

Introduction

INNOVATION IN HEALTH CARE: THE ENGINE OF TECHNOLOGICAL ADVANCES

RIFAT A. ATUN

*Centre for Health Management, Tanaka Business School
Imperial College London, South Kensington Campus
London, SW7 2AZ, UK
r.atun@imperial.ac.uk*

DESMOND SHERIDAN

*Department of Cardiology
National Heart and Lung Institute, Imperial College London
and St Mary's Hospital, Norfolk Place,
London, W2 1PG, UK
d.sheridan@imperial.ac.uk*

Better and equitable health is a global aspiration. Health has become a key issue in the development of stable global social, political and economic structures and the creation of mechanisms to achieve it remains one of the greatest challenges we face in the 21st century. Understanding the breadth and complexity of the solutions required to improve global health is critical to maintaining substantial progress in this endeavour. Great progress has been made during the past century in understanding diseases, developing new diagnostic technologies and new medicines, resulting in better prevention and treatment of illness and contributing to major advances in longevity in the developed world. Indeed, in the period 1952–1992, over one half of the gains in health were due to access to better technology and application of new knowledge. Remaining gains were due to income improvements and better education (World Health Organization, 1999). However, in spite of these gains the challenges ahead are equally formidable. The emergence of new diseases and the spread of disease as a direct result of human activity or indirectly through environmental change are major new scientific challenges.

The healthcare sector operates in a uniquely complex social, political and ethical environment. All societies recognise the importance of equity in provision of

health care and aspire to achieve it through various means, almost always involving a mix of state and private sector involvement. Healthcare systems are characterised by involvement of the state to prevent market failure. The extent of this involvement distinguishes it from other forms of consumption. The involvement of the state in health systems varies in different contexts. It may be limited to “stewardship” of the sector, with an emphasis on regulation, policy development and provision of strategic oversight, or may include involvement in financing, purchasing or delivery of healthcare services. Involvement in healthcare financing may include collection, pooling and allocating resources amassed from the citizens or corporations in the form of taxes, insurance or direct payments. Involvement in service delivery may be direct, with ownership and management of healthcare institutions and employment of the staff who work in these. However, involvement in financing and delivery may be delegated to third parties: public or private “not for profit” or “non-profit distributing” organisations (such as public insurance agencies, non-governmental organisations, trusts or mutuals), or to private “for profit” organisations and structures. However, whatever the mix and the extent of state involvement, all health systems face the challenge of meeting increasing demands that have outgrown the available resources. Understanding the dynamic and complex nature of health systems, and how regulatory interventions help achieve system goals and objectives is critical to designing meaningful policies.

Technological advances and development of new medicines are achieved on the basis of fundamental research carried out in universities and institutes of research, while virtually all end products and medicines are developed and produced by the pharmaceutical and related industries. These organisations operate in markedly differing financial and regulatory environments, but their successful interaction is critical for success. By its nature treatment of disease involves altering or disturbing normal body functions on a temporary or permanent basis to achieve some overall benefit in wellbeing or longevity and therefore necessarily involves some element of risk which is overt and unavoidable. Despite this there appears to be no aspect of human activity which generates a more risk-averse attitude. Huge rates of death and disability are blithely accepted and tolerated in exchange for the pleasures of smoking tobacco and drinking alcohol or the convenience of daily road travel. In contrast we seem to have deluded ourselves into regarding illness as an unjustified inconvenience for which we can expect risk free treatment as a right. As a result the healthcare sector operates in an environment of intense and unique regulation.

Innovation is at the heart of all advances and has the capacity to solve problems facing humanity. Societies which have turned away from innovation and technological development have failed in their ability to support their populations. Understanding the nature of innovation in the life sciences and in particular health care,

how it operates, what enables and hinders it is therefore of great importance to meeting the challenges ahead.

