this week

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GETTY IAMGES

Bullying was rife in NHS Highland

Leaders of Scotland's health service are to be brought together to look at how working relationships can be improved after a series of reports on bullying and harassment.

The move follows an independent inquiry into complaints raised at NHS Highland, where doctors alleged "a culture of fear and intimidation" had existed for the past decade. The report, compiled by John Sturrock QC, said that while it was not possible to conclude a bullying culture existed, "it seems possible that many hundreds have experienced behaviour that is inappropriate. That seems far too many."

The inquiry's findings were supported by health secretary Jeane Freeman. She said the report contained lessons for the whole of the NHS and a summer summit will be held involving managers, trade unions, and the royal colleges to discuss the best way to achieve an open and honest working environment. She also announced that by the end of the year every health board will appoint a whistleblowing champion.

The inquiry heard from 340 people, of whom 66% reported bullying. The report says that "in many instances these were significant, harmful, and multi-layered at all staff levels, in many geographic areas and disciplines." Staff complained of feeling "sidelined, criticised, victimised, undermined, and ostracised for raising matters of concern," while managers were seen as autocratic and defensive.

The board's failure to act prompted a group of clinicians to raise their concerns in a letter to the *Herald*, leading to the review being commissioned. NHS Highland chairman David Alston and its medical director Rod Harvey left the board in February, and its chief executive Elaine Meade retired at the end of last year.

The inquiry calls for people centred leadership, early action to resolve problems, more use of mediation, better training, and an effective whistleblowing system. NHS Highland is preparing an action plan to implement the changes, said the new chief executive, Iain Stewart. A statement from the whistleblowers said, "We look forward to a time of healing but we need to be confident this won't happen again."

NHS Ayrshire and Arran is the latest Scottish board to face bullying allegations, with 85 radiology staff raising a collective grievance. A BMA Scotland survey last year showed that nearly four in 10 doctors said bullying was a problem in their workplace.

Bryan Christie, Edinburgh

Cite this as: *BMJ* 2019;365:l2166

Scottish health secretary Jeane Freeman said the Sturrock report contained lessons for the whole NHS

LATEST ONLINE

- Most hospital doctors experienced staff shortages last winter, says RCP
- Dozens of US states sue 20 generic drug makers over "industry-wide conspiracy" to drive up prices
- Around one in seven of the world's babies has low birth weight

MEDICINE

Glyphosate

Monsanto must pay couple bn over cancer claims

A jury in California ordered Monsanto to pay more than bn (. bn) to a couple who developed non-Hodgkin s lymphoma after using the weedkiller Roundup (right), which contains glyphosate identified as a probable human carcinogen by the World Health Organization s International Agency for Research on Cancer. The victory for Alva and Alberta Pilliod is the third verdict against Monsanto, which is now owned by Bayer. The companies said that they would appeal the verdict

Public health

Philadelphia s sugar tax may boost sales elsewhere

Taxing sugar sweetened and artificially sweetened beverages (by . c per ounce) in the city of Philadelphia in cut the volume of drinks sold by . billion ounces (%), a study published in *JAMA* found. However, this decrease was partially offset by increased sales of . m oz in surrounding areas that had no sugar tax, offsetting the drop in Philadelphia s sales by . %.

Global alcohol target is likely to be missed

The World Health Organization s target to cut harmful use of alcohol by % by is unlikely to be met, researchers warned, after finding the volume consumed worldwide each year rose by % from to . Alcohol intake rose by . L of pure alcohol per adult a year (up from . L to . L). This is predicted to reach . L by , a study in the *Lancet* found. Although alcohol consumption in the UK dropped from . L in to . L in , other countries saw increases. Consumption rose in South East Asia from . L to . L, in the US from . L to . L, and in China from . L to . L.

Regulation

FDA ends report system that hid device failures

The US Food and Drug Administration announced it will end the alternative summary reporting programme that has allowed millions of medical device injuries to escape public notice over two decades. Much of the information will be published within weeks, the agency said. The programme went largely unnoticed, until it was unearthed by a Kaiser Health News investigation in March.

Black box warnings put on common insomnia drugs

The FDA applied its strongest black box warnings to the common sleep drugs eszopiclone (Lunesta), zaleplon (Sonata), and zolpidem (Ambien, Ambien CR, Edluar, Intermezzo, and Zolpimist). It found examples of patients taking one of these non-benzodiazepine hypnotics for insomnia and experiencing serious injury or dying from an activity performed unconsciously as complex sleep behaviour. The regulator has reports of serious injuries from causes as varied as accidental overdoses, burns, exposure to extreme cold leading to limb loss, gunshot wounds, and suicide attempts.

Cite this as: *BMJ* ; :l

DEFICITS

NHS hospital trusts are forecasting a combined overspend of **£1.2bn** in 2018-19. The highest projected deficits were **£182m** at King's College Hospital, London, **£94m** at Cambridge University Hospitals, and **£89m** at United Lincolnshire Hospitals

[NHS Improvement]

SIXTY SECONDS ON . . . BACTERIOPHAGES

A NEW WEAPON AGAINST RESISTANCE?

The potential for bacteriophages viruses that target and kill speci c bacteria as a way to defeat antibiotic resistant infections took a leap forward last week when researchers reported signi cant recovery in the rst patient to be treated with phages.

BACK TO THE PAST?

You could say so. Phages were explored more than a century ago but lost out to antibiotics. The resurgence is due to the rise in antibiotic resistant bacteria. Over the past two years phages have treated a multidrug resistant *Acinetobacter baumannii* infection and a *Pseudomonas aeruginosa* infection.

A LAST RESORT

In the latest skirmish, teenager Isabelle Carnell-Holdaway (below) was deteriorating with a *Mycobacterium abscessus* infection a er a lung transplantation. Her Great Ormond Street Hospital team tried many antibiotics and had moved her on to a palliative care plan before turning to phages.

BUILDING A LETHAL WEAPON

The GOSH researchers, with the University of Pittsburgh, which has more than phages, targeted mycobacteria to identify those most likely to kill Isabelle s infection. They found three: Muddy, which killed the strain, and Zoe and BPs, genetically engineered to boost the killing power.

SOUNDING THE RETREAT

A er a topical test dose, Isabelle began intravenous therapy every hours for six months. Phages were detected in her serum just a day a er starting treatment, and she le GOSH nine days later for home treatment.

WHO WON THE BATTLE?

A er a month, Isabelle s wound had improved more than other skin lesions so the team added daily topical therapy to the infusions. At six months she showed objective clinical improvement, including her surgical wound s closure, said her team in *Nature Medicine*.

SO RESISTANCE IS NOW FUTILE?

Not quite. We have to be cautious about what can be concluded from one clinical case report, said Helen Spencer, the respiratory paediatrician who led Isabelle s care. The next step? Proper clinical trials, of course.

Susan Mayor, London Cite this as: *BMJ* ; :l

It is absolutely vital that all innovation puts patients' safety centre stage Peter Lamont, RCS

Royal college's new tech guide warns against "maverick" surgeons

Surgeons should refrain from using new procedures and techniques if they lack the training and supervision to ensure patients' safety, the Royal College of Surgeons has warned.

The guidance on the best practice for using new techniques follows the death of a patient who had multiple organ failure after robot assisted heart valve surgery. It outlines the principles all surgeons should consider when developing new techniques, instruments, or devices, as well as how surgeons can demonstrate the safety and effectiveness of those innovations.

