

Global Trends in University Hospitals

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Citation: Zuber M, Alkhamis A, Juned M (2017) Global Trends in University Hospitals. J Community Med Public Health 1: 111. DOI: 10.29011/2577-2228.100011

Received Date: 08 August, 2017; **Accepted Date:** 21 October, 2017; **Published Date:** 26 October, 2017

Summary

The lack of basic infrastructure in many countries has meant that university hospitals are floundering. The current funding in industrialized countries will be wasted, if structural changes are not made to allow teaching hospitals to capitalize on new investments. The trend in infrastructure development is in consolidation, Public Private Partnership (PPP) to enable university hospitals to provide all or most health care services another big trend in the USA is the bundling of payment for all services for a discrete procedure and a move away from fee-for-service towards risk-based health care coverage. Decades of evidence from countries of all income levels indicate that investing in recruitment, retention, and high-quality development and training of health-care workers brings ample short-term and long-term returns and has a high opportunity value for other sectors' performance. However, university hospitals need to be vigilant when recruiting physicians from India. Accreditation, re-accreditation, quality measurement and Continue Medical Education (CME) are important developments to proper management of university hospitals and enhanced physician capabilities.

The trend is to have physicians manage and operate teaching hospitals. University hospitals must engage and involve all stakeholders; the public, patients, practitioners, politicians, and policymakers. University hospitals need to become more "Businesslike" and more adept at using the media. Teaching and learning will become even more important, with one reason being that dissatisfied students may go elsewhere. Learning will be lifelong and depend heavily on information technology. It is more important to combine research, both basic and applied, with implementation and improvement. The trend is in the use of information technology in evidence-based medicine. Investment in technology is needed to keep pace with changes in healthcare. The thinking and skills of academic medicine must become broader, combining with and learning from other disciplines like economics, law, engineering, ecology, and humanities. Educators must prepare learners to work in an unknown future. Scholarly future thoughts could provide a framework for thinking about important problems, a richer context for clinical services planning, and a sophisticated perspective for planning and allocating resources more effectively. Demographic trends demand that future doctors have expertise in treating the chronically ill and the elderly. Political and economic trends in healthcare have rendered the current shortage of primary care physicians more urgent, whilst changing the venues and practitioners involved in healthcare as scientific, technological, and pedagogical knowledge are updated, the medical curriculum is shifting to a model that prioritizes self-directed learning and critical thinking skills that can be utilized throughout a career and in the midst of an ever-changing field.

Introduction

The university hospital refers to an integrated organization where academic, clinical and research functions are performed. The activity of university hospitals involves patient care, teaching and educational programs for students, and research directed to the development of new diagnostic or therapeutic techniques. Therefore, the mission of university hospitals deals with the provision of high-quality care, especially in the treatment of rare

diseases and complex patients, the production of specialized services, the use of advanced technology and scientific research. Medical education activity and students' training also characterize university hospitals; the latter invest their knowledge in the improvement of innovative clinical care. University hospitals are organizationally or administratively integrated with a medical school. The hospital is the principal site for the education of both medical students (undergraduates) and postgraduate medical

specialty trainees (residents or interns).

The hospital conducts academic and/or commercial human subjects' research under multiple approved protocols involving patients of the hospital. This brings laboratory and clinical research as well as teaching of medical education into close contact with clinical care [1]. This intersection of university hospitals and medical education gave rise to the practice of academic medicine. "Academic medicine" might be defined as the discovery and development of basic principles, effective policies, and best practices that advance research and education in the health sciences, ultimately to improve the health and well-being of individuals and populations [2]. Accordingly, medical schools and teaching hospitals are central to realizing this capacity in all countries. In addition, new discoveries in science offer tremendous opportunities, and emerging diseases pose huge threats. Indeed, the contribution of academic Medicine to human health over the last century has been extraordinary. The public's and the government's greater understanding of the central importance of health to societies has led to unprecedented scientific advances. New genetic technologies, rapid advances in cell and molecular biology, and imaging technologies promise even more innovation and progress. Recent investments in academic medicine, most notably in the United States and the United Kingdom, are unparalleled.

However, critics are becoming increasingly concerned that academic medicine is in crisis around the world [3,4,5]. Indeed, the lack of basic infrastructure in many countries has meant that academic medicine is floundering. Even the current funding in industrialized countries will be wasted if structural changes are not made to allow teaching hospitals to capitalize on new investments [6,7]. At a time when the health burden, poverty, globalization, and innovation all are growing, medical schools and teaching hospitals seem to be failing to realize their potentials and global social responsibilities [8]. In response to these concerns, this report hopes to provoke more informed discussions by broadening ideas about the future of university hospitals and also enables established medical schools and teaching hospitals make better short-term pragmatic decisions and long-term strategic planning.

Medical schools and Teaching hospitals in the Private Sector

Slowly but surely governments around the world realized that it could not support the cost of academic medicine. The movement of academic medicine almost entirely into the private sector started when more and more medical schools became private, beginning with the most prestigious schools. In an increasingly global market, these schools could charge high fees, pay their staff well, and upgrade their facilities. They also invested a great deal in information and communication technology, bringing state-of-the-art learning to their students. It meant, too, that the schools could offer courses to students far away from their geographical base. As these schools developed, they expanded internationally, sometimes

forming alliances with other prestigious schools but also taking over the weaker schools. Soon the best schools were operating on all five continents. In the branches in developing countries, the medical student bodies tended to be made up of students from both the developed world and a quota from the developing countries. Competition was intense and was based on both cost and quality. Although schools that managed to improve quality while reducing costs, usually through the clever use of technology, flourished, a great many medical schools disappeared. The number of students, however, grew, and the competition for talent was intense, with schools offering generous scholarships to poor but bright students and becoming ever more sophisticated at finding high-quality students in deprived populations. As in other intensely competitive markets, medical schools competed also by occupying niches. That is, the schools offered very different kinds of courses, such as specializing in older students, basic science, rural medicine, surgical skills, and training doctors for poor communities (in both the country where the medical school was based and in lower- and middle-income countries).

Sometimes the students' fees were paid by governments, local communities, or the military in order to produce physicians who met their needs. Many students attended schools in countries other than their own. Some schools owned companies that produced and sold goods and services, whereas others were subsidiaries or departments of global corporations (e.g., McDonald's Hamburger University). Health research was carried out almost entirely in the private sector, but in a wide range of organizations: pharmaceutical companies, medical schools, biotechnology companies, small companies offering a huge range of services, and charities. These companies were founded not only by researchers but also by patients, practitioners, and others. Many of the companies founded by academics offered complex and innovative health services. As in all businesses, to be successful these companies had to be highly responsive to the needs of their customers, including patients and governments. Those that were innovative, flexible, responsive, and relentlessly cost conscious flourished, but many of them "Failed." Little stigma was, however, attached to "Failure." Indeed, as in Silicon Valley, California, at the end of the twentieth century, the experience of "Failure" was seen by many as an important qualification in a leader.

Not only more efficient but also more effective: research was much more relevant, and the "Know-do" gap between the development of new ideas and their introduction into practice was dramatically shortened. Basic science was still well funded because both governments and investors recognized the potentially high returns. Research on the health needs of poor and marginal populations also improved because public-sector bodies concentrated their resources on these problems, leaving the problems of the wealthier to the market. On the negative side, applying the business model to academic medicine meant that efficiency and effectiveness trumped equity. Academic Inc.

resulted in a two-tier system, with the rich finding it easy to pursue a career in academic medicine and the poor finding it hard to enter the profession, despite the generous scholarships available to some. In addition, much more attention continued to be paid to the health problems of wealthier people and countries, and the brain drain from poor to rich countries accelerated. Innovation also suffered. Private academic medicine enjoyed less lead time and had more direct and immediate accountability to its shareholders than it had when it was publicly funded.

Trends in United States of America University Hospitals and worldwide

The USA is a large country (population 300 million) with a robust healthcare system. The medical education system is extensive, with over 140 medical schools, and thousands of postgraduate training programs. Healthcare facilities are a mix of public and private institutions, both non-profit and for profit. The USA healthcare system is also the most expensive in the world, both on a gross domestic product and per capita basis [9]. The payment system is a mixed public and private system, but without universal coverage. There continues to be contentious debates in government regarding the future of healthcare spending and the reduction in the number of uninsured [10].

A simultaneous trend in hospital medicine is towards consolidation. Some university hospitals, like many large non-profit healthcare systems across the USA, has bucked the prevailing negative revenue trend in the industry mainly by absorbing smaller hospitals in the area. A case of the big getting bigger. Steinhart and Goldstein [11] reported the aggressive expansion has led to a solid year of economic growth. Acquisitions and non-recurring payments are one of the main reasons larger non-profit hospitals have been able to grow revenue.

It is predicted that larger nonprofit hospitals with more than \$2 billion in revenue should grow by 3 to 4 percent in the coming year, but operating margins for the majority of hospitals will continue to weaken. The report also states the largest hospitals are getting stronger, while the smaller hospitals get weaker and the ability to offer more services has worked in favor of larger systems. Many of the recent mergers are across medical specialties or between hospitals and physician groups, leading to more employment of doctors by hospitals and health systems. This dynamic has driven one of the most rapid periods of hospital consolidation in the USA in two decades. The prediction is that operating margins will continue to erode for most hospitals in the coming year as the institutions grapple with operating fewer than two very different reimbursement models; the traditional fee-for-service model versus emerging models that emphasize preventive care and avoiding hospital stays [12,13].

However, analysts acknowledged challenges ahead, stating a long list of trends affecting the healthcare environment, including increasing competition from non-traditional sources supermarket pharmacies, and other national pharmacy chains, and pay for performance by insurers [11].

The field of hospital medicine in the USA has been driven by the healthcare reform and the Affordable Care Act [13]. Much of the movement was toward consolidation; value-based purchasing, population- and risk-based health coverage, and the Accountable Care Organizations (ACOs) and other integrated systems that are emerging to make those payment models succeed. The anticipated big jump away from fee-for-service toward risk-based healthcare coverage has not been implemented, but the major hospitals are preparing for it. For physicians, their role in managing the health of populations cost-effectively is expected to grow, creating new assignments, expectations, and accountabilities.

The big trends in hospital medicine involved the accelerating pace of healthcare reform. There is a lot of uncertainty about how hospital and health system integration will affect inpatient practices. Many of the things that save money under risk-based care for example, avoiding infections, blood clots and readmissions are influenced by physicians. Hospital medicine is well-positioned to be a key asset in driving and demonstrating value.

A growing proportion of payment from Medicare and other insurers will include a value-based adjustment, while another big trend is bundling of payment for all services for a discrete procedure. In November, the federal Centers for Disease Control and Prevention published a final rule, effective April 1, 2016, for the comprehensive care for joint replacement model stating a mandatory bundled payment for all hip and knee replacement care from surgery until 90 days post hospitalization in 67 metropolitan service areas [14]. This bundled payment builds on recent Centers for Medicare & Medicaid Services experience with bundled payment demonstrations and seeks to incentivize Medicare providers and suppliers to work together to improve quality and reduce costs.

The challenge is how the hospitals oversee and manage bundled episodes of care and the dividing of resources. This will be easier with elective surgical procedures like a joint replacement, which are relatively predictable, rather than with medical diagnoses, where we will need to better define an episode of care. It is predicted there will be tremendous demand for physicians' leadership and for people with medical backgrounds to be leaders of these organizations in order to get the delivery system changes demanded by risk-based payment right.

Another trend in investments in university hospital is Public-Private Partnership (PPP) (see Appendix).

