comment

"The single most 'mission critical' challenge is workforce shortages" **DAVID OLIVER**
"So much of our NHS has been outsourced to profit driven firms" **HELEN SALISBURY**
PLUS Patients are not to blame for antibacterial resistance; the life expectancy crisis

THE BOTTOM LINE Partha Kar

Body shaming is not a cure for anything

Give this a try. Walk up to someone you love or like. Pick someone who, in your eyes, looks "overweight." And then say, "Shame on you for not eating the right things. You will die early, and you deserve to."

Many things would stop you doing this: most importantly, common decency, but also recognition of the importance of not judging others against your own situation, economic status, or cultural background. And yet body shaming is treated by some sectors of society as if it were perfectly normal and acceptable. Social media show that healthcare professionals are not exempt either, with quick judgments about others' bodies not entirely uncommon.

Put simply, body shaming is not acceptable. This is not some politically correct statement, and no "but," no justification, is needed after it. We don't live the lives of others, and so we do not have the authority to lecture them.

Datasets continue to show the effects of socioeconomic divides on what people eat and what they can afford to eat. Brushing that evidence aside indicates a perspective where "our view" of the world is what matters most, not anyone else's. For people standing in line at a food bank, without the option of having to worry about whether they should be having both eggs and bacon, a tin of beans can be like manna. We should not smirk at the food choices made by people in very different circumstances from our own.

Doctors can provide information to help people with their choices, but we need to then let adults decide, given that information, what they want to choose, what they can afford, and what they can sustain. The question of what diet works best to tackle obesity and to put type 2 diabetes into remission, and what dietary advice should be promoted by official sources, has prompted fierce debate. Academics are trying to use randomised controlled trials to answer the question, and individuals are themselves trying out low carbohydrate diets. The work on low carbohydrate diets is fascinating, and seems to have real potential. But we need to make sure it doesn't just become a bubble of enthusiasm generated by a small group of people who are wealthy enough to have real choice over what they eat.

Care for people with type 2 diabetes is changing, and there is no doubt that what was once labelled as a progressive and irreversible disease is now looked at as something that can, in certain people, be put into remission. That's a fundamental change, and so, alongside the usual drug treatments, we need to be able to put all the dietary options on the table, from low calories to low carbs, and give people the ability to choose the approach that is right for them. The big question is what choice is actually possible in circumstances of socioeconomic deprivation.

The best diet in the world is the one you can tolerate, sustain, and afford. Until the day we bring affordability to a uniform level, judging others is futile and a whole lot of wasted time.

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We need to then let adults decide what they want to choose to eat, what they can afford, and what they can sustain

PERSONAL VIEW Rebecca Glover, Margaret Dangoor, and Nicholas Mays

Blaming patients for antibiotic resistance is unhelpful and wrong

The idea that the public is "demanding" antibiotics or putting unreasonable "pressure" on GPs is based on scant evidence

Bundled in with attempts to reduce unnecessary prescribing of antibiotics, patients are persistently mischaracterised as a barrier to reducing antibiotic resistance. They—or "we," as we are all patients at some point—are said to be "pressuring" GPs or "demanding" antibiotics inappropriately. This alienating and blaming language continues to be reflected in the literature, government statements, and the health service, despite being an unfair oversimplification.

The main problem with blaming patients is that the evidence does not support the narrative. First, there is little evidence that patients are unreasonably pressuring GPs for antibiotics. Second, the UK is making good progress in reducing antibiotic prescribing in primary care. And, finally, senior GPs are more likely to inappropriately prescribe antibiotics than junior colleagues, casting doubt on the narrative that patient demand is more responsible than other factors.

The prevailing narrative is also unhelpful in general practice. When patients are surveyed, they report their "expectations" or "requests" for antibiotics—not demand—when they believe that antibiotics might be an effective treatment for their illness. Patients are unlikely to want their GPs to behave in professionally inappropriate ways even within the constraints of a brief consultation. The onus remains on the GP to provide the appropriate response to a patient with an upper respiratory tract infection.

The evidence does show, however, an association between financial incentives on practices (unrelated to patient behaviour) and use of antibiotics—for example, an association between fee-for-service payment and higher outpatient antibiotic prescriptions was shown in a study of 17 European countries.

Free access to GPs

Capitation payment of practitioners, on the other hand, was associated with lower use of antibiotics. A 2011 Irish study found that private patients paying fee-for-service received more antibiotic prescriptions than those with free access to GPs and medications. So even if there is pressure from a minority of patients (which should be manageable by experienced clinicians), a largely capitation based system such as that used in NHS general practice should already be encouraging lower prescribing rates.

Are there other factors at play that might put pressure on GPs to prescribe antibiotics? A 2014 study found that 44% of GPs might prescribe antibiotics to end a consultation. Implicit in this finding is the potential effect of the tight time constraints under which GPs work. Consultation time and GP workload have been shown to be associated with antibiotic prescription rates. In Norway, a 2011 study found that GPs who saw more patients per year prescribed more antibiotics than those with fewer patients. A 2017 qualitative UK study of GPs and nurse prescribers had similar findings. Patients should not be held responsible for under-resourced practices seeing too many patients in rushed appointments and prescribing antibiotics rather than discussing potential costs and benefits.