The college said that although new technologies such as 3D printing, artificial intelligence, robotics, and nanotechnology were exciting and had much potential, there were "significant risks" in allowing innovation in the absence of clear guidelines. It has previously called for a national protocol on introducing new procedures and technologies and has offered to create one with the Department of Health and Social Care and the GMC.

It is also pushing for all new surgical procedures and devices to be registered, with related data collected in appropriate national audits, before being routinely offered to patients.

The college's guidance advises all surgeons to keep an accurate and accessible record of their surgical activity and to submit data

NHS is "losing its grip" on cancer screening

A damning report into health screening has accused the government of "losing its grip" as it revealed that the number of women accessing the cervical cancer programme has fallen to a 21 year low.

Missed targets

The Public Accounts Committee report covers four of England's 11 screening programmes: bowel, breast and cervical cancers, and abdominal aortic aneurysm. None met targets for ensuring the eligible population was screened in 2017-18.

MPs on the committee said that national bodies are not doing enough to ensure everyone who is eligible is being screened, and do not know if everyone who should be invited has been.

The report showed a "massive" disparity across the country, with parts of the north east reaching more of their eligible population for cervical screening than areas of London.

But it said that the Department of Health and Social Care, NHS England, and Public Health England do not have a plan to reduce these health inequalities, and don't know what stops certain groups from attending, so cannot effectively target them.

It added that the IT system used to identify the eligible population was described by DHSC in 2011 as "not fit for purpose" but has yet to be replaced. As a result the national oversight of screening has failed patients, resulting in thousands of women not being invited for breast and cervical screening or waiting too long for their screening results, the report said.

The national bodies have been too slow to recognise and respond to the problems, including holding local screening providers to account for long term failure, it said.

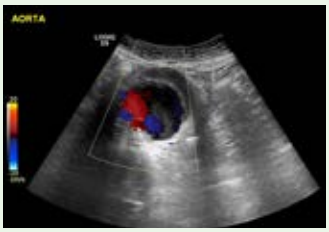
In 2017-18, almost eight million people were screened for the four conditions at a cost of £423m.

Meg Hillier, the committee chair, said millions of people were not benefitting from screening. "Our inquiry has exposed a health service that is losing its grip on screening programmes. Many people waiting for delayed results will suffer anxiety, stress, and uncertainty. Those delays also stretch beyond the department's target waiting periods.

"The government's understanding of variation across the country and the barriers facing different demographics of the population is patchy, which constrains their capacity to act.

"This is a question of health equality. The government has a

Just **71.7%** of the eligible population, or 3.2 million women, were screened for cervical cancer in 2017-18, and only one of 207 clinical commissioning group areas succeeded in meeting the target of screening **80%**. The results for breast cancer screening were **72.1%**



IN 2017-18
eight million people were screened, costing
£423m

to national audits, registries, and databases. It also gives surgeons information on training, patient consent, ethical considerations, regulatory requirements, and cost implications.

Patients' safety

Peter Lamont, a college council member who helped develop the guidance, said that as a new wave of technologies was expected to affect every type of surgery, it was "absolutely vital" that this innovation put patients' safety and best interests at centre stage.

He said, "The introduction of new technologies or techniques in surgery has no place for the maverick surgeon who proceeds without appropriate peer review or training.

"Surgeons by nature are innovators, and we hope that these guidelines will help them bring their new ideas forward in a way that most benefits patient care."

Elisabeth Mahase, *The BMJ*

Cite this as: *BMJ* 2019;365:l2170

duty to ensure that everyone has access to health screening."

The committee is pressing the department and NHS England to set out a plan of action to better hold local screening providers to account, overhaul governance arrangements, and develop an IT system that works as intended.

IT to be replaced

The system is to be replaced next year, but until then, the report said there remains a risk that more eligible people will not be invited for screening.

NHS England has commissioned a review of adult screening services, the results of which are expected this summer.

The health department is waiting for its recommendations but is pushing ahead with changes to help detect as many cancers as early as possible, a spokesperson said, adding, "The NHS in England is investing £200m to fund new ways to rapidly detect and treat cancer."

Jacqui Thornton, London

Cite this as: *BMJ* 2019;365:l2168

Prescription rules are "overly complex and cause mistakes"

Rules on prescription exemptions set by the Department of Health are too complicated, causing patients to make genuine mistakes, the National Audit Office has said.

The spending watchdog investigated penalty charge notices (PCNs) issued to patients who claim free prescriptions or dental treatment fraudulently or in error, and it found a significant increase in checks and fines issued. In February *The BMJ* reported that the number of PCNs issued to patients in England had risen by a third last year and by 60% in the past three years.

The NHS estimates that this type of fraud costs £256m a year and has set a target to halve the losses by 2020. However, the report said many factors may be causing confusion and wrong claims, including the introduction of universal credit rules and people not understanding differences between benefits. Additionally, some exemptions may vary between prescriptions and dental treatments; and in specific circumstances, such as pregnancy, the patient may need to apply for exemption certificates that have varying time limits.

"The NHS must take urgent steps to avoid causing unnecessary distress to patients"

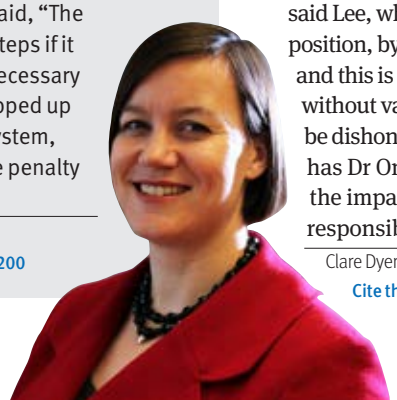
Valid exemptions

Nearly a third (30%; 1.7 million) of PCNs issued since 2014, worth £188m, were withdrawn because of a valid exemption. This means that many patients are incorrectly receiving "distressing, threatening letters or fines" that could affect their mental wellbeing, said Richard Vautrey, chair of the BMA's GP committee.

Meg Hillier (right), chair of the Public Accounts Committee, said, "The NHS must take urgent steps if it is to avoid causing unnecessary distress to patients, tripped up by an overly complex system, who end up facing large penalty charges."

Elisabeth Mahase, *The BMJ*

Cite this as: *BMJ* 2019;365:l2200



GP struck off for lack of indemnity insurance

A GP who worked for six years without indemnity insurance, and who provided fake information in three appraisals to make it appear he was covered, has been struck off the UK medical register.

Between 2014 and 2016 Augustine Onojeje-Oraka filled in the indemnity coverage sections of three appraisal forms, claiming to be covered by either the Medical Defence Union or the Medical and Dental Defence Union of Scotland, and giving false membership numbers, knowing his insurance lapsed in 2010. The fraud was revealed during a Care Quality Commission inspection of his practice in Borough, south London.

Onojeje-Oraka, who qualified at Benin University in 1985, did not attend a Manchester hearing of the medical practitioners tribunal, but previously gave evidence to a performers list decision panel, to which he was referred by NHS England. In that evidence, the tribunal heard, he did not deny his lack of coverage, nor that he faked policies, but he denied dishonesty. In an email to NHS England soon after the inspection, he blamed a "constellation of mitigating circumstances." These included partners reluctant to join a group cover scheme, pressure of work, a declining practice income, and personal stressors, said the tribunal chair, Linda Lee.

