A Dynamic Balanced Scorecard for Managing Health Systems Performance

David Lyell
Centre for Health Informatics
University of New South Wales
Sydney NSW 2052
AUSTRALIA

Phone: +61 2 9385 9020
Fax: +61 2 8572 5397
E-mail d.lyell@student.unsw.edu.au

Dr Geoff McDonnell
Centre for Health Informatics
University of New South Wales
Sydney NSW 2052
AUSTRALIA

Phone: +61 419 016 116
Fax: +61 2 9386 0992
E-mail gmcdonne@bigpond.com.au

Abstract

Health system performance management is a dynamically complex problem, affected by a large number of factors which interact to produce health outcomes over time. A brief review of current health system performance assessment instruments, including the balanced scorecard, demonstrates only a limited ability to deal with the dynamic complexity of this problem. These are limitations that can be overcome with the incorporation of system dynamics methods. We propose a dynamic balanced scorecard for managing regional health system performance in New South Wales, Australia. Central to this scorecard will be an understanding of the dynamic interactions of cost, quality and access and how these affect population health.

Supported by HCF Health Insurance's Health and Medical Research Foundation
www.hcf.com.au

Overview of Health System Performance

The goal of any health system is to improve health for the population that it covers. Health system performance management is the means by which a health system measures progress towards this goal and provides a mechanism to inform decision making about corrective action that needs to be taken when the system progress deviates from the goal.

While this sounds simple, nothing could be further from the truth. First let us consider what is involved in improving health. The World Health Organisation in its constitution defines health as '*a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*' (WHO, 2006).

This is a very broad definition which demonstrates how a multitude of factors interact to produce health. These factors might include access, education, clean water, adequate nutrition, sanitation, paid employment, pest control, stress management, adequate shelter and protection from criminal activity and violence. There are enviromental factors to consider such as levels of pollution, exposure to second hand ciggarette smoke, the presence of fluoride in the water supply, quality of food and the quality of roads and transport infrastructure which reduce accidents. There are also numerous individual factors which contribute to health such as level of fitness, obesity, genetic factors and risk taking behaviour such as smoking, drinking or unsafe sex pratices. On top of this there is also government intervention to improve health.

This list could go on, and all these are in addition to the provison of medical services. Ultimately this means that the responsibility for improving health rests with everybody which makes performance management very difficult.

Improving health is a dynamically complex problem with many contributing factors and time delays between the implementation of policy and when results are observed. A health system is "*all actors, institutions and resources that undertake health actions - where the primary intent of a health action is to improve health*" (WHO, 2003, p 7). The focus of the research presented in this paper will be on managing performance in the context of a regional health system.

A number of performance management and measurement systems have been developed for the health system with the focus being to improve health. We will review some of the more sophisticated performance management systems in use. To varying extents these all appreciate the systemic interactions that are required to achieve the goal of improving health. However, these could be strengthened with the use of system dynamics to understand the dynamic complexity of health system interactions and the knowledge to improve health.

This paper will briefly overview the components of health system performance by examining a number of health system performance assessment instruments. It will them move to consider the balanced scorecard as an instrument for health system performance

management. The limitations of the scorecard are also identified and how these can be overcome by incorporating system dynamics methodology. Finally we will propose the development of a dynamic balanced scorecard for use in area health services, which are responsible for the regional health system performance in the Australian state of New South Wales.

World Health Organisation Health System Performance Assessment Framework

The World Health Organisation's (2003) Health System Performance Assessment (HSPA) framework focuses on three intrinsic goals of a health system. These are to improve health, to be responsive to those who interact with it and the fairness of financial contribution.

There are two dimensions to health and responsiveness, the first being the level or quality and the second being the distribution or equity. So healthcare should be of high quality and be highly responsive when interacting with the user. In addition it should also be equitably distributed across the population covered by the health system, providing those who reside in rural areas with the same quality of care as those who are in metropolitan areas and similarly the same level of responsiveness for the rich as the poor.

