comment

CUT TO THE CHASE Gabriel Weston

Keeping an open mind

This month marks the 500th anniversary of the death of Leonardo da Vinci. Despite very little formal education he was surely the greatest polymath who ever lived, displaying genius in areas as diverse as art, medicine, engineering, and invention.

Given the huge influence of Leonardo's imagination, it's disappointing how arts and sciences have become siloed over the years—a steady divorce that gained real traction in the 19th century. This is still evident today, in ways ranging from how museums are organised to our ludicrous tradition of choosing just three A level subjects, which often results in arts or sciences being erased from children's intellectual landscape by the time they hit 16.

But the tide is turning. Writers such as the poet Lavinia Greenlaw and the playwright Bryony Kimmings have shown that science and medicine are perfect fodder for highbrow literature. Popular science writing itself is having a heyday, enabling once arcane ideas to be enjoyed by people who might otherwise feel unsure about dipping their arty toes in. Institutions such as the Wellcome Trust and the Medicine Unboxed project have been getting these two disciplines in bed together for years. And 11 UK medical schools now have foundation programmes specifically for arts graduates who want to be doctors—a massive improvement on how things were when I started out.

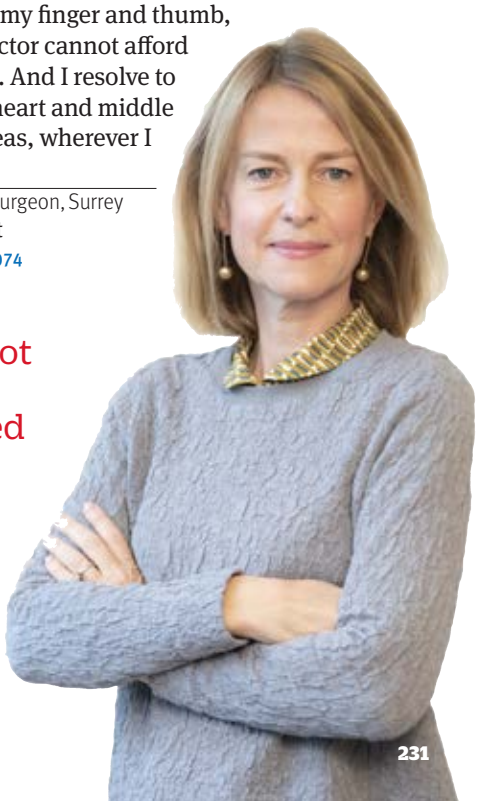
What a joy, then, to discover London's Science Gallery this week. Nestled just under the Shard in the campus of Guy's Hospital, this free exhibition space promises to celebrate the collision between arts and sciences. Its current exhibition, *Spare Parts*, does just that.

Garishly coloured kidneys made from blown glass portray the artist John A Douglas's ambivalent feelings about his own renal transplant. A glass fronted beehive, writhing with life, is connected to a container incubating live human skin cells—celebrating the collaboration between a beekeeper, an artist, and a cell biologist. And a massive wall made from a thick felted material, coiled like the cerebral cortex, disorientates the approaching visitor because of the peculiar way it absorbs sound.

As with all good exhibitions, some parts were uncomfortable for me. In particular, many displays were scarily high tech. But Leonardo would have loved it. I soon gave in and allowed myself to be escorted by a perky young brainbox, in a Science Gallery T shirt, to marvel at a 3D printer pumping out tiny replicas of body parts. She gave me a miniature magenta brain to take away as a souvenir. Now, every time I roll it between my finger and thumb, I remember that a doctor cannot afford to be narrow minded. And I resolve to open my hardening heart and middle aged mind to new ideas, wherever I find them.

Gabriel Weston is an ENT surgeon, Surrey
gabriel.weston@nhs.net
Cite this as: *BMJ* 2019;365:l2074

A doctor cannot afford to be narrow minded



PERSONAL VIEW

Katherine Ripullone,
Kate Womersley

Is resilience a trainable skill?

Can you detect who can recover quickly from set backs, let alone teach someone how, and does it really improve patient care?

The GMC views resilience as a critical part of becoming a professional. All graduating medical students should have proved that they are resilient, and NHS job specifications expect it. They define resilience as "the capacity to recover quickly from difficulties." It implies toughness and an untiring effort to do more, to work faster, and to be better.

This sounds impressive, but is resilience a trainable skill? Confusingly, it's also presented as an intrinsic part of any good doctor's personality. Can you detect resilience, let alone teach it? And does increasing the resilience of individual doctors—if that's possible—improve patient care?

We were among the first medical students to receive mandatory resilience training as part of our degree. Theories about resilience seeped into many aspects of our education, particularly the GMC mandated Situational Judgement Test (SJT), an exam that uses realistic clinical and professional scenarios to test candidates' understanding of the "most appropriate" and "least appropriate" reactions to challenges on the wards.

Flawed system

The exam's ostensible purpose is to test a candidate's ability to cope with complex medical and interpersonal situations when senior support isn't readily available. Many of the questions, however, encourage juniors to take on additional levels of responsibility. The expectation is that they stay overtime, agree to additional shifts, and make clinical decisions even if they feel uncertain. The SJT frames professionalism as a readiness to fill gaps in a leaking system, and lessen pressures which lie outside of individual doctors' control.

In fact, resilience training expects that doctors merely adapt to system-wide challenges within healthcare, rather than tackle them. Compensating for a flawed system sounds more like compliance than resilience—the implication being that rationed resources, rota gaps, and overstretched teams are inevitabilities of care delivery and that's just how it is in today's NHS. Resilience rhetoric also assumes that everyone experiences their working environment in the same way, but trainees' own biographies and identities profoundly affect their responses when negotiating risk and uncertainty, as well as when party to distressing events and testing decisions.

BMJ OPINION Nathan Rockey

Recognising the generosity of patients

Learning medicine would be impossible without patients' contributions

During our second year of medical school, my classmates and I have spent many mornings in the hospital learning the art of medicine. On these teaching rounds, I simultaneously relied on, and was constantly surprised by, the generosity shown to us by the patients we saw. In the midst of scary, tiring, and uncertain hospital stays someone has knocked on their door and asked if a student can take a history and perform a physical examination. Amazingly, overwhelmingly, most people agree.