His MDU insurance had lapsed, he claimed, because of "an administrative error requesting lump sum payment," which he could not afford. "I kept going back to [the MDU] in the hope they might reinstate me," Onojeje-Oraka told the decision panel. "I did make an attempt but because of the pressure that I was under I think I did lose track of it."

But the tribunal found no evidence to support his claims for mitigation, said Lee, who added that "doctors in his position, by nature, have stressful jobs, and this is not an excuse to practise without valid indemnity insurance or to be dishonest." She added, "At no point has Dr Onojeje-Oraka acknowledged the impact of his actions or accepted responsibility for them."

Clare Dyer, *The BMJ*

Cite this as: *BMJ* 2019;365:l2181

"Give us simple, intuitive systems"

NHS leaders continue to grapple with one of its biggest challenges: how to staunch the rising number of patients attending emergency departments. **Gareth Iacobucci** reports

It has never been less clear how the various different initiatives fit together into a coherent whole
Siva Anandaciva, King's Fund

The NHS in England has been trying to get to grips with rising numbers of accident and emergency attendances and admissions for several years, with the 2013 Keogh review, the 2014 *Five Year Forward View*, and the recent long term plan all proposing solutions.

But the trend continues. The latest figures show a 7% rise from April 2018 in daily attendances and the worst performance on record against the target for 95% of patients to be admitted, transferred, or discharged within four hours. The NHS wants to replace this target, which has not been met since July 2015.

The NHS long term plan pledged investment in primary and community care to divert more non-emergency cases to "new service channels" such as urgent treatment centres and a beefed-up version of NHS 111. Also being trialled is "same day emergency care," with the aim of cutting overnight stays in hospital.

All this is a lot for patients—and for the service itself—to grasp. This was noted by Siva Anandaciva, chief analyst at the King's Fund, when welcoming NHS leaders, senior clinicians, and patients' representatives to a conference on urgent and emergency care on 9 May. "It has never been less clear how the various different initiatives fit together into a coherent whole," he said.

Shifting the focus

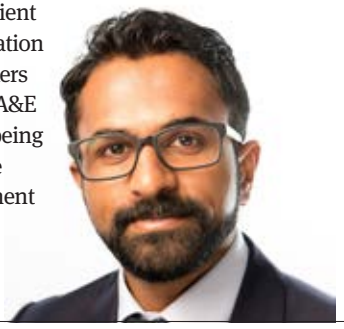
Trying to shed some light was Mark England, NHS England's deputy national director of urgent and emergency care, who said the complex system had often been "too focused on A&E." Providing more proactive care to the most complex patients—5% of A&E attendances take up 54% of hospital bed days—could make a huge difference to capacity, he said.

Karen Kirkham, a Dorset GP and NHS England's clinical adviser for primary care, described how a Dorset area had seen a drop in emergency admissions after testing an approach that shifted resources out of hospital, improved access to primary care, and shared the workforce across services.

Kirkham said the scheme had succeeded because of hospitals' "willingness to give up resources," a population health management approach with proactive care planning, anticipatory care plans for patients, and having a shared electronic care record in place. It also had strong clinical leadership. The experts at the conference acknowledged that these conditions existed in only a minority of places and would take a lot of effort and perseverance to implement.

But Chris Moulton, vice president of the Royal College of Emergency Medicine (RCEM), said an achievable ambition would be to "re-engineer systems to make them simpler, more intuitive, and easier for people."

Derek Prentice, RCEM's lead patient representative, expressed exasperation at the repeated push by policymakers to discourage patients from using A&E departments. "Patients don't like being told 'you need to be educated,'" he said. "People use the A&E department because they regard it as the only place of safe access for them. They



Antibiotics after assisted childbirth could halve infections

Giving women a single dose of preventive antibiotic after childbirth involving forceps or vacuum extraction could prevent almost half of maternal infections, equivalent to more than 7000 every year in the UK.

The finding came from a randomised trial of 27 UK obstetric units involving 3420 women. The study also found that, for every additional 100 doses of preventive antibiotic given, 168 doses could be avoided overall because of the reduction in infections after delivery. Implementing a policy of routine antibiotics after such births could help to reduce antibiotic use by 17%, the researchers said.

In 2016 around 19 500 women in the world died from pregnancy related infections. However, for every woman who dies, another 70 develop a severe infection and survive, often with long term health consequences, previous research has found.

The latest study, published in the *Lancet*, was carried out between March 2016 and June 2018 and involved women who were randomly assigned to receive intravenous amoxicillin and clavulanic acid or placebo within six hours of assisted vaginal delivery. The researchers monitored confirmed or suspected maternal infections within six weeks of delivery and assessed the effect of the preventive antibiotic dose on overall antibiotic use.

Rates of perineal wound infection or burst stiches, perineal pain, and need for extra perineal care were also substantially lower in the antibiotic group. From the findings the researchers estimated that an average of £52.60 per women could be saved by the NHS within the first six weeks after birth.

Marian Knight, from Oxford

RESEARCHERS estimated that an average of **£52.60** per woman could be saved within the first six weeks after birth

know they are going to be seen 24/7 if they can't get hold of a GP or any other appropriate service at the time they need it. We need to recognise what patients want."

Eileen Sutton, head of urgent and emergency care at the Healthy London Partnership, said that many patients, particularly frail elderly people, would choose not to go to an emergency department if community services were available. "Patients don't want to go to A&E at the end of their life. It's not one size fits all. We need to think about them," she said.

As part of a wider clinical review of its waiting time targets, NHS England is piloting plans to replace the four hour goal with other measures, such as time to initial clinical assessment, time to emergency treatment of critically ill and injured patients, and mean waiting time across all departments. Some critics have argued that this has been prompted by the NHS's inability to meet the four hour target. But the emergency medicine consultant Cliff Mann, a former RCEM president and clinical lead for A&E improvement plan at NHS England, said the rationale was sensible.

Fifteen million patients a year

He said, "I don't think anyone is trying to give up on the four hour standard. It did a great job in the early 2000s. But then emergency departments were seeing around 10 million patients a year—now it's 15 million. More importantly, we were admitting about 15%, we now admit 31%."

He added, "A clinical review of standards has to shine a much greater light on admitted patients who are in emergency departments for an unacceptably long period of time."

Gareth Iacobucci, *The BMJ*

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University, who led the study, said, "These findings highlight the urgent need to change WHO antibiotic guidelines and guidance from organisations in the UK, North America, and Australasia that do not recommend routine antibiotic prophylaxis for assisted childbirth.

"This intervention could be used to prevent maternal infections in low and middle income countries where intravenous antibiotics are available."

The study team noted that one in 10 women still had a suspected or confirmed infection, so more research was needed to assess whether earlier, prenatal, or repeated administration would be more effective.

Elisabeth Mahase, *The BMJ*

Cite this as: BMJ 2019;365:l2188

Researchers found that women who received a single dose of antibiotic had significantly fewer suspected or confirmed infections: 11% in the antibiotic group and 19% in the placebo group (risk ratio 0.58 (95% confidence interval 0.49 to 0.69)).

Women who received antibiotic prophylaxis were 56% less likely to have confirmed sepsis proved by culture than women receiving the placebo (0.6% versus 1.5%).