The final goal, fairness of financial contribution is designed to ensure that all households pay an equitable amount for healthcare in proportion to their means. This goal is the responsibility of governments. In Australia this is mostly handled by the federal government with programs such as Medicare and the Pharmaceutical Benefits Scheme, which provide citizens with subsidised healthcare and prescription medications respectively. However this is beyond the scope of a regional health system and will not be considered here in any great detail.

The HSPA (WHO, 2003) considers four functions which contribute to the achievement of the intrinsic goals. These are financing the health system, the provision of healthcare services, the generation of resources (such as training medical personnel and investment in infrastructure) and stewardship.

The WHO HSPA was originally focused on benchmarking member counties against each other, but this was widely reported as a ranking of counties on their health system performance. Many participants in the Western Pacific regional forum on the HSPA framework (WHO, 2003) felt this ranking was not useful and instead the framework should be adapted more for internal use to improve or supplement each counties own performance framework. They also identified the problem of the time and expense that is required to gather the data required for the HSPA.

Health Metrics Network

The Health Metrics Network (HMN) is an initiative of the World Health Organisation and aims to improve health thorough the provision of better health information based on

the premise that better information will lead to better decision making and improved health outcomes (WHO, 2007). At the present time HMN is working on the development of Health System Metrics (HSM), which aims to provide users with "*a minimal set of core indicators, that are comparable between populations and over time, and identify the key measurement issues and strategies required to report regularly on the status of the health system*." (Health Metrics Network, 2006, p 6) The goal is that the information by the dashboard can then be used for health system improvement.

The Health System Metrics will present a dashboard of indicators of the inputs and output of the health system. This will focus on the three intrinsic goals considered by the HSPA discussed previously, in addition to health system coverage, efficiency, quality and safety.

The HSM will measure the following inputs of the health system: governance and leadership, financing human resources, health information, service provision (including availability and quality) and the coverage of services.

Presently the HMN is in the process of developing indicators for the various inputs and outputs described above, with the exception of those already developed by the HSPA.

Balanced Scorecard in Health

The balanced scorecard (BSC) developed by Kaplan and Norton is perhaps one of the most well known multi-dimensional performance management systems which views performance as more than simply the bottom line. Derived from an organisation's vision and strategy a balanced scorecard focuses on the long and short term drivers of performance, by viewing performance from four different perspectives: that of the customers, that of stakeholders, from the perspective of what internal business processes the business must excel at in order to achieve their vision and strategy and organisational growth and learning how to perform better (Kaplan and Norton, 1996).

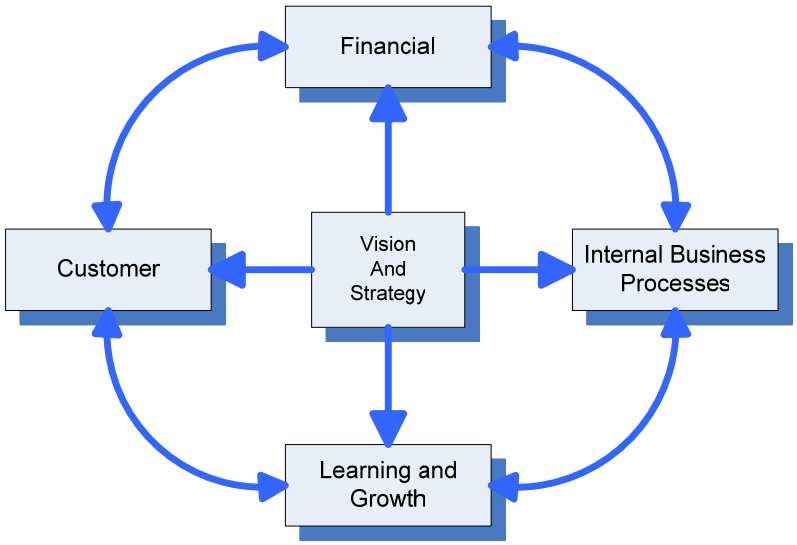


Figure 1 - The Balanced Scorecard

Although originally developed for use in the private for-profit sector, Kaplan and Norton's (1996) method can also be used in the pubic and not-for-profit sectors, where the financial perspective rather than being viewed as a goal, now comes to represent the financial and resource constraints in which these organisations must operate.