University of Texas Medical Branch Hospitals and Clinics		
1.	Beneficiary	Insured and self-pay patients, Students
2.	Operation and Management	Public, an academic teaching hospital for University of Texas medical branch.
3.	Service Delivery	<p>Primary care and specialized medical care clinics, Regional Maternal & Child Health Clinics, John Sealy Hospital, Jennie Sealy Hospital,</p> <p>The physicians on the Clinics staff are all members of the Faculty Group Practice of Medicine.</p> <p>Residents or fellows, medical students from the School of Medicine often assist faculty physicians. All medical evaluations and care provided by residents, fellows, and medical students are coordinated and closely supervised by one or more of the clinics' faculty physicians.</p> <p>Areas of clinical excellence include organ transplantation; cancer care; women's, infants' and children's health; cardiovascular health; neurology and neurosurgery; ophthalmology; otolaryngology, Center for Obesity and Metabolic Surgery; breast imaging and care; pediatric and adult burns care; gastroenterology; and diabetes care. Geriatric program features the innovative Acute Care for Elders (ACE) Unit, designed to help hospitalized seniors maintain their independence.</p>
4.	Infrastructure	<p>Three on-site hospitals (including an affiliated Shiners Hospital for Children), a network of clinics that provide primary and specialized medical care.</p> <p>John Sealy Hospital is a 12-story building which includes single patient rooms and specialized care units. The Hospital has the world-renowned Blocker Burn Unit, Mother & Baby and Labor & Delivery Units, the Children's Hospital, Blood Donor Center, the Sleep Lab</p> <p>A second John Sealy Hospital known as the John Sealy Annex houses administrative and support services.</p> <p>The new Jennie Sealy Hospital features 310 patient rooms, including 60 dedicated ICU beds, a 28-bed day surgery unit and 20 state-of-the-art operating suites. It consists of specialized clinic for: Acute Care for the Elders, Cardiology & Vascular, Surgery, Family Medicine, Gynecologic Oncology, Medicine, MICU/SICU, Neurology ICU, Neurology/Neurosurgery, Orthopedics/Trauma, SICU, Surgery, Transplant Surgery</p> <p>The hospital also connects to the Clinical Services Wing, which contains the hospital pharmacy, laboratory space, support services (environmental services, materials management, linen) and a commercial kitchen</p>
5.	Information Technology	My Chart: is a secure electronic way to access one's health information and communicate with the health care team. It is a convenient, confidential online connection tool. Online bill Payment. Maintenance of hospital medical records by health information management system.
6.	Manpower	Clinical staff from school of medicine, administrative and professional staff
7.	Budget, Supply, Investment	Varied mix of revenue resources: Students tuition and fee, Federal and state of Texas sponsored programs, local and private sponsored programs, professional fees (patient charges) Insurance, sales and services of hospitals, auxiliary enterprises.
8.	Accreditation	Joint Commission International, United States of America

Table 1: University of Texas Medical Branch Hospitals and Clinics.

Johns Hopkins Hospital, Johns Hopkins School of Medicine, (JHU)		
1	Beneficiary	Insured people, Financial assistance for services not covered under insurance plan, Students
2	Operation Management	Private, operates cooperatively and interdependently with the faculty of Johns Hopkins University
3	Service Delivery	<p>Primary care through community physicians to specialized medical care. Residency and Fellowship programs in School of Medicine, Institute of Nursing and Continuing Medical Education</p> <p>Research is conducted through specialized institutes in the university. Featured research topics are Clinical Trials, Cancer, Genetics, Brain. Health awareness campaigns are conducted at the community level A Magnet hospital, the highest honor for nursing excellence awarded by the American Nurses Credentialing Center. The Hospital has been recognized as a leader in LGBT patient-centered care in the 2016 Healthcare Equality Index, an annual national survey that promotes equitable and inclusive care for lesbian, gay, bisexual and transgender patients and families. The hospital consistently receives Home Care Elite and Delmarva Foundation Excellence Awards for patient safety and quality care.</p>
4	Infrastructure	The Johns Hopkins Hospital offers an astonishing level of service and innovation, with state-of-the-art facilities like the Sheikh Zayed Tower, The Charlotte R. Bloomberg Children’s Center and the Nelson/Harvey building, Adult and Pediatric Emergency Department. The hospital occupies approximately 20 of the 60 buildings on the Johns Hopkins Medical Campus. The complex receives 80,000 visitors weekly. It houses over 1,000 beds and has a staff of over 1,700 doctors.
5	Information Technology	<p>Innovative technology is used which eliminates overhead paging, advanced building materials absorb sound and thoughtfully designed floor plans reduce foot traffic and noise. An advanced air circulation system with filtration to prevent the spread of germs and reduce respiratory complications.</p> <p style="text-align: center;">The latest surgical technologies in 33 operating rooms, including intraoperative MRI</p> <p>Innovative location of patient units to provide the best care and collaboration among your health care team A real-time locating system that instantly tracks equipment anywhere in the hospital and can locate staff on the inpatient units.</p> <p>Radiologic imaging suites with the most sophisticated diagnostic imaging and radiology services in the country.</p> <p>An automated underground system that hauls supplies and waste materials through a tunnel and out to the hospital’s loading dock, a quarter mile from patient care areas.</p> <p>Highly advanced computer systems to help your medical care team respond to problem.</p> <p>My Chart: is a secure electronic way to access ones health information and communicate with the health care team. It is a convenient, confidential online connection tool.</p>
6	Manpower	Faculty clinicians from John Hopkins University, School of Medicine, professionals and administrative staff.
7	Budget, Investment Supply,	Insurance, Research grants
8	Accreditation	Joint Commission International, United States of America.

Table 2: Johns Hopkins Hospital, Johns Hopkins School of Medicine, (JHU).

University College London Hospital's		
1	Beneficiary	Insured and self-pay patients from Local population, Greater London and the south east, International patients, Students
2	Operation and Management	Operated by NHS Foundation Trust, Independent
3	Service Delivery	<p>University College London Hospital's (UCLH) specialize in women's health and the treatment of cancer, infection, neurological, gastrointestinal and oral disease. It has world class support services including critical care, imaging, nuclear medicine and pathology. Includes University college Hospital, Royal National Throat, Nose & Ear Hospital, Royal London Hospital for Integrated Medicine, National Hospital for Neurology and Neurosurgery, Eastman Dental hospital to name a few. Pioneer surgical techniques, minimal access procedures are followed apart from routine clinical practice and patient management. Highest standards of preparation and continuing medical education is done using leading-edge technologies and methods.</p> <p>Under graduate and Post graduate training in Medicine, Dentistry and Nursing.</p> <p>World-class leader in clinical research having one of the largest portfolios of studies. At any one time there are over 1,200 research projects taking place at UCL hospitals. Clinicians work closely with scientists at UCL (University College London) and together continue to make advances in medical research. It comprises of Biomedical Research centre, Cancer clinical trials, Centre for Nurse and Midwife led research. UCLH is a part of National Institute for Health Research Health Informatics Collaborative (HIC) to share routinely collected clinical data so researchers can find ways of improving patient treatment and care.</p> <p>Primary care is provided by General Practitioners. The Chaplains are a multi-faith/multi-denominational team offering spiritual and pastoral care to all patients, staff and visitors throughout University College London Hospitals NHS Foundation Trust.</p>
4	Infrastructure	Consists of six hospitals. Over 950,000 outpatients and admit over 156,000 patients each year. More than 1200 clinical trial research projects.
5	Information Technology	<p>Most of the mandatory training is available as e-learning via the UCLH Learning Portal, and new recruits set up with access to the Portal before they start so that they fulfill their statutory and professional obligations and keep their knowledge and skills up to date, reduce the risk of injury to themselves, and keep the patients safe.</p> <p>The new Learning Hospital comprises of a range of innovative clinical training suites at The UCH Education Centre which combines state-of-the-art technology and progressive teaching to meet the exacting needs of today's hospitals and Primary Care Organizations. As a benefit of this unique collection of training resources, The Learning Hospital runs master classes giving clinicians the opportunity to share expertise with groups of colleagues and students through live demonstrations. A Conference Centre which offers a range of adaptable, high-tech teaching rooms bespoke for behavioral learning and meetings.</p> <p>Up-to-the-minute live audio-visual feeds from UCH's operating theatres, interactive display resources.</p>
6	Manpower	Works with the Royal Free and University College Medical School, London South Bank and City universities to offer high-quality training and education. Over 8000 staff members
7	Budget, Supply, Investment	A turnover of £882 million and contracts with over 70 primary care trust commissioning bodies to provide services. Patients (Insured and self-pay), Research grants, NHS funding, Charitable fundraising
8	Accreditation	General Medical Council, United Kingdom

Table 3: University College London Hospital's.

Canberra Hospital, Australia		
1	Beneficiary	People with health insurance from Australian Capital Territory (ACT), South East NSW, International patients with reciprocal health agreements between governments, Uninsured and overseas patients with no reciprocal health agreements between governments, Students
2	Operation and Management	Public, associated to Australian National University Medical School and University of Canberra, School of Nursing.
3	Service Delivery	<p>A comprehensive range of services is delivered from the Canberra Hospital campus, including acute inpatient and day services, outpatient services, women's and children's services, pediatrics and pathology services.</p> <p>The Hospital has a strong national and international reputation in research and teaching, and is affiliated with a number of pre-eminent research institutions, including the internationally acclaimed John Curtin School of Medical Research at the Australian National University.</p> <p>The Canberra Clinical School enhances the hospital's teaching status and capacity in clinical services, teaching and research.</p> <p>Offers a wide range of community based services. Services are provided by community nurses, physiotherapists, podiatrists, occupational therapists, dietitians, social workers and allied health assistants. The majority of these services are provided free of charge.</p>
4	Infrastructure	<p>Canberra Hospital is the principal teaching hospital of the Australian National University (ANU) Medical School. It is an acute care teaching hospital of approximately 600 beds, and a tertiary referral centre that provides a broad range of specialist services to the people of the ACT and South-East NSW. The Canberra Clinical School enhances the hospital's teaching status and capacity in clinical services, teaching and research. The hospital is also part of the University of Canberra's School of Nursing. Is a Health Promoting Hospital, under the auspices of the World Health Organization (WHO).</p>
5	Information Technology	<p>All patients of Canberra Hospital and Health Services are clients of ACT Health and are registered on the ACT Health's Patient Administration System (ACTPAS).</p> <p>This record is used to manage the care, monitor the progress and may also be used for quality assurance, training and funding purposes. A Personally Controlled E health Record (PCEHR) is an initiative of the Commonwealth Department of Health. Health Direct Australia is a nationwide free phone service (from landlines) that lets you talk to a Registered Nurse. If necessary, the nurse can then connect you with a doctor for further advice. Health Directs can help you decide what you need to do next. An ambulance will be called if the service thinks you are in need of immediate assistance.</p>
6	Manpower	General Practitioners, Specialists, Consultants, Clinical Nurse/ Midwife Consultant, Resident Nurses, Allied Health staff
7	Budget, Supply, Investment	Health Insurance, Canberra Hospital Foundation coordinates fundraising activities for Canberra Hospital. The office is responsible for the receipt of donations and proceeds from fundraising activities conducted by generous supporters. The office also conducts its own fundraising activities to raise funds for Canberra Hospital.
8	Accreditation	Australian Council on Healthcare Standards

Table 4: Canberra Hospital, Australia.