FIVE MINUTES WITH . . .

Paul McNeive

The Irish novelist on his unlikely antibiotic resistance collaboration with the chief medical officer

"I suffered bad burns in a car accident in 1982 which culminated in losing both my legs. I was learning to walk on prosthetic legs, and I picked up cuts, bruises, and blisters which would sometimes get infected.

"About 10 years ago I went to the doctor with a routine looking skin infection. I was prescribed antibiotics, but nothing happened. I went back and was prescribed a longer course; again nothing happened. I tried another, and then another; nothing happened. I had a multi-resistant bacteria infection and the antibiotics didn't work any more.

"Eventually I had to have a skin graft to get rid of it. The infection caused me to retire because the consultants warned me they were running out of options. I had sepsis a couple of the times I had been admitted to hospital, and there was a risk of losing my remaining knee, which is crucial to my mobility. This all caused me to look into antibiotic resistance, which I knew nothing about. I became more appalled at what was going on. To me, it's on the same level as global warming; it's that level of catastrophe.

I WAS THE PATIENT FACE THAT COULD HELP BRING THE PROBLEM TO LIFE

"I had written one non-fiction book and I wanted to write more. I retired and wrote *The Manhattan Project*. The book explores the idea of whether terrorists could induce and accelerate the consumption of antibiotics—for example, by getting more of them into the food chain, by disrupting hospital cleaning, or by spreading bacteria around hospital wards.

Initiatives

"Six months ago, the publisher sent a copy to [England's chief medical officer] Sally Davies, because she's one of the best known and most outspoken voices on antimicrobial resistance (AMR). She invited me to meet her and said that I was the patient face that could help bring the problem to life—beyond the sterile "doctors warn about AMR threat" newspaper story that Joe Public switches away from very quickly. She asked me to help her with some initiatives, and I'm grateful for her interest.

"I don't think the problem is getting the political attention that it should be. Hopefully, people who read the book will get an entertaining read and also be a lot wiser about the problem."

The Manhattan Project is published by Black and White Publishing

Gareth Iacobucci, *The BMJ* Cite this as: *BMJ* 2019;365:l2189

INVESTIGATION

Big tobacco, the new politics, and the threat to public health

With several Tory leadership contenders sympathetic to its ideology, the Institute of Economic Affairs is closer to power than ever before. In an exclusive investigation, **Jonathan Gornall** reveals how the organisation is funded by British American Tobacco and, after orchestrating attacks on the "nanny state", it may now hold the key to No 10

Dominic Raab: spoke at IEA's birthday celebrations

David Davis: received £1949 from IEA to attend meetings in the US

Liz Truss: wrote an essay "On the nanny state" for an IEA website

Whatever the eventual consequences of Brexit for the NHS, an article published in the *Daily Telegraph* in March made it clear that an even greater threat to public health in the UK may emerge from the battle for control of the Conservative Party.

In an essay published on 31 March, entitled "The next Tory leader must be a bullish libertarian," the director general of the free market think tank the Institute of Economic Affairs (IEA) set out what amounted to a manifesto for a new party leader.

The leadership election, wrote Mark Littlewood, was a chance "to rediscover an agenda supportive of . . . free markets and a smaller state." Theresa May's successor should ensure that "the plethora of censorious and hectoring measures over what British adults choose to eat, drink and smoke must come to an end."

What the IEA says matters. "Bullish libertarianism" appeals to a significant Tory faction, and, as the showcasing of Littlewood's prescription in the *Telegraph* attests, any prospective leader is likely to emerge from the ranks of those who subscribe to the IEA's ideology.

The institute has a longstanding commitment to dismissing public health initiatives as "nanny state" interventions. Its recent research publications have challenged the childhood obesity strategy, dismissed "sin taxes" as regressive, and ridiculed the link between fast food outlets and obesity. In the past year alone it has issued more than a dozen statements criticising everything from alcohol controls to sugar taxes as "pointless," "absurd," and "draconian."

All of this might not be quite so worrying were it not for two facts: the IEA is or has been funded by some of the very industries that stand to gain commercially from its attacks on public health initiatives, and it is connected—ideologically, financially, or both—to no fewer than 25 serving Conservative MPs, including several candidates for May's job.

The IEA is secretive about its funding sources, but *The BMJ* can report that the organisation is part funded by British American Tobacco. In the past it has also taken money from the gambling, alcohol, sugar, and soft drink industries. Meanwhile, politicians with links to the IEA seem to be progressing ever closer to power. The concern is that public health policies could be put at risk under a new Tory leadership, including current plans for calorie labelling and for advertising restrictions designed to tackle childhood obesity, as well as progress towards a minimum unit price for alcohol.

