



THE GEORGE INSTITUTE
for Global Health INDIA

The George Institute for Global Health
India

T: +91 40 2355 8091

F: +91 40 2354 1980

info@georgeinstitute.org.in

www.georgeinstitute.org.in

The
**OXFORD
INDIA
LECTURE**

**MOBILISING HEALTHCARE: HARNESSING
SCIENCE, TECHNOLOGY AND
ENTREPRENEURSHIP**

(FULL TEXT)

Presented by

Professor Robyn Norton

Principal Director, The George Institute for Global Health

Professor of Global Health, University of Oxford

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Introduction

Good evening. Vice Chancellor, distinguished guests, colleagues and friends, it is both a pleasure and an honour to address you tonight. I am very humbled to have been invited to present this inaugural Oxford-India lecture, given the many distinguished staff and alumni of the University of Oxford who could well have addressed you this evening. I am especially honoured, given that my appointment is relatively recent – it is less than four years since we established The George Institute for Global Health at the University of Oxford as a joint venture with the Oxford Martin School. Before I begin though, I would like to acknowledge my colleagues at the University of Oxford, our many collaborators in India and especially the staff of The George Institute for Global Health across our offices, not only in Oxford and in India, but also in China and Australia. My lecture and the ideas presented are not mine alone but represent the collective thinking and the research activities of these many individuals.

Why choose the topic “mobilising healthcare: harnessing science, technology and entrepreneurship”? Quite simply, there is an urgent need to make transformative changes to the delivery of healthcare worldwide. Most people in the world do not have reliable access to the healthcare necessary to prevent and treat those conditions most likely to cause early death and lifelong disability. And the best available evidence suggests this situation is likely to worsen in the coming years – unless we make major changes now. Developing the strategies required to deliver transformative change will require engagement of the best scientific minds and the application of the best evidence about what works and what does not. It will also require us to take advantage of new technologies, including mobile technologies, which are widely accessible and affordable. High-cost technologies accessible only to the rich are not part of the solution. Transformative change will also require



“disruptive” innovation – ideas that are truly “out of the box” - and this will require that we engage with the new breed of entrepreneurs who recognize that financial success and humanitarian contribution are not mutually exclusive.

Over the next 40 minutes, I will outline the case for why transformative global change in healthcare systems is required urgently. I will firstly describe the current and projected challenges to the healthcare systems of both the UK and India. I will then argue the case that science, technology and entrepreneurship should drive this change and I'll outline some of the key strategies I believe are required to bring about this transformation. Finally, I will provide you with a specific example of what The George Institute for Global Health and our partners in India are currently doing to bring about change in this country. However, throughout the lecture, I will highlight a range of collaborations between Oxford and colleagues in India, all which are designed to address the challenge of delivering healthcare to the very large numbers who will require it in the remainder of the 21st Century.

Mobilising healthcare

The Oxford Dictionary defines mobilise as “the organisation and encouragement of a group of people to take collective action in pursuit of a particular objective”. It also offers an alternative definition, which is “to make something movable or capable of movement”. Both these actions are absolutely central to bringing about the healthcare transformation that is required. We need to take collective action to ensure healthcare change and we need to make healthcare mobile – it needs to be delivered where patients live and not just where doctors live.

Let's start by looking at the situation in the UK, where most healthcare is provided free through the National Health Service, out of the public purse. Less than 20% of healthcare is



provided by the private sector. Currently about 9% of GDP is spent on healthcare – which represents a doubling of the amount over recent years, but is still only about half the proportion of GDP spent in the US. Coinciding with this rise in expenditure has been a marked improvement in the services provided by the NHS, public satisfaction, overall, has increased and so, importantly, has the health of the population. However, there is significant variation in both health status and the quality of care provided. For example, disability-free life expectancy varies by about 17 years between the richest and poorest parts of the country and outcomes of various treatments also vary widely by socioeconomic status. For example, among patients with colorectal cancer, the proportion undergoing surgery is significantly lower among the least well off and, not surprisingly, the death rate is higher.

The need for change in the UK is driven in part by such inequalities, but perhaps more so by the projected increase in demand for health services. This increased demand reflects three main factors.

Firstly, there will continue to be growth in both the number and proportion of older people in the population. Older people represent the most intensive users of health care services - already more than 2/3 people admitted to hospital in the UK are over the age of 65. Secondly, there will continue to be changes in the burden of disease and, in particular, increases in the proportion of people with multiple and long-term conditions, including dementia. Already the 30% of patients who have complex or chronic conditions account for 7 out of every 10 GBP spent on healthcare in England. Thirdly, expectations regarding the standard of care provided will continue to rise, with pressure to access newer and usually more expensive treatments and technologies. However, these demands are unlikely to be met, given increasing constraints on the provision of care.



