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Care in a changing world

Challenges and opportunities for
sustainable healthcare

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The healthcare industry is facing an era of significant change and transition. As populations grow, demographics shift and the gap between the rich and the poor becomes ever-larger, the demand for health services will rise significantly in both the developed and the developing world.

At the same time, the healthcare system is coming under increasing pressure from rising input costs in energy, water and carbon, leading many governments to re-assess the value of sustainability within the health system. There is also a growing recognition that the effects of climate change will continue to drive up the cost and the demand for health services around the world.

Rising temperatures will increase the need for energy-hungry air conditioning; rising sea levels will put coastal hospitals at risk of flooding; changing weather patterns and damaging natural disasters will increase demands for services. These challenges are often inextricably linked. Rising temperatures in Europe created a devastating heat wave in 2003 that strained the region's health system and – by some estimates – resulted in the death of between 21,000 and 35,000¹ people across five European countries.

As a result, the health sector is facing an unprecedented scale of change that will require public, private and non-governmental organizations to

come together to identify and develop innovative solutions in order to make available resources work harder towards creating a sustainable model of health.

According to KPMG's report, *Expect the Unexpected: Building business value in a changing world*, there are 10 sustainability 'megaforces' which will dramatically change how healthcare is conceived and delivered in the decades to come. Of the 10 megaforces, healthcare is highly exposed to Climate Change, Population Growth, Water Scarcity, Energy and Fuel, Food Scarcity, Urbanization and Wealth. The sector is also potentially exposed to Material Resource Scarcity and Ecosystem Decline.



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Global sustainability megaforces

- **Climate Change:** The one global megaforce that directly impacts all others. Predictions of annual output losses from climate change range between 1 percent per year, if strong and early action is taken, to at least 5 percent a year if policymakers fail to act.
- **Energy and Fuel:** Fossil fuel markets are likely to become more volatile and unpredictable because of higher global energy demand; changes in the geographical pattern of consumption; supply and production uncertainties; and increasing regulatory interventions related to climate change.

¹ UK Met Office, <http://www.metoffice.gov.uk/education/teens/case-studies/heatwave> and *The New Scientist* 10 October 2003 <http://www.newscientist.com/article/dn4259-european-heatwave-caused-35000-deaths.html>.

- Material Resource Scarcity:** As developing countries industrialize rapidly, global demand for material resources is predicted to increase dramatically. Business is likely to face increasing trade restrictions and intense global competition for a wide range of material resources that become less easily available. Scarcity also creates opportunities to develop substitute materials or to recover materials from waste.
- Water Scarcity:** It is predicted that by 2030, the global demand for freshwater will exceed supply by 40 percent.² Businesses may be vulnerable to water shortages, declines in water quality, water price volatility and to reputational challenges. Growth could be compromised and conflicts over water supplies may create a security risk to business operations.
- Population Growth:** Global population is predicted to be 8.4 billion by 2032 in a moderate growth scenario.³ This growth will place intense pressures on ecosystems and the supply of natural resources such as food, water, energy and materials.⁴ Businesses can expect supply challenges and price volatility as a result. This is a threat, but there are also opportunities to grow commerce, create jobs, and to innovate to address the needs of growing populations.
- Wealth:** The global middle class (defined by the OECD as individuals with disposable income of between US\$10 and US\$100 per capita per day)⁵ is predicted to grow 172 percent between 2010 and 2030.⁶ The challenge for businesses is to serve this new middle class market at a time when resources are likely to be scarcer and more price-volatile. The advantages many companies experienced in the past two decades from 'cheap labor' in developing nations are likely to be eroded by the growth and power of the global middle class.
- Urbanization:** In 2009, for the first time ever, more people lived in cities than in the countryside.⁷ By 2030 all developing regions including Asia and Africa are expected to have the majority of their inhabitants living in urban areas;⁸ virtually all Population Growth during the next 30 years will be in cities. These cities will require extensive improvements in infrastructure including construction, water and sanitation, electricity, waste, transport, health, public safety and internet and cell phone connectivity.
- Food Security:** During the next two decades the global food production system will come under increasing pressure from megafactors including Population Growth, Water Scarcity and Deforestation. Global food prices are predicted to rise 70–90 percent by 2030.⁹ In water-scarce regions, agricultural producers are likely to have to compete for supplies with other water-intensive industries such as electric utilities and mining, and with consumers.
- Ecosystem Decline:** Historically, the main business risk of declining biodiversity and ecosystem services has been to corporate reputations. However, as global ecosystems show increasing signs of breakdown and stress, more companies are realizing how dependent their operations are on the critical services these ecosystems provide. The decline in ecosystems is making natural resources scarcer, more expensive and less diverse; increasing the costs of water and escalating the damage caused by invasive species to sectors including agriculture, fishing, food and beverages, pharmaceuticals and tourism.
- Deforestation:** Forests are big business. Wood products contributed \$100 billion per year to the global economy from 2003–2007 and the value of non-wood forest products (mostly food) was estimated at US\$18.5 billion in 2005. Yet forest areas are predicted to decline by 13 percent from 2005–30, mostly in South Asia and Africa.¹⁰ The timber industry and downstream sectors such as pulp and paper are vulnerable to potential regulation to slow or reverse deforestation. Companies may also find themselves under increasing pressure from customers to prove their products are sustainable. Opportunities may arise through market mechanisms and incentives to reduce the rate of deforestation.