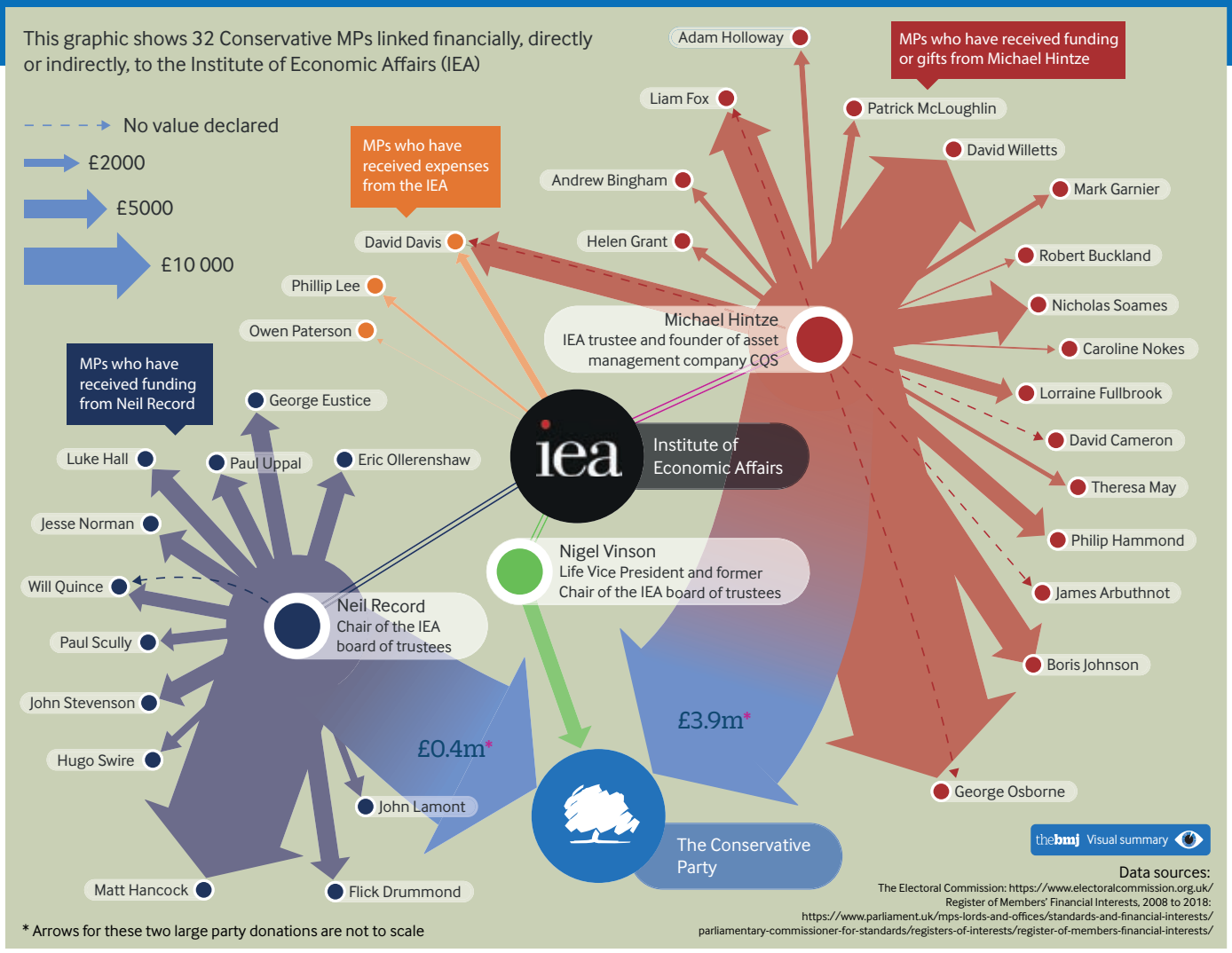
POLITICAL LINKS

Among the MPs most closely and publicly associated ideologically with the IEA is Dominic Raab, MP for Esher and Walton in Surrey since 2010.

Raab, backed for the leadership by a "Ready for Raab" social media campaign launched within days of his resignation in 2018 as secretary of state for exiting the European Union, has performed well in Tory grassroots polls and had his candidature endorsed by David Davis (another former Brexit secretary).

In 2015 he spoke at the IEA's 60th birthday celebrations, where he acknowledged his ideological debt to the organisation. He recalled a time he had been swimming off a Brazilian beach, pleasantly swept along by an unseen current. In "the fight for economic freedom," he told the audience, "the IEA . . . will be like the warm, irresistible tide on that Brazilian beach—gently, powerfully, sometimes without us even knowing it, shifting the debate to a whole new place."

Raab remains close to the institute. Last month he appeared in an online video to launch the Richard Koch Breakthrough Prize, the IEA's annual essay competition.



The institute, he said, was "well known for promoting free market principles, and they're absolutely essential, now more than ever . . . get thinking, send us your ideas."

Asked by *The BMJ* whether Raab supported Littlewood's libertarian call to arms, a spokesperson for the MP sought to distance him from the IEA's view that public health initiatives were undesirable "nanny state" interventions that should be scrapped. "Dominic has always been a strong supporter of public health initiatives to make the UK healthier and reduce pressures on the NHS [and] a big believer in the power of sport to transform people's mental and physical health and the need for more education to tackle issues like childhood obesity," the spokesperson told *The BMJ*.

Raab also believed that "all interventions need to be proportionate and evidence based. He therefore fully supported measures such as the ban on smoking in public places and better labelling and information on calorie content." The spokesperson declined to be drawn on whether Raab was aware that the IEA was funded by a major tobacco company.

Matt Hancock, England's health secretary and considered to be a frontrunner in the Tory leadership race, does not have direct links with the IEA but in recent years has received funding from Neil Record, who became chair of the IEA board of trustees in 2015. From 2010 until his appointment as health secretary in July 2018, Hancock received £32 000 from Record, the founder of a currency management company who joined the IEA's board of trustees in 2008.

The IEA is connected—ideologically, financially, or both—to 25 serving Conservative MPs

The funding, given in a personal capacity in support of Hancock's "parliamentary work and travel costs" and recorded in the *Register of Members' Financial Interests*, ceased before Hancock became health secretary.

Hancock, as paymaster general and Cabinet Office minister, sided with the IEA's view that charities funded by the government should not be allowed to lobby it. "When government funds the lobbying of itself," the IEA has argued, "it is subverting democracy and debasing the concept of charity." In February 2016 Hancock announced that charities and others receiving government grants were to be banned from lobbying.

A press release issued jointly by the Cabinet Office and Hancock began by crediting the IEA for having "undertaken extensive research on so-called 'sock puppets,' exposing the practice of taxpayers' money given to pressure groups being diverted to fund lobbying rather than . . . good causes."

Since his appointment as health secretary Hancock has shown that he is aligned with the IEA's position on minimum unit pricing (MUP) for alcohol, prompting concern in the public health community that he might be "listening to the views of . . . vested interests above those of the health community."

Hancock did not respond directly to *The BMJ*'s request to confirm whether he had been aware that the IEA was funded by a tobacco company when he accepted donations from its chair of trustees. A spokesperson said only that "all donations have been declared in line with parliamentary regulations." Hancock also did not respond directly when asked whether he supported the IEA's call for the next Tory leader to scrap "censorious and hectoring" public health measures. Instead his spokesperson referred to a speech Hancock gave at the International Conference on Obesity. Here, he highlighted

Comments from public health figures

MacGregor: "Extremely concerning"

Graham MacGregor, professor of cardiovascular medicine, Wolfson Institute of Preventive Medicine, and founder of Action on Sugar and Action on Salt

"The prospect of a government following the IEA's lead on public health initiatives is extremely concerning."

Lang: "Alarm bells should ring"

Tim Lang, professor of food policy, City University London

"Mark Littlewood's leadership manifesto should ring alarm bells. Over the past nine years the catastrophe of obesity has become ever more clear, and since 2010 three Conservative led governments have only with great reluctance added some public health protection measures. Now the IEA is saying, 'We don't like this,' and I think that serves as a very good warning to people in public health that the gloves are coming off."

Gilmore: "Victims of free marketism will be the vulnerable"

Ian Gilmore, director of the Liverpool Centre for Alcohol Research and chair of Alcohol Health Alliance UK

"Public health would be an early victim of populist free marketism and the victims would be the most vulnerable—including children. We are already in the middle of a public health crisis through the move of public health into local government and central government cutting funding to local authorities. 'Shrinking the state' would make this even worse."

Hawkes: "What future do we want for our children?"

Corinna Hawkes, director of the Centre for Food Policy, City University London

"Public health interventions are ultimately about what future we want our children to have. Do we want as a society to do everything we can to support children in making healthy decisions? If the answer is yes, then we need public health interventions that prevent the intrusion of negative influences into children's lives. If banning cartoon characters provides an environment that makes it easier for children to accept a wider range of foods, that's increasing choice, not removing it."

Sheron: "Commercial interests are vectors for these diseases"

Nick Sheron, head of the Population Hepatology Research Group, Southampton University

"The prime health challenge of the 21st century will be the diseases caused by alcohol, smoking, and obesity. The vectors for these diseases are profitable commercial organisations who consistently and forcefully oppose effective, evidence based measures such as protecting children from marketing or increasing price through taxation.

"There is clear blue water between the health of populations and the shareholder wealth of commercial interests, and previous conservative leaders have tended to float offshore. They have actioned evidence on smoking, done a bare minimum for childhood obesity, and completely failed to tackle alcohol. The results are clear to see: tremendous reductions in smoking deaths, a future health crisis from obesity, and colossal increases in alcohol related deaths, to the extent that more working years are lost from alcohol than from the 10 most frequent cancer types combined.

"The consequences of a future leader aligning against health and in favour of the tobacco, alcohol, and obesity industries are deeply concerning."

