Future of Healthcare Delivery: Strategies that will Reshape the Healthcare Industry Landscape

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Abstract: *Healthcare is in the throes of great change. And history has shown that large-scale disruption incubates innovation. The issue of balancing affordability and value with respect to health care is to define the dimensions of interest and place them in priority order. Primary focus on optimizing health care allocations and investments, notwithstanding, the real purpose is to maximize health. Quality health care is essential - as it is a critical element in enhancing the health of the population. Other priorities include value - getting the best; and the affordability - not spending too much. There is a need to build a stronger healthcare delivery system rightfully led by primary care that seeks to remain cost conscious, efficient in its delivery, and fairly compensated for helping people attain a healthy life. Healthcare is in the midst of transformational change in the way it is financed. Rising health care costs; the new approach to cost containment (which asks individuals to pay more for their own health care) is going to lead to tiering, in which those with higher incomes will be able to afford a wider range of health care services than those with lower incomes; and growing number of elderly people, suggesting a rapid increase in funding for long-term care and the development of alternatives to nursing home; new and reemerging infectious diseases, rediscovery of lifestyle-related health issues (smoking, obesity, diabetes, cancers) and the advances in technology. Consumers are expecting higher levels of quality. Service industries have moved toward "data-driven" methods in which they closely monitor their processes for anomalies; the response has to be more efficient systems with fewer errors. But the pace in Health industry is slow. New drugs and devices meant that people are living longer and healthier lives than ever before, but the health care experience has become complex. Hospitals and health systems will face ever more pressure in next few years to establish the core skills needed to thrive in a rapidly changing healthcare market. Healthcare leaders continue to put infrastructure and governance practices in place to support value-based models even as providers still have significant fee-for-service revenue. Health organizations that are shifting to value-based models must contend with the realities and limits of their local economies, the strategies of large employers for reducing their healthcare costs, concentration of the payer market and physician practice alignment. Health systems with cash reserves and strong margins are better positioned to make investments that are related to. Investments that can supplement declining revenue from payers can include ambulatory care centers, telemedicine, business software development and pharmaceutical research. These developments point towards opportunities for improvements in the delivery of health care. The building block is operational efficiency, such as optimizing staffing and managing the supply chain efficiently. Changing the way care is delivered with the right providers at the right place at the right time, reducing unnecessary services and focusing on value is essential for the survival in the competitive market. This paper focuses on health transformation, technological advances, health economics, health insurance, universal health care and future trends in healthcare delivery system.*

Keywords: Healthcare, Financing, Technology, Evidence Based Healthcare, EBM, ICT, Hospitals, Health Insurance, Technological advances, future trends, universal health coverage, Sustainable Development Goals, emerging infection, DALYs, Emerging Infectious Diseases, Mental Health, Antibiotic Resistance, Telehealth, Telemedicine, Universal Health Coverage, Lifestyle diseases

1. Background

The melting of barriers among nations and their increasing interconnectedness, accelerated by technology, has led to a change in the world order that has had a profound impact on socioeconomic landscape and also health care delivery. Standards of health profoundly influence economic performance and quality of life. The past three decades have witnessed enormous gains in medical science. Many infectious diseases are on the retreat because of improved sanitation, nutrition, drugs, and vaccines and life expectancies are rising. Urbanization could decrease the incidence of water born and parasitic diseases if it improves access to clean water and better sewerage. But the virulence of old infectious scourges such as tubercloses and malaria has resisted modern science, and in recent decades AIDS, SARS, H1N1, H5N1, Ebola, etc have emerged as a sizable cause of death and disability among adults in the 15-59 age group. Moreover, the toll exacted by infectious diseases is increasingly overshadowed by that of non-communicable diseases such as cancer, injuries, diabetes, hypertension, coronary artery disease, tobacco use and neuro-psychiatric conditions. The future contribution of health to sustainable development will depend on successful action on these fronts. Our planet has to be sustainable - this realization has hit businesses perhaps the hardest in recent times. In the coming decades, we are likely to see a lot of focus directed towards applying management principles to solutions of complex social issues such as environmental sustainability, energy security, access to healthcare etc. This will also underline the need for increased interdisciplinary interaction and influence on management.[1,2,3,4,5,6,7,8,9,10]

A resilient health system is one able to absorb the shock of an emergency like Ebola and at the same time continue to provide regular health services, leaving other sectors of the country fully functioning. In Guinea, Liberia, and Sierra Leone, the 2014 Ebola outbreak has claimed many lives and laid waste to economies, food provision, and development.

The World Bank's forecast of tens of billions of dollars lost for the three affected countries and the broader west Africa region points to the interdependence between health and countries' wider socioeconomic landscape. Using the concept of disability adjusted life years (DALYs) - which expresses years of life lost to premature death and years lived with a disability – injuries account for 16% of all DALYs, followed by psychiatric conditions (10%), non communicable diseases (10%), and HIV / AIDS, Tuberculosis, and maternal conditions (7%). Major childhood conditions caused by diarrheal and respiratory infections and by malaria comprise another major component of DALYs.[11,12,13,14,15,16,17,18]

The risks from injury are likely to increase – road traffic accidents are already the ninth leading cause of DALYs worldwide, and the fifth highest in developed economies. With longer life expectancies and older populations, many middle-income and some low-income countries will see an increase in the incidence of lifestyle diseases. This will lead to rising expenses on diagnosis and curative treatment. Globally, life style diseases, psychiatric ailments, injuries and emerging infectious diseases could shave several points off the GDP growth rate by winnowing the number of prime age adults. The speed with which new stains of influenza and cholera have spread throughout the world testifies that these diseases could also substantially raise expenditures on health care.[19,20,21,22,23,24]

Countries will need to pursue a multi-track strategy, with the priorities dictated by levels of income, financing, age profile, social circumstances, and organizational capacity. Preventive measures propagated by educational campaigns are likely to be the most cost effective against HIV, smoking, maternal complications, and conditions affecting children. Simple but highly effective technologies could be the most effective measures. Confronting emerging and re-emerging infectious diseases will require a broader effort that embraces housing and the infrastructure of health services. This will require coordination between sub-national entities, with some centralized over site and funding. The answer to many old and new diseases, including possibly heart disease, could lie in new DNA-based vaccines, better drugs that draw on advances in genetic engineering, and ingenious new ways of targeting and destroying pathogens inside the body. Nevertheless, chronic conditions, injury, and poor mental health, which will be responsible for a growing share of DALYs, will be best held in check by sustained educational efforts to influence living and eating habits and by controlling environmental hazards. Greater effort must be reinforced by well-orchestrated action at the international level, with a coordinated division of labour among international agencies. This will ensure the requisite provision of public goods, and the management of health–related externalities, whose likelihood has been greatly magnified by globalization.[25,26,27,28,29,30,31]

2. Driving Forces

During the 21st. Century (century of knowledge), the driving forces that will influence healthcare delivery include epidemiological, demographic, technological, and quality pressures besides emergent infection and consumerism. There will be increasing need for the Ambulatory care/Daycare as it costs less (30-60% as compared to inpatient care). Other emerging trends include growth of smaller hospitals (mostly in private sector), single-specialty and stand-alone centres. Hospitals will place more emphasis on Outsourcing services like housekeeping, security, dietary services, chronic services, better facility and quality, increased spectrum of services and downsizing.[32,33,34,35,36]

Similarly Hospital administration will pay more attention towards technology - diagnostic, therapeutic, laboratory, equipment cost, capital intensive, equipment planning, procurement and maintenance, standardization, variety reduction, training of users, environment and control. Hospital planning needs to be more scientific with strong emphasis on energy conservation. Ethical & legal issues will have to be properly addressed. It seems that healthcare will be a relentless economic, political, social, and ethical challenge with which we all deal with in one way or another. Personally.[1,2,3,4]

We are living in exciting times. Technology is transforming every aspect of the way we live. Perhaps no area is more important or more profound than the innovations we are seeing in healthcare. As the industry looks to leverage technology to increase access to information, drive better patient outcomes and unlock mysteries hidden in plain sight, it is facing the enormous challenges of privacy and security that are perhaps more worrisome in healthcare than in any other industry. In today's health-conscious world, it's hard to miss the ubiquitous Fitbit and other personal monitoring tools that help people track fitness activities, sleep patterns, blood pressure and caloric intake. But these tools are just the beginning. Increasingly sophisticated apps and nanotechnology will not only empower individuals to track their own health, they will also deliver troves of actionable data to the medical community. The next step will be integrating all of that data into our healthcare system to help anticipate and prevent broader health issues.

Digitalization is making us ask ourselves new questions; what, how, who, where, when and why? It's has slowly but surely been spreading it is impact in even the smallest corners of all organisations. For researchers, cloud technology will make massive amounts of healthcare data easy to access and analyze, facilitating innovation and rapid response to warning signals. For doctors and patients, transitioning medical records from paper to digital and then moving them to the cloud, will improve the everyday needs of the medical community – streamlining billing, giving patients access to their information and providing doctors with a more complete picture of a patient's medical history.

By 2020, 30 billion connected devices will generate unprecedented amounts of data, and the world's data centers will consume up to 30% of the world's electricity to support them. As 3D printing technology advances, its medical uses are becoming increasingly clear. It will revolutionize the manufacturing of medical devices and surgical tools – personalized prosthetic limbs and other body parts, precision drug dispensing, fluidics modeling – the possibilities continue. Recent advances in technology will spur new wave

of innovation in healthcare. In 2012, MIT researchers found a way to implant memories into a brain, which has enormous consequences for mental health. A company called Emotiv has found a way to translate thoughts into action through neuro-headsets. These discoveries and cutting-edge tools will allow us to access brain information in noninvasive ways, opening up new spectrums of science and human understanding. Global health will improve with the expansion of technology to developing countries. The goal is to use these technological developments to offer care to nearly everyone, no matter where they live. Technology is not only saving lives, it's opening up new frontiers that were previously unimaginable.[37]
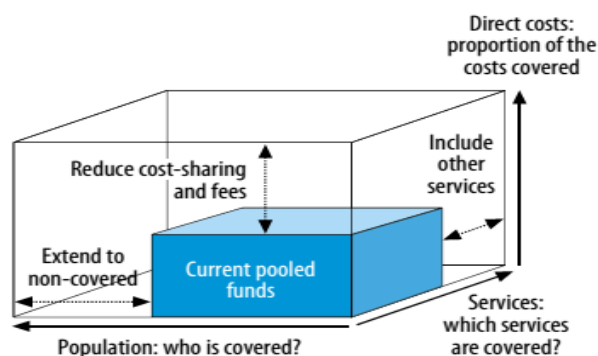
Universal Health Coverage

Universal Health Coverage (UHC) means that all people who need quality, essential health services (prevention, promotion, treatment, rehabilitation, and palliation) receive them without enduring financial hardship. UHC is indeed considered one of the key components of the Sustainable Development Goals (SDGs) to ensure healthy lives and promote wellbeing for all people at all ages. Arguably, healthy populations are the basic engine to reach sustainable development, and health contributes to all 17 SDG targets. Evidence to measure specific health effects is, however, ill-defined - eg, the relationship between health and marine resources or urbanisation.[37]

The goal of universal health coverage is to ensure that everyone can use the health services they need without risk of financial ruin or impoverishment.[37] The idea that everyone should have access to the health services they need underpinned a resolution of the 2005 World Health Assembly, which urged Member States "to plan the transition to universal coverage of their citizens so as to contribute to meeting the needs of the population for health care and improving its quality, to reducing poverty, and to attaining internationally agreed development goals".[38] The twin goals of ensuring access to health services, plus financial risk protection, were reaffirmed in 2012 by a resolution of the United Nations General Assembly which promotes universal health coverage, including social protection and sustainable financing.[39] The 2012 resolution goes even further; it highlights the importance of universal health coverage in reaching the MDGs, in alleviating poverty and in achieving sustainable development.[40] As a descendant of the "Health for All" movement, universal health coverage takes a broad view of the services that are needed for good health and well-being. These services range from clinical care for individual patients to the public services that protect the health of whole populations. They include services that come from both within and beyond the health sector. Financial risk protection is one element in the package of measures that provides overall social protection.[41] Protection against severe financial difficulties in the event of illness gives the peace of mind that is an integral part of well-being. To support the goal of universal health coverage is also to express concern for equity and for honouring everyone's right to health.[42] These are personal and moral choices regarding the kind of society that people wish to live in, taking universal coverage beyond the technicalities of health financing, public health and clinical

care. With a greater understanding of the scope of universal health coverage, many national governments now view progress towards that goal as a guiding principle for the development of health systems, and for human development generally. It is clear that healthier environments mean healthier people.[43] Preventive and curative services protect health and protect incomes.[44,45] Healthy children are better able to learn, and healthy adults are better able to contribute socially and economically. The path to universal health coverage has been dubbed "the third global health transition", after the demographic and epidemiological transitions.[46] Universal coverage is now an ambition for all nations at all stages of development. The timetable and priorities for action clearly differ between countries, but the higher aim of ensuring that all people can use the health services they need without risk of financial hardship is the same everywhere. [Fig. 1,2,3]

The goal of universal health coverage is to ensure that all people obtain the health services they need – prevention, promotion, treatment, rehabilitation and palliation – without risk of financial ruin or impoverishment, now and in the future. Since 2005, when all WHO Member States made the commitment to universal health coverage, many advances have been made in the provision of health services and in financial risk protection. This is illustrated by progress towards the healthrelated Millennium Development Goals (MDGs), and in the widespread fall in cash payments made for using health services. Despite this progress, the coverage of health services and financial risk protection currently fall far short of universal coverage. Thus nearly half of all HIV-infected people eligible for antiretroviral therapy were still not receiving it in 2011; and an estimated 150 million people suffer financial catastrophe each year because they have to pay out-of-pocket for health services. The conditions causing ill-health, and the financial capacity to protect people from ill-health, vary among countries. Consequently, given limited resources, each nation must determine its own priorities for improving health, the services that are needed, and the appropriate mechanisms for financial risk protection.[37]

Fig. 1 **Measuring progress towards universal health coverage in three dimensions**

Source: The World Health Report 2010. Health systems financing: the path to universal coverage. Geneva, World Health Organization, 2010.

"First, who has the right to demand health? We believe the answer is everyone. UHC is within the mandate of the right

to health rooted in the International Covenant on Economic, Social, and Cultural Rights. Non-governmental organisations (NGOs) are concerned that current SDG discussion around UHC is less around rights of people and more about the opportunity to open national health markets to international corporations. UHC national plans must have an accountability mechanism from the outset to ensure that governments and providers (private sector included) deliver services fairly. Second, what about quality of care? Financial risk protection alone is not enough. Early national discussion on quality, approachable compassionate care, cost of services, and user friendliness are crucial - without which UHC is meaningless. Lin says, "it is pointless to have 100% coverage if people die in hospital due to poor quality care, but quality tends to superficially translate to nice facilities rather than the conventional definition of overuse, underuse

and misuse". Patient experience is a crucial component in quality evaluation. Finally, how can we progress towards equity and include the most vulnerable populations? Equity must underpin national health and development planning to address the unfinished MDGs and to make the benefits of sustainability equitably distributed. UHC beyond 2015 must start and end with people. Listening to different experiences with illness and specific needs in all contexts, learning from other countries—not only those who have excellent services and 100% coverage, but also from national programmes that have given users of health services a role in accountability—will mean that strong responsive systems can be built. Health can then be claimed as the universal right that post-2015 generations can fully deliver on." [47]


Fig. 2 A representation of the results chain for universal health coverage, focusing on the outcomes
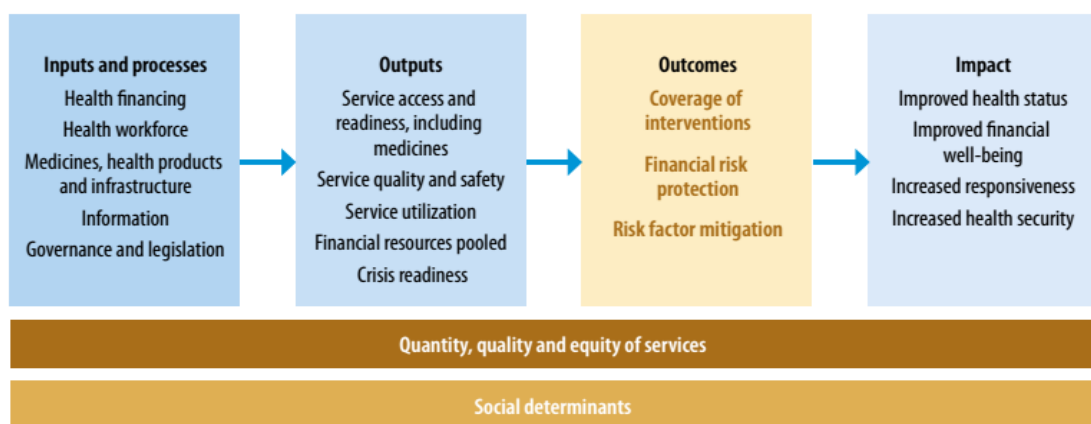
Note: Each of these outcomes depends on inputs, processes and outputs (to the left), and eventually makes an impact on health (to the right). Access to financial risk protection can also be considered an output. All measurements must reflect not only the quantity of services, but also quality and equity of access (first cross panel). Equity of coverage is influenced by "social determinants" (second cross panel), so it is vital to measure the spectrum from inputs to impact by income, occupation, disability, etc.