This endeavour of learning medicine—of doctors passing along their ability to diagnose and treat—would be impossible without these contributions. Such generosity is essential for the practice of medicine to continue.

The patients that I saw this year allowed their stories to be turned into temporary textbooks. And, as Osler said, "Every patient you see is a lesson in much more than the malady from which he suffers." Once patients granted me this glimpse into their lives and their bodies, the physical examination and presentation skills were certainly not the most important lessons.

I learnt how to kneel down, look a patient in the eyes, and listen to their story without worrying about filling a silence with a textbook question. In fact, it's OK to sit in silence—empathy and compassion sometimes enter a room only once scripted words have finally left. I learnt that it is fine to tell a joke, and that it's even better to laugh when a patient tells a funnier one. It can be important to cherish

Medical students should be taught the importance of handing over work when the day is done

Selling resilience as a form of personal nourishment puts the responsibility for change firmly on the individual, while letting the system off the hook. Working conditions for doctors have become more demanding and less secure. Resilience deflects accountability for doctors' struggles away from understaffed, inadequately funded, and poorly managed organisations, on to the people who work within them.

A shared value

The professionalism curriculum needs to be revised with a focus on resilient systems rather than resilient doctors. Workplaces would do better by defining resilience as a shared value rather than a personal asset. Otherwise, resilience risks becoming a metric with which to deny the sensitivities and valuable differences that come up over the course of training. Medical students should be taught about their employment rights, the importance of handing over work when the day is done, mutual support for colleagues to take breaks, and raising concerns with seniors without intimidation. It's time for junior doctors to be empowered to build more resilient systems —to whistleblow, to advocate, and to speak out against wrong. It is the GMC's responsibility to embolden this potential in the next generation.

Katherine Ripullone is academic foundation year 1 doctor, Norfolk and Norwich University Hospital
Kate Womersley is academic foundation year 1 doctor, Edinburgh

Cite this as: *BMJ* 2019;365:l2162

humour in times of difficulty. On the other hand, it's also right to honour a patient's frustration, and to realise that their recent experience likely warrants it.

To the patients that I saw this year: thank you for letting me make mistakes and for allowing me to be nervous. You taught me what strength and patience look like. Becoming a competent, compassionate physician is a long journey—above all, this year reinforced to me that the people I encounter as patients must always be at the centre of this journey. After all, it is their generosity that enables it to happen in the first place.

Nathan Rockey is a second year medical student at the Mayo Clinic Alix School of Medicine in Rochester, Minnesota, in the US

ACUTE PERSPECTIVE David Oliver

Stress of sending patients home

"Look! It's that's bloody doctor who said he could go home." I heard those words directed at me in the local supermarket. I was shopping with my wife, and it was said in a threatening way, designed to be overheard. The experience was unsettling. We left the shop, not looking up to see who'd said it, and to this day I don't know.

I mentioned this story over dinner to some other senior hospital doctors, who all described similar experiences in hospital corridors, or in public places during their leisure time.

In my clinical day job and my policy and leadership work, I've encountered public perceptions that pressure on beds has led to patients being sent home too soon, and the Health Service Ombudsman has highlighted transition from hospital as a key area for complaints.

It can certainly be a shock and a major stressor for patients' families, or for paid care staff and community health services, to find themselves suddenly taking back the care of patients with complex needs who are still recovering from acute illness or injury and not yet back at the level they were.

But what of the burden on hospital doctors? Yes, we work in multidisciplinary teams, but we generally carry the main responsibility for the decision to admit or discharge. And we're usually the ones at the coroner's inquest, or at the bereavement or complaint resolution meeting, or fielding the call from the patient advocacy and liaison team. It isn't just complaints and unhappy families we fear, but the distress we experience ourselves in worrying or knowing that our decisions have led to preventable harm.

Compared with when I started 30 years ago, we're under far more pressure to weigh priorities around bed use and to manage competing risks. No hospital discharge is risk-free. We must balance the risk of harm from ongoing admission against the risk of going home; the wishes of patients (often very keen to leave) against those of their families (often less keen); and, crucially, the needs and wants of patients currently occupying scarce acute beds against those of others who may need them more.

Despite my lengthy experience, these issues probably cause me more sleepless nights than any other aspect of the job. I can't be alone. So, how do fellow hospital doctors and clinical teams cope? How much support do they get from senior managers when things go wrong? It's a conversation we need to have: please do post your responses.

David Oliver is a consultant in geriatrics and acute general medicine, Berkshire
davidoliver372@googlemail.com

Cite this as: *BMJ* 2019;365:l2094

These issues probably cause me more sleepless nights than any other part of the job

PRIMARY COLOUR Helen Salisbury

Why be a doctor?

Doctors spend a lot of time complaining. There's a socially acceptable, almost obligatory, level of moaning; but, if you dig a little deeper, only a minority regret joining the profession. Some onlookers find this incomprehensible: we work ridiculous hours, for less pay than our city colleagues. We spend our time in physically and emotionally unpleasant places, surrounded by body fluids and bad smells, grief, pain, and distress. How can that be considered a good job?

Medicine is rarely boring, although it helps to be naturally curious. In a GP consultation little time is wasted on small talk: by the end of 10 minutes you may have heard about past struggles with alcohol, current debt or relationship problems, and fears for the future. Technically, the patient only came for a sick note or a new prescription for antidepressants, but really he came to be heard. You're invited to share the important moments of your patients' lives—the births, the suffering, and the deaths.

Sometimes we even make clever diagnoses: taking a careful history, doing a skilled examination, and then adding together the symptoms and signs and feeling a bit like Sherlock Holmes (or Gregory House). This happens less often than one assumed that it would at medical school, but there's a joy in flexing those intellectual muscles and exercising those skills.

We may rightly worry about just how effective some of our medicines are or fret over numbers needed to treat, but we're entrusted with the right to prescribe a vast array of drugs that do work. When patients come to us with infections, pain, or nausea, we have the tools to help. Even in the simplest of cases—seeing the relief on the face of the patient with a urinary tract infection as she leaves clutching her prescription for antibiotics—we get a feeling of efficacy, of really making a difference.

