

Activity Based Funding: The implications for Australian health policy

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DECLARATION

This work contains no material which has been accepted for an award of another degree or diploma in any university and, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person except where due reference is made in the text of the thesis.

ABSTRACT

This thesis answers the question: *Has the throughput of patients in public hospitals changed since the introduction of Activity Based Funding?* A multi-case study of one New South Wales Metropolitan and one Regional Local Health District, was conducted. Hospital admissions and visits to Emergency Departments of patients with chronic diseases, are analysed over the period 2009 to 2013. Changes in patient throughput are identified, and seven possible explanations for these changes, such as a change in demography of patients or a change in clinical practice, are explored. An index (the PARI) was developed from which the potential revenue and resource implications for each clinical condition, in each hospital, in each Local Health District, are examined. The findings from this study are discussed within the theoretical framework of Alford's (1974) structure interests at three levels: first, the micro level (public hospitals and patient care); second, the meso level (public health policy for publicly-owned and operated health services); and third, the macro level (the role of the state vis-à-vis capital accumulation, interest groups and the global health market).

It is concluded that, many patients who were 'eligible' to be treated in a setting other than that of an inpatient, were admitted to hospital for their treatment. Activity Based Funding has, however resulted in patients spending fewer days in hospital. The implications of these findings are that: (i) the 'bio-medical' model of the provision of health care will continue, and the interest of current interest groups preserved; (ii) the increasing amounts of public expenditure to the private sector, means less funding is available for publicly-owned and operated health services; and (iii) more of the cost of health care is being passed from the taxpayer to the consumer. The greatest change in dominant interests, since the work of Alford, is the growing influence of multi-national companies that supply health-related goods and infrastructure globally, which hinders the development of a competitively strong domestic industry.

Keywords: activity based funding, interest groups, hospital, health services.

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INTRODUCTION

This thesis answers the question: *Has the throughput of patients in public hospitals changed since the introduction of Activity Based Funding?* A nationally consistent approach to Activity Based Funding (ABF) was introduced in 2011 as a mechanism from which to fund public hospital services following years of debate in Australia about the economic and technical efficiency of the current health system, and whether it will continue to be affordable (Council of Australian Government [COAG] 2011).

On the one hand, it has been claimed that Australia cannot afford the projected increasing cost of the now well-entrenched 'bio-medical' model of Western medicine, which predominantly consists of the treatment of disease in hospital (Blewett 2000). Many economists and health policy experts have reinforced this opinion in numerous publications (Boxall & Gillespie 2013; Duckett, Breadon, Weidmann & Nicola 2014). On the other hand, it has been claimed that there is no real affordability crisis, and that the proportion of expenditure on health care is affordable, and therefore Australia is in a strong position to meet future increases in the cost of health care (Scotton 1995; Richardson 2005).

The position adopted in this thesis is that concern about the future affordability of health services is only one of the many reasons of why there are persistent calls for reform of the health system. There has also been a change in the health care needs of the population in Australia, and the current provision of health services, which are mainly provided through public hospitals and Medicare payments to doctors, is not meeting those needs (Johnston & Duffield 2002; Baum 2008; Barraclough & Gardner 2008; Boxall & Gillespie 2013).

The most recent attempt to reform the health system was in 2011, when the Commonwealth government introduced the National Health Reform (NH Reform), of which ABF is a key component (COAG 2011). Under the NH Reform Agreement (2011), Medicare Locals (and Super Clinics), which are

private entities supported by Commonwealth government grants and established through public-private partnerships (PPPs), and Local Hospital Networks, which consist of a group of public hospital services located within a defined geographic area, were established (COAG 2011, Schedule D & E).

These entities were expected to work together: (i) to improve the local responsiveness to the needs of their communities; (ii) to provide seamless care to patients, and (iii) for more of that care to be provided in non-acute settings, where appropriate (COAG 2011, Schedule D & E). States also agreed to implement a national efficient price for each patient episode of hospital care using ABF. Implementation of this funding model was expected to improve public hospital efficiency (COAG 2011, Schedule A). An intended outcome from implementing ABF is described as service substitution in this thesis, where some categories of patient with chronic disease are diverted from receiving their treatment as an inpatient in an acute hospital, to a non-acute service location preferably in the community (COAG 2012).

If successful, the impact of these initiatives on public hospitals would be that fewer people would be admitted to hospital with conditions that were potentially able to be treated in a setting other than that of an acute hospital. Fewer of these people would present for treatment to an Emergency Department, and fewer of those who did present would be admitted to hospital. Achieving these outcomes would require changing the behaviour of interest groups who, rely on public hospitals for their economic survival, and/or who have a vested interest in maintaining the current bio-medical' model for the delivery of health services.

Whether the objectives of this most recent reform were achievable has been met with scepticism, which is reinforced by the history of the unsuccessful implementation of other health policies. Many health policy commentators' believe that the implementation of previous policies was unsuccessful because they did not changed the known structural, economic and political impediments to improving the health system, and that, without addressing these impediments, the way that health care is provided would not change

greatly (Duckett 1984; Murray & Peetz 2013; Boxall & Gillespie 2013). Considering the disquiet about the current health system, the question is - *why is there such resistance to changing the way in which health care is funded and provided?* Examination of the role of the state and Alford's (1975) theory of structural interest provides insight into the answer to this question.

The state's role in the health system is complex; it is the regulator, funder, and provider of many publicly-funded health services: functions which are operationalised through regulation and bureaucratic structures, and by the development and implementation of health policies. This role enables government to have a degree of influence in the health market, to provide some public-good, and, at the same time, for it to continue to provide the conditions for private property rights to be upheld, and for the accumulation of capital from which the state benefits through receiving revenue from taxation (Offe & Ronge 2009; Loeppky 2014; Spies-Butcher 2014).

Examples of health policies that enable the state to operationalise its role include Medicare, the Pharmaceutical Benefits Scheme (PBS), the Therapeutic Goods Administration (TGA), Private Health Insurance (PHI) and the NH Reform policies including ABF. These policies are all designed to contain public expenditure, and to provide some public benefit, while at the same time supporting a market approach to the delivery of health care (Griffith 2006; Broom & Primrose 2014). Embedded in these policies are opportunities for greater involvement of the private sector in the provision of public health services, a government strategy that was introduced with the passing of *The Private Establishments Act 1982* (Eager *et al* 2001, p.61). The passing of this Act enabled the planned development of private services and led the way to the creation of a market, which is now underpinned by neoliberal ideology (Eager *et al* 2001; Stilwell 2011). This market, through which health care is provided, contains many interest groups, and the activities of these interest groups in maintaining the *status quo* have been cited as the reason why past attempts to reform the health system have been consistently unsuccessful (Alford 1975; van Gool 2007; Baker 2014).

The problems described above are set against a backdrop where hospitals remain the dominant provider of health care, because that is the way health care has traditionally been delivered in Australia (Peterson 2005). Providing health care in a centralised location is claimed to be efficient, because it enables a limited number of trained health professionals to provide care to more people, and allows the most efficient use of expensive equipment. Hospital administrators, health professionals, and some communities who rely on their local hospital for employment, continue to use these arguments to secure the largest possible proportion of available public health funding for their hospitals, and in doing so maintain public hospitals as the dominant health service provider – maintenance of the *status quo* (Evans, Gil-Soo Han & Madison 2006).

However, the main focus of the thesis is to examine, at a micro level, changes in the use of services in public hospitals to answer the research question: *Has the throughput of patients in public hospitals changed since the introduction of Activity Based Funding?* The aim of the thesis is to identify whether ABF has changed patient throughput using three chronic diseases each of which has been identified as potentially able to be managed in a setting other than that of an acute hospital (Australian Institute Health and Welfare [AIHW] 2015). Analysed are: (i) the number of patients with chronic obstructive airways disease, or diabetes, or cellulitis admitted to hospitals that receive ABF; (ii) those patients' mode of access to, and destination from, hospital; and (iii) the balance between the potential revenue available and the resources required to treat those patients. Where statistically significant changes in these parameters are observed, possible explanations for those changes are explored, and conclusions are drawn.