University Medical Center Freiburg, Germany		
1	Beneficiary	Insured people, International patients, students
2	Operation and Management	Public, part of the Albert Ludwig's University Freiburg, Germany
3	Service Delivery	<p>The University Medical Center Freiburg engages in patient health care, research, and teaching.</p> <p>The University Medical Center believes that basic science and clinical research are prerequisites to realize the newest medical expertise and treatments and therefore encourages ongoing and new research by its physicians. Training of professions within the health sector is undertaken via the operation of schools and apprenticeship training. In total, there are approximately 550 apprenticeship training positions in the following schools: Nursing, Pediatric Nursing, Physiotherapy, Medical Technical Assistants, Midwifery and Orthotics. Programs in hospital management and German public health, Master programs for medical and paramedical staff face to face or via teleconferences to upgrade their qualification.</p> <p>The medical centre has 24x7 emergency facilities for various specialties of medicine and laboratory.</p> <p>Specialty clinics, Research Institutes and interdisciplinary centers, Addiction counseling for employees, Psychosocial counseling service.</p> <p>Highlights include the Comprehensive Cancer Center Freiburg, Center for Chronic Immunodeficiency, Heart Center, University of Freiburg</p>
4	Infrastructure	<p>Medical Center - University of Freiburg is one of the largest medical facilities in Europe and consists of 14 specialized clinics, 5 institutes and 5 centers. Comprises of three campuses in the city of Freiburg:</p> <p>The main clinical campus is situated in the western part of the city between the Stühlinger and Beurbarung districts. The off-campus clinics of the Psychiatry and Dermatology Departments are located in the city district of Herder on Hauptstraße. The Medical Theoretical Institutes are also located in the city district of Herdern in the Institute Quarter of the University.</p> <p>It has 1,600 beds in over 110 wards. There are approximately 64,500 inpatient admissions annually and over 580,000 patient visits per year in the outpatient clinics.</p>
5	Information Technology	Teleradiology, Teleconsultation, Teleteaching
6	Manpower	The University Medical Center Freiburg is one of about 11,000 employees, the largest university hospitals in Germany. Approximately 1,400 physicians and more than 2,900 nurses meet the annual consumption of 68,000 patients and inpatients and approximately outpatient 700,000 visitors.
7	Budget, Supply, Investment	Budget - 600 Mio €, 320 Mio € from Insurance companies, 96,3 Mio € state funding for teaching and research, 21,8 Mio € state funding for investments
8	Accreditation	KTQ, a German standard of quality in health care.

Table 5: University Medical Center Freiburg, Germany.

National University Hospital, Singapore		
1	Beneficiary	Insured people (Medicate and Med shield Life insurance), self-payment, Overseas referrals, students
2	Operation and Management	Public, part of National University of Singapore.
3	Service Delivery	<p>It is the principal teaching hospital of the NUS Yong Loo Lin School of Medicine and the NUS Faculty of Dentistry. The National University Hospital (NUH) is a tertiary hospital and major referral centre for a comprehensive range of medical, surgical and dental specialties. These include Cardiology, Gastroenterology & Hematology, Obstetrics & Gynecology, Ophthalmology, Oncology, Pediatrics, Orthopedics Surgery, and Hand and Reconstructive Microsurgery. The Hospital also provides organ transplant programs for adults (in kidney, liver and pancreas) and is the only public hospital in Singapore to offer a pediatric kidney and liver transplant program. At the National University Cancer Institute, Singapore (NCIS) and the National University Heart Centre Singapore (NUHCS) – both conveniently housed within the NUH premises – dedicated cancer and heart care are provided to better support the growing complexities of public healthcare needs in Singapore. In 2014, NUH became the first local hospital to introduce the macerator, a human waste disposal system that uses single-use bedpans, urinals and vomit bowls instead of reusable ones. The new system helps prevent odors and reduces the spread of infections. It also halves the time nurses need for cleaning duties and allows them to focus on patient care. Research is undertaken at NUH to improve the health of Singapore and sharing this with the global community. Clinical trials are undertaken to develop better drugs, devices, and predictive tests for our patients. Six diseases (cancer, cardiovascular disease, diabetes & obesity, neuron-cognition, infectious disease, eye disease) are interrogated by eight platforms in a matrix fashion. Events are organized at the community level for screening of disease, awareness and preventive measures.</p>
4	Infrastructure	Working closely with the National University of Singapore Yong Loo Lin School of Medicine, Faculty of Dentistry, the Alice Lee Centre for Nursing Studies and the Saw Swee Hock School of Public Health, NUH plays a pivotal role in nurturing future healthcare professionals and leaders. Beds 1225, Inpatient facilities (Wards 44, Deliver room 8, Operating theatres 29), Outpatient facilities (Specialist Outpatient Clinics/Centers 42, Specialized Service Centers 13, Offsite Specialist Outpatient Facilities 4), 24x7 Emergency facilities.
5	Information Technology	<p>Critical laboratory results are automatically sent to alert the doctors on their mobile phones, so that intervention can take place promptly. In 2009, NUH was the first in Asia Pacific to implement an intelligent automated inpatient closed loop medication system that ensures the right dose is delivered to the right patient at the right time. In 2014, plans were rolled out to automate the hospital's outpatient medication system.</p> <p>NUH is the first hospital in Asia to own a complete in-house system of 3D computer modeling and printing capabilities, which enables doctors to reconstruct severely-injured faces more precisely, giving patients an improved chance of looking like them pre-trauma.</p>
6	Manpower	Staff 7,871 including faculties, skilled professionals and administrative.
7	Budget, Investment Supply	Insurance, Singapore research grants, Ministry of Health,
8	Accreditation	Joint Commission International, United States of America

Table 6: National University Hospital, Singapore.

University Hospital Sharjah, University of Sharjah		
1	Beneficiary	Insured residents of UAE and MENA region, students.
2	Operation Management	Private, part of Medical campus, University of Sharjah
3	Service Delivery	<p>Patient-centered care with an emphasis on tertiary-level and specialty care, primarily for residents of UAE and the wider MENA region. This patient-centric hospital is a dedicated center of excellence for several key specialties and super-specialties. It brings together a multidisciplinary team of physicians, nurses and health-care professionals to address the most complex and challenging medical problems. Advanced breast cancer treatment and surgical solutions in collaboration with Gustave Roussy. Cochlear implant program Physiotherapy services Regional center of excellence for maternity care with dedicated theatre suite, fetal assessment unit, ultrasound department and neonatal intensive care unit.</p> <p>Children's diabetes clinic specialized in providing check-up, follow-up and treatment. Level 3 NICU equipped to care for babies born at 23 weeks gestation and above as well as babies born with critical illnesses at all gestational ages. Offers specialty services in the following departments: Center of Obstetrics, Gynecology, and Women Health; Center of Neonatal Intensive Care; Center of Diabetes and Endocrine Services; Center of Digestive Diseases Medical / Surgical; Center of Minimally Invasive Surgery and Obesity Surgery; Center of Orthopedics and Rheumatology Diseases; Center of Urology and Men's Health; Center of Medical Diagnostic Imaging and Interventional Radiology 24x7 pharmacy and emergency care. The hospital accepts insured members of approved networks from all major local and international medical insurance providers. The UHS coordinates with the UAE Central Department of Maternal and Child Health to collect blood samples for the National Neonatal Screening program from all babies born in this hospital and forwards it to their central processing laboratories. The aim of this program is to test all newborn babies to be sure that they are free from some genetic and congenital disorders, which may affect their physical health and mental development. The early detection and treatment of these disorders are the only ways to protect the newborn babies from mental retardation or other complications associated with these disorders.</p>
4	Infrastructure	325 beds spread across multiple specialties including 210 in-patient beds, 40 specialty outpatient beds, 34 emergency beds, 11 ICU beds, 10 CCU beds, 11 neonatal ICU and 9 daycare beds
5	Information Technology	Multimedia Patient Education, Electronic medical records
6	Manpower	Clinicians of different specialties, allied health and administrative staff.
7	Budget, Supply, Investment	Insurance, private grants
8	Accreditation	Joint Commission International, United States of America

Table 7: University Hospital Sharjah, University of Sharjah.

Hospital	Services provided	Infrastructure	Operation i.e. links to medical schools	Manpower	Investments	Training	Methods of payment for services.
<p>Johns Hopkins Hospital Baltimore U.S.A. Accredited by Middle States Commission on Higher Education and the Commission on Accreditation of Rehabilitation Facilities.</p>	<p>The hospital is number one in World hospitals ranking, because of its best services in patient care, teaching and research. John Hopkins specializes in neurosurgery, gynecology, urology and pediatrics. Offers 1^o 2^o and 3^o patient care</p>	<p>Johns Hopkins Medicine operates six academic and community hospitals, four suburban health care and surgery centers, and 39 primary and specialty care outpatient sites.</p>	<p>Combined total of more than 2,816 licensed beds.</p> <p>Johns Hopkins University School of Medicine, John Hopkins Nursing and research programs</p>	<p>More than 41,000 combined full-time equivalent employees</p>	<p>Independently funded through research grants, contracts, endowments, and generous philanthropic community. FY 2015: \$7.177 billion budgeted net revenue Expenses of \$6.995 billion</p>	<p>M.D./Ph.D. program-largest NIH medical science training program in the country • M.D./M.P.H. and M.D./M.B.A. joint degree programs • M.A. in medical and biological illustration</p>	<p>Health insurance and co-payments. Students pay health fees with tuition for medical services, but dental services are on a fee-for-service basis.</p>
<p>Harvard Medical School Boston U.S. Accredited by the New England Association of Schools and Colleges and Association of American Medical Colleges.</p>	<p>HMS does not own or operate hospitals, but is affiliated to 16 hospitals that offer 1^o 2^o and 3^o patient care.</p>	<p>The School and affiliate hospitals provide patient care and clinical training, while mentoring aspiring physicians and scientists in research programs that transform medical care</p>	<p>The Program in Medical Education (PME) at Harvard Medical School is the organizational structure housing the educational programs leading to the MD</p>	<p>The Faculty of Medicine includes more than 11,000 employees.</p>	<p>Independently funded through research grants, contracts, endowments, rents, tuition fees and generous philanthropic community. FY 2015 revenue Total \$616,471,006.</p>	<p>SDL (self-directed learning) and blended learning especially for postgraduates). Skills training on scientific applications, Microsoft Office and a variety graphics programs.</p>	<p>Health insurance and co-payments. Students pay health fees with tuition for medical services and dental services are on a fee-for-service basis.</p>

