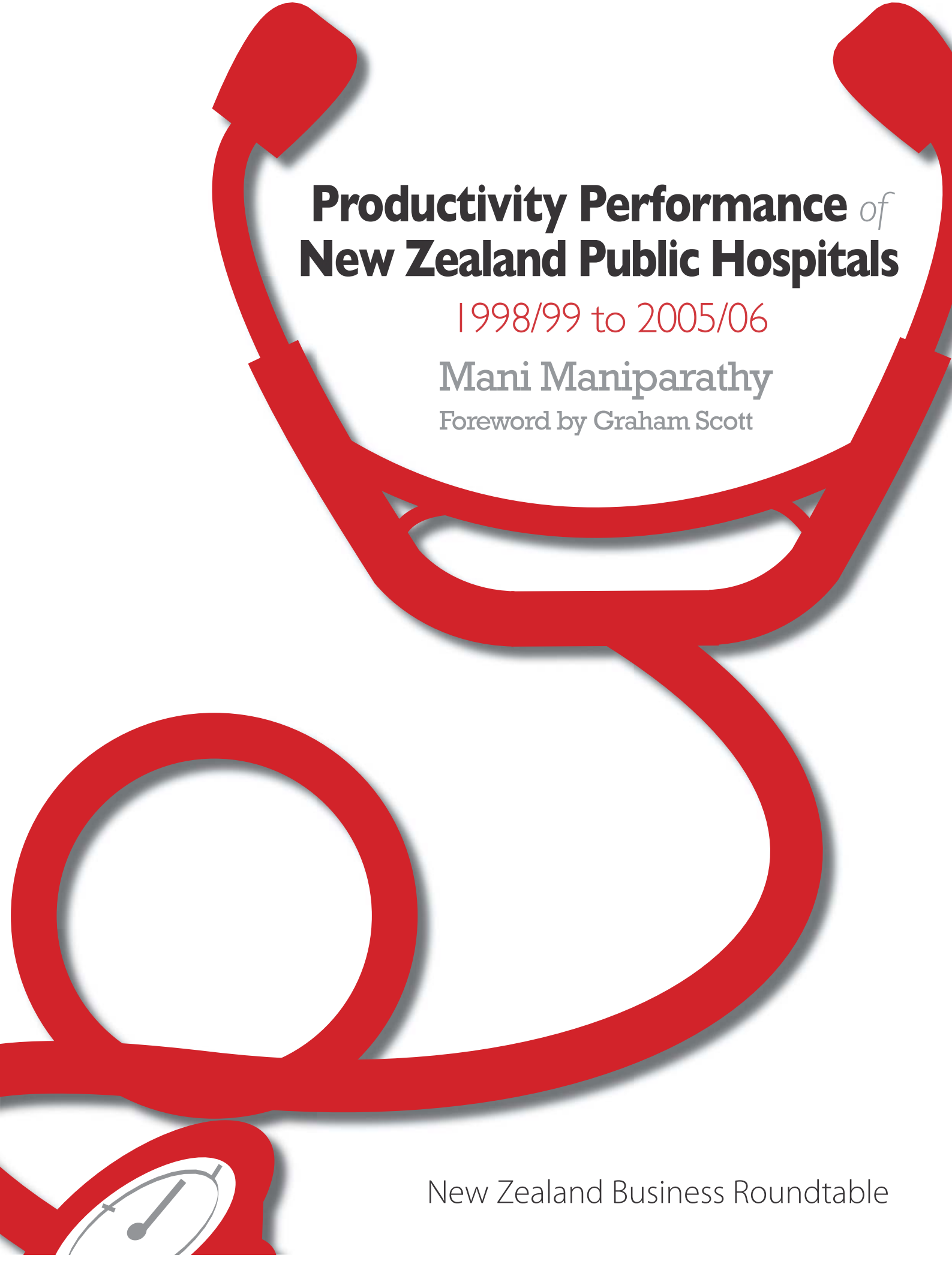

Productivity Performance *of* New Zealand Public Hospitals

1998/99 to 2005/06

Mani Maniparathy

Foreword by Graham Scott

New Zealand Business Roundtable

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ABOUT THE AUTHORS

Mani Maniparathy is a specialist in the use of quantitative methods for performance management in the public sector and has a lengthy experience in the health sector. He was a technical analyst/manager in the Central Regional Health Authority, Health Funding Authority, and Ministry of Health.

Dr Graham Scott was the Secretary to the Treasury in New Zealand from 1986 to 1993 and chair of the Health Funding Authority from 1996 to 2000.