² United Nations Environment Programme. (2011). *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*.

³ United Nations, Department of Economic and Social Affairs, Population Division, (2011). *World Population Prospects: The 2010 Revision*.

⁴ Behrens, A. et al. (2007). The material basis of the global economy. *Worldwide patterns in natural resource extraction and their implications for sustainable resource use policies*. Ecological Economics 64.

⁵ Kharas, Homi. (2010). *OECD Development Centre Working Paper No. 285: The Emerging Middle Class in Developing Countries*. January 2010.

⁶ Ibid.

⁷ UN Habitat. (2009). *Global Report on Human Settlements 2009: Planning Sustainable Cities*. London, UK and Sterling, VA, USA: United Nations Human Settlements Programme (UN-Habitat).

⁸ UN Habitat. (2010). *State of the World's Cities 2010/2011 – Cities for All: Bridging the Urban Divide*.

⁹ Oxfam International. (2011). *Growing a Better Future: Food justice in a resource-constrained world*.

¹⁰ OECD. (2008). *OECD Environmental Outlook to 2030*.

Healthcare's environmental impact: Significant room for improvement

Around the world, the healthcare industry represents one of the biggest environmental footprints of almost any industry. In the US, the health sector accounts for 8 percent of the country's total greenhouse gas emissions and 7 percent of its CO₂ emissions,¹¹ making the sector the second most energy-intensive industry after fast food.¹²

In the EU, the health sector creates at least 5 percent of total emissions, the

equivalent of the region's international aviation and shipping industries combined. For its part, the UK's National Health Service (NHS) produces 21 million tonnes of CO₂ equivalent¹³ – the same as annual greenhouse gas emissions from more than 3.7 million passenger vehicles.

Better managing this impact will require new models of care, investment in infrastructure and new collaborations between the public and private sectors.



In Africa, Asia and Latin America, the move to urbanization has resulted in vast shanty towns and slums with little to no access to health services, freshwater or sanitation services.

Trends, risks and opportunities: The impact of population growth, wealth and urbanization

As global populations expand and shift, the healthcare sector is coming under increasing pressure. In the developed world, aging populations and extended life expectancy have led to an increasing prevalence of chronic, expensive-to-treat diseases and disabilities and a growing shortage of healthcare workers to cope with the rising demand.

In the developing world, rapid economic growth and an emerging middle class have dramatically increased demand for health services, even while governments struggle to bring social services to remote and underserved populations, often for the first time. In India, for example, it is projected that the government will need to train some

800,000 new clinicians if they hope to match the proportion of doctors to population seen in many developed world countries like the UK.¹⁴

Since 2009, the balance of the world's population now lives in urban areas,¹⁵ creating a series of new challenges for governments and the healthcare sector. In Africa, Asia and Latin America, urbanization has resulted in vast shantytowns and slums with little to no access to health services, freshwater or sanitation services. And as urban populations swell, so too does the incidence of illness such as hypertension, heart disease, obesity, diabetes and asthma.¹⁶

¹¹ US healthcare sector addresses carbon footprint with information technology, *Ecoseed*, 5 May 2011.