<p>Chris Hani Baragwanath Hospital Johannesburg South Africa. Accredited by the Council for Health Service Accreditation of Southern Africa.</p>	<p>Approximately 70% of all admissions are emergencies, including approximately 160 victims of gunshot wounds per month. Accident, emergency and ambulance represent the busiest services, counting over 350 daily patients. Every year, about 150,000 inpatient and 500,000 outpatient cases are registered. The Department of Ophthalmology has 111 beds and counts about 50,000 patients per year. Approximately 60,000 patients per year access the Maternity Hospital. Offers 1^o 2^o and 3^o patient care.</p>	<p>3rd largest hospital in the world, occupying around 173 acres (0.70 km²), with approximately 3,200 beds. The facilities are housed in 429 buildings with a total surface area of 233,795 m².</p>	<p>It is a teaching hospital for the University of the Witwatersrand Medical School, along with the Charlotte Maxeke Johannesburg Academic Hospital, Helen Joseph Hospital and the RahimaMoosa Mother and Child Hospital. It is involved in research.</p>	<p>There are about 6,760 staff members.</p>	<p>The hospital is funded by the Gauteng Provincial Health Authorities. Its 2013/2014 budget was R2,7bn.</p>	<p>Human Nutrition, Occupational Therapy, Physiotherapy, Speech Therapy & Audiology, Social Work, Anesthesia Blood Bank Burn Units ICU (Intensive Care Unit) Internal Medicine Cardiology Unit Gastro-enterology Unit, Psychiatry Unit Renal Unit, Respiratory Unit Laundry Services National Health Laboratory Services Nursing College Obstetrics & Gynecology Orthopedic Centre Orthopedic Surgery Pediatrics Pharmacy Public Relations Radiology & Radiography Staff Residences St John Eye Hospital Surgery</p>	<p>Private Health insurance, National Health Insurance (NHI) and those without insurance paying out of their own pockets</p>
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<p>Royal Adelaide Hospital, Australia. Accredited by the The Australian Commission on Health Service Safety and Quality in Healthcare.</p>	<p>Specialty services provided; Anesthetics, Cardiology, Medicine Cardiothoracic Surgery, Clinical Pharmacology, Dermatology, Emergency Medicine, ENT (Ear, Nose and Throat) Surgery, Endocrinology, Gastroenterology, General Surgery, Geriatric Medicine, Gynecologyetc Offers 1° 2° and 3° patient care</p>	<p>The RAH's North Terrace campus has 544 general medical beds and 96 specialty beds. The RAH also includes the 115-bed Hampstead Rehabilitation Centre (HRC) at Northfield.</p>	<p>It serves as a public teaching hospital.</p>	<p>Employed around 6000 staff across its two sites, including more than 3000 nursing staff. Also employs trainees and interns medical staff.</p>	<p>The Government of South Australia is investing \$2.3 billion over the next decade to build Australia's most advanced hospital – the New Royal Adelaide Hospital.</p>	<p>The hospital offers basic training positions in internal medicine, surgery and general practice, as well as advanced training in a range of specialty areas. The hospital is involved in cutting edge research, making the RAH a centre for both medical and research excellence.</p>	<p>universal health care system (Medicare), private health insurance, Co-payment, self-funding if not covered by insurance. International students must have "Overseas Student Health Cover".</p>
<p>Assistance Publique-Hôpitaux de Paris (Greater Paris University Hospitals).</p>	<p>Cover all medical needs, from conception to senior care. 720 services provided across 176 departments Offers 1° 2° and 3° patient care. Accredited by the French National Authority for Health (HAS)</p>	<p>Made up of 39 hospitals. Has 22,474 beds, including 350 in intensive care, 300 operating rooms and 88 operating theaters, 1,681-day clinic, 820 in-home hospitalizations</p>	<p>Collaborates with 7 universities to train over 16,000 medical and paramedical professionals per year, including 800 foreign doctors.</p>	<p>95,000 dedicated professionals at the service of patients including 22,000 physicians and 18,000 nurses</p>	<p>Funded by the Ministry of Health. Has an annual budget of 7.2 billion euros.</p>	<p>7 medical, 2 dental and 2 pharmaceutical faculties 27 specialized training institutes for paramedical professionals (operating room nurses, nurse-anesthetists, chief nurses, etc.) Research</p>	<p>Social Security health insurance, Universal Healthcare Coverage (CMU) or State Medical Assistance (AME) and copayments if not fully covered.</p>
<p>NHS Fife, UK. Accredited by the UK Care Quality Commission</p>	<p>A&E, Children's Unit, Maternity Services, Intensive Care and Surgical and Medical Wards. Physiotherapy Department, out-Patient Department (containing a Minor Injuries Unit and Treatment Room), In-Patient Ward, X-Ray Department, Rehabilitation area, Administration offices and a Child Health Unit Offers 1° 2° and 3° patient care</p>	<p>There are two main hospitals in NHS Fife, Victoria Hospital in Kirkcaldy and Queen Margaret Hospital in Dunfermline.</p>	<p>Linked to the University of Dundee medical school.</p>	<p>NHS Fife employed 8,865 employees. The 2015-16 annual budget is 571.4 million GBP.</p>	<p>Funded by Scottish Government (UK) Public Private Partnerships</p>	<p>Provide medical education to medical students, doctors in training and training the trainers/continuing professional development for senior medical staff and research.</p>	<p>National Health insurance. All citizens are eligible for free medical treatment.</p>

National Taiwan University Hospital, Taiwan.	Medical support department, all medical departments and several specialist centers. Offers 1 ^o , 2 ^o and 3 ^o patient care. Accredited by the Joint Commission on Hospital Accreditation (JCI).	The hospital had 2182 beds in 2015.	National Taiwan University College of Medicine, National Taiwan University College of Public Health	The hospital currently employs 12,470 staff. FY 2014. Revenue NT\$ 8,926,011, Expenditure: NT\$8,818,043	The NTUH is supported by the Central Government, Department of Health, National Health Research Institute, Academia Sinica, and the National Science Council.	Provides education and training to a large variety of medical, para-medical, and non-medical personnel, including clerks, interns, post-graduate trainees, with backgrounds in Medicine and allied health. Involved in research.	Taiwan National Health Insurance (NHI) and copayment, full cash payment by those without insurance. Free for staff and students
King Faisal Specialist Hospital & Research Centre. Has two hospitals located in Riyadh and Jeddah	Provided services in Riyadh include, Radiology, IVF Clinic, Post Graduate Centre, Bone Bank, and the Heart Center Day Medical Unit, Medical Genetics, Kidney Center, Hemodialysis, Liver Transplant, Gastroenterology, Colorectal & Endoscopy, Pediatric Clinic, Neurosciences Clinic, Otolaryngology & Audiology Clinic, Dermatology. Jeddah cover a range of medical specialties including oncology, transplant, pediatrics, ob-Gyn, neuro, cardiology, emergency surgeries and more	Riyadh is a 985-bed tertiary/quaternary care and referral hospital. Jeddah is a 470-bed tertiary specialist hospital, but it is expected to have in 2017; over 1,000 beds including 152 ICU beds and 30 operating rooms.	Affiliated to the Alfaisal University medical school.	KFSH&RC has over 11,000 employees	Funded by state budget and donations. Revenues and expenditures of King Faisal Specialist Hospital and Research Center are estimated at SR 5,753,489,000).	Postgraduate Medical Education Professional Development Programs Continuing Medical Education Undergraduate Medical Education and Research.	Provides free medical care to citizens. Expatriates through the compulsory employment based insurance.

Table 8: Hospital Services provided Infrastructure.

It is a funding model for a public infrastructure project such as a new teaching hospital, airport or power plant. The public partner is represented by the government at a local, state and/or national level. The private partner can be a privately-owned business, public corporation or consortium of businesses with a specific area of expertise. PPP arrangements are useful for large projects that require highly-skilled workers and a significant cash outlay to get started. They are also, useful in countries that require the state to legally own any infrastructure that serves the public. For example, recently the University Hospitals Coventry and Warwickshire NHS Trust (UHCW) have issued a tender for a PPP to deliver a suite of theatres for public and private patients. The successful bidder will be responsible for the design, build, finance and operation, which will be physically connected to the hospital.

Funding of Graduate Medical Education in the USA

Graduate Medical Education (GME) is the supervised hands-on training after medical school that all physicians must complete to be licensed and practice independently. The length of this training varies but generally lasts at least three to five years for initial specialty training; those in subspecialties may train for up to 11 years after they graduate from medical school. Training is coordinated

and funded by teaching hospitals, though the clinical experiences occur in a variety of settings. Their education and research missions enable teaching hospitals to offer patients the most advanced expertise, services, and technology. The physicians who staff teaching hospitals provide a diverse range of specialty care-trauma centers, neonatal intensive care units, etc. around the clock and are prepared to care for the nation's most critically ill or injured patients. The Federal Support for GME Medicare Direct Graduate Medical Education (DGME) Payments offset a portion of the direct costs associated with training physicians (resident stipends and benefits, supervising physician stipends and benefits, GME office overhead costs, for example). The Medicare supports only a portion (the "Medicare share") of the costs associated with training a resident. This share is a hospital-specific amount that reflects each hospital's Medicare volume. Teaching hospitals in the USA incur \$17.4 billion in direct training costs each year, with Medicare supporting only \$3.5 billion of that total. Medicare support for training residents has been frozen since 1997 despite an aging, growing population. Teaching hospitals themselves must offset the balance of each resident's training costs (a declining number of states provide a declining level of support through the Medicaid program).

There is also the Medicare Indirect Medical Education (IME) Payments. Teaching hospitals depend on IME payments to maintain the state-of-the-art facilities and equipment (such as Level 1 trauma centers), and specialized services (e.g., advanced cancer care) that are critical for the environment in which health professionals are trained and for the health of the community. Since the creation of IME payments, the US congress has consistently clarified these are patient care payments that recognize the unique expertise, resources, and other costs associated with caring for the disproportionately high level of complex and vulnerable patients treated at teaching hospitals.

Due to the important role Medicare plays in financing residency training through payment to teaching hospitals for Graduate Medical Education (GME), the Medicare Payment Advisory Commission (Med PAC) recently conducted a review of the U.S. GME system. This system is, in many ways, the envy of the world, annually producing thousands of new clinicians who are well trained in applying cutting-edge technology and techniques to aid severely ill or injured patients. Teaching hospitals also serve as linchpins of their local health care systems and contribute to stunning advances in medical science.

Judged through this traditional frame of reference, the GME System is an extraordinary success. However, that success and frame of reference are no longer adequate. The GME system must join others in transforming the U.S. health care system into an economically sustainable enterprise that provides appropriate care for all Americans. Working with academic medicine and specialty boards, the Accreditation Council for Graduate Medical Education

took important steps in reorienting its residency-program accreditation standards to support needed change. Importantly, the review suggests one step towards a more effective and sustainable health care system is to match the content of training with anticipated needs. This is not a job for government, but for a partnership among GME faculties, residency- accreditation and physician-certifying organizations, insurers, and patient representatives. Government should serve as a catalyst, using its financing leverage to ensure that the necessary work is done, and the proper parties are engaged [15].

Academic Medicine for Global Health Equity

The growing global gap between the rich and poor is unacceptable. This concern was driven partly by anxieties about global security. Terrorism was seen as fueled by the gap between the rich and poor. Global policymakers also understood that better investments in health produced some of the richest returns in economic and social development. Money flowed into health in the poor world, and governments required that these investments be accompanied by learning, research, planning, and evaluation. The primary concern of much of academic medicine was improving global health, particularly by concentrating on the health problems of the 90 percent who had previously received only 10 percent of health care resources (the 90:10 gaps). The result was that it was impossible for an academic institution to be a world leader without a substantial investment in global health and extensive links around the world.

The view and scope of academic medicine has broadened to include human rights, justice, economics, and the environment, recognizing these as the major drivers of health. This meant that teaching hospitals became the main institution. But at the same time, basic science remained important because of its contribution to global problems like finding vaccines and new treatments for malaria, AIDS, and emerging diseases like Reserve (rapidly spread respiratory virus), which appeared in 2010 and killed millions in a global pandemic.

Academic medicine, in partnership with governments (and, where corruption was prevalent, with NGOs), became a major driver toward achieving the millennium's development goals. The G-8 governments (the world's richest eight countries plus Russia) had signed an accord that prohibited the recruitment of academic health professionals from the developing world. Medical schools and research institutions formed networks linked to local NGOs made up of developing and developed countries and forming links among developing countries. In one network, the universities of industrialized countries gave 10 percent of their faculty members' research time to address the problems of the developing world. Some institutions formed pairs of developing and developed country institutions; some merged; and researchers, teachers, and students moved regularly between both settings. The net flow

was to the developing world, with the 90:10 divide beginning to correct itself surprisingly rapidly. Big investments in information and communication technology meant that those in the developing countries had the same access to information and modern learning methods as did those in the developed world. However, too often, some nations would revert to narrow self-interest which is an enormous problem in the developing world [8].

Health-Care Workers as Agents of Sustainable Development

The Millennium Development Goal (Sustainable Development Goal) SDG movement consolidated a critical mass of roles that a health-care worker could play in improving health outcomes, but also in promoting human rights, accountability, innovations, political commitment, and multi-stakeholder partnership. These issues remain relevant in the new development agenda, which could successfully capitalize on the roles health-care workers perform not only in terms of lives saved but also in a broader socioeconomic development context by serving important synergy points among various elements of the wider system. Currently, there is only one SDG sub target that focuses on substantially increasing the recruitment, development, training and retention of the health workforce. However, decades of evidence from countries of all income levels demonstrate that investing in recruitment, retention, and high-quality development and training of health-care workers brings ample short-term and long-term returns and has a high opportunity value for other sectors' performance. The most recent evidence [16] shows that investing in midwives would yield a 16-fold return on investment in term of lives saved and costs of caesarean sections avoided. Health-care employment has a significant growth-inducing effect on other sectors and health-sector employment remains stable or grows even during recessions as general unemployment rises, contributing to the resilience of national economies and benefiting women [17].

These findings bring a new dimension to the SDG narrative: money spent on health, of which health-care workers are a large recurrent component [17] should no longer be seen as a cost, but rather an investment in prosperity and sustainable growth.

Also, health-care workers' unique features such as strong dedication, ability to volunteer, closest ties with the community make them extremely well positioned with regard to manifold dimensions of the SDG agenda. The recent Ebola crisis clearly demonstrates that, without the multiple skills of health-care workers, the toll of lost lives could have been much higher.

