more radical innovations and disruptive ideas are more likely to emanate from smaller teams.

I agree with Cumming's conclusion that we probably need both small and large teams. In the meantime I hope that he will turn his influential attention to the dead weight of bureaucracy, which not only diminishes the productivity of us scientists, but which also extinguishes the share joy of discovery.

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## Antibiotics for Back Pain: Whatever Next?

*Richard Lilford, ARC WM Director*

A good friend of the ARC WM Director, Dr Alistair Stirling, published a revolutionary paper in the *Lancet* in 2001.[1] His study showed that people with disc herniation in the spine carried certain bacteria in the spinal tissues more often than controls. Infection-related back pain is thought to be associated with rather specific x-ray signs called [Modic changes](#). The putative organism is *P acnes*. A previous single RCT has assessed the efficacy of

antibiotic treatment in Modic patients.[2] This study reported a significant improvement in outcome in association with the antibiotic therapy.

Replication is a tenet of good scientific practice and a double blind RCT has recently been reported in the *BMJ*.[3] The authors wanted to see if they could replicate the earlier result. They failed to do so, recording a null finding. However, the trial is not all that large; only 180 patients. Further, one of the two main outcomes was borderline

positive. Certainly, any effect is likely to be of modest magnitude and is unlikely to justify three months of continuous high dose antibiotic treatment, as administered in the study. Moreover, there was a much higher incidence of side effects in the intervention group. But what about the underlying hypothesis: is that disproven? Is there a lurking sub-group where infection really is the cause of the back pain? I wonder if we will ever know for sure.

### References:

1. Stirling A, Worthington T, Rafiq M, Lambert PA, Elliott TSJ. [Association between sciatica and Propionibacterium acnes](#). *Lancet*. 2001; **357**: P2024-5.
2. Urquhart DM, Zheng Y, Cheng AC, et al. [Could low grade bacterial infection contribute to low back pain? A systematic review](#). *BMC Med*. 2015;**13**:13.
3. Bråten LCH, Rolfsen MD, Espeland A, et al. [Efficacy of antibiotic treatment in patients with chronic low back pain and Modic changes \(the AIM study\): double blind, randomised, placebo controlled, multicentre trial](#). *BMJ*. 2019; **367**:I5654.

Panagioti and colleagues, writing in the *BMJ*, conducted a meta-analysis of 70 studies measuring adverse events. These studies included over a third-of-a-million patients.[1] They found that about half of all harms are preventable; about one-fifth of preventable harms are serious or life-threatening; and intensive care and surgery are the highest risk specialties.

These estimates have remained stable over decades.

The great majority of studies are hospital-based and rely on reviews of case-notes. This study does not give much information on reliability, a topic that has been thoroughly reviewed in our *ARC*. [2] Nevertheless, the study does mention the probability that

many harms are not picked up in case-notes. Some people have been investigating the possibility of combining case-note review with patient accounts of their experiences. While citing one *ARC* WM authored study, this review does not mention some of our work on gradually improving harm rates over time. [3]

### References:

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## Huge Meta-Analysis of Patient Harm, Mostly in Hospitals

*Richard Lilford, ARC WM Director*

# Improving Diagnostic Probability Estimates of Students

*Peter Chilton, Research Fellow*

Probability estimates are often used by clinicians during a diagnosis as they narrow down their initial range of possible diagnoses based on test results, pre-test probabilities, and the sensitivity and specificity of the tests. However, when it comes to explicitly calculating probabilities, it has been found that physicians' estimates can be inaccurate, generally too conservative or prone to errors. So there could be potential to improve quality of diagnosis, and thus medical care, through teaching medical students how to make more accurate estimates.

Brush and colleagues in Canada recently conducted a randomised controlled trial [1] looking at two different methods of teaching – receiving explicit instruction regarding testing

and Bayesian revision (concept group), or being exposed to repeated examples of cases with feedback (experience group) – to see whether there was any improvement in students' abilities to update diagnostic probabilities when compared to controls.