ACKNOWLEDGEMENT

Dr Lynne McKenzie's assistance with the preparation of this paper is gratefully acknowledged.

FOREWORD

The performance of the public health system and public hospitals especially is an enduring and crucial issue for public policy under any government. The value of spending in the sector, approaching 20 percent of government spending and 8 percent of the total economy, is not only critical for meeting health sector goals but also goals for fiscal policy and improvements in the wider economy.

The indicators of productivity in New Zealand's public health sector are reason for concern, as is the paucity of transparent and reliable information with which to evaluate the effectiveness of policies and management. In spite of continuing substantial – and possibly unsustainable – increases in funding each year, the system struggles to meet some of its obligations, for example to provide treatment to all those who qualify under the points system.[1]

Long-term and consistent time series data on performance have not been easily available to researchers, so studies are often compromised by weak data. Hospital performance data are fragmentary and hard to obtain because they are not routinely and consistently assembled in a readily usable form. Even the Ministry of Health, in a recent report on productivity (Ministry of Health, 2007, released under the Official Information Act), refers to considerable difficulties in collecting consistent data across years. How can external researchers make sound judgments about the effectiveness of policies and contribute to policy discussion?

Such data as have emerged in recent years have been compromised by technical weaknesses such as the lack of consistent definitions about even such fairly simple concepts as 'full-time equivalents'. Nevertheless, the data point to troubling trends as regards productivity. The two main conclusions of a 2005 Treasury report (released under the Official Information Act 1982) were as follows, allowing for the limited data available and recognising various conceptual issues:

- Real (that is, Consumers Price Index-adjusted) hospital expenditure in 2003/04 was 13.4 percent higher than in 2000/01, whilst measured hospital outputs were 4.7 percent higher than in 2000/01. Based on these figures, hospital efficiency appears to have fallen 7.7 percent (2.6 percent per year) over the past three years (1997/98 to 2000/01).
- Over the previous three years (1997/98 to 2000/01), the same approach suggests that hospital efficiency increased 1.1 percent.

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[1] The points system refers to the system used to prioritise patients for elective surgery. It was expected that all those who qualify under the points system would receive surgical treatment within a set timeframe.

My colleague Lynne McKenzie and I attempted to follow this story and get a clearer picture of what was happening and the policy implications, but this proved difficult. We turned to Mani Maniparathy for advice on how to get the data we were interested in. Mani has many years' experience working with health sector data in the Central Regional Health Authority, Health Funding Authority, and Ministry of Health. Using the methodology he describes in this paper which summarises his results, he has produced new time series data on hospital performance in terms of value for money and productivity.

Although in some areas Mani's series are compromised by weaknesses and inconsistencies in the primary data sources, the study reinforces and extends the trends noted in the Treasury's 2005 report.

- The real cost per unit of output increased approximately 18 percent over the five years between 2000/01 and 2005/06. When only diagnostic-related groups are used to measure output (as a proxy for all output), cost per unit increased 11 percent between 2000/01 and 2005/06 as opposed to 18 percent when all output is used.
- Overall productivity of personnel in public hospitals decreased 8 percent over the five years between 2000/01 and 2005/06. This compares with a productivity decrease of approximately 15 percent for medical personnel and 11 percent for nursing personnel. (Productivity figures for all personnel are somewhat distorted by the contracting out of certain services like cleaning, maintenance and information technology.)
- The overall real average personnel costs for hospital services increased approximately 16 percent over the five years between 2000/01 and 2005/06.

In assembling this data, our purpose is to stimulate research and discussion, so this is not the place to attempt to draw strong policy conclusions. However, many important questions spring from this analysis.

How much of the deterioration in productivity reflects quality improvements? The 2007 Ministry of Health report suggests there have been quality gains, but the evidence is fragmentary and the scale of the effect is swamped by the much larger deterioration in productivity.

Wage increases to retain medical staff are needed if the sector's capability is to be maintained, but what explains the apparent decline in output per employee? Are there time lags that mean increases in unit costs today will result in improvements in productivity in the future?

What impact has the growth in the number of administrative staff had on the trends? The study takes into account only administrative staff in hospitals. It does not take account of the administrative cost increases that have arisen from duplicating the funding function that was with the Health Funding Authority among the 21 District Health Boards (DHBs); nor does it take into account the growth in full-time equivalent personnel in the Ministry of Health and other government health agencies.

What are the real reasons behind the deterioration in productivity and value for money in the hospital sector? The data suggest a break in trend productivity that coincides with

the abolition of the purchaser–provider model of health funding. What have been the effects of changes in the governance, funding and management of the system and the use of private providers on productivity? Has the location of the funding function within the 21 DHBs produced the benefits that were claimed would arise and the savings in administrative costs?

