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PLANNING FOR PREVENTION

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CONTENTS

FOREWORD

PROFESSOR TRACY DASZKIEWICZ

The UK faces a defining challenge for the coming decade: how we respond to the rising burden of long term conditions in a context of widening inequalities, constrained public finances, and a health and care system under sustained pressure. Cancer, cardiovascular disease, diabetes and chronic respiratory disease account for the majority of premature mortality and disability in this country, much of which is preventable, yet too often our collective response remains focused on treating illness rather than preventing it.

This collection, Planning for Prevention, makes a compelling case that prevention is not an optional add on to healthcare reform, but its essential foundation. Drawing on leading research from across The University of Manchester, the chapters bring together robust evidence on how earlier action grounded in science, equity and system design can reduce avoidable disease, improve population health and deliver better value for the public purse.

Across the major long term conditions, a consistent message emerges: prevention works best when it is personalised, proportionate and fair. Advances in genomics, biomarkers, data science and artificial intelligence offer unprecedented opportunities to identify risk earlier and target interventions more effectively. Yet these innovations will only improve outcomes if they are implemented with equity at their core. Without deliberate action, risk stratified screening, predictive tools and new technologies we risk reinforcing the very inequalities that prevention seeks to address. The research presented here rightly emphasises the need for inclusive datasets, accessible infrastructure and community embedded approaches that reach those at greatest risk.

Equally important is the recognition that prevention does not sit solely within the NHS. The evidence on hypertension, diabetes and cancer prevention demonstrates that population level gains depend on sustained action across communities, local government and national policy. Behavioural science, fiscal policy, regulation and service design all play critical roles in shaping healthier environments and enabling people to maintain good health over the life course. As this collection shows, prevention is as much an economic and social policy priority as it is a clinical one.

The chapters on social determinants of health are particularly powerful in reminding us that long term conditions are not distributed at random. Poverty, trauma, discrimination and institutional processes can drive preventable disease just as surely as biological risk factors. Effective prevention therefore requires courage to address upstream causes of ill health, alongside the delivery of evidence based interventions such as social prescribing, trauma informed systems and targeted support for communities experiencing the greatest disadvantage.

Taken together, the contributions in this volume align closely with the ambitions of the 10 Year Health Plan. They illustrate how prevention can be embedded through whole system approaches: integrating data and prediction across conditions, designing programmes that people can and will engage with, and ensuring that funding, accountability and governance support long term impact rather than short term gains.

As President of the Faculty of Public Health, I welcome this collection as a timely and authoritative contribution to the national conversation on prevention. It offers policymakers, Parliamentarians and health leaders not only a clear diagnosis of the challenges we face, but practical, evidence based recommendations for action. If we are serious about improving health outcomes, reducing inequalities and securing the sustainability of our health and care system, prevention must move from aspiration to delivery. This publication shows us how.

Professor Tracy Daszkiewicz
President, Faculty of Public Health

The Faculty of Public Health is the professional membership body for public health, responsible for overseeing the quality of training and professional development of public health consultants in the UK.

SOCIAL PRESCRIBING

EVIDENCE FROM THE NATIONAL ROLLOUT OF SOCIAL PRESCRIBING LINK WORKERS

DR ANNA WILDING AND PROFESSOR PAUL WILSON

Social prescribing is a way of connecting patients in primary care to non-medical activities and services to improve their health and wellbeing. It is aimed at patients with complex social needs who may be lonely or socially isolated, living with long-term conditions, or who require support for mental health.

Social prescribing link workers work with patients to find solutions that will improve their health or wellbeing. An individual is referred to a social prescribing link worker, who meets them for around four appointments, each of up to an hour, to discuss their social (non-clinical) needs. The link worker then identifies community groups and activities in their local area for them to attend. These can include groups, such as befriending services, volunteering, arts and crafts, nature groups, exercise groups, and employment and housing.

Over the last decade there has been a significant expansion of link worker provision in primary care. In England, the 2019 Long Term Plan heralded the largest introduction of link workers in primary care with the specific aim of helping patients' non-medical needs. By 2025, there were approximately 3,350 social prescribing link workers funded in England and 340 community link workers funded in Scotland. In Wales and Northern Ireland, there are social prescribing programmes; however, there are no published numbers on recruitment.

Ongoing NIHR-funded research led by The University of Manchester is comparing the deployment of additional roles, such as link workers, advanced practitioners, pharmacists, physiotherapists, and paramedics, in primary care. This compares deployment and funding models in England and Scotland and assesses their impacts on patients and the system as a whole.

Prior to the national expansion of social prescribing link worker provision, small scale evaluations had demonstrated positive effects on patients' health and well-being. Some studies also documented substantial decreases in demand for healthcare services. However, much of the evidence was limited by poor design and reporting, making it difficult to reliably judge whether social prescribing did deliver benefits. Despite this, there has been a large expansion in provision across the UK. There is now a need for a broader understanding of the impact of social prescribing link worker initiatives to refine, enhance and to sustain provision at this scale.

> **By 2025, there were approximately 3,350 social prescribing link workers funded in England and 340 community link workers funded in Scotland. In Wales and Northern Ireland, there are social prescribing programmes; however, there are no published numbers on recruitment.**

> **A large, interdisciplinary, mixed-methods study led by researchers at The University of Manchester has spent three years evaluating the expansion of social prescribing link workers in primary care across the UK.**

A large, interdisciplinary, mixed-methods study led by researchers at The University of Manchester has spent three years evaluating the expansion of social prescribing link workers in primary care across the UK. The study aimed to assess impact by determining whether certain groups of individuals are more or less likely to engage with social prescribing and whether engagement with social prescribing led to changes in health and well-being and in healthcare use. The study aimed to understand the experience and acceptability of link workers from those who deliver and engage with social prescribing services.

FINDINGS

Using data from 12 million patients across 1,400 general practices in England, we found that individuals who live in more deprived areas were less likely to be referred to social prescribing. This is shown in Figure 1; the panel on the left shows the sample of patients by deprivation decile, which shows the sample is slightly skewed to more deprived deciles (IMD = 1 is the most deprived). The opposite is shown in patients referred to social prescribing, which is skewed to the least deprived (IMD greater than 7). A key predictor of being both offered and then referred was those with multiple long-term conditions, and those whose biological sex is female. Factors such as rurality, region of England, and ethnicity did not impact offers of social prescribing.

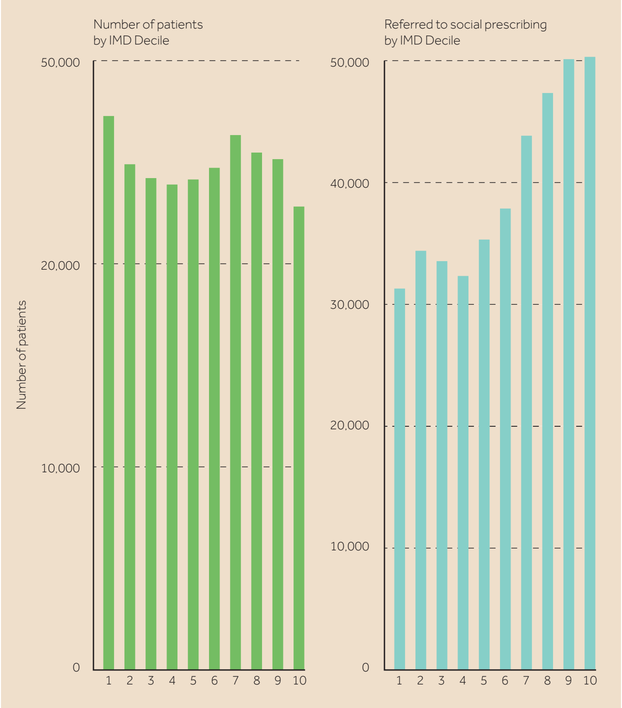
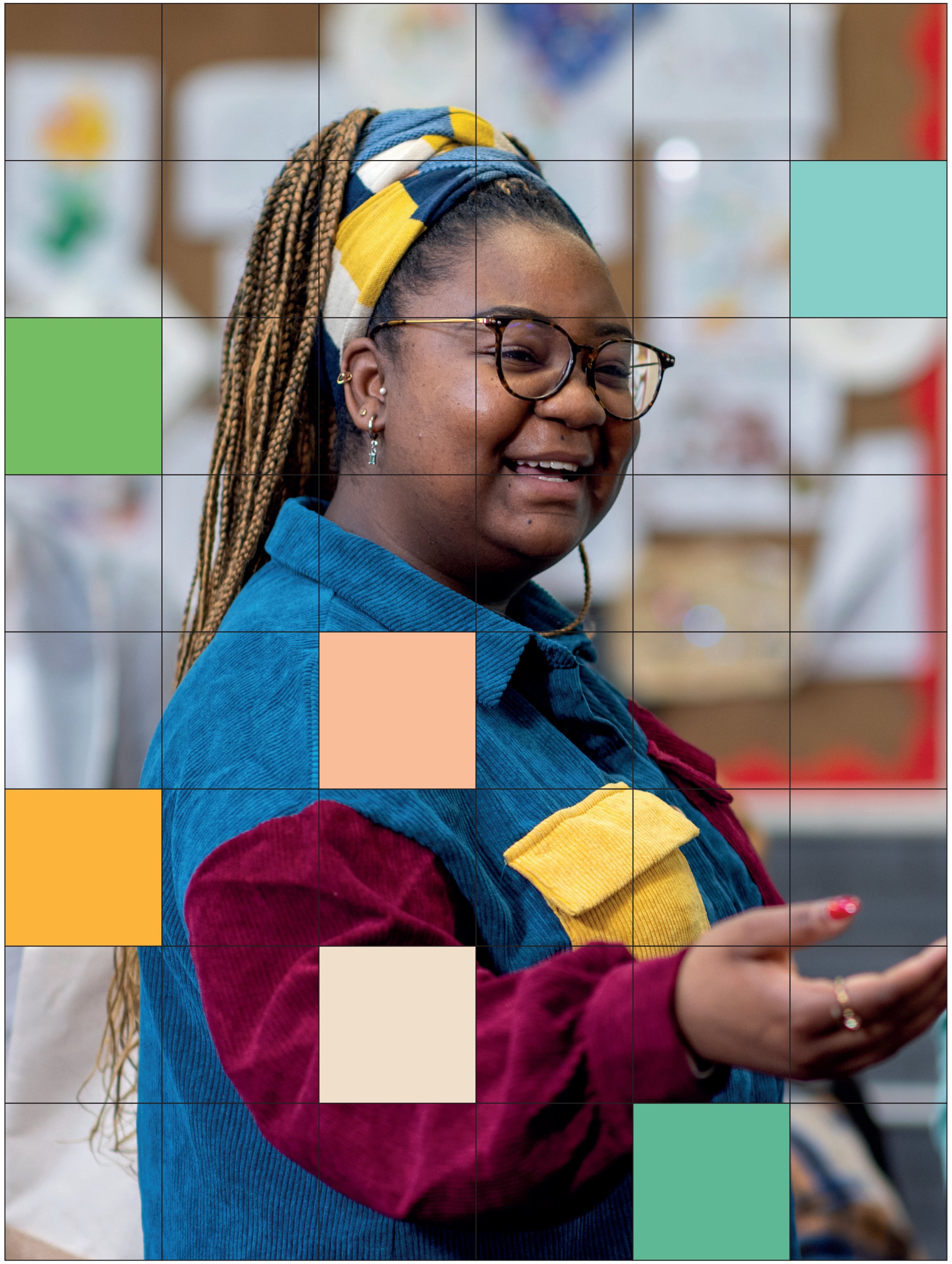