Coggon: "Large corporations need democratic checks"

John Coggon, codirector of the Centre for Health, Law, and Society, University of Bristol Law School

"In a lightly regulated marketplace, the impacts of large corporations on people's decisions are enormous, potentially coming at the cost of great personal and social harm and without the sorts of democratic checks and transparency requirements against which public actors and agencies are held to account.

"Within the small state, the power to influence health affecting decisions, however negatively, is considered to be benign to the point of being a fundamental right when in the hands of big business, notwithstanding overarching organisational aims to maximise wealth; yet health affecting interventions, however positive, are considered an unjustifiable interference with freedom when exercised by agencies whose remit is promotion of the public interest."

"Unnecessary and seemingly ineffective, minimum unit pricing has no place in a free society"—Christopher Snowdon

initiatives such as calorie labelling in restaurants and restrictions on advertising of junk food and cited the success of the sugar tax in reducing sugar in soft drinks as evidence that "population-wide measures work, and are necessary, alongside promoting healthier behaviours and empowering individuals to make better choices."

But he added, "I am no fan of nanny state interventions that treat everyone the same, or punish the masses for the problems of a minority . . . the modern public health problems of largely non-communicable diseases need a much more targeted approach." On alcohol pricing, he added, "For 95% of people, the alcohol we drink is perfectly safe and normal. Let's not punish the masses for perfectly healthy behaviour."

The IEA has long expressed opposition to MUP and did so once again in an April article by Christopher Snowdon, its head of lifestyle economics. MUP, he wrote, was "a shamelessly paternalistic and patently regressive policy. Unnecessary and seemingly ineffective, it has no place in a free society."

The institute has repeatedly refused to confirm that it is, or has been, funded by the alcohol industry. But, in a rapid response to a 2014 article in *The BMJ*, Snowdon seemed to imply that it was—and, in an undercover recording made by Greenpeace in 2018, IEA's director general Littlewood, illustrating for the benefit of a supposed prospective client how the IEA worked, admitted that "we would take money from alcohol companies."

It certainly has no objection to working with them. At the Tory Party conference in 2017 the IEA hosted a debate on alcohol policies ("How much is too much?") with the drinks company Pernod Ricard UK, and it staged another ("Standing Up for the British Beer Industry") with the support of the world's largest brewer, Anheuser-Busch InBev.

Snowdon's article about MUP had first appeared on the website of a new organisation called Freer, whose purpose is to "refocus the political debate, shifting attention towards free enterprise and social freedom." Although Freer is "financed, run and operated by the IEA," based at the institute's offices and headed by Rebecca Lowe, a research fellow at the IEA, it is not registered as a charity and is therefore not

Policies at risk: calorie labelling and advertising restrictions designed to tackle childhood obesity

Government plans to oblige all cafes, restaurants, and meal delivery companies to give calorie information about the food they sell are already in the IEA's sights.

At the end of last year the Department of Health ran a three month public consultation on the proposals, which it said were designed "to make sure people have clear and accurate information about the calorie content of the food and drink they and their families are eating when dining out, so they can make informed and healthy choices."

The initiative, it said, was driven by concern that "nearly one in four children in England are obese or overweight by the time they start primary school, and this rises to one in three by the time they leave primary school."

The department says it is still analysing feedback to the consultation, which ended in December. On the day it was launched Mark Littlewood, IEA director general, told the *Daily Telegraph* that the scheme was "yet another example of the government using a sledgehammer to fail to crack a nut" and that, while this would not change consumer habits, it would harm business. It was, he said, "disappointing that the government seems increasingly obsessed with further adding to the red tape that afflicts British business."

The stand-off perfectly illustrates the problem at the heart of the IEA's business-centric, free market philosophy. As was made clear in the department's economic assessment of the impact of options, from a mandatory energy labelling scheme for all businesses to one excluding smaller businesses, the sector would face costs over 25 years ranging from £220m to an estimated maximum of £630m. The benefits to society as a whole, however—in terms of reduced health and social care costs and increased economic activity by a healthier labour force—would range from £4.84bn to £10.57bn.

The department said originally it would respond to the consultation by Easter, but a spokesperson told *The BMJ* this had been delayed by a couple of months as the consultation "received a high level of interest and it takes time to analyse feedback."

There is also a consultation running on more advertising restrictions to reduce children's exposure to products high in salt, fat, and sugar, which is due to close on 10 June. The measures were proposed as part 2 of the plan for action on childhood obesity, launched last June.

The IEA's views on childhood obesity have been expressed frequently. Obesity is "a statistical invention," created by "flawed methodology" that "has led to the number of obese children being greatly exaggerated."

The prospect of an IEA fellow traveller and free market ideologue taking the reins of the Conservative Party fills Martin Caraher, professor of food and health policy at City University of London, with dismay. In an editorial in *The BMJ* in March, Caraher welcomed the proposals to further cut salt levels in food, especially in the out-of-home sector. Tougher policies, he argued, were necessary to make fast food healthier.

Mark Littlewood: Calorie labelling on menus is using a "sledgehammer to fail to crack a nut"

Now he is "desperately concerned" by the message being put out by the IEA. He says, "I thought that as a society we'd reached an understanding that some protection is needed at least for some people, if not all. The free market offers no protection in health, and society simply has to pick up the costs down the line.

"The 'nanny state' gets criticised, but it isn't taking away people's free choice—it's just saying that, in terms of health, 'This is what we recommend and we've set some limits.' The companies themselves make these decisions for us every day, and nobody objects to that.

"We think we have choice, but that's determined by where you live, your social profile, and whether you have a Waitrose or Tesco nearby. All that the state is doing is introducing a little control."

subject to the same political lobbying restrictions that constrain the IEA.

Freer's co-chairs are the Conservative MPs Luke Graham and Lee Rowley. Contacted by *The BMJ*, Graham declined to say whether or not he supported the IEA's "nanny state" stance but said, "The Freer initiative, like the IEA, has no corporate line on public policy proposals. It is united by people who broadly support free markets and free people. All views published by the IEA or Freer are the author's own." Rowley did not respond to a comment request.

On 16 July 2018 Freer held a summer party at the IEA's offices, featuring speeches by Liz Truss, chief secretary to the Treasury, and Raab. Freer's launch in 2018 was also attended by a number of MPs including Truss, Raab, and Michael Gove. In April, Freer published *On Social Freedom*, its first collection of essays, featuring contributions from Tory MPs Truss ("On the nanny state"), Graham ("On cannabis"), and Ben Bradley ("On taxing meat and sugar"), as well as the IEA's Snowdon ("On minimum unit pricing").

OPAQUE FUNDING

The IEA makes much of the fact that it seeks and receives no government funding. It is, however, less forthcoming about where it obtains its money.

In a recent appearance on BBC Two's *Politics Live* Littlewood repeatedly avoided answering direct questions from the presenter, Jo Coburn, about whether his organisation received money from the sugar, tobacco, alcohol, or casino industries.

As a charity and a private company limited by guarantee, the IEA publishes accounts with the Charity Commission and Companies House, but there is no legal requirement to identify individual donors. The most granular funding detail offered is that, in 2017, its income of £2m came primarily from unnamed "foundations and trusts" (23%), "large businesses" (23%), and "individuals, entrepreneurs and family firms" (20%).