There are also clinical policy pressures on GPs not to miss sepsis, meningitis, or other serious but rare illnesses, which may push practitioners to prescribe as a precaution. Patients share this concern about serious infections such

BMJ OPINION Lucinda Hiam, Martin McKee

The UK's deepening life expectancy crisis demands society-wide, political intervention

LEON NEAL/GETTY IMAGES

Are rising deaths linked to austerity?

Life expectancy in the UK has fallen—again; the trend that started in 2010-11 has worsened. The total fall since 2015 is 13 months for men and 14 months for women.

These latest figures are no surprise to those who have been raising the alarm since 2014. Extensive research on 30 000 excess deaths in 2015 called for an urgent investigation to determine whether rising deaths were linked to austerity. The Department of Health described this work as "a triumph of personal bias over research."

Concern over 10 000 extra deaths in the first few months of 2018 eventually led to a promise of government investigation. Despite the urgency, and worsening outcomes, nine months later this has still not happened.

"Health statistics represent people with the tears wiped off." This quote, attributed to the epidemiologist Austin Bradford Hill, is a pertinent reminder with the release of another set of worsening health outcomes. In all the debate on the cause of the UK health crisis, little consideration is given to the people that these numbers represent.

More babies are dying in the UK than before, and experts predict this will "soar" unless effective action is taken. And now a report has found that death rates for 20 to 24 year olds rose between 2013 and 2016. These are not just numbers, they are lives.

Protecting the health of a population

as sepsis. This is often due to diagnostic uncertainty. GPs are doing their best with imperfect information; so too are patients. A family member falling acutely ill can cause considerable anxiety. Professionals can find it difficult to determine a reasonable course of action when faced with the possibility of a rapidly spreading infection that could be fatal.

Mistrust and friction

We welcome patient education campaigns as part of a wide ranging effort to minimise unnecessary antimicrobial resistance, but we caution against blaming patients. Ignoring the effect of health system factors (including short consultation times) on patterns of prescribing and, instead, relying on patient blaming rhetoric may increase mistrust or friction between GPs and patients in the longer term. Patients are allies, not opponents, in limiting antimicrobial resistance and should be seen as such.

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is a key part of the social contract between a government and its electorate. Any stall in improvements—or worse still, reversal of trends in key indicators like life expectancy and infant mortality— point to a failure by society. The growing evidence of worsening health outcomes resulting in, put bluntly, deaths of babies, young people, and those over 65, means the arguments that this was a "blip," caused by flu or simply fluctuations in the data, are no longer worthy of debate. Neither will focusing on individual behaviour improve outcomes. The deepening health crisis in the UK requires society-wide, political intervention.

Lucinda Hiam is a doctor and honorary research fellow

Martin McKee is professor of European public health at the London School of Hygiene and Tropical Medicine

ACUTE PERSPECTIVE David Oliver

Hancock and upstanding nurses

I'm worried about what England's health secretary's remarks at the chief nursing officers' conference reveal about his understanding of the modern health service.

Matt Hancock made some valid points about recognising the skills of our nurses. Sadly, he also said: "I find it shocking that, in my grandmother's day, nurses were expected to stand up when a doctor entered the room. And worse, I find that's still the case in some antiquated, archaic corners of the NHS. I want it to stop. If anything, it should be doctors standing up for nurses. Because who runs a hospital at 2 in the morning? Who keeps the show on the road?"

The reaction to these remarks on social media made it into the national press. It was hard to find a doctor or nurse still practising who had seen or heard of such behaviour or expectations. Not least because nurses are so overstretched that sitting down in the first place would be a luxury.

As well as bemusing the nurses, Hancock managed both to offend doctors working overnight in hospitals and to look as though he was trying to drive a wedge between the two biggest clinical professions. Doctors and a range of allied health professionals are very much available on call or working on site overnight, and Hancock's remarks echoed his predecessor Jeremy Hunt's inaccurate views on weekend and evening working.

Misspeaking on public platforms is understandable among ministers new to their brief: we're all human and fallible. But Hancock has been in his post for eight months, so one might think that basic errors could be avoided with the help of senior officials, private office staff, and communications teams, with input from doctors and nurses in government bodies. Yet he's already managed a few gaffes, such as publicly favouring Babylon Health or sending a tweet appearing to claim that deaths from sepsis were all preventable, when most are not, and having to backtrack semi-apologetically online.

The real shame of his rhetorical trip to an NHS no one seemed to recognise was that it detracted from the points he and others made about the serious challenges to nursing and the need for solutions, some of which were set out at the same conference by the new chief nursing officer, Ruth May.

I'm glad both Hancock and May recognise the need to boost the engagement and influence of nurses at every level of NHS leadership. I'm glad he recognised the crucial contribution nurses make, their high level skills, and their key role in managing and leading services. But the single most "mission critical" challenge is workforce shortages. Around 40 000 nursing positions are unfilled in England—one in eight. That's what Hancock and his government should focus on tackling.