Figure 1: Sample of patients and patients referred to Social Prescribing by Deciles of Deprivation (Income Domain) within our sample of 12 million patients in CPRD

Findings from the GP Patient Survey identified that increasing social prescribing link worker employment by one additional full-time worker within primary care networks is associated with improvements in patient outcomes. These outcomes include confidence in managing long-term condition(s), feeling more supported by local services, having a good experience at their general practice, and having their mental health needs understood. We also estimated that adding one extra link worker per 50,000 population in all Primary Care Networks would help around 47,000 more patients manage their long-term conditions, and lead to around 130,000 patients having a better experience with their GP.



> **Our data emphasises the importance of integration of link workers into the primary care team – particularly the newly funded Neighbourhood Health Centres (NHCs) – to ensure appropriate support for the role and the delivery of joined up care for the patient.**

Our study using electronic healthcare records found that referrals to social prescribing are initially associated with an increase in elective care (primary care and outpatient appointments) in the first 6 months. 1-year post-referral, there was no difference in primary care use between referred and non-referred – though we did find a reduction in GP appointments for patients who had been referred to social prescribing.

RECOMMENDATIONS

The quantitative elements of the study have utilised large datasets of national routinely collected data. However, better data linkage is required. Currently, there are no studies using data from social prescribing platforms that contain information such as the number of sessions, referral destinations, and reasons for referral, linked to electronic healthcare records. In the context of the 10 Year Health Plan and its shift from analogue to digital health and care, it is imperative that social prescribing link workers can feed information into the proposed Single Patient Record. This could provide a more complete analysis of social prescribing and answer questions on the optimal number of sessions and the availability of referral destinations in relation to outcomes, for example.

The qualitative data from our study shows that social prescribing link workers now play a central role in supporting patients with complex needs. They are increasingly supporting issues relating to the social determinants of health, especially in deprived areas. Much of this activity is not captured routinely in electronic healthcare records in primary care.

Our data emphasises the importance of integration of link workers into the primary care team – particularly the newly funded Neighbourhood Health Centres (NHCs) – to ensure appropriate support for the role and the delivery of joined up care for the patient. NHCs are expected to deliver debt advice, stop-smoking, and weight management services among other offers, making them an ideal hub for social prescribing.

While part of the hospital to community shift in the 10 Year Plan, the sustainability of the link worker role is threatened by unstable funding, rising service demands due to ongoing austerity and worsening access to statutory and non-statutory services. Our research shows more deprived areas are already served by a disproportionately lower number of link workers. However, our research also showed that where referrals *were* made in deprived areas, patients in these places felt more benefit from social prescribing, particularly in managing long-term conditions.

As such, a properly funded and targeted social prescribing programme holds great potential to narrow health inequalities, especially regarding long-term conditions – but an unequal rollout risks widening the gap. Policymakers must ensure those with the most to gain from social prescribing are among those able to access it.

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GETTING DNA INSIGHTS ON RISK BETTER BUILT INTO SCREENING AND PREVENTION STRATEGIES

DR SAM MERRIEL, DR LORNA MCWILLIAMS, AND PROFESSOR GARETH EVANS

Cancer remains a leading cause of disease burden and death in the UK, with breast and prostate cancer two of the most dominant types. The 10 Year Health Plan for England and the National Cancer Plan have signalled a shift towards personalised medicine, including the integration of genomic insights (incorporating analysis of DNA) into screening and prevention strategies. But what are the opportunities and challenges this presents? How best can we tailor screening for breast and prostate cancer to an individual's risk profile, and what are the implications for equity, infrastructure, and for policy?

BREAST CANCER SCREENING

The UK's current breast cancer screening programme is based on age alone, with women typically invited for mammography between the ages of 50 and 70. While this age-based approach has improved early detection, it does not account for individual risk variation. Advances in genomics and imaging now make it possible to assess breast cancer risk more accurately, incorporating polygenic risk scores (an individual's genetic liability to a specific trait or disease) and breast density measures. Women at greatest risk could be offered enhanced screening and preventive interventions, such as medication or lifestyle modification. Evidence so far suggests risk-stratified approaches to breast cancer screening are cost-effective for the NHS, and the 10 Year Plan is encouraging in acknowledging the importance of genomics. The challenge lies in ensuring implementation is fair and inclusive.

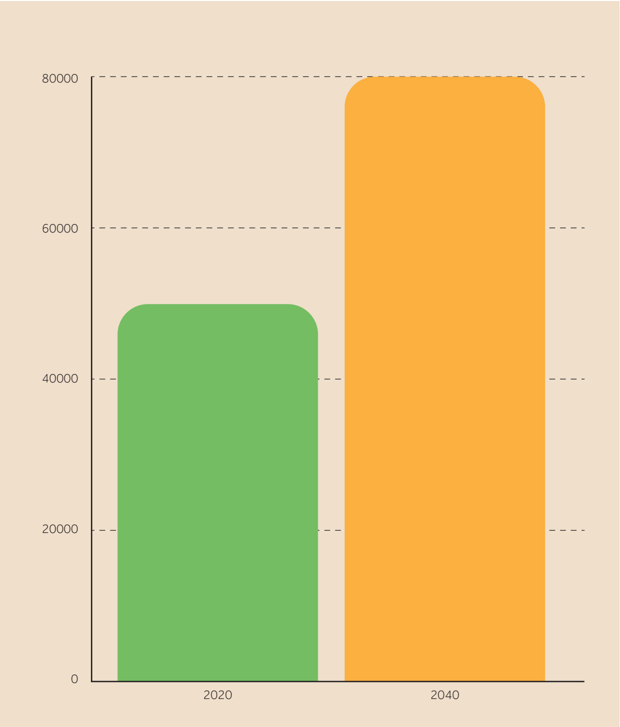
Health inequalities pose a significant obstacle. Disparities in screening uptake are already high. Women from deprived areas, some UK minority ethnic groups, and rural communities may face barriers to access, including limited health literacy, cultural factors, and logistical constraints. In light of this, moving to genomic-based screening risks exacerbating these inequalities unless proactive strategies are adopted. Lessons can be drawn from other screening programmes that have successfully improved equity, such as targeted outreach and culturally tailored education campaigns. Building on recently announced plans to address gaps in screening uptake, the Department of Health and Social Care should prioritise identifying these inequalities and developing mitigation strategies before implementing risk-stratified screening (screening that identifies for individual risk).

> **Evidence so far suggests risk-stratified approaches to breast cancer screening are cost-effective for the NHS, and the 10 Year Plan is encouraging in acknowledging the importance of genomics. The challenge lies in ensuring implementation is fair and inclusive.**

> **Recent advances in cancer genomics have uncovered that prostate cancer is amongst the most heritable and genetically driven types of cancer, raising the possibility of using genomic prostate cancer risk information to develop personalised approaches to its detection.**

PROSTATE CANCER SCREENING

Prostate cancer is the most common cancer affecting men in the UK, with around 12,000 people each year losing their lives to it. Cases are expected to rise from 50,000 new diagnoses in 2020 to a predicted 80,000 patients affected by 2040. Currently, unlike breast screening, there is no national prostate cancer screening programme in the UK. The UK National Screening Committee (NSC) has reviewed the evidence base for a prostate-specific antigen (PSA)-based prostate cancer screening on more than one occasion and has concluded that the potential benefits of prostate cancer screening do not outweigh the potential harms, with the recent exception for men who carry pathogenic variants in the BRCA2 gene.