The authors randomised 61 medical students to either the control group or one of the two teaching methods and compared their subjective post-test probability to a Bayesian calculation of post-test probability. The results showed that the students in the concept group demonstrated a significant improvement in probability estimates compared to the other two groups ( $p < 0.001$ ) – there was a mean (SE) discrepancy of 0.4% (0.7%) between the subjective score and the Bayesian score,

compared to 3.5% (0.7%) in the experience group and 4.3% (0.7%) in the control group. It seems, therefore, that there is therefore a benefit in teaching Bayesian reasoning to medical students in order to improve their diagnostic accuracy.

We thank Gus Hamilton for drawing our attention to this paper.

## Reference:

1. Brush Jr JE, Lee M, Sherbino K, et al. [Effect of Teaching Bayesian Methods Using Learning by Concept vs Learning by Example on Medical Students' Ability to Estimate Probability of a Diagnosis. A Randomized Controlled Trial. JAMA Netw Open. 2019; 2\(12\): e1918023.](#)



# Automated Change Detection to Track Uptake of New Knowledge Across a System and to Identify Laggards

Richard Lilford, ARC WM Director

**T**ime-series analyses using Hospital Episode Statistics (HES) data have been used in NIHR ARC West Midlands to track uptake of knowledge derived from surgical trials.[1] However, this methodology was used to monitor uptake across the health system as a whole, rather than to examine heterogeneity across individual providers. Walker et al, recently writing in the BMJ,[2] report on the use of a method to compare longitudinal data across general practices. They used the monthly prescribing data

sets from the NHS Business Services Authority. The authors selected two types of prescribing behaviour where new guidelines prescribed a change in practice. They measured the timing of break points in prescribing behaviour and the steepness of any change in slope. They examined for heterogeneity across general practices in the English health service.

While significant change of practice in line with the guidelines was demonstrated across the service, there was considerable heterogeneity

between practices and also different patterns of change. Some practices changed abruptly, while in others change was more incremental.

We propose to use these methods in our future work. The CRASH-3 trial has shown that tranexamic acid improves recovery after severe head injury.[3] We will evaluate uptake of this knowledge across the health service. We will also try to use this method in tracking uptake of knowledge from surgical trials

## References:

1. Reeves K, Chan S, Marsh A, et al. [Implementation of research evidence in orthopaedics: a tale of three trials. \*BMJ Qual Saf.\* 2019.](#)
2. Walker AJ, Pretis F, Powell-Smith A, Goldacre B. [Variation in responsiveness to warranted behaviour change among NHS clinicians: novel implementation of change detection methods in longitudinal prescribing data. \*BMJ.\* 2019; \*\*367\*\*: I5205.](#)



# Obituary

## Ray Fiveash

It is with great sadness that we report that Ray Fiveash, one of NIHR CLAHRC WM's Public Contributors, died has recently passed away.

Ray was one of NIHR CLAHRC WM's first public contributors and he was a valued member of both the Prevention and Detection Theme and the Public Advisory Committee. In addition to contributing his perspective to a range of projects, Ray was a dedicated member of CLAHRC WM's Executive Committee, where he provided thoughtful insights to meetings and could be relied upon to be a 'voice of reason' in discussions and debate.

Ray was kind and thoughtful and was always willing to share his time and knowledge with members of the CLAHRC WM community. Researchers have described how Ray's contributions were '*thought-provoking*' and '*helpfully-challenging*', but also how he brought a '*gentle humour and warm charm*' to all interactions. I have received many touching tributes from his fellow Public Contributors who will miss working alongside Ray, and reflected that they found him to be '*supportive*' and someone who had a great sense of humour.

Ray will be sadly missed and we extend our deepest sympathies to his wife, Diana, and his two children, George and Bethan.

## Latest News

### RCGP Midland Faculty Research Symposium

On 21 May the Institute of Applied Health Research at the University of Birmingham are hosting the 2020 Royal College of General Practitioners Midlands Faculty research symposium. This will be a great opportunity to showcase any work in and around general

practice, and to find out what others are doing in the region. The event is suitable for anyone working in, undertaking research related to, primary care. Deadline for abstract submission is 13 March 2020. For more information, and to book a place, please visit: <http://tiny.cc/v9xlkz>.