The balanced scorecard has been used to manage performance in public health. Sometimes the scorecard is implemented in its pure form as set out by Kaplan and Norton (Kaplan and Norton, 1992), however many people have proposed modified scorecards (eg Linard et al., 2000) and others have proposed more radical transformations, which though they were inspired by the BSC look very different to it. Such alternations are generally to ensure fitness for purpose.

For example Linard et al (Linard et al., 2000) propose a template for a dynamic balanced scorecard for the Australian public sector. This template identified three customers: the Minister as the representative of government for the implementation of policy, the auditor-general and parliament in respect of good governance and finally to the customers with whom the public sector agency or departments deals.

The scorecard is used for performance management in public hospitals in Ontario, Canada (Paul et al., 2006), was the basis for the development of the Performance Assessment Framework in the UK NHS (Chang et al., 2002) and Queensland Health in Australia is currently in the process of developing a balanced scorecard.

To a large extent the WHO's HSPA and the HMN's HSM are instruments which approximate the beginnings of a balanced scorecard. Each has a focus on customers, providing quality healthcare, system responsiveness and equity of healthcare. Each has a focus on finance or the resources that are available in order to realise the goal of health improvement. There is consideration of efficiency, an internal business processes

perspective and growth and learning, with efforts to improve stewardship and health information.

Limitations of the Balanced Scorecard

The balanced scorecard is not without its limitations, some of which can be overcome with system dynamics.

The scorecard is based on a series of cause and effect relationships, where improving performance on one or another indicator will increase outcomes (Kaplan and Norton, 1996).

This is an overly simplistic and unidirectional view of causation. However in complex system it is more likely that there is bi-directional causality with multiple contributors (Akkermans and van Oorschot, 2002). It also ignores the effect feedback.

The BSC also ignores the time lag between cause and effect (Linard, 2001, Akkermans and van Oorschot, 2002). Major reform in public health policy takes time to implement and there will be a time delay before the results begin to appear. For example recently in the state of New South Wales, Australia, the government has placed significant restrictions on smoking in pubs and clubs, however we would expect there to be a significant time delay between the implementation of that law and seeing a drop in people suffering the effects of passive smoking.

The scorecard also lacks a rigorous means for the selection and validation of performance indicators and policy decisions or business rules which respond to performance gaps (Linard, 2001). Typically indicators for the scorecard are chosen by consensus among the stakeholders and it is further assumed that presenting decision makers with information on the scorecard will lead to good decision making. This is not so, especially when faced with the dynamically complex problems of managing organisational performance.

System dynamics (SD) can help to overcome these limitations. SD provides a framework by which we can understand dynamically complex causal relationships. In addition to this models can be constructed to test hypotheses of casual relationships and the effectiveness of indicators and policy to correct performance deviations from targets (Linard, 2001, Akkermans and van Oorschot, 2002). The application of system dynamics to the balanced scorecard results in what has been called a *dynamic balanced scorecard*.

Developing a dynamic balanced scorecard to manage health system performance

This present research will focus on the development of a dynamic balanced scorecard (DBSC) for an area health service (AHS) within the state of New South Wales, Australia. New South Wales is divided up into eight AHSs, each being responsible for the delivery

of healthcare in their region, including health promotion, disease prevention, primary health care, community health services, home care, hospital services and nursing home care.

NSW Department of Health Performance Framework

The New South Wales Department of Health has four strategic goals for the New South Wales (NSW) health system (NSW Department of Health, 2000, NSW Department of Health, 2005). These are:

- To keep people healthy (*health outcomes for the population*)
- To provide the health care people need (*access)*
- To deliver high quality health services *(quality)*
- To manage health services well (*cost)*

These four areas represent the most important outcomes for the New South Wales Health system. The Department of Health requires the area health services (AHS) who are responsible for delivering health services to report their performance and outcomes against these indicators derived from these four strategic goals. AHS also receive incentive funding for meeting targets set by the department of health.