Perhaps the most important difference we make is in our role as interpreter of the medical world, offering explanations and reassurance, making the unknown less scary, and being a partner in difficult decisions. Our patients trust us to look after them and to work on their behalf. In the UK we're particularly fortunate in that, on the whole, we can do the right thing for our patients without worrying about what they can afford.

Being a doctor is self evidently useful: no one ever asks, "What's the point in doing that?" While our contemporaries do something incomprehensible in the world of finance or struggle to make a living in the arts, many of us feel privileged to have a job that is valued, secure, interesting, and—for all our moaning—relatively well paid.

Helen Salisbury is a GP in Oxford
helen.salisbury@phc.ox.ac.uk

Cite this as: *BMJ* 2019;365:l2153

The most important difference we make is in our role as interpreter of the medical world

LATEST PODCAST

Doctors role in Extinction Rebellion movement

Over the past few weeks, the group Extinction Rebellion has been making headlines with its direct action protests calling for governments to tackle climate change.This podcast hears from two doctors and Rowan Williams, the former archbishop of Canterbury, about why they support Extinction Rebellion. Williams also talks about why he thinks medical professionals can make a difference in the campaign:

"The world we're in at the moment seems to be a world at war with itself. We're globally, as a human race, acting in ways that if you thought of in an individual you'd be classed as pathological. The challenges facing the human race these days are such that no one society or no one country can face them alone. But it's equally true that no one profession can face them alone. To be able to join all of them up has to be part of the answer."

The sex lives of Brits

Last week, a study in *The BMJ* reported a decline in how often people in Britain are having sex. One of the authors, Kaye Wellings, joins us to talk about the study and what doctors can do with this information:

"I think people will inevitably take to their GP anxieties that they have about their sex lives. One important service that the survery performs for public health is to dispel myths. Data have shown that people generally think that other people have more sex than they do and that can be worrying. We found in this survery that more than half were dissatisfied with the amount of sex they were having.

"It could be possible that they're comparing themselves with what they believe everybody else is doing. If that is the case, then doctors can perform a really valuable function in saying, 'You think this, but actually . . .' and their patient can go away feeling reassured."

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Edited by Kelly Brendel, deputy digital content editor, *The BMJ*

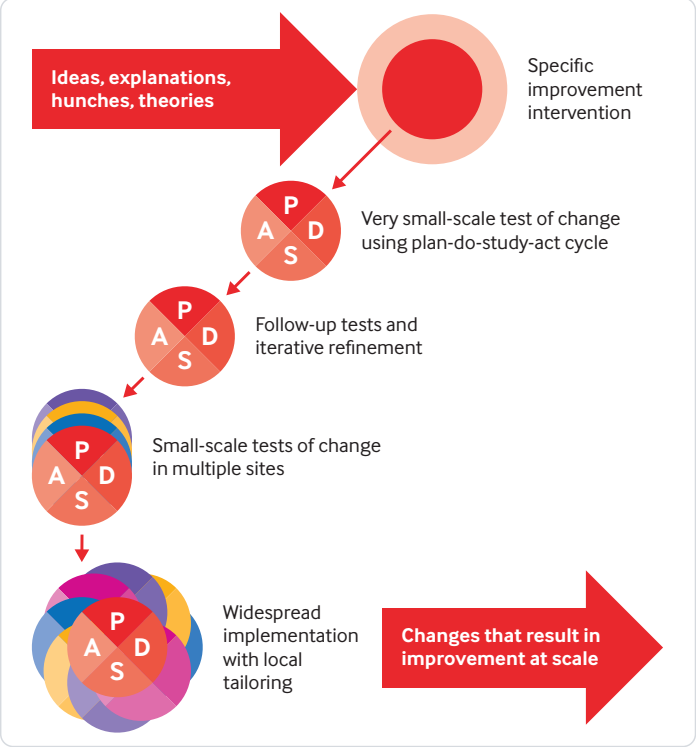
QUALITY IMPROVEMENT

Spreading and scaling up innovation and improvement

Disseminating new ideas across the healthcare system is challenging but potentially achievable through different logics: mechanistic, ecological, and social, say **Trisha Greenhalgh** and **Chrysanthi Papoutsi**

The GP in the surgery, the nurse manager on the ward, and the policy maker in the boardroom would be forgiven for losing track of all the new technologies, care pathways, and service models that could potentially improve the quality, safety, or efficiency of care. Yet we know that innovations rarely achieve widespread uptake even when there is robust evidence of their benefits (and especially when such evidence is absent or contested).[1] The NHS Long Term Plan points out that every approach it prioritises is already happening somewhere in the NHS but has not yet been widely adopted.[2]

Achieving any change takes work and usually involves—in various combinations—spending money, diverting staff from their daily work, shifting deeply held cultural or professional norms, and taking risks. Simplistic metaphors ("blueprint," "pipeline") aside, there is no simple or universal way of implementing change at scale in a complex system. A technology or pathway that works smoothly in setting A will operate awkwardly (or not at all) in setting B.



Rapid cycle test of change model of spread used in implementation science. Drawing on insights and a previous diagram in a review by Barker[3]

Achieving any change usually involves spending money, diverting staff, shifting deeply held cultural norms, and taking risks

KEY MESSAGES

- Spread (replicating an intervention) and scale-up (building infrastructure to support full scale implementation) are difficult
- Implementation science takes a structured and phased approach to developing, replicating, and evaluating an intervention in multiple sites
- Complexity science encourages a flexible and adaptive approach to change in a dynamic, self organising system
- Social science approaches consider why people act in the way they do, especially the organisational and wider social forces that shape and constrain people's actions
- These approaches may be used in combination to tackle the challenges of spread and scale-up

What insight does the rapidly growing research literature on spread and scale-up offer the busy clinician, manager, commissioner, or policy maker? How—if at all—does this literature speak to the patient?

"Spread" generally means replicating an initiative elsewhere and "scale-up" means tackling the infrastructural problems (across an organisation, locality, or health system) that arise during full scale implementation[3]. In practice one blurs into the other.

In this rapid review (the methods of which are described in box 1, see bmj.com) we found that scholars of spread and scale-up had used many different theoretical lenses. We discuss three—implementation science, complexity science, and social science—each of which is based on a different logic of change (mechanical, ecological, and social, respectively; table 1, see bmj.com).