Understanding whether the implementation of ABF has resulted in change, or not, and who benefits most, has both political and health policy relevance. This thesis will provide timely new knowledge, which will be useful to health managers and policy makers, by providing a baseline for future health policy, practice and research. Additionally, using a political economy approach, the

thesis makes a case for taking the influence of interest groups into account in the evaluation of the reasons for the success (or otherwise) of health policies such as ABF.

This thesis has seven chapters, the contribution of each chapter to answering the research question is as follows.

Chapter One presents the theoretical framework used to describe the socio-economic and political environment in which public health services are funded and delivered in Australia. This environment is the context in which the NH Reform has been introduced, (a component of which is ABF), and on which its success is dependent. This theoretical framework draws on the work of Alford (1975) and other authors who have claimed that interest groups, such as clinicians, administrators, private and public companies, and other agencies, which are reliant on public hospitals for their economic survival, have a vested interest in maintaining hospitals as the dominant provider of health care. This is in spite of the knowledge that the many medical treatments which hospitals offer, may not meet the health needs of those suffering from chronic disease. The influence of vested interests in the formulation and implementation of health policy (meso level), and how those dominant and challenging interests use their influence locally, and with government, to secure health policies that are favourable to their achieving their business objectives, are discussed. Applying the theory of structural interests enables analysis of the existing interests (and interest groups), and their influence on the implementation of ABF, and other health policies at a micro (hospital/consumer), meso (state) and macro (global) level. It is important to understand the interconnections among these three policy levels, because each has the potential to influence the success (or otherwise) of the implementation of ABF.

Chapter Two presents the methodology in two sections, each of which describe separate but interrelated methods necessary to answer the research question. Section one presents the research design of a multi-case study of one Metropolitan (Western Sydney) and one Regional (Hunter New England)

Local Health District¹. The selection of these two Local Health Districts for analysis, will show whether there are different impacts of ABF in different locations, and it will enable demographic differences in Metropolitan and Regional Local Health Districts to be examined. Demographic differences influence: the type and mix of local health services; the ease of patients' access to health services; clinical referral patterns; clinical and social support for patients after discharge from hospital; and funding arrangements. The selection of these two Local Health Districts has the added benefit that it will enable the analysis to establish that each Local Health District selected is reasonably representative of other Local Health Districts in its group. This is important to enable the findings from this research to be generalisable beyond the two Local Health Districts under study.

Section two of this chapter describes the quantitative methods used to select for analysis: those hospitals that receive ABF, the three clinical conditions, (chronic obstructive airways disease, diabetes and cellulitis), and the data variables used in the analysis. In describing how data are managed and analysed, and for what purpose, the many biases that could affect the interpretation of data, which might result in the assertion of a causal relationship which does not in fact exist, are discussed. To mitigate this risk, for any significant change in patient throughput, seven possible explanations are explored, such as a change in demography of patients, or a change in clinical practice, or a change community morbidity and/or health policy. Finally, changes in patient throughput have financial consequences, which, when known, enable a more complete analysis of the implications of the introduction of ABF for public hospitals. A method to identify change in the balance between potential available revenue from ABF and the resources required (but not actually used) to treat patients in those hospitals, is developed.

Chapter Three presents the incentives for State governments to sign the National Health Reform Agreement (2011), the salient elements contained in that Agreement; and the infrastructure established for its implementation. By

¹ Local Health District is equivalent to a Local Hospital Network in NSW

providing a description of the model of ABF from which public hospital services are funded, and how it was operationalised in New South Wales (NSW), the history of the development of ABF and the complexity of its implementation are conveyed. The disease classification system - Diagnosis Related Groups which is the basis for coding each patient's episode of care, on which ABF operates is then discussed. It is important to understand this classification system because it is the basis on which data have been selected (and analysed) to answer the research question.

Chapters Four, Five and Six deal respectively with chronic obstructive airways disease, diabetes and cellulitis. Each chapter presents the number of admissions to hospital, and visits to Emergency Departments over the five-year period of the study, 2009 to 2013. Each chapter also presents the balance between the potentially available revenue and the resources used in the treatment of patients for each hospital, for each clinical condition, for those patients who might reasonably be expected to be treated in a setting other than that of an acute hospital. The discussion of the findings from each of these analysis contributes to the final conclusion drawn, which answers the research question.

Chapter Seven presents the conclusion drawn from the analyses, and discusses the health policy implications at three levels. First, the micro level (public hospitals and patient care); second, the meso level (public health policy for publicly-owned and operated health services); and third, the macro level (the role of the state vis-à-vis capital accumulation, interest groups and the global health market). This approach provides a comprehensive picture of the implications of health policy decisions on public-good.

It is concluded that the implementation of the policy of ABF has not changed patient throughput or the practice and/or behaviour of interest groups in the ways that were intended. The implications at a micro level are that, the dominant 'bio-medical' model of the provision of health care will continue, and the interest of current interest groups will be preserved. The implication of current health policies (the meso level) is that, more of the cost of health care

is being passed from the taxpayer to the consumer. Additionally, as a consequence of the diversion of increasing amounts of public expenditure to the private sector, less funding is available for publicly-owned and operated health services. The implication of the growing interdependence of multinational companies and the state (the macro level) is that, it has enabled these companies to dominate the global supply of health-related goods and infrastructure, which hinders the development of a competitively strong domestic industry for the provision of these items.

Chapter 1: The political economy of health

1.1 Introduction

This thesis contends that the power of interests embedded within existing arrangements should be incorporated in studies that examine, at a micro level, the impact of meso level policies such as the NH Reform and its policy of Activity Based Funding (ABF). This is particularly important for ABF because the aim of the national policy is to make the provision of hospital services more efficient, which will be evident (or not) when changes in the throughput of patients admitted to hospital are examined. Changing patterns of patient throughput will require a change in the practice and/or behaviour of clinicians and other staff working at the micro level (that is in public hospitals). The process of change begins with engaging these interest groups, and if that engagement is not successful the status-quo will remain. For example, a senior clinician recently stated: 'If today I walk into a hospital ward and ask the doctors: What is ABF? – I believe that no-one would be able to tell me. If I asked them: How has ABF changed your work practice? The response is likely to be, "in here, it is business as usual!" (Personal Communication 2014). Thus the degree of success in implementing ABF will be influenced by the degree to which clinicians are engaged.

Clinical practice at the micro level (hospital) is also influenced by other interests. As will be shown in this Chapter, the behaviour of these other interest groups is self-serving and is influenced by the culture embedded in their respective professions. As well as the organisation in which they work: the unions who represent their interests, large corporations which provide health related goods and services, and others who have a vested political interest in maintaining the status quo at the micro, meso and macro-levels. Thus the degree of success in implementing policies such as ABF is influenced by the level of support for that policy by a range of interests groups

within the wider community and who participate in the market for health services (hospital and community).

To provide a better understanding of the reasons why health reform had been consistently unsuccessful, Alford (1975) categorised the interests and interest groups in the health system of the United States (US). His categorisation showed how dominant and challenging interests and groups maintained their influence, and how they continued to obtain support from the state (Alford 1975). As a result, the process of capital accumulation was maintained, some of the benefits of which flow back to the state from the revenue it receives through taxation.

These interest groups were described by Alford (1975) as: (i) corporate rationalisers, who comprise administrators and planners who control public hospitals, medical schools and government agencies; (ii) professional monopolies, who comprise physicians, bio-medical researchers, not-for-profit hospitals and others who benefit from autonomy, independence and control over their work conditions; and (iii) repressed structural interests, who comprise consumers, community people, and minorities who are marginal to the system, but who often come together to work on a specific issue or need, and who are easily co-opted by more powerful others (Taylor 1977). Duckett (1984) used these three categories to look beyond the interest groups themselves, and to understand the broader interests which were being served by their activities in the Australian health system.