Source: The world health report 2013: research for universal health coverage

Fig. 3 A framework for measuring and monitoring the coverage of health services
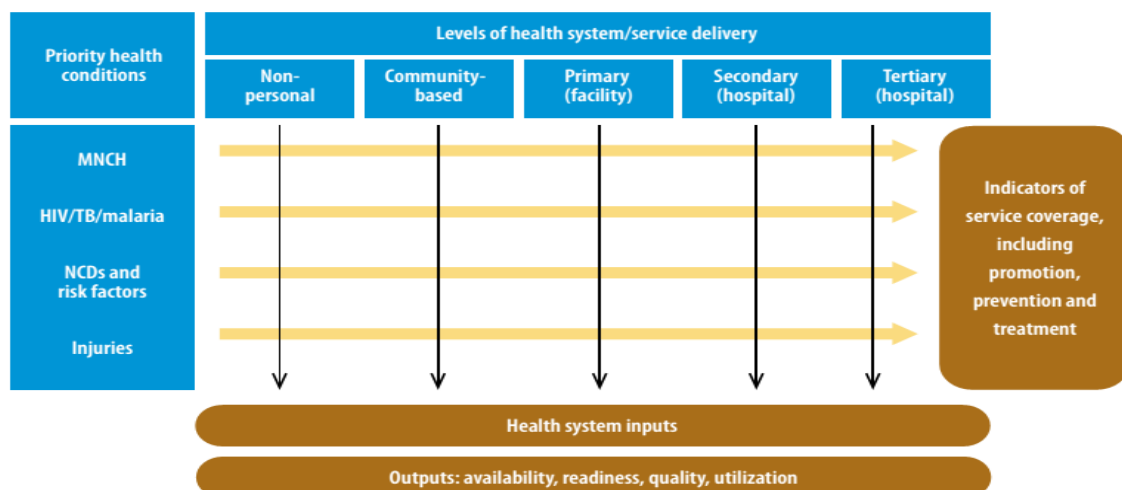
HIV, human immunodeficiency virus; MNCH, maternal, newborn and child health; NCDs, noncommunicable diseases; TB, tuberculosis.
Note: "Non-personal" health services are actions applied either to communities or populations – such as mass health education, policy development or taxation – or to the nonhuman components of the environment – such as environmental health measures. Community-based health services are defined as individual and community health actions delivered in the community (e.g. by community health workers) and not through health facilities. They are often considered to be part of the primary health care service.

Source: The world health report 2013: research for universal health coverage

All eight of the MDGs have consequences for health, but three put health at front and centre – they concern child health (MDG 4), maternal health (MDG 5), and the control of HIV/AIDS, malaria, tuberculosis and other major communicable diseases (MDG 6). To highlight just one of these, MDG 4 calls for a reduction in the number of child deaths from 12 million in 1990 to fewer than 4 million by 2015. Although great strides have been taken since the turn of the millennium, especially in reducing deaths after the neonatal period, the best measurements indicate that nearly 7 million children under five years of age died in 2011. From experience in high-income countries, we know that almost all of these deaths can be prevented. But how can that be done everywhere? One idea is to make greater use of community-based interventions. These rigorous investigations have the potential to benefit millions around the world. They confront the challenge presented by just one of the MDGs, but they capture the general spirit of this report – to promote investigations in which creativity is harnessed by the highest-quality science in order to deliver affordable, quality health services and better health for everyone. More than that, the process of discovery is a source of inspiration and motivation, stirring ambitions to defeat the biggest problems in public health. This is the purpose of Research for universal health coverage.[48]

There are plenty of creative ideas about how to achieve comprehensive health care. They come from both within the health sector and beyond it and will flourish wherever they are permitted and encouraged to do so. Research to stimulate and harness new ideas is growing worldwide. The growth is uneven, but most countries now have the foundations on which to build effective research programmes. In low- and middle-income countries, the principal challenges are to strengthen research systems, identify key research questions, and generate the capacity to turn research into practical applications. Research is the development of knowledge with the aim of understanding health challenges and mounting an improved response to them.[49,50] Research is a vital source, but not the only source, of information that is used to develop health policy. Other considerations – cultural values, human rights, social justice and so on – are used to weigh the importance of different kinds of evidence in decision-making.[51,52] All nations will benefit from taking a systematic approach to the monitoring and evaluation of research investments, practices, outputs and applications. Research for universal health coverage is not a luxury; rather, it is fundamental to the discovery, development and delivery of interventions that people need to maintain good health.[53] If "the best days for public health are ahead of us" it will be, in part, because the best days for health research also lie ahead.[54] Research for universal health coverage addresses questions on three levels. First, what is the nature of the health problem, e.g. is it disease-related or health-system related? Second, what specific question is being asked, and where is this question placed in the cycle of research from understanding causes to applying solutions? Third, what is the most appropriate study design for addressing the question at hand? Research illuminates the path to universal health coverage and to better health. Research is not merely an essential tool for improving health services; it is also a source of inspiration for public health.[37] The World Health Report 2010 on financing for UHC has

managed to draw attention to the core financing functions of progressive equitable and efficient financing of health systems that hitherto have escaped policy makers' attention.[55]

3. Trends for Future Health Care

The number of individuals arriving at age 65 will increase dramatically. More patients will be living longer. The ability to treat patients with chronic disease such as heart disease is clearly lengthening their lives; in the next 30 years, the number of people with heart disease in the United States is expected to double. As genetic diagnosis and treatment translate from cell to bedside, the information and armamentarium available to the clinician will increase perhaps inconceivably over the next 10 years. Markedly improved less invasive imaging (e.g., computer assisted diagnosis of coronary artery disease combining echo, magnetic resonance, and positron emission tomography) along with less invasive treatment using catheter techniques will provide better functional outcomes with earlier resumption of activity. DNA chip technology or genetic fingerprinting will vastly improve risk assessment. Knowledge of the risks will increase the ability of other technology to extend life. Yet techniques such as these will require that we face and attempt to resolve a series of new ethical questions. Electronic technology will also improve efficiency. The electronic medical record will be tied directly to billing. It will soon be possible for a physician to dictate directly into the record and have software that analyzes the type of visit or procedure and creates a Current Procedural Terminology (CPT) Code automatically. The information deriving from patient care will improve. With the Internet and its successors, the electronic medical record will not only be able to store patient information but also to provide information on "best practice" instantaneously. The opportunities for "online clinical research" are clear. The ability to question large numbers of patients and large segments of the general population may provide overall improved definitions of "quality" from the patient perspective.[56,57,58]

With improved availability of data to the public, process and outcomes will improve. Those not capable of achieving the best outcomes will likely either improve or stop doing the procedure. Process and outcomes will be optimized for a significant proportion of patients with relatively common diseases. With these patients, care will become more regularized, making it possible to develop a better understanding of the best care delivery model. It will be possible to measure the outcomes interventions in the management of certain diseases and determine the best utilization of each, creating better "hand-offs." As the population ages, specialists will be needed in the areas of disease that currently afflict the aging and also in areas of emerging diseases that are now relatively rare but will become more prevalent as other more common diseases become preventable, possibly even leading to the development of new specialties. There will be greater self-diagnosis and self-care as patients obtain more information from the Internet. Hospitals will be places for extremely ill patients, with the remainder of patients at home communicating on the Internet.[56,57,58]

Emerging Infectious Diseases

Antimicrobial resistance (AMR) threatens the effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses and fungi. It is an increasingly serious threat to global public health that requires action across all government sectors and society. Patients with infections caused by drug-resistant bacteria are generally at increased risk of worse clinical outcomes and death, and consume more healthcare resources than patients infected with the same bacteria that are not resistant. Nearly 300 million people will die as a result of drug resistance during the next 35 years. This would have a catastrophic knock on effect on the world's economy, reducing global GDP by 2–3·5% more than it should otherwise have been in 2050. In addition to antibiotic resistance, the review projects figures for resistance to antimalarial, HIV, and tuberculosis drugs. There is a need for coordinated action, politically, nationally, and internationally. The next milestone is a Global Action Plan due to be ratified at the World Health Assembly in May, 2015, and the push for the inclusion of antimicrobial resistance as a post-2015 sustainable development goal. AMR is a complex problem driven by many interconnected factors. As such, single, isolated interventions have little impact. Coordinated action is required to minimize emergence and spread of AMR. People can help tackle resistance by using antibiotics only when they are prescribed by a certified health professional, completing the full treatment course, even if they feel better; never sharing antibiotics with others or using leftover prescriptions. Health professionals can help tackle resistance by enhancing infection prevention and control; prescribing and dispensing antibiotics only when they are truly needed; prescribing and dispensing the right antibiotic(s) to treat the illness. Policymakers can help tackle resistance by: strengthening resistance tracking and laboratory capacity; strengthening infection control and prevention; regulating and promoting appropriate use of medicines; promoting cooperation and information sharing among all stakeholders. Policymakers, scientists and industry can help tackle resistance by fostering innovation and research and development of new vaccines, diagnostics, infection treatment options and other tools. What role society has towards its prevention? To eliminate infection from the human population by mid-2015, as UNO hopes, the world must intensify its fight against this virus, but we should also recognize that we need better ways to combat international health hazards of all kinds. If epidemics such as Ebola are to be contained, then they must be tackled at their source; that means rapid detection and effective action at the earliest, more manageable stages. To better achieve this in future, we need to bolster global surveillance and enhance national and international capability to react appropriately. The foundations of a more effective response already exist in the form of multidisciplinary technical networks, WHO's Global Outbreak and Alert Response Network, the Training Programs in Epidemiology and Public Health Interventions Network, the logistics and special competences of the international humanitarian system, and the International Health Regulations. But these existing elements need to be brought into a stronger system of global governance that can manage a variety of health hazards, especially infectious diseases. Building national capacity is paramount, and the strengthening of national health services is vital. The new mechanism would include an adequately resourced global rapid reaction capability to manage major incidents and provide immediate and sustained assistance where local health services are at risk of being overwhelmed, or where there is a major risk of international spread. There is a need to improve contingency planning and coordination; develop and stockpile diagnostics, drugs, and vaccines; set up sequencing pipelines and data-sharing protocols; and anticipate public engagement and ethical issues. Disease surveillance and response are global public goods. World can drive Ebola infection out of the human population, but we must also do more to guard against, and respond to, similar crises in the future. Is it possible to eliminate infection from the human population by mid-2015 as UNO hopes? Hepatitis B virus infection is a major public health problem worldwide; roughly 30% of the world's population show serological evidence of current or past infection. Hepatitis B virus is a partly double-stranded DNA virus with several serological markers: HBsAg and anti-HBs, HBeAg and anti-HBe, and anti-HBc IgM and IgG. It is transmitted through contact with infected blood and semen. A safe and effective vaccine has been available since 1981, and, although variable, the implementation of universal vaccination in infants has resulted in a sharp decline in prevalence. Hepatitis B virus is not cytopathic; both liver damage and viral control—and therefore clinical outcome—depend on the complex interplay between virus replication and host immune response. Overall, as much as 40% of men and 15% of women with perinatally acquired hepatitis B virus infection will die of liver cirrhosis or hepatocellular carcinoma. In addition to decreasing hepatic inflammation, long-term antiviral treatment can reverse cirrhosis and reduce hepatocellular carcinoma. Studies on the natural history of HBV in the past few years have identified important risk factors for the development of hepatocellular carcinoma (HCC) and cirrhosis. The greatest detriment to treating HBV is the development of antiviral resistance. The consensus of guidelines is that the goal of treatment should be complete suppression of HBV DNA to a level undetectable by a polymerase chain reaction-based assay. The alfa interferons have the advantage that resistance does not develop to them and there is a limit to the duration of treatment of not more than 1 year, but only about 30% of patients respond to them. Entecavir and tenofovir are potent nucleoside/tide analogues that render most patients negative for HBV DNA. These two drugs have a high barrier to resistance and require more than one HBV mutation for resistance to occur, so they are currently considered first-line drugs. Providers need to remember to screen their high-risk patients for HBsAg and anti-HBs to identify persons with chronic HBV who need management and to vaccinate those who are negative with hepatitis B vaccine. It is important for clinicians treating HBV to minimize the risk of developing resistance while maximizing the probability that patients will have an excellent response to the antiviral medication chosen. Progression to cirrhosis depends on hepatitis B virus (HBV) genotype, hepatitis B e antigen (HBeAg) presence, persistently high levels of HBV DNA, and elevated alanine aminotransferase, although hepatitis B surface antigen (HBsAg) kinetics may help predict natural history and antiviral response. Antiviral resistance limits the success of nucleos(t)ide analogs and agents such as entecavir and

tenofovir with high potency and high genetic barrier to resistance are considered first-line therapy. Specialized treatment of CHB in pregnancy, coinfection, decompensated cirrhosis, and posttransplant is safe and effective. Development of new therapies that can improve HBsAg clearance and virological cure is warranted.

Emergent Infection and Re-Emerging Infectious Diseases is a major Public Health problem world over. The Ebola outbreak in West Africa constitutes an 'extraordinary event' and a public health risk to other States; the possible consequences of further international spread are particularly serious in view of the virulence of the virus, the intensive community and health facility transmission patterns, and the weak health systems in the currently affected and most at-risk countries. A coordinated international response is deemed essential to stop and reverse the international spread of Ebola. The Response to EIDs needs to be robust, prompt, dependable and a top priority for Governments to prevent further loss of human life.

Antibiotic Resistance

Some clinical isolates of many pathogenic bacterial species —Mycobacterium tuberculosis, Neisseria gonorrhoeae, Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa, and species of enterobacter, salmonella, and shigella — are now resistant to most antibiotics. The problem seems out of control. Progress has recently been made some key challenges to ensuring that antibiotics retain an effective role in medicine. Innovative experiments in public–private partnership are under way for antibiotic-drug discovery. Sound solutions will require a global organization with the authority, leadership, and resources to oversee collaboration of the health, security, economic, and development sectors; maintain global surveillance of antibiotic resistance; and manage rewards for developing and conserving antibiotics. Better diagnostics could allow prescriptions to be tailored narrowly to a pathogen's susceptibilities. Adoption of such technology would require physician education, suitable reimbursement, and documentation of outcomes. The problem of Antibiotic Resistance threatens the achievements of modern medicine. A post-antibiotic era is a very real possibility for the 21st century. Innovative experiments in public–private partnership are under way for antibiotic-drug discovery. Antibiotics' growing lack of effectiveness has spurred resurgence in infection surveillance and control practices. Despite progress on these fronts, securing a long-term ability to treat bacterial infections requires leadership, delinking monetary rewards from drug sales, access to lifesaving antibiotics to all who need them while restricting overuse, Conservation through prescription tailored to diagnosis through physician education, suitable reimbursement, and documentation of outcomes, building sufficient infrastructure to allow medical personnel to distinguish among pathogens before antibiotics are prescribed. The need for new antibiotics to effectively treat antibiotic-resistant infections remains unfulfilled. Despite the well-publicised concern over this issue, only two novel antibiotic classes have been introduced in the past 20 years alongside several new agents of existing classes. Accordingly, the current antibiotic armoury remains inadequate to meet the challenges posed by resistance today. More worryingly, there are very few new agents being developed that can be expected to replace existing antibiotics that succumb to the rising tide of resistance. In January 2013, the World Economic Forum placed antibiotic resistance on the global risk register alongside terrorism and global warming. According to a Princeton University study, India has emerged as the world's largest consumer of antibiotics with a 62% increase in use over the last decade. Globally, antibiotic use has risen by 36% during the period, with Brazil, Russia, India, China, and South Africa accounting for 76% of the increase. An average Indian has been found to be popping over 11 antibiotic pills a year. India's antibiotic use went up from 8 billion units in 2001 to 12.9 billion units in 2010. Conservation of effective antimicrobial agents is essential, and a range of global and regional authorities such as the World Health Organization have identified antimicrobial stewardship as one of the key interventions in combating antimicrobial resistance. extensive use of antibiotics has raised a serious public health problem due to multiantibiotic resistant bacterial pathogens that inevitably develop resistance to every new drug launched in the clinic. Consequently, there is a pressing need to develop new antibiotics to keep pace with bacterial resistance. Recent advances in microbial genomics and X-ray crystallography provide opportunities to identify novel antibacterial targets for the development of new classes of antibiotics and to design more potent antimicrobial compounds derived from existing antibiotics respectively. To prevent and control infectious diseases caused by multiantibiotic resistant bacteria, we need to understand more about the molecular aspects of the pathogens' physiology and to pursue ways to prolong the life of precious antibiotics. Antibiotics have been falling to resistance for almost as long as people have been using them. Consumption of antibiotics is ever-increasing. Before bacteria win the battle and currently treatable infections become fatal, doctors, patients, and governments need to take responsibility to ensure that antibiotics are used far more rationally. Discovery of new antibiotics is a necessary but not sufficient solution because of the high cost and lengthy timelines. Thus, action to control prescription practices should be a key feature of intervention strategies.

Lifestyle Diseases

One of the greatest challenges facing societies in the 21st century is the changing burden of disease, with a shift from communicable to non-communicable diseases affecting countries at all levels of development. Chronic diseases pose a particular challenge to public health systems because of their multifactorial nature and frequently strong links to lifestyle-related factors such as smoking, diet, alcohol use, and physical activity. Persisting health inequalities are of particular concern, with people disadvantaged because of education, income, or social position less likely to participate in healthy behaviours. There is co-occurrence of health risk factors, with people living in deprived areas tending to have higher rates of multiple risk factors than those living in more affluent areas. Deprivation is also associated with a larger burden of chronic disease and, in particular, multimorbidity, including mental health

disorders. This pattern of health inequality is noted internationally. There is a strong need for Public Health Professionals to maximisation of the value of health and incentives for healthy behaviour; promotion of healthy choices as default; and minimisation of factors that create a culture and environment which promote unhealthy behaviour. How best can we reduce inequalities in health keeping in view evolving waves of Public Health development - structural, biomedical, clinical, social and especially to promote the active participation of the population as a whole; and to renew focus on working together towards health as a common good?