The interaction of Cost, Quality and Access

Central to the operation of the dynamic scorecard will be an understanding of the interaction of cost, quality and access to produce health outcomes for the population covered by the AHS.

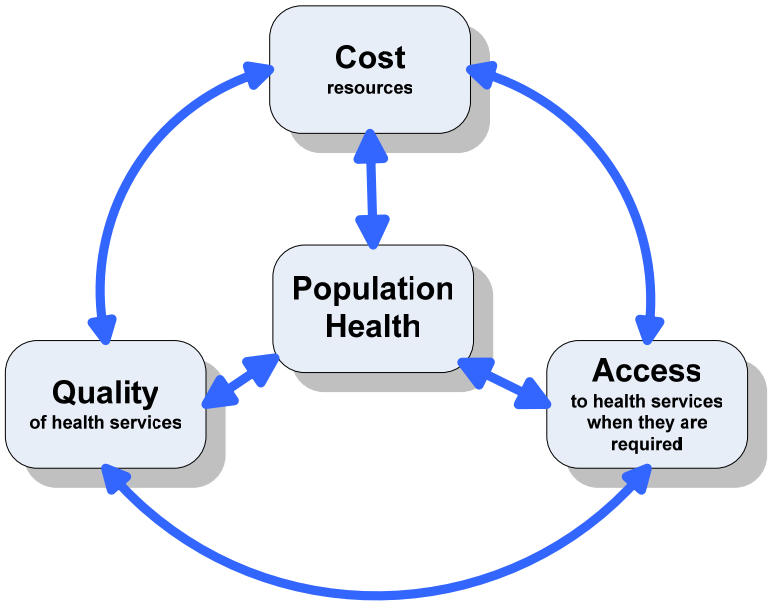


Figure 2 - The interaction of cost, quality and access on health outcomes

It has been generally said that a health system in improving population health can provide two but never all three of these goals. It could produce high quality care which is highly accessible, but this would be very costly. It could produce high accessibility at a low cost, but with poor quality.

This makes is especially important to understand this dynamic as the costs of healthcare are rising (see Figure 3). This raises some very important policy questions looking to the future. How will this impact of the quality of healthcare? How will it impact on the ability of people to access healthcare when they need it? How will these in turn impact on population health?

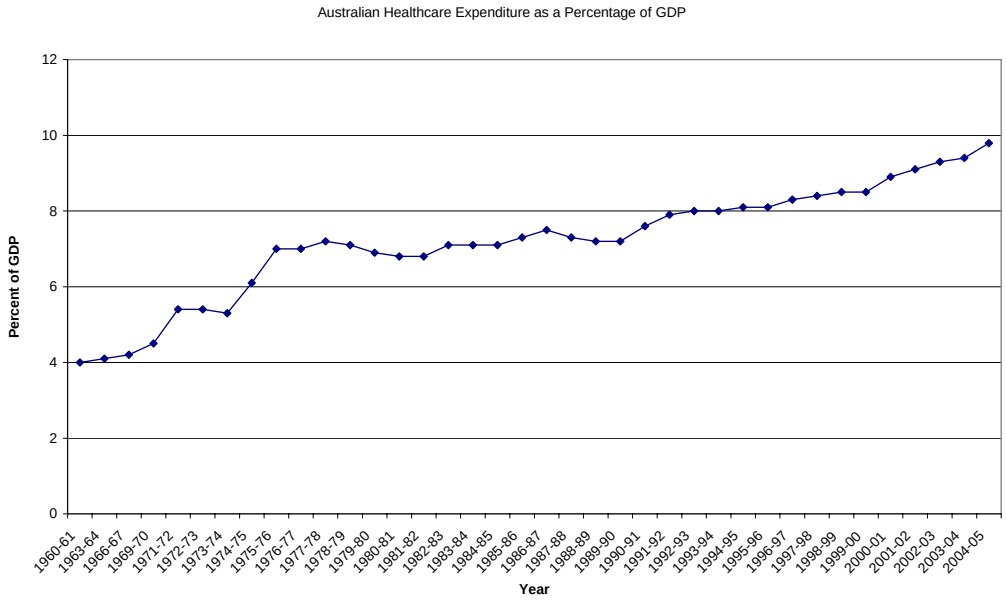


Figure 3 - Australian Healthcare Expenditure from all sources as a percentage of GDP. (AIHW, 2007)