In this connection, the paper points to the increase in payments to hospitals that are not tied to service delivery but are provided as lump sums. These have reached levels approaching 10 percent of total funding for the services in question. Once known as the 'second cheque book' when the purchaser–provider split under the Health Funding Authority was in operation, these payments are outside the spirit of the Public Finance Act 1989 that requires budgets for outputs, and they are symptomatic of difficulties in maintaining financial discipline.

It is encouraging that, in the last few years, interest in the issues has increased with the creation of the Performance Assessment Steering Group (established in 2005 with representatives from the Ministry of Health, the Treasury and DHBs). But it is perplexing that almost a fifth of government expenditure has in preceding years received so little attention in respect of productivity and value for money and that the current state of analysis is well behind better practices – for instance in the United Kingdom. While a re-emergence of interest in information on productivity within government is welcome, questions have to be asked about what it is going to be used for. In the context of bulk funding of DHBs based on population, it may not be used to much effect.

The 2007 Ministry of Health report points to the use of productivity and cost data for benchmarking DHBs, but under existing governance and funding arrangements it is not clear that there is any system of incentives to achieve benchmarks. Hence, there are questions to be considered about the current funding and governance arrangements in the sector regarding how to ensure better productivity and value for money. In particular, there are questions about what exactly the slate of public health services would actually cost if all the undertakings about access were met effectively and safely.

With the establishment of the DHBs, the system of estimating 'efficient prices' from hospital cost data using data envelope analysis was abandoned as out of tune with the DHB model and the politics behind it. This was unfortunate, as a continuation of this analysis could have helped to explain the reasons behind the productivity trends.

There is a rich agenda for policy analysts and evaluators in exploring the causes of the productivity decline. One conclusion that is clear, however, is that a continuation of the trends in these series will create serious problems for future governments in terms of fiscal costs and the delivery of health services. It seems that the public health sector is a contributor to New Zealand's unsatisfactory productivity record.

Looking to the future, we hope that this data can be developed into a more robust and consistent time series. It is encouraging that Bakker Maniparathy Claridge Ltd is willing to update the study periodically and make it available to researchers. On a wider scale, I would like to see Statistics New Zealand mandated to produce performance information to high and consistent standards across the public sector and selected private sector areas

to support a drive for performance improvement. The health sector would be a good place to focus attention.

I have argued elsewhere that the Official Information Act 1982 should not provide any protection for performance information held by state sector service providers.[2] It is not policy advice, which is rightly accorded some protection. It was disappointing that the Ministry of Health was not as cooperative as it could have been in releasing this information to us.

I would like to thank Mani and his colleagues for their hard work in putting this data together and express my appreciation to the New Zealand Business Roundtable for meeting much of the cost of the study. My appreciation is also due to Lynne McKenzie for her contribution to the research.

Graham Scott

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[2] Address delivered on 28 August 2008 at the Annual General Meeting of the New Zealand Institute of Economic Research on the occasion of its 50th anniversary.

INTRODUCTION

This paper presents findings on the productivity of the New Zealand public hospital sector from 1998/99 to 2005/06.

Although there is a large amount of existing information on New Zealand public hospital activities, it is not readily comparable over the long term and is not easily accessible. A database is needed to provide comparable sector performance information over the long term to support policy analysis and evaluation.

Graham Scott initiated this project in late 2006 and, with Lynne McKenzie, prepared the project's terms of reference. I appreciate the advice and comments they have given along the way. The project was largely funded by the New Zealand Business Roundtable with contributions from Bakker Maniparathy Claridge Ltd.

The database I have assembled focuses on information on hospital productivity trends. It is intended that the database will be updated each year and the information on the productivity trends will be extended.

This paper describes the database and summarises key trends in hospital productivity. It focuses on District Health Board (DHB) provider arms (that is, hospitals) and does not include the changes in DHB funding or the governance arms. Also, the paper does not consider changes within the Ministry of Health and other hospital sector–related entities such as shared services agencies, Healthpac and the New Zealand Health Information Service. An examination of the changes in the costs of all the administrative bodies in the health sector would also be timely.