The costs of care are rising: previously untreatable conditions are now being treated, many diseases can now be avoided by preventive care; and a range of treatments have been shown to increase the length and quality of people's lives. Moreover, it is unlikely that further productivity improvements – better performance management, reductions in length of stay, wage freezes and better procurement practices – can be achieved within the existing healthcare system. Most recently, a range of strategies has been implemented to improve performance management in an effort to deliver budget cuts of GBP 20B annually. However, it is widely believed that little more can be achieved without damaging the quality or safety of health care. Finally and most significantly, the financial resources available to pay for the NHS are limited and the expectation is that the NHS budget will remain flat in real terms for some time to come. This represents a dramatic slowdown in spending growth, such that continuation with the current model of care is projected to lead to a funding gap of around GBP 30B annually between now and 2020.

In India, by comparison, most healthcare expenditure is “out of pocket” and most healthcare services are provided by the private sector – to which the majority of government health funds flow. Overall, government expenditure on healthcare is low compared with most countries in the world - about 4% of GDP. This is less than the proportion spent in most sub-Saharan African countries, where only the very poorest African countries spend less than 5% on healthcare. In India between 2000 and 2010 the % of GDP spent on healthcare actually fell – a trend that is the opposite of that seen in almost every other country in the world.

This shortfall in expenditure is manifest in many different ways. For example, access to hospital care is sharply limited: whereas WHO recommends about 3 hospital beds per 1000 population, the average number in India is 1 (compared with 3 in the UK). Similarly, whereas WHO recommends 1 physician per 1000 population, the average number of physicians is 0.7



per thousand (compared with 2.8 in the UK). Nevertheless, over the past 20 years there have been some important health improvements: average life expectancy in India has increased from 58 to 65 years – but this is still very different to the 80 years life expectancy in the UK. Infant mortality rates (the probability of dying by the age of 1) have dropped from 81 to 42 per 1000 births in 2012 – but this compares with only 4 per 1000 in the UK. Notably, also, the improvements in health outcomes have not been consistent across states or across rural and urban regions.

On the basis of the above, there is a clear imperative for fundamental change in the structure and functioning of health services in India. However, this need will be compounded by the huge increases in demand for health services projected for the next few years, driven largely by the same factors driving increased demand in the UK.

The population is expected to grow to 1.4B by 2026, with particularly large increases in the numbers and proportions of older people over the age of 60 years - an expected increase to about 170M (12.4% of the population). Demand will also be driven by changes in the burden of disease and, in particular, the increase in the number of people with chronic diseases requiring long-term care. This change is the result of both the successes in managing infectious diseases, maternal and child health conditions and changing lifestyles that have increased the risks for conditions such as heart and lung disease. Finally, demand will be driven by an increasing middle-class, with larger disposable incomes and expectations about the standard of care they receive. This group will also represent the fastest area of growth for health insurance, which itself is likely to fuel increased use of healthcare services.

So, in both the UK and India – and indeed in most countries in the world - current inadequacies in the provision of healthcare combined with future projections for demand and



limited resources, are forcing a call for system-wide change. In the UK, there is a growing belief that this will not be achieved by a few incremental changes in how we deliver care, but that fundamental, transformative change will be required. Arguably, the same can be said for India.

Achieving transformative change – harnessing science, technology and entrepreneurship

If we are to achieve transformative change, we will have to harness science, technology and entrepreneurship. Over the past half century, the increasing importance of scientific evidence as the basis on which healthcare policy decisions are made has resulted in many gains – including the development of innovative new drugs for the treatment of infectious diseases (for example, HIV/AIDS) and new drugs for the prevention of chronic diseases, such as heart disease. Science focused on the discovery of new causes and treatments for disease must continue to be supported, particularly for those conditions for which current preventive and therapeutic strategies are inadequate.

An example of this type of discovery science is the INDOX Cancer Research Network, collaboration between Oxford and 12 of India's leading comprehensive cancer centres. This collaboration continues to be at the forefront of research seeking to identify causes and treatments for cancer, especially those cancers that are particularly prevalent in India, such as head and neck cancers.