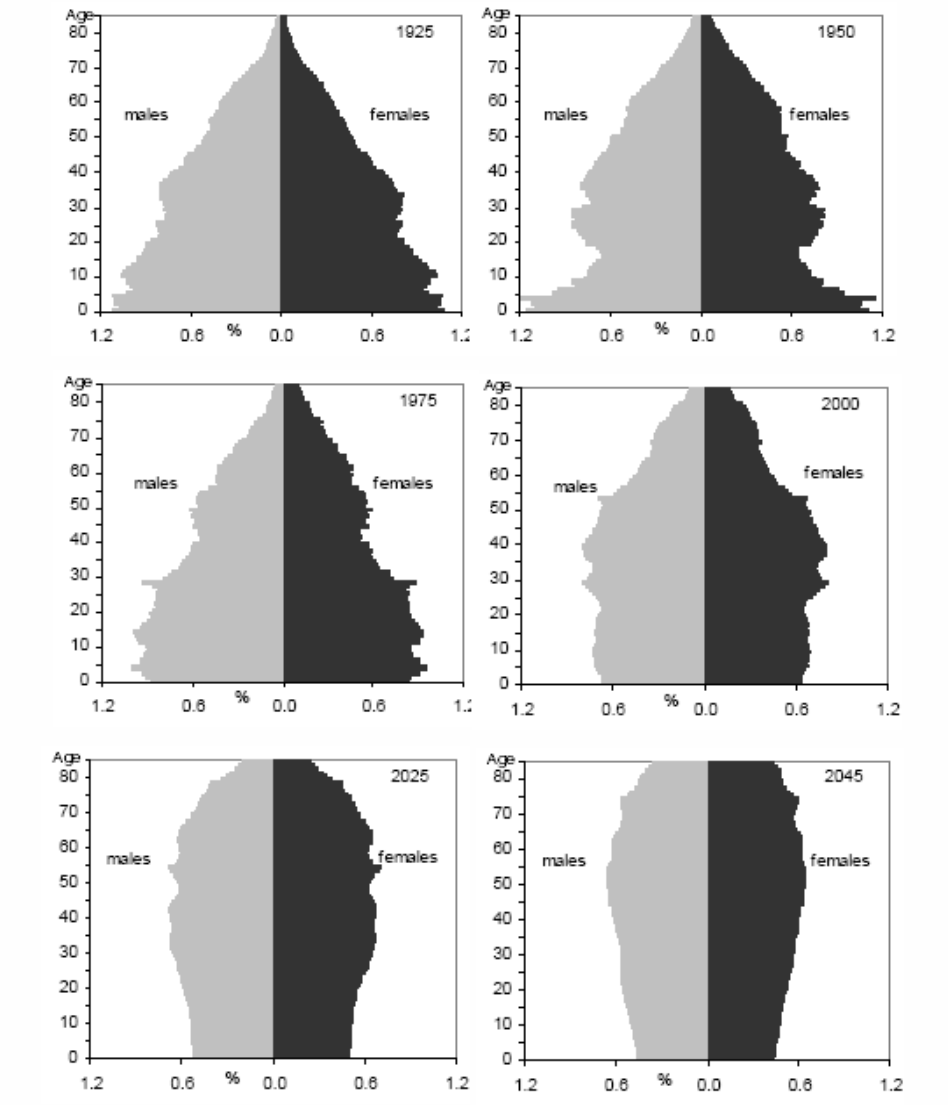
According to the Australian Productivity Commission (2005a) the two main drivers of real growth in healthcare expenditure is due to advances in medical technology and the ageing population.