KEY FINDINGS

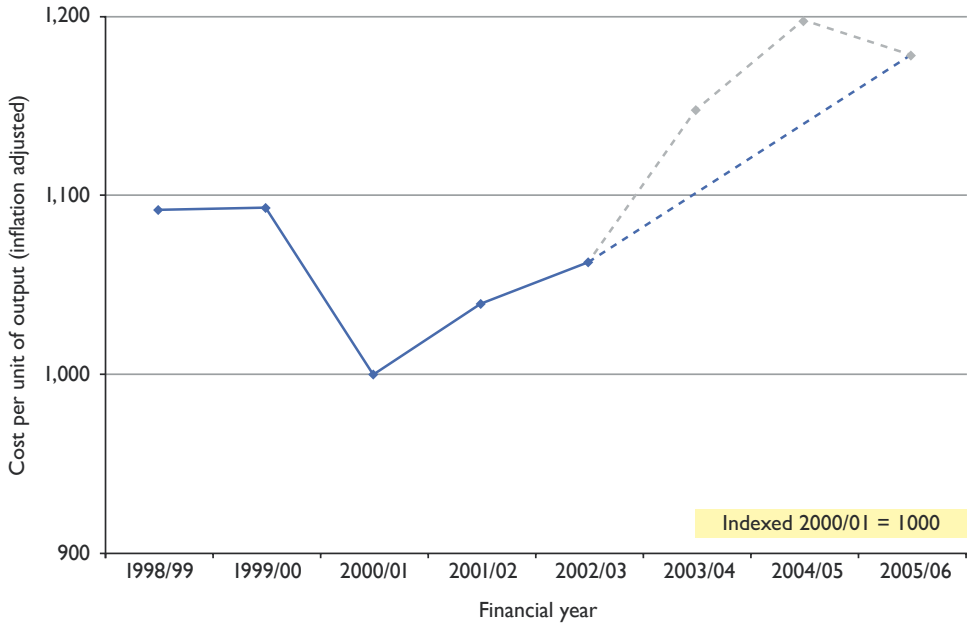
Figure 1 shows the real cost per unit of the hospital outputs over the seven years between 1998/99 and 2005/06. The cost has been adjusted to eliminate the impact of inflation using the Consumers Price Index (CPI). Figure 1 shows that the real cost per unit of output increased approximately 18 percent over the five years between 2000/01 and 2005/06.

The 2000/01 year has been used as the benchmark for comparative purposes. Note that the information for 2003/04 and 2004/05 is less reliable than for other years, so Figure 1 shows those years in grey. See the methodology section below for further details.

Considering the gaps and inaccuracies in the data used to arrive at these findings, the following cross-validation is useful in confirming them. Figure 1 is based on *all* the outputs produced by the public hospitals. The information on some of the outputs (diagnostic-related groups, DRGs) is of much better quality than the information on other outputs (non-DRGs).[1]

Figure 2 compares cost per unit of output, where all outputs are used and where only DRGs are used (as a proxy for all outputs). Figure 2 shows that when only DRGs are used to measure output (as a proxy for all outputs), cost per unit increased 11 percent between 2000/01 and 2005/06 as opposed to 18 percent when all outputs are used.

Figure 1: Inflation-adjusted cost per unit of output (indexed 2000/01 = 1000), 1998/99 to 2005/06



[1] See the explanation of DRGs in the methodology section below.

Figure 2: Inflation-adjusted cost per unit of output (indexed 2000/01 = 1000), 1998/99 to 2005/06