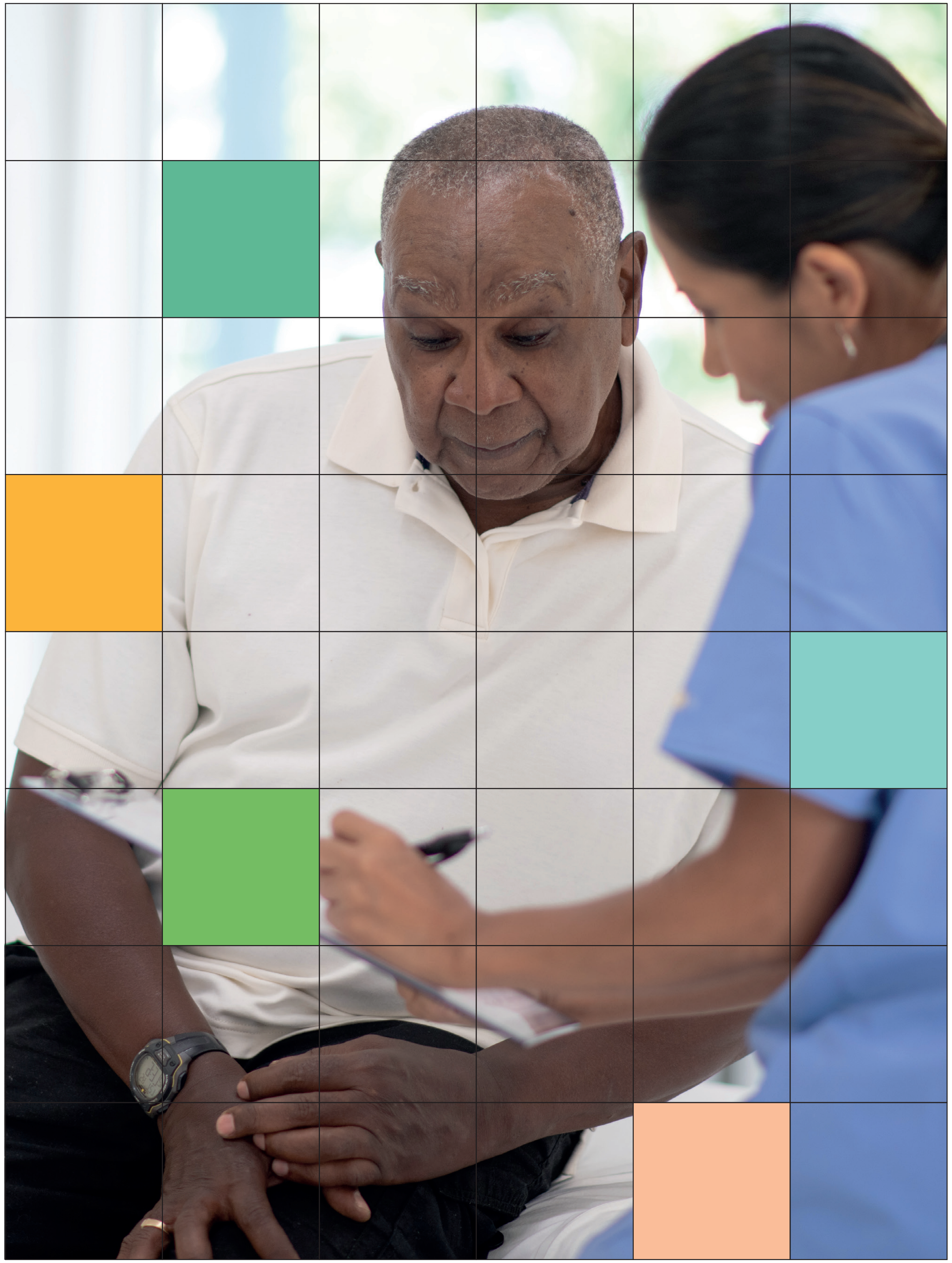
Prostate cancer cases will increase by 60% between 2020 and 2040.

Recent advances in cancer genomics have uncovered that prostate cancer is amongst the most heritable and genetically driven types of cancer, raising the possibility of using genomic prostate cancer risk information to develop personalised approaches to its detection. A limitation of prostate cancer genomic risk scores (GRS), which combine the risk conferred from hundreds of individual genomic variants into a single risk score, is that they were developed in cohorts of patients and healthy individuals that lacked ethnic diversity. This is a major issue for prostate cancer risk differentiation because Black men have the highest lifetime risk of prostate cancer (1-in-4) of any ethnic group and yet they are under-represented in the relevant cancer studies. Breast cancer GRS carry a similar limitation, with the studies used to inform these GRS conducted primarily on White Europeans. Transferring genetic risks to other ethnicities leads to a high risk of overprediction, particularly for Black women.

The NSC has also recently finished consultation on recommending prostate cancer screening to men with disease causing genetic variants in the BRCA1 and BRCA2 genes – most commonly associated with breast cancer. Combined with the genomics focus of the National Cancer Plan, this reflects the start of moves by health policymakers towards genetically-informed cancer screening.

INCORPORATING CANCER RISK DATA AND AI SOLUTIONS TO PREVENT DISEASE

The TRANSFORM trial – including researchers from The University of Manchester and funded by Prostate Cancer UK and the National Institute for Health and Care Research (NIHR) through the Health Technology Assessment (HTA) programme – will evaluate modern approaches to prostate cancer screening including prostate cancer genetic risk score (GRS). It plans to use a recently published multi-ancestry prostate cancer GRS that has been shown to perform better amongst non-white ethnic populations (though disparities



> **Integrating cancer GRS (genetic risk scores) into clinical practice in UK primary care and national screening programmes can enhance understanding and identification of cancer risk, leading to earlier cancer detection.**

still exist with White Europeans) and is better at identifying clinically significant prostate cancer, which reduces over diagnosis of slow-growing tumours.

TRANSFORM also aims to ensure one-in-ten people invited to participate in the trial have Black ethnicity to address their under-representation in research – though this does not guarantee their ultimate participation, and planning for clinical trials should include measures to remove known barriers to participation for people from minority ethnic populations. The kind of research to implementation pipeline TRANSFORM represents is an explicit aim of the National Cancer Plan, and the findings from this trial should be used to inform earlier, precision diagnosis, particularly in historically under-represented populations.

The majority of patients with prostate cancer are diagnosed after presenting to their GP with prostate symptoms. Prostate cancer GRS can also potentially be used to differentiate risk amongst symptomatic patients presenting to primary care services to identify higher risk men for further diagnostic testing, and potentially avoid unnecessary referrals and investigations for low-risk men. These findings need validation and further evaluation in prospective clinical studies in primary care.

AI-driven solutions to handling the increased volume and complexity of clinical and genomic data could potentially help advances in prostate cancer genomics. These need innovative digital solutions and dedicated resources, particularly as the National Cancer Plan commits to "large-scale digital transformation", taking a data-first approach to accelerate diagnosis and treatment. Policymakers must ensure clinicians and other healthcare staff have both the equipment and infrastructure, and the training and skills, needed to deliver this vision.

Integrating cancer GRS (genetic risk scores) into clinical practice in UK primary care and national screening programmes can enhance understanding and identification of cancer risk, leading to earlier cancer detection. Delivering this huge benefit will, however, require significant improvements in healthcare data infrastructure, clinical decision support, and educational resources for the public, patients, and clinicians. We need to build genomic health literacy and trust in these new approaches to gain the great health prevention benefits they offer.

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REDUCING CANCER DEATHS AND DISIBILITY

HOW PREVENTION, EQUITY AND PRECISION ONCOLOGY CAN DELIVER

DR SARA VALPIONE AND PROFESSOR ARPANA VERMA

Every year, around 16,000 people in the UK are diagnosed with tumours of the oesophagus and stomach. These tumours are the 11th highest cause of cancer-related deaths and disproportionately affect the North-West of England and North Wales, especially in deprived communities. While new immunotherapies have improved outcomes, most patients do not benefit from these treatments.

> Both Cancer Research UK and the Medical Research Council (MRC) have identified oesophagogastric adenocarcinoma as a key priority for research and intervention.

Oesophagogastric adenocarcinoma (OGA) is the most common subtype of oesophageal cancer, with a low 5-year survival rate from diagnosis of just 12 – 15%. Even cancers discovered at an operable stage have a 50% risk of recurrence after treatment, making prevention a critical priority. Both Cancer Research UK and the Medical Research Council (MRC) have identified OGA as a key priority for research and intervention.

Research from The University of Manchester is revealing the role played by inequalities in driving higher rates – and poorer outcomes – of OGA in deprived communities, as well as the biological markers which can enable earlier detection and treatment. Together, these strands offer a route to fewer deaths, earlier diagnoses, and better survival.

Meanwhile, a new collaboration between The University of Manchester, The Christie NHS Foundation Trust, and the Cancer Research UK National Biomarker Centre is taking advantage of local expertise and the presence of biobanked patient samples to enable the next generation of personalised medicine. This new precision oncology programme could serve as a national model for multidisciplinary clinical research, delivering nanomedicine to patients while informing the National Cancer Plan's commitment to accelerate biomarker-driven screening, treatment, and monitoring.

THE ROLE OF INEQUALITIES

Most cancers are driven by modifiable risk factors, such as smoking and unhealthy diet. Accessible screening and prevention policies such as controlling the availability of tobacco, supporting healthy diets and action on obesity and improving uptake of the HPV vaccine, can substantially lower cancer incidence and mortality, particularly in under-resourced communities.

Manchester's Health Determinants Research Collaboration (HDRC), which includes The University of Manchester, is leading work to create local solutions. By embedding lived experience in research and policy, preventable deaths and health inequalities can be reduced across the region, serving as a blueprint that could be locally tailored and applied across the UK.

> Collaborations based in our regions, like the HDRC, can offer new solutions by drawing on local lived experience, and could be funded to co-design cancer prevention and early detection within communities.

IMPROVING EARLY TREATMENT

An MRC-funded consortium, led by researchers at The University of Manchester, is engineering the next generation of precision medicines for oesophagogastric cancers. In parallel, these researchers are designing new liquid biopsy biomarkers that will enable clinicians to more accurately understand how a patient is responding to a treatment, and whether pivoting to another approach could be more effective, as well as indicators to better target immunotherapy within patients. Additionally, these new, minimally invasive techniques can use DNA samples within patients' blood to track tumour progress and response to treatment. This rapid identification of how patients respond to treatment reduces exposure to ineffective, toxic therapies, improving both survival and patient quality of life.

RECOMMENDATIONS FOR POLICYMAKERS

Collaborations based in our regions, like the HDRC, can offer new solutions by drawing on local lived experience, and could be funded to co-design cancer prevention and early detection within communities. Meanwhile, the Office for Health Improvement and Disparities (OHID) could use urban health indicators to track equity and outcomes. The 'hospital to community' shift in the 10 Year Health Plan provides an opportunity to deliver locally-tailored cancer screening and prevention programmes through Neighbourhood Health Centres (NHCs).

Building on the Government's aim to reduce inequalities through research inclusion (part of its vision to be a world leader in clinical research), access to new medicines can be made more equitable through clinical trial recruitment for patients from disadvantaged communities. Similarly, early access to biomarker-based diagnostics and testing should be expanded, with priority given to areas with a higher burden of OGA.

At a data collection level, the Department of Health and Social Care could mandate routine reporting of cancer stage at diagnosis, screening uptake, and biomarker access by deprivation, ethnicity, and geography; tying funding to improvements in high need areas. This data can be used to identify priority areas for the Neighbourhood Early Diagnosis Fund announced in the National Cancer Plan. Integration of biomarker labs with community prevention programmes, delivered through NHCs, should be used to speed up diagnosis, screening and monitoring times, offering faster and more patient-centric access to treatment for underserved communities.

To support the sickness to prevention shift, health policymakers should build on the Tobacco and Vapes Bill to expand smoke-free spaces and plain packaging for tobacco products, with smoking one of the main drivers of OGA. Similarly, the recent ban on junk food advertising to children is a welcome intervention, and one which should be further developed to restrict junk food advertising to all citizens, with a focus on the most deprived areas.

