Integrating clinical services with research and education. The Johns Hopkins experience and how it can be applied in the NHS

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Professor Antony Rosen is the first visiting professorship of the Royal Society of Medicine (RSM). He is Mary Stevens Professor of Medicine and Director of the Division of Rheumatology and Professor of Pathology at Johns Hopkins University (JHM). His research has focused on shared mechanisms of autoimmune rheumatic disease (Sjogren’s, Scleroderma, Lupus, Myositis, Rheumatoid Arthritis and vasculitis).

Professor Rosen was introduced by Dr Sonya Abraham, President of the RSM Clinical Immunology and Allergy Section to the audience, which included Sir Richard Thompson, Professor Sir Michael Rawlins and Professor Sir Anthony Newman Taylor. She gave the audience a short review of the current state of medical academia and its relationship to the various new medical bodies before introducing the Professor.

The professor began by discussing the origin of Johns Hopkins medicine (JHM). Johns Hopkins had money and a vision. He was a Quaker banker and businessman who left $7million ($11 Billion today) to found the Hospital and Medical School. The practice and education of medicine at this time was not standardised with no formal curriculum. New models and standards of medical education were developed by the medical school faculty: William Welch, Sir William Osler, William Halstead and Howard Kelly. The trustees emphasized scientific discovery and the Academic department heads were appointed chiefs of service.

Professor Rosen discussed Osler’s road map “To wrest from nature the secrets which have perplexed philosophers in all ages, to track to their sources the causes of disease, to correlate the vast stores of knowledge, that they may be quickly available for the prevention and cure of disease—these are ambitions. To carefully observe the phenomena of life in all its phases, normal and perverted, to make perfect that most difficult of all arts, the art of observation, to call to aid the science of experimentation, to cultivate the reasoning faculty, so as to be able to know the true from the false—these are our methods”.

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JHM, he said, is a great place for research. He discussed the JHM model overview, how they got there and the challenges. The public do not recognise the importance of academic medicine. Doctors may not communicate the passion and dreams. He discussed Martin Luther King’s “I have a dream” speech. The last 100 years have been productive and he wondered if JHM could freeze all new discoveries what would happen in 10, 15 or 20 years. Yet society wants to develop new treatments. In 1996 the health system and the school of medicine joined together to form Johns Hopkins Medicine. The Dean/CEO makes decision related to funding.

He described the vision and goals of the National Institutes of Health (NIH). The goals of the agency are to “foster fundamental creative discoveries, innovative research strategies and
their applications as a basis for ultimately protecting and improving health; to develop, maintain, and renew scientific human and physical resources that will ensure the Nation’s capability to prevent disease; to expand the knowledge base in medical and associated sciences in order to enhance the Nation’s economic well-being and ensure a continued high return on the public investment in research; and to exemplify and promote the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science”.

Today Johns Hopkins has approximately 40,000 staff, 2.8 million annual OPD visits and 1000 daily visits to Emergency Room. The annual operating revenue is in the region of $6.7 billion. JHM gets $900 million in development spending. Of this $450 million is from NIH, foundations and philanthropy. Rheumatology on its own has raised $45 million from philanthropy, mostly from grateful patients. $200 million is transferred from healthcare to school of medicine.

This has been achieved through vision and a clear programme. However this has been an era of unparalleled challenges with the worst recession since the depression. The NIH has not grown and there are pressures pushing costs relentlessly downwards. In the US as elsewhere there is major restructuring of healthcare financing. Pharmaceutical companies are having unprecedented challenges getting drugs to market. The rollout of new drugs is at an all-time low.

However, there are opportunities; there are tens of thousands of parameters to assay. We can measure tiny amounts of molecules. Molecular imaging with computer and data analysis has vastly changed. Whilst disease may be seen as dysregulated biological pathways the patients define the questions and hold the answers. There is also a need for the coupling of understanding patient care to scientific discovery.

Rosen discussed “Disruptive Innovation”, a theory put forward by Clayton Christiansen. As an example he discussed the changes to IBM that produce a small number of very large computers for a small market. They were overtaken by smaller computers that became quicker, cheaper and simpler with a bigger market.

Where is the “disruption innovation” in medicine? Humans and diseases are not uniform and it is almost impossible to drive out biological variability. We must embrace biological variation and discover subset. Defining subset can be achieved using tiny amounts of material and tight coupling of patient care and discovery.

What about the future enterprise? There is a requirement to provide outstanding patient care. Giving the right care to the right patient at the right time. This can be achieved by models of Speciality Centre focusing on specific diseases and allowing for the collection of data and samples prospectively. In these learning healthcare systems cost savings would be a secondary benefit.

He discussed the framework that enables discovery, coupled learning health systems and clinical phenotyping. The rapid advance in technology is improving data collection.
Analysis is the critical interdisciplinary opportunity. As an example in head and neck cancer radiation therapy there was a “best guess” radiation plan. By collecting data on outcome and side effects and choosing the best field algorithm the machines make precision adjustments leading to better outcomes and cost savings.

The development of new treatments takes time and is expensive\(^1\). Furthermore clinical translation from bench to bedside is not a smooth process\(^2\)\(^-\)\(^4\). For this reason academic health centres in the USA and the UK were established in order to speed up the process of research breakthroughs and ultimately improve health through developing novel and safer therapeutics. In the UK, the partnership between universities and the National Health Service means that these organisations rely heavily on income from the government, whereas in the US the majority of their income comes from philanthropy, as the case with Johns Hopkins. Although the principles are the same in both countries the roles and responsibilities of the Academic Health Sciences Centres (AHSC) are very different. For example, AHSC in the UK are part of the NHS which provides an excellent opportunity for patient orientated research. However most clinician scientists find it difficult to dedicate time to research because of the pressures of clinical service demands in the NHS.

Every organisational model has advantages and disadvantages and in the search for the perfect model it is important to share the successes and failures so that best practice can be established. As part of the evolution of AHSC, it was suggested that academic health sciences systems (AHSSs) maybe a better model, which function as integrated health-care delivery systems that not only include medical centres but also a network of hospitals and practices\(^5\). Many of these structures already exist in the NHS, and we should take advantage of this opportunity to successfully integrate clinical services with research and education.

In conclusion, integrating clinical services with research is challenging, not least because of the competition between providing cost effective medical care and the discovery of mechanisms of diseases which both have different goals. Despite the many challenges, the medical community should re-capture its history, vision, belief, and dream in order to successfully integrate clinical services with research and only then, will the NHS be remembered for having a bold vision.

References