The *Tobacco* epidemic is one of the biggest public health threats the world has ever faced, killing nearly six million people a year. More than five million of those deaths are the result of direct tobacco use while more than 600 000 are the result of non-smokers being exposed to second-hand smoke. Approximately one person dies every six seconds due to tobacco, accounting for one in 10 adult deaths. Up to half of current users will eventually die of a tobacco-related disease. Nearly 80% of the more than one billion smokers worldwide live in low- and middle-income countries, where the burden of tobacco-related illness and death is heaviest. Tobacco users who die prematurely deprive their families of income, raise the cost of health care and hinder economic development. Unchecked, tobacco-related deaths will increase to more than eight million per year by 2030. More than 80% of those deaths will be in low- and middle-income countries

Globally, *Diabetes* Type 2, has emerged as a major health problem over the last two decades. In 2014, 9% of adults 18 years and older had diabetes. In 2012 diabetes was the direct cause of 1.5 million deaths. More than 80% of diabetes deaths occur in low- and middle-income countries. Type 2 diabetes comprises 90% of people with diabetes around the world, and is largely the result of excess body weight and physical inactivity. To help prevent type 2 diabetes and its complications, people should: achieve and maintain healthy body weight: be physically active – at least 30 minutes of regular, moderate-intensity activity on most days. More activity is required for weight control; eat a healthy diet of between 3 and 5 servings of fruit and vegetables a day and reduce sugar and saturated fats intake; avoid tobacco use – smoking increases the risk of cardiovascular diseases. According to an estimate one in 10 of the world's population will have diabetes by 2035. New wealth and development in the Middle East has already led to one in 10 adults having the disease. The greatest number of people with diabetes worldwide are between the ages of 40 and 59. Every six seconds someone dies from diabetes. Diabetes imposes unacceptably high human, social and economic costs on countries at all income levels . In Africa, three quarters of diabetes deaths are in people under 60 years old, handicapping Africa's ability for development. In 2013, the world spent $548 billion (US) on diabetes health care (11 percent of the total spent for health care worldwide). Nearly 175 million people are currently undiagnosed and progressing toward complications unaware. The number of people with diabetes globally will increase by 55 percent by 2035.[4,11] Diabetes is not merely a health issue, but also a political issue, one which requires a holistic approach with

peoples involvement. The National Diabetes Education Program—a partnership between the National Institutes of Health and the Centers for Disease Control and Prevention—has issued Guiding Principles for the Care of People With or at Risk for Diabetes that focus on areas across the spectrum of care in which there is general agreement in existing guidelines. The ten guiding principles cover areas such as identification of people with undiagnosed diabetes and prediabetes, provision of self-management education, nutrition therapy, physical activity, control of blood glucose, and management of complications. The final guiding principle—to provide patient-centred care, defined as "providing care that is respectful of and responsive to individual patient preferences, needs, and values"—is perhaps the most important. Achieving this goal can be challenging; patient preferences might go against evidence-based guidelines, and discussion of pros and cons and patient goals requires time and effort. As a result, patient-centred care might be seen as worthy but too difficult. However, such an approach is crucial to diabetes; the foundations of treatment and prevention—self-management, improved nutrition, and increased physical activity—are much more likely to be achieved with it than without it.[11] [Fig. 4]
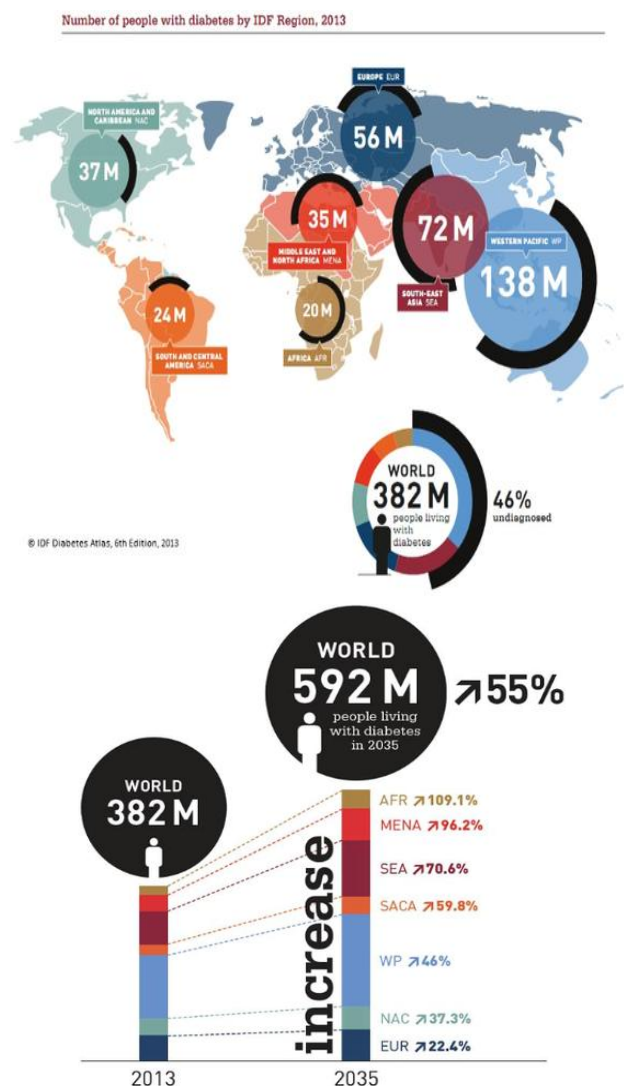

Figure 4: (a,b): Number of people living with Diabetes

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Mental Health

Mental health is a fundamental prerequisite for overall health, and ample evidence shows that countries around the world need to improve the priority and organisation of, and resources devoted to, mental health care. Yet the global mental health movement will not lack challenges in the future. The statistics indicate that mental illness is responsible for about 13% of the global burden of ill health, and almost a quarter of years lived with disability, yet receives no more than 2% of health funding in most developing countries. Despite the unprecedented number of people living with mental illness in the U.S., only about one-third of those in need of treatment will ever seek professional help. Although traditional psychotherapy is undoubtedly effective for many, some mental health professionals are actively searching for new treatment methods in order to make mental health care more accessible for the general public. Ultimately, they argue that alternative forms of treatment other than psychotherapy are necessary if the medical community hopes to see a decline in the prevalence and affliction of mental illness in the U.S. Consideration needs to be given to human rights issues and to cultural, indigenous, gender and age issues in analysing the conceptual underpinnings of mental health laws. Legislators need to look at balancing protection and care in order to establish some of the guiding principles and values that should be taken into account in developing a legal framework. The World Health Organisation emphasises the importance of clinical guidelines in minimising intrusive treatments such as restraint and seclusion for both involuntary and voluntary patients. The direction of innovation in health care can be influenced by basic incentives in payment systems. Management of mental health care under public and private insurance has focused on controlling the use and cost of the traditional mental health sector made up of specialty inpatient and outpatient mental health care. This has meant controlling fees, strictly limiting admission to inpatient facilities, and reducing the duration of outpatient mental health care. The design of managed care in mental health has left prescription drug usage, often handled by non–mental health practitioners, largely outside of management. This may be a key factor behind the patterns of mental health spending growth documented here. Mental Health for Sustainable Development aims to promote a threefold change in policy: bringing about an improvement in living and working environments to reduce the incidence of mental disorders; provision of psychiatric care appropriate to individual countries and cultures; and recognition of the rights of people with mental health issues.

Child Mortality

We have entered the year 2015 - final target year for the Millennium Development Goals (MDGs), it is already clear that the world is not quite going to achieve MDG4: to reduce the child mortality rate (under 5) by two-thirds between 1990 and 2015. The most recent report of the UN Interagency Group for Child Mortality Estimation has estimated that the child death rate dropped by 49% between 1990 and 2013, from 12·7 million deaths in 1990 to 6·3 million in 2013. Yet, despite an acceleration in the rate of

reduction, from a global average 1·2% per annum in 1990—95 to 4·0% per year in 2005—13, progress remains insufficient to reach MDG4. Although the number of under-5 deaths worldwide has decreased by 49% since 1990, the neonatal mortality rate (ie, deaths within the first 28 days of life), only declined by 40%. As a result, the proportion of under-5 deaths occurring in the first month of life has increased from 37% in 1990 to 44% in 2013. Reductions in pneumonia, diarrhoea, and measles collectively were responsible for half of the 3·6 million fewer deaths recorded in 2013 versus 2000. In 2013, the three leading causes of under-5 deaths worldwide were preterm birth complications (0·97 million), pneumonia (0·94 million), and intrapartum-related complications (0·67 million). Two of these three causes are concentrated in the neonatal, and particularly the early neonatal, period (the first week of life). The leading contributors to early neonatal deaths are preterm birth complications and intrapartum-related complications (birth asphyxia and birth trauma), together accounting for 40% of all neonatal deaths. Both of these causes of death are highly amenable to preventive and health-care interventions. What are the deficiencies in the system that hampered achieving MDG4?

Changing Health Needs of the People

About 0.13 percent of the world's population control 25 percent of the world's financial assets. The GDP (Gross Domestic Product) of the 41 Heavily Indebted Poor Countries (567 million people) is less than the wealth of the world's 7 richest people combined. The wealthiest nation on Earth has the widest gap between rich and poor of any industrialized nation. The poorer the country, the more likely it is that debt repayments are being extracted directly from people who neither contracted the loans nor received any of the money. Approximately 790 million people in the developing world are still chronically undernourished, almost two-thirds of whom reside in Asia and the Pacific. Worldwide, 2.2 million children die each year because they are not immunized, 15 million children orphaned due to HIV/AIDS (similar to the total children population in Germany or United Kingdom). 1.4 million die each year from lack of access to safe drinking water and adequate sanitation. Less than one per cent of what the world spent every year on weapons was needed to put every child into school by the year 2000 and yet it didn't happen. The poorest 40 percent of the world's population accounts for 5 percent of global income. The richest 20 percent accounts for three-quarters of world income, and 80 percent of humanity lives on less than $10 a day.

The WHO predicts that unmitigated climate change will lead to significant increases in illness and death brought on by environmental changes. Climate change - "threat multiplier" - is the greatest global health threat of the 21st Century. The effects of climate change on health have begun to be well established, but despite global and regional efforts to make connections between climate and health, planning and policy development continues to occur separately. Little attention has been paid to the health systems that must adapt to deliver services that can respond to changing disease patterns and health needs of people. Climate change will have far-reaching effects on how we build, organise, and manage health systems as complex institutions. Yet, to date,

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these challenges have largely been ignored by the research community. Disease surveillance, and the development and maintenance of early-warning mechanisms of climate change, will need to become a key function of health systems. Management of changing patterns of disease will necessitate planning for, and financing of, changing supply chains for drugs and test-kits and additional training for medical staff and new infrastructure projects must be climate-safe. A truly effective public health response will depend on actions taken across government and by other partners. Moreover, there is a need for adapted governance to protect health.

Opportunity for Innovation
As care for many patients becomes more regularized and process and outcomes data become more similar, competition among practitioners will be based less on who has the best outcomes for common diseases and more on ability to innovate: developing the best care delivery models for patients with common diseases or developing new strategies for patients with uncommon diseases or presentations.

Increasing Costs
Less wasteful tests and procedures will be done as better information on appropriate care becomes available, and more efficient care models will emerge with technology for care of patients at home, these improvements will be dwarfed by increasing costs. Consider the cost of doubling the number of patients with chronic cardiovascular disease, currently 13% of medical care costs. A recent analysis on the "magic bullet" that could prevent atherosclerosis reveals that the drug would not save money, since individuals will need to take what will likely be an expensive drug for their entire lifetime. [56,57,58]

Implications for Academic Health Centers (AHC)
Strategies must be developed to ride out the decreased patient care revenue, increased uninsured, and increased competition on the basis of price and increased expense on technology. The first strategy is to "push back" against the squeeze in prices by demonstrating to the patient that the AHC is "different" and "better." The AHC can and should be the engine that drives improved health. It is the AHC that will improve quality of care. The AHC has the tools and the personnel not only to improve patient care processes, but also to understand how to decrease costs in providing care while maintaining quality. AHCs must be an engine of innovation and continuously regenerate the next new knowledge in current quaternary programs and birth new quaternary programs as well. It will be important for AHCs to demonstrate innovation to patients and physicians by developing new ways to describe new techniques and treatment. Continued innovation can also be fostered by appropriate partnerships with industry. AHCs should create visible Centers of Excellence that are large and multidisciplinary. A tertiary program combined with quaternary programs, truly outstanding Centers of Excellence may be all that is required for the halo effect to steer patients in the direction of the AHC. [56,57,58] AHCs can also be "better" by improving both the effectiveness and efficiency of patient care. AHCs should develop centers for health services research that integrate with quality improvement programs and clinical research to create not only protocols for efficient patient care and demonstrating outcomes, but also integration of new drugs and devices into these protocols.

Technology Trends in Health Care

As online platforms and digital technologies rapidly emerge and change, we need partnerships between patients and health-care professionals, as well as a guide to prepare for the future technologies that will have to be implemented quickly in everyday practices and in the health management of patients. Whether it is correct and reliable medical information, dynamic resources, or medical records online, everything will simply be available to everyone. This would clearly be the most important development in the history of medicine.

The only way to prepare health-care professionals for the digital technologies coming to medicine is to include digital literacy in the official medical curriculum. Medical students can access the materials in a game-based e-learning platform and answer questions about the topics covered in the lectures on a Facebook page for bonus points. Disruptive Technologies in Medicine introduces students to technologies ranging from genomics to telemedicine that they will be using in practice. Such courses should be available in every medical school worldwide. Medical students will study anatomy on virtual dissection tables and not on human cadavers. What we studied in small textbooks will be transformed into virtual 3-D solutions and models using augmented reality. We can observe, change, and create anatomical models as fast as we want, as well as analyze structures in every detail. Examples include Anatomage, ImageVis3-D, and 4D Anatomy. [59]

Switching from long and extremely expensive clinical trials to tiny microchips that can be used as models of human organs or whole physiological systems provides clear advantages. Drugs or components could be tested on these without limitations, making clinical trials faster and even more accurate. Microchips with living cells that model how a lung works are already available. The Organs-on-Chips technology, such as that at the Wyss Institute at Harvard, has been developed for years and now provides a range of chips modeling organs. More-complicated microchips that can mimic the whole human body are needed, and this ultimate solution could arrive soon. [59]

The methods and materials of biotechnology have increasingly become more available to anyone interested in them. Expensive laboratory equipment is no longer needed as much for performing biological experiments; materials for experiments can be ordered on demand, and the data or information required are much more accessible than before. Biotechnology, especially among do-it-yourselfers, is the new IT industry. One application being developed is the Virtual Physiological Human, a framework enabling collaborative investigation of the human body. Medical students would be able to study the human body in detail like never before, understanding the core concepts of how our body works and the pathology of diseases. Another example, HumMod, consists of 5,000 variables describing

cardiovascular and metabolic physiology, among others. Gamification seems to be the key in persuading people to live a healthy lifestyle or stick to the therapy they have been prescribed to. Wearable gadgets, online services, or mobile health solutions can lead to better results if gamification with the right design is included.[59]

It is possible to swallow digital devices and tiny sensors for gathering and storing data and transmitting body temperature and heart and respiration rates to an external device. In diseases related to our gastrointestinal system, it could give instant diagnosis by combining the results of lab markers and colonoscopy (if the device swallowed includes a video camera). Examples include Proteus Digital Health and Equivital.

The completion of Human Genome Project begins the era of personalized medicine in which everyone gets customized therapy with customized dosages. There will be more and more opportunities for using DNA analysis at the patient's bedside, which should be a must-have before actually prescribing drugs. It means patients would get drugs and dosages exactly customized to their own genomic backgrounds. Fast and accurate DNA sequencing is needed to reach this goal.

The intelligent surgical knife, iKnife, uses an electrical current to heat tissue to make incisions with minimal blood loss. The vaporized smoke is analyzed by a mass spectrometer to detect the chemicals in the biological sample. The device thus can identify whether tissue is malignant during an operation in real-time without need to send a biopsy to the pathology lab. During operations, surgeons can see through anatomical structures, such as blood vessels in the liver. They can therefore perform more-precise excisions based on the patient's radiology images.[59]

The concept of the medical tricorder that can diagnose diseases quickly will be real. The Qualcomm Tricorder X Prize challenge may lead to the development of a portable, wireless device that can monitor and diagnose several diseases and give individuals more choices in their own health. An example, Scanadu, can measure body temperature, heart rate, ECG (electrocardiogram), pulse oximetry, and other basic parameters simply by placing it on the forehead. What matters is that patients should be able to access bioparameters about themselves and get the right devices/data to control their own health.[59]

The only way to constantly improve a system is to generate and analyze data about it. The basic requirement of improving health care is to give everyone access to their own medical/health data, which is stored in semantic databases. This would facilitate public-health research, as well. Getting information from the Internet by wearing a Google Glass or digital contact lenses would be a huge addition to the practice of medicine. Augmented reality could also be used in emergency situations, such as summoning an ambulance to your GPS location while you're performing CPR. Google Glass can be controlled through voice and hand gestures, while digital contact lenses will be controlled with brain waves.

With the growing number of elderly patients, introducing robot assistants to nursing homes and hospitals is inevitable. It could be a fair solution for moving patients and performing basic medical procedures, such as drawing blood. A prototype made by a U.S. company combines robotics and image-analysis technology to find a good vein on the patient's arm and draw blood in a safe way. In the next step, it might also perform analysis on the blood, detecting biomarkers or obtaining genetic data.

The future belongs to digestible, embedded, and wearable sensors that work like a thin e-skin. These sensors will measure all important health parameters and vital signs—e.g., temperature, blood biomarkers, and even neurological symptoms—24 hours a day. They will transmit data to the cloud and send alerts to medical systems in real time when, for example, a stroke is happening. It will call the ambulance itself and send all the related data immediately.

Plenty of laboratory methods and procedures will be available at home, which could also mean the detection of diseases at an early stage, making intervention simpler and more effective. Patients will bring the data to the doctor on any device they use; therefore, a new role of digital health data analyst will appear soon. Examples include Nanobiosym, the Google Smart contact lens project, and AliveCor.[59]

Robots can be used in remote surgery, surgical rehearsal in pre-operative planning, intra-operative navigation, and simulation and training, among other applications. Robotic interventions can add a lot to the success of operations and different procedures. One of the best examples is still the Da Vinci system, but other robots in the fields of emergency response and radiosurgery are also available. We might soon see operating rooms with no people inside except the patient. Surgical instruments will be so precise in a few years' time that it will be impossible to control them manually; therefore, robotic or mechatronic tools will be needed in order to reach the required accuracy.

The future belongs to interdisciplinary innovations. Neurosurgeons can use magnetic resonance imaging (MRI) guidance for delivering gene therapy as a potential treatment for brain tumors. This way, the rest of the brain remains unaffected, so the risk of the procedure is minimized. Medical specialists have to start looking at the same medical problem from different angles. As medical education focuses on developing specialized knowledge, social media and other digital technologies can help us get glimpses into other areas for new collaborations. Combining cognitive computing with the knowledge of physicians from different specialties could result in the best outcomes for patients.