Multiple interacting factors influence the uptake and diffusion of new knowledge and technologies which are needed to improve health. In turn, the delivery of health care on a global scale depends on effective and stable political and economic foundations, which have the capacity to improve and manage disease prevention and treatment.

Understanding the nature of innovation in the life sciences is critical to creating innovation ecosystems that combine an appropriate balance of incentives, rewards and regulations that encourage the innovation process but also the uptake and diffusion of innovations once these reach the market place.

Developing such an understanding requires a careful examination of the nature of innovation in the life sciences, the innovation process that spans academic institutions, healthcare systems and multiple industrial organisations, and involves a wide range of stakeholders, as well as the innovation life cycle in the life sciences.

It is all too easy given the complexity and scale of these challenges to focus on single issues and partial solutions that have little prospect of achieving long term gains or which may even hinder solutions in other areas. Hence, policy makers should adopt a holistic approach when developing policies aimed at improving health — informed by sound understanding of the innovation process, knowledge of factors which encourage or hinder innovation, and awareness of the societal expectations which shape the goals and objectives of health systems. Partial understanding of the innovation process, the factors which influence the uptake and diffusion of innovations, and the goals and objectives of health systems may lead to the development of inappropriate policies and partial regulations which hinder the innovation process as well as the uptake and diffusion of innovations.

This book volume, reprinted from the *International Journal of Innovation Management* (Vol. 11, No. 2), brings together a series of papers which address many of the issues related to innovation in the life sciences. The papers, developed by a multidisciplinary group of scholars and practitioners, explore innovation in the life sciences in a holistic manner but viewed through a variety of lenses.

J. Attridge distinguishes theory from practice in managing innovation, as a business and management strategy in the life sciences and in particular in the biopharma sector. He explores how our understanding of innovation has evolved from simple linear “push” and “pull” models to more complex dynamic, interactive incremental ones that more realistically represent what happens in practice.

Using real life case histories, D. Sheridan analyses the innovation process in cardiovascular medicine and illustrates how important advances have emerged. His

analysis demonstrates an important feature of the innovation process in the biopharma sector: the “bench-to-bedside” interaction. The ability of physicians to work across a wide range of scientific fields at “the bench and bedside” enables continuous innovation, as new technologies and solutions are developed and enhanced incrementally over many years by observing what happens in practice and by building on developing science to address new challenges.

K. Sikora brings a unique practitioner perspective on the importance of innovation in delivering new treatments to patients. His personal view reflects on how innovation may evolve to meet future needs in cancer medicine and outlines the challenges that lie ahead. He argues how within the next 20 years the advances in cancer medicine could transform cancer from a death warrant to long-term health management. But that promise, he contends, depends on sustained investment in innovation, and on the society’s willingness to pay for that innovation, but may not be realised in Europe where investment in medical science remains low compared to the United States and where innovation is inadequately rewarded.

Drawing on a review of empirical evidence, R. A. Atun, I. Harvey, and J. Wild stress the critical importance of intellectual property (IP) in enhancing national potential for competitive leadership in the global market for life sciences. Through case studies they illustrate how the US has approached IP strategically and created an IP infrastructure; how Japan aims to develop into an “IP nation”; the way China is investing in creation of a well-developed IP system, while the European Union — which has a fragmented and expensive system of national patents — lacks an environment which values investment in IP generation and management.

R. A. Atun, I. Gurol-Urganci, and D. Sheridan explore how regulatory policies aimed at managing healthcare costs and access to new medical technologies impact on the pace of innovation and health system objectives of equity, efficiency, effectiveness and user choice. They demonstrate an asymmetry between the regulatory policies and efforts to enhance access to new innovative medicines. Often the regulatory policies have too narrow a focus on aggregate measures of efficiency (such as reduction in volume of medicines prescribed or reductions in pharmaceutical budgets), without adequate consideration of the effect on the health system objectives of equity, effectiveness and choice. The complexity and lengthy course of innovation, they argue, makes it hard to evaluate new technologies, as discovering the true benefits of a new medicine may take longer than timing of health technology assessment that determines decisions on adoption of these innovations in health systems. They also note in Europe an undue emphasis on assessing product innovation, but without due concern for process innovations which are introduced without appropriate assessment of benefits. They warn that focusing on short-term efficiency savings in one domain of the health system may have adverse consequences on the system as a

whole and recommend decision makers to adopt a more holistic approach to policy making, and to carefully consider the potential impact of regulations on innovation ecosystems, the uptake and diffusion of innovations and the efforts to achieve health system goals.