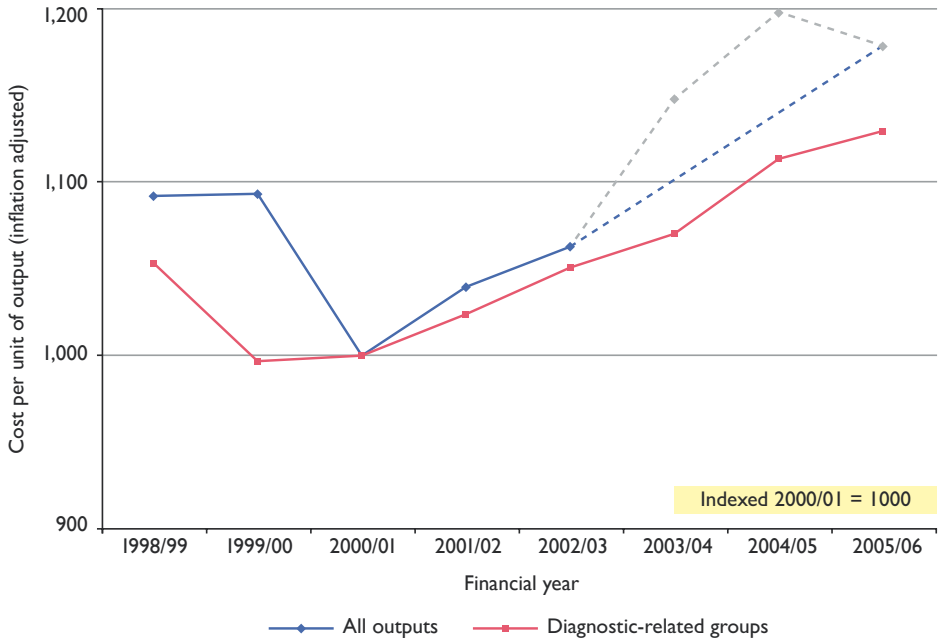


Figure 3 shows that the overall productivity of personnel in the public hospitals decreased 8 percent over the five years between 2000/01 and 2005/06. This compares with a productivity decrease of approximately 15 percent for medical personnel and 11 percent for nursing personnel. Note that the productivity figures for all personnel are somewhat distorted by the contracting out of certain services (for example, cleaning, maintenance and information technology). The finding of a reduction in productivity is consistent with the finding that the cost per unit of output increased. (Productivity is determined by comparing the volume of outputs produced per head of personnel. The year 2000/01 is used as the benchmark year.)

Figure 4 shows the average personnel costs for medical, nursing, management and support personnel, as well as for all employee types. The overall real average personnel costs increased approximately 16 percent over the five years between 2000/01 and 2005/06.

The figures have been adjusted for inflation using the CPI and indexed, where 2000/01 = 1000. Note the personnel costs include salaries and all salary-related expenditure such as leave pay, allowances and training expenditure. Management and support personnel include allied health personnel, community nurses, laboratory, radiology and pharmacy personnel, cleaners, orderlies, administrators and managers.

Figure 3: Productivity (volume per head) of public hospitals (indexed 2000/01 = 1000), 1998/99 to 2005/06

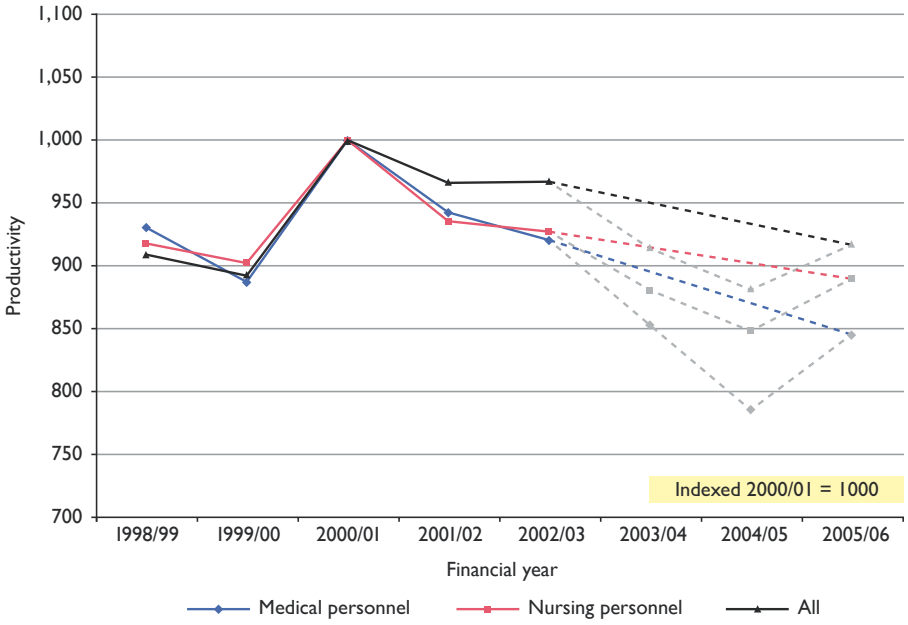
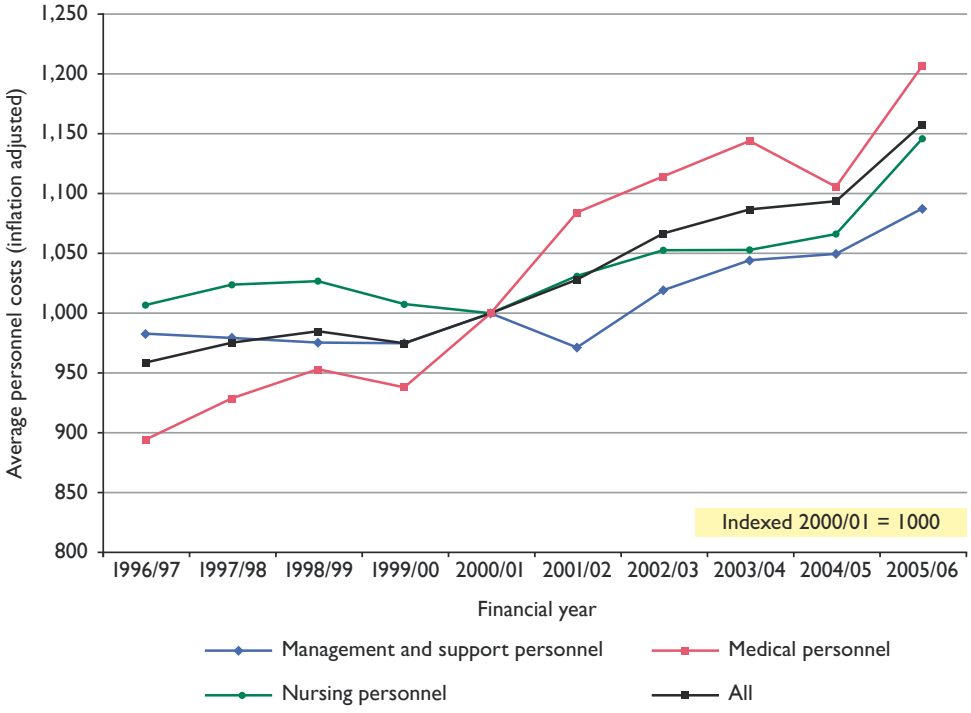