Trends in the United Kingdom Medical Workforce

In the UK, the medical workforce has grown substantially in the past 15 years, with an average annual growth rate of 3.4 per

cent between 2000 and 2009 [18]. There was a 15% increase in the number of female doctors in 2013 above the 2008 level [19]. Several workforce trends require careful planning over the next 20 to 30 years: rising numbers of women and part-time workers in some specialties: concerns that the supply of fully trained hospital doctors could exceed demand and challenges in recruiting and retaining GPs. Between 1960 and 2010 medical school places in the United Kingdom rose by more than 70 per cent from 2,000 to 7,889, with a subsequent increase in the number of doctors graduating from medical schools to 5,684 in 2008/9. Overall, the medical workforce has increased substantially; the number of hospital doctors alone increased by 30 per cent to 143,000 in the past decade [20].

According to the Centre for Workforce Intelligence, the level of investment in medical training, rose sharply from 2000, but has leveled off in recent years. The number of female medical students has grown considerably over this time period, and they now make up more than half of all medical students. This trend is expected to contribute to the rise in female doctors, as they qualify and move into postgraduate training and employment [21].

Current trends suggest there could be 2,800 excess hospital specialty trainees at consultant level by 2020, adding £2.2 billion to pay costs if they were all appointed as consultants at current rates [21]. At the same time, more doctors are choosing to take non-consultant grade posts, which could mitigate this risk if it continues.

Supply of General Practitioners

The changing nature of primary care and demographic pressures indicate that more GPs will be required by 2035 to meet a doubling of the number of GP consultations [22]. These challenges could be overcome if, for example, the trend towards part-time and flexible posts continues and proposals granting trainees greater freedom to switch specialties redirects more hospital trainees towards general practice [23].

The supply of GPs is under growing strain as the workforce ages

In 2010, more than a fifth of GPs were aged 55 and over; those leaving the profession rose by 7.8 per cent and surveys indicate a further 10,000 GPs plan to retire in the next five years [22]. At the same time, the proportion of medical trainees choosing to enter GP specialty training has fallen in the past two years and salaried GPs (who tend to work part-time) increased by a factor of 10 between 2000 and 2010 to 8,700 [22].

In 2015, 69 per cent of all doctors in England were female, with numbers increasing at a faster rate than male doctors. Women are expected to outnumber men at some point between 2017 and 2022, accelerating demand for flexible, part-time and salaried posts raising the prospect that more doctors may be required to

provide care in future years [24].

Future scenarios for the consultant workforce

The number and composition of the consultant workforce is likely to have a substantial impact on the way health care is delivered over the next 20 years. The NHS is heavily reliant on trainee doctors, but concerns around quality of care and calls to move towards the provision of consultant cover seven days a week have prompted a review of this model of care [25]. Growing numbers of doctors-in-training are expected to increase demand for a finite number of positions at consultant level, while changes to pension arrangements may prompt doctors to work beyond retirement age, further reducing the number of available consultant posts.

Non-medical and nursing workforce

Between 2000 and 2010 the nursing and midwifery workforce in the NHS in England grew by 26 per cent, an average of 2 per cent per year, the result of a concerted effort to reverse nursing shortages in the previous decade by increasing training places, improving staff retention and active international recruitment [20].

However, the number of nurses on the Nursing and Midwifery Council's UK register of all practicing nurses, began declining in 2008 and continued to fall in the following three years, while the headcount of qualified nursing staff working in the NHS in England only began to reduce after reaching a high of 375,505 in 2009. A number of factors could drive a mismatch between supply and demand for the non-medical and nursing workforce.

Migration patterns

Migration patterns have changed, the number of UK-trained nurses leaving to work in other countries now outnumbers those trained outside the United Kingdom seeking to work in the United Kingdom [26].

Age of the workforce

Perhaps most importantly, the current workforce is ageing: 12.4 per cent of the nursing workforce is aged 55 and over (2011 figures) and the figures are even higher for some roles, for example, 24 per cent for health visitors. In midwifery, 48.6 per cent of the workforce will be eligible for retirement in the next 10 years [26].

Training places

Between 2010/11 and 2012/13, the number of nursing training places fell 12.7 per cent from 20,092 to 17,546 [26]. From 2013 nursing education will become all-graduate entry, but it is uncertain what impact this will have. The number of training places in the allied health professions and pharmacy workforce is also being reduced in response to funding constraints; this may have an impact on the supply of staff in the next 20 years. Demand for nursing and allied health professionals is expected to

outstrip supply unless the number of training places is increased or recruitment outside the United Kingdom intensifies.

Medical Schools in Sub-Saharan Africa

Health in Africa is important as an issue of human equity and as a precursor to poverty reduction and human development. Africa has 24% of the world's burden of disease, but only 3% of the world's health workforce. The Joint Learning Initiative and the 2006 World Health Organization Report [27] called attention to the particularly severe shortages of human resources for health in Africa. The very low physician-to-population ratios in countries in sub-Saharan Africa result from several factors, including a modest output of students by a small number of medical schools, and emigration of many graduates to other countries or continents. A survey by Mullen et al. [28] reported that many countries in Africa are scaling up medical education as part of health-sector strengthening. Several national governments are investing greatly in human resources for health, producing health-sector strategic plans that include increases in health-care workforce. Medical education is essential to the development of the health-care workforce and is an integral part of human resource plans. Several medical schools have opened, and many medical schools are expanding enrolment of students.

When civil society is in disarray and governance is compromised, medical education and retention of physicians will be affected. Graduates in many countries decline to work in rural areas because of lack of clinical support. Graduates from Ibadan University, for example, forgo employment in Nigeria's large and crucial network of secondary hospitals because of poor pay and working conditions, and shortages of supplies, support personnel, and equipment shortages within medical school faculties are endemic, problematic, and made worse by emigration of health-care workers. Almost every school visited in the study had some degree of faculty shortage in both basic and clinical sciences. Some schools have initiated creative strategies to retain faculty staff, such as the Hubert Kairuki Memorial University in Tanzania, where incentives such as housing and communications allowances, free telephone air time, and seminar participation are provided. The Catholic University in Mozambique has made a targeted effort to train and promote the medical faculty. Nowadays more than half their faculty staff are Mozambicans, although the university remains dependent on expatriates as well. At Walter Sisal University, the shortage of clinical faculty staff is relieved largely by partnerships with clinicians at local hospitals who are employed by the provincial Department of Health but obliged by their contracts to participate in teaching.

Insufficient coordination between ministries of education and health can be a barrier to medical schools' ability to increase the capacity of the health workforce. Coordination between these two ministries was a problem in almost all countries visited.

The ministry of education generally provides funds for medical schools, whereas the ministry of health is the main employer of school graduates. In many countries, coordinated planning for budgets, priorities, and outcomes between ministries of health and education is poor, which contributes to inappropriate curricula and the graduation of doctors who cannot find employment in the country. In Mali and Sudan, the yearly number of medical graduates substantially exceeds the in-country capacity to hire new physicians, despite the need for health services. Overall, ministries of education seem to be more active in setting of medical school priorities than are ministries of health. Accreditation and quality measurement are important developments to standardize medical education and physician capabilities. Various levels of accreditation and certification were noted in the countries visited. In Ethiopia, there is no official continuous accrediting body for medical schools. Accreditation is granted only when an institution is initially founded. However, many schools report progresses in accreditation of institutions and assessment of graduates. In Mozambique, the newly formed Medical Council plans to develop accreditation standards for medical schools and external examinations for medical students. The Tanzanian Commission for Universities visits teaching institutions once before accreditation and then every 4 years. The Malawi Medical Council uses guidelines from the Southern African Development Community for accreditation and quality assurance.

Education planning focused on national health needs is improving the ability of medical graduates to meet such needs. Schools are increasingly emphasizing community oriented, relevant, or nationally focused medical education. Many of the schools are developing curricula around national priority health problems, and are using rural and community-based experiences to improve their programs. Although some initiatives are undertaken by the schools alone, many are set in the context of government priorities and national service programs. Beyond the creation of new knowledge, research is important for development of medical school faculties, retention of staff, and infrastructure strengthening. Many schools reported that research promoted staff recruitment and retention and attracted external partners.

Impressive curricular innovations are occurring in many schools. Survey respondents reported several nontraditional teaching methods used in medical schools in sub-Saharan Africa, including community-based education, problem-based learning, and multidisciplinary team-based learning. At the College of Health Sciences at Makerere University, Uganda, a new curriculum includes regular exposure to patients in rural communities throughout medical school.

Postgraduate medical education is an important aspect of a national health-system development strategy. By increasing such programs, schools have been able to retain more graduates and to hire some of the newly trained graduates as faculty members.

Some schools implement so-called sandwich postgraduate programs in which residents pursue the program at home but spend time during training at a regional or international program. This principle is intended to provide exposure to clinical work abroad while mitigating the tendency of doctors to remain abroad when all their training is done elsewhere. Variability in quality of secondary schools creates challenges in medical school admissions. Sound secondary education systems are prerequisites to success in medical school, but the quality of secondary education is not strong in many countries. As a result, many schools have developed preparatory or recruiting programs for disadvantaged students.

Despite challenges, private medical schools represent an area of innovation and growth in medical education in sub-Saharan Africa. Some universities partner with public district hospitals to provide students with additional clinical teaching sites. International partnerships are an important asset for many medical schools. Almost all medical schools in sub-Saharan Africa, including all schools visited, are engaged in collaborations locally and internationally, mainly with institutions in Europe, North America, and Africa.

Trends in Medical Students Enrolment

A study by Holt in 2013 [29] reported that lower fees, cheaper living, and less-stringent entry requirements are attracting many foreign medical students to eastern European universities. There are many courses in English, the qualifications the students get are internationally recognized, and the quality of teaching is comparable with anywhere else. Many students weigh all that up and just choose to come study in Eastern Europe Medical schools from the Czech Republic, Hungary, Romania, Poland, and the Balkan states have seen a strong rise in foreign student numbers in recent years. According to statistics from the United Nations Educational, Scientific and Cultural Organization, between 2005 and 2011, the number of foreign students grew by 21% in Hungary, and by 50% in the Czech Republic. In Poland, the number grew 80% between 2005 and 2010.

Research from the organization for Economic Co-operation and Development [18,19]. Shows that most of these students came for degrees in medicine and health care. In Slovakia, for instance, 45% of foreign students were attending a course in a field of health care in 2010. In Hungary, the figure was 42%. In western countries such as Germany and Canada, it was between 6% and 9%.

The costs of tuition are also generally much lower in the region. In the Czech Republic, students pay a maximum of €14 000 a year for a medical degree in English. Costs at Hungarian universities are €1000-2000 per year higher. In Romania, the annual fee is around €5000, while in Belgrade, the Serbian capital, foreign students pay around €2500 a year. This compares with a lower end of US\$30 000 (€22 571) a year in the USA and £900 (€10 700) in the UK.

Under communism, eastern European countries were a popular destination for medical studies for students from other communist countries and low-income nations. That remained the case for many years after the Iron Curtain fell as students in high-income countries continued to see universities and medical schools in their home nations as the natural place to pursue their medical education. However, universities say that in recent years they have seen more and more students from places such as the USA, Canada, Britain, Asia and other western European states. Nevertheless, the trend of foreign students coming to Eastern Europe's medical schools looks set to continue in the near future, the long-term projections are less clear.

India's Medical Schools - Plagued with Fraud

India's system for training doctors is broken. It is plagued by rampant fraud and unprofessional teaching practices, exacerbating the public health challenge facing this fast-growing but still poor nation of about 1.25 billion people. The ramifications spread beyond the country's borders: India is the world's largest exporter of doctors, with about 47,000 currently practicing in the United States and about 25,000 in the United Kingdom.

In a four-month investigation, Reuters [31] has documented the full extent of the fraud in India's medical-education system. It found, among other things, that more than one out of every six of the country's 398 medical schools has been accused of cheating, according to Indian government records and court filings. The Reuters probe also found that recruiting companies routinely provide medical colleges with doctors to pose as full-time faculty members to pass government inspections. To demonstrate that teaching hospitals have enough patients to provide students with clinical experience, colleges round up healthy people to pretend they are sick.