Implementation science

Implementation science, defined as "the scientific study of methods to promote the systematic uptake of research findings and other evidence based practices into routine practice,"[16] developed from the evidence based medicine movement in Europe and North America. It is perhaps best known for the sequential, structured (and somewhat top-down) method of spreading focused improvement techniques.[10 16]

The first phase of this approach is the development of a clearly defined intervention, the components of which are optimised to reflect the evidence base (especially relating to how to change individual behaviour) (figure). There is then a small scale trial of this intervention in one or a few selected settings, followed by a systematic effort to replicate it in other settings, partly by identifying and dealing with any barriers and facilitators.

Patient input can be harnessed very productively in this effort, though careful

do; how they interpret material artefacts and other people's actions; and how they draw on programme resources to achieve their goals (or why they refuse or are unable to do so).

Staff in organisations implement change creatively and adaptively rather than mechanically. They experiment with innovations, develop feelings about them, worry about them, adapt them to particular tasks, "work around" them, and try to redesign them.[1] Efforts to standardise the replication of an intervention across multiple settings therefore rarely go to plan.

Social science approaches to scale and spread generate theories about why and how programmes of change diverge from plans over time: explanations that answer the question, "What did people do in this case and why did it have that effect?" A programme theory is expressed at a very low level of generality—for example, "The nurses did not engage because of a staffing crisis." Social scientists also develop more substantive theories to explain why spread and scale-up did or did not happen—for example, theories of behaviour change (individual level), absorptive capacity (organisational level), or interorganisational influence (supra-organisational level). Usually, a social science explanation of a spread or scale-up effort requires both substantive theory and a more specific programme theory.[11-23]

Shaw et al synthesised various substantive theories (summarised in the supplementary file on bmj.com) that have been used to analyse the spread and scale-up effort as social practice.[13] These theories—which include normalisation process theory, actor-network theory, and structuration theory—help researchers and change agents to tap into (with a view to influencing) the organisational and societal influences that shape and constrain peoples' actions. What do patients expect? What do professional groups define as the gold standard? What do different professionals on the team expect of each other? What is thought to be legally sanctioned (whether or not correct)?

Many social scientists view the organisation as a "meso" level world that mediates between the individual (micro) and societal (macro). Individuals' actions in organisations are seen as shaped not only by practical and material realities but also by scripts or routines—that is, expected or required patterns of behaviour defined by formal roles, regulations, and standard operating procedures as well as by informal customs, practices, and traditions.[24] Organisational routines, in turn, are strongly influenced by external social forces including professional norms, public expectations, laws and policies, and vested interests.

Organisational change can thus be viewed as inherently transgressive, because doing things differently violates the norms that are inscribed in organisational routines. Yet because routines are carried out by creative individuals rather than automatons, they contain the scope for change.[24] Leaders—clinical, managerial, or both—have a crucial part in creating the preconditions in which staff will feel confident to innovate and improve (for example, by setting a climate of risk taking and collaborative learning rather than one of playing safe and covering one's back).[3 12] An example is shown in box 4.

Box 4 | A social science approach to spread and scale-up

Dixon-Woods and colleagues studied national efforts to reduce catheter associated infections in intensive care units in the US[23] (highly successful) and UK (less successful).[25]

The US investigators had initially concluded (using an implementation science lens) that a technical checklist, introduced in more than 100 intensive care units, had dramatically reduced rates of central venous catheter infection by making the care process more systematic, rational, consistent, and evidence based. Dixon-Woods and colleagues undertook post hoc interviews, reanalysed the data, and came up with a new theory of spread that was predominantly social rather than technical.

They found that the US programme was seen as something that "good" intensive care units should do, perhaps because it was led by respected leaders from a university. Relations between participating units strengthened as a result of participation, resulting in extensive interorganisational networking and lateral support. Over time, the initiative took on the characteristics of a grassroots social movement; clinicians and managers identified strongly with the programme and wanted to be involved.

In the UK, the intervention was seen as top-down and driven by government rather than professionally led and collaborative; the initiative was introduced in parallel with other major infection control policies so had a less distinct identity; there was limited lateral support between participating units; and in low performing units there seemed to be a history of under-resourced improvement initiatives, resulting in change fatigue.

Box 3 | A complexity science approach to spread and scale-up

Eaton and colleagues used a systematic review and national stakeholder interviews to build an international case study of challenges to the spread of evidence based mental health programmes in low and middle income countries.[8]

Every country had its own unique problems, but some inter-related challenges recurred: limited finances and government commitment; overcentralisation of services in large psychiatric hospitals with a weak, underfunded primary care sector; scarcity of trained mental health personnel; and low public health expertise among mental health leaders.

The term scale-up was extended to refer to several linked goals: increase coverage (the number of people receiving services); increase the range and appropriateness of services; increase the extent to which these services were evidence based (using service models that had been tested in comparable settings); and strengthen the system through policy formulation, implementation planning, and financing. Mobilising political will and reducing the stigma of mental health conditions were key. Through a complexity lens, these goals are interdependent and mutually reinforcing.

Numerous national approaches were taken in different countries (including attempts to influence the priorities, planning, and resources for mental health services; challenging the tertiary care focus; developing and disseminating evidence based guidelines) and local level (support for service restructuring; training primary care staff in common mental disorders; engagement and education of patients, families, and communities; and strengthening systems for evaluation and monitoring). Many settings had weak data systems. By improving the quality of routinely collected data, developing reliable metrics of success that fed into system planning, and developing links with academic researchers, the potential for system learning was greatly improved, though the spread and scale-up effort was more successful in some settings than others.

Conclusion

There are substantial synergies and overlaps between the three logics. These approaches can inform the design and implementation of spread and scale-up programmes from small quality improvement interventions to system-wide transformational change and can offer insights to frontline teams about how and why particular change efforts are effective. As a rule of thumb, the larger, more ambitious, and more politically contested the spread challenge, the more ecological and social practice perspectives will need to supplement (or replace) mechanical efforts to replicate an intervention.