Figure 4: Inflation-adjusted average personnel cost (indexed 2000/01 = 1000), 1996/97 to 2005/06



METHODOLOGY

The key information required for determining the cost per unit of output and productivity comprises the amount of: (1) inputs used by the hospitals and (2) outputs produced by the hospitals. For determining productivity, this work used the number of personnel employed (full-time equivalents) as the inputs. The outputs are the volume of services the hospitals deliver. Productivity is equivalent to the outputs divided by the inputs. Similarly, in determining the cost per unit of output, total hospital expenditure is used as the input.

Outputs

Hospitals produce a diverse range of services or outputs. To compare the outputs produced from year to year, they need to be standardised and weighted consistently. For example, in one year a hospital may provide 100 hip replacements and 500 general medical outpatient visits. The next year the hospital may produce 110 hip replacements and 800 general medical outpatient visits. In order to compare both years, it is necessary to measure the hip replacements and outpatients using a consistent system of standard 'cost weights' so that the total output figures are not distorted by changes in the mix of outputs. Table 1 expands the above example.

The section below outlines the methodology used to standardise and aggregate the output volumes, as well as the weightings used for various sets of outputs. New Zealand hospitals use purchase units to describe their outputs. The purchase units can be classified into DRGs, non-DRGs and adjusters.

Table 1: Example of the use of cost weights to standardise outputs

	Year 1			Year 2		
Output	**Volume**	**Weight**	**Weighted volume**	**Volume**	**Weight**	**Weighted volume**
Hip replacement	100	4.0	400	110	4.0	440
General medical outpatient visits	500	0.1	50	800	0.1	80
Total weighted volumes			**450**			**520**

Table 2: Actual volume of admitted patients (Weighted Inlier Equivalent Separations), 1998/99 to 2005/06

Diagnostic-related groups	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Medical	199,120	216,699	230,970	241,963	241,493	250,368	254,203	263,264
Surgical	271,419	285,010	298,265	294,318	298,031	302,638	311,471	317,299
Maternity	48,111	50,253	49,554	48,622	49,550	51,185	49,853	52,159
Neonatal	20,625	23,343	24,273	25,042	27,429	26,503	25,456	25,452
Total	**539,276**	**575,306**	**603,061**	**609,944**	**616,502**	**630,695**	**640,984**	**658,174**

Diagnostic-related groups

DRGs are used to describe the patients admitted to hospital (inpatients and day patients).[2] DRGs are considered highly reliable for describing medical and surgical admitted patients. While more debatable, the DRGs are reasonably reliable for describing obstetric and neonatal admitted patients. All actual information on admitted patients is captured by the National Minimum Dataset. DRGs are also used to describe mental health and disability patients but are generally considered unreliable for this purpose, so this information is not used in this work.

DRGs for all years are consistently weighted and aggregated using the Weighted Inlier Equivalent Separations 11b (WIES 11b) weighting system.[3]

Non-diagnostic related groups

Non-DRGs describes every output other than DRGs.[4] Unlike DRGs, non-DRG purchase units are developed in New Zealand and have yet to be evolved into a stable set of information. This means that over 1998/99 to 2005/06 the definitions of non-DRG purchase units varied, which makes comparisons over time difficult. Nevertheless, non-DRGs together with DRGs make up the best available information to describe hospital sector outputs.