Government records show that since 2010, at least 69 Indian medical colleges and teaching hospitals have been accused of such transgressions or other significant failings, including rigging entrance exams or accepting bribes to admit students. Twenty-four schools have been recommended for outright closure by the regulator. Paying bribes often in the guise of "Donations" to gain admission to Indian medical schools is widespread, according to India's health ministry, doctors and college officials.

The poor state of India's medical education reflects a health system in crisis. The country has the highest rates of mortality from diarrhea, pneumonia and tuberculosis, creating pressure to train more physicians. Patients are regularly denied treatment at public hospitals that are so overcrowded, often the only way to see a doctor is to pay a bribe. The system's problems are felt abroad, too. Tens of thousands of India's medical graduates practice overseas, particularly in the United States, Britain, Australia and Canada. All of these countries require additional training before graduates of Indian medical schools can practice, and the vast majority of the doctors have unblemished records. But regulatory documents

show that in both Britain and Australia, more graduates of Indian medical schools lost their right to practice medicine in the past five years than did doctors from any other foreign country. In the United Kingdom, between 2008 and 2014, Indian-trained doctors were four times more likely to lose their right to practice than British-trained doctors, according to records of Britain's General Medical Council. (The U.S. and Canada lack publicly available centralized databases of disciplined doctors.)

Fake Degrees

About 45 percent of the people in India who practice medicine have no formal training, according to the Indian Medical Association [31]. These 700,000 unqualified doctors have been found practicing at some of India's biggest hospitals, giving diagnoses, prescribing medicines and even conducting surgery.

The best medical schools in India are absolutely world class. But, the Indian government's process of accrediting a "huge" number of recently opened, private medical schools "Has at times been highly dubious." The All India Institute of Medical Sciences in New Delhi has been rated the best medical school in India. Similarly, Christian Medical College is a top-ranked school in the southern city of Vellore, Health ministry officials and doctors say India's medical-education system began to falter following a surge in new, private medical colleges that opened across the country during the past few decades, often in remote areas.

Little Better Than Quacks

Many of the private colleges have been set up by businessmen and politicians who have no experience operating medical or educational institutions. The boom in private colleges was driven by a change in the law in the early 1990s to make it easier to open new schools because the government was struggling to find the money to build public medical schools. A study in India published in 2012 compared doctors holding medical degrees with untrained practitioners. It found "No Differences in the Likelihood of Providers' Giving a Diagnosis or Providing the Correct Treatment." The study, funded by the Bill & Melinda Gates Foundation, concluded that in India, "Training in and of Itself Is Not a Guarantor of High Quality."

Last year, a "Concerned" student at a rural government medical college in Ambajogai, in western India, posted a letter online with a litany of allegations about the school, Swami Raman and Teeth Rural Medical College. There were professors who existed only on paper, and "no clinics and no lectures" for students in the medicine and surgery departments. He also alleged that students had to pay bribes to pass exams. Students have graduated "Without Even Attending a Single Day." Records from the Medical Council of India, the body charged with maintaining the country's medical education standards, show that an inspection of the college this January found numerous deficiencies, including a shortage of

faculty, residents and lecture theaters. But finding enough patients to provide students with clinical experience at rural, private teaching hospitals like Muzaffarnagar is a challenge. The truth is that many medical students are not prepared to be doctors when they finish college. The result is that patients suffer.

Trends in Modern Healthcare Practice

Several key social, economic, and political issues affect the context of healthcare delivery and the demands on healthcare practitioners. Medical educators face evolving contexts that will alter the ways in which healthcare is delivered in the future, including increases in community based medicine; economic pressures to limit costs; the rise in cases of chronic and episodic illnesses; aging societies; increasing demand for end-of-life care; and the changing nature of the relationship between doctors and patients [32-34]. One specific trend with significant implications for medical educators and healthcare practitioners is the shortage of primary care physicians. Medical schools and organizations are concerned about the misdistribution of specialties chosen by medical students, which is exacerbated by the compartmentalization of medical knowledge into very specific fields of medicine. These factors lead to a lack of evenly distributed learning opportunities in clinical practice and hinder students' ability to connect medical practice to new trends in integrative science [32,35-37]. A shortage of primary care doctors portends negative implications for the future of the medical field, especially given the economic incentive for this specialty to take a major role in providing healthcare.

Therefore, medical schools must consider ways to entice students to elect this specialty. Given the changing nature of the field, medical schools are recognizing the need to create competent practitioners and giving greater importance to issues of patient care, communication, and professionalism. Teamwork is also becoming an important aspect of medical education, since doctors are increasingly coordinating patient care with a variety of other healthcare practitioners, such as Physician assistants and nurses. Furthermore, given rapid advances in technology and science, medical students today are being trained to become lifelong learners and critical thinkers, giving them the ability to adapt and adjust to the shifting demands of the medical field [10,32,38-41].

It is estimated that the United States is facing a shortage of between 61,700 and 94,700 Physicians by 2025, between 14,900 and 35,600 primary care physicians, between 37,400 and 60,300 surgeons and other specialists. By 2025, there will be a 41 percent growth in the number of Americans over 65. Seniors today are living longer and have more lifestyles that are active. Medical advances have increased the number of people living with multiple chronic illnesses. Figure 1

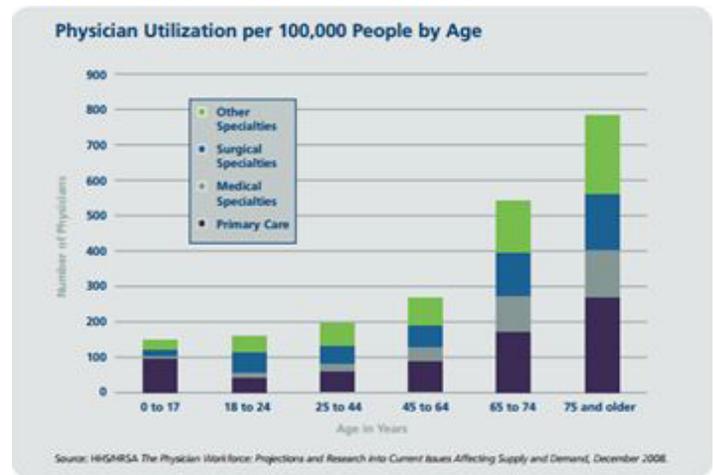


Figure 1: Physician utilization by patients' age

Though demand is increasing, supply is not increasing at the same pace because of a cap Congress imposed on Medicare GME support A scoping review by Farmer et al. in 2015 [42].on the inequitable distribution of the medical workforce as an international problem that undermines universal access to healthcare reported that medical students attending a rural campus or spending time in a rural area are more likely to practice in non-metropolitan areas upon graduation than students studying at a city campus. The review found some evidence to suggest that the longer a person spends time as a medical student in a rural area, the more likely they are to work rurally following Graduation. Overall, the articles states that more than 25 percent of doctors were over age 60 and likely to retire in the next decade.

The review had limitations related to small sample size, inconsistent definition of reality and lack of attention to controlling for variables that might influence rural practice decision, for example, rural background Comparative data was lacking, and most studies were conducted by staff from the medical schools that were the focus of the research. There was no consideration given in any study found to the cost-effectiveness of entry-level medical education delivered in rural settings versus other ways of producing rural practitioners.

Given the limitations, the study concluded that available evidence suggests that medical education in a rural location does increase the number of medical graduates that will work in a rural place. There are indications of a gradient effect where increased rural practice exposure during medical education leads to more rurally located graduates. Given the significant funding being directed to universities to increase graduates that will work rurally, appropriate future research was recommended

Building a Hospital Medicine Program

Recruitment and retention of physicians in all specialties remains a national challenge. This challenge applies to outpatient and inpatient physicians, primary care and specialist physicians, as well as private, government, and hospital owned practices. According to Simone in 2010 [30] the key elements for building and maintaining an effective physician program includes:

Developing a recruitment plan that attracts the right people and clearly sets forth expectations

Many hospitalist programs have failed to create a well - planned and choreographed recruitment process, leading to missed opportunities and/or a hiring mismatch. Physician recruitment is a buyer's market. This is particularly true for university hospitals. Many programs fail to appropriately estimate the demand for their services (at the program's onset and over time) and thus fail to anticipate staffing requirements. In addition, many programs fail to plan and time the hiring of physicians (e.g., sequencing) when multiple providers are needed. They have failed to develop short - and long - term strategic staffing plans.

Hiring the best people to meet organizational objectives

Many programs hire providers who do not fit in with the practice "Culture." There is a mismatch between the vision, values, and objectives of the hospital's program and the newly hired physician. This can lead to disruptive behaviors within the hospitalist practice, low morale, and can result in poor provider and program performance.

Implementing an effective retention plan that keeps high-quality staff motivated and committed to excellence

Many programs have been successful in ending a good physician - practice but failed in support and integration of the new physician into the practice, hospital, and community. A poorly developed retention plan or the absence of one can lead to physician turnover. Physician turnover can result in staff shortages, which may lead to program instability (e.g., be disruptive to the "Chemistry" of a practice), provider job dissatisfaction, provider burnout, and subsequent poor clinical outcomes. Provider turnover can be quite costly to a hospitalist program, as numerous costs are associated with replacement of providers. These costs include those associated with recruitment (e.g., travel, lodging, sign - on bonuses, medical school loan repayment, relocation expenses, lost productivity for hospitalist and hospital staff during the recruitment process), headhunter fees, and revenues lost during provider shortages. In addition, programs may experience inappropriate ancillary utilization and an increase in the length of stay as a result of

being understaffed, negating two of the major benefits of having a hospitalist program. This ultimately will decrease the return on investment for the subsidizing entity

Technology and Medical Education

Technology has had a significant impact on the practice of teaching, and this is increasingly becoming evident in the field of medicine. New technological advancements like iPads are being incorporated into clinical training [72]. Researchers suggest that medical trainees must become proficient in technology and adaptable to new technologies to enjoy a competitive advantage in the field. New technologies have also affected the potential of the classroom. Medical educators can take advantage of the availability of curricular materials on the web and the potential to open the classroom to online participation, even to the extent that intra-university courses can become possible.

Technology has not only changed the structure of the classroom, it also has implications for curriculum in certain fields; psychiatric training must enable students to deal with new diagnoses that may arise from a world increasingly dependent on technology, and therapeutic approaches that students learn may integrate technologies such as videoconferencing and access to databases [38,43,41]. One drawback is that medical school training and preparation are not keeping pace with the changes. Every physician should have a portable ultrasound machine in his or her pocket. Doctors should come out of training very familiar with how to use their cell phones on the job. However, not all physicians are ready for the change, but no other specialty is better positioned for what is coming.

Online mentoring in medical education

Healthcare in many parts of the world faces unforeseen challenges. Many countries need to significantly improve the quantity and quality of healthcare delivered. In order to do this many of them need substantially more healthcare professionals that they have at present [35,44]. This in turns places pressure on healthcare professional education and especially on educators, supervisors and mentors. In many countries the growth in the number of medical students and postgraduate trainees has not been followed by a parallel increase in the number of educators and mentors. In certain fields of medicine there are even more challenging problems. Many countries need to increase the number of primary care clinicians to cater for population health needs and yet have very few existing primary care clinicians to teach, supervise or even share their experience with and mentor the next generation of trainees.

There are broadly two possible ways forward. One way is to massively increase mentor: learner ratios so that a small number of mentors can maintain responsibility for a large number of learners. This is possible, but it would inevitably affect the quality of mentoring. The other way forward is simply to do things differently

from the way that things have been done in the past. One possibility is to make more and better use of new technologies-such as online mentoring. New technologies have made a major impact in other fields of medicine and medical education, there is no reason why they could not have an equal impact on mentoring [45].