Since the publication of Alford's (1975) research findings, there has been a change in which interest groups are the most dominant, and new interest groups have emerged. Checkland, Harrison and Coleman (2009) claimed that the role of some 'corporate rationalisers' had changed, and that hospitals (as corporate entities) had emerged to form a new category of interests which they called 'corporate monopolists'. As shown by Checkland *et al* (2009), and as was acknowledged by Alford (1975), the dominant and challenging interests and interest groups will change over time, and therefore the theory of structural interests will evolve.

The contributions of Duckett (1984) and Checkland *et al* (2009) expanded Alford's theory of structural interests, although they have not altered it substantially. The theory remains relevant as a tool for: (i) categorising interest groups, (ii) identifying whose interests they serve, and (iii) elucidating the extent to which these interest groups might influence the formulation of health policy. Before describing the current interest groups, the political context in which health services are funded and provided is presented. It is important to understand the role of the state in the health market, and the mechanisms that it has adopted in operationalising its role, because it is through these structures and processes that the political economy of health becomes apparent.

The structure of the chapter is as follows. The chapter explores the role of the state, the economic and political disposition of government, and why the state supports the process of capital accumulation. Various interest groups, and the interdependence between these groups and the state, are identified. The extent to which the state and these groups share a common interest in supporting a market approach to the delivery of health services is established by examining four current health policies. This examination also shows the influence of an ideology that, promotes the rights of private property, on the *modus operandi* of all these interests, and the subsequent implications for the state in its meeting its obligations to provide public-good in health: i.e. 'a good or service that it is not possible to exclude people from consuming once any is produced' (Culyer 2005, p. 280).

1.2 Political economy context

Australia is a capitalist democratic state: its laws and regulations protect the rights of owners of private property; it obtains its revenue through taxation; it promotes the conditions that support capital accumulation, and its government is democratically elected by its people (Offe & Ronge 1975; Stilwell 2011). The role of the state in a capitalist democratic society is to govern, and it does this through the passage of laws, regulations and policies.

Among the many regulations implemented and monitored by the state, the state provides regulations for the collection of revenue through taxation, and its subsequent redistribution (Hollingsworth & Boyer 1997; Duckett & Willcox 2011). Without tax revenue the capacity of the state to influence economic and policy decision-making would be seriously diminished (Offe & Ronge 1975).

The redistribution of the state's surplus resources includes, appropriately, the provision of public-good that benefits the general population, such as publicly-funded health services. However, this role competes with the state's informal obligation to those interest groups which also provide (private) health services, which have often helped the government to a position of power. This interdependence between government and interest groups has resulted in public health policies (and the success of their implementation) being strongly influenced by political ideology, and by vested interests, as shown in the history of Medicare (Stilwell 2011; Legge, Gleeson, Lofdren & Townsend 2014).

Since the introduction of Medibank in 1974 by the Whitlam Labor government, the scheme has undergone a series of changes, each driven by the ideology of the government of the day (Boxall & Gillespie 2013). In 1976, the Fraser Conservative Coalition government increased the involvement of private enterprise in the health market, a move which was supported by the Australian Medical Association (Scotton & Ferber 1978, 1980; Jennett & Stewart 1990). The result of that policy was similar to that experienced as a result of the introduction of the Menzies Conservative Coalition government's health policy (1950), where the health needs of the most vulnerable groups in society became less well-protected (Scotton & Ferber 1980; Boxall & Gillespie 2013).

In the early 1980's, following its election, the Hawke Labor government introduced Medicare, which was similar to Medibank (Boxall & Gillipsie 2013). Medicare was designed to provide 'universal access to health services' with the emphasis on subsidising the cost of the health care which people

received (Jennett & Stewart 1990, p. 223). However, there was no intervention to alter the organisation of the delivery of health care, and thus the 'bio-medical' model of the delivery of health services remained dominant (Jennett & Stewart 1990).

Although public opinion continued to support Medicare, it was rejected by the Australian Medical Association, and was the cause of the 1984-1985 doctors' dispute (Jennett & Stewart 1990). In 2004, universal health insurance and a Medicare safety net were introduced, but in 2013 the protection afforded by the Medicare safety net was lowered (Spies-Butcher 2014; Bunday 2014). In 2014, the Abbott Conservative Coalition government announced a \$20 reduction in the rebate for short General Practitioner visits, and a freeze on non-General Practitioner Medicare rebates, which would hinder peoples' access to diagnostic testing, to the medications available under the PBS, and to other health-related services, thus further eroding the integrity of Medicare (Bunday 2014).

In an ABC News program the former Prime Minister Tony Abbott was quoted as saying that his party's policy on co-payment measures gave a much-needed 'price signal' to the market, thus demonstrating the party's view that health care is a commodity, which will respond to the market principles of demand and supply (Woodruff 2015). As shown by Chester (2014), essential public services such as health care do not operate in this neoclassical way, and those people in greatest need are not well served by such policies.

More recently, The Commonwealth Minister of Health, Susan Ley M.P., announced in a Media Release a review of Medicare (Medical Benefits Schedule), which was triggered by the perception of the unaffordability of the continuing escalating cost of publicly-funded health services (Ley 2015).

The continuous oscillation between the ideology of Conservative Coalition and Labor governments in the formulation of health policy, in an environment where the policies of both parties are influenced by the values underpinning capitalist society, has resulted in the occurrence of incremental change,

which has eroded the public-good component of Medicare (Scotton & Ferber 1978; Jennett & Stewart 1990; Spies-Butcher 2014). Following this long and politically-fraught-process, which has spanned 42 years, the demise of Medicare is now thought to be imminent (Jennett & Stewart 1990).

One potential consequence of the demise of Medicare is that it will lead to the erosion of the integrity of other health policies, thus providing an opportunity for even greater involvement of the private sector in the provision of health services, for more public monies to flow from the public to the private sector, and for more of the cost burden of health care to be passed from the taxpayer to the consumer (Spices-Butcher 2014; Bunday 2014). As examples, the PBS, the TGA, and PHI policies have been examined to identify the intent of each, who benefits most from their implementation, and whether the integrity of these policies is also being eroded.

In Australia, the PBS was established in 1944 by the Curtin Labor government, to 'include drugs with some evidence of efficacy' (Boxall & Gillespie 2013, p. 26). The cost of the PBS to the taxpayer is now about \$8.8 billion annually, and as a consequence, greater emphasis is now being given to containing expenditure (PBS 2013). While its core objectives remain, the Scheme has undergone change, as a result of which consumers now contribute to the cost of their medication – an intended goal of neoliberal-type health policies (Ewig 2009; Baker 2014). The success of this Scheme in containing expenditure has been celebrated, and it is being copied by other countries, but the effect of this policy on improving the health of individuals or the population has never been examined in Australia, and its impact on health outcomes is unknown (Gardner 1996). What is known is that the introduction of a policy of co-payments, where patients share some of the cost of their medication with the state, shifts costs from the taxpayer to the consumer, and can result in the poor not obtaining medications when they need them most (Bunday 2014).

The TGA is another example of a health policy that, again supports the involvement of the private sector by providing a secure market for the sale of

their goods to public hospitals and other service providers (TGA 2013). The TGA was established in Australia as the mechanism for government to control product standards, and to contain expenditure on a wide range of goods such as prostheses, devices and intravenous fluids (Gardner 1996; Richardson 2005). The TGA has earned international respect for the economic success of its standard-setting and pricing policy. It is now a World Health Organization (WHO) Collaborating Centre for changing standards - but there is little evidence of evaluation of its impact on any social objective (Gardner 1996). Nor has its contribution to the public-good, by improving the health of individuals or the population, ever been evaluated.