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2 The DRG system classifies hospital-admitted cases, also referred to as DRGs. All patients grouped within a DRG are expected to consume similar hospital resources. The DRG classification system was originally developed for the US Medicare system as part of the prospective payment system. The DRG classification system used for funding purposes in New Zealand is based on the Australian National Diagnostic-Related Groups system, which in turn is an adaptation of the US grouping.

3 The WIES system is used to weight the DRGs. The system weights each DRG (in other words, the patients within each DRG) based on the respective standard use of resources. For example, if cataract surgery has a weight of 1 and hip replacement has a weight of 10, then the hip replacement consumes 10 times more resources than cataract surgery consumes.

The WIES system is updated from time to time to recognise the changes in clinical practice as well as the cost of inputs. WIES 11b refers to the version in use in 2006/07.

4 The term non-DRG is used to describe all outputs other than DRGs. Non-DRGs cover all non-medical and surgical admitted patients, including medical and surgical outpatients, obstetric patients, and patients attending community-based services, disability support services and mental health services.

Until recently, actual non-DRG information was not captured in a centralised data set such as the National Minimum Dataset. However, as part of the annual contracting process, a detailed price–volume schedule lists the volume of non-DRGs that hospitals must deliver. In this study, the contracted volume has been used as a proxy for the actual volume. It should be noted that there are gaps in the non-DRG data and these were corrected by extrapolating adjoining years. The correction was carried out at the purchase unit level to ensure the quality and granularity of the information was maintained.

In this analysis, non-DRG volumes are converted to the equivalent of WIES 11b to enable their aggregation with DRG volumes (Table 3). The non-DRG volumes are converted to WIES 11b by dividing the non-DRG price by the DRG price for the respective year. For example, if the standard DRG (WIES 11b) price is $3,000 and an outpatient visit price is $300, then the outpatient visit is equivalent to 0.1 WIES 11b.

It is acknowledged that there are likely to be differences between actual and contracted volumes. It is assumed this difference consistently affects all years (except 2003/04 and 2004/05), so year-to-year comparisons are possible. See Figure 5 for a comparison between price–volume schedules and revenue as per the financial accounts.

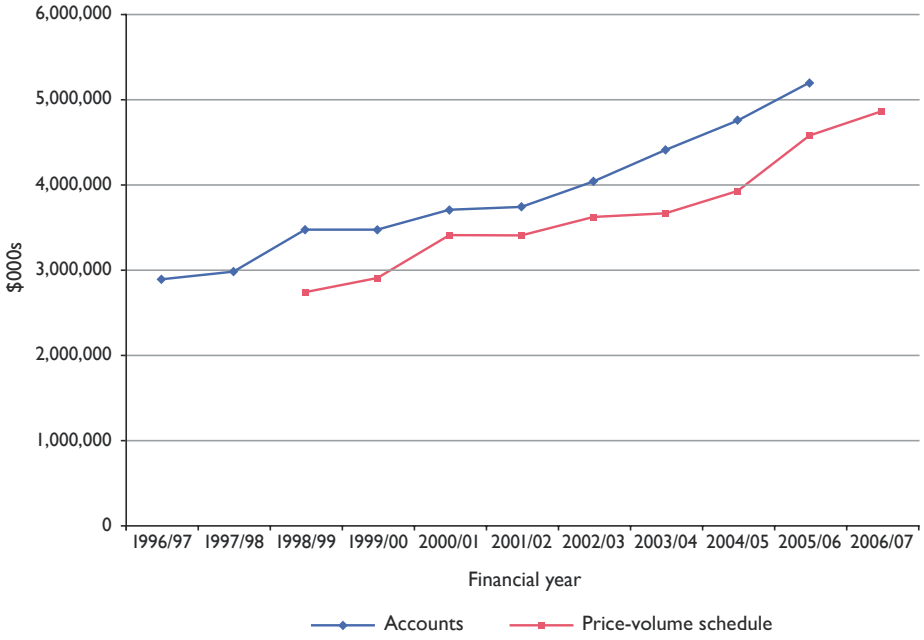
As the price–volume schedules do not account for all the revenue, a certain level of difference between price–volume schedules and accounts is expected. However, there was a greater difference between the price–volume schedules for 2003/04 and 2004/05 and the accounts. Therefore, the findings for those two years are less reliable than the findings for other years.