DNA sequences would be sent over the Internet to synthesize proteins, viruses, and living cells. We are not far from breaking the barriers to exchanging medical information, drugs, medical equipment, or life itself through biological teleportation and the advances of 3-D printing. Every country needs an E-patient Dave, a Jack Andraka, and a Regina Holliday to fulfill these goals.

Optogenetics uses a combination of methods from optics and genetics to control the activity of individual neurons in living tissue. Optogenetics will provide new solutions in therapies. The ultimate goal is to be able to modulate our senses, repair lost senses, or even perform specific DNA targeting with femtosecond lasers.[59]

Bionic ears and simpler organs will be printed at the patient's bedside; printing transplantable human organs could eradicate waiting lists. Current technological issues such as the lack of available models and blueprints will be solved through crowd-sourced and open-access databases from communities of designers. This is one reason why social media has the potential to become a huge "digital brain." It will become possible to transmit, share, crowdsource, and store pieces of medical information, either for e-patients or for medical professionals, if such social platforms are used properly. Digital medical communication is a potentially powerful tool.

In the near future, we will be able not only to replace the functionality of our organs with biomaterials and synthetic devices, but also to grow organs that can replace a nonfunctioning natural organ in its full physiological capacity. Artificial organs could also be used for other tasks, such as helping the body conserve water.

Radiology will probably be a combination of imaging techniques and personalized diagnostics, with real-time interventions. One multifunctional machine will be able to detect plenty of medical problems, biomarkers, and symptoms at once. With one quick checkup, a machine would tell patients what percentage of their cells is cancerous.

Medicine today is based on interventions after the diagnosis is given. What if nanorobots in the bloodstream could intervene even before the disease appears? Nanorobots called respirocytes could be used to keep a patient's tissues safely oxygenated for up to four hours after a heart attack; they could serve as white blood cells, remove platelets, or repair damaged cells. The opportunities are almost limitless. Moving it to the next level, modules that self-assemble inside the stomach could perform more-sophisticated diagnosis and treatment. The number and range of noninvasive operations could increase with such self-assembling robots.[59]

New disease categories as a result of the excessive use of virtual reality (VR) in gaming and other industries will appear. Examples include virtual post-traumatic stress disorder, where gamers who participate in large virtual battles such as Call of Duty experience symptoms similar to soldiers who fought in real wars. But VR could also be used in psychotherapy or to prepare patients for an upcoming operation. Patients wearing implanted defibrillators or pacemakers can already be classified as cyborgs, but there will also be more cases of patients without medical problems asking for certain digital implants to augment their capabilities, creating biological "wealth" gaps.[59]

4. Impact on the Future of Healthcare

Three technology trends—size and scale, personalization and social—are all impacting the future of healthcare. For example, healthcare professionals have begun to exploit people's natural tendency to play games in order to improve their cognitive skills and change their behaviors. Telehealth offers patients remote access to healthcare professionals and also has major advantages over traditional methods of delivery. Healthcare-specific social networks can help practitioners to deliver services, but they also enable patients to play a more active role in their care. The healthcare information technology (HIT) transformational power has yet to be fully recognized. While tools like electronic health records (EHR) are now accepted and mainstream, there are more wide-ranging, IT-driven opportunities still to be grasped.[60] There are three broad technology trends playing out, each of which will shift the future of healthcare. One is *size*. The sheer scale of digital technology is astonishing. In 2015 alone, the world will produce data equal to 120,000 times the total of all previously written words in history. This data will be generated by exponentially more powerful computing, and then stored in the cloud, to be accessible there from a growing range of devices. The second is a shift towards personalization. All consumer trends point towards greater customization for individual needs. Websites like Amazon track your shopping habits and recommend goods accordingly, while other online services only display content or updates relevant to your specific needs. Third is that technology is more *social* than ever before. Networks such as Facebook, the most visited site, have helped establish online communities of engaged users. Consumers increasingly create their own content and access what has been created by others. Social networks are not just a place to find friends. They are becoming platforms for content creation, idea sharing, and self-service. [Fig.5]
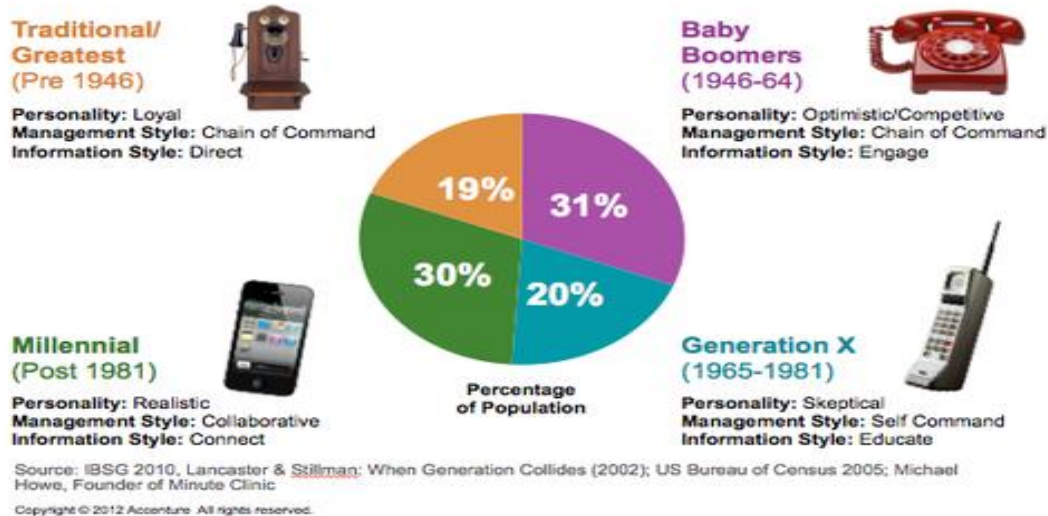
Figure 5: Patients' use of Technology

Gaming is an established Internet activity with huge potential. Healthcare professionals, as seen through Wii Fit Plus, a popular exercise system developed by Nintendo, have begun to exploit people's natural tendency to play games to improve cognitive skills and change behavior. *Telehealth* is another example offering patients remote access to healthcare professionals and has major advantages over traditional methods of delivery. It's not just about meeting the needs of the underserved. It is a means of improving care for the already served. While still providing face-to-face care, telehealth gives each patient access to more than one doctor at a time and can further enhance a patient's understanding of his or her own health, making the experience more personal. *Health-specific social networks* help practitioners deliver services and enable patients to play an active role in their care. By sharing and collaborating with others on similar health experiences and conditions, patients and practitioners build relationships, ask more questions and become, pioneers in the healthcare process. The challenge is to embrace new technologies in the context of what patients actually want, rather than what practitioners want to use. Research suggests that practitioners value healthcare cost, where for patients cost is much less important. While there are challenges to confront as healthcare professionals make better use of IT, the benefit can be extremely valuable. Personalized care at-a-distance could soon be as commonplace a healthcare tool as the stethoscope.[60]

Trends for the Future of Healthcare Quality

There is a need to move from healthcare, in essence the treatment of sickness, to health creation. There is clearly a theme of moving toward collaborative versus individual care. There will be a significant paradigm shift required by the more traditional physicians who see the need for face to face as the primary way to build relationships. In the USA, the Patient Protection and Affordable Care Act is probably the greatest advancement toward creating preventative care models in recent history. The bill is loaded with measures that seek to prompt providers to keep their patients healthy through the use of tools like electronic health records and other means. The bill establishes a National Prevention, Health Promotion and Public Health Council; creates a public health fund for promoting prevention; creates a taskforce dedicated to preventative strategies; establishes a grant for community-based programs and institutes a grant for school-based wellness programs. The Act also gives individuals access to web-based tools that can help them make more informed decisions about their own health, including advising them on treatment options for certain conditions. This a part of an overall strategy to get patients more involved in their own care through technology and communication tools. The patient centered medical home model of care is becoming increasingly common. It involves a primary care physician who uses tools like electronic health records to track the progress of their patients and coordinate services with other specialists. It is particularly effective when treating chronic conditions like heart disease and type 2 diabetes. The need for using tools like electronic health records to improve the quality and efficiency of the healthcare system has never been greater. The USA needs a major overhaul of the entire system that realigns incentives and balances fundamental rights with corresponding responsibilities. To do this, however, requires disruptive and transformational changes in how we pay for medical care, how we fund preventive medicine and public health, how we manage medical information, how we incentivize and pay healthcare providers, how we incentivize ourselves to take better care of our health, and how we assure that everyone has both access to care and the means to pay for it. It will mean reorganizing medical care so that the consumer is the decision-maker, just as in any other industry or profession-customer relationship. There will be many barriers to success, but it can be done. Indeed, it must be done or else we will continue to be a country deficient in the care that everyone could and should have while we will continue spending more and more on a per capita basis for healthcare – much more than other countries with equal or better health quality measures.[61]

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As the USA continue to devote extensive resources towards achieving a high-value, high-quality health care system, the capacity to evaluate the state of care is increasingly important. While some areas have improved, the overall quality of health care in the United States is suboptimal. The Committee's[62] Eight Recommended National Priority Areas for Health Care Quality Improvement recommends a set of eight national priority areas for health care quality improvement: 1. Engage patients and their families in managing their health and making decisions about their care. 2. Improve the health of the population. 3. Improve the safety and reliability of the health care system. 4. Ensure patients receive well-coordinated care within and across all health care organizations, settings, and levels of care. 5. Guarantee appropriate and compassionate care for patients with life-limiting illnesses. 6. Eliminate overuse while ensuring the delivery of appropriate care. 7. Ensure that care is accessible and affordable for all segments of the population. 8. Improve the foundation of health care systems to support high-quality care.

Diseases that were once uniformly fatal are now easily cured, and our ability to rescue patients from acute, life-threatening illness is unparalleled. These successes are often cited as proof that we have the best healthcare in the world, but on closer examination this premise does not hold up, Berwick said. The 100,000 Lives Campaign [63] focused on 6 areas for improvement:

- Deploying rapid response teams at the first sign of patient decline;
- Delivering reliable, evidence-based care for acute myocardial infarction to prevent deaths from heart attack;
- Preventing adverse drug events by implementing medication reconciliation;
- Preventing central line infections by implementing a series of interdependent, scientifically grounded steps called the "Central Line Bundle";
- Preventing surgical site infections by reliably delivering the correct perioperative antibiotics at the proper time; and
- Preventing ventilator-associated pneumonia by implementing a series of interdependent, scientifically grounded steps, including the "Ventilator Bundle."

As the healthcare industry has begun to realize that quality of care is at least as important as the quantity of care, the hospitalist value proposition has become even more compelling. Berwick's keynote was an acknowledgment of the role that hospital medicine plays in the national quality movement, and an important milestone in the growth of this specialty. The Triple Aim[63] is a new IHI initiative intended to simultaneously achieve the following goals:

- Improve the individual experience of care;
- Improve the health of the population; and
- Contain the per capita cost of providing care.

What makes this initiative both challenging and potentially transformational is the degree to which it requires the realignment of individual and institutional incentives. The integrators should: design models of care and financial incentives that optimize the care of patients and populations;

measure performance in new ways; test and analyze effects of such approaches, continually learning what works to reach their goals; and develop and deploy information technology for use by patients and suppliers.

Trends in Hospital Planning and Design

In Health economics, care delivery, and buildings of the future "Future of Healthcare" report[64], including 10 areas of change projected to impact what's on the healthcare horizon including:

- Hospitals will be smaller and more integrated at many levels.
- Systems will be changing.
- Outpatient systems will be the focal point for growth.
- Specialty areas will focus on those that are most profitable.
- Technology/data intensity will be crucial.
- The economy and availability of capital will be limiting.
- Renovation and adaptive reuse will increase.
- Sustainability expectations are changing.
- New delivery methodologies and best practices are being embraced.
- Demographics are a top concern, aging staff and patient populations.

There are concerns too. In addition to cost cutting and tight schedules, the top design and planning issues include: flexibility, universal design, standardization, energy conservation, and sustainability. Hospitals and health systems will be held more accountable than ever. Each organization is going to have to do a better job of tracking their performance and how they provide certain services. According to IFMA, 25% of a building's lifecycle budget is dedicated to the design and construction of the building. The remaining 75% is spent on operations and maintenance.[64]

The issues that will have the most impact on healthcare centers are: accountable care organizations, pay for performance, aging population, electronic medical records, healthcare workers shortage, sophisticated diagnostic and treatment equipment, handheld computers and portable diagnostic equipment, medical homes, holistic patient centred environment, Evidence Based Medicine, targeted treatments, palliative care programs, hospitals becoming wellness centers, hospital PPPs, neuroscience advances, increased building security, and medical research.[64] Improving the delivery of care goes hand in hand with offering patients technology that supports that care. Beginning with electronic medical records and on to hybrid ORs, technology is growing at such a huge rate, the last thing we want to do is build a new hospital and have it not sized right from an infrastructure standpoint to accommodate future technology. Also on the technology front is personalized medicine—for example, offering patients the ability to track their heart rate on their smart phone and send the data right to their doctor's own mobile device.

Community outreach
The key goals of health care organizations will include an increased emphasis on community health, treating routine

cases away from the expensive, high-acuity environment of the traditional hospital through networks of ambulatory centers, physician practices, urgent care clinics and similar facilities. These facilities will be established closer to the population, tied together through electronic health record (EHR) systems and constructed under business occupancy codes rather than more expensive institutional codes. They also will differ from many of their predecessors by featuring large spaces where cross-functional care teams can collaborate. Most organizations are already positioning themselves from a planning standpoint to have satellite hospitals and clinics and primary care settings as feeders into the health system. Emphasis on the continuum of care also will push fast-advancing home care and monitoring technologies. Actual delivery through home health care and virtual care delivered through smart phone apps and virtual connections to customers is going to be a reality.

Intense activities

As many of these low-acuity activities are shifted off-site, the main hospital likely will see increased intensity as it handles the sickest of the sick, experts say. Most experts agree that a certain degree of design standardization also can be economical. Given the growing importance of patient satisfaction measurements, it also will be important for designers to pay attention to consumer preferences. Flexibility (utilization of the space) is another key to efficiency. Another challenge will be how well designers can adapt existing structures to new uses. Current assets are very important in terms of how well they can be repurposed or reused. Many of the greatest opportunities for achieving efficiencies center on facilities infrastructure. Energy, in particular, is a closely watched variable. This likely will lead to more innovative energy-saving strategies, such as a geothermal heat pump system. Information technology infrastructure will be another area of emphasis. Health care facilities are going to change and evolve as the management of patient care goes across a broader spectrum and moves away from episodic care within the hospital. Hospitals, in turn, are becoming an information industry rather than simply a health care delivery industry.

The Future of Health Care Delivery

One of the most important changes in the USA is a shift from a focus on the treatment and prevention of acute illness (e.g., pneumonia, appendicitis, etc.) to chronic diseases (e.g., diabetes with complications, heart failure, and cancer), which often are lifelong once developed, difficult to manage, and very expensive to treat – yet, mostly preventable. Few people understand that true comprehensive healthcare delivery requires both an intensive focus on both diagnosing and treating diseases and injuries when they occur as well as an equally intense focus on health promotion and disease prevention. Moreover, few in the general public understand that those with chronic illnesses require well coordinated care by a multi-disciplinary team.[61] Information Technology (IT) is a critical resource for improving today's healthcare and proactively manage or improve the efficiency and effectiveness of their services with IT. Survival in a competitive business environment demands continuous improvements in quality and service, while rigorously

maintaining core values. Electronic commerce continues its development, gaining ground as the preferred means of business transactions. Embracing e-healthcare and treating IT as a strategic tool to improve patient safety and the quality of care enables healthcare professionals to benefit from technology formerly used only for management purposes.[63]

Key Trends Reshaping the Future of Healthcare

The healthcare industry's foundation is shifting from within. Some Macro Trends Driving Healthcare Industry Investment include the re-distribution of accountability and risk; the expansion of retail insurance markets and direct-to-consumer sales channels; mobility; vertical integration, diversification and the emergence of healthcare conglomerates; and big data, artificial intelligence and next-generation analytics. New accountability concepts are reshaping healthcare delivery models, with risk shifting from payers to providers and from groups to individuals. Patient care turns away from an episodic model to a continuum, with an emphasis on prevention, wellness and management. These concepts shift financial risk away from payers to providers through an array of new reimbursement models and capitation, including pay-for-performance, outcomes-based contracts, global pricing strategies and risk-based capitation. The biggest challenge will be population care management - engaging individual members to stay healthy and/or successfully manage their chronic conditions.

Payers will market directly to consumers, expanding the retail insurance market and readying themselves for participating in health benefit exchanges. To succeed, plans must invest heavily in designing and implementing new individual consumer-oriented market segmentation strategies. Payers will continue to emulate financial services and insurance industry business models for consumer profiling, market segmentation and 360-degree customer views. Mass customization and personalized products will proliferate for the individual market. These will include "build-your-own benefit plan" approaches in which members can plug-and-play provider networks, benefit provisions and riders, modeling premium rates with real-time quotes.

With an "app for that" available, all healthcare is not local. Experiments with "virtual care" models and telehealth will proliferate and accelerate, disrupting traditional care models. Rapidly evolving and increasingly powerful technologies like mobility, broadband, social computing, apps, "anything as a service" and cloud-based service models make it possible to deliver and receive care anywhere. Rapidly multiplying mobile health apps collect and send vital signs from wireless and wired remote patient and personal health monitoring devices. Cloud technology, combined with advances in mobility and telepresence solutions, will create new "unwired" business models capable of providing care anywhere. That will enable new entrants to leapfrog bricks and-mortar and go directly to virtual integrated healthcare delivery models. Mobile and telehealth applications and remote monitoring devices will dramatically change how patients and providers interact. Mobility solutions will expand in provider and clinical settings, and care

management strategies will be increasingly dependent on remote monitoring devices and remote interventions. Network development strategies will change to accommodate online networks and reimbursement models for e-consults. Cloud computing solutions will be critical to delivering scalable, reliable and secure mobile and remote solutions that enable new business models and a rewired healthcare workforce. Cloud and various IT-as-aservice models will fundamentally change the capital expense and operating cost equations associated with software, services and hardware, creating opportunities and eliminating barriers for new entrants to the mobile and virtual health marketplace.[66]

Healthcare players have new opportunities to work together to rethink business models to capitalize on each others' areas of expertise and share the risks and rewards of new ways of delivering care. New deals from traditional players will combine the care experience of providers, the analytics and risk management expertise of payers and the outreach infrastructure of life sciences and pharmaceuticals. This activity could involve suppliers buying providers; health plans teaming with providers; and pharmaceuticals becoming involved in services along care pathways. Adaptable, agile health plan business models that can accommodate accelerated transformation through rapid-cycle change management, innovation and virtualization will be in the best position to exploit the business opportunities in a post-reform market.