By acting now with proactive health policies like these, we can diagnose earlier, reduce deaths and improve quality of life for thousands of patients, particularly for cancers that disproportionately affect the most deprived communities.

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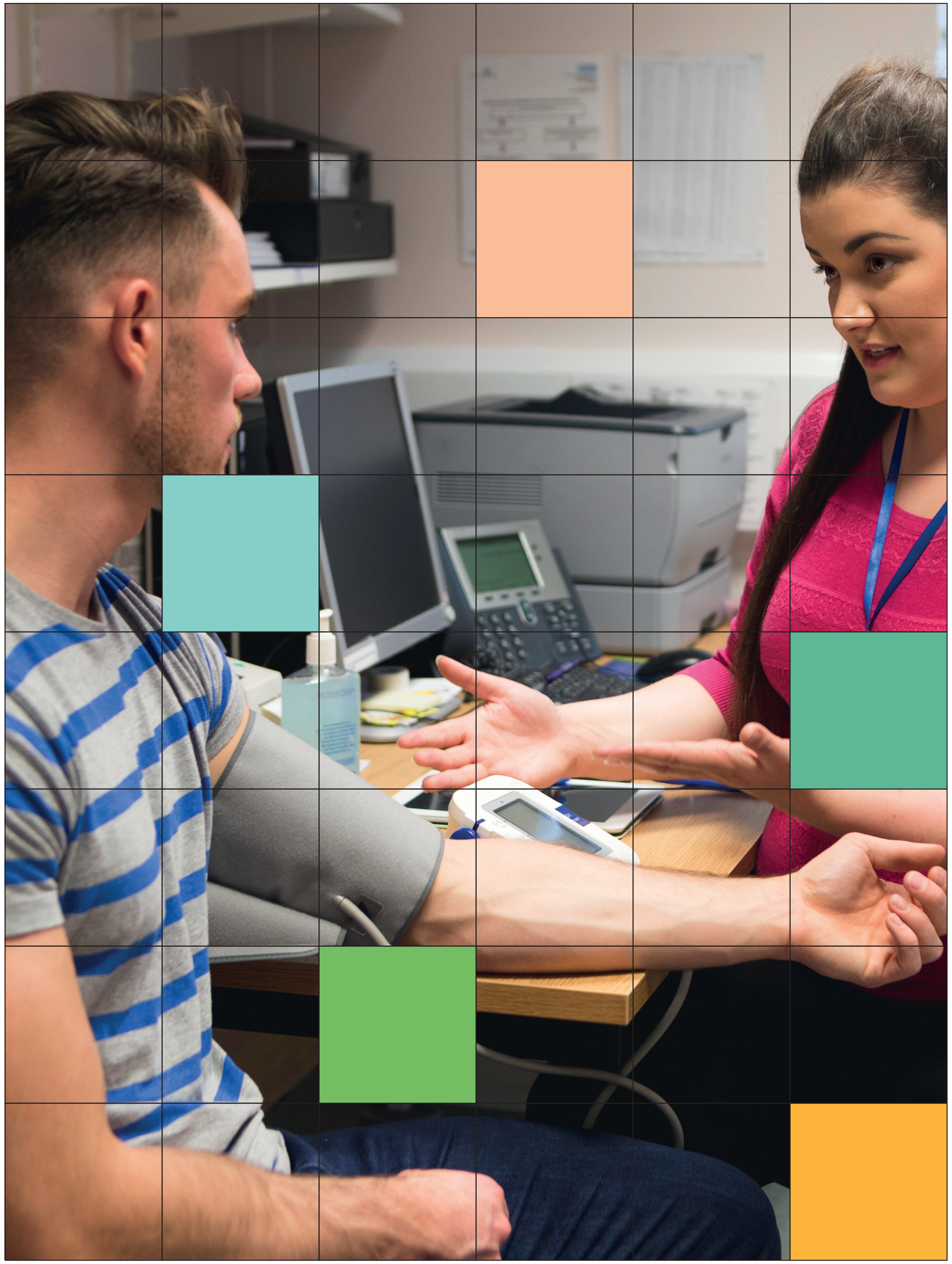

TACKLING BLOOD PRESSURE

HOW TO MAKE BIG GAINS FOR POPULATIONS, FOR THE NHS AND FOR THE ECONOMY

RACHEL HARRIS, DR HARRY PRITCHARD, AND PROFESSOR ADAM GREENSTEIN

Hypertension – or high blood pressure – is often called the "silent killer". This is because most people feel completely well while their blood vessels, heart, and brain are, in fact, under sustained stress. In England, hypertension affects around a third of adults. Half of those affected don't know they have it, and of those who are treated, only half are treated to target.

> **This is not just a health story; it is an economic one. Chronic ill health is already keeping people out of work... The 10 Year Health Plan explicitly links prevention to national prosperity...Managing blood pressure earlier and more consistently is one of the most direct, evidence-led ways to deliver that outcome.**

The consequences of this are not limited to heart attacks and strokes. Long-term high blood pressure damages the brain's small blood vessels, restricts blood flow and can lead to vascular dementia - the second most common form of dementia in the UK. Vascular dementia currently affects around 150,000 people and makes up about 20% of dementia cases. Dementia is already the leading cause of death in England and Wales and is on course to reach 1.4 million cases across the UK population by 2040.

This is not just a health story; it is an economic one. Chronic ill health is already keeping people out of work. The number of workers in England living with major illness - much of it cardiovascular and metabolic in origin - is projected to rise from around 3 million today to 3.7 million by 2040, and around 80% of this increase will occur in the most economically deprived communities. People in these communities are also likely to develop major illness a decade earlier than those in the least deprived areas. The 10 Year Health Plan explicitly links prevention to national prosperity: a healthier working-age population means higher participation, fewer sick days and a stronger tax base.

Managing blood pressure earlier and more consistently is one of the most direct, evidence-led ways to deliver that outcome.

HOW BLOOD PRESSURE DRIVES PREVENTABLE DISEASE

In the UK, hypertension is diagnosed at a blood pressure reading of 140/90 mmHg or higher in the clinic and confirmed by regular readings over 24 hours or home readings. NICE (the National Institute for Health and Care Excellence) advises targets of less than 140/90 mmHg in the clinic (and less than 135/85 at home) for most under 80, and less than 150/90 mmHg for those aged over 80. Despite these clear thresholds, the scale of hypertension remains hidden: over 5 million people in England are likely undiagnosed; and among those diagnosed, control is uneven – about half are either unaware of their condition or not adequately controlled. This silent burden drives preventable disease and avoidable pressure on services.

The consequences are profound. A small drop in blood pressure delivers big gains: a sustained 10 mmHg reduction in systolic blood pressure is linked to

27% lower stroke risk, 17% lower coronary heart disease risk, and 28% lower heart-failure risk. Stroke, heart failure and vascular dementia are not isolated events; they are progressive, disabling conditions that drive emergency admissions, long-term care needs and loss of independence. For the NHS, unmanaged hypertension means avoidable GP visits, A&E attendances for suspected stroke, unplanned admissions for heart failure, and memory clinic referrals for preventable cognitive decline. The 10 Year Health Plan estimates that lifting the share of people who are well managed from 70% to 80% within three years could avert around 2.24 million healthcare episodes over the next decade - freeing GP time, cutting waits, and boosting productivity and health equity.

NEW RESEARCH INSIGHTS FROM THE UNIVERSITY OF MANCHESTER

The University of Manchester has helped establish why high blood pressure is so damaging to the brain, and why acting earlier matters. Our work shows that sustained high blood pressure disrupts the signalling that lets small arteries in the brain dilate to fuel active tissue. Instead, vessels stiffen or stay constricted, starving regions of oxygen and nutrients. Repeated "low-flow" injury kills neurons and drives the small-vessel damage seen in vascular dementia.

Manchester researchers have also mapped the molecular steps behind this loss of vascular responsiveness, and showed that standard therapy (such as amlodipine, a medicine used to treat hypertension) can restore these pathways, reopen flow to vulnerable areas, and limit vascular brain injury linked to memory loss. This reframes routine blood-pressure drugs: they are not only stroke prevention, but potentially dementia prevention.

These mechanisms align with trial and population data. In one study, intensive control (~<120 mmHg) versus standard (~<140 mmHg) reduced major cardiovascular events and significantly lowered the risk of mild cognitive impairment - the precursor to many dementias. Community programmes delivering structured blood pressure management at scale have likewise reported meaningful reductions in cognitive decline over just a few years.

Two policy takeaways follow. First, brain and heart protection are the same agenda: uncontrolled blood pressure damages both large vessels and cerebral microvasculature. Second, timing is critical - injury begins in midlife. With UK practice typically aiming for <140/90 mmHg (and <150/90 in older adults), while US and some international guidelines using 130/80 mmHg, is the UK protecting the ageing brain early – and intensively – enough?

WHAT THIS MEANS FOR POLICY AND PRACTICE

Make blood-pressure detection universal and convenient. Hypertension shouldn't depend on patients booking GP slots. England's Community Pharmacy Blood Pressure Check Service already identifies previously undiagnosed cases - especially in more deprived areas - and the 10 Year Plan's "Prevention Accelerators" in selected Integrated Care Boards can expand this neighbourhood model. Community pharmacy must be treated as core screening infrastructure, building on the growing role in primary care it has taken on through the Pharmacy First initiative. As with that earlier shift, new responsibilities for screening must be accompanied by financial incentives and training support.

> **Hypertension is the quiet pressure behind too many heart attacks, strokes and cases of vascular dementia - and it's fixable. The evidence is clear and actionable: detect earlier, control tighter, and keep people in range.**

Normalise home and remote monitoring. NHS England's Blood Pressure @ Home programme has issued more than 220,000 validated monitors so people can submit readings digitally rather than return for repeat appointments. This is the shift from sickness to prevention: tighter day-to-day control, earlier treatment adjustment, and freed GP capacity. This programme should be expanded, accompanied by subsidies for blood-pressure monitors in low-income households.

Integrate cardiovascular and dementia prevention in national messaging and planning. The biology is clear: healthy blood pressure protects both heart and brain. Manchester research links hypertension to cerebral small-vessel injury and vascular dementia risk. Public campaigns, NHS Health Checks and employer programmes should make mid-life blood-pressure control a headline action to safeguard later-life memory and independence. A "Healthy Heart = Healthy Brain" national campaign to link blood pressure control and dementia prevention should be launched alongside targeted screening and prevention in deprived communities. More directly, the Health Check already includes a blood pressure test: the threshold for action should be adjusted to the 130/80 mmHg measure used elsewhere.