Table 3: Contracted non-diagnostic related group volume (Weighted Inlier Equivalent Separations 11b), 1998/99 to 2005/06

Non-diagnostic related groups	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Blood	4,764	5,291	6,136	6,127	11,267	7,622	9,551	10,324
Community	70,168	78,711	91,960	97,130	95,034	84,526	89,339	87,122
Clinical training agency			27,427	27,418	26,048	24,844	23,677	23,742
Disability	114,288	90,785	109,537	100,304	95,447	87,142	60,502	68,491
Medical and surgical	192,326	182,444	229,075	226,414	234,128	215,578	233,106	256,937
Mental	177,055	172,698	198,475	192,588	197,940	183,968	194,479	210,830
Public	15,542	15,605	22,252	22,541	21,503	20,189	19,284	12,502
Patient travel	2,766	4,648	6,155	6,553	6,865	7,100	7,236	7,712
Other	16				3,203			17,564
Total	**576,925**	**550,182**	**691,017**	**679,075**	**691,434**	**630,970**	**637,175**	**695,225**

Note: The 2003/04 and 2004/05 non-diagnostic related group data are of poor quality, so are not used in the overall findings of this paper.

Figure 5: Difference in revenue reported in financial accounts and price–volume schedules ($000s), 1996/97 to 2006/07



Adjusters

A set of purchase units are called adjusters. Adjusters are essentially price premiums or lump sums paid to the hospitals as part of the contract negotiation. No specific outputs are expected to be delivered for these adjusters. In this work, the adjusters are excluded in determining the aggregate volume of outputs. Table 4 summarises the price–volume schedules. It can be seen that the adjusters increased from $155 million in 2000/01 to $454 million in 2005/06, a threefold increase. This is significantly higher than increases in DRGs and non-DRGs. This means hospitals are increasingly being funded without clear deliverables attached to the funding.

Table 4: Summary of price–volume schedules ($m), 1998/99 to 2005/06

	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	200506	200607
Diagnostic-Related Groups	1,121	1,226	1,317	1,304	1,394	1,445	1,525	1,679	1,856
Non-Diagnostic Related Groups	1,599	1,659	1,940	1,904	2,027	1,964	2,066	2,311	2,452
Adjuster	24	24	155	202	206	246	340	454	445
Total	**2,744**	**2,910**	**3,413**	**3,410**	**3,627**	**3,655**	**3,930**	**4,445**	**4,753**

Inputs

The data on inputs (full-time equivalents and expenditure) are largely complete and accurate (see Table 5). Minor gaps and anomalies in the input data were corrected by extrapolating the information for adjoining years.

Expenditure data were normalised to eliminate the impact of inflation. The CPI was used as the basis for adjusting for inflation. It was opted not to use the Producer Price Index (PPI) for the health sector. Some may argue over the choice of CPI rather than the PPI as the deflator in this analysis. As the PPI for the health sector is dominated by the public hospitals, using the PPI would not show the growth in public hospital expenditure compared with inflation in the country's economy as a whole.

Table 5: Input data, 1998/99 to 2005/06

	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Full-time equivalents								
Medical personnel	4,235	4,479	4,569	4,827	5,017	5,203	5,746	5,652
Nursing personnel	17,164	17,607	18,265	19,447	19,908	20,219	21,270	21,470
All	40,242	41,343	42,412	43,730	44,332	45,245	47,545	48,386
Expenditure ($000s)	(3,379,076)	(3,479,290)	(3,777,218)	(4,019,306)	(4,230,883)	(4,513,039)	(4,907,703)	(5,315,545)
Consumers Price Index	832	849	876	900	913	935	962	1000
Expenditure Consumers Price Index Adjusted	(4,061,649)	(4,100,105)	(4,311,697)	(4,465,070)	(4,631,622)	(4,826,222)	(5,102,993)	(5,315,545)

Sources of data

All the data used in this work were sourced from the Ministry of Health via a request under the Official Information Act 1982. The Official Information Act request was for all relevant data for July 1993 to June 2006. However, the Ministry of Health could not provide all the requested data. The gaps and anomalies in the data were corrected by extrapolating the data for the adjacent periods.

The data sourced from the Ministry of Health include:

- actual annual revenue, expenditure and full-time equivalent personnel numbers for all hospitals from July 1996 to June 2006
- actual volumes of admitted patients for July 1996 to June 2006 via an extract from the National Minimum Dataset
- a consistent set of weights (WIES 11b), which was used to weight the DRGs
- copies of price–volume contracts between the hospitals and the funders, which showed the contracted volume and prices of purchase units for July 1998 to June 2007.

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