The supply of health services is strongly influenced by the *Private Health Insurance Act 2007*, (and associated regulations) (Australian Government [AG] 2013). Through the Australian Government Rebate, the legislation regulating PHI enables the private health insurance industry to receive indirect annual financial subsidies from government costing \$5.5 billion annually, with the advertised aim of increasing competition in the health market and thus lowering prices (Boxall & Gillespie 2013; Spies-Butcher 2014).

Even though there had been an overall reduction in the uptake of private health insurance, membership has grown recently, driven by incentives such as 'avoidance of tax penalties or fears of higher premiums in later life..' (Boxall & Gillespie 2013, p. 173). A perception also exists that those who have private health insurance will receive priority access to health services, and those who do not will find that they are put on a waiting list and will experience delays in their access to health care (Boxall & Gillespie 2013). In fact, the outcome of this policy has been to inhibit competition, and to reduce the overall uptake of private insurance by older people, which, in turn, has put more pressure on public hospital beds (Deeble 2009). Such negative outcomes are likely to be compounded by the reduction in the total number of public hospital beds per head of population, which was reported by Bunday (2014).

There is also evidence that many people who have private health insurance do not use it when they go to hospital. Seah, Cheong and Anstey (2013), estimated that the cost to public hospitals of the 10 per cent of patients who have private health insurance, but who, when admitted to a public hospital choose not to use it, is of the order of \$588 million annually. Financially, private health insurers benefit from this practice, which is reported to be because patients discover that the outcome of the cost of treatment in hospital is not met by their private health insurance cover (Seah *et al* 2013).

In spite of the negative impact of this policy, the Commonwealth government is considering giving even greater power to private health insurers, by allowing them to limit the price paid for treating patients in publicly-funded health services – a strategy aimed at containing costs. Dr Brian Owler, the previous President of the NSW Australian Medical Association, spoke out about the negative consequences for the Australian health system if the government were to give this level of power to the private insurance industry (*Seven Thirty Report* 2014). Again, the contribution that this policy has made to improving the health of individuals or the population, remains unevaluated and unclear, but there is a growing concern that, as a result of incremental changes to the PHI policy, access to health care is increasingly becoming a two-tier system (Richardson 2005). This example also shows the ease with which taxpayers funds are diverted to the private sector through financial subsidies which are embedded in health policies.

The policies contained in the NH Reform also provide some public good and encourage greater involvement of the private sector in the provision of health services. However, these policies are different from those described above, because cooperation of the States, the private sector, and other interest groups is required for their successful implementation. Commonwealth/State relations are complex as shown using the history of the development of ABF.

The origin of the policy of ABF, which determines how hospital services are now funded, began in 1988, when the then Labor Federal Minister for Health,

Dr Neil Blewett, incorporated provision for progressing casemix funding using Diagnosis Related Groups (DRGs) in the Medicare Agreement (Leeder 1999; Duckett 2007). This decision led the way for the Medicare Agreement (which is negotiated every five-years) to become the vehicle, that the Commonwealth government uses to obtain agreement with the States, for implementation of certain health reforms (Leeder 1999).

Casemix funding for public hospitals was based on the average cost (price) of treating each patient according to their disease and its severity (Leeder 1999). Both the Conservative Coalition and Labor governments believed that casemix funding could contain expenditure in public hospitals, and both supported the process of refining the model of casemix funding for use in Australia. In 1993, the newly appointed Kennett Conservative Coalition government in Victoria introduced casemix funding as a mechanism for funding its public hospitals. At the same time as casemix funding was introduced, the Victorian government rationalised hospital services, and removed \$220 million from the health budget (Hancock 1999 p.141). The State made no provision for enhancement of the availability of, or access to, health services in the community (Hancock 1999).

The Victorian experience showed that casemix funding was a viable alternative to the previous method of funding public hospitals in terms of economic efficiency. In 1996 the Olsen Conservative Coalition government in South Australia under its policy of privatisation, introduced casemix funding, and other States followed soon after (Hancock 1999). Even today there is insufficient research to know what the impact was of casemix funding on patient care, but this lack of information did not slow the pace of its adoption (Hancock 1999). In 2008 at a meeting of the Council of Australian Governments (COAG), the States agreed in principle to introduce a national approach to the funding of public hospital services (Department of Health [DoH] 2011). This in-principle agreement was realised in 2011, when the then Federal Labor Minister for Health and Ageing, Nicola Roxon negotiated with

the States (and Territories) to introduce a national approach to funding hospital services, which was ABF. The NH Reform Agreement (Clause 18), requires a review of the Reform in 2015-16, and an evaluation of the implementation of ABF. The outcome of the evaluation of ABF was due on 31 May 2016 (Independent Hospital Pricing Authority [IHPA] 2013). At the time of writing this thesis a search of the IHPA web-site for the outcome of this evaluation showed 'no publications found'.

The formulation of all these policies is built on the perception that Australia cannot afford the projected increasing costs of the now entrenched model of Western medicine, and therefore emphasis is rightly placed on curtailing public expenditure (Duckett 1984; Blewett 2000; Duckett & Willcox 2011). Many economists and health policy experts have reinforced this opinion in numerous publications (Hollingsworth & Peacock 2008; Boxall & Gillespie 2013; Duckett *et al* 2014). In a recent, Federation Discussion Paper (2015), public expenditure on health care was reported to be \$100 billion dollars annually (Department of Prime Minister and Cabinet [DPMC] 2015).

In 2010, Australia's expenditure on health care accounted for over nine per cent of its Gross Domestic Product (Organisation for Economic Cooperation and Development [OECD] 2013). This level of expenditure is similar to that of the United Kingdom or Japan, and less than that of Canada or the US (OECD 2013). Therefore, when compared with the level of Gross Domestic Product expenditure in other OECD countries, the argument that the level of expenditure on health care is not affordable does not stand up well to scrutiny. This point was made by Richardson (2005) when he reported that the current expenditure on health care is affordable, and that Australia is in a strong position to meet future increases in the cost of health care. The question then becomes: *why is the state (represented by government and politicians) reluctant to invest more of the state's resources in the health budget?*

One explanation is that the state gains no short-term benefit from investing more of its resources in the health system. Publicly-funded health services do not produce a product that can be exchanged in the market, and therefore they do not contribute directly to capital accumulation. Their contribution to accumulation is through labour power, enabling an increase in overall economic productivity as a result of the state having a healthier workforce (Chave 1987). This long-term and convoluted cycle of return on investment means that the gain from any investment of revenue in health services does not result in measurable economic outcomes in the short-term (Johnson 2011a).

If the government wished to invest more in the health budget it could do so by reducing its current level of funding in another portfolio, and by re-investing the funds gained in health. This strategy of disinvestment and reinvestment is not often pursued, because it has been known to create political tension. As pointed out by Offe and Ronge (1975), maintaining the *status quo* and doing nothing is the approach which is taken most often.

Another reason which is cited for politicians choosing to do nothing, in the absence of disinvestment, is that any increase in funding to publicly-funded services will only occur if individuals and/or households are prepared to give more money for public spending through increased taxation. While people want access to quality health care when they are ill, they do not want to pay more for it, and politicians are always reluctant to raise taxes (McTaggart, Fudlay & Parkins 1996).

Given these explanations of why there is reluctance to invest more of the state's resources in the health system, an alternative option is for politicians to support the creation of a health market, which was facilitated in Australia with the passing of *The Private Establishments Act 1982* (Eager *et al* 2001). This option is attractive to governments of most Western countries, including Australia, because the ideology that underpins this market is consistent with that which underpins capitalism *per se* (Broom & Primrose 2014). An added attraction for supporting the creation of a health market is that it has the

potential to deflect the responsibility for the decisions about, and the operation of, some health policies from the public to the private sector, thus absolving politicians from having to make unpopular decisions (Anderson 2014).