Recognise hypertension control within employment support programmes. Pathways to Work strategy envisions a joined-up approach between health and employment support services, with cardiometabolic conditions highlighted as a major contributor to economic inactivity. By preventing stroke, vascular dementia and heart failure before they develop, tighter control supports longer, healthier working lives, reduces social-care demand, and frees NHS capacity. The 10 Year Plan frames prevention as a growth strategy; hypertension is one of the clearest places to act first, and policymakers should ensure it forms part of the wrap-around support systems for getting people back into work.

THE EVIDENCE IS CLEAR: ACT NOW

Hypertension is the quiet pressure behind too many heart attacks, strokes and cases of vascular dementia - and it's fixable. The evidence is clear and actionable: detect earlier, control tighter, and keep people in range.

Reducing hypertension also requires normalising home and remote monitoring, and hard-wiring cardiovascular and dementia prevention into every NHS touchpoint and public campaign. It means focusing on places with the highest burden, so we narrow health inequalities rather than entrench them. And it means backing prevention as economic policy - protecting memory, independence and productive working years.

The University of Manchester's research shows why speed and control matter for the brain; national policy can turn that insight into outcomes. A coordinated strategy that joins pharmacy, primary care and digital monitoring - measured transparently and scaled through the 10 Year Plan - would relieve pressure on services and deliver healthier, longer lives. Act on blood pressure with the urgency it deserves - and deliver better outcomes for patients, the NHS and the economy.

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LESSONS FROM THE DIABETES PREVENTION PROGRAMME

DR RATHI RAVINDRARAJAH, DR EMMA MCMANUS, PROFESSOR PETER BOWER, PROFESSOR EVAN KONTOPANTELIS

Diabetes is a serious long term health condition associated with adverse outcomes, affecting around 1 in 14 people in the UK. The cost to the NHS for Type 2 Diabetes Mellitus (T2DM) is approximately £10 billion each year, a figure that's predicted to rise with increasing rates of obesity. Finding out what works in terms of prevention is an obvious priority for policymakers.

Patients often first develop non-diabetic hyperglycaemia (NDH), a condition where patients have blood sugar levels above the normal range but below the threshold for diabetes diagnosis (although no clear consensus exists for a definition of this). It has been shown to be a marker of progression to T2DM – with varying rates of progression for different NDH definitions. Research from several countries in those with impaired glucose tolerance suggests behaviour change programmes targeting weight loss and increasing physical activity help reduce the risk of developing T2DM. This has also shown to be effective in managing diabetes.

The UK's diabetes care pathway, delivered through the NHS and guided by the National Institute for Health and Care Excellence (NICE), sets out a structured, lifelong approach to prevention, diagnosis, treatment and monitoring to improve outcomes and reduce complications. It begins with identifying people at risk of T2DM through screening and offering prevention programmes focused on weight loss, physical activity, and healthy eating for those diagnosed. Early assessment determines diabetes type and treatment is tailored accordingly, involving lifestyle advice, education and, where needed, medication or insulin. Structured education programmes support self-management, while ongoing care is largely delivered via primary care with specialist input as required. People with diabetes receive regular monitoring through the nationally recommended 'care processes', including checks on blood glucose control, blood pressure, cholesterol, kidney function, weight and foot health, alongside annual eye screening, to detect complications early. Specialist pathways exist for pregnancy, children and young people, those requiring hospital care, and serious complications such as foot disease.

More recently, NHS England has introduced additional pathways such as the NHS Diabetes Prevention Programme (NDPP) for eligible people at high risk of developing T2DM, highlighting a shift towards prevention and, where possible, reversing disease progression rather than only long-term management. The NDPP represents a behavioural intervention programme led by a partnership of NHS England, Public Health England and Diabetes UK, and currently run by NHS England – though responsibility will shift to the Department for Health and Social Care following its absorption of NHS England's responsibilities by 2027. Much of the programme was offered through primary care practices (99% and some self-referred) to adults aged 18 years and over, who were identified with NDH. Although the NDPP is based on a strong international evidence base, justifying the commissioning of such a large and complex programme requires rigorous evidence that the programme is achieving benefits beyond those delivered by current prevention services.

> **...justifying the commissioning of such a large and complex programme [NHS Diabetes Prevention Programme] requires rigorous evidence that the programme is achieving benefits beyond those delivered by current prevention services.**

Researchers at The University of Manchester evaluated the NDPP to assess its effectiveness and value for money. For this 'real world' evaluation, primary care records were used to identify patients who were referred to the programme, and these patients were then compared to individuals who were at similar risk but did not attend the programme.

EVIDENCE OF EFFECTIVENESS

Real-world evaluation from The University of Manchester (the NIHR-funded DIPLOMA Programme) found that NDPP referral significantly reduces T2DM incidence compared to standard care.

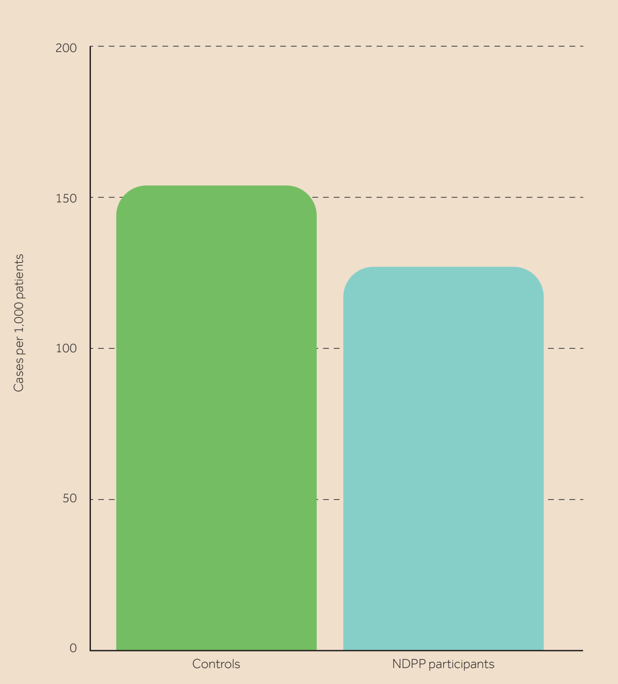
The programme prevented around 27 cases of diabetes for every 1,000 people who took part – this equated to a 20% lower risk of developing diabetes in those participating in the NDPP versus those who were not.

Importantly, the programme demonstrates equitable effectiveness across all examined patient subgroups, with consistent benefits regardless of age, sex, weight, or socioeconomic status.

The findings suggest that being referred to the NDPP is associated with a lower risk of developing type 2 diabetes, offering reassurance about the real-world impact of the programme and supporting the key NHS policy of moving from 'treatment to prevention'. Although effectiveness levels were lower than those observed in randomised controlled trials, this pragmatic evaluation assessed referral impact rather than intervention completion, reflecting real-world implementation conditions and providing robust evidence for population-level improvements.

VALUE FOR MONEY

While it is important to show clinical effectiveness, it is also important to demonstrate that the NDPP is cost-effective, given



Participants in the Diabetes Prevention Programme were around 20% less likely to develop diabetes than those not referred to the programme.

> **A study from The University of Manchester showed that patients from ethnic minority backgrounds were overrepresented in initial referrals to the NDPP but were less likely to complete the programme.**

finite health budgets and competing demands. Commissioners may be particularly reluctant to fund prevention programmes, given delivery costs are usually incurred in the short-term, while anticipated benefits (for example, diabetes cases prevented or reduced rates of complications) are realised over a longer timeframe and may be uncertain. Evidence suggests that public health budgets may also be the first to be cut when faced with budget reductions, with short-term needs taking precedent, and a preference for immediate benefits.

We therefore evaluated the cost-effectiveness of the NDPP over a shorter time horizon, to generate evidence to policymakers that could support the investment in the NDPP. We evaluated the short-term costs and benefits of the NDPP using data on over 380,000 referrals to the NDPP (collected between June 2016 and March 2019) combining programme delivery costs with changes in health-related quality of life to estimate quality-adjusted life years (QALYs) gained during programme participation. Analysis showed that each NDPP session attended was associated with small but positive utility gains, and when applied across all referrals, this translated to 1,773 QALYs generated in the short-term, with a cost-per-QALY of £24,929, falling within the NICE willingness-to-pay threshold at the time of £20,000–£30,000. These benefits alone suggest that the NDPP is a cost-effective use of resources, even before the impacts of T2DM prevention have been realised.

In separate analysis using a long-term decision-analytic model, to take into account diabetes cases prevented, we found that the NDPP is likely to save £71.4 million over 35 years, as well as generating a greater number of QALYs, further supporting its continued commissioning. Importantly, this analysis only used the observed effectiveness of the NDPP (as described above) at three years. If the NDPP had a continued effect beyond this, these numbers may underestimate its true impact.