The healthcare market will start to segment, with organizations capable of leveraging the power of analytics demonstrating clear advantages in market share and trend management. Data mining technology today supports predictive modeling and risk stratification and will continue evolving. Plans using near-real-time data will improve MLR management and offer more competitively priced products. Greater investment in superior analytics also will sharply increase the "speed to business value" of ICD-10, meaningful use and Health plans will make IT investment decisions with these priorities in mind, keeping them firmly within the context of broader information management (IM) strategic road maps that encompass data management and business intelligence.

Hospital of Tomorrow

The health care industry is evolving because of policy changes, societal shifts and technological advances. Working in healthcare seems to be the trendy thing to do lately. Healthcare trends affecting the future of medical coding include: The ICD-10 transition might be the biggest issue medical coders are facing right now, and for good reason. The current system for reporting medical diagnoses and in-patient procedures is the International Classification of Diseases, Ninth Revision, or ICD-9. These codes are on a range of health records, from vital records to death certificates. The healthcare world will soon transition to a new system, ICD-10. ICD-9 has 3,824 procedure codes and 14,025 diagnosis codes. ICD-10, on the other hand, has 71,924 procedure codes and 69,823 diagnosis codes. That's a lot of new codes to learn. The introduction of so many codes has a plus side. ICD-10 will provide the coder with so much more description to their coding and provide them with an almost unlimited way in which to describe encounters and hospital stays. For medical coders, the Affordable Care Act (ACA) means that an exceptional eye towards accuracy is required. There are also new rules regarding proper documentation of issues such as joint replacement surgery—medical records need to state what steps have been taken to avoid the surgery and thus, why it's necessary now. That's where a coder comes in, keeping track of a patient's procedures so the insurance company can see what's been done. Current Procedural Terminology (CPT) codes are descriptive terms or identifying codes that coders use to report medical services or procedures. There are currently thousands of CPT codes in use, but they're not static. CPT code updates occur more frequently than ICD updates. For example, CPT Category III codes are updated every six months. They're known as the "emerging technology" codes and are considered temporary unless they're moved into Category I. Healthcare trends make the future of medical coding ever-changing. ICD-10, the Affordable Care Act and CPT code updates guarantee that medical coding isn't just another boring job where you sit behind a computer all day.[67]

Transparency in the areas of cost, quality of care, and expected outcomes will allow patients to become informed consumers and choose the best option for their healthcare needs. Increased transparency also builds a competitive landscape for healthcare providers, positioning those organizations with the best care at a reasonable price to grow their practices. Specialized care organizations that focus on a few particular and related treatments will emerge as viable options for consumers. This new landscape will put consumers in a position to share information with each other and take advantage of standardized pricing models that will both improve outcomes and lower the cost of care.[1-10]

Healthcare Technology Assessment

Health systems are starting to investigate new technologies that allow patients to be more intimately involved in their own healthcare decisions. They're creating in-house innovation departments and partnering with third-party organizations to define what a more patient-centric model will look like. Health systems that don't innovate will begin to see patients moving toward more open systems that prioritize patient satisfaction. The next step towards empowering the patient is the development of health portals for individuals. These portals will allow patients to easily connect with their providers as well as compile data from their health and fitness devices and apps. Once this data is integrated into the portal, companies will be able to condense these complex health statistics into understandable test result summaries and personal progress notes. The ability to access an individual's complete health and wellness data, combined with intelligent data mining and behavior modification applications, will create a more educated consumer.

Healthcare providers will continue to face difficult choices among an increasingly complex array of *clinical-care technologies* in the near and longer term. Decision-makers face the larger challenge of creating a care environment that

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incorporates minimally invasive surgery for everything from needle breast biopsies to image-guided cardiac procedures. They might also be weighing the comparative clinical effectiveness for robotic surgery versus the use of increasingly refined surgical instruments not assisted by robotic controls. The technologies are no longer solely hospital based. A patient leaving the hospital for less intensive institution-based care or home care might receive treatment or monitoring far more frequently than in the past. Remotely programmable pacemakers are one example of a technology for which this is now possible. Emerging delivery systems such as accountable care organizations and bundled payment and outcome-based reimbursement policies will drive the trend and extend the types of technologies considered to be the health system's responsibility. A patient takes his or her orthopedic implant home but may return for treatment of a postoperative infection, for which the hospital will be financially responsible. As hospitals increasingly implement or enhance their EHRs, they will also capture information from medical devices such as remotely programmable pacemakers. Personalized technology is often associated with genetically based diagnostic tests and treatment and is often considered a future issue because, while diagnostic tests have been developed, treatments lag.

The universe of medical technology - of pharmaceuticals, medical devices and clinical procedures - continues to expand at an extraordinary rate. The challenge for hospitals is to address the specific technologies that fit with larger technological trends, such as the continuing trend toward minimally invasive surgery, and to match that with the organization's capabilities and strategic directions. Technological development, changing reimbursement practices and public expectations for safe as well as effective care are leading to a fundamental shift in the purview of clinical and administrative executives. "New-era" hospital executives will need competence in enterprise technology management, not just the ability to decide whether to buy a single expensive technology or suite of technologies.

Future Trends for Telehealth

While both telemedicine and telehealth offer great benefits to physicians and patients, telehealth has become one of the most promising evolutions in the health care landscape. The ability to conduct remote visits with patients and monitor their recovery improves access to quality care by removing traditional barriers to healthcare delivery such as distance, mobility and time constraints. The healthcare industry has used telemedicine for around 30 to 40 years, but due to advancements in technology, not only have more hospitals and healthcare organizations and medical specialties adopted telemedicine technologies, the healthcare world has welcomed the advent of telehealth. Telemedicine is about connecting physicians so that those in rural areas can consult with physicians based in areas that are miles away. Telehealth uses the same principles, but introduces the patient into the equation. Telehealth has the potential to play a fundamental part in making this happen. Leading electronic health record companies will introduce telehealth capabilities to their practice management systems, enabling online visits for thousands of physicians. Telehealth is the simplest way for a physician to say to their patient, 'let's get together for a few minutes each week.' With telehealth, the patient will not need to visit the office or schedule an appointment. Telehealth offers a close intimacy, and when telehealth becomes a part of practice management systems, it becomes part of the arsenal for physicians to take charge of their patients' care. The adoption rate and the use of telehealth in treating and communicating with patients is going to grow. The consumer demand is there; the healthcare industry just needs to catch up. Consumers have a large preference for telehealth services. There is no question that health information technology like telehealth and telemedicine are critical resources for healthcare providers, hospitals, delivery networks.

Health Care Financing

Consumer-driven health care is getting its push not only from technology but also from those who are looking for new ways to control costs and who believe individuals are better stewards of their own health care dollars. This approach differs greatly from the current system, in which patients have no incentives and no opportunities to be prudent purchasers. A consumer-driven health care financing system depends on the basic idea: Individuals are the best stewards of their own health care dollars. The system is just not currently set up to do so. It continues to be relatively paternalistic, and with significant first-dollar coverage, there is no motivation for people to be all that engaged. They always want the latest and greatest test or drug, whether they need it or not, because they feel that they are entitled. Consumers will need not only financial responsibility but also incentives, information and tools, which defined contribution plans, accruable medical savings accounts and the Internet are now providing. In the USA, under a defined contribution model, employers would commit to a fixed dollar amount employees could use to pay for health care coverage they select, rather than the current practice of committing to a fixed health benefits package with pre-selected networks for all employees. Most health plans today are more like defined benefit plans, so it's kind of an open-ended commitment and obligation for employers, and they would like to be able to change that. A defined benefit approach also puts employers in the position of trying to decide which benefits to provide populations of employees based on medical necessity. Employees would simply use the defined contribution to choose among several health plans pre-selected by their employer. The best approach is to give employees health care vouchers or to deposit the money earmarked for health care directly into employees' medical savings accounts, which the employees would then be responsible for managing.[68,69,70,71,72,73]

A consumer-driven health care financing system not only promises to benefit patients but could benefit physicians as well. Perhaps most notable is the potential for returning doctors and patients to the same side in health care. The new e-health plans boast that they will re-couple doctors and patients by expanding patient choice, increasing physician freedom in medical treatment and, in some cases, establishing direct-contracting arrangements. A second potential benefit is the creation of a marketplace that finally compensates physicians and other providers for their

excellent performance. Defined contribution models will open up the possibilities of choosing physicians and hospitals based on their reputation, their performance and their service. A consumer-driven system also makes for better patients. When patients have financial control over their health care spending, it affects the way they approach the clinical setting. They are more engaged, more informed, more interested in their options and less wasteful of resources because they understand "there are choices and there are consequences of those choices. To thrive in a consumer-driven environment, physicians will have to respond to patient needs and demonstrate their value, in terms of quality, service and cost. A health care financing system that encourages patients to shop around for quality, service and price could be good news for family physicians in particular. Clearly the market is searching for new solutions. The financing paradigm does seem to be shifting, however, bringing new challenges but also opportunities to physicians and patients alike. [68]

Preparing Today's Leaders for Tomorrow's World

With shortages of Human Resources leadership, there is especially sharp demand and increased competition for these strategic roles and positions: Physicians in executive and operational positions, Clinical informatics leaders, Nursing leaders, and Population health management leaders. Beyond specific roles, leadership skills are highly sought after across the board. Ability to embrace uncertainty, commitment to personal growth through self-generated development, education, networking and outside coaching, Ability to influence others - expertise, trust, -likability, credibility are crucial. Existing human resources can focus on high priorities, leaving completion of specialized or temporary projects to external partnerships. An increasing demand for next generation leaders who bring fresh, new perspectives to the challenging healthcare environment. These future healthcare leaders will need the following skill sets: Communication skills, vision, agility and adaptability, financial and technical acumen and ability to align physicians and the hospital. Developing tomorrow's leaders is a priority. Creative partnerships between key executives

both internally and externally can create deeper mentoring opportunities and help fill voids in knowledge/experience. Clinical and administrative efficiency and agility are at absolute premiums today. Increasing patient acuity on inpatient units, increasing use of outpatient services and declining across-the-board reimbursements are straining historical staffing models and upending current operations. With smaller staffs delivering fewer but more specialized services, hospitals are embracing LEAN approaches and seeking to standardize practices, processes, policies, technology and purchasing. Reducing process variability not only reduces risks and costs, it also can provide the speed and momentum needed to adapt to a highly dynamic environment. Standardization is likewise viewed as a way to create an infrastructure that is able to sustain long-run performance improvements. As a result, boards are showing less tolerance for standardization efforts that take years, pressuring leaders to make progress in weeks and months in many cases. [74,75,76,77]

Healthcare delivery is the most complex industry in existence. Simplification unleashes speed and agility, and permits organizations to focus their efforts. There is a need to create a "culture of leadership" in which people that exhibit flexibility, creativity and resourcefulness can thrive. Such a culture promotes the innovation and collaboration that this year's survey demonstrates are essential to success in 21st century healthcare. [74,75,76,77]

Future Global HR Trends

Sweeping demographic changes across both the developed and developing world will place greater pressure on both the government and private sector to initiate and implement creative solutions to educate, integrate and retain a rapidly changing and diverse working population. When you add the issues of a multi-generational workforce and growing cultural diversity, it is no surprise that people management is cited to be by far the most substantial challenge facing organizations. [Fig.6]
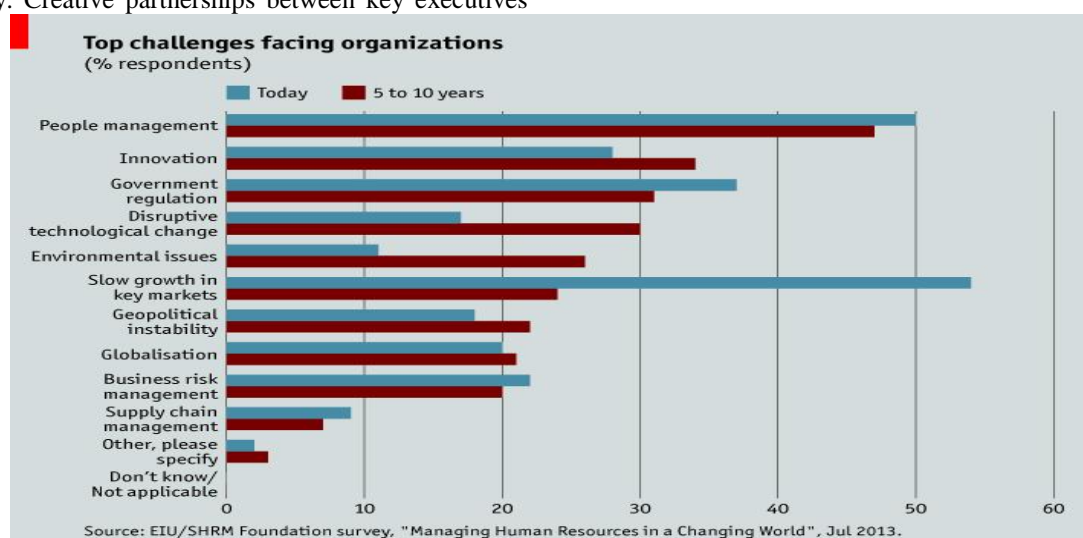

Figure 6: Top Challenges Facing Orgaizations

Ageing populations across the globe will continue to pose a challenge. On the one hand, experienced employees are departing the workforce, leaving a leadership void. On the

other hand, many older workers plan to carry on working well past the traditional retirement age. Institutions will need to anticipate and assess which new skills and training older

employees will require, particularly in the realm of technology where they may feel less comfortable than many of their younger colleagues. Organisations will need to manage the successful transfer of experience and knowledge to younger generations at the outset of their careers. If demand continues to outstrip supply for certain positions, companies will also need to rethink how to hire junior workers into positions requiring more tenure and experience, and determine what additional training will be necessary. Preparing the world's youth for the workplace will certainly present challenges. In countries with high youth unemployment rates, there are increased concerns that many young people will leave the workforce permanently, producing a lost generation. Meanwhile, the skills and education of the millennials who remain in the workforce must always be relevant and attractive to employers. Educational institutions will need to create solutions that reform the educational system, and prepare the future workforce for employment opportunities. Strategic vision and the ability to handle complexity are argued to be the most difficult skills to find among senior executives, presumably also the reason why strategic roles are deemed so problematic to fill. Organisations are clearly struggling to recruit those with the apparently rare ability to guide them through an unpredictable and competitive external environment.[4,5,6]

There is a need to partner with educational institutions to change the way courses are being taught, ensuring they address contemporary business issues and future business strategy. This collaboration could prove pivotal in equipping the future workforce with the necessary skills to bridge the labor-market gap. Organizations can influence the material being taught through redesigning curricula with policymakers, and developing creative education solutions. One Indian-based education and training company, Global Talent Track, has been based on this principle of collaboration between various stakeholders. It is funded by Intel Capital, Helion Ventures and Cisco Systems, with its founders emanating from industry, academia and technology. By 2015, it seeks to equip 500,000 aspiring students with the vocational skills that they will need in the workplace.[4,5,6] Another example in India is the public-private partnership (PPP), The National Skills Development Corporation, which promotes skill development by catalyzing the creation of large, high-quality, for-profit vocational institutions. These types of initiatives give raise to the broader policy question: Who should bear the burden of educational investment in workforce-skills development—individuals themselves, corporations or governments? Another method of counteracting any deficiencies in the educational system is to establish an efficient internal training and development system. For example, the Indian IT industry has instituted -"a surrogate education system"[78,79]

As the demographic composition of the workforce changes, their motivations and expectations evolve too. It is imperative that HR understands what is most valued by these workers. Is it compensation, or prestige, or perhaps autonomy at work? In many cases, HR will have to adapt their incentives, benefits policies, and retention strategies for workers that are not just driven by financial compensation.

Organizations have to make sure that their people are committed, productive, and do not leave after a short period, incurring substantial turnover costs and wasting all previous training invested in them. Motivational strategies for younger workers are particularly necessary in regions of the world where there is intense competition for candidates with the right skills.

An improved ICT infrastructure and increased usage in developing nations will certainly continue to expand the availability of local talent for recruiters and HR managers. HR departments will need to engage with local governments, universities, community colleges and vocational schools to offer ongoing training for all existing and new employees as technologies change. Employers will need to implement more sophisticated recruitment policies as the global talent pool expands and operating risks (geopolitical, legal and financial) become more complex. HR will need to become better integrated into their organisation's overall risk-management and business-continuity planning. HR will have to be more attuned to corporate social-responsibility practices. Retention of talent will prove challenging, as employees feel that stellar performances are not being rewarded appropriately. While their employers continue to have higher work expectations, employees' efforts are not necessarily translating into compensation they deem to be satisfactory. HR will have to continue to explore retention strategies and benefits models that focus on factors beyond financial compensation.[78,79]

5. Trends That Are Changing the Face of Health Care

As the sweeping transformation in health care takes hold, several models appear to be taking shape.[80] Each has its strengths and weaknesses and each presents opportunities and risks:

- Bundled payments model: calculates total historical payments for the various components of a bundle and then discounts or at least holds constant that amount, placing the responsibility for cost and quality control in the hands of the collective providers.
- Accountable Care Organization (ACO) model: seeks to tie provider reimbursements to quality metrics and reductions in the total cost of care for an assigned population of patients.
- Capitation model: sends a fixed per-patient prepayment of premium dollars to a provider in return for medical services.