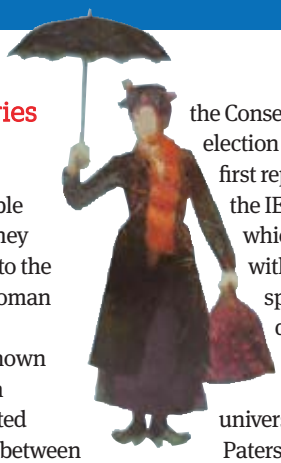
Despite the IEA's penchant for funding secrecy, details of its involvement with a range of industries whose products are bad for public health have trickled out over the years. For example, in 2012 the National Casino Industry Forum gave £8000 to the IEA after the publication of a discussion paper written by Snowdon.

In 2013 the cigarette companies Philip Morris International, British American Tobacco, Japan Tobacco International, and Imperial all confirmed that they had financed the IEA, which had campaigned against plain packaging of tobacco products as "a draconian attack on the freedom of smokers, retailers and manufacturers." These relations came as little surprise to anyone familiar with the multiple references to the IEA in documents that emerged during litigation between US states and the tobacco industry, which are now held in the Truth Tobacco Industry Documents online archive created by the University of California, San Francisco.

What is surprising, however, is that at least one major tobacco company says that it continues to support the IEA to this day, as *The BMJ* has discovered.

One document in those archives is an IEA fundraising prospectus aimed at potential US based corporate donors, who are promised

Few in public health will be happy at the prospect of the Tories adopting a leader wedded to anti-"nanny state" ideology



"immediate access to IEA's network of experts—authors, policymakers, business leaders and media." Prepared for use by the American Friends of the Institute of Economic Affairs, the document lists more than 153 corporate supporters of the IEA in the UK.

On the list are several companies whose products had public health implications and would clearly have benefited from the IEA's commitment to deregulation, including British American Tobacco, Rothmans UK Holdings, Tate and Lyle, Whitbread, and Coca-Cola Great Britain and Ireland.

Although undated, the document seems to be from about 1999. In the intervening 20 years many companies on the list have been restructured or have changed owners, but *The BMJ* asked a number of them if they still supported the IEA. Some declined to comment, and others were evasive. But one company admitted that it still supported the IEA: British American Tobacco (BAT).

"We support like minded organisations on issues that are important to our business and our consumers," Simon Cleverly, BAT's group head of corporate affairs, told *The BMJ*. A spokesperson confirmed BAT was still an IEA supporter but declined to say how much it donated.

The MPs Raab, Hancock, and Truss, as well as IEA's trustee Record and life vice president Nigel Vinson, did not respond to requests from *The BMJ* to clarify whether they were ever aware of the institute's financial relations with BAT, which was part of an industry responsible for "the single largest cause of preventable deaths and one of the largest causes of health inequalities in England."

An IEA spokesperson declined to confirm it was receiving donations from BAT or from any company or industry body producing soft drinks, alcohol, food, or tobacco products. "We respect the privacy of our donors and don't place a list of them in the public domain," she told *The BMJ*. "It is a matter for individual donors whether they wish their donation to be public or private." Funders, she added, were "not permitted to influence the conclusions of our analysis, neither across a programme nor within a single publication or communication about it. We uphold strict rules to protect our academic independence, including clear guidance to potential donors and a rigorous system of peer review."

The BMJ also asked for comment from Record and Vinson on whether they agreed with the institute's characterisation of public health initiatives as undesirable "nanny state" interference. They had "nothing further to add" to the IEA's statement, the spokeswoman said.

The IEA's most generous known benefactor is the Nigel Vinson Charitable Trust, which donated £450 000 to the organisation between 2013 and 2018. Vinson, who from 1968 to 1975 was a member of the Sugar Board, joined the IEA board in 1971 and, since stepping down in 2004, has remained a life vice president.

In 2016 he gave £5.5m to the University of Buckingham to create a Centre for Economics and Entrepreneurship in collaboration with the IEA. The university, which offers a range of medical courses in addition to degrees in economics and entrepreneurship, declined to discuss the appropriateness of establishing such a relation with the IEA, an organisation that accepts funds from the tobacco industry. A spokesperson told *The BMJ*, "We can't speak on behalf of other organisations but are committed to the principles of academic freedom and free speech and encourage debate on matters of public policy."

The *Register of Members' Financial Interests* shows that, in the past 10 years, direct funding of MPs by the IEA itself, rather than by senior figures on its board of trustees, has been rare. Although the amounts have been insignificant, the significance lies in the ideological relations the payments highlight.

For example, in September 2014 the IEA gave £735 to Phillip Lee, a part time GP who is Tory MP for Bracknell, to allow him to attend an IEA conference on privatisation in Slovenia. In January 2018 the *Daily Express* reported that Theresa May was considering Lee as Jeremy Hunt's successor as health secretary, and in March he was reported to be "considering a run" in the Tory leadership race. Lee did not respond to a request for more information about his relations with the IEA.

The register of interests also records that, in November 2018, the IEA paid for David Davis to fly to the US for meetings in Washington and Oklahoma. His travel expenses cost the IEA £1949. Davis was accompanied by another Conservative MP, Owen Paterson, who recorded a contribution of £84 from the IEA.

In 2014 Paterson, a former environment secretary, formed his own "independent centre-right think tank" called UK 2020, set up "to produce a manifesto for the leader of the Conservative Party contesting the general election in 2020." In 2016 it published its first report, written by Kristian Niemietz, the IEA's head of political economy, which compared the NHS unfavourably with other national health systems. In a speech launching the report, Paterson questioned whether "a centralised state-run monopoly of healthcare is the best and only way to run a universal healthcare system that is fair."

Paterson has complied with parliamentary rules by declaring receipt of donations from his own think tank, which does not reveal its funders, but he has declined to say where its money comes from.

Links between the IEA and other leading Tory MPs emerged in September 2018, when the institute published a report, *Plan A+—Creating a Prosperous Post-Brexit UK*, dismissed by one of many critics as a "product of fanaticism [with] dangerous consequences for the NHS." At the launch were the MPs Davis and Jacob Rees-Mogg, and the former foreign secretary Boris Johnson hailed the report as "a very good piece of work."

The Charity Commission was less impressed. The report and its launch, it said in a statement in December 2018, "sought explicitly to change government policy on an issue unrelated to the charity's purposes—furthering education—which constitutes a breach of the commission's guidance on political activity and campaigning." The warning issued to the IEA under section 75A of the Charities Act 2011 called on it to remove the report from circulation.

Uncertainty over the Conservative Party's future will continue for some time. In the meantime, no progress is likely on any public health initiatives, such as plans to introduce calorie labelling on food consumed outside the home or further restrictions on advertising to reduce children's exposure to products high in salt, fat, and sugar.

Few in public health will be happy at the prospect of the Conservatives adopting a leader wedded to the IEA's anti-"nanny state," free market ideology, but the signs are not good. Three days before Littlewood's rallying cry in the *Telegraph*, a round-up of contenders published by the *New Statesman* listed no fewer than seven candidates for the job who had demonstrated various degrees of involvement with the IEA or empathy with its views. They included Davis, Raab, Truss, Hancock, and Lee.

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EDITORIAL

Hans Eysenck: controversialist or worse?