¹² *American Medical Association Journal*, November 2009.

¹³ NHS Sustainable Development Unit, "Saving Carbon, Improving Health," 2007.

¹⁴ http://articles.timesofindia.indiatimes.com/2011-06-28/chennai/29711855_1_nurse-shortage-nursingstudents-healthcare-industry.

¹⁵ *UN Habitat Global Report on Human Settlements 2009: Planning Sustainable Cities*. UN Settlements Programme, 2009.

¹⁶ <http://www.ncbi.nlm.nih.gov/pubmed/15847005>.

Increasing affluence has also created a series of new challenges for the healthcare industry as the gap widens between the rich and the poor, resulting in a disparity in the availability and quality of care. And as more people move into the ranks of the middle class, the impact on the disease profile has been dramatic

as changing diets result in increasing levels of obesity and diabetes.

Responding to growing needs for healthcare services requires investment in those services and in the infrastructure required to support it.

The nexus of water, energy, food, climate change and waste

The combination of rising energy costs, scarce resources and climate change are creating critical challenges for healthcare providers. For one, this nexus has an immediate and dramatic effect on the health of the world's population: water scarcity and climate change are increasing the incidence of drought and famine leading to significant malnourishment and disease in many regions of the world, while rapidly rising costs for food and energy are – in some cases – forcing families to make difficult choices between putting food on the table and paying the bills.

For the healthcare industry itself, these challenges raise the cost of delivering health services and put healthcare facilities at risk. Energy is a particularly difficult challenge: US hospitals spend roughly US\$8.5 billion per year on energy costs and consume almost twice the energy per square foot of traditional office space. Brazil's hospitals are reported to account for 10.6 percent of the country's commercial energy use.¹⁷

As a result, the cost of operating health systems will dramatically increase as energy, food and water start to consume larger proportions of healthcare budgets. These costs will continue to impact both private and public organizations operating in this sector. Pharmaceutical companies, who use a significant amount of water and energy in the development and manufacturing of treatments, will see input costs soar and will be forced to increase prices while health systems seek to reduce the financial burden of care.

Managing waste has also become a key concern for healthcare providers. At the institutional level, the cost of waste disposal will continue to rise and create new challenges for the environment. In Nigeria, for example, poor waste disposal and management has led to high levels of contamination in many of the country's rivers and basins, leading the Mercer Quality of Living Report to name Port Harcourt one of the 25 dirtiest cities in the world.¹⁸



Managing waste has also become a key concern for healthcare providers. At the institutional level, the cost of waste disposal will continue to rise and create new challenges for the environment.



¹⁷ World Health Organization and Healthcare Without Harm, *Healthy Hospitals, Healthy Planet, Healthy People*, 2009.

¹⁸ 25 Most-Dirtiest Cities In The World, *Mercer Quality of Living Report* 2011.

New approaches to healthcare delivery will drive sustainable care

The context of rising populations, scarce resources and financial limitations will require governments and healthcare providers to develop new approaches to the delivery of care.

There is a growing body of evidence that technology can be brought to bear on these challenges to not only provide care to remote or underserved populations, but to also reduce the overall system costs of health. For example, telehealth – the remote exchange of data between a patient and a healthcare professional – has been proven to enhance patient care and reduce costs.

In the UK, the Department of Health launched the Whole System Demonstrator program to build a body of evidence for the integration of health and social care provision through telehealth and telecare. The results show that by leveraging technology, the health system was able to achieve a 20 percent reduction in emergency admissions, a 14 percent reduction in elective admissions and a 45 percent reduction in mortality rates.¹⁹ (For more information see our case study on UK Department of Health's Whole System Demonstrator). According to Lord Crisp, former NHS CEO and Honorary Professor at the London School of Hygiene and Tropical Medicine, "Telemedicine, rightly in

my view, is seen as central to the improvement of health and life in developing countries."²⁰

The combination of electronic health records, mobile health devices, virtual teamwork and electronically-enabled disease and knowledge management has also emerged as a platform for catalyzing the transformation of healthcare, particularly in the developing world. In China, for example, the government is engaged in a program to drive universal access to health services by developing the technologies and infrastructure required for a national eHealth program. In one fell swoop, the Chinese government expects to extend access-to-care to more than 1.3 billion people. The government also plans to build 30,000 hospitals²¹ across the country which – if built within sustainable guidelines – will provide substantial dividends to the health of a large portion of the world's population.