Advances in medical technology

Advances in medical technology has provided significant benefits to the health system, with higher quality treatments, the ability to treat more patients, increase quality of life and also creates a greater demand for treatments. However advances in medical technology are also responsible for around one-third of growth in health expenditure (Productivity Commission, 2005b). The report by the Productivity Commission form the opinion that on the whole these benefits outweighed the additional costs.

Ageing population

The Australian population is ageing, with the portion of people over 65 expected to double in the next 40 years (Productivity Commission, 2005a). By 2045 it is expected that Australian aged 65 and older will make up one quarter on the entire population (see Figure 4). Presently this group comprises around 12.5% of the population.



Data sources: Data are end June. Data are for single years of age up to 84 years, with truncation of 85+ year old data to avoid a spike at that age interval. Data are from: Commonwealth Bureau of Census and Statistics (*Australian Demographic Bulletins* for 1925 and 1950); ABS (*Australian Historical Population Statistics*, Cat. No. 3105.0.65.001, table 19 for 1975 and 2000); and PC-M series for 2025 and 2045.

Figure 4 - Ageing profile for Australia from 1925 to 2000, with projections for 2025 and 2045. (Productivity Commission, 2005a)

A recent report by Productivity Commission (2005a) highlights that the ageing population will have a significant impact on health expenditure, as health care expenditure for people over 65 is significantly higher than for those under 65 (see Figure 5).

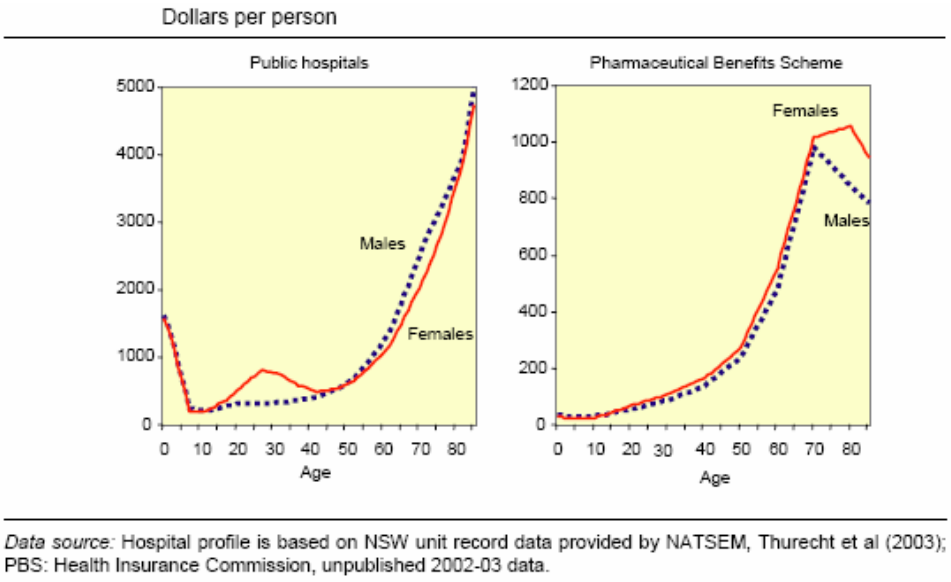


Figure 5 - Cost of public hospitals and PBS by age (Productivity Commission, 2005a)

Other factors for consideration

A recent Auditor-General's report (New South Wales Auditor-General, 2006) projected that by 2010 there will be a shortfall of 40,000 nurses in New South Wales owing to nurses retiring from practice and the increasing demand for nurses as a result of the ageing population. Presently New South Wales hospitals are relying on overtime, casual and agency nurses to fill the existing shortages, but this will present larger challenges in managing performance in the future as staffing shortages are magnified by increasing demand due to the ageing population. Such shortfalls are likely to have a significant impact on cost, quality and access and therefore health outcomes.

Conclusion

Health system performance management is a dynamically complex task, due to the number of factors that contribute to improving health, the interaction and feedback among factors and the time delays between the implementation of public policy and achieving results and feedback.