Trisha Greenhalgh, professor
trish.greenhalgh@phc.ox.ac.uk
Chrysanthi Papoutsi, postdoctoral researcher, Primary Care Health Sciences, University of Oxford
Supported by the Health Foundation
Cite this as: *BMJ* 2019;365:l2068

Box 2 | An implementation science approach to spread and scale-up

McKay and colleagues followed the efficacy, effectiveness, and implementation trials to develop, test, and scale up intervention of physical activity and healthy eating in elementary schools in Canada.[19]

In the first phase, a multifaceted intervention (resources, training for teachers, school facilitators, and a regional support team) was developed through participatory research with schools, communities, and other stakeholders, accounting for contextual realities, behaviour change, and social-ecological theories.

Efficacy was evaluated in a cluster randomised controlled trial in 10 schools, which measured four outcomes: school based opportunities for physical activity; actual physical activity levels; pupils' chronic disease risk factors and academic performance; and pupils' self reported consumption of vegetables and fruit. Process evaluation captured contextual and operational issues that led to refinement, which was evaluated for effectiveness under real world conditions in a larger cluster randomised controlled trial.

In the implementation and scale-up phase, a further 348 schools were supported to adopt and embed the intervention (with attention to fidelity) and evaluate its effect locally. At the time of publication, 225 regional trainers had delivered more than 4000 workshops to more than 80 000 teachers, reaching about 500 000 pupils. The programme, which took six years to develop and pilot, was sustained over 10 years.

This is a rare example of a predominantly top-down spread and scale-up strategy that achieved widespread coverage and measurable improvements in some but not all outcomes. Its success is probably attributable to the use of participatory research and social-ecological theories and to a positive policy context, strong professional buy-in, generous resourcing, and long timescale.

attention needs to be paid to power dynamics, the kinds of data that are collected, and how and by whom those data are analysed.[15]

The sequence shown in the figure is often promoted as the key to quality improvement, but one systematic review found that nearly half of all successful scale-up initiatives had not followed it.[10]

Implementation science approaches tend to draw heavily on quality improvement methodology. Barker and colleagues describe this as an "engine" that uses rapid cycle change to drive spread of an innovation, with some potential to adapt to different contexts.[3]

In recent years, implementation science has matured as a field in a way that has paralleled developments in the MRC's guidance for developing and testing complex interventions.[17] Both have shifted from a highly structured and narrowly experimental approach based on mechanical logic (emphasising standardisation and replicability) to a more adaptive approach that recognises the need to think flexibly, understand and respond to local context, use qualitative methods to explore processes and mechanisms, and adapt the intervention to achieve best fit with different settings.[18] This shift resonates with the complexity science approach described in the next section.

An example is shown in box 2.

Complexity science

A complex system is a set of things, people, and processes that evolve dynamically and can be defined in terms of their interactions.[4 18] Such systems are characterised by uncertainty, unpredictability, and emergence. They adapt through self organisation (such as continuous adaptations initiated by frontline staff so they can complete tasks given local contingencies and availability of resources), attention to interdependencies (how parts of the system fit together), and sensemaking (how people, individually and together, assign meaning to experience and link it to action).[4]

To study the ecological (emergent, interdependent, adaptive) properties of complex systems, researchers and evaluators use multiple methods, particularly ethnographic observation, in real world settings. Such studies are usually written up as richly described case studies incorporating both quantitative and qualitative data and including a narrative of how and why things changed over time.

Complexity can be hard to square with spread strategies that seek to replicate a "blueprint" innovation in a standardised way in widely different settings. The plan-do-study-act engine depicted in the figure might work for small scale improvement initiatives, but spreading and scaling up major innovations requires attention to the underlying logic of complex systems, which is ecological rather than mechanical.[4-8]

Lanham and colleagues recommend the following principles when planning major change programmes in complex conditions:[4]

Acknowledge unpredictability—designers should consider many plausible futures; designs should be tailored to local context and view surprises as opportunities

Recognise self organisation—designers should expect their designs to be modified in different settings; implementation teams should capture data and feed it into the process

Facilitate interdependencies—designers should develop methods to assess the nature and strength of interdependencies; implementation teams should attend to these relationships, reinforcing existing ones and facilitating new ones

Encourage sensemaking—designers should build focused experimentation into designs; implementation teams should encourage participants to ask questions, admit ignorance, explore paradoxes, exchange different views, and reflect collectively.

To this list, we would add:

Develop adaptive capability in staff—individuals should be trained to tinker with technologies and processes and make judgments in case of incomplete or ambiguous data

Attend to human relationships—people must work together to solve emergent problems using give-and-take and "muddling through"

Harness conflict productively—view conflicting perspectives as the raw ingredients for multifaceted solutions.

These principles underpin the concept of the learning health system, defined as one "in which science, informatics, incentives, and culture are aligned for continuous improvement and innovation, with best practices seamlessly embedded in the delivery process and new knowledge captured as an integral by-product of the delivery experience".[20] A learning health system is characterised by participatory culture, distributed leadership, engaged patients, shared and evidence based decision making, transparent assessment of outcomes, and use of information and technology for continuous learning. Innovation, improvement, spread, and scale-up will all occur more readily in such a system.[20]

There are numerous specific models of spread and scale-up that embrace (implicitly or explicitly) ecological logic and the learning health system (see table 2 on bmj.com).

An example is shown in box 3. Although the success of an initiative based on implementation science can be measured by fidelity of its replication across a range of contexts, success of an effort in different parts of a complex system is better measured by a nuanced account of what changed and why.[22]

Social science

Social science approaches seek to identify and explain social mechanisms, such as what people believe and feel; why they act as they

LETTERS Selected from rapid responses on bmj.com

LETTER OF THE WEEK

Cash for publication is discriminatory and unscientific

Plan S aims to achieve open access publishing without paywalls (News online, 27 November 2018). I don't often write scientific papers, but a recent experience made me uneasy.

I submitted a paper to a prestigious journal. It was rejected. I don't get hung up about rejection; one is always convinced by the brilliance of one's own work. But the journal suggested that, were I to submit it to the open access version of the same journal, it would probably be accepted.

I don't have the $3000 needed to follow this course. But I thought peer review was peer review. If it's not suitable for the journal, it's not suitable for any version of that journal. Clearly not. Pay and be published, it seems.

I resubmitted the paper to another prestigious journal. The same thing happened (except I got reviewer feedback). But again I was offered the opportunity to submit to the open access version. It cost less—about $1500.