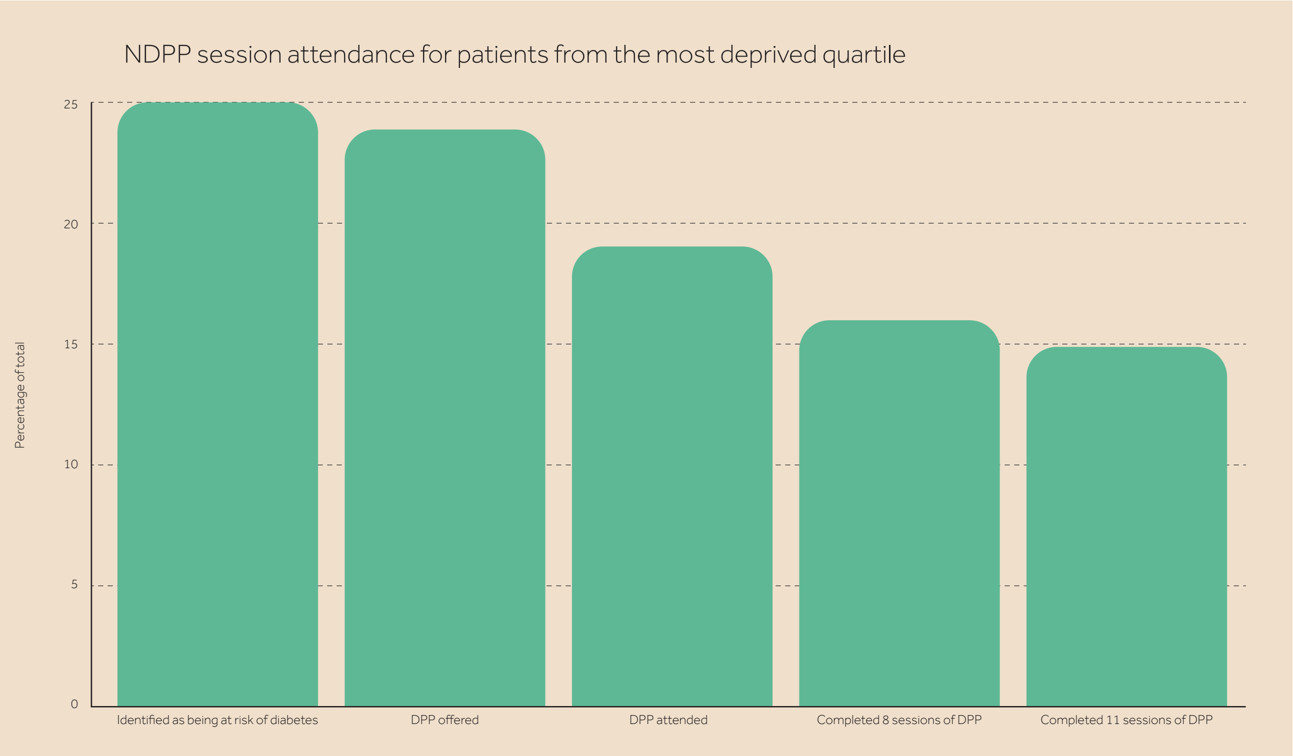
IMPLICATIONS FOR IMPROVING POLICY AND PRACTICE

In line with the 10 Year Health Plan's focus on prevention, early intervention, and evidence-based policymaking, it is important to evaluate the long-term effectiveness of diabetes prevention programmes in delaying or preventing T2DM. Large-scale interventions can support the goal of reducing the burden of long-term conditions, but limited resource mean prioritising those at greatest risk of developing the disease is essential.

Using primary care data for evaluation can be challenging if policymakers and those developing programmes don't engage with GPs and primary care providers. For example, we had issues regarding the definition of the NDH from our previous analysis as the guidelines of defining NDH have changed over the years, while not all practices in primary care were referring patients.

It was also found that patients were not always invited to the programme through their GP, making it difficult to determine whether some individuals within primary care had participated without being formally recorded. This inconsistency in referral pathways has important implications for health inequalities, as those from more deprived backgrounds or less engaged with healthcare services may be less likely to access preventive support. A study from The University of Manchester showed that patients from ethnic minority backgrounds were overrepresented in initial referrals to the NDPP but were less likely to complete the programme.

Meanwhile, people living in deprived areas were underrepresented, highlighting the risk that, if not properly targeted, prevention programmes run the risk of widening, rather than reducing, health inequalities.



Patients from the most deprived fifth of the country represented 21% of DPP referrals - but just 13% completed 11 sessions of the programme, compared to 24% in the least deprived areas.

Ensuring equitable referral systems and proactive outreach aligns with the 10 Year Health Plan's commitment to fair, accessible, and population-wide health improvement. Risk stratification tools should be introduced in primary care, to identify and prioritise the highest risk NDH patients for referral to prevention plans. Use of these tools should be incentivised through Quality and Outcomes Framework (QOF) indicators, maximising cost-effectiveness and aligning with the prevention-first aims of the 10 Year Plan.

The 10 Year Health Plan acknowledges that a 'one-size-fits-all' approach to healthcare misses the distinct needs of people from minority ethnic backgrounds. In the context of the NDPP, sessions require cultural tailoring, such as adapting healthy eating classes to a range diets reflecting different communities.

> **Sustainable funding, flexible programme design, and standardised evaluation frameworks are essential to ensure that interventions deliver proven, equitable, and population-level benefits across the NHS.**

Sustainable funding, flexible programme design, and standardised evaluation frameworks are essential to ensure that interventions deliver proven, equitable, and population-level benefits across the NHS. The reduction in conversion rates reflects changes in the definition of NDH, at least in the UK, with people diagnosed with NDH more recently having lower conversion rates. The definition of NDH needs to be re-evaluated to make it more relevant to conversion to T2DM, and improve targeting of high-risk individuals, ensuring equitable access to prevention programmes.

Digital initiatives may play a vital role in realising the 10 Year Health Plan ambitions to enhance digital health delivery and reduce health inequalities – and the NDPP is already available as a digital stream in England. However, there is a risk that inequitable access could widen existing inequalities, particularly in the context of the shift from analogue to digital. To maximise their impact, clearer guidance is needed for referrers on matching individuals to the most appropriate digital programme, alongside digital inclusion strategies (such as device provision or digital literacy support for vulnerable populations) ensuring equitable access, improved engagement, and better health outcomes across diverse populations.

Policymakers should prioritise long-term funding commitments that allow programmes to reach their full potential rather than short-term pilot approaches. The finding that real-world effectiveness differs from randomised controlled trial results highlights the importance of pragmatic evaluation in policy decisions. Future programme commissioning should account for implementation realities, including referral rates and attendance patterns, when setting expectations and budget allocations. This suggests a need for flexible programme design that optimises engagement rather than rigid adherence to trial protocols. Policy should support similar evaluation frameworks for all major health and care interventions, ensuring resources are allocated based on population-level effectiveness demonstrated in high quality real-world evaluations.

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HEALTH PREVENTION PROGRAMMES

HOW THE POWER OF BEHAVIOURAL SCIENCE DELIVERS STRONGER RESULTS

DR RHIANNON HAWKES, PROFESSOR DAVID FRENCH, PROFESSOR PETER BOWER

The 10 Year Health Plan for England describes three strategic shifts for the NHS over the next decade: sickness to prevention, hospital to community, and analogue to digital. Over the last decade, large-scale behaviour change programmes have been nationally implemented across England which speak to all three of these shifts; two of these programmes are the NHS Diabetes Prevention Programme (NDPP), and the NHS Healthy Living programme. Behavioural science involves understanding people's behaviours, systems and wider social influences, to understand why people might think, feel and act in different contexts. So how can behavioural science expertise be effectively embedded into these programmes, and what have we learned about what does – and doesn't – work?

> **...providers of the NDPP did not always include all the key behaviour change content that the evidence base suggested was most effective...this was likely due to the absence of a logic model. In other words, if providers don't know why something matters, they are unlikely to prioritise it.**

The NDPP was first launched in 2016 for people in England who were identified as having high blood glucose levels, and therefore at a higher risk of developing Type 2 Diabetes Mellitus (T2DM). By 2021, more than one million people were referred to the programme, which was completed by over 250,000 people. The programme is recommissioned every few years, and independent service providers deliver the programme on behalf of the NHS. Service users are given the choice of attending in-person group sessions in their local communities, online remote group sessions, or receiving digital support (for instance, via an app).

The NHS Healthy Living programme is another national programme that was rolled out in 2020, providing a web-based resource for people living with T2DM to help better self-manage their condition.

Research teams at The University of Manchester conducted independent evaluations of both programmes (the NIHR-funded DIPLOMA and HEDLINE evaluations).

UNDERSTANDING HOW AN INTERVENTION IS EXPECTED TO CHANGE BEHAVIOUR

We evaluated the first rollout of the NDPP between 2018 and 2020, where service users attended in-person group sessions. Our research found that the independent providers delivering the programme did not have a clear underpinning theory or explicit description (a 'logic model') of how their programmes were expected to work. The inclusion of a logic model during the intervention design helps to establish the key intervention features (such as 'behaviour change techniques') in these prevention programmes to help people make changes to their health behaviours.

We also found that providers of the NDPP did not always include all the key behaviour change content that the evidence base suggested was most effective in this population group; this was likely due to the absence of a logic model. In other words, if providers don't know why something matters, they are unlikely to prioritise it. Our work highlighted the need for a more formalised way of reporting the important intervention features in these programmes, so that successful ones can be replicated for other prevention schemes.

Following our research findings, NHS England now requires providers delivering the NDPP to include a logic model or clear justification in their service bids detailing which behaviour change techniques they have included in their programme designs and how they expect these techniques to achieve the desired programme outcomes.

Conducting an evidence review, gathering input from people with lived experience of the health conditions, and developing a logic model will facilitate optimal intervention development. Other prevention programmes aimed at long-term conditions (LTCs), such as those aimed at preventing tooth decay, tackling childhood obesity through the National Neighbourhood Health Implementation Programme, and the Health Coach programme should adopt a similar approach to this. Doing so will support the sickness to prevention shift, by ensuring interventions are designed to change behaviours before illness develops.

THE IMPACT OF REMOTE SUPPORT FROM TRAINED STAFF

During the second rollout of the NDPP between 2021 and 2023, we evaluated the digital service and found that service users were more engaged with making behaviour changes such as setting goals and monitoring their health behaviours when they interacted with a health coach (staff employed by the service provider to offer remote support to service users). We also found that support from health coaches helped to increase service user engagement, motivation and accountability on the programme.

Further research evaluating the digital NHS Healthy Living programme for people with T2DM also found that service users wanted more interaction from healthcare professionals and other service users to increase their engagement and continued use of the programme. These findings suggest that digital prevention and self-management programmes still require some form of human coaching to increase engagement, accountability and understanding of behaviour change content. Delivering behaviour change support requires a complex skillset, and these staff must therefore receive in-depth training in how to deliver behaviour change techniques for these interventions to be effective.

This is important in the context of the 10 Year Health Plan and proposals to introduce digital-only weight management programmes. More research is needed to better understand the amount of human support required to keep users engaged in these digital programmes and how this support is best delivered at a scale that is cost-effective (including via telephone, messaging or chatbots).

WHY PREVENTION AND SELF-MANAGEMENT PROGRAMMES NEED A BEHAVIOUR CHANGE SPECIALIST AT ALL STAGES

Prevention and self-management are about people; so, understanding an individual's behaviours, systems, services and wider social influences are crucial to understanding factors that shape health and therefore prevention of LTCs. We know from previous research that just telling someone they are at risk of developing a health condition is often ineffective for behaviour change.

A more effective approach may be to use risk communication to encourage people to join prevention programmes where they can receive structured support in how to make changes to their health behaviours. This is why it is important to provide behavioural insight into how these prevention services are designed and delivered, alongside considering other important factors such as promoting uptake and engagement with these prevention programmes.