Online mentoring offers a number of advantages in medical education. These advantages can help both mentors and mentees. The main advantages of online mentoring are that: it is much more likely to be learner or mentee centric than traditional forms of mentoring; it has great potential to save costs; it can enable a more continuous and long-term relationship to develop; it enables the recording of mentoring activities, goals and milestones by means of online portfolios. There are some disadvantages associated with online mentoring. One of the main criticisms of online mentoring is that, when it is asynchronous, it prevents the mentor and mentee from reading each other's facial expressions and body language. Another disadvantage is that lapses in online security may make the relationship less secure. A final issue is that the information technology context and levels of information technology proficiency amongst the intended participants also needs to be addressed. Online mentoring will only work if there is a consistent and reliable internet connection that enables mentors and mentees to keep in touch [46].

Optimizing the Environment for Learning, Care, and Discovery

The prized foundations of academic medicine are its people. The talent within medical schools, teaching hospitals and health systems transforms bricks and mortar into spaces for innovative teaching that enhances learning, groundbreaking discovery, and compassionate, world-class care. Creating an environment that celebrates and fosters

the shared goals of learning, care, and discovery is of primary importance. Therefore, understanding how people learn, create, and care for others and for themselves is only the beginning of optimizing the environment for learning, care, and discovery. The recent literature on medical pedagogy draws attention to the practice and content of medical education. Some practices in current medical education that have been critiqued for failing to foster curiosity in students are: demands for increased efficiency, a culture of objectivity and overconfidence, and a top-down lecture approach that discourages students from questioning medical knowledge and incorporating their emotions into the learning process (17). Further, new theories are constantly arising in this field. One theoretical approach to medical pedagogy that has recently gained in popularity is Evidence based Medicine, although it has been critiqued for its failure to account for complex diseases, their interactions, and unorthodox treatment approaches [35,48]. The dominant pedagogical approach in medical education has shifted from that of a top-down, hierarchical lecture, to instructional approaches

that foster self-directed learning, relying on techniques including small groups and case studies. These changing instructional practices have occasionally been accompanied by changing styles of assessment. Medical schools have also had to modify the clinical and scientific curriculum to reflect the changing emphasis on integrating clinical education earlier in the medical school curriculum, thereby evolving past the century-old standard established in the landmark Flexner report, which strictly separated science education and clinical education. Medical schools have increasingly taken efforts to invest more care in their student bodies.

The needs of medical students and trainees are increasingly being recognized, as academic programs become more considerate of their mental and physical health, leading to changes such as restrictions on clinical hours. Also, given evidence of underrepresentation of students with low socioeconomic backgrounds, medical schools in the UK have increased efforts to recruit such students and to strengthen the quality of the education provided to students [10,36, 37, 39,41]. Medical schools are recognizing the need to provide professional development resources to their own faculty members and clinical directors, and many have established centers or institutes to concentrate on pedagogy.

Theory and Practice in Medical Education

Training physicians and physician scientists who are well-prepared and nimble enough to practice in today's rapidly evolving health care environment requires comprehensive educational transformation. While reform of educational programs is already underway, the pace must accelerate to ensure that physicians are ready to demonstrate competence not simply in medical knowledge and patient care, but also in interpersonal and communication skills, practice-based learning and improvement, systems-based practice, interprofessional collaboration, professionalism, and personal and professional development. The system must ensure that each trainee is fully prepared for the next phase of his or her education, be it medical school, residency, fellowship, or practice. Adequate preparation requires the full consideration of the spectrum of future practice and the current and emerging needs of patients.

The dominant form of medical education in the USA is allopathic (the 125 allopathic schools accounted for 84% of USA medical school graduates in 2007); the other type is osteopathic medicine. The application requirements and training of osteopathic students are similar to allopathic physicians, with the primary difference being the teaching of manipulation in the osteopathic schools. In recent years, osteopathic medical schools have been expanding even more rapidly than allopathic schools, increasing from 10 schools in 1977 to 28 currently. As a result, by 2019, Gevitz [49] predicts that 25% of all USA medical school graduates will come from osteopathic schools.

Becoming a physician in the USA

The educational steps to become a physician in the USA are

slightly different than in Europe and other parts of the world. After graduation from “high school” (kindergarten followed by 12 years, or grades, of school) at age 18, students attend a college or university and obtain a 4-year bachelor’s degree before being eligible to begin medical school (though some medical schools permit the first year of medical school to count simultaneously as the final year of a Bachelor of Science degree). Medical school faculty weighs several factors when deciding whom to accept for admission. One is the Medical College Admissions Test (MCAT). This standardized exam assesses knowledge in verbal reasoning, biological sciences, and physical sciences; it also requires a writing sample. The MCAT score is used by nearly all medical schools and is predictive of medical school and licensure exam performance [50]. Other admission factors typically include college/university grade point average; a personal statement; letters of recommendation; medical, leadership, and volunteer experience; and, for those meeting a medical school’s minimum criteria, an interview [51].

During the final year of medical school, students typically apply for GME via a matching program, the largest of which is the National Residency Match Program. Upon graduation, these new doctors receive an MD (Medical Doctor) or DO (Doctor of Osteopathic Medicine) degree and will then spend between 3 and 7 years in residency training in their selected specialty (e.g., internal medicine for 3 years), and some may opt for additional fellowship training (e.g., cardiology). Fellowship refers to additional training beyond completion of residency training, e.g., a pediatric gastroenterologist completes residency in pediatrics and fellowship in gastroenterology. After completing GME training, most residents and fellows will attempt to become board certified.

Board certification is a process that certifies that physicians have completed appropriate training in their specialty and demonstrated appropriate competence to represent the specialty. The American Board of Medical Specialties houses the 24 major boards. Board certification is now time limited from 6 to 10 years (requiring maintenance of certification) and is considered the marker of a high-quality physician in the specialty [52]. All physicians must be licensed to practice medicine in the USA.

Undergraduate medical education

All allopathic medical schools in the USA are 4-year programs accredited by the Liaison Committee on Medical Education. There are 126 allopathic schools that have completed the accreditation process. These schools are located in 44 of the 50 states, plus the District of Columbia, and Puerto Rico. An additional 10 schools have achieved preliminary accreditation (five are accepting students) and seven more schools have applied to begin the accreditation process. Of the schools accepting new students, 58% are publically funded, 41% are privately funded, and the remaining school (Uniformed Services University of the Health Sciences) is a federally funded school that trains physicians solely for military and public health service.

The average class size is 146 students, of which 47% are women. Osteopathic schools are accredited by the American Osteopathic Association. Students have an average of 21 hours per week in direct instruction over 38 weeks in the preclinical years. In the clinical years, students spend 38-47 weeks per year in direct instruction [54]. The style of instruction in the preclinical years is often lecture and case-based learning, with laboratory experiences (particularly with the use of cadavers). The clinical years are typically structured in core clerkships, such as internal medicine and general surgery, with elective clerkships in the final year of training. During clerkships, students work with an attending physician and typically GME trainees (interns and residents). Simulation is used by more than 90% of schools in the USA [53]. Evaluation in the clerkships is done in a variety of ways.

One synthetic, clinical evaluation system, RIME (Reporter, Interpreter, Manager, Educator), is used in 42% of internal medicine clerkships [55]. Nearly all schools use knowledge exams and Objective Structured Clinical Exams. Other methods of assessment include reflective writing, portfolios, clinical skill labs, and standardized patient encounters [10,53].

Graduate medical education

Upon completion of medical school, physicians enter GME. The first year of training is typically called “Internship,” although some organizations no longer recognize this term, preferring PGY-1 (postgraduate year 1) residents. For the next few years, trainees are called “Residents” until they are eligible for certification in their specialty. After completion of GME training, if sub-specialization is desired (e.g., medical oncology or oncologic surgery), the physician can apply for a fellowship. Nearly, all GME is accredited by the Accreditation Council of Graduate Medical Education. A physician is eligible for licensure in most states after successful completion of 1 year of GME in an accredited program, but the vast majority will complete a residency program. Currently, there are 93,000 residents training in 4100 programs and 18,000 fellows training in 4800 programs [10,56]. Residents are paid a salary and nearly all programs are at least partially publicly funded. Once in independent practice, all state licensing boards require evidence of continuing education, usually about 50 hours per year. This training, referred to as Continuing Medical Education (CME), can be accomplished in a variety of ways and is regulated by the Accreditation Council of Continuing Medical Education.

Trends in US Medical education

Many institutions are moving from a traditional 2 years of “Basic” or “Preclinical” sciences and 2 years of “Clinical” sciences to earlier clinical experiences in the form of modules or blocks that provide education through an organ-system approach as opposed to a subject or discipline approach. There is a movement away from lecture-based instruction and toward small-group, often case-based education. A number of multi-institutional col-

laborations have been formed in the USA on topics such as well-being [57] student career choice [58] and duty hours [59].

Additional growing areas of interest with emerging collaborations are medical student emotion and motivation, and the application of broader, more holistic views of self-regulated learning, including the use of novel methodologies for capturing the dynamic nature of these context-dependent phenomena [60]. There is also an emergence of degree programs in medical (or health professions) education in the USA and this has the potential to improve the theory and practice of medical education in the USA and abroad. Competency-based training has been a major development in GME over the last decade. All training must be designed and evaluated around at least one of the six

competencies: patient care, medical knowledge, interpersonal and communication skills, practiced-based learning and improvement, professionalism, and systems-based practice. The goals of the competency movement are to reliably measure competency-based behaviors in trainees and determine what behaviors and measurements predictably lead to physicians who provide quality patient care [61].

The latter goal, known as the ACGME’s “Outcome Project,” is still in development with much research in progress to answer this call. Some specialties, (e.g., internal medicine, pediatrics), have organized training into milestones to better document how residents are progressing through training in regard to each competency [62] and thus, readiness to provide quality patient care. Specialties are also beginning to explore whether Entrust Able Professional Activities (EPAs), those critical components of daily work that are the hallmark of the specialty, might provide an alternative way to synthesize “Competencies” in a way that is more readily identifiable by faculty [10,63].

The CLER Pathways' Framework

The CLER Pathways to Excellence highlights the importance of 3 distinct groups of professionals in the education of our future physician workforce: faculty members, nurses, and executive leadership. Because faculty members serve an important mentoring role, many of the pathways highlight ways in which faculty members can model optimal behavior in addressing the CLER focus areas. Many of the pathways also stress the importance of interprofessional teams, in particular nurse-physician collaborations, in addressing the 6 focus areas (patient safety; healthcare quality; care transitions; supervision; duty hours and fatigue management and mitigation; and professionalism). Finally, most of the pathways and their properties cannot be achieved without a close partnership between the GME leadership and the highest level of executive leadership at the clinical site. The clinical environment must model in everyday practice the various properties that constitute the 6 focus areas. The CLER Pathways to Excellence is designed to provide a framework for clinical sites to use in their

continuing efforts to prepare physicians-residents and faculty-to deliver consistently safe, high-quality patient care [64,65].

Interprofessional collaboration: Three best practice models of interprofessional education

Interprofessional education is a collaborative approach to develop healthcare students as future interprofessional team members and a recommendation suggested by the Institute of Medicine. Complex medical issues can be best addressed by interprofessional teams. Training future healthcare providers to work in such teams will help facilitate this model resulting in improved healthcare outcomes for patients the models represent a didactic program, a community-based experience and an interprofessional-simulation experience (Figures 2, 3, 4, 5). The didactic program emphasizes interprofessional team building skills, knowledge of professions, patient centered care, service learning, the impact of culture on healthcare delivery and an interprofessional clinical component. The community-based experience demonstrates how interprofessional collaborations provide service to patients. Figure 2



Figure 2: Interprofessional practice and interprofessional education: An emerging concept. Source: D’Amour, D. & Oandasan, I. (2005). Interprofessional practice and interprofessional education: An emerging concept. Journal of Interprofessional Care, Supplement 1, 8-20. Figure 3

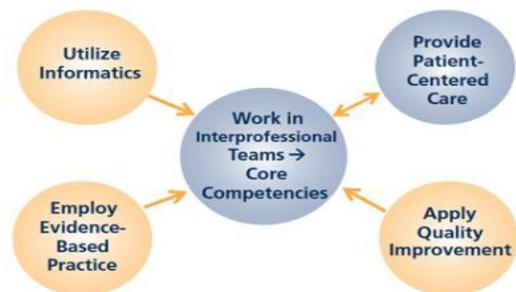


Figure 3: Interprofessional Teamwork and IOM Core Competencies.