But both eHealth and telehealth require a significant investment in technology and infrastructure, as well as a supportive policy environment to ensure change is sustainable and effective. And, again, the participation of the private sector will be critical, particularly in building the basic infrastructure to support these emerging technologies.



The program implemented simple energy-saving measures such as the installation of energy-efficient lighting and the modernization of circuitry that reduced energy use by 25 percent. ”



¹⁹ http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_131689.pdf.

²⁰ http://web.idrc.ca/en/ev-137414-201-1-DO_TOPIC.html.

²¹ http://www.chinadaily.com.cn/china/2009summerdavos/2009-09/10/content_8674666.htm.

Case Study

UK Department of Health: Whole System Demonstrator program

Changing the model of care to enhance patient outcomes

Having undertaken a series of clinical trials, small pilots and meta-data reviews, the UK's Department of Health recognized that – while the case for telehealth was strengthening – the evidence lacked scale, statistical significance and robust cost-savings data.

As a result, the Department of Health launched the Whole System Demonstrator (WSD) program in May 2008. Preliminary findings from this, the largest randomized control trial of its kind in the world, prove how eHealth delivers on its promise to be truly transformational.

WSD sought to build the evidence for a new way of providing patient care through integrated health and social care provision, supported by advanced assistive technologies such as telehealth and telecare. It involved more than 6,000 participants across three locations.

The program selected five main themes upon which to evaluate the system:

- The impact upon service utilization and costs across health and social care.
- The impact upon the lives of participants and caregivers.
- The cost and cost-effectiveness of the service.
- The views and experiences of users, caregivers and professionals involved in the program.
- The impact of change, collaborative working and large-scale programs on the organization and individual.

“What we have seen in preliminary results is that telehealth and telecare – when applied to chronic disease areas such as diabetes, COPD and heart conditions – can provide a valuable alternative to the current model of

patient care in the UK,” noted Andrew Hine, a partner with KPMG in the UK. “And by treating patients outside of the emergency or ambulatory wards, the program has effectively changed the model of care that is provided to some of the most frequent users of health services.”

The WSD “Headline Findings – December 2011” released by the Department of Health²² reveals the significant benefits of telehealth. If used correctly, telehealth can deliver a 15 percent reduction in A&E visits, a 20 percent reduction in emergency admissions, a 14 percent reduction in elective admissions, a 14 percent reduction in bed days and an 8 percent reduction in tariff costs. More strikingly the program also demonstrated a 45 percent reduction in mortality rates.

²² Ibid.

Improving the energy and resource efficiency of healthcare

Given the significant carbon footprint of most healthcare systems, reductions in energy use and improvements in resource efficiency are key to driving system-wide cost savings, ensuring compliance with environmental legislation and driving enhanced sustainability.

A growing number of healthcare facilities are exploring innovative approaches to impact their long-term cost structure by creating better alignment between hospitals and the natural environment. Many are relatively simple yet carry significant impact. Retrofitting is a prime example: by improving the efficiency of air conditioners, installing energy-efficient lighting systems and reducing reliance on fossil fuel energy sources,

hospitals can significantly reduce their carbon footprint.

At the Royal Free Hospital in the UK, for example, the implementation of a Combined Heat and Power (CHP) plant and the installation of three new boilers – plus a number of smaller adjustments such as low voltage distribution boards and lighting updates – resulted in annual energy savings of EUR1.8 million per annum. The project provided a return on the investment after just seven years and allowed the site to increase its energy security and meet its sustainability targets.