He should stand up for nurses with concrete action and investment, not bizarre rhetorical fantasies based on a long gone age.

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Nurses are so overstretched that sitting down in the first place would be a luxury

PRIMARY COLOUR Helen Salisbury

Dis-integration of cancer care

We are lucky enough in our city to have a world class cancer treatment centre. But word is out that the contract for doing combined positron emission tomography and computed tomography scans for the region has been taken away from the local NHS trust and awarded to InHealth, a commercial provider of medical imaging.

The contract, along with those for PET-CT imaging at other hospitals across the country, was put out to tender in 2016 by NHS England, and the local hospital's bid was not chosen.

There are several reasons why this is a really bad idea. The scans are used in diagnosis, to find out whether cancer has spread, and to determine whether treatment has been effective. Currently radiologists are part of a multidisciplinary team who discuss and plan treatment for patients. If the NHS does not provide the service, how will we train the next generation of specialist cancer radiologists?

In future, scans will be performed at a different site and will be reported by a radiologist who is not part of the team. And patients, some of them quite unwell, will need to travel off site to be scanned. Oxford's role as a major centre for PET-CT research is also at risk.

InHealth will need to build new premises for the scanners. It would be good to know how this move can be saving money, unless there is a reduction in the quality of the service, which is precisely what local doctors fear will happen. In the words of one local surgeon, "Let us be absolutely clear—if this goes ahead it will lead to patient harm."

The rationale for the decision offered by NHS England is that they were forced by EU procurement law to put this contract out to tender. ("Let's blame it on the EU"—sound familiar, anyone?) So many parts of our NHS have been outsourced to profit driven corporations, and bids seem to have been judged disproportionately on how much money they will save rather than on the quality of the service that will be provided for patients. The treatment of people with cancer is an emotive issue and, though this is only one in a long sequence of services previously delivered in the NHS that are now outsourced to private companies, local MPs and health bosses are up in arms.

People are angry the decision has been taken without consulting the local community or the council health board. When two major themes of the NHS long term plan are improving cancer care and greater integration, this move looks particularly ill timed.

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It would be good to know how this move can be saving money, unless there is a reduction in the quality of the service

LATEST PODCASTS

ROSE LLOYD

How to talk about complications

In the first of our What Your Patient is Thinking podcasts, Renza Scibilia and Chris Aldred use their combined 45 years of having type 1 diabetes to give advice on how to treat the patient, not the complication. As Renza says:

"We need to remove this idea that complications are something to be ashamed about. Complications are a reality for a lot of people living with diabetes and we should feel comfortable speaking about it. So much comes down to removing blaming and shaming language. We know that there are no guarantees in diabetes, which is one of the really unfair things about living with it.

"Making sure that we're speaking in a way that doesn't blame people or make them feel responsible for what's happened is really important if we want people to engage."

The counterintuitive effects of loop diuretics

In this podcast, cardiologist Steven Anisman explains what the threshold effect of loop diuretics is and why it's not intuitive for clinicians: "We expect lower doses to have a small effect and higher doses to have a bigger effect. Think of warfarin or morphine, you can kind of intuitively figure out how these drugs are going to work and how changing the dose will affect the response. The funny thing about loop diuretics is that they're really a different animal. They just don't work that way.

"There is a 'magic' dose for each person and below that you get no effect—it's essentially giving a placebo—and above that dose you get the full effect. You can't incrementally or proportionally change these drugs and their effect. You can either turn them on or turn them off. And it's unusual to think of a drug working this way."

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Edited by Kelly Brendel, assistant web editor, *The BMJ*

COMPLAINTS

Fear of saying "no"

White suggests that doctors who don't declare any complaints might be saying "yes" to patients when they should be saying "no" (Letters, 16 February).

In a training session, local GPs said unanimously that antibiotic prescribing was too high. But the tone changed when I asked what they could do to cut prescribing. Responsibility shifted to "the government" and "patients." A repeatedly voiced theme was that patients would complain if refused antibiotics. Challenging patients was out of the question.

This finding is not unique to Birmingham. I agree that saying "no" to patients is part of professional practice. It is what distinguishes professionals from the retail industry.

Tom Marshall, professor of public health and primary care, Birmingham

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APPLYING AVIATION SAFETY

We need gradual, adaptive process improvement

I used to think that medicine was special and differed from aviation. A colleague of mine noted: "Anaesthesia is not like a plane flight. It must be exceptionally rare to fly an 80 year old plane with failing hydraulics while a lunatic tries his best to hack off one of the engines."

Belatedly, I've realised we were wrong. Kar is right that we can learn from aviation, but he misses two principles (Partha Kar, 23 February). First, safety is a system property. Aviation requires guidance from the top, but quality is engineered from the bottom. We have failed to engineer the system well. We can increase employment, but this is not a reasonable fix.

We need to learn a second lesson from aviation: unnecessary variation is expensive. Perhaps 70% of our effort is wasted through inefficiency.