The nature of the health market requires further explanation. Globally, the health market has evolved from being an oligopoly, where power and control of the market was in the hands of the few, to being more pluralist, consisting of powerful social institutions, and professional, corporate and community interests, where power is shared more generally among interest groups in ways that enable each to meet their own objectives (Feingold 1977; Checkland *et al* 2009). Under these circumstances convergences and conflicts between interests and interest groups will inevitably occur, but the players understand the rules of any engagement, and their interests are likely to converge over time, to their mutual benefit (Hollingsworth & Boyer 1997). However, this market is changing rapidly to become neoliberal, which Mikler (2012) has suggested will ultimately force the state to adopt a similar role to that of a large corporation. Under such conditions government is likely to become even more open to trading-off its public-good responsibilities in return for economic prosperity.

Neoliberal ideology contends that markets are efficient and self-regulating, and that government involvement is useful, but required only to provide those public goods and services that private enterprise has no interest in providing because they do not generate a direct economic return on their investment (Stilwell 2012). The best use of public spending is seen to be when it creates employment in the private sector, thus supporting a market approach to the delivery of services, where individual responsibility and freedom of choice rule (Stillwell 2011). In addition, opening state borders to free trade is viewed as positive, because it will 'ultimately' benefit all (George 2013, p. 10).

However, in the terminology of economics, the health market is a failed market, because it does not satisfy the attributes of a free competitive market (Spies-Butcher 2014). In a free market it is believed that, consumer demand for a particular commodity (product or service) will drive the supply of that commodity to the point where an equilibrium is reached. At this point the price of the commodity should stabilize; if the demand is greater than the supply the price will rise and if the supply is greater than the demand the price will fall. These conditions do not apply in health. For example: the price for each episode of care in hospital, which is set by the Independent Hospital Pricing Authority (an independent Government agency), is governed by the ABF policy, clearly demonstrating that the health market is not self-regulating (IHPA 2011; Stilwell 2011). This failed market can only operate successfully with the involvement of government, its legislation and associated regulations and policies (Stilwell 2012). Cahill and Paton (2011, p. 12) claim that the 'involvement of government, its regulations and policies is, in fact, necessary for markets to develop'. Many of the state regulations and policies now bear the hallmarks of neoliberal ideology, the impact of which is now discussed (George 2013).

The NH Reform contains two distinct but related policies which, when combined, support a market approach to the delivery of health services in practice, up-holding the neoliberal principles of: private property rights, free markets, and the opening of state borders to trade (Peck 2010; Stilwell 2012). The two policies are: ABF which is designed to improve efficiency in publicly-funded Local Hospital Networks, and the creation of public-private partnerships which are designed to create Medicare Local and Super Clinics in the private sector (COAG 2011).

ABF is designed to contain health care expenditure in the public sector. The intended effect of ABF on hospital services is a reduction in the cost of each patient's episode of care bought about by improved economic efficiency, which is likely to arise from a decline in the length-of-stays of patients in hospital. A decline in the length-of-stay will result in an increase in the number

of patients who, on discharge from hospital, require on-going health care in the community. The state encourages the private sector to provide this care on a fee-for-service basis, either paid for by the consumer direct, or by Medicare under the auspice of Medicare Locals or Super Clinics. Entities which have been established using Commonwealth grants. These entities can expand their services to include diagnostic testing and/or to form alliances with large corporations (international) for services to be provided at a one-stop-shop. The private sector is therefore able to access taxpayer dollars to establish, grow and maintain their business, while, at the same time, public sector services are constrained. There is government regulation, but little control over the total price paid by consumers for services provided by the private sector, and consumers are often required to meet more of the cost of their health care from their own pocket.

When there is a relative increase in government expenditure to the private sector, as a result of the combined effect of the implementation of such policies, it results in a redistribution of wealth (Ryan 2016). Such policies demonstrate that the state is captured by, and continues to support, the development of a market for health, which Peck (2010) and other authors describe as 'actually existing' neoliberalism. The state's influence in this market may in fact increase, but its responsibility for the direct delivery of public good/services is eroded (Cahill 2013).

A market will purportedly be efficient if there is adequate competition: thus from a neoliberal perspective opening state borders to trade is viewed, as positive because it will create competition which will 'ultimately' benefit all (George 2013, p. 10). However regulation and trade agreements which favour the private sector, and which enable monopolies to operate supply chains at a local, state and global level (micro/meso/macro-levels), have been shown to result in less competition in the market and in higher costs to consumers. For example, consumers pay more for medications in Australia compared with their overseas counterparts (Bundey 2014).

The adoption of neoliberal health policies, which encourage a greater involvement of the private sector in the delivery of health services, is based on a perception that the private sector can provide these services more efficiently (Johnson 2011a). However, as noted by Spies-Butcher (2014) some public services operate more efficiently than those provided by the private sector, because they do not have the same overheads. There is also a belief that the flow-on effects of those policies will benefit individuals and the community, a belief that has been challenged by a number of authors, who report that the main beneficiaries of the outcomes of regulation and health policies remain those interest groups which are in dominant positions in our society (Feingold 1977; Johnston & Duffield 2002; Checkland 2009; Harvey 2012). These dominant interests do not include consumers.

Although health services would not exist without consumers (the 'repressed structural interests'), consumers have limited power compared with that exercised by health professionals and the other interest groups. When consumers are ill, their interest is to have access to high-quality health services, preferably close to where they live, and at least cost to them. Most consumers do not have expert knowledge about their condition, or how to navigate the health system, and therefore, when they are ill, they are not in a position to make rational choices about which doctor they should see, or which hospital has the best outcome for certain procedures, or the best record in controlling hospital-acquired infections (Hollingsworth & Peacock 2008; Davidson 2011; Spies-Butcher 2014).

Consumers rely on their general practitioner for appropriate care and/or for referral to a specialist, or to the Emergency Department of a local hospital which is usually of the general practitioner's choice (Johnston & Duffield 2002; Hollingsworth & Peacock 2008; Britt, Miller, Henderson, Charles, Valenti, Harrison, Bayram, Chambers, Zhang, Pam, O'Halloran, Pollack 2013). Further, many people who are on low incomes do not access health care in a timely way, because queues in the public system are long, and they cannot afford the private care which may be more immediate (Baker 2014). Therefore, consumers are not

in a position to know the type or amount of services required to cure illness or to maintain good health, and as a consequence they do not drive demand for health services directly. The neoclassical mechanism, of market forces of consumer demand driving the supply of goods and services, does not apply in the health market.

In fact, the health market in most OECD countries is supply-driven, where the supply of goods and services drive the demand for them (Loepky 2014). Hence governments' focus on the formulation of health policies that curtail expenditure – one of their interests is to cap the supply of health-related goods and services in this quasi-market. Examination of the sources of supply of health-related goods and services helps to identify who are the dominant interest groups today, and whose interests are being served by them. These groups are now discussed.

The supply of medical professional labour in both the private and public sectors is controlled by Universities and their associated facilities such as medical schools and government agencies ('corporate rationalisers'). Their control is exercised through restricting the number of entrants and graduates, and through control over the work conditions of employees (Feingold 1977). However, because they do not have control over the medical profession *per se*, or over other elements of the health system, their power is limited (Feingold 1977).

Nevertheless, these agencies remain influential in controlling the number and type of health professionals available to the health market, and these 'corporate rationalisers' have a vested interest in maintaining the current 'bio-medical' model of the provision of health care – hospitals, for example, are where most health professional graduates have gained their practical experience and where they will find employment. Universities and other education and training institutions, who rely on public hospitals as a venue for the training and education of their students, welcome expansion in these facilities, particularly in the light of the recent doubling of intakes to medical schools (Medical Training Review Panel [MTRP] 2013).

The supply of labour is, to an extent, also controlled by unions ('professional monopolies'), whose professional self-interest is well-known. Unions work to increase their membership by supporting their existing members in improving their working conditions and/or wages, and by representing them in industrial disputes (McTaggart *et al* 1996). The Australian Council of Trade Unions represents 'over 150 affiliated unions', some of whom have members working in or for hospitals (Gardner 1996; McTaggart *et al* 1996, p. 925). Any reduction in the level of hospital employment would mean fewer potential union members, and therefore less revenue, so that unions also have a vested interest in maintaining the *status quo*.