> **We know from previous research that just telling someone they are at risk of developing a health condition is often ineffective for behaviour change.**

> **Building on the evidence from The University of Manchester, policymakers can ensure the next generation of prevention programmes are grounded in evidence-led behaviour change principles.**

To deliver the outcomes we need in health prevention, initiatives such as the newly proposed Neighbourhood Health Service should embed behaviour change expertise into prevention programmes right from the very start of intervention design, through to the programme implementation. For example, without a clear logic model describing how the programme is expected to achieve behaviour change, those developing interventions are less clear on the exact behaviour change components that should be included in the programme, and consequently the staff delivering these programmes in communities are less likely to be trained in how to deliver key behaviour change techniques. Ultimately, this reduces the likelihood that key behaviour change components are delivered in practice.

Behaviour change specialists should form part of the multidisciplinary teams in Neighbourhood Health Centres to:

1. Refine the inclusion of key behaviour change content in the programme design,
2. Help develop a programme logic model,
3. Provide training to staff employed by independent providers and/or in neighbourhood teams in how to deliver behaviour change content, and
4. Continually monitor and evaluate programme delivery to ensure that high quality behaviour change support continues to be delivered throughout programme implementation.

TACKLING BEHAVIOUR CHANGE TO TACKLE THE PREVENTION CHALLENGE

Policy programmes targeting LTCs should therefore ensure that behavioural science expertise is embedded in the design, training and delivery of prevention programmes. To support staff in this, the Department for Health and Social Care should develop national guidance on effective risk communication strategies which goes beyond informing individuals of their risk and instead motivates enrolment in structured behaviour change programmes. Alongside this, behaviour change training should be standardised for frontline staff in prevention programmes, with a national framework developed.

Achieving the sickness to prevention shift of the 10 Year Plan in the context of LTCs requires learning from what has – and hasn't – worked in the past. Building on the evidence from The University of Manchester, policymakers can ensure the next generation of prevention programmes are grounded in evidence-led behaviour change principles. And the message is clear – get this right and we can help far more people to achieve better health – reducing the cost of disease and disability for individuals and saving the huge and escalating cost, for the NHS, of failing to prevent it.

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PREVENTION OF LONG-TERM CONDITIONS

THE NEED FOR TRANSDISCIPLINARY SCIENCE

PROFESSOR ARPANA VERMA

Long-term conditions (LTCs) now represent one of the greatest challenges facing health systems globally. Their rising prevalence, social patterning, and complex interactions with environment, behaviour and inequality demand approaches that span far beyond the remit of traditional public health. At the Manchester Urban Institute (MUI), our research and policy engagement have consistently shown tackling LTCs requires a fundamental shift, moving from siloed practices to transdisciplinary science that integrates diverse expertise, communities, a whole systems approach for the determinants of health and real-world systems.

> **Through our contributions to European and global health indicator programmes, we have demonstrated how the determinants of health through local governance can shape patterns of LTCs and vulnerability.**

Public health is a medical speciality defined as the “art and science of preventing disease... through the organised efforts of society" and is committed to work across sectors to reduce inequalities and inequities. The World Health Organization estimates that 80% of all premature deaths are due to cardiovascular disease, cancer, respiratory disease and diabetes. Poverty is closely linked to the development, morbidity and mortality associated with these diseases. We need to understand better the wider, social, commercial and informational determinants of health that affect the choices we make such as tobacco-use, unhealthy diets, physical activity, harmful-use of alcohol and “making the healthy choice the easy choice” for the prevention of LTCs.

The Health Foundation argues that population-level interventions that are less reliant on individual agency and “aim to alter the environments in which people live should form the backbone of strategies to address smoking, alcohol use, poor diet and physical inactivity.” For two decades, our innovative work at MUI in urban health, health metrics and prevention has highlighted the multifactorial nature of chronic disease and multi-morbidity and the need for local level data collection, analyses and implementation for equitable health gain. Through our contributions to European and global health indicator programmes, we have demonstrated how the determinants of health through local governance can shape patterns of LTCs and vulnerability. Evidence from projects such as EURO-URHIS 2 confirms that understanding these interactions requires interdisciplinary mixed methods research bridging public health, architecture, urban planning, epidemiology, environment, occupation, education, housing, transport, social sciences, creative methods and policy design.

Where we live is not just a postcode but a risk factor for past, current and future risk. The built, social and natural environment affects all our health and wellbeing. The more affluent we are, the more choices we have to be able to change our exposure to harmful environments that are known to affect health and wellbeing including pollution, poor housing, and poor access to blue and green space. Bringing the person-and-place together for clinical research is fundamental to understanding prevention, structural inequalities and research inclusion. Across our implementation science publications, summarised in work with Public Health England, prevention emerges not merely as early detection or risk reduction, but as a lifelong, place-based and whole-system wide effort, including system leadership. Studies across the life-course from physical activity in school-aged children, older adults’ polypharmacy (concurrent use of multiple medications), and sociodemographic drivers of loneliness demonstrate how long-term conditions accumulate across the life course and are affected by structural inequities and the need to put “communities at the heart” of all we do. The COVID-19 pandemic further exposed these inequities, with digital exclusion and socioeconomic disadvantage amplifying health gaps.

These challenges show that classical categories of prevention – primary (vaccinations, changes in lifestyle choices for modifiable risk factors); secondary (case finding and screening); and tertiary (preventing death and disability) – are as important now as they were when Geoffrey Rose described his ‘Prevention Paradox’. That is, that population-based preventative health measures such as screening programmes bring large benefits to the community, but little to the individual. Recent debates stress the need to clarify prevention for thinking through the syndemic of multiple long-term conditions, emphasising the importance of tackling “sentinel conditions” and the broader physical, environmental, economic and social factors underpinning disease development. This aligns with the foundational principles of transdisciplinary science: that effective prevention must integrate biology, behaviour, place, policy, technology and lived experience into a shared conceptual framework.

> **Research published in The Lancet shows that impactful public health solutions arise when disciplines codevelop conceptual models, use shared language, and generate knowledge in partnership with communities and policymakers.**

The case for transdisciplinary approaches is further supported by emerging evidence on best practice research methods. Research published in The Lancet shows that impactful public health solutions arise when disciplines codevelop conceptual models, use shared language, and generate knowledge in partnership with communities and policymakers. Short-term and linear projects are unlikely to deal with the complexity of the determinants, actors and outcomes required to tackle LTCs. Long-term solutions are required to address this challenge with evaluation embedded within the intervention implementation pathway. Using a rapid cycle evaluation has helped us understand how place and person to communities interact, understanding what works and why. Moving from the “deficit model” of some interventions to an “asset-based” health improvement model is fundamental to this paradigm shift.

This transdisciplinary, place and asset-based whole systems movement is reflected in the ethos behind our research challenge area of health and wellbeing within MUI.

POLICY IMPLICATIONS

Applying transdisciplinary approaches translating prevention research into policy and practice is required to achieve the three NHS Fit for the Future’s radical shifts. The new Neighbourhood Health Centres could go beyond simply being places where healthcare is delivered, to places where upstream interventions to prevent major health burdens in an area are co-developed with the people who live there. This work is exemplified in the Health Determinants Research Collaborations, moving rapidly from research to implementation and evaluation by creating research-ready local authorities and communities.

Because LTCs form across the life course, expanding national programmes that address early-life risk, childhood environments, digital access, mental health, and polypharmacy man-

> As Greater Manchester advances its integrated care reforms, there is a significant opportunity to embed transdisciplinary science at the heart of prevention policy.

agement is essential. Supporting equitable digital transformation is also critical: ensuring all population groups can access digital health tools reduces, rather than deepens, health inequalities.

As Greater Manchester advances its integrated care reforms, there is a significant opportunity to embed transdisciplinary science at the heart of prevention policy. This means investing in data systems that capture complex interactions, designing interventions collaboratively with residents, and ensuring that digital innovation reduces and does not deepen inequalities. It also requires sustained partnership across universities, local authorities, NHS organisations, and the voluntary, community, faith and social enterprise sector groups and, most importantly, our communities to end the 'postcode lottery'.

To prevent long-term conditions effectively, we must move beyond fragmented and short-term solutions. Transdisciplinary science offers a pragmatic, evidence driven pathway that embraces complexity, prioritises equity, and places communities at the centre of innovation. By aligning research, policy and practice, we can create healthier environments across the life course and build a future where prevention is not an aspiration, but a systemwide reality, leaving no-one behind and protecting the most vulnerable.

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HOW FAMILY COURT PROCEEDINGS CAUSE PREVENTABLE DISEASE IN WOMEN AND CHILDREN

DR ELIZABETH DALGARNO AND PROFESSOR ARPANA VERMA

Sometimes the true causes of illness in particular populations take in-depth investigation to uncover. Research from The University of Manchester has found that victims of abuse may suffer serious health consequences from engaging with private family court proceedings, often to determine child arrangements between parents or carers. Studies from Brazil and England have uncovered a pattern of court and perpetrator-induced trauma (CPIT), a cycle where court professionals and abusive fathers weaponise legal processes and trigger physical, mental and social health outcomes in victim-survivors.

Mothers' trauma responses were then used against them to portray them as 'unfit' parents. These mothers reported long-term conditions (LTCs) including autoimmune illness, chronic pain disorders, respiratory and cardiovascular problems, gastrointestinal and musculoskeletal diseases, and lifelong trauma responses. The systematic use of pseudoscientific concepts such as parental alienation (PA) allegations exacerbated harm, producing social conditions that may sustain LTCs. These findings point to a looming public health crisis that national governments have not yet integrated into health-justice policy.

LEGAL PROCESSES AS DRIVERS FOR LONG-TERM CONDITIONS

The private family courts in both studies failed to recognise domestic abuse, enabling perpetrators to continue coercive control through legal mechanisms. In a study with researchers in Brazil, victim-survivor mothers described LTCs, including autoimmune diseases, respiratory conditions, suicidal ideation, suicide of mothers known to them, and maternity complications, which they believed were directly associated with court engagement.

In England, research found victim-survivor mothers similarly reported LTCs, including chronic pain, gastrointestinal disorders, central sensitivity syndromes, suicidal ideation, suicide of mothers known to them, and persistent trauma responses during and after court proceedings. A focused paper on child sexual abuse (CSA) cases in England revealed minimisation of CSA, disbelief of children, and pro-father contact biases further intensified harm for both mothers and children.