The ACO model, if more broadly accepted, could have a major impact on hospitals, especially because the overall goals here are to reduce unnecessary services and provide better overall health care, which would mean less traditional business for them. For hospitals, the solution lies in changing their business model. That means forging enhanced relationships with physicians; owning outpatient ancillary services, perhaps in conjunction with physicians; employing physicians; creating joint ventures with physicians; and fostering more than a low-level interest in primary care. The hospitals must take advantage of the positive business aspects of the current model while altering

their strategic direction by being as efficient as possible now to retain valuable financial resources while they explore innovative options for the future.[80]

The capitation model could be part of the health care solution, because payments remain largely the same, regardless of how many services or what type of services each patient actually receives. Capitation offers a number of other positives as well: provider organizations can gain greater sustainability, control over their own destiny, and enhanced business possibilities--all of which complement the accountability this model requires. It aligns incentives for provider organizations. It fosters coordination, quality, and financial responsibility. The organizations must grapple with a series of critical success factors. Among the must-haves: a provider network with adequate breadth and depth, appropriate funding, a large enough membership complement, sophisticated care coordination systems, providers vested in the success of the entity or model, sufficient administrative support and physical infrastructure, a culture of high quality, and proper leadership. Good business discipline is also required: strategic planning; mentorship and succession planning; business modeling and forecasting based on actuarial projections; IT infrastructure; knowledgeable, experienced administrative staff; and effective contractual relationships and communication mechanisms with outside providers. Health care industry is clearly changing. Provider organizations now must decide which model makes the most sense for them and take proactive steps to stay ahead of the health care curve. The key trends and emerging models show us that providers, payers, and patients will be the players who determine the future of health care in the decades to come. Quality through coordination and evidence-based medicine is the answer. Better care will lead to better health, which will lead to lower costs.

Healthcare Everywhere

Healthcare leaders must adapt to regulatory, technology, medical and market changes that are forcing the re-invention of healthcare. Consumers are becoming more informed about healthy living and how to manage their own health. Expect explosions in the growth in self-monitoring technologies. The new healthcare system will focus on higher quality, better outcomes and greater satisfaction. This focus on value requires hospital and health system leaders to improve the results for every dollar they spend. Cost effectiveness will also drive the growth of integrated delivery systems, risk-based healthcare, and reforms in medical education and medical malpractice. Healthcare will be everywhere will move to homes and communities. Healthcare providers and patients will stay connected and informed via interoperable electronic health records, cloud-based computing, data shortage and smartphones that will help patients manage their own health in every possible setting. To lower costs, increase efficiency and improve quality, payers, hospitals, health systems, pharmaceutical suppliers and other healthcare organizations will consolidate in the near future. As part of this trend, expect more attention on population health, integration of new electronic tools, growth of a multi-billion HIT and service industry that provides an infrastructure of care coordination and analytics,

more narrow provider networks, and gaps in charity care and rural access as not-for-profit healthcare and small, community hospitals struggle to survive. Other trends include harnessing data to increase value, personalized medicine and an uptick in medical tourism. Transformation of Primary Health Care is a top priority that has to be vibrant. There is an urgent need for professional management, introducing work culture, accountability, supervision and monitoring (China and Cuba experience). Corporate governance will be of immense help.[2,3]

Quality Management

Quality Management in health care is critical - meeting or exceeding the needs of consumers, professional care excellence, optimal utilization of resources, safety of customers, trust, transparency, communication (transactions), benchmarking, ISO certification 9001, 9002, 2000 with legal compliance. The ISO 9000 series of international quality management standards lays down detailed procedures for ensuring quality at all stages of production / service and requires strict documentation of adherence for organizations/institutions seeking certification. The International Standards Organization (ISO) 9000 certification signals quality in international markets). People and organizations use technical knowledge to improve their efficiency in the production of goods and services. Accreditation and Regulating Healthcare is essential and includes feasibility, orientation, review planning, review documents, audit, continuous quality improvement, user focus in terms of access and cost.[1-8] **Evidence-based health care** is the conscientious use of current best evidence in making decisions about the care of individual patients or the delivery of health services. Current best evidence is up-to-date information from relevant, valid research about the effects of different forms of health care, the potential for harm from exposure to particular agents, the accuracy of diagnostic tests, and the predictive power of prognostic factors.[81] **Evidence-based clinical practice** is an approach to decision-making in which the clinician uses the best evidence available, in consultation with the patient, to decide upon the option which suits that patient best.[82] **Evidence-based medicine** is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research.[83]

Cost-effectiveness

There are three basic approaches to examining the issue of costs and cost-effectiveness at the national level. The first is to look at aggregate achievements in health and to compare these to the actual amounts spent on health, relative to those in other countries, while controlling for potential confounders. One can analyze the relationship between life expectancy, for example, and health expenditures per capita, and compare the relative expenditures across countries in terms of gains in life expectancy achieved per dollar/rupee spent. A second approach is to examine health expenditures in each country and assess whether these are too "high" or too "low", relative the numbers in other countries or to some

predicted   value.
The third approach would be to check if the existing level and composition of health spending could be modified to yield a higher return in terms of outcome measures, such as disability adjusted life years (DALYs), or to increased consumption of other non-health goods, all else the same.[9-18] Quality can be maintained if there exist a suitable set of laws on consumer protection, provided at least these are reasonably well implemented. The two most common avenues for relief in the arena of medical care are the Consumer Protection Act and various Civil Courts. The challenge is to find ways to improve upon the existing situation in the health sector. A potential for improvement exists in areas including the overall costs of care, financial equity, and the quality of care. A sustained improvement in these areas would play a significant role in advancing the primary goal of health policy – health, itself.[1-10]

Environment and Good Health

Good health can have quite significant implications for economic development – it is also a means for economic advancement. Good health depends on individual preferences, the socioeconomic circumstances that help shape those preferences (such as marital status, cultural and religion, education and the like), incomes, and the prices of different items consumed by an individual, including health inputs. It also depends on the quality of health care that is consumed. [Fig. 7,a,b,c,d,e]

There are four channels through which improvements in health can translate into increased economic growth - the productivity enhancing effects of health; the fact that healthier people live longer and hence have a higher incentive to invest in education and other skills; that healthier people live longer and, therefore, save more, apart from attracting foreign investment and; the "demographic dividend" that could potentially result from large declines in mortality at the beginning of the demographic transition. The government may play a quite substantial role in improving health. Many of the decisions that individuals take about health depend on the information that they possess about potential health impacts. To the extent that information is a public good, it is not readily obvious, for example, that all the information relevant to healthy life-style choices will be made available to the individual by the market. Thus, a poorly informed or uneducated public may take socially sub-optimal decisions about their own and their dependents' health. Protecting children and adults against infectious diseases, promoting better quality of care, and ensuring that families and individuals do not face inordinate financial risks related to catastrophic illnesses, typically form key objectives of public health policy. Moreover, it is proper to be concerned, not just with the average family or individual, but also with the way, these benefits are distributed across various groups in society. Inequalities in reported health status are strongly associated with inequalities in income, (some of which may be caused by inequalities in access to health care because of income differences). Similarly, immunization rates are positively associated with income. Cost-containment and cost-effectiveness of health care are a natural addition to these goals, since resources are scarce and these objectives highlight the need to control the financial burden for the spending parties, be it households, or the government, to ensure sustainability of achievements. A key policy challenge is the provision of a support system with respect to health expenses for the bulk of the poor, especially people living in rural areas.

Source: Department of Health 2006
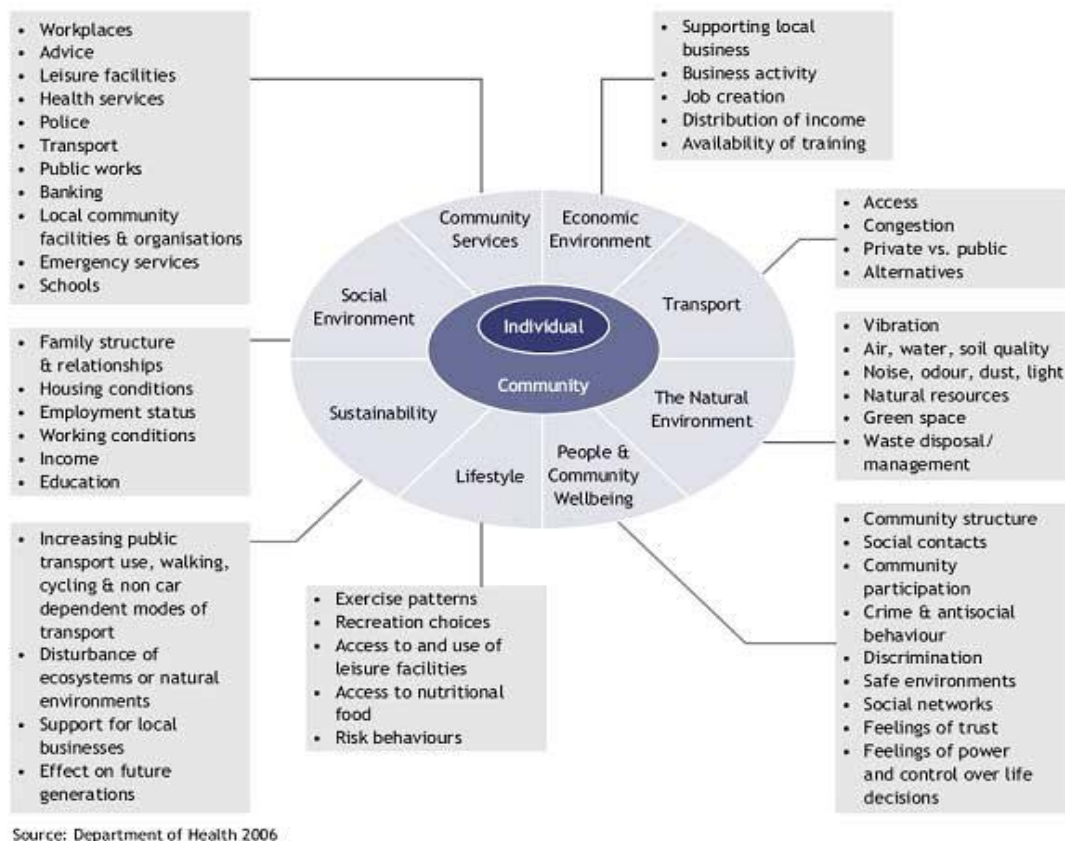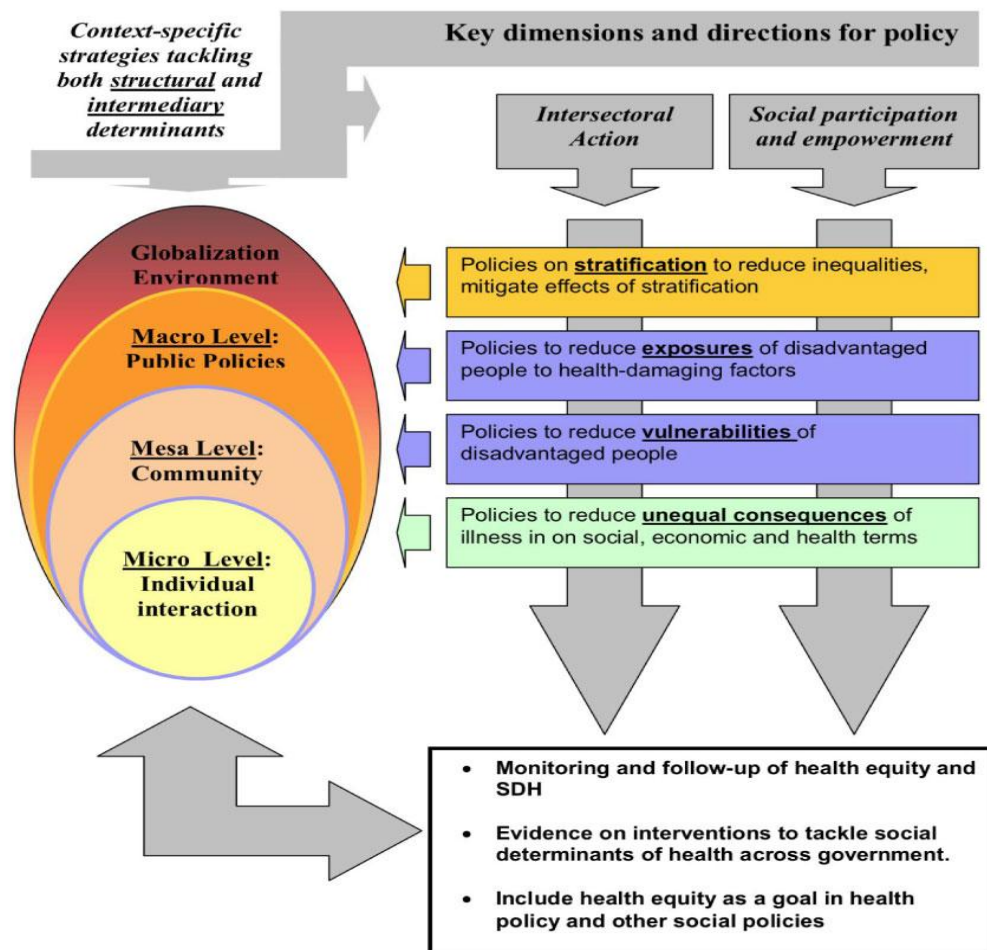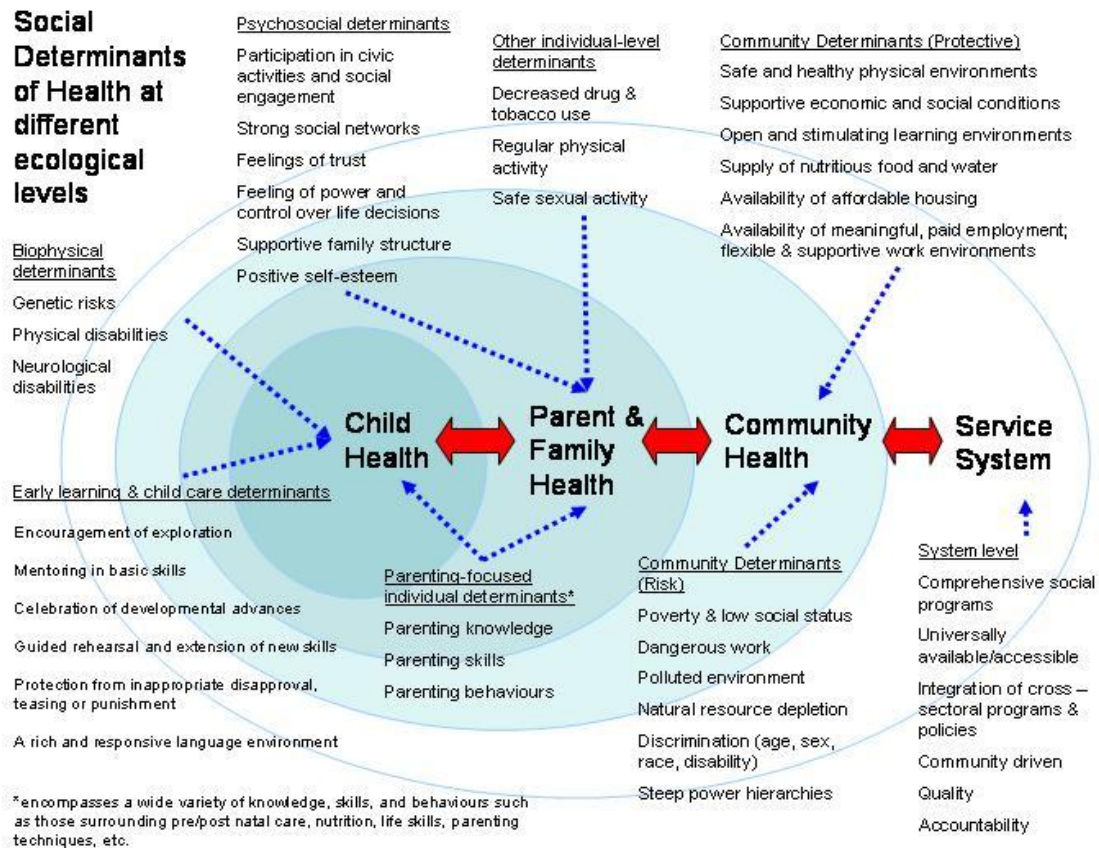
Fonte/Source: WHO. Commission on Social Determinants of Health. A conceptual framework for action on the social determinants of health. Discussion paper. 2007.
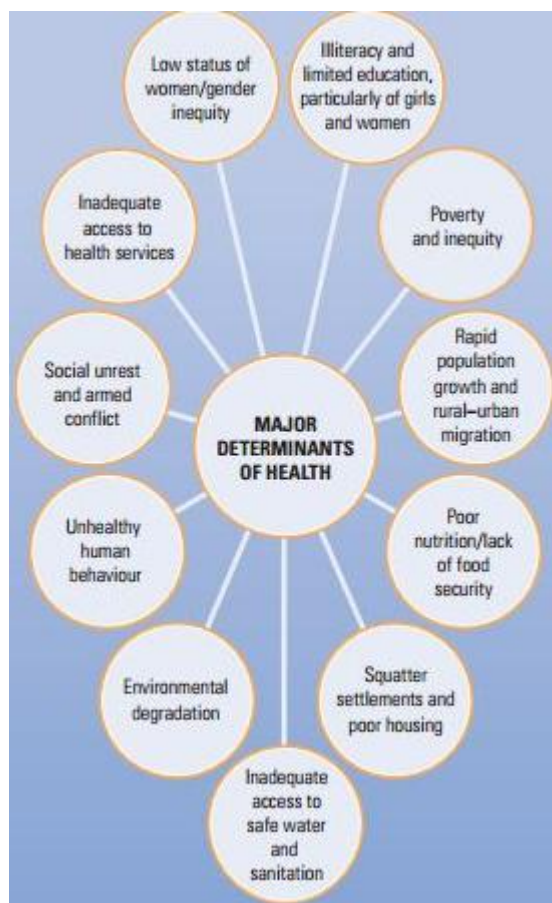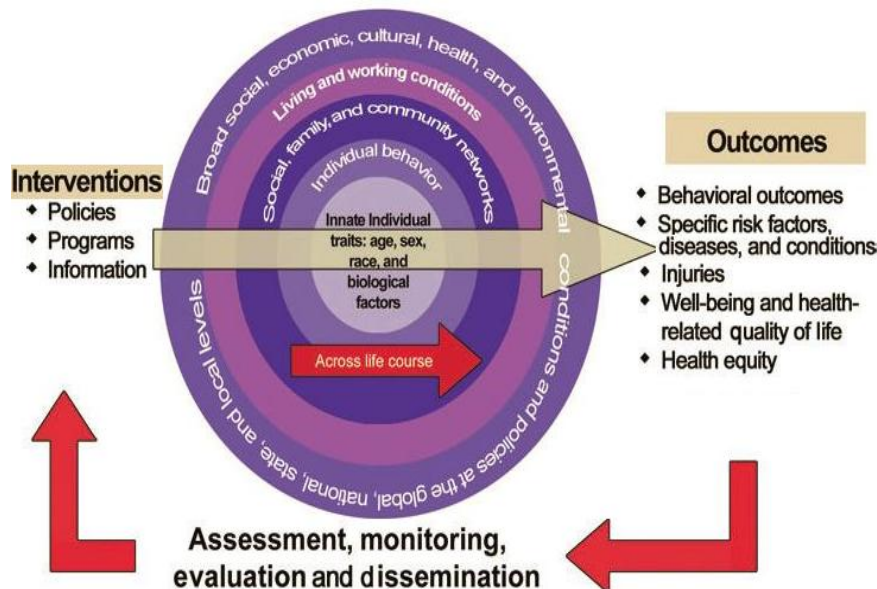
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Figure 7: (a,b,c,d,e): Determinants of Health