I suspect we have ignorantly rationalised our failure using arguments like my colleague's analogy. The fundamental problem is that quality costs money. Aviation has succeeded through decades of investment in quality, while medicine lags by 50 years. The fix is in plain sight: gradual, adaptive process improvement. Opening our eyes to the success of others—and the reasons for that success—is a good start.

Johan M van Schalkwyk, perioperative physician, Auckland

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Learning from mistakes

The aviation industry can work in a much more predictable way than medicine: pilots know the route they are flying, the aircraft is the same each trip, and the weather can be accurately predicted. The same cannot be said for any patient's journey through illness. We cannot predict the trajectory of a disease, no two patients are the same, and it is impossible to predict complications.

What makes aviation safe is a willingness to analyse mistakes and to use them as learning opportunities to improve future performance. This "growth mindset" is perhaps one of the most important aspects of aviation safety that should be applied to healthcare.

Niall Gilliland, urology clinical fellow, Bristol

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LETTER OF THE WEEK

What is "normal" antibiotic prescribing?

The UK has a culture of high antibiotic prescribing (Commentary, 16 February). Some 50% of primary care consultations for respiratory tract infections are associated with an antibiotic prescription. In some countries, including Sweden and the Netherlands, antibiotic prescribing is half this. The rate has also changed over time, being lower now than five years ago but still higher than 10 or 15 years ago.

Hicks and colleagues give examples of how social norm feedback can increase the effectiveness of interventions to reduce antibiotic prescribing, but this approach also has difficulties. In qualitative interviews to support intervention development for the REDUCE trial, GPs expressed scepticism that external norms could be applied to their patient populations. Antibiotic prescribing is driven by consultation rates, which are typically higher in deprived areas. It is also highly dependent on age distribution and the prevalence of comorbidities, which vary between practices. Estimates for individual general practices are often based on small numbers. Comparative metrics require rigorous development to avoid some of the negative connotations of targets and league tables.

High antibiotic prescribing seems to be acceptable in the UK, with a "norm" of prescribing rather than withholding. Future interventions need to tackle this rather than simply using it as a reference point.

Martin Gulliford, professor of public health, Dorota Juszczyk, research associate, London; Lucy Yardley, professor of health psychology, Bristol

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DIVERSITY IN THE BMJ

Recognising women of colour in the NHS

My usual Sunday morning flick through the BMJ Confidential profiles threw up an interesting observation (Editor's Choice, 16 February). The wonderful women of colour featured were in Rwanda, the US , Malaysia, Australia, and Scotland.

We know that around 40% of NHS doctors are people of colour and that 36% of hospital consultants and 53% of GPs are women. But the proportion of black and minority ethnic (BME) staff in very senior manager posts in the NHS last year was just 6.9%, way below the proportion of BME staff (19.1%) in NHS trusts.

We must tackle this to deliver the long term plan and to attract the best. So it would be good if *The BMJ* could lead the way in profiling a more diverse group of leaders that better reflects the workforce—it's hard to be what you can't see.

Shera Chok, medical director, Tower Hamlets GP Care Group CIC

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BREXIT

If we can't provide drugs, we should provide advice

The government has told GPs to resist patient's requests to overprescribe in the run up to Brexit (This Week, 23 February).

Many patients may now be wondering whether going on "half rations" might be a way to eke out their drugs. They may be asking themselves: What's best to do? Take one tablet instead of two, break a tablet in half, try alternatives, stop taking them and restart when something happens? Should I buy more tablets online?

These are not easy questions to answer, but if drugs become less available, patients will be forced to make choices. If we can't provide drugs, we should provide advice.

Mark Davies, consultant in anaesthesia and perioperative medicine, Liverpool

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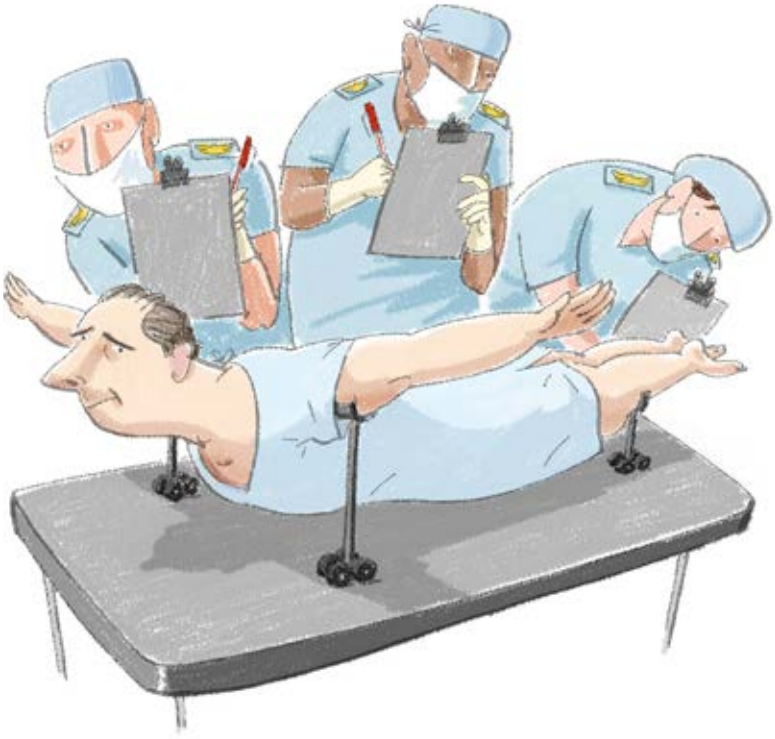
Can we import safety improvements from industry to healthcare?