A number of different performance management systems have been reviewed. Each to varying extents focus on measuring inputs and outputs of the health system to determine performance. What is common to all is that all measure multiple dimensions of health system performance. The common categories for health system performance are quality healthcare, equitable access to healthcare and health system responsiveness to users. Each

acknowledge that health systems are characterised by limited resources and the need to manage these well.

The balanced scorecard has been used in the health field and was also considered that while the scorecard itself has limited ability to adequately deal with dynamic complexity, the application of system dynamics methods to the development of a BSC can overcome these limitations and provide a robust basis for the testing of policy interventions designed to close any performance gaps.

For the New South Wales health system it will be necessary to develop an understanding of the dynamic interactions produced by cost, quality and access in delivering population health. This is especially important in light of increasing costs of healthcare, due to advanced in medical technology and the ageing population and the decreasing workforce of nurses, so that we gain an understanding of what this will mean for the quality and accessibility of the healthcare system and ultimately population health.

It is hoped that the development of a dynamic balanced scorecard for New South Wales area health services will provide a tool by which to gain understanding of the dynamics which affect health system performance and make explicit and understand the tradeoffs between cost, quality and access with the end result of this knowledge being improved decision making about health system performance and improved population health.

List of References

AIHW (2007) Australian Institute of Health and Welfare.

AKKERMANS, H. & VAN OORSCHOT, K. (2002) Developing a Balanced Scorecard with System Dynamics. *20th International Conference of the System Dynamics Society.* Palermo, Italy.

CHANG, L.-C., LIN, S. W. & NORTHCOTT, D. N. (2002) The NHS Performance Assessment Framework: A 'Balanced Scorecard' Approach? *Journal of Management in Medicine,* 16**,** 345-358.

HEALTH METRICS NETWORK (2006) Health System Metrics: Report of a Technical Meeting. Glion, Switzerland 28-29 September 2006. World Health Organisation,.

KAPLAN, R. S. & NORTON, D. P. (1992) The Balanced Scorecard - Measures That Drive Performance. *Harvard Business Review,* 70**,** 71-79.

KAPLAN, R. S. & NORTON, D. P. (1996) *The Balanced Scorecard: Translating Strategy into Action,* Boston, Massachusetts, Harvard Business School Press.

LINARD, K. (2001) Dynamic Balanced Scorecard for the Public Sector. *International Quality and Productivity Council Conference.* Canberra, Australia.

LINARD, K., YOON, J., BASSETT, M. & DVORSKY, L. (2000) A Dynamic Balanced Scorecard Template for Public Sector Agencies. *18th International Conference of the System Dynamics Society.* Bergen, Norway.

NEW SOUTH WALES AUDITOR-GENERAL (2006) Performance audit : attracting, retaining and managing nurses in hospitals : NSW Health. Sydney Australia.

NSW DEPARTMENT OF HEALTH (2000) 2000 - 2005: Strategic Directions for Health. Sydney, Australia, NSW Department of Health.

NSW DEPARTMENT OF HEALTH (2005) Annual Report 2004/2005. NSW Department of Health.

PAUL, J., BLACKSTIEN-HIRSCH, P. & BROWN, A. (2006) Aligning Performance Management with Corporate Strategy: A Toolkit for Ontario's Hospitals. Hospital Report Research Collaborative,.

PORTER, M. E. & TEISBERG, E. O. (2006) *Redefining health care : creating value-based competition on results,* Boston, Mass., Harvard Business School Press.

PRODUCTIVITY COMMISSION (2005a) Economic Implications of an Ageing Australia. Canberra, Australia, Productivity Commission.

PRODUCTIVITY COMMISSION (2005b) Impacts of Advances in Medical Technology in Australia. Melbourne, Australia, Productivity Commission.

WHO (2003) *Health Systems Performance Assessment: Debates, Methods and Empiricism,* Geneva, World Health Organisation.

WHO (2006) Constitution of the World Health Organization. Geneva World Health Organization.

WHO (2007) Health Metrics Network.