The maintenance of discovery science must, however, be balanced by much greater investment in implementation science, since there are many situations in which we do not know how to get effective treatments to those most in need. Research is required to inform strategies for the implementation of known preventive strategies and treatment regimes in



real life environments, whether that is in the community or in healthcare settings. This will require the conduct of rigorous, randomised controlled trials to determine whether systems-focused interventions actually make a difference to health outcomes, as well as studies to identify the barriers to implementation. This includes gaining a better understanding of how health systems currently work and which factors are most likely to facilitate change. Accessing big data sets, such as the data from The Rajiv Aarogyasri Community Health Insurance Scheme, launched in Andhra Pradesh in 2007 and now covering 19M households, provides one such opportunity that staff in The George Institute India, in collaboration with their counterparts in Oxford, are undertaking.

Technology has transformed healthcare dramatically in the past 50 years, with intensive care units – first established in the 1950s - perhaps epitomizing how ubiquitous technology has become in the provision of modern healthcare. However, it is the development of frugal technologies and in particular the potential to harness mobile technologies in the delivery of healthcare, that is likely to be the biggest technological driver of the transformative healthcare changes that are needed. The Institute for Biomedical Engineering at the University of Oxford is one of the leading research groups in the world working on the development of affordable healthcare technologies. Currently, for example, they are working in partnership with the Indian Institute of Science in Bangalore on the development of an affordable upper arm prosthesis and on innovative low cost ultrasound methods for the assessment of many conditions – ranging from foetal growth to adult heart defects.

With IBME as our technology partner, The George Institute has been exploring the potential for using mobile technologies for point-of-care diagnostics, remote monitoring, electronic decision-support and self-management tools. The exponential growth in the use of mobile phones - 900 million connections in India - and increased internet access globally, provides a



potentially powerful healthcare delivery tool that we have only begun to harness.

Wikipedia defines entrepreneurship as “the process of starting a business or other organisation” and entrepreneurs as “leaders willing to take risk and exercise initiative, taking advantage of market opportunities by planning, organising, and employing resources, often by innovating new or improving existing products”. Social entrepreneurs pursue innovative solutions to social problems and there is a strong case to be made for encouraging social entrepreneurs to engage in the development of innovative, affordable healthcare solutions. India has a strong tradition of social entrepreneurship and indeed health entrepreneurship, as exemplified by Dr Venkataswamy, the founder of Aravind Eye Care Hospitals in 1976. In partnership with the Entrepreneurship Centre and the Skoll Centre for Social Entrepreneurship at the Saïd Business School, The George Institute is involved in new initiatives to train and support social entrepreneurs interested in the healthcare sector.

Last year, for example, we co-hosted the “BIG CHANGE” conference at Oxford, which focused on sustainable healthcare for the 21st century. It brought together some of the most creative minds in healthcare globally, including leaders from India, such as one of our panellists today, Mr Keshav Desiraju, previously the Secretary for Health.

Achieving transformative change – key components of change

So, mindful of the need to embrace science, technology and entrepreneurship in the development of solutions, what should be the specific targets for change? First and foremost, if we are to reduce the costs of care (as is essential in the UK) and make care more accessible to those in economically disadvantaged circumstances (such as in rural and urban slum areas in India), then the location and focus of care needs to move out of major tertiary care hospitals into the community.



Ideally, tertiary care hospitals should only be used for people who need specialty care, unavailable in other lower cost settings. This will only occur if patients and providers can be assured that the quality of care provided will not be compromised. Key to this is the development and implementation of technology that will ensure the best evidence is used in decision-making and that information is shared across the various levels of the health services as well as between patients and providers. By way of example, The George Institute in Oxford and India are working with the Indian Institute of Public Health in Bhubaneswar, together with healthcare providers and funders in Odisha to determine how to manage hip fractures in older people closer to the areas in which they live – potentially using electronic decision support systems to identify those who can best be safely managed in district level hospitals.

A second strategy requires that there is a significant shift in the composition and roles of the healthcare workforce, such that hospital specialists and physicians focus on the treatment of patients who need care that cannot be provided by non-physician healthcare workers. Once again, patients and care providers will need to be assured that the quality of care provided by non-physician healthcare workers is as safe and effective as that which they would have received from a physician. In the UK, there is much interest in the success of the Aravind Eye Care Hospitals - with a ratio of one specialist to five paramedics - and the potential application of this highly cost-effective model in the NHS. Globally, however, the greater interest is in the potential for non-physician healthcare workers, supported by mobile technologies, to play a much more significant role in the delivery of primary healthcare.

This strategy offers the promise of greatly increased access at comparatively modest cost, without compromising the quality of care, as a recent review by George Institute researchers



showed. Moreover it is a strategy that could be implemented relatively quickly, given the shorter training requirements.