### Milbank Quarterly Top 5 Article

A systematic review by CLAHRC WM researchers on ranking hospitals based on preventable hospital deaths was recently reported as the fifth most read article in the Milbank Quarterly

journal for 2019. The review by Manaseki-Holland, Lilford, Te, et al. is available online at: [onlinelibrary.wiley.com/doi/10.1111/1468-0009.12375](https://onlinelibrary.wiley.com/doi/10.1111/1468-0009.12375).

# Practical Introduction to Running RCTs

Keele University are hosting a four-day course to improve knowledge and skills in designing, conducting, managing and analysing RCTs from 30 June to 3 July 2020. Combining talks and workshop activities, the course will focus on the principles, methodology and practical

implementation of RCTs. The course is aimed at individuals who are planning to undertake or are undertaking clinical trials. For more information, and to register, please visit: [keele.ac.uk/pcsc/newsandevents/shortcourses/runningrandomisedclinicaltrials](http://keele.ac.uk/pcsc/newsandevents/shortcourses/runningrandomisedclinicaltrials).

## Why Are Life Chances of Young People in Care so Low?

Prof Graeme Currie recently wrote an article for the Core Insights magazine of Warwick Business School on the life chances of young people in

care. The article can be read at: [wbs.ac.uk/news/why-are-the-life-chances-of-young-people-in-care-so-low/](http://wbs.ac.uk/news/why-are-the-life-chances-of-young-people-in-care-so-low/).

## Introduction to Lifestyle Medicine

The University of Birmingham are hosting a three-day course on an evidence-based approach to an Introduction to Lifestyle Medicine on 28-

30 April 2020. For more details, and to register, please visit: <http://tiny.cc/a8lmkz>.

# Latest Funding Opportunities

### HS&DR Programme

- 20/10 [Family Group Conferencing](#)
- 20/12 [Evaluation of the Low Calorie Diet Programme](#)

### NIHR Visiting Speaker Award

Round 2 of the NIHR Visiting Speaker Award is now open for applications from individuals based in the NIHR Infrastructure or NIHR Schools. This funds up to £300 to support presenting work in another NIHR Infrastructure centre or

### NIHR In-Practice Fellowship

This scheme is part of the Integrated Academic Training programme set up to improve career pathways for fully-qualified General Practitioners who have outstanding potential as a researcher and/or educationalist. It funds a personalised programme of academic training; salary for 50% of awardees' time over 24 months; and conference attendance. It allows

### PGfAR Programme

- [Competition 32](#)

NIHR School.

For further details on how to apply and full eligibility criteria, please visit: [nihr.ac.uk/funding/nihr-visiting-speaker-award-vsa/23941](http://nihr.ac.uk/funding/nihr-visiting-speaker-award-vsa/23941).

the practitioner protected time to develop academic skills and is expected to lead to the preparation of an application for a competitive, peer-reviewed doctoral fellowship.

Full details are available at: [nihr.ac.uk/funding/in-practice-fellowship-round-14/24061](http://nihr.ac.uk/funding/in-practice-fellowship-round-14/24061).

Deadline for applications is Thursday 26 March 2020.

# Recent Publications

Ayorinde AA , Williams I, Mannion R, Song F, Skrybant M, Lilford RJ, Chen Y-F. Assessment of publication bias and outcome reporting bias in systematic reviews of health services and delivery research: A meta-epidemiological study. *PLoS One.* 2020.

Brown C. How to Analyze an Observational Study. *Paediatr Child Health.* 2019; **30**(2): 60-5.

Kamfose MM, Muriithi FG, Knight T, Lasserson D, Hayward G. Intravenous Ceftriaxone Versus Multiple Dosing Regimes of Intravenous Anti-Staphylococcal Antibiotics for Methicillin-Susceptible Staphylococcus aureus (MSSA): A Systematic Review. *Antibiotics (Basel).* 2020; **9**(2). pii: E39.

Mei C, Fitzsimons J, Allen N, Alvarez-Jimenez M, Amminger GP, Browne V, Cannon M, Davis M, Dooley B, Hickie IB, Iyer S, Killackey E, Malla A, Manion I, Mathias S, Pennell K, Purcell R, Rickwood D, Singh SP, Wood SJ, Yung A, McGorry PD. Global research priorities for youth mental health. *Early Interv Psych.* 2020;**14**(1): 3-13.

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