The threat climate change poses to health, equity, and development has been rigorously documented. However, in an era marked by economic crisis, regional conflicts, natural disasters and growing disparities between rich and poor, the joint global actions required to address climate change have been vigorously debated. Health and climate change have entered a new phase. Recently, WHO hosted the first worldwide conference on health and climate in Geneva, Switzerland. The conference brought together 400 participants from more than 90 countries, including 25 ministers and four UN agency heads. The conference substantiated the growing leadership of countries around the world in connecting health to climate change. It concluded with a strong statement—warning that, in the absence of mitigation and adaptation, climate change poses unacceptable risks to health; defining a scaled-up, systematic approach to increase health resilience to the climate risks that countries are now experiencing; and recognizing that health needs to support and help define climate change mitigation policies, not least to help reduce the 7 million worldwide annual deaths from air pollution.[84] An estimated 24% of the global disease burden and 23% of all deaths can be attributed to environmental factors. Of the 102 major diseases, disease groupings and injuries covered by the World Health Report in 2004, environmental risk factors contributed to disease burden in 85 categories. The specific fraction of disease attributable to the environment varied widely across different disease conditions. Globally, an estimated 24% of the disease burden (healthy life years lost) and an estimated 23% of all deaths (premature mortality) was attributable to environmental factors. Among children 0–14 years of age, the proportion of deaths attributed to the environment was as high as 36%. There were large regional differences in the environmental contribution to various disease conditions – due to differences in environmental exposures and access to health care across the regions. For example, although 25% of all deaths in developing regions were attributable to environmental causes, only 17% of deaths were attributed to such causes in developed regions. Although this represents a significant contribution to the overall disease burden, it is a conservative estimate because there is as yet no evidence for many diseases. Also, in many cases, the causal pathway between environmental hazard and disease outcome is complex.[81] Minimizing exposures to environmental risk factors indirectly contributes to poverty reduction, because many environmentally mediated diseases result in lost earnings.

Environmental risk factors are physical, chemical and biological hazards that directly affect health, and also factors that exacerbate unhealthy behaviours (e.g. physical inactivity). Environmental risk factors include unsafe drinking-water and poor sanitation and hygiene, which are the sources of infections that cause diarrhoeal diseases. [Fig.

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7] In 2010, the three leading risk factors for global disease burden were high blood pressure (7·0%) of global DALYs), tobacco smoking including second-hand smoke (6·3%), and household air pollution from solid fuels (4·3%). Dietary risk factors and physical inactivity collectively accounted for 10·0% (95% UI 9·2–10·8) of global DALYs in 2010, with the most prominent dietary risks being diets low in fruits and those high in sodium. Several risks that primarily affect childhood communicable diseases, including unimproved water and sanitation and childhood micronutrient deficiencies, fell in rank between 1990 and 2010, with unimproved water and sanitation accounting for 0·9% of global DALYs in 2010. However, in most of sub-Saharan Africa childhood underweight, HAP, and non-exclusive and discontinued breastfeeding were the leading risks in 2010, while HAP was the leading risk in south Asia. The leading risk factor in Eastern Europe, Andean Latin America, and southern sub-Saharan Africa in 2010 was alcohol use; in most of Asia, most of Latin America, North Africa and Middle East, and central Europe it was high blood pressure. Despite declines, tobacco smoking including second-hand smoke remained the leading risk in high-income north America and western Europe. High body-mass index has increased globally and it is the leading risk in Australasia and southern Latin America, and also ranks high in other high-income regions, North Africa and Middle East, and Oceania.[85,86,87,88]

Universal health coverage explicitly includes preventive measures where their primary purpose is to improve health, and yet the opportunities to prevent ill-health have often been overlooked, both within and outside the health sector. The "Health in the Green Economy" project provides numerous examples of research that identify environmental health benefits that come from mitigating climate change. These illustrate how policies whose primary objective is not to achieve universal health coverage but rather to confront environmental threats can yield major health co-benefits. The health system can play an important role in advocating for such policies, which are complementary to effort to promote universal health coverage. Two examples of sectors in which research has demonstrated health co-benefits are urban transport and housing. Whatever the particular risks to health, whether they are related to consumption or not, every country needs to be able to adapt risk reduction policies to its own needs. Mitigation measures that can produce better health outcomes are of vital interest to the health sector and health policy-makers. Local, national and international policies can protect the natural environment while also improving public health and health care services.[85,86,87,88] The best health policies are those based on scientific evidence. [Fig.8]
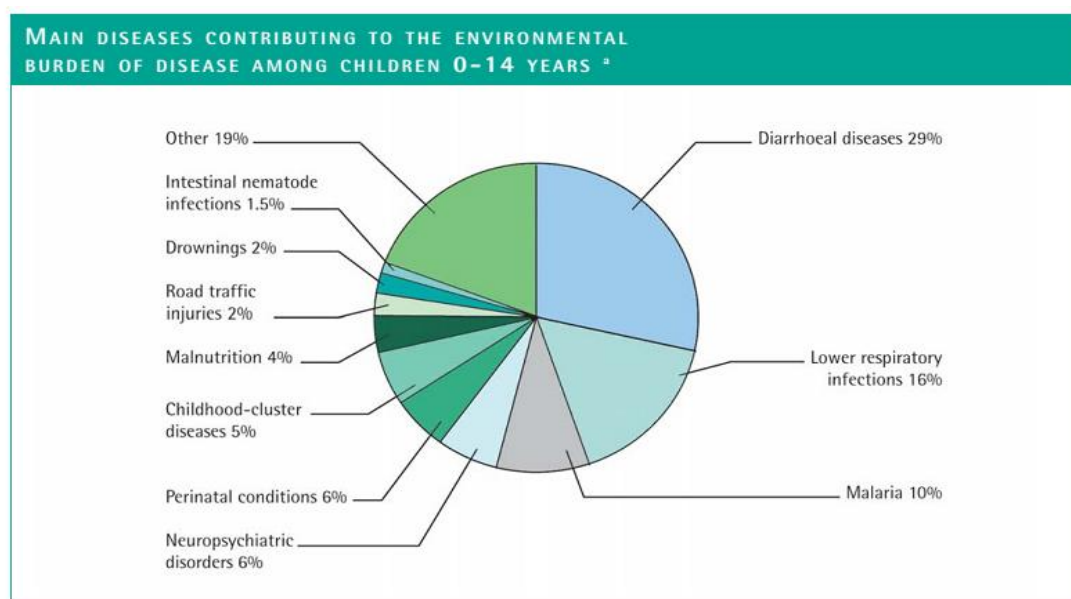
Source: WHO;Prüss-Üstün, Annette, Corvalán C. (2006). Preventing disease through healthy environments. Towards an estimate of the environmental burden of disease
Figure 8: Environmental Burden of Disease

6. Healthcare in India

India represents almost 17.31% of the world's population, which means one out of six people on this planet live in India. Current population (2015) is 1.27 billion. 29.1% population lies between 0-14 age group while only 8.3% are above the age of 60 years. With the population growth rate at 1.58%, India is predicted to have more than 1.53 billion people by the end of 2030. More than 50% of population is below the age of 25 and over 65% below the age of 35.

About 72.2% of the population lives in some 638,000 villages and the rest 27.8% in about 5,480 towns and urban agglomerations.[89]

Estimated birth rate was 21.6 in 2012 while the death rate declined from 8.5 to 7.0 per 1000 population over the same period. Infant mortality rate (IMR) has declined considerably i.e. 42 per 1000 live births in 2012; however, there is a huge gap between IMR of rural (46 per 1000 live births) and urban (28 per 1000 live births). Infant mortality

rate (IMR) has declined slightly in 2012 i.e. from 47 (2010) to 42 (2012). Total fertility rate of India was 2.4 (2012). Among the various Communicable Diseases reported, the Acute Respiratory Infections has accounted for the maximum number of cases. The efforts by the government to wipe out the menace of Polio from the country have been exceptional and are clearly demonstrated by the fact that there has not been even a single case in 2012 as well as in 2013.[90]

Investment on Health, AYUSH, NRHM / NHM, NACO and Health Research for 12th Plan (2012-17) is INR 75,145.29 Crores, INR 10,044.00 Crores, INR l,93,405.71 Crores, INR ll,394.00 Crores; INR 10029.00 Cores respectively with budgetary allocations under Health Sector is INR 3,00,018.00 Crores. In Annual Plan 2012-13, 2013-14 and 2014-2015 the total allocation of funds on Health Sector (Health, AYUSH, NRHM / NHM, NACO and Health Research) is INR 30,477.00 Crores, INR 32,745.00 Crores and INR 33,725.00 Crores respectively. Fund flow to the Health Sector is maximum by private funds at 71.62% as per 2008-09 estimates and only 26.70% by public funds.[90]

The total number of Allopathic Doctors registered (upto 2013) is 9,18,303, Dental surgeons 120897, registered AYUSH Doctors in India 686319, ANM is 726557 and Registered Nurses and Registered Midwives (RN & RM) 1562186 and Pharmacists 643301.

The country has 381 medical colleges, 301 Colleges for BDS courses and 140 colleges which conduct MDS courses. There has been a total admission of 43,576 in 342 Medical Colleges and 25,320 in BDS during 2013-14. There are 2670 Institutions for General Nurse Midwives with admission capacity of 109224 and 686 colleges for Pharmacy (Diploma) with an intake capacity of 40898.

There are 19,817 hospitals having 6,28,708 beds in the country. 15,398 hospitals are in rural area with 1,96,182 beds and 4,419 hospital are in urban area with 4,32,526 beds. Medical care facilities under AYUSH by management status i.e. dispensaries and hospitals are 26,107 and 3,167 respectively as on 1.4.2013. There are 1,51,684 Sub Centres, 24,448 Primary Health Centres and 5,187 Community Health Centres in India as on March 2013. Total no. of licensed Blood Banks in the Country is 2,545.[90]

In spite of substantial progress in healthcare delivery during the last six decades, India continues to live under the shadow of triple burden of disease – infectious diseases, lifestyle diseases and injury. The bed strength is one of the problems being faced by the country resulting in the long waiting time for undergoing treatment in public hospitals. Patients have to wait for four to twelve months to get admission in the hospital. The Planning Commission says that it is because of India's acute shortage of hospital beds. When it comes to secondary and tertiary care, India lags behind most other countries in the number of hospital beds per 1,000 population, despite having a higher absolute number of hospital beds than other countries. The World Health Statistics say that India ranks among the lowest in this regard globally, with 0.9 beds per 1,000 population - far below the global average of 2.9 beds. Sri Lanka on the other hand has 3.1 beds per 1,000 population, China 3 beds, Thailand 2.2, Brazil 2.4, USA 3.1 and UK 3.9 beds per 1,000 population. It was recommended in 1948 by Bhore Committee that there should be one bed per 1,000 population. However, it has been 67 years since and target is yet to be achieved.[2,3,87]

The Indian healthcare delivery system will need to add 3.6 million beds, three million doctors and six million nurses over the next 20 years, says a recent study by consultancy PricewaterhouseCoopers (PwC). The report, called 'The Future of India: The Winning Leap', says roughly 100,000 hospital beds have been added annually over the last decade and if India continues to maintain this rate, it will fall short of target by 1.6 million beds by 2034. At present, there are only 0.65 doctors, 1.3 nurses and 1.3 hospital beds per 1,000 people in the country. The desired requirement by 2034 for every 1,000 people is 2.5 doctors, five nurses and 3.5 beds. To achieve this standard, the study estimates, an investment of around $245 billion would be required. PwC suggests that low-cost operational models combined with innovative financing models could help secure the needed resources. These include public-private partnerships, low-cost specialty care models like the one followed by eye hospital Arvind in Madurai and cardiac care specialist Narayana Hrudayalaya in Bangalore. High asset utilisation as well as para-skilling of nurses (training them to perform some procedures that previously only doctors could do) can further help to lower costs and enable the staff to serve larger volumes of patients.

The healthcare industry is potentially the world's largest industry with total revenues of approximately US$ 2.8 trillion. In India as well, healthcare has emerged as one of the largest service sectors constituting 5 per cent of the gross domestic product (GDP) and offering employment to around 4 million people. India's primary competitive advantage over its peers lies in its large pool of well-trained medical professionals. Moreover, India's cost advantage compared to peers in Asia and Western countries is significant - cost of surgery in India is one-tenth of that in the US or Western Europe. The healthcare sector is growing at a 15 per cent compound annual growth rate (CAGR) and grew from US$ 45 billion in 2008 to US$ 78.6 billion in 2012 and is expected to touch US$ 158.2 billion by 2017, according to a report by Equentis Capital. India's per capita healthcare expenditure has increased at a CAGR of 10.3 per cent from US$ 43.1 in 2008 to US$ 57.9 in 2011 and is expected to rise to $88.7 by 2015. The factors behind the growth are rising incomes, better access to high-quality healthcare facilities and greater awareness of personal health and hygiene, highlighted the report. The private sector has emerged as a vibrant force in India's healthcare industry, lending it both national and international repute. The private sector's share in healthcare delivery is expected to increase from 66 per cent in 2005 to 81 per cent by 2015. Its share in hospitals and hospital beds is estimated at 74 per cent and 40 per cent, respectively. According to data released by the Department of Industrial Policy and Promotion (DIPP), hospital and diagnostic centres attracted foreign direct investment (FDI) worth Rs 12,413.57 crore (US$ 2.02 billion) between April 2000 and July 2014.[2,3,91,92]

The coming years will see great out-of-the-box thinking by the strategists in the field of healthcare, beginning with the way healthcare is delivered. A rise in retail clinics, single specialty, secondary and tertiary care centres are seen coming to the fore. The tier II/III cities have suddenly become attractive to the healthcare players, especially because of the tax sops and increasing disposable incomes among Indian families across the country and dearth of quality healthcare infrastructure in these locations. Specially focused on medical tourism, health cities are being designed and executed and hospitals with bed strengths of 1500/2000 which were never heard in the private domain are now coming to light.

Clinical services are now a global opportunity for India with a strong competitive edge based on speed and quality of clinical development. Rising income levels, ageing population, growing health awareness and changing attitude towards preventive healthcare is expected to boost healthcare services demand in future. The private sector has emerged as a vibrant force in India's healthcare industry, lending it both national and international repute. Its share in healthcare delivery is expected to increase from 66 per cent in 2005 to 81 per cent by 2015. In India, private healthcare accounts for almost 72 per cent of the country's total healthcare expenditure. Per capita healthcare expenditure is estimated to grow at a CAGR of 15.4 per cent during 2008-2015E to reach US$ 88.7 on the back of rising incomes, easier access to high-quality healthcare facilities and greater awareness of personal health and hygiene. The Government of India has created the National Health Mission (NHM) for providing effective healthcare to both the urban and rural population. India has an advantage over its peers in the West and Asia in terms of cost of high-quality medical services offered. It offers a huge patient pool, favourable regulatory environment and cost advantage for conducting clinical trials.[2,3,91,92]

According to the most recent estimates, the aggregate of public sector and private sector health spending amounted to nearly 5.6 percent of the Gross Domestic Product of India. These are certainly much lower, as a proportion of GDP, of aggregate health expenditures among India's neighbors – Bangladesh with 2.4 percent, China with 3.8 percent,

Pakistan with 3.5 percent, and Sri Lanka with 1.9 percent, respectively. Given that both Sri Lanka and China are doing significantly better than India in terms of indicators such as infant mortality rate and life expectancy at birth, this suggests that health spending in India is not as cost-effective as among some of its neighbors. Indians are spending relatively more on curative care, compared to the more "cost-effective" preventive care -- of the total health spending in India; only about 9 percent is spent on preventive/promotive care.[2,3] [Fig 9,10]

The public sector in India offers heavily subsidized medical care to its citizens through a large network of government-operated facilities, to which access is ostensibly free. However, it is also clear that it is unable to cater to the needs of large sections of the population, since the overwhelming share of total health spending – 75 percent of the total – is accounted for by out-of-pocket expenses of households. The extremely large burden of spending on households is problematic since it raises the possibility of a disproportionate welfare burden on the poor sections of society. Out-of-pocket payments for health are the most inequitable among the class of resources that could be used to finance health services – other examples being, social insurance taxes, direct taxes, and the like. Given that the ratio of out-of-pocket spending as a proportion of mean expenditure is higher in the richer quintiles, the financial burden of health care is not grossly inequitable. There are some rural-urban differences, but these occur mainly in the richer groups – with health spending by the upper quintiles in rural areas much higher, as a proportion of total consumption spending, than their counterparts in urban areas.