Processes in other sectors, particularly aviation, are often held up as exemplars, but transferring these systems to health is more complex than we think, argue **Carl Macrae** and **Kevin Stewart**

Exhortations to learn from other healthcare industries are not always helpful. Recounting oversimplified improvement examples from other industries (often aviation) can provoke considerable frustration and scepticism among clinicians exposed to the unique challenges and everyday complexities of trying to improve healthcare.

Patients are not aeroplanes, and hospitals are not production lines. Nonetheless, many successful efforts to improve the quality and safety of healthcare have taken inspiration from other industries.

Caring for patients is radically different from making cars or flying aeroplanes



MALCOLM WILLETT

No simple solution

From simulation training[2] to patient handover[3] to structured communication[4] to quality improvement itself,[5] many healthcare interventions have been adapted from industrial settings as diverse as civil aviation, nuclear power, and car manufacturing. Other industries have spent decades developing tools, methods, strategies, and techniques to improve quality and safety: why not just apply these in healthcare?

Translating improvement techniques to healthcare is hard and has had varied results. Some interventions, such as those aimed at reducing infections related to central venous catheters, have proved successful[6]; others, such as incident reporting systems, have met with failure.[7] Initial enthusiasm for oversimplified, large scale attempts to apply a new improvement technique often quickly gives way to confusion, complication, and criticism.[8 9]

Despite these difficulties, looking to other industries still has value, just as other industries are increasingly looking to learn from healthcare.[10] But to do this well requires a more sophisticated approach.

First, efforts to translate strategies from one setting to another need to be based on a sophisticated understanding of the contextual, practical, and structural differences (and similarities) between the settings.[11] Second, translational efforts need to pay close attention to the cultural and organisational arrangements that support the intervention. Third, any translational effort needs to be based on a process of careful adaptation and intelligent reinvention, not simply importing and applying a readymade tool.

Lost in translation

Why is learning from other industries so hard? One of the main reasons is obvious: caring for patients is radically different from making cars or flying aeroplanes. Healthcare is unique in the intimacy, complexity, and sensitivity of the services it provides.

It is also enormously varied: elective surgery, community mental health, emergency medicine, and

KEY MESSAGES

- Many of the improvement strategies, tools, and techniques in healthcare have been drawn from other industries
- When transferring methods key elements are often missed, mistranslated, or inappropriate
- It is important to understand the work context and systems that underpin a method's success
- Better understanding of healthcare systems is also vital for successful translation
- Other industries allocate considerable resources and staff to systems analysis and quality improvement

palliative care are very different in terms of the work, knowledge, and activities involved— and the ways they need to be organised and managed. Healthcare is better understood as perhaps 20 industries, many of which need to seamlessly interact at critical junctures throughout a patient's journey.[13]

Another rarely recognised consideration is that work in other industries is also diverse. In the healthcare literature, for example, "aviation" is often translated as "pilots flying aeroplanes"[14]—which overlooks the considerable differences between the operational work of flight crew, the diagnostic work of engineers, the work of maintenance technicians, the design work of system analysts, and the myriad other activities that constitute any complex industry.

When attempting to transfer improvement lessons, it is important to understand the precise nature of the work in different healthcare settings as well as in other industries. For instance, it might be useful to draw parallels between the technical, process oriented, monitoring activities of anaesthesia and similar types of activities in the control rooms of nuclear power plants.[10] Likewise, the complex diagnostic tasks, multiple handovers, and relatively isolated working patterns of maintenance engineering may be a useful analogue for some elements of primary care.

In addition, successful translation from other industries into healthcare typically depends on considerable adaptation of the original improvement techniques.

Incident investigation and analysis

The pioneering reports that established incident investigation drew directly on the experience of other industries, primarily aviation,[15 16] and incident reporting systems have become one of the most widely implemented improvement strategies across modern healthcare. The English National Reporting and Learning System collects data on over two million incident reports each year[17] and root cause analysis techniques have been widely adopted.[8]

However, the translation of these approaches into healthcare has often missed or misconstrued some of the most important elements seen in other industries. Incident investigations in industries such as nuclear power[18] are typically conducted by dedicated in-house teams of professionally trained investigators; routinely incorporate rigorous human factors and systems analysis; are separated entirely from management processes that seek to allocate blame; and typically produce actions that focus on strong, systemic safety improvements such as redesigning equipment.

In contrast, the organisational systems and structures needed to learn from incident investigations remain relatively underdeveloped in many healthcare settings. Investigations can get tangled up with political processes of blame, there is limited expertise, and resulting actions are not always robust.[8] There has also been a heavy focus on collecting large quantities of incidents. Reporting incidents has almost become an end in itself.