Figure 4

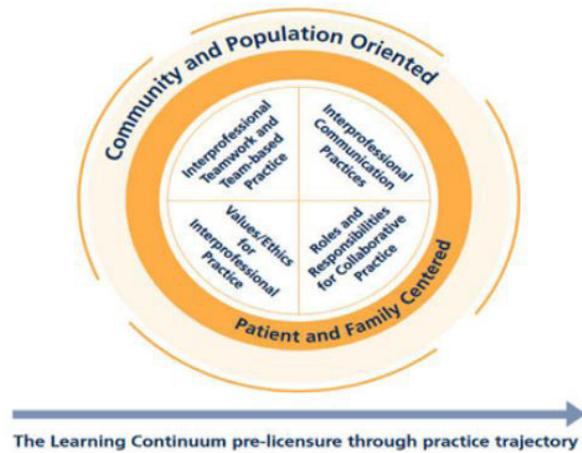


Figure 4: Interprofessional Collaborative Practice Domains.

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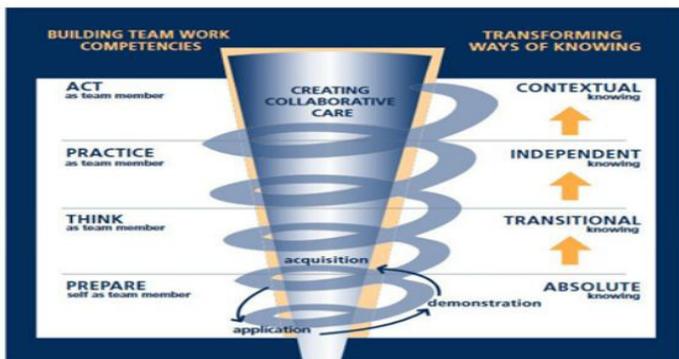


Figure 5: Medical University of South Carolina conceptual framework for advancing interprofessional education. Source: Medical University of South Carolina. (2007, February) Creating Collaborative Care (C3): A Quality Enhancement Plan (QEP). Charleston, SC: Author and how the environment and availability of resources impact one's health status.

The interprofessional simulation experience describes clinical team skills training in both formative and summative simulations used to develop skills in communication and leadership. One common theme leading to a successful experience among these three interprofessional models included helping students to understand their own professional identity while gaining an understanding of other professional's roles on the health care team. Commitment from departments and colleges, diverse calendar agreements, curricular mapping, mentor and faculty training, a sense of community, adequate physical space, technology, and community re-

lationships were all identified as critical resources for a successful program. Summary recommendations for best practices included the need for administrative support, inter professional programmatic infrastructure, committed faculty, and the recognition of student participation as key components to success for anyone developing an IPE centered program [66].

UK Medical Education Figure 6

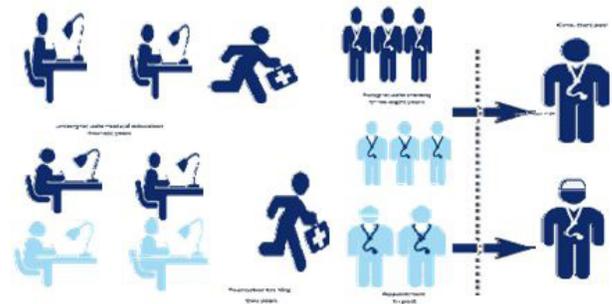


Figure 6: Stages of medical education in the UK.

Undergraduate medical education: a degree program providing an academic grounding in medicine and basic clinical skills. There are 32 medical schools in the UK. Undergraduate medical courses in the UK typically last five years; some six-year courses offer students the opportunity also to obtain a related BSc. There are also four-year Graduate Entry Programs for students with a degree in another subject. In 2010, there were 41,405 medical students across all the years. Those who successfully complete the course are awarded a UK primary medical qualification which enables them to apply for provisional registration with the GMC and entry to the Foundation Program.

Foundation training: A two-year generic medical training program, which bridges medical school and specialist training. Foundation year 1 (F1) builds on the learning, skills and knowledge obtained during undergraduate education. F1 trainees are provisionally registered, those who successfully complete F1 can apply for full registration and a license to practice medicine with the GMC. Foundation year 2 (F2) focuses on training in the assessment and management of acutely ill patients among other things. F2 trainees are fully registered and licensed (Figure 6). Postgraduate training: in 2010 there were an estimated 31,300 specialty trainees and 7,600GP trainees in the UK. On completion of specialty or GP training a doctor receives a Certificate of Completion of Training (CCT) or Certificate of Completion of Training for General Practice (CCTGP). This entitles them to apply to register on either the Specialist Register or the GP Register run by the GMC. In order to practice as a GP or a consultant in the NHS a doctor must be on one of these registers. Figure 7, provides an outline of postgraduate medical training in the UK [67].

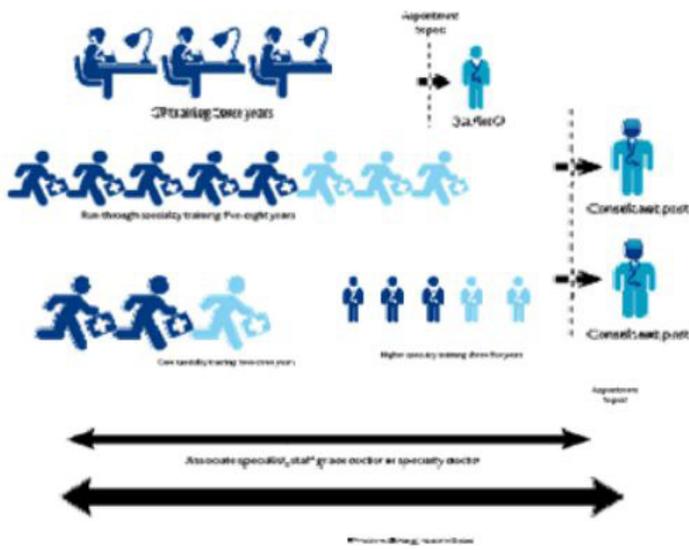


Figure 7: Postgraduate medical training in the UK*. * These timings are indicative so can vary. For example, extensions to training, less than full time training and periods of absence will all extend this.

Also shown in Figure 7, there is a significant number undertaken one of the approved formal training of doctors who do not progress to consultant or programs can still qualify for specialist or General Practice posts. Many work in the NHS as GP registration. Those who can show that their Staff and Associate Specialist (SAS) grade doctors qualifications or training and experience are practicing under the supervision of consultant or equivalent to the standard required for a CCT or GP. SAS doctors are not part of the formal training CCTGP are eligible for award of a Certificate of program. We do not know from the medical Eligibility for Specialist Registration (CESR) or register the number of doctors working in these types the Certificate of Eligibility for General Practice of post, although one

recent estimate has put the Registration (CEGPR). These certificates enable figure at up to 20,000. In 2010, there were 3,551 successful CCT applications, compared with 284 applications via CCT equivalent training routes, and 2,310 CCTGP successful applications, compared with 79 successful applications from GP trainees on an equivalent training route. Also shown in Figure 6, there is a significant number of doctors who do not progress to consultant or General Practice posts. Many work in the NHS as staff and associate specialist (SAS) grade doctors practicing under the supervision of consultant or GP. SAS doctors are not part of the formal training program.

The value and impact of accreditation and continuing medical education

In the current era of heightened fiscal responsibility, transparency, accountability, and escalating health care complexity and risk, accreditation contributes to ensuring that care meets the high-

est standards of health care decision-making and provision. Accreditation can serve as a risk mitigation strategy, and it can also measure performance; it provides key stakeholders with an unbiased, objective, and third-party review. It can constitute a management tool for diagnosing strengths and areas for improvement, as well as for facilitating the merger of health care organizations by stimulating the emergence of common organizational identity, culture, and practices [58]. Organizations that participate in accreditation confirm their commitment to quality improvement, risk mitigation, patient safety, improved efficiency, and accountability; it sends a powerful message to key decision-makers and the public. This performance measure contributes to the sustainability of the health care system [69].

Accreditation and reaccreditation of healthcare facilities has been shown to have positive effect on the overall quality of care and services provided [70]. Moreover, physicians are facing enormous pressure in a rapidly changing health care environment and look to the education community to help them stay current through continuing medical education with advances in medicine and provide optimal care. Most clinicians feel increasing time constraints as they seek to balance professional and family responsibilities and seek efficiency in their learning. Clinicians expect high-quality, relevant, and effective education that is independent of commercial bias and expect that when possible their participation meets the variety of expectations of the state licensing boards, specialty certification, hospital credentialing, and other regulatory requirements [71].

University hospitals, Patients, Public and the Media

Academic medicine was slow to recognize the rise of global media and the use of public relations (or spin) to drive the political process, but once it did acknowledge how the world had changed, it responded dramatically. Whereas once it had been suspicious of the media and public appeal and rather patronizing to patients, academic medicine realized that to succeed, it had to impress and satisfy patients and the public and learn how to use the media. All academic institutions became dominated by public citizens and patients, and in all institutions, the public and media relations department became the most important one. Money, from both public and private sources, followed "Interest," which referred to what interested the public.

There was much greater diversity in the form and size of academic institutions than there had been at the beginning of the millennium. Both huge public and private universities and smaller institutions were often built around one charismatic individual. Competition among the institutions was intense, particularly for "Celebrity" teachers and researchers. Only those institutions that could attract and keep the public's attention could survive. In the developing countries, the academic health community was linked to strong consumer movements, such as those focused on HIV/

AIDS, and the leading Nongovernmental Organizations (NGOs) established their own medical schools. These ensured that the public voice would be powerful, that training would be tailored to local needs, and that the group for field- testing new research advances would be committed.

University hospitals must fully engage with all stakeholders

Most medical academics admitted that they were doing a poor job of relating to stakeholders and it was not surprising that they were misunderstood, underappreciated, and seen as largely irrelevant. This, they thought, was particularly unfortunate, as the ability of the system of health care to discover, think, study, learn, and evaluate had never been more important.

The community thus decided that it had to do better, and across the globe medical academics devised ways of becoming fully engaged with their stakeholders. In many countries this meant the creation of new organizations, and in others it required the transformation of existing ones. Fifty prestigious universities in developed countries with medical faculties partnered with at least one university in a developing country to help stop the "Brain drain" and to replace it with a "Brain gain" through incentive programs that provided resources for training and research, academic recognition, travel funds, and family support. Everywhere, medical academics had to learn how to communicate with the public, patients, and practitioners. They had to be more sensitive to the perception of their being elitist and patronizing and acknowledge the messiness of public discourse. They also had to be much cleverer in handling the media, telling them not only about their successes but also sharing their uncertainties and problems.

But communication on its own was not enough. Academic medicine had to bring its stakeholders inside the fold. The governance of academic institutions included patients, the public, and practitioners. Sometimes the president of an academy was not a distinguished researcher but a prominent patient. The medical academics discovered that their arguments were taken much more seriously when advanced clearly by a patient rather than by themselves. Patients became involved not only in peer reviews of grants and studies but also in the prioritizing, designing, and conducting of research. Medical students became the main drivers of medical education rather than simply its consumers. They insisted on rearranging the curriculum to ensure that they acquired and demonstrated competence in self-assessment of the crucial skills needed by doctors in today's society.

Slowly but surely, medical academics became not a group apart but a highly diverse group of people with a broad set of skills and backgrounds. They were at the center of a vibrant community of patients, members of the public, practitioners of all stripes, policymakers, members of the media, marketing experts, and politicians, all of whom were interested in learning, studying, research-

ing, and thinking about health care. This has led to an increase in the number of applications to medical schools. More funds flowed into basic research, and the connections among the many different groups involved in research improved.

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