In general, unions do not support multi-skilling practices, the removal of restrictive work practices, or the loss of any already-gained advantage, but they do exercise their power when it is used to support an increase in the number of employee positions, using mechanisms such as bargaining for change in their respective awards to include new categories of staff, or changing the staff work-ratio (Gardner 1996). This latter strategy was demonstrated when the NSW Nurses and Midwives Association put forward a case to increase the nurse-to-patient ratio from 1: 5 to 1: 4, with the claim that increasing the ratio would improve the quality and safety of health care for patients (N&MA 2014). No evidence has been found to support the claim that those outcomes would be achieved by increasing the number of staff, particularly when there has been no previous evidence of changes in their work practices in public hospitals (Numata, Schulzer, Van Der Wal, Globerman, Semeniuk, Balka & FitzGerald 2006).

The most influential union in the health sector is claimed to be the Australian Medical Association, even though since the early 1980s its power has been eroded (Gardner 1996). While, the Australian Medical Association supports public-private partnerships, and greater involvement of the private sector in the provision of health services, it does not support what it deems to be 'Socialist medicine', such as the provision of publicly-owned and funded community health services (Jennett & Stewart 1990; Gardner 1996; Blewett

2000; Johnston & Duffield 2002; Boxall & Gillespie 2013). The failure of the Community Health Program to reduce 'institutionalisation, or provide a saving in health care costs' has been attributed to the tension which exists between health service providers (Hancock 1999, p. 173).

This Association has been successful in its quest to maintain its members' position at the top of the professional hierarchy in health, and it continues to influence the formulation (and implementation) of new health policy, as demonstrated by its inclusion as a member on recent health policy committees (Ley 2015). Gardner (1996) has claimed that the maintenance of doctors' position at the top of the professional hierarchy is also supported by the state, through its continuing to fund orthodox medicine and treatments, which in effect also maintain hospitals as the dominant provider of health care.

Whatever the reason, the medical profession has enormous power and autonomy in the health system, which gives doctors the capacity to provide the best care possible to their patients, and at the same time to maintain their own personal and professional interests (Gardner 1996). Their autonomy is exemplified by the fact that many doctors work both in public hospitals and also in private practice, a model of service provision which, although supported by their Award entitlements, is poorly monitored, the outcome of which is that public hospital services are open to exploitation.

These hospitals in which the state is both the funder and provider of health care remain the monopoly providers of publicly-funded health services, and, as proposed by Checkland *et al* (2009), public hospitals are now 'corporate monopolists' (Hollingsworth & Peacock 2008). The goal of public hospital managers and administrators (e.g., Chief Executives of Local Health Districts in NSW) is at least to maintain their existing level of funding, or to position their hospital(s) to obtain a greater share of the total annual funds allocated to the health sector (McTaggart *et al* 1996; Hollingsworth & Peacock 2008).

The claim for more funding for hospitals is strongly supported by the interest groups which supply hospitals with goods and services and labour, or which monitor compliance with the standards contained in the regulations that govern both the supply of, and demand for, health services (McTaggart *et al* 1996; Hollingsworth & Boyer 1997). The result of this dynamic is that the interests of hospital managers and other interest groups, such as the medical profession in general, are also progressed by the 'corporate monopolists', and by other interest groups.

These other interests include the private and not-for-profit organisations that operate outside the public health sector, but which are financially dependent on its continuing existence, for example the Red Cross Blood Bank and disease-focussed associations such as Juvenile Diabetes, Cancer Care, and many more (Feingold 1977). Alford (1975) examined the role of these organisations in the health service industry in the context of 'modern society', and concluded that the real influence of some of these organisations came from their contacts with people in prominent positions in society. Boxall and Gillespie (2013) also came to a similar conclusion. In their recent publication titled: '*Making Medicare*', it was claimed that the structural interests of 'organized medicine and organized medicine itself, draws its power from the way it fits the logic and principles of the dominant interests in a society' (Boxall & Gillespie 2013, p. 66).

The influence of structural interests in the health market is particularly evident in the case of large multi-national companies, which for the purpose of this thesis, have been categorised as 'corporate monopolists'. The emergence of multi-national companies, to become a dominant interest group in the health sector, is the most significant change in the balance of interests since the original work of Alford, which was conducted in 1975. Large multi-national companies now supply the majority of goods and infrastructure to specialist clinics and hospitals, in the form of intravenous fluids, prostheses, bandages, medications, surgical instruments, large-scale diagnostic equipment, and much more.

The major interest of multi-national companies is to provide a return on investment to their shareholders; hospitals are no more than a secure market for the sale of their products, and with the growing influence of these companies, the state has become their collaborator, rather than an independent negotiator in securing the best price for their indispensable goods and services, as will be shown below. The growing influence of these companies is demonstrated by four recent trends in the way that they now operate.

The first trend is cited by Murray and Peetz (2013) who identified that between 2006 and 2010, foreign ownership of Australian health manufacturing and supply companies had increased. One of the consequences of Australia not having a strong manufacturing industry, coupled with the changing *modus operandi* of states which do, is that Australia is dependent on these countries (and their corporations) for access to many necessary items, over which it has only limited influence in price-setting. Further, as fewer Australian-owned companies exist, fewer dollars will circulate domestically, and more of the necessary health-related goods and infrastructure will be imported into Australia.

The second trend, which is particularly evident in the pharmaceutical industry, is that the 'high cost of research and development has encouraged the amalgamation of companies', resulting in a concentration of power and budgets in fewer companies which 'operate global supply chains' (Gardner 1996; Mikler 2012, p. 47). The Australian government's attempt, in 1987, to introduce initiatives (Factor f scheme), which were designed to support the development and maintenance of a domestic pharmaceutical industry, was not successful (Gardner 1996). The consequence of which is that, Australia is increasingly becoming a net importer of pharmaceuticals, with an annual rate of increase of \$0.5 billion (7 per cent per. annum) (Australian Bureau of Statistics [ABS] 2015).

The third trend, which demonstrates the growing influence of these companies, is a change in the *modus operandi* of some multi-national companies who now are using 'international rules' to protect their market share globally (Ranald 2014, p. 77). The consequence is that the domestic laws of countries in which these companies trade are being challenged in the international arena. For example the right of the Australian Government to restrict advertising of tobacco, on the grounds that tobacco has caused much ill-health to its citizens, is being challenged in an international court by Philip Morris Tobacco Company (Ranald 2014).

Even so, the state continues to provide regulatory frameworks and policies that extend the favourable environment for these companies' trade and investment strategies. This has influenced the way in which health care is now provided and has resulted in some unintended consequences for consumers (Ranald 2014). In Australia, private providers now dominate the provision of diagnostic testing and pathology services, and these providers now charge a fee of \$66 for those diagnostic tests which are not covered by the Medicare rebate, thus increasing the profit margin for those companies (Baker 2014). Many companies that provide diagnostic tests and other services, are supported by medical practitioners ('professional monopolies') who, when ordering diagnostic and pathology tests for their patients, use request forms which carry the brand of a specific company (Baker 2014).

This subtle networking between these providers and the medical profession demonstrates the pluralist nature of the health market. It shows also that more of the costs of health care are being met by consumers, the consequence of which is that many people with limited financial resources have difficulty in accessing those services at all, or in a timely way (Baker 2014). Such policies are welcomed by the interest groups who stand to benefit from those policies, such as members of the Australian Medical Association, the private health insurance industry, and multi-national companies who supply health-related goods, infrastructure and services.