Growing frustration[7] led to a shift back to the practical work of investigating and improving healthcare.[20 21] Notably, several national systems are developing the capacity for routine, system-wide safety investigations. Many healthcare organisations still have a long way to go before they can reliably transform incidents into improvements.

Revisiting the organisational and cultural principles that support this in other industries still offers salient lessons: the need for well resourced safety teams led by experts that allow systematic examination of practical work and the development of robust system-level improvements in contexts removed from fear and blame.[24]

The most fundamental step in many healthcare improvement projects is simply to design a process to begin with

Checklists and cognitive aids

One of the highest profile improvement interventions adopted from other industries are safety checklists[25] and other cognitive aids such as emergency manuals.[26] Checklists provide a set of structured and practical instructions that either prompt, or serve to verify, a series of actions at key stages of a process—such as the sign-in process before surgery[9] or during an anaesthetic emergency.[26] Checklists draw directly on those used in other industries—aviation in particular—and the approach has been widely popularised.

However, in the process of being imported into healthcare, checklists have taken on functions beyond those in other industries. For example, in healthcare they are often intended to prompt communication and facilitate team functioning. In other industries, the use of checklists depends on the prior creation of well functioning teams through building stable cultural norms and expectations, routinely

System-wide, learning focused, safety investigation

What?
In April 2017 England became the first country to establish a dedicated, system-wide safety investigation organisation for healthcare: the Healthcare Safety Investigation Branch. Norway will launch a similar organisation in 2019, and other countries are exploring the idea.[22]

Why?
The objectives of these organisations are translated directly from other industries, including railways, shipping, and aviation: to undertake rigorous, non-punitive, and systematic investigations into serious patient safety risks that span the healthcare system and to develop system-wide recommendations for learning and improvement.[21]

How?
Uniquely, the organisations are independent of all other parts of the healthcare system. They can investigate and issue recommendations across the sector—including frontline practice, the design of equipment, and the regulation of services. Importantly, the investigation processes are focused solely on learning and are separate from systems that seek to allocate blame, liability, or punishment.

Information collected for the purposes of safety investigation will be used only for safety improvement and cannot be used for punitive purposes. Ensuring this independence requires strong legislative protections.[23]

training for simulated emergencies, and establishing standard protocols for reliable communication,[3 26] rather than aiming to create effective teams through the use of a checklist.[9]

In other industries, checklists are just one element of a carefully designed sociotechnical system built to support processes for high reliability and effective human performance. Some areas of healthcare, such as maternity care, have emulated this successfully.[27] But in many healthcare settings the checklist may be the only element of an entire process that has been actively designed with reliability and safety in mind.[9]

Deceptively sophisticated

Healthcare quality improvement owes its existence to other industries. Process re-engineering and systems improvement tools such as lean production,[29] plan-do-study-act cycles,[5] statistical process control,[30] and failure modes and effects analysis[31] have been imported into healthcare almost wholesale.

Many of these methods may seem simple[5] but are actually sophisticated and challenging techniques that require considerable expertise to implement well. Reviews suggest they are not always consistently or effectively applied in healthcare.[5 31]

This might be partly because individuals and teams are not appropriately trained or experienced in the particular method.[5] But more fundamentally, it points to the importance of having appropriate organisational systems, resources, and culture in place to support the systematic application of improvement methods.

One of the hidden assumptions that underpins many process improvement methods is that there are stable processes in place to improve. However, this can be a bold assumption as the reliability of systems such as those for inpatient prescribing and theatre equipment availability has been found to be about 80%[28]. Activities in many areas of healthcare have grown organically over many years, so the most fundamental step in many improvement projects is simply to design a process to begin with.

To date, the improvement approach in healthcare has largely focused on initiating large numbers of locally led projects. This approach can work to optimise existing processes but is less suited to tackling the large, complex problems of system design.[32] Again, insights from other industries are still highly relevant, such as the importance of systems engineering.

One of the defining features of many industries is the importance of "systems integrators," who oversee and coordinate the design of complex systems. In aviation, for example, major manufacturers fulfil this function by designing the core of the aircraft, coordinating with all the component manufacturers (from engines to flight computers), designing the maintenance processes, and defining the procedures for operating and maintaining the aircraft—even down to specifying that on certain types of twin engine aircraft on certain types of operations, the same engineer may not conduct the same maintenance task on both engines, in case the same error is made.

Healthcare has much to learn from other industries about integrating complex technical, operational, and organisational systems. Recent examples include the systems engineering work undertaken to integrate technologies, processes, and systems in intensive care units[33 34] and efforts to apply safety case techniques from the nuclear and chemical process industries to analyse, map, and improve the reliability of health systems.[35]

There are likely to be new lessons to learn from developments in user-led design[36] and the organisation of resilient organisational systems.[27] But above all, perhaps one of the most striking and fundamental lessons for healthcare is the extent to which other industries allocate considerable resources and dedicated staff to systems analysis and quality improvement.[24]

From translation to exploration

Learning from other industries is neither simple nor straightforward but it remains an important part of improving the quality and safety of healthcare. Adapting tools from elsewhere requires a deep understanding of the mechanisms and systems that underpin a technique in one industry; closely examining the context, practices, and challenges inherent in a particular setting in healthcare; and then carefully adapting and reinventing the technique to work in healthcare.