In the developing world, the Brazilian energy holding company, Companhia Paulista de Força e Luz (CPFL),

developed an initiative in 2002 to reduce the energy costs and carbon footprint of more than 100 hospitals in the state of São Paulo. The program implemented simple energy-saving measures such as the installation of energy-efficient lighting and the modernization of circuitry that reduced energy use by 25 percent.²³

Others are looking at realigning their non-clinical costs by improving overall efficiency and enhancing sustainability. For example, by purchasing food and services from local sources, hospitals can reduce carbon emissions related to transportation and delivery, while reducing water use in laundry and facilities management can also generate important savings.

Public Private Partnerships will be a critical response to healthcare sustainability

Creating a sustainable healthcare system is a significant challenge. Existing healthcare facilities will need investment to become more energy-efficient, while new infrastructure is likely to be built to more exacting requirements. Governments and system administrators will need to play a leading role through increased investment, supportive policy development and innovative solutions. But there is also a role for the private sector to play.

Over the past two decades, governments have increasingly come to recognize that the burden of infrastructure provision is not one they can meet alone. Government health departments generally do not have the

capacity to provide all of the skills and expertise necessary to handle large or complex construction or technology projects. The private sector therefore has a role to play in terms of:

- bringing specialist expertise in these areas
- managing large and complex risks within programs
- underwriting its own performance through bearing those risks and providing finance to projects.

A key issue for government is therefore how to get value from these arrangements. Competitive tendering of Public Private Partnership (PPP) contracts is one way to do this.

The development of new facilities also offers ample opportunity to reduce the cost and environmental impact of healthcare. Most hospitals built under a PPP model now include stringent sustainability requirements, particularly in relation to energy efficiency and the use of sustainable building materials. Indeed, a growing number of contracts now include specific requirements that are designed to enhance long-term sustainability, while setting targets for energy and cost reduction. Contracts for services and infrastructure development can be structured to directly reward sustainability outcomes and, as a result, provide incentives for greater performance and innovation in sustainability.

²³ Urban Energy Services Program – Sustainable Municipal Energy Services Slum Electrification – Brazil Background Report USAID 2005, http://pdf.usaid.gov/pdf_docs/pnadf318.pdf.

For example, the recently inaugurated Royal Children's Hospital in Melbourne, Australia was developed with sustainability requirements built into the tendering process. The design brief required the use of fresh air, natural light, water systems and recycling, as well as energy and greenhouse gas targets.

The contract also included performance parameters and evaluation criteria to ensure that the facility would continue to meet all of the requirements through the project's delivery and operation phases. (See our case study on the Royal Children's Hospital, for more information.)

Case Study

Melbourne's Royal Children's Hospital

Driving sustainability through PPP contracting

Located in a large park in close proximity to Melbourne's central business district, the Royal Children's Hospital was envisioned as a 'hospital in the park and a park in the hospital'. As such, it was critical that the design and development of the project follow rigorous sustainability practices, both in the way it was to be built and the impact of its ongoing operations.

In order to achieve these objectives, the government incorporated a number of key elements into the tender and bid process to ensure its vision was maintained throughout the life of the new facility.

Key aspects of the process were built into various elements:

- **Design brief:** A full section articulating the Environmentally Sustainable Design (ESD) requirements (such as the use of fresh air, natural light, water systems, energy and greenhouse gas targets)

were mandatory requirements of bid submissions and were embedded into the contract to become a binding element of the construction and completion.

- **Performance Parameters:** The performance requirements ensured that all ESD elements were incorporated into each stage of the operations phase with certain abatement clauses included to respond to missed targets (triggered as a 'Failure Event').
- **Contracting:** The contract included an Energy Risk Sharing regime that bound the developer to delivering and maintaining the facility at a certain level (or, if possible, lower level) of energy usage. Moreover, the targets were set at the bid phase with no allowance for resetting the levels unless the facility underwent a 'change in purpose' such as extending hours of operation.

- **Evaluation criteria:** Specific criteria were set, outlining a formal requirement for addressing the ESD elements of the development and operations. This included submissions on how the requirements were being met and any further opportunities for enhancement.

In order to win the bid, the successful bidder also included a number of elements that went above and beyond the brief by including additional sustainability measures such as a biomass boiler and blackwater treatment plant.