Cash for publication is discriminatory, unscientific, and dangerous. The potential for bias is stupendous. An individual might not be able to fund publication, but a research department might, and a drug company certainly will. Researchers need publications in journals with high impact factors to maintain grants and prestige. Drug companies might want to promote positive studies of their own new drugs. Naturally, they will pay. But if a journal with a high impact factor has dual acceptance standards for its main and open access versions, this disadvantages the individual. Equally it raises serious questions about peer review.

I don't need more papers on my CV. I am not applying for any jobs. But can one really trust the work published in paid-for journals?

Andrew N Bamji, retired consultant rheumatologist, Rye

Cite this as: *BMJ* 2019;365:l1915

DOCTORS AS NHS CEOS

Management education for doctors in India

Oliver rightly argues that doctors should have more opportunities to pursue administrative training and to opt for such roles (David Oliver, 13 April). But his assumption that having doctors in leadership positions in many overseas health systems is the prime reason for their performance is unsupported.

In India, most leadership positions in hospitals and health systems are held by doctors because the health management workforce is lacking. These doctors usually find it difficult to balance their clinical and administrative responsibilities because they lack any formal education or training in management, policy, leadership, and so on. Many academic institutes in India are now providing doctors with formal education and training in hospital administration and healthcare management.

This trend of doctors in India now opting for formal education in management science and then taking up leadership positions in the health system is expected to bring a sea change in healthcare service delivery.

Mahesh Devnani, assistant professor, Chandigarh

Cite this as: *BMJ* 2019;365:l2145

DRUG COMPANY INFLUENCE

Why is privatisation NHS policy?

Private sector sponsorship in medicine is known to affect doctors' behaviour and prescribing activity, published outcomes of research trials, and awarding of contracts. It also affects patients' behaviour, creating dependency and fuelling demand.

Salisbury's question (Who let the drug companies in? Helen Salisbury, 13 April) is timely and urgent, as NHS England and NHS Improvement are pushing towards privatisation of ever bigger contracts, now including a £2.2bn pathology contract. Why is this active policy?

Private industry sponsorship is bound to influence the way that an NHS service is provided and run. The Oxford fiasco should cause alarm: a scheme primarily designed to benefit the private provider that is demonstrably poorer for patients. Such is the aggressive pressure from industry that NHS England threatened to sue the NHS rather than consider the medical merits of the case.

Nick Mann, GP, London

Cite this as: *BMJ* 2019;365:l2149

Increased sales of bronchial drugs

Salisbury writes about an integrated multidisciplinary respiratory team in Oxford jointly funded by a drug company and the local clinical commissioning group.

We had a similar initiative locally—earlier diagnosis of chronic obstructive pulmonary disease (COPD) through industry funded spirometry and then treatment, with shroud waving over unmet need.

The dissident practice that stood against this and chose to just do smoking cessation deserve a medal. We know that smoking cessation is the only intervention in early or moderate COPD that affects outcomes. We also know that palliative inhaled treatments can facilitate continued smoking and can even make it more enjoyable.

This is a recipe for increased sales of bronchial drugs not just because of the natural progression of disease but also because of the comforting effect of bronchodilator treatment in extending enjoyable tobacco use.

Stephen Head, retired clinical director, Newark

Cite this as: *BMJ* 2019;365:l2152

Inhalers distract from exercise and clean air

Salisbury says that Boehringer Ingelheim is paying £748 000 towards an integrated multidisciplinary respiratory team in Oxford, compared with £181 000 from the clinical commissioning group. I hope the finance and prescribing leads are budgeting for an increase in spend greater than £748 000.

My former practice had the "benefit" of its population with a diagnosis of psoriasis being able to see a sponsored dermatologist. Many of them ended up on a product costing about £70 a tube, and many are still on it years later.

Few would disagree that many people with COPD do not have formal diagnoses, but the marginal benefit of inhalers diverts attention from exercise and clean air.

Nicholas Sharvill, GP, Deal

Cite this as: *BMJ* 2019;365:l2156

Nobody gains from not recognising second victims

Clarkson and colleagues' inference that randomness is assigned to an adverse event simply because the health professional is termed a "second victim" is not solid (Editorial, 13 April).

Adverse events typically originate from an action by frontline staff, but that doesn't mean the underlying errors are in the front line. Most adverse events can be traced back to systemic, strategic, or organisational faults.

When my 17 year old son died, the inquest found it was due to mistakes made by two health professionals, who were later sanctioned. They did their job to the best of their ability—whose fault was it that they were asked to perform a job that they did not have the expected competences and experience to hold?

My life is devastated, I am a first victim, but what could I possibly gain from not recognising the frontline workers as second victims? I cannot save my son, but I can help save the next—by helping to get a health service with a good learning system, operating in a solid learning culture, and with the necessary psychological safety for health professionals.

Ivar G Petersen, patient ambassador, Copenhagen

Cite this as: *BMJ* 2019;365:l2157

We have to call them something

I've heard the argument that second victim is an affront to "first victims" before. I appreciate the sentiment, but to think that acknowledging that medical error harms both patients and caregivers—albeit in different ways and to different extremes—somehow absolves those involved of responsibility is maddening.

Most medical error is the result of a systems issue, of which the physician or staff is the victim. We have to call them something, and I note that the authors of this piece did not suggest an alternative. Would they refer to them as perpetrators? What, then?

Crystal Strader, manager of risk and claims, Greenville, South Carolina

Cite this as: *BMJ* 2019;365:l2158

MALCOLM WILLETT

Focus on lawyers and managers

I have buried one family member and another has been seriously injured because of medical errors. I was very angry at the medical community when I founded Sorry Works! in 2005. But my eyes were opened as I continued my efforts. Doctors and nurses are victimised by schools that don't teach them how to communicate after medical errors and by lawyers and claims managers who insist on unethical behaviour.

Many clinicians want change and are embracing disclosure and apology

Many clinicians know that they are the victims of a bad system and want change. They are embracing disclosure and apology; part of this is asking for the support offered by second victim programmes. In my experience, clinicians embrace the term "second victim."

The authors are correct to worry about the lack of accountability for injured consumers, but their worry is better placed by looking at lawyers, claims managers, and executives, who are still too content to do nothing.