While non-physician primary healthcare workers have typically been considered as part of government healthcare services, there is no reason why they could not provide a key component of the healthcare provided by the private sector. In India, as in many other countries, the private sector has focused largely on the provision of services to the higher socioeconomic groups. However, there is an increasing interest among social entrepreneurs about the provision of private healthcare services to a much wider cross section of the community. Such initiatives include the establishment of low-cost community clinic chains in slums, micro-health insurance initiatives and non-physician healthcare worker outreach services.

Transformative change will also require that patients themselves play a much greater role in the management of their care. Self-management and self-monitoring at home are key not only to improved patient outcomes, but also to reducing hospital admissions, which are critical drivers of overall healthcare costs. Once again, the use of innovative mobile technology will be central.

At The George Institute in Oxford, we have been working with older people discharged from hospital with congestive heart failure, to teach them how to self-monitor their health, using a tablet pc that is wirelessly connected to several sensors that transfer data directly to their hospital healthcare provider. While this research is still in its infancy, our preliminary findings show there is great enthusiasm from older people to utilise this technology, as they feel greater comfort being connected to the hospital and to additional care, should they need it. This concept is now being extended through collaboration with George Institute staff in India, in an effort to better manage patients with kidney failure undergoing peritoneal dialysis at



home.

Lastly, but perhaps the greatest potential for transformative change, is through an increased focus on prevention and mobilising populations to take an active role in their own health – including becoming more mobile! However this potential is unlikely to be realised unless prevention is better resourced and the science underpinning prevention strategies is improved. Currently in the UK, only 4% of health expenditure is spent on prevention and public health activities and while overall, health expenditure has doubled as a % of GDP, there has been almost no increase in the amount being spent on prevention.

Notwithstanding the need in India to continue to focus on the prevention of communicable diseases, there are significant opportunities to stem the growing burden of NCDs and injuries through action now. Specifically, smoking cessation efforts and the management of blood pressure and cholesterol have collectively contributed to significant reductions in cardiovascular deaths in the UK. By comparison, increasing physical activity levels and changing unhealthy eating behaviours has proved more elusive, although there is optimism presented by some of the new technology options, such as opportunities to self-monitor health status – the “quantified self”- combined with the use of SMS messaging to encourage people to engage in healthy behaviours and apps to facilitate healthy food choices, such as the George’s FoodSwitch app – in which individuals scan the bar codes of products and are informed of other similar, but healthier products that can be purchased.

Before moving to the final section of my lecture, I would like to spend a little more time on the need for prevention and the potential for technology to play a fundamental role in prevention – particularly with adolescents. The work I will describe shortly, builds on a long-term collaboration between Oxford and India focused on improving the health of young people.



This collaboration, Young Lives, which is examining the impact of poverty on children, launches the results of its fourth survey this coming Thursday. In India, Young Lives has been following 3,000 children in Andhra Pradesh and Telengana, since 2002. These individuals, some of whom have been followed from birth, are now aged 12 and 19 years – part of the adolescent age group that comprises 25% of the entire Indian population.

Despite the size of this population, not only in India but also globally, the only real attention that has been paid to health issues among adolescents has been on sexual and reproductive health. Other critical health issues such as mental health, suicide, trauma and the early onset of chronic diseases such as diabetes have been largely ignored. It is therefore of great relevance that the Government of India has recently launched a major national programme, RKSK - Rashtriya Kishor Swasthya Karyakram – focusing on the need to improve adolescent health. The George is committed to the same goal and has been working with a range of partners in India, including colleagues from the Center for Chronic Disease Control, AIIMS and the University of Hyderabad.

A major focus of our work is to explore the potential to use social media to modify high-risk behaviours and to change high-risk environments that affect adolescents. We plan to build on UNICEF's Geographic Information System (GIS), in which adolescents are encouraged to use mobile phones to map their physical environment and to then use this information to facilitate community action and change. We are also exploring the potential to work in partnership with reproductive and sexual health services, to train health care workers, using mobiles technologies, to identify adolescents at high risk of mental disorders and injuries, as well as those engaging in unhealthy behaviours likely to lead to chronic diseases. We would then provide them with information that may help them access care or otherwise bring about changes that will reduce their risk. If we are successful, such strategies offer a huge potential



to reduce the enormous projected need for health services in early adulthood and the associated burden of early death and disability.

Achieving transformative change – a specific initiatives

So, to the final part of my lecture. In this section I propose to describe in some detail, the flagship programme of The George Institute, in which we are harnessing science, technology and entrepreneurship to improve healthcare in India. Over the past several years, we have been working in the Godavari district of rural Andhra Pradesh, on a programme entitled SMARTHealth – an acronym for Systematic Medical Appraisal, Referral and Treatment.