These collective comparative findings from the Global South and North indicate that family court systems, intended as protective mechanisms, have become structural drivers of LTCs for significantly large and vulnerable populations, potentially worldwide.

> **These findings point to a looming public health crisis that national governments have not yet integrated into health-justice policy.**

> **Long-term activation of the stress response also elevates cardiovascular risk, indicating substantial future public health costs.**

LONG-TERM CONDITIONS LINKED TO FAMILY COURT TRAUMA

Mothers in both countries consistently reported a pattern of multi-morbidity; LTCs linked to ongoing trauma, coercive control, and institutional betrayal.

Physical health

Mothers described developing a range of physical conditions, including autoimmune diseases, chronic inflammation, and musculoskeletal conditions during prolonged court engagement, directly attributing these to sustained trauma and fear caused by this engagement process. Long-term systemic inflammation is a recognised pathway linking trauma to chronic disease. They also reported chronic back pain, fibromyalgia, headaches, IBS and restless legs syndrome, consistent with trauma-induced central sensitivity syndromes. Most explicitly in terms of LTCs, mothers reported respiratory illness linked to chronic stress and court-related trauma.

Long-term activation of the stress response also elevates cardiovascular risk, indicating substantial future public health costs.

Mental health

All mothers reported PTSD and complex trauma; chronic anxiety and depression; hypervigilance and sleep disorders; and suicidal ideation and suicide of mothers known to them. Mothers also reported misogyny, humiliation, loss of employment and economic and financial ruin, restricted freedom of movement, and racism and disability discrimination. These conditions often escalated due to PA allegations, abusive courtroom environments, and loss of child contact.

Health harms to children

Mothers reported that children exposed to court-enabled abuse – including sexual violence and physical assaults – suffered severe mental and physical ill-health. There were concerns about neurodevelopment and the impact on education and behaviour, as well as physical health symptoms such as convulsions, chronic digestive issues, headaches, and skin conditions. Systemic failures, including blocking abuse disclosures and ordering unregulated therapies, left children feeling unseen and unheard. Longitudinal evidence indicates that such childhood trauma increases adult risk of cardiovascular disease, COPD, diabetes, cancer, and premature mortality.

SYSTEMIC DRIVERS: INSTITUTIONAL BIAS AND NEGLECT

Across both studies, there were consistent structural determinants that contributed to long-term health harms. These included the misuse of pseudoscientific frameworks to silence abuse and remove children from mothers – one symptom of gender-bias within the family court system, alongside institutional disbelief and pathologisation of mothers. Victim-survivors also faced exposure to abuse perpetrators through repeated hearings or court-ordered contact, as well as medical neglect more broadly.

These determinants create an environment in which LTCs not only emerge but also become entrenched. Mothers' trauma responses were then used against them to portray them as 'unfit' parents, highlighting a disturbing entrapment within these systems.

AN URGENT CALL TO ACTION

In the UK, policymakers must urgently revise and update the Children Act 1989 in England and advance a Family Justice Bill. HM Government have committed already to revoking the presumption of parental involvement and this must now proceed. Following calls from researchers at The University of Manchester, the Government has committed to introducing a Bill 'when parliamentary time allows' – this Bill should also establish independent monitoring and regulation of family courts.

> **The international evidence is a clarion call to action: family court systems are producing life-limiting, long-term conditions among women and children.**

In both countries, policymakers across health and justice must recognise CPIT as a public health issue, mandating health-impact assessments within family courts and developing guidance on trauma-informed decision-making. Pseudoscientific concepts such as PA should be prohibited in child-contact cases, reflecting guidance from the WHO and UN, while multidisciplinary experts trained in domestic abuse (DA), child sexual abuse (CSA), and trauma should be employed by courts to review complex cases.

Integrated health monitoring and screening for LTCs should be introduced for parents and children, particularly in cases where DA or CSA is raised. Lastly, there is an urgent need for routine data collection, monitoring, and reporting on health outcomes associated with family court involvement, while public health officials should engage in longitudinal studies.

The international evidence is a clarion call to action: family court systems are producing life-limiting, long-term conditions among women and children. Addressing this requires treating court-related trauma not only as a legal failure but as a driver of chronic disease. Without urgent reform, these systems will continue to generate preventable illness, disability, and premature mortality.

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THE POWER OF PREDICTION

HOW DATA AND NEW TECHNOLOGY CAN HELP PREVENT MULTIPLE CONDITIONS

PROFESSOR MATTHEW SPERRIN AND DR GLEN MARTIN

The NHS could make huge gains in efficiency by *preventing* rather than *treating* illnesses, including long-term conditions. Doing this efficiently and well requires better use of data - building models using statistics, machine learning and AI to predict who is at risk - so we can take appropriate action. Key challenges need to be addressed to ensure that data, through models, is supporting better decisions in healthcare, and The University of Manchester is leading efforts to tackle them.

This research is demonstrating the need for:

1. A 360-degree view of the patient: include data from different sources across the life course and allow prediction of multiple diseases.
2. Actionable insight: models need to be move beyond prediction (who is at risk) to benefit evaluation (what interventions deliver better outcomes)
3. Beginning with the end in mind: implementing prediction models needs to be a focus from the outset.

A PROACTIVE AND PERSONALISED APPROACH

The NHS Prevention Programme and the 10 Year Health Plan prioritise a *proactive* approach to healthcare: moving care and intervention upstream to prevent or delay illness, from the hospital into the community, and advancing from analogue to digital systems. The 10 Year Plan in particular requires new prediction models, underpinned by anonymised healthcare data, to evaluate patients' lifetime risk for major non-communicable diseases such as cancer or heart disease.

This demands a personalised and predictive approach to healthcare, which in turn depends on the ability to accurately identify individuals at high-risk of disease to support early, individualised, and equitable primary and secondary prevention. Clinical prediction models developed using statistical, machine learning and AI methods, should be central to delivering this national step-change in NHS healthcare. This is because they can estimate an individual's risk of future medical conditions based on their current health, allowing for more accurate personalisation of care.

However, the pathway from developing to implementing prediction models is broken. While thousands of models are published annually, few are implemented into UK clinical guidelines. This problem stems from three fundamental challenges that need to be addressed.

> **Clinical prediction models developed using statistical, machine learning and AI methods, should be central to delivering this national step-change in NHS healthcare.**

> Most prediction models for long-term conditions, like heart disease, cancer and kidney disease, are developed in isolation, each focussing on just one disease. But this does not reflect how health works in the real world, where people often live with multiple conditions that interact with each other.

CHALLENGE 1
DATA AND MODELS SHOULD SUPPORT A HOLISTIC PERSON-CENTRED VIEW

Most prediction models for long-term conditions, like heart disease, cancer and kidney disease, are developed in isolation, each focussing on just one disease. But this does not reflect how health works in the real world, where people often live with multiple conditions that interact with each other. To better support the prevention of disease, we need models that can estimate the risk of different combinations of conditions occurring together, and how these risks change over time.

At The University of Manchester, we are tackling this challenge by developing methods that capture the relationships between conditions and consider how treating or preventing one disease might affect others. This allows models to answer questions like those posed in the 10 Year Health Plan: namely, “what is this person’s risk of developing diabetes, followed by cardiovascular disease, over the next 10 years?” Such insights could help to identify people at highest risk and support the aims of the Plan to develop more effective, personalised prevention strategies.

With the NHS aiming to introduce a single patient record by 2035, and with growing access to rich health data from a range of sources, now is the perfect time to adopt a more integrated, patient-centred approach to prediction.

CHALLENGE 2
MAKING PREDICTION MODELS MORE ‘ACTIONABLE’, SO THEY CAN INFORM DECISIONS

A fundamental limitation of most existing prediction models is that while they can identify which individuals are at high risk of bad outcomes, they do not tell us what should be done to reduce that risk. We need to help answer the ‘what if’ questions. Consider a patient with a probability of 15% of developing cardiovascular disease over the next 10 years. The patient and clinician might reasonably ask: “How would that risk reduce if I lost weight?” or “How would the risk reduce if I started taking a statin?” Such questions are *causal* in nature, and prediction models are not designed to answer causal questions (indeed, trying to answer causal questions with prediction models is often done, and in a previous study we found leads to wrong answers).

Research at The University of Manchester is addressing this. Our CHARIOT model predicts cardiovascular risk ‘under intervention’. It combines prediction modelling with the required causal methods – the tools that allow us to model the effect of an intervention like losing weight, on outcomes.

Models such as CHARIOT are *actionable* because they provide information that directly informs decisions and should act as the basis for the shift to a prevention-focussed NHS.

CHALLENGE 3
GETTING MODELS FROM THEORY INTO PRACTICE

We need to reframe how we approach the impact and implementation of prediction models. Rather than treating these aspects as afterthoughts, they must be defining principles from the outset of producing prediction these models. That is, we need to *‘develop the right models and develop the models right’.*

This shift requires early identification of operational needs and pathways to clinical impact, and it demands that models be co-produced with stakeholders, from initial design to deployment. At The University of Manchester, our research has illustrated the importance of clearly defining the decisions a model is intended to support, early in the development pipeline. Doing so helps shape both the study design and the modelling methods.

Focussing on impact and implementation from the outset also calls for more context-specific testing of prediction models within the populations they are meant to serve. We refer to this as ‘Targeted Validation’. This sharpens the focus on the model’s intended use and guides how – and with what data – its predictive performance should be evaluated. In turn, this ensures that the evidence generated is directly relevant to the evidence base that would be required for integrating the model into clinical practice.

> Prediction models, especially those that take a *holistic* and *actionable* perspective, can be exploited more readily in healthcare.

Prediction models, especially those that take a *holistic* and *actionable* perspective, can be exploited more readily in healthcare. But identifying the right models (those that have been developed to solve the right problems, using the right methods and the right evaluation), and taking these from the academic community into clinical practice is challenging. Policymakers and regulators need to work with academics and other stakeholders to refine this pipeline, to ensure benefit from data-driven insights that enhance and better target care and interventions.

Medical device regulations need to be tailored to prediction models, taking a balanced view of the risks and benefits involved in their use in practice – including the risk of *not* using them. Clear policies and regulation are needed to guide responsible use of these tools in practice (including who should monitor and maintain them). This must be underpinned by a robust infrastructure capable of integrating such tools across complex healthcare pathways and IT systems.

We call on policymakers and regulators to join us in co-designing the prediction models of the future. Together we can turn these new technologies into powerful and practical tools with a huge potential healthcare impact.

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Analysis and research on long-term conditions.

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