In November 2011, Queen Elizabeth II officially opened the Royal Children's Hospital. Since then, it has received significant praise from industry participants and community groups for its environmental design and operation.

Around the world, the PPP model is being adapted to deliver increasingly innovative programs to address specific issues, particularly in the developing world.

For example, the use of cookstoves is believed to contribute to the death of more than 1.9 million people per year,²⁴ largely from lung and heart disease. (The stoves produce significant pollution.) In response, a global program has been launched to bring together private enterprise, government funding and non-governmental support in a PPP that aims to provide 100 million cleanburning

stoves to villages in Africa, Asia and South America. The project received about US\$50 million in seed funding from the US Government which will sit alongside US\$10 million in funding from more than a dozen other partners including multilateral organizations and corporate sponsors. (For more information, see our cookstove-related case study.)

These types of innovative partnerships will be central to developing sustainable health solutions. However, more activity will be needed, especially in creating the IT and telecommunications

infrastructure necessary to support new approaches to healthcare delivery such as telehealth and eHealth.

In part, this will require governments to create a supportive policy environment that encourages private investment and sets out clear rules of engagement for participation. It will also require private and non-governmental organizations to step up to explore and develop opportunities that deliver sustainable solutions and quantifiable benefits to the health system.

Case Study

Global Alliance for Clean Cookstoves

Almost half the world's population – around 3 billion people – cook with wood, charcoal, dung, coal or agricultural residues on simple traditional stoves or open fires.

Breathing the smoke from those stoves causes a wide variety of acute and chronic illnesses – pneumonia, emphysema, cataracts, lung cancer, bronchitis, cardiovascular disease, and low birth weight – all contributing to an estimated 1.9 million premature deaths every year.²⁵ That's more than double the global death toll of malaria. Indeed, the World Health Organization (WHO) estimates cookstove smoke to be the fourth-worst overall health risk in developing countries.

In addition to devastating health and social impacts, growing evidence points to smoke from cookstoves – also referred to as black carbon – as second only to CO₂ in contributing

to global warming and climate change.²⁶ In most cultures, cooking is traditionally practiced inside the house, thereby disproportionately subjecting women and young children to harmful fumes (Total Suspended Particulate Matter and Respirable Suspended Particulate Matter) from inefficient stoves. WHO estimates nearly 2 million deaths are attributed to indoor air pollution every year.

In response, a group of public and private organizations have banded together to develop a project aimed at providing 100 million cleanburning stoves to villages in Africa, Asia and South America by 2020. In 2010, the project received about US\$50 million in funding from the US Government to sit alongside a further US\$10 million contributed by more than a dozen other partners including governments, multilateral organizations and corporate sponsors.

The project has already achieved notable success. In the first year of operation, the organization raised almost US\$80 million from a variety of organizations such as Dow Corning which, in September 2011, provided US\$5 million in unrestricted funding. The group has also seen exponential growth in the number of participating partners, swelling the ranks from just 20 in 2010 to 175 in September 2011. This includes 21 countries from across five continents.

According to Dr. Maria Neira, director for the WHO's Department of Public Health and Environment, "WHO is wholeheartedly joining in and supporting the work of the cookstoves alliance as it has the potential to halve childhood pneumonia mortality and dramatically improve the health of women through reducing lung cancer and disabling respiratory disease."

²⁴ <http://www.who.int/mediacentre/factsheets/fs292/en/>.

²⁵ Ibid.

²⁶ GVEP *International Cookstoves and Markets: Experiences, Successes and Opportunities*.

Conclusion:

Making resources work harder

Given all of the sustainability impacts that are now facing the healthcare system, it seems clear that these challenges will compound the fact that there is simply not enough money or capacity to respond to the critical need for health services.

As a result, financial and human resources that are at our disposal work harder and more effectively to help respond to the challenges ahead.

That means that we need to explore new approaches to the delivery of health. There needs to be more collaboration between public and private organizations to help build infrastructure and develop innovative programs to help improve the delivery of care. The Healthcare industry needs to think differently about the way service delivery is approached by harnessing new technologies. And there is need to re-examine the efficiency of our health systems and infrastructure to help make better use of water, energy and waste management to reduce the cost and environmental impact of healthcare.

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