The fourth trend demonstrates the growing interdependence of the state and multi-national companies. Mikler (2012) has suggested that states are now facilitating the business objectives of multi-national corporations registered in their own jurisdiction when negotiating trade agreements, and that it is those companies that benefit most from those agreements, once implemented. Trade agreements designed primarily to achieve economic objectives, and which open state-borders more fully to international trade, have serious implications for the state in it meeting its obligations for public-good in health care. For example, future health policies will need to be formulation within the constraints of those agreements, regardless of their impact on the health of the population (Legge *et al* 2014).

Legge *et al* (2014, p.117) have also reported that trade negotiations have opened the way for stronger 'geopolitical alliances' to emerge, where the more dominant states, which have an advantage in trade negotiations, are reaching agreements with states which are less dominant, and whose citizens are potentially affected negatively by those agreements. For example, American negotiators were successful, in securing, on behalf of companies registered in the US, the inclusion of a much-disputed intellectual property clause in the Trans-Pacific Partnership Agreement (Legge *et al* 2014). The outcome of which is an increase in the life of patents, the benefits of which flow mostly to companies registered in the US (Legge *et al* 2014).

The inclusion of this clause in the Agreement was supported by the current Conservative Coalition government in Australia in spite of the opposition of many health policy commentators, who remain concerned that it is likely to prevent competition, and will delay the availability of cheaper medication to consumers (Legge *et al* 2014). Australian citizens' currently pay more for their medications, and more from their own pocket, than do citizens of other countries (PC 2015). The Trans-Pacific Partnership Agreement is currently being submitted to the Australian Parliament for its endorsement, thus also demonstrating the extent to which the current Government is prepared to trade-off its obligation to provide public-good in health for economic gain.

1.3 Conclusion

This chapter has presented the economic and political context in which public health services are provided in Australia, and has identified interests and interest groups that comprise the health market and whose interests are served by them. There is no doubt that the greatest beneficiaries of the nexus between government and these interests and interest groups are those individuals and organisations which rely on the health market for their economic survival (Harvey 2012).

From a health policy perspective, the pronouncements of politicians (and other health policy commentators) that health care is unaffordable, has a number of potentially unfortunate consequences. It focuses the health debate on economic efficiency and particularly on, but not limited to, specific diagnostic and treatment modalities and public hospitals, and defers any discussion about the effectiveness of care (technical efficiency) and what government could do to improve and/or maintain the health of its population (its public-good obligation), as was reported recently in a report prepared by the Productivity Commission (2015). The NH Reform and its policy of ABF reinforces the perception that greater economic efficiency will make public health services technically efficient. As will be shown in this thesis this is not the case.

Whether the most recent NH Reform and its policy of ABF has been able to change the *modus operandi* of those interests and interest groups mentioned above, or to enable the state to meet its public-good obligations in health, remain unexplored questions. Chapter two discusses the methodological approach adopted to answer the research question.

Chapter 2: Methodology

2.1 Introduction

The overall research design of this thesis consists of a multi-case-study of one Metropolitan and one Regional Local Health District, in which public hospital inpatient and Emergency Department data are examined over five years; three years before and two years after the introduction of ABF. These analyses determine the different impacts of ABF in a Metropolitan and Regional context. The Chapter has two Sections.

In Section One the characteristics for the NSW population are used to: (i) demonstrate differences in the demographic characteristics of Metropolitan and Regional Local Health Districts; (ii) justify the selection of the two Local Health Districts in the case study; and (iii) to determine the extent to which each of the selected Local Health Districts is representative of the other Local Health Districts in its group. Published literature on this question of generalisability of the results from this research, is used to assert that each Local Health District is adequately representative of its group.

Section Two presents the quantitative method used to: (i) identify those hospitals that receive their funding through the NH Reform model of ABF in each of the selected Local Health Districts; (ii) select three clinical conditions for analysis; and (iii) identify in a dataset, appropriate data variables for each clinical condition from which the research question is answered. Three data management steps are then described, and for each, the methods used to analyse data to identify change in patient throughput, examine possible explanations for any significant change observed, and to demonstrate the balance between potential revenue and resources required to treat patients for each clinical condition, in each hospital, in each Local Health District.

2.2 Selection of Local Health Districts

Each Local Health District in NSW comprises a number of Local Government Areas (LGAs). The eight Local Health Districts which are classified as Metropolitan by the NSW Ministry of Health comprise 50 LGAs. These Local Health Districts are: Central Coast, Illawarra Shoalhaven, Nepean Blue Mountains, Northern Sydney, South Eastern Sydney, South Western Sydney, Sydney' and Western Sydney (NSW Ministry of Health [MoH] 2014a; ABS 2011). The seven Local Health Districts which are classified as Regional by the NSW Ministry of Health comprise 103 LGAs. Those Local Health Districts are: Far West, Hunter New England, Mid North Coast, Murrumbidgee, Northern NSW, Southern NSW, and Western NSW (MoH 2014a; ABS 2011).

Since ss. 20 of the *NSW Health Services Act 1997, No. 154* states that, the function of a Local Health District is 'to promote, protect and maintain the health of the residents of its area', it is appropriate to begin this section, by exploring the demographic characteristics of the Local Health Districts. In particular, the demographic characteristics of those groups of residents whose social circumstances mean that they are more likely to rely on public hospitals for their health needs (COAG 2012).

The demographic characteristics were obtained from the 2011 Census data (ABS 2011). The following data were extracted from the Basic Community Profile (Table B 01a) for each LGA in each Local Health District: geographic area (square km), total persons, total number of Indigenous persons, number of persons whose language spoken at home was 'English only' (or, the number of persons where a language other than English is spoken), and the number of persons aged 0-4 years, and 75 years and older. These data enabled the following to be calculated: the population density (persons per square km), the proportion of residents identifying as Indigenous, the extent to which the resident population was of an English-speaking background, and the distribution of the resident population. Characteristics for all the NSW Metropolitan and Regional Local Health Districts, are shown in Table 2.1.

Table 2.1: Characteristics of NSW Metropolitan and Regional Local Health Districts

Characteristic	Metropolitan LHDs (n=8)	Regional LHDs (n=7)
Geographic area (square Km)	25,031 (3% of NSW)	779,368 (97% of NSW)
Total population (persons)	5,030,541 (70% of NSW)	2,068,668 (30% of NSW)
Population density (persons / square km)	193.4	2.7
Indigenous residents (% of residents)	1.4%	5.0%
Only English spoken at home (% of residents)	64%	91%
Residents aged 0-4 years (% of residents)	6.7%	6.4%
Residents aged 75+ years (% of residents)	6.3%	8.3%

Source: ABS 2011; MoH 2013.

Only 30 per cent of NSW residents live in Regional Local Health Districts which occupy 97 per cent of the geographic area of the State. Regional Local Health Districts are populated much more sparsely, by residents who are more likely to be Indigenous i.e. Aboriginal or Torres Strait Islander or both, more likely to speak only English at home, and who have an older demographic profile. The differences in demographic characteristics between Metropolitan and Regional Local Health Districts provide a rationale for selecting, for the purpose of this study, one Local Health District which is representative of a Metropolitan area, and one which is representative of a Regional area, in NSW.

Western Sydney was selected as the Metropolitan Local Health District for study because its demography is typical of that of a metropolitan area. The Western Sydney Local Health District spans 775 square km, has a population density of 938 people per square km, and provides health services to 11 per cent of the State's population. Of those people, two per cent identify as Indigenous, which is consistent with the average for the State, and 45 per cent of the population speak only English at home (ABS 2011).

The Hunter New England Local Health District was selected as the Regional Local Health District because its demography is relatively representative of the demographic profile of a mixed urban / rural population. The Hunter New England Local Health District spans 11,627 square km, has a population density of nearly eight (7.26) people per square km, and provides health services for 12 per cent of the State's population. Of those people, five per cent identify as Indigenous, which is more than twice the State average, and 91 per cent of the population speak only English at home (ABS 2011).

Another reason for selecting Hunter New England as the Regional Local Health District was because its boundaries did not change in the most recent re-organisation of health services in NSW in 2010. Therefore, service provision in this Local Health District is likely to have been more stable than that in other Local Health Districts, where boundary re-organisations occurred at the same time as ABF was introduced.