We began this programme by documenting the burden of disease, the prevalence of risk factors and current disease management patterns in 53 rural villages. We found that cardiovascular disease had already overtaken infectious diseases as the leading cause of death. Disturbingly, of those with identified risk factors for cardiovascular disease, over 80% were not receiving even the cheapest treatments available. So, programmes were developed to train low cost, village health care workers – ASHAs - to use a standardized, evidence-based approach to assessing the risk of cardiovascular disease and to use a simple decision support algorithm to make recommendations about essential drug treatments, and to refer high risk patients to medical practitioners at the nearest primary health centre.

Evaluation of this strategy in 44 villages showed that the ASHAs were able to identify high risk patients better than medical practitioners and that they were able to provide appropriate advice about treatments at least as well as the doctors. Building on this success, and in partnership with the Institute of Biomedical Engineering at Oxford, we have developed a technology platform specifically designed to support ASHAs and we are now testing it in 54 villages. Each ASHA will have access to a smartphone programmed with custom-designed



software, enabling her to input information about her patients and receive personalised, evidence-based recommendations about management of their cardiovascular disease risk. Simultaneously, the phone automatically transmits the patient information to a secure server for storage within an electronic medical record accessible to local doctors and hospitals. The system also allows patients, using their own phones (which need not be smartphones) to access healthcare information, receive reminders to take medication or arrange appointments with the ASHA or doctor. Importantly, this process ensures that there is quality control over the information provided, allowing for regular assessment of performance management and continuous improvement – all at a cost that is arguably affordable.

We are now building applications for a broader range of health conditions and our goal is to develop an integrated support system that extends to at least the top 10 causes of premature death and disability in India. We have commenced a second phase of the programme, focused on the identification and management of common mental disorders, with an extension of this work to a number of Scheduled Tribe areas. We are also planning an extension of this programme to the management of diabetes and the prevention of chronic kidney disease in rural areas of Nepal, Bangladesh and Sri Lanka, in addition to India. Further afield, we have recently been awarded funding from a number of UK agencies to extend this work to Iran – in large part, based on the success to date of the programme in India. Our next step ... extension of this approach to the UK!

Perhaps the greatest challenge for this initiative, is how best to “scale it up” and to facilitate its adaption and adoption into both government and private sector operations. Engagement with social entrepreneurs is key – we hope to develop a financially viable model for the utilisation of this approach and to understand its commercial potential – and so we are currently in discussion with a number of Indian healthcare providers, to determine how best



this might be possible.

Closing remarks

I would now like to draw my lecture to a close, and in so doing, briefly focus on the future. If we are truly to bring about transformative change in the way in which we deliver healthcare, then we must ensure that we build the leadership and human resource capacity to ensure this happens. To facilitate this, over the past few years we have established an informal network of students and staff undertaking collaborative research between Oxford and India – the Oxford-India Health Research Network.

At last year's Big Change conference, the network issued a challenge to its student members to identify innovative approaches to addressing India's healthcare problems – they worked on this overnight, and next day presented their ideas to a distinguished panel – including Mr Keshav Desiraju! More formally, Oxford provides a range of programmes to support Indian students and graduates, including the PHFI-UK Wellcome Trust Capacity Building Programme in the Nuffield Department of Population Health and the Chevening Rolls-Royce Science and Innovation leadership programme, within the Saïd Business School, aimed specifically at mid-career Indian professionals in science, innovation, business and related public administration.

Recently, with the support of the Government of India, Somerville College has established the India-Oxford Centre for Sustainable Development, which has a mandate that includes health. The College, where Indira Gandhi was a student, will provide scholarship opportunities for the next generation of Indian leaders to study at the University of Oxford.

So in closing, I reiterate the view that transformative change in healthcare delivery is urgently



required in both the UK and India – and indeed globally. Both countries have a strong tradition of scientific achievement that we can jointly bring to the table, but we must ensure there is a much greater focus on implementation science if we are to achieve our goals. The development of new technologies has been a strength of both countries, but in India there has been a much greater focus on frugal innovation – and this is now also needed in the UK. India has much to offer Britain in this regard. Likewise the history of social entrepreneurship is stronger in India than the UK, so once again we, in the UK, have much to gain from forging strong entrepreneurial partnerships with colleagues in India.

In summary, in both countries we urgently need collective action, we need to mobilise the government, the private sector and the population generally if we are to avoid the unnecessary premature death or disablement of several hundreds of millions in the next few decades alone. There is perhaps no greater global challenge.

Thank you.