At the core, the process of learning from other industries is really a process of learning more about our own.

WHAT'S DIFFERENT IN HEALTHCARE?

The principles of investigation are common across all industries, but the specifics need to be reinvented to deal with the unique challenges of healthcare. In particular:

- Healthcare practices draw on cutting edge and ever changing science and so investigations will need to engage with evidence and will probably need to regularly recommend further scientific inquiry
- Health systems are much more complex than any transport industry and encompass a wide range of highly specialised groups, skilled activities, and advanced technologies
- Healthcare investigations must sensitively engage patients and families throughout the process; they are often the only people who see the entire trajectory of care
- Healthcare organisations routinely capture few data relevant to safety—there are no "black box" flight data recorders—and the data that are collected may be difficult to collate and are often qualitative
- Healthcare processes are less specified and less standardised than in other industries, meaning there may be few benchmarks against which to identify deviation

Supported by the Health Foundation

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Stephen I Katz

Influential director of the National Institute of Arthritis and Musculoskeletal and Skin Diseases at the US National Institutes of Health

Stephen I Katz (b 1941; q Tulane University 1966; MD, PhD), died from a stroke on 20 December 2018

Steve Katz's selection to be director of the US National Institutes of Health (NIH) National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) in 1995 generated some apprehension among the arthritis community.

The institute had been separated from a larger body by law in 1985. Its first director was renowned rheumatologist Lawrence E Shulman. As its second director, Katz was an unknown figure, a dermatologist who had a laboratory at the National Cancer Institute.

"He quickly won over both the research and patient communities with his commitment to science, immunology, and the NIH," Debra Lappin told *The BMJ*. She served on an advisory council to NIAMS and was a board member and later chair of the non-profit Arthritis Foundation when Katz was appointed.

"He was politically very astute. You don't do all that he did without understanding how to manage, how to read the political tea leaves, and how to prioritise what was important for his time and leadership." Lappin said, "I don't think I ever sent him an email that he didn't respond to within an hour, I marvelled at that."

Evened the playing field

In a 2018 interview Katz said, "I evened the playing field across these various constituencies by attending their meetings, by speaking to them, by answering sometimes very difficult and indelicate questions.

"I was not afraid of doing that because I knew that if we adhered to outstanding science, both extramurally and intramurally, nobody could argue with that."

Early in his career Katz mixed basic and clinical research, a pattern that continued until he closed his laboratory in 2014. He initially focused on inherited and acquired blistering skin diseases, and later showed that skin is an important component of the immune system in both its normal function and as a target of immunologically mediated disease. But he really shone as a facilitator who got the best out of others.

Katz recalled in the 2018 interview how the then NIH director and Nobel laureate Harold Varmus chose him to lead NIAMS, Varmus advised him "not only to be a good steward of taxpayer dollars, but also to 'play well in the sandbox,' and to be fair. That's what I've tried to do."

A string of NIH directors recognised Katz's commitment to those goals and his success in achieving them. They tapped his counsel over the years for a variety of matters and programmes. His interests and influence were so much broader than his job title suggests.

Band musician

Lappin says it helps to know that Katz was a musician who played guitar in a band called ARRA (Affordable Rock'n'Roll Act), now a 13 member group of NIHers ranging from postdocs to current director Francis Collins, the catalyst behind its initial formation. Playing in a band requires individual competence as well as deference and teamwork.

Stephen I Katz was born in New York City. When he was 11 the family moved to Bethesda, Maryland, where he would spend much of his life. His father refused to let him join the Coast Guard, so he attended the University of Maryland, where the previously mediocre student blossomed and graduated with honours. Medical school at Tulane University was followed by a medical internship in Los Angeles, a dermatology residency in Miami, and military service at the Walter Reed Army Military Center. A postdoctoral fellowship took him to the Royal College of Surgeons of England and a PhD in immunology from the University of London (1974). He was a senior investigator at the National Cancer Institute (1974-2014) and director of NIAMS (1995-2018).

NIAMS

"I knew that if we adhered to outstanding science nobody could argue with that"

Katz was active in dermatology organisations throughout his career, including serving on the board and as president of the Society for Investigative Dermatology, and president of both the International League of Dermatological Societies and the International Committee of Dermatology. Furthermore, he was recognised within his profession with seemingly every award possible, including, last year, the Gold Medal from the American Academy of Dermatology. He also received the highest honour for a US civil servant, the Distinguished Executive Presidential Rank award.

He leaves Linda, his wife of 51 years; three children (Mark, Kenneth, and Karen); and his extended family.