At the all India level, the share of the richest 20 percent of the population in total public sector subsidies is nearly 31 percent (nearly three times the share of the poorest 20 percent of the population). The inequality is even greater among the rural residents, where the share of the top 20 percent in public subsidies is nearly four times that of the poorest 20 percent. Urban areas have a more equitable distribution, in addition to enjoying a somewhat greater share in total subsidies (rural plus urban combined).[1-8]
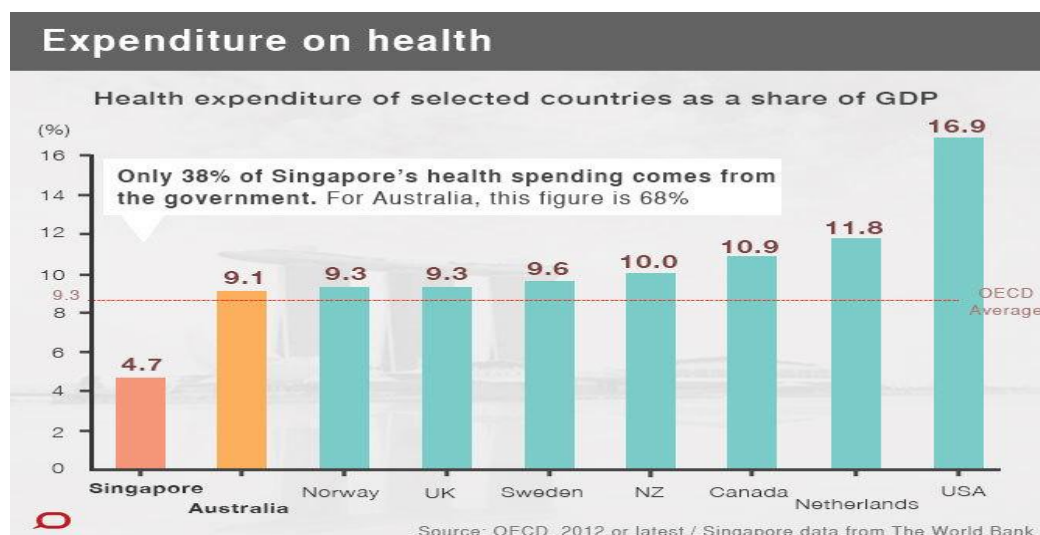

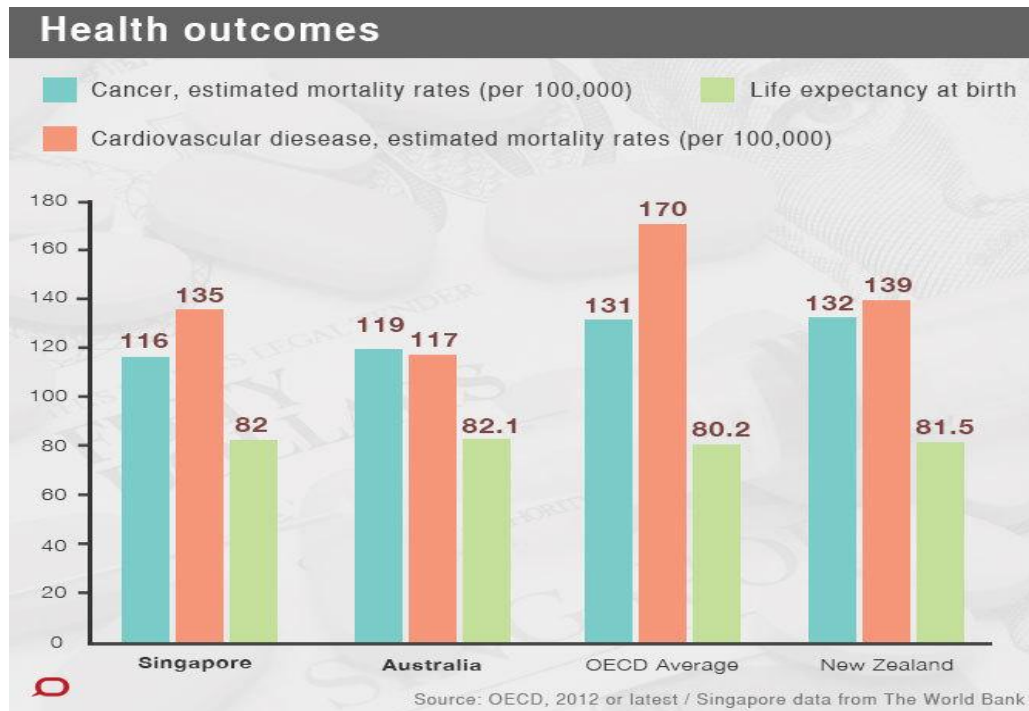**Figure 9:** Expenditure on Health

Figure 10: Health Outcomes

Health Insurance

As noted by the Office of the United Nations High Commissioner for Human Rights (OHCHR) and the WHO: "The right to health is relevant to all States: every State has ratified at least one international human rights treaty recognizing the right to health. Moreover, States have committed themselves to protecting this right through international declarations, domestic legislation and policies, and at international conferences." It includes a wide range of factors that can help us lead a healthy life. The Committee on Economic, Social and Cultural Rights, calls these the "underlying determinants of health": Safe drinking water and adequate sanitation; safe food; adequate nutrition and housing; healthy working and environmental conditions; health-related education and information; and gender equality.[93]

Health provision varies around the world. Almost all wealthy nations provide universal health care (the US is an exception). Health provision is challenging due to the costs required as well as various social, cultural, political and economic conditions. People with the most means – whose needs for health care are often less – consume the most care, whereas those with the least means and greatest health problems consume the least. Public spending on health services most often benefits the rich more than the poor in high- and low-income countries alike. Wherever people lack social protection and payment for care is largely out-of-pocket at the point of service, they can be confronted with catastrophic expenses. Over 100 million people annually fall into poverty because they have to pay for health care. The excessive specialization of health-care providers and the narrow focus of many disease control programs discourage a holistic approach to the individuals and the families they deal with and do not appreciate the need for continuity in care. Health services for poor and marginalized groups are often highly fragmented and severely under-resourced, while development aid often adds to the fragmentation. Primary health care offers the best way of coping with the ills of life in the 21st century: the globalization of unhealthy lifestyles, rapid unplanned urbanization, and the ageing of populations. These trends contribute to a rise in chronic diseases, like heart disease, stroke, cancer, diabetes and asthma, which create new demands for long-term care and strong community support. A multisectoral approach is central to prevention, as the main risk factors for these diseases lie outside the health sector.[93]

Models of Healthcare Delivery

There are about 200 countries on our planet, and each country devises its own set of arrangements for meeting the three basic goals of a health care system: keeping people healthy, treating the sick, and protecting families against financial ruin from medical bills. There are four basic systems of Health Care Delivery:

The Beveridge Model: In this system, health care is provided and financed by the government through tax payments, just like the police force or the public library. Many, but not all, hospitals and clinics are owned by the government; some doctors are government employees, but there are also private doctors who collect their fees from the government. In Britain, you never get a doctor bill. These systems tend to have low costs per capita, because the government, as the sole payer, controls what doctors can do and what they can charge. Countries using the Beveridge plan or variations on it include its birthplace Great Britain, Spain, most of Scandinavia and New Zealand. Hong Kong still has its own Beveridge-style health care, because the populace simply refused to give it up when the Chinese took over that former British colony in 1997. Cuba represents the extreme application of the Beveridge approach; it is probably the world's purest example of total government control.

The Bismarck Model: This system of providing health care would look fairly familiar to Americans. It uses an insurance system -- the insurers are called "sickness funds" -- usually financed jointly by employers and employees through payroll deduction. Unlike the U.S. insurance industry, though, Bismarck-type health insurance plans have to cover everybody, and they don't make a profit. Doctors and hospitals tend to be private in Bismarck countries; Japan has more private hospitals than the U.S. Although this is a multi-payer model -- Germany has about 240 different funds -- tight regulation gives government much of the cost-control clout that the single-payer Beveridge Model provides. The Bismarck model is found in Germany, of course, and France, Belgium, the Netherlands, Japan, Switzerland, and, to a degree, in Latin America.

The National Health Insurance Model: This system has elements of both Beveridge and Bismarck. It uses private-sector providers, but payment comes from a government-run insurance program that every citizen pays into. Since there's no need for marketing, no financial motive to deny claims and no profit, these universal insurance programs tend to be cheaper and much simpler administratively than American-style for-profit insurance. The single payer tends to have considerable market power to negotiate for lower prices; Canada's system, for example, has negotiated such low prices from pharmaceutical companies that Americans have spurned their own drug stores to buy pills north of the border. National Health Insurance plans also control costs by limiting the medical services they will pay for, or by making patients wait to be treated. The classic NHI system is found in Canada, but some newly industrialized countries -- Taiwan and South Korea, for example -- have also adopted the NHI model.

The Out-Of-Pocket Model: Only the developed, industrialized countries -- perhaps 40 of the world's 200 countries -- have established health care systems. Most of the nations on the planet are too poor and too disorganized to provide any kind of mass medical care. The basic rule in such countries is that the rich get medical care; the poor stay sick or die. In rural regions of Africa, India, China and South America, hundreds of millions of people go their whole lives without ever seeing a doctor. They may have access, though, to a village healer using home-brewed remedies that may or not be effective against disease. In the underdeveloped countries, patients can sometimes scratch together enough money to pay a doctor bill; otherwise, they pay in potatoes or goat's milk or child care or whatever else they may have to give. If they have nothing, they don't get medical care.

Health care is primarily a state subject so any improvements in underlying regulations is a responsibility of the states and the not the federal government. Thus, improvements in this area will require coordination among states. When public services are cheaper than private services but less than demand we would observe queuing – if both private and public services are consumed in equilibrium, then it must be the case the full cost per unit of care must be the same in each case, private or public.[1-7]

Affordable Health Care: Singapore Experience

Singapore has one of the most successful healthcare systems in the world, in terms of both efficiency in financing and the results achieved in community health outcomes, according to an analysis by global consulting firm Towers Watson.[94] The government regularly adjusts policies to actively regulate "the supply and prices of healthcare services in the country" in an attempt to keep costs in check. However, for the most part the government does not directly regulate the costs of private medical care. These costs are largely subject to market forces, and vary enormously within the private sector, depending on the medical specialty and service provided. The specific features of the Singapore healthcare system are unique, and have been described as a "very difficult system to replicate in many other countries." Many Singaporeans also have supplemental private health insurance (often provided by employers) for services not covered by the government's programs. Patients are free to choose the providers within the government or private healthcare delivery system and can walk in for a consultation at any private clinic or any government polyclinic. For emergency services, patients can go at any time to the 24-hour Accident & Emergency Departments located in the government hospitals. Singapore's medical facilities are among the finest in the world. As of 2012, Singapore had a total of 10,225 doctors in its healthcare delivery system. This gives a doctor to population ratio of 1:520. The nurse (including midwives) to population ratio is 1:150, with a total of 34,507 nurses. There are 1,645 dentists, giving a ratio of 1 dentist to 3,230 people.

A key feature of Singapore's Health System is that no medical service is provided free of charge, regardless of the level of subsidy, even within the public healthcare system. This mechanism is intended to reduce the overutilisation of healthcare services, a phenomenon often seen in fully subsidised universal health insurance systems. Out-of-pocket charges vary considerably for each service and level of subsidy. At the highest level of subsidy, although each out-of-pocket expense is typically small, costs can accumulate and become substantial for patients and families. At the lowest level, the subsidy is in effect nonexistent, and patients are treated like private patients, even within the public system. [Fig 10] Singapore has a range of policies that support health care, People of Singapore are required to have a health savings plan, called *Medisave*, that works like a 401K retirement savings plan in the U.S; the government sets both policies and prices for private insurance companies; health care costs for services and procedures must be completely transparent; there's a minister of "wellness" who emphasizes the importance of a healthy diet and exercise and works to curb smoking; there are high health care subsidies for those with low incomes; and the government invests heavily in medical education. There's also a compulsory savings program for workers called the Central Provident Fund that can be used to pay for housing; as a result, 85% of Singaporeans own their own home. That is a big social stabilizer, and a big stabilizer of health. The heart of Singapore's national health-care policy is a system based on balancing individual and household responsibility with state control (a single state), balancing transparency, information and data sharing with market forces, balancing

equity, expenditure and choice with affordability. The Singapore government blends the notion of individual responsibility and government control through a financing system of government subsidies for primary health care, hospital services and pharmaceuticals, along with individual savings accounts. Health care is not unique in that sense. Apart from the general pool of taxation revenue collected by the government, Singapore has a Central Provident Fund (CPF). Each month individuals and employers contribute to three accounts: an ordinary account (savings to buy a home, insurance investment and education) a special account (savings for retirement) a Medisave account (money used to pay for personal medical expenses or the hospital bills for immediate family members). The accounts are held by the government and earn a minimum risk-free return. Medisave has been likened to a bank savings account for health care: the more you have in your account, the more you can spend; if you want to be imprudent with your personal savings that's your business. But that's not actually the case with Medisave; there are strict rules about how individuals can use their savings for medical expenses.[95] Hospital care is broken up into classes and levels from class C wards (lowest) to A (highest). The gradient of service refers to the amenity provided. If you want "… additional comforts such as air conditioning and privacy" then you will need to opt for the higher cost B1 and A class wards. [Fig 11]

The government provides a subsidy of 65% to 80% of the cost of a class C ward hospital stay, 50-65% for B2 class. The gap can be paid from a Medisave account. If you are tempted to fly hospital business class on a beer budget and you run out of money to settle the bill, the Medisave accounts of your immediate family members can be used. If you are unlucky enough to need hospital care that results in a very large bill, there is a reinsurance pool known as *Medishield* that provides basic health care in subsidised wards. There is also a basic care safety net for all Singaporeans known as *Medifund*. The government subsidises the cost of primary health care in polyclinics. And GP visits and dentist visits (at approved providers) for lower- and middle-income Singaporeans. Medisave can also be used to pay for screening services.
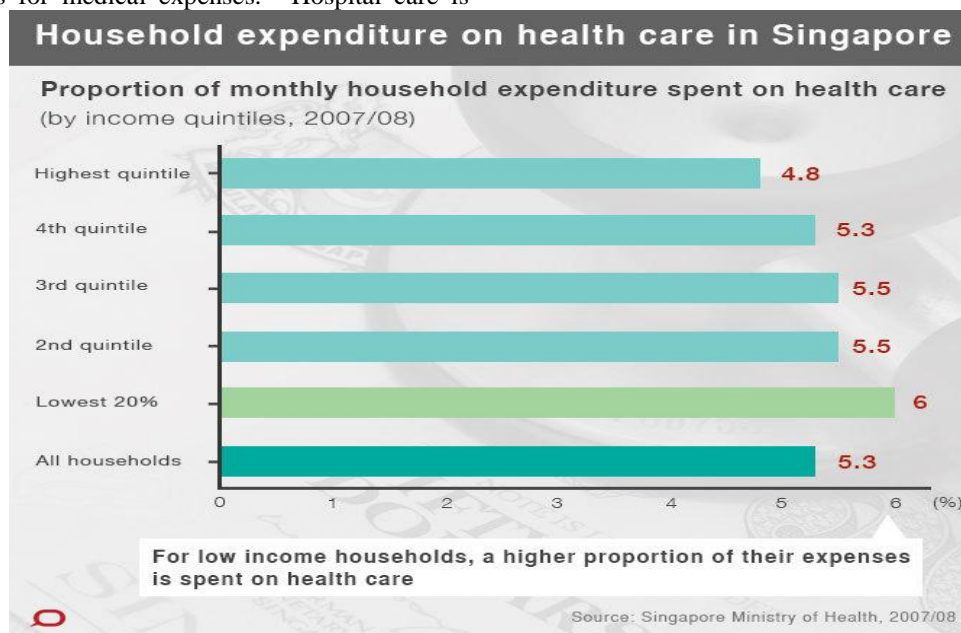

Figure 11: Household Expenditure on Health in Singapore

7. Summary

There is ample evidence that better care could be provided to more people at lower cost if care delivery were organized in a more sophisticated fashion. Medical science has advanced dramatically. Pioneers have reduced rates of hospital-acquired infections, falls, medication errors, and other complications - symptoms of fragmentation - by 90 percent and more, saving thousands of lives and hundreds of millions of dollars. It requires leaders to get into the nitty-gritty of patient care, finding deficiencies in current approaches, confronting professional norms and habits that overvalue autonomy, tolerate unscientific variation in practice, and undervalue cooperative behaviors, and making continual improvements. But a strong link exists between the moral obligation of universal care and the hard work of redesigning and improving healthcare processes. The paradigm shift in health care delivery is occurring and will continue. Understandings gained from enactment and institutionalization theory can be used by managers to create the health care organization of the future. Administrators can create new environments or establish new organizational forms that will put their organization in a leading, rather than following, position. The government will have to promote the growth of private, social and community insurances to improve healthcare affordability for the people at large. Lessons can be learnt from Singapore, Korea and Brazil where insurance has become quite popular and helped the cause of healthcare. Indian pharmaceutical industry though quite big has not helped the poor people in getting adequate healthcare in rural areas. Government has an essential role to provide basic healthcare to underserved and deprived sections of society. There is an urgent need to strengthen District Health System and simultaneously, make health care professionals accountable. Quality of care needs special attention. Professionalisation of management in hospitals is highly desirable. Basic generic drugs for common ailments like infectious diseases need to be under

strict price control to make them affordable to poor. Alternatively, these drugs may be made available to economically deprived sections of society at subsidized rates.[1-14]

Government should enhance spending on health both GDP and per capita expenditure. Radical reforms are required to improve infrastructure including surveillance mechanisms. Health development must be a top priority with the government. There is a need to evolve a well-defined strategy to ensure health for all by 2020. The expenditure on health needs proper monitoring to ensure that the benefits reach the common person.

Existing health infrastructure should be optimally utilized to the advantage of community. This needs good governance, accountability, emphasis on performance and merit and professionalism. Medical devices and interventions have been developed specifically for low-resource settings, and aim to be of low cost, easy to use, and culturally appropriate. But these devices commonly fail to reach scale of production and implementation in their intended markets. Some international organisations have emphasised the ability of global health technologies to support universal health coverage. The difficult last mile translation (eg, the final phase when the product is finally delivered to patients and providers) for existing, highly effective medical devices has to first be addressed to improve health-care in low-resource settings. The concept of Health for All reflects the quest for social justice and health equity. The Alma-Ata Declaration still inspires us - because it puts the people at the centre of health and development. The Health for All ideal is alive and will always be central to any healthcare initiative. If we do not do it, who will do it?

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