In the final paper of the series, D. Kleyn, R. I. Kitney, and R. A. Atun explore the role of partnerships between academia and business in fostering innovative technologies. Through a review of published studies and interviews with key informants in the European biopharma, university, and venture capital sectors, the paper identifies perceived benefits of partnering, strategies pursued by organisations engaged in research partnerships and the factors which encourage or hinder the development of successful partnerships. Although biopharma R&D partnering activity in the UK and some other European countries is encouraged there are few studies which assess the benefits of these interventions in the European context and empirical evidence is lacking. While the views of key informants differ on the adequacy of current government support for industry–university research partnerships in the UK, there is agreement on the key barriers to developing healthy partnerships, which include pressure on pricing from industry partners; asymmetry of experience, knowledge, and skills between industry and universities; problems with negotiating ownership of IP; and excessive bureaucracy coupled with lack of administrative support from universities.

Collectively, these studies demonstrate the critical importance of taking a holistic view of innovation from “concept to diffusion” or from “bench to bedside” when developing health and science policy. The dangers of partial understanding of the innovation process or well intentioned but narrow assessment of the value of innovations are all too obvious. The critical importance of seeing the innovation process, as distinct from the products it produces, as an invaluable engine of technological advance is not yet adequately appreciated in the European context, where the rewards for the innovator to encourage investments needed to sustain research and development are inadequate or mistargeted. Indeed, a recent review of research funding in the UK has highlighted poor coordination of research funding and sub-optimal collaboration amongst key organisations engaged in the innovation process (Cooksey, 2006). But as the studies in this volume demonstrate, these problems are not confined to the UK but are prevalent in Europe which faces a decline in academic clinical science (Sheridan, 2006).

Until recently, the EU enjoyed global competitive advantage in the life sciences. This advantage has been lost and the research to inform us on the reasons for this decline are lacking. One could argue that perhaps Europe’s decline as a creative force in the health and bioscience sectors results not from what is happening in the laboratory, but from policies and practices built on a misunderstanding of the innovation process itself. To regain this competitive advantage the EU must invest

substantially in R&D, IP generation and commercialisation of these outputs. However, these investments must be coupled with policies that encourage interaction amongst all the key parties involved in innovation and reward innovation along the whole innovation cycle.

References

- Attridge, J (2007). Innovation models in the biopharmaceutical sector. *International Journal of Innovation Management*, 11(2).
- Atun, RA, I Gurol-Urganci and D Sheridan (2007a). Uptake and diffusion of pharmaceutical innovations in health systems. *International Journal of Innovation Management*, 11(2).
- Atun, RA, I Harvey and J Wild (2007b). Innovation, patents and economic growth. *International Journal of Innovation Management*, 11(2).
- Cooksey, D (2006). *A Review of UK Health Research Funding*. London: Stationery Office.
- Kleyn, D, RI Kitney and RA Atun (2007). Partnerships and innovation in the life sciences. *International Journal of Innovation Management*, 11(2).
- Sheridan, D (2006). Reversing the decline of academic medicine in Europe. *The Lancet*, 367(9523), 1698–1701.
- Sheridan, D (2007). Development and innovation in cardiovascular medicine. *International Journal of Innovation Management*, 11(2).
- Sikora, K (2007). Development and innovation in cancer medicine. *International Journal of Innovation Management*, 11(2).
- World Health Organization (1999). *The World Health Report 1999*. Geneva: WHO.