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John (Seán) D Carroll

General practitioner Kilkeel and Mourne, County Down, Northern Ireland (b 1929; q Queens University Belfast, 1952), died from bronchopneumonia on 17 January 2019

John (Seán) D Carroll stayed true to the founding principles of the NHS throughout his career as a GP from 1957 to 1999. He participated in prevention strategies by teaching the local fishermen first aid and basic life support. Working in a rural practice, he and his colleagues covered one of the first areas in Northern Ireland to have a fully equipped intermediate care vehicle, which meant that the GPs were able to manage most life threatening emergencies until emergency services were able to attend. Outside medicine, John was a keen yachtsman and long time member of the Carlingford Lough Yacht Club. He was an excellent model maker, model train enthusiast, poet, and raconteur. He leaves his wife, Ann; five children; and 14 grandchildren.

Áine Carroll

Cite this as: *BMJ* 2019;364:l900

Anthony John Gilmore Dickens

Head of division in medical research European Economic Community (b 1938; q Bristol 1963; FFPH, FRCPath), died from melanomatosis on 12 May 2018

Anthony John Gilmore Dickens ("Tony") worked in Bristol before he became Northern Ireland secretary for the BMA. Having moved to Belfast at the height of the Troubles, he returned to London in 1972 as assistant secretary. In 1976 he moved to the UK Medical Research Council and worked predominantly in tropical medicine. He moved to Brussels to work for the European Economic Community in 1984 and ended up as head of division in medical research. Non-Hodgkin's lymphoma forced him to take early retirement in 1997; he then travelled widely with his wife, Diana, whom he had met at Bristol University. He was a trustee of the SS *GreatBritain* and the SS *Matthew* and supported various charities. He leaves Diana, two children, and five grandchildren.

Diana Dickens, Sandra Stuckey

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Ronald Law

General practitioner (b 1927; q Barts 1949; FRCGP), died from Alzheimer's disease on 15 February 2019

Ronald Law ("Ron") trained at Barts and after his military service was in general practice in Brent for his entire career. He is remembered as an outstanding clinician, educator, and pioneer in academic general practice, which resulted in several seminal publications. He was a founding member of the Royal College of General Practitioners. He met his future wife, Rhoda, while they were at medical school and they formed a joint practice with surgeries in Harlesden and Wembley. He was motivated by caring for those who were socially disadvantaged and understanding their social, psychological, and cultural barriers to medical care. Ron and Rhoda had a long loving marriage that ended in her dying from breast cancer in 2004. He leaves three children (Mark, Adam, and Jane); eight grandchildren; two great grandchildren; and his companion, Shirley Pinfold.

Adam Law

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David Henry Green

Consultant radiologist (b 1951; Liverpool 1982; BSc, PhD, DMRD, FRCR), died from glioblastoma multiforme on 30 December 2018

Before embarking on a medical career in 1977, David Green studied mathematical statistics and computational science to PhD level. He was appointed consultant radiologist at Wirral University Hospital in 1990 and honorary lecturer in medical imaging at the University of Liverpool in 2000. In 2011 he was offered the post of clinical director at the Bermuda Cancer and Health Clinic. He was heard on local radio, appeared on television, and had his photograph on the handrails of the famous Bermuda pink buses. He was training for a half Ironman when he was diagnosed with glioblastoma multiforme. David was immensely brave during his terminal illness. He died at home, surrounded by his family. He leaves his wife, Pauline; four children; three grandchildren; and two brothers.

Pauline Green

Cite this as: *BMJ* 2019;364:l903

James A T Dyer

Consultant psychiatrist and former director of the Mental Welfare Commission for Scotland (b 1946; q Aberdeen 1970; OBE, FRCPsych, FRSA), died from the effects of prostate cancer on 24 January 2019

James A T Dyer ("Jim") led the Mental Welfare Commission for Scotland from 1993 to 2003, focusing on the care of those with mental disorder who had been detained. He was a consultant in general and rehabilitation psychiatry at the Royal Edinburgh Hospital and an honorary senior lecturer in psychiatry at the University of Edinburgh (1981 to 1991). From 2005 to 2016, he was a medical member of the new Mental Health Tribunal for Scotland. He was also the first Scottish parliamentary standards commissioner and was engaged with major issues, from nuclear weapons to assisted dying. Jim Dyer leaves three children from his first marriage, three stepchildren, and a granddaughter.

Joe Morrow

Cite this as: *BMJ* 2019;364:l901

Poornima Sreekumar

Consultant anaesthetist Nevill Hall Hospital, Abergavenny (b 1962; q JIPMER, Pondicherry, India, 1986; FFARCS, DA), died from subarachnoid haemorrhage on 15 January 2019

Poornima qualified in Pondicherry, where she met and married her colleague Sreekumar (a surgeon). After training and working in London for six years, they returned to India to work in a large charitable hospital in Kochi. They set up major gastrointestinal surgical and anaesthetic services for a few years and then returned to the UK. Poornima completed further training, gained her royal college fellowship, and joined Nevill Hall Hospital in Abergavenny. She enjoyed her work at the hospital and was popular with patients, friends, and colleagues. She gave her time generously to trainees, helping professionally and with personal difficulties. She leaves two children, her husband, and fond memories of a happy life.

N S Sreekumar

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