Doug Wojcieszak, president, Glen Carbon, Illinois

Cite this as: *BMJ* 2019;365:l2159

Everyone is affected

What does the word "victim" mean? It comes from "victus," a Latin term that means "defeated" or "beaten."

When medical harm occurs, healthcare professionals have fought a battle and lost. We ask patients to join forces with us, and this alliance allows us to trust each other. When things go wrong for unpreventable reasons, we are the second victims, after the patients and their families, who are obviously the first.

When adverse events occur because of preventable errors, we are the main losers. We tried to achieve a goal, and we failed.

Everyone is affected, everyone a victim. Allies in treatment planning, allies in defeat. This scenario could and should be grounds for the emergence of a no blame culture in healthcare. Patients and physicians can be allies in learning from harmful events how to act differently and do their best for shared success.

Giuseppe Vetrugno, forensic pathologist and risk manager; Fabio De-Giorgio, forensic pathologist; Federica Foti, forensic pathologist, Rome

Cite this as: *BMJ* 2019;365:l2160

Supporting doctors

The term "second victim" is provocative and may seem abhorrent to those who have lost loved ones to medical error. In our survey, 83% of doctors reported being involved in a near-miss or adverse event. Most healthcare professionals make errors; whether these lead to harm is often a matter of chance. Only a third of UK doctors report adequate support from their organisation. We launched www.secondvictim.co.uk to tackle this.

Language is powerful, and "victim" might imply a lack of accountability or responsibility. But we have seldom, if ever, encountered a health professional who does not punish themselves for errors that harmed a patient. Unhelpful coping responses can lead to harmful behaviours. Until better terminology is agreed, this justifies the term victim.

Rebecca Lawton, professor; Judith Johnson, lecturer; Robbie Foy, professor, Leeds; Gillian Janes, senior research fellow, Bradford; Ruth Simms-Ellis, theme manager, CLAHRC YH, Leeds

Cite this as: *BMJ* 2019;365:l2161

Psychological distress

Introduction of the term "second victim" has been good for all parties. The number of publications on patient safety has increased since the term was coined.

Physicians are reluctant to ask for help, and it can be even harder if they think that they are not allowed to feel this way because someone else is the only victim.

Psychological distress can cause a wide range of symptoms affecting cognitive performance, which affects the provision of healthcare. The second victim phenomenon can be devastating for healthcare professionals but also for patients and the healthcare system. Neglecting it will neither cultivate empathy with harmed patients nor increase attention on patient safety issues.

Esperanza L Gómez-Durán, psychiatrist; G Tolchinsky

C Martin-Fumadó, J Arimany-Manso, College of Physicians Barcelona

Cite this as: *BMJ* 2019;365:l2167

Raymond Nim-Wah Chan

Orthopaedic surgeon (b 1939; q Cambridge 1962; FRCS), died from complications of chronic obstructive pulmonary disease on 1 April 2019

Raymond Nim-Wah Chan ("Ray") was appointed a consultant orthopaedic surgeon—specialising in spinal surgery, scoliosis, and hip and knee replacement arthroplasty—at the Leicester Royal Infirmary teaching hospital in 1976. He also held clinics at the Leicester General Hospital, in Oakham, and at the then Nuffield Clinic in Leicester. He was one of the Leicester City Football Club's team surgeons during Gary Lineker's heyday in the 1980s and was a staunch supporter. After retiring in 1999 Ray lived in Mountsorrel, Leicestershire. He was married to Patricia, the mother of his children, from 1968 until 1985. Predeceased by his second wife, Maureen Chan, in 2011, he leaves four children and three grandsons, with a fourth grandchild on the way.

Alice Chan

Cite this as: *BMJ* 2019;365:l1879

Frances Cunningham

General practitioner Cheshire (b 1967; q Liverpool 2003), died from biliary cancer on 14 September 2018

Frances Cunningham ("Fran") came to medicine as a mature student after an accomplished career as a registered nurse. As a sister in the operating department environment, she received support from surgical staff to undertake her medical degree. As Fran had humanities A levels, she completed an access to medicine course, gaining a distinction. Accepted by all the medical schools she applied to, she stayed within her home city to be near her elderly parents. Her working class background and previous career gave her a unique insight and empathy with many of the problems of the patients whom she served. Fran's love, apart from her family, was music—playing piano and singing. She was also a keen amateur artist and lived life to the full. She leaves her husband, two children, and brothers and sisters.

M Cunningham

Cite this as: *BMJ* 2019;365:l1883

Alexander Wilson McIntosh

District medical officer York, general practitioner Barnard Castle and Aberdeen (b 1927; q Aberdeen 1950; DPH, MD, FFCM, FFPHM), died from carcinomas of colon and prostate on 3 March 2019

Alexander Wilson McIntosh ("Wilson") did national service in York and Barnard Castle as a doctor in the Royal Army Medical Corps. Wilson settled on a career in public health in Aberdeen and had an important role in the control of the 1964 typhoid epidemic there. In 1965 he returned to north Yorkshire as deputy medical officer, based in Northallerton. In 1974 he was appointed district community physician for York district, and after subsequent reorganisations his title was York district medical officer, at the point of his retirement in 1988. He leaves his wife, Mona; three children; two grandchildren; and three great grandchildren.

Paul Cann

Cite this as: *BMJ* 2019;365:l1876

Stewart Sinclair Jessamine

Acting medical director Pharmac Pharmaceutical Management Agency of New Zealand; director of protection, regulation, and assurance New Zealand Ministry of Health; and group manager Medsafe (b 1958; q Glasgow 1981), died from acute myocardial infarction on 7 February 2019

Stewart Jessamine was a world leading medicines expert and public servant. He met his Malaysian wife, Siew Gueh, while he was at university in Glasgow. After the birth of their daughter, the couple emigrated to New Zealand in 1987, where Stewart worked as a GP in several small towns. At a conference in the early 1990s he heard an appeal for GPs to consider switching from "poachers" to "gamekeepers," and in 1993 he joined the New Zealand Ministry of Health, where he was a dedicated and innovative leader for 25 years. He leaves his wife, Siew Gueh; and a daughter.