An independent and authoritative inquiry is needed into "unbelievable" work

Hans Eysenck, who died in 1997, is described in the *Dictionary of National Biography* as having an "international prominence and impact ... unmatched among post-Second World War British psychologists."[1] He's usually called "controversial" in that he denied the link between smoking and cancer, had strong links with the tobacco industry, thought race was related to intelligence, opposed comprehensive schools, nursed an intense hostility towards psychoanalysis, supported astrology and parapsychology, and declared the entire discipline of economics as worthless. Now David F Marks, the editor of the *Journal of Health Psychology*, has called for a formal investigation of some of Eysenck's work and the retraction or correction of 61 publications.[2]

STEVE BENT/AN/SHUTTERSTOCK

If Eysenck's work were to be examined with a critical eye many of his 1100 journal articles and 80 books might begin to unravel

Serious criticisms

The *Journal of Health Psychology* also published a paper by the psychiatrist Anthony J Pelosi describing how serious criticisms of Eysenck's work date back three decades—and yet there has been no investigation.[3] Pelosi's paper was originally accepted for *Personality and Individual Differences*, a journal founded by Eysenck, for an issue to celebrate Eysenck's centenary—but it was then "unaccepted." It has taken him another three years to get the paper published.

Pelosi together with Louis Appleby published an article in *The BMJ* in 1992 discussing studies Eysenck published in 1991 with a German researcher, Ronald Grossarth-Maticek, showing that people with particular personalities were 121 times more likely to die from cancer and 27 times more likely to die from heart disease than people with other personalities.[4] The relative risk for cancer, observed Pelosi and Appleby, "is perhaps the highest ever identified in non-infectious disease epidemiology."

Equally remarkable results came from a randomised trial showing that "bibliotherapy" (giving people a short pamphlet containing advice like, "Your aim should always be to produce conditions which lead to a happy and contented life") given to 600 participants resulted in an all-cause mortality of 32% over the ensuing 13 years compared with 82% in the 600 untreated controls.[4]

The BMJ article detailed many problems with these studies beyond them being unbelievable, and others too have cast severe doubts on them.[5-7] Eysenck responded in *The BMJ* to Pelosi and Appleby's criticisms, noting cleverly and accurately that results being "too good to be true" is "unfalsifiable" and "hence not a scientific statement."[8] He also agreed with their assertion "that there should be a total re-examination and proper analysis of the original data from this research." There has been no such examination.

The world moved on and Eysenck died with his reputation relatively unscathed. Grossarth-Maticek continued his studies, but his and Eysenck's results have not been accepted—because if true they would have led to substantial developments in the conceptualising and treating of cancer and heart disease.

"Mercilessly manipulated"

In his latest paper Pelosi adds to the case against Eysenck and Grossarth-Maticek by finding reports from tobacco companies that doubt "the validity or even the integrity" of Grossarth-Maticek's studies.[3] Others have found "unequivocal evidence of manipulation of data sheets" and results that are "better than perfect." He reaches the conclusion that Eysenck had "mercilessly manipulated ... an untrained, isolated, and vulnerable collaborator."[3]

Meanwhile, Robert Buchanan's biography of Eysenck raises serious questions about how he could get away with his reckless approach to scientific endeavour throughout his career.[9]

Marks and Pelosi want an independent and authoritative inquiry into the studies of Eysenck and Grossarth-Maticek.[2 3] Some might argue that the world clearly discounts these studies so why does it matter? But the studies are not retracted, are included in textbooks, and undermine attempts at meta-analysis and future research. I suspect too that if Eysenck's work were to be examined with a critical eye many of his 1100 journal articles and 80 books might begin to unravel.

We need the truth about Eysenck's studies with Grossarth-Maticek. King's College, London (where Eysenck worked for many years), the British Psychological Study, or preferably a wholly independent group should conduct the inquiry that Marks and Pelosi demand. Without an inquiry that sets the record straight, psychology and the whole of science could be polluted.

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EDITORIAL

Tackling disinformation on vaccines

Closing down trolls, bots, and content polluters would be a start

In April 2019, Unicef and the World Health Organization highlighted a global surge of measles.[1 2] There were 966 cases of measles confirmed in the UK in 2018, nearly four times as many as in 2017[3]; 91.2% of 2 year olds in England had been given the MMR vaccine in 2018, down from 92.7% in 2013-14,[4] with both rates below the 95% considered necessary to prevent transmission in the population. Those seeking an explanation have highlighted the role played by disinformation spread through social media. The English secretary of state for health, Matt Hancock, described "those promoting the antivaccine myth as having blood on their hands," adding that he was "completely open to all options" on how to bolster vaccination rates, including making immunisations compulsory.[5]

Social media platforms such as Facebook and Twitter have facilitated a massive increase in access to health related information, accurate or not. Antivaccine activists seized the opportunity.[8] Studies of internet content have consistently found that a substantial share of the available content on vaccination was misleading, and false messages were liked and shared more than those that were accurate.[9 10]

Researchers are now using advanced techniques to identify the sources of these messages.

False social media messages were liked and shared more than those that were accurate

Sources of disinformation

A recent study of vaccine related posts on Twitter shed considerable light on what is a complex landscape.[12] It identified three broad categories of account especially likely to spread vaccine related disinformation. The first it termed Russian trolls. Trolls are people who conceal their identity to post false accusations or inflammatory remarks. Many of those identified were associated with the Russian Internet Research Agency, which has also been implicated in messaging in the 2016 US presidential election and the UK EU referendum.[13] These accounts, many using the hashtag #VaccinateUS, spread messages both for and against vaccination, seemingly designed to create discord and undermine trust in authority. Thus, they included messages rarely found elsewhere, linking vaccines to issues that are especially divisive in the US, such as race and religion, or the idea that vaccination is a conspiracy by the elite.

A second source is sophisticated bots, which are automated accounts that promote particular content. These also contained a mix of messages for and against vaccines. The third, characterised by antivaccine messages that seem designed to stimulate curiosity, comprise "content polluters," devised to spread malware or unsolicited commercial content and to direct readers to sites that generate income.

Fighting back

So what can be done? Vaccination rates above 90% are testimony to the efforts of community nurses and doctors whose knowledge is still respected and whose guidance is followed by most parents.[7] Vaccine hesitancy is a natural response for any parent, and explaining the benefits is essential. The personal example of health professionals giving their children vaccines can be compelling.

Those responsible for vaccination programmes must ensure they have a detailed understanding of knowledge and beliefs in their populations[14] and employ much more sophisticated messages, recognising that many traditional ones can backfire.[15] They should draw on a growing body of research, some in related fields such as climate change,[16] on confronting disinformation. It is important not to overcomplicate messages or repeat erroneous ones, even to correct them[14]; "inoculating" the public with the facts before disinformation takes hold may be effective.[17]

We also need a much better understanding of who is behind the growing volume of internet traffic on vaccination, exploiting methodological advances in network analysis and artificial intelligence[18] and engaging with social media companies to reduce it. Twitter has already deleted millions of suspicious accounts.[19] In addition, legal measures should be considered. The UK government proposes the toughest internet safety regulation in the world[20]; might a public health protection clause be possible, to withdraw flagrantly dangerous messages? Another option is the US approach, with vaccination a condition for school entry.[21]

Those involved in the battle against infectious disease understand that they must always strive to be one step ahead of constantly evolving microorganisms. Exactly the same principle applies in what is now a rapidly evolving information environment.

A new generation of trolls are implicated in the online spread of anti-vax messages

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