Peter Abernethy, Linda Stephen

Cite this as: *BMJ* 2019;365:l1872

Ramesh Chandra Joshi

Consultant physician in respiratory and general medicine Walsall Manor Hospital (b 1936; q Christian Medical College Ludhiana, India, 1958; MD, MRCP, FRCP), died from prostate cancer on 15 March 2017

Ramesh Chandra Joshi was a research associate at Johns Hopkins Hospital in Baltimore, US, in 1966-67. He then became a lecturer in the department of medicine at Queen Elizabeth Hospital, Birmingham. In 1972 he was appointed as a consultant physician in general and respiratory medicine at Walsall Manor Hospital, where he built a modern lung function unit and was instrumental in developing a combined cardiorespiratory clinical measurement unit. After retiring at 65 he continued to work at various hospitals around the country until ill health finally forced his retirement. Ramesh Joshi leaves his wife, Rishi; two sons; and three grandchildren.

Alan Cunnington, Anil Joshi, Raj Joshi

Cite this as: *BMJ* 2019;365:l1877

John Raymond Smythies

Psychiatrist, neuroscientist, and psychedelic pioneer (b 1922; q Cambridge 1945; MSc, MD, FRCP Lond), died from heart failure on 28 January 2019

John Raymond Smythies trained as a psychiatrist at St George's Hospital in London. With his then senior registrar, Humphrey Osmond, he developed and proposed what was the first biochemical theory of schizophrenia—the transmethylation hypothesis. After more than a decade at the University of Edinburgh's psychiatry department, John took up a personal chair in psychiatry at the University of Alabama, Birmingham, in the US, where he was to remain for the rest of his clinical career. John was a "gentleman scientist" from another era, when science was a round-the-clock obsession—not just the nine-to-five job it has become today. He leaves his wife, Vanna; two sons; and seven grandchildren.

Paul D McGeoch, VS Ramachandran

Cite this as: *BMJ* 2019;365:l1873

Michael O'Donnell

Medical journalist, author, broadcaster, and GMC reformer

Michael O'Donnell (b 1928; q Cambridge, St Thomas' Hospital Medical School, 1952; FRCGP), died from heart failure on 9 April 2019

As editor of *World Medicine*, Michael O'Donnell was an outstanding radical journalist. Stephen Lock, a former editor of *The BMJ*, ranked him alongside William Cobbett, Thomas Wakley, William Morris, and George Orwell in terms of zest, wit, readability, and purpose.

Wakley is perhaps the most appropriate comparator. Founding editor of the *Lancet* in 1823, Wakley attacked nepotism, malpractice, and quackery—"the canker worm which eats into the heart of the medical body." O'Donnell's canker worm was the General Medical Council and a profession where power was exerted largely through "a mixture of patronage and politesse."

Both men were renowned innovators. While the *Lancet* was—among other things—the first periodical with a chess column, *World Medicine*—medicine's *Private Eye*—broke new ground by reflecting "the uncertainties, the paradoxes, and the black comedy that make practising our craft so rewarding."

World Medicine

O'Donnell began his 16 year tenure at *World Medicine* in 1966. He already had a formidable reputation. While studying natural sciences at Cambridge, he appeared in *La Vie Cambridgienne*, the first Footlights revue to be televised by the BBC. He was a star in the Young Writers Group, led by Stephen Joseph, later a leading stage director and theatre-in-the-round pioneer. O'Donnell succeeded Joseph as editor of *Cambridge Writing*. His story, *A Sense of Value*, part of an anthology of postwar writing from Cambridge, was commended by EM Forster.

Good writers don't necessarily make good editors. Good editors spot and nurture talent and build loyal teams. O'Donnell excelled in both these areas. Meeting him when my first *World Medicine* piece appeared, I felt as if I had just been elevated to the premier league—which, in one sense, I had.

I was not alone. TV producer Karl Sabbagh recalls: "Michael was the best editor a writer could have. He saw his role as ensuring that his writers wrote what they wanted to, not what he wanted them to. From the moment I submitted my first article to *World Medicine* as an unknown writer—and nearly fell off my chair when he immediately accepted it—he became a staunch supporter, mentor, and friend."

O'Donnell left *World Medicine* after a freedom of speech dispute over a controversial article by Sabbagh, criticising Israel's actions against the Palestinians. He refused to sign a new contract after one of the magazine's major backers sold its shareholding. The magazine folded two years later.

O'Donnell's GMC reform campaign culminated in the Merrison inquiry and the Medical Act 1978. For the next 25 years he topped the poll to elect GMC members.

Rebel in residence

Speaking later as the GMC's "rebel in residence," as he called himself, O'Donnell complained that many of the changes had been cosmetic. But he remained on the council until 1996, because he was outside the medical career structure and was thus "free to call things" as he saw them. Good medical writers were essential, he often said, because doctors were so inept at coping with authority.

His questioning of the establishment extended to the profession's line on death and dying. He explained: "My wife [Catherine Dorrington Ward] had a great fear of the mode of dying enforced on her. During the 50 years we shared our lives, she often made me promise to do all I could to protect her from it. I tried to reassure her with talk of palliative care, but all I could do was pass on her wishes to the hospital doctors, knowing that there was no legal way they could implement them.

"I'll never lose the feeling that I betrayed her, though I remain grateful to the nurses—the doctors were notable by their absence—who cared for her with skill and kindness during the three days she took to die an undignified death. They tried hard to keep her at peace, but the moments that dominate my memory are her spells of lucidity, when her physical and audible signals were those of someone being tortured rather than comforted."

He and Catherine, a pianist, met at St Thomas' as fellow students. He wrote the lyrics and she provided the music for a revue. O'Donnell made more than 100 TV and radio documentaries; published three novels; and wrote regular columns for the *Times*, the *Guardian*, *New Scientist*, and *Vogue*, and the first signed column in *The BMJ* (1983-86).

But *World Medicine* was uniquely special—his hallmark. Lock put it this way: "Not to have read Michael O'Donnell was to have been incomplete as a doctor."

He leaves two children (one daughter died in 2009).

John Illman, London
john@jicmedia.org

Cite this as: *BMJ* 2019;365:l1896

In World Medicine, O'Donnell tried to reflect the uncertainties and the black comedy that make practising the craft of medicine so rewarding