Thus the Western Sydney and Hunter New England Local Health Districts display different demographic characteristics. However the extent to which these case-study Local Health Districts are representative of their respective Metropolitan and Regional Local Health District groups requires exploration. If each Local Health District can be demonstrated as being generally representative of its group (Metropolitan or Regional), then it is reasonable to assert that the findings of this thesis are generalisable, or at least transferable, to other comparable Local Health Districts, and the findings of this thesis will be useful beyond the boundaries of this case study (Sarantakos 2005). The question of generalisability of research findings is now discussed.

2.3 Generalisability of research findings

The selection of one Sydney Metropolitan (Western Sydney) and one Regional (Hunter New England) Local Health District for study has been described. It is recognised that each Local Health District is unique, but the question is: *to what extent is each of these two Local Health Districts representative of other Local Health Districts in its group?*

In answering this question, the proposition put forward by Hollingsworth and Peacock (2008) and Weidmann and Duckett, (2014) that, research findings in the health sector are not generalisable but are only relevant to the study under question, is challenged. These authors cited the following reasons for their stated position: differences in the demography and health status of populations; different referral networks operating in different regions, low quality of available data, and 'omitted variable bias' (Weidmann & Duckett 2014, p. 1). Omitted Variable Bias is where unknown variables are not controlled in the research design, and these may unwittingly influence the research findings. The difference between the work conducted by these authors and the work reported in this thesis is outlined, and it is argued that each threat to generalisability is countered in this thesis.

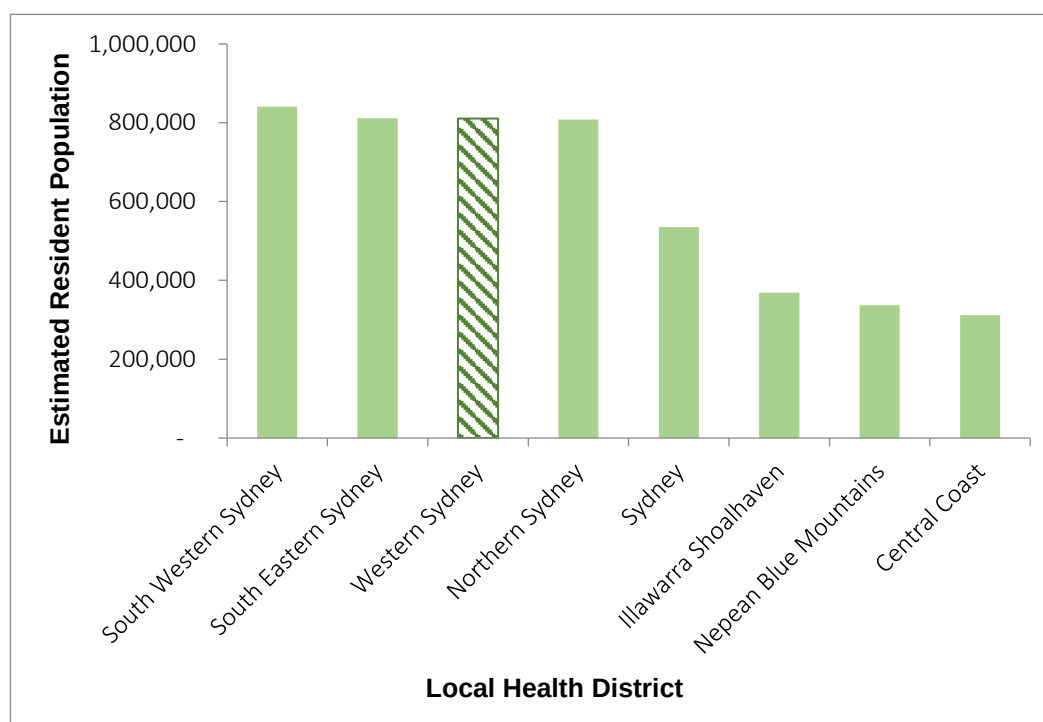
2.3.1 Demographic Characteristics in Metropolitan Local Health Districts

The results of an analysis of the demographic characteristics of the eight Metropolitan Local Health Districts are shown below, and conclusions are drawn about the extent to which the Western Sydney Local Health District is representative of other Metropolitan Local Health Districts. This analysis is then repeated for the Hunter New England Local Health District in respect of other Regional Local Health Districts.

Total population of Metropolitan Local Health Districts

The total population of each of the eight Metropolitan Local Health Districts is shown in Figure 2.1.

Figure 2.1: Total population of each Metropolitan Local Health District

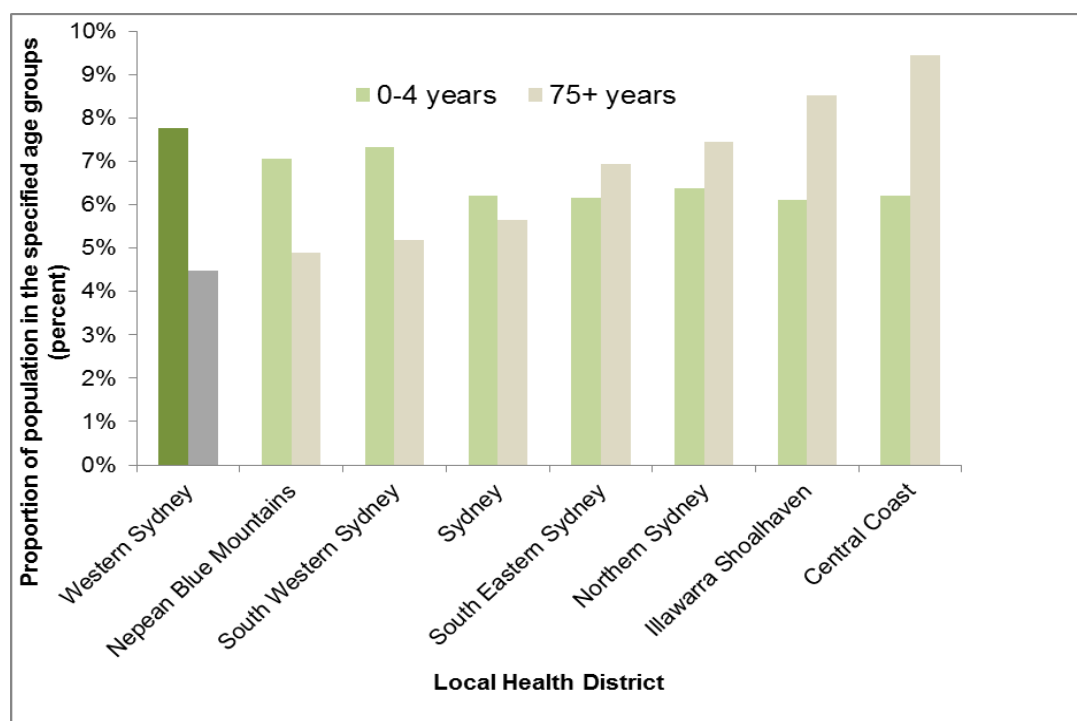


In 2011, four of the eight Metropolitan Local Health District each had a population of approximately 800,000, while that of the Sydney Local Health District was just over 500,000. The three more peripheral Local Health Districts each had a population between 300,000 and 400,000. Thus the Western Sydney Local Health District is comparable with the other central Metropolitan Local Health Districts in terms of its total population, and contained a substantial proportion (17 per cent) of the population of the eight Metropolitan Local Health Districts in 2011.

Age profile of the population in Metropolitan Local Health Districts

The relative proportions of the very young and the very old in each of the eight Metropolitan Local Health Districts (ranked by difference between proportions of young and old populations) are shown in Figure 2.2.

Figure 2.2: Proportions of those aged 0-4 years, and 75 years and older, in each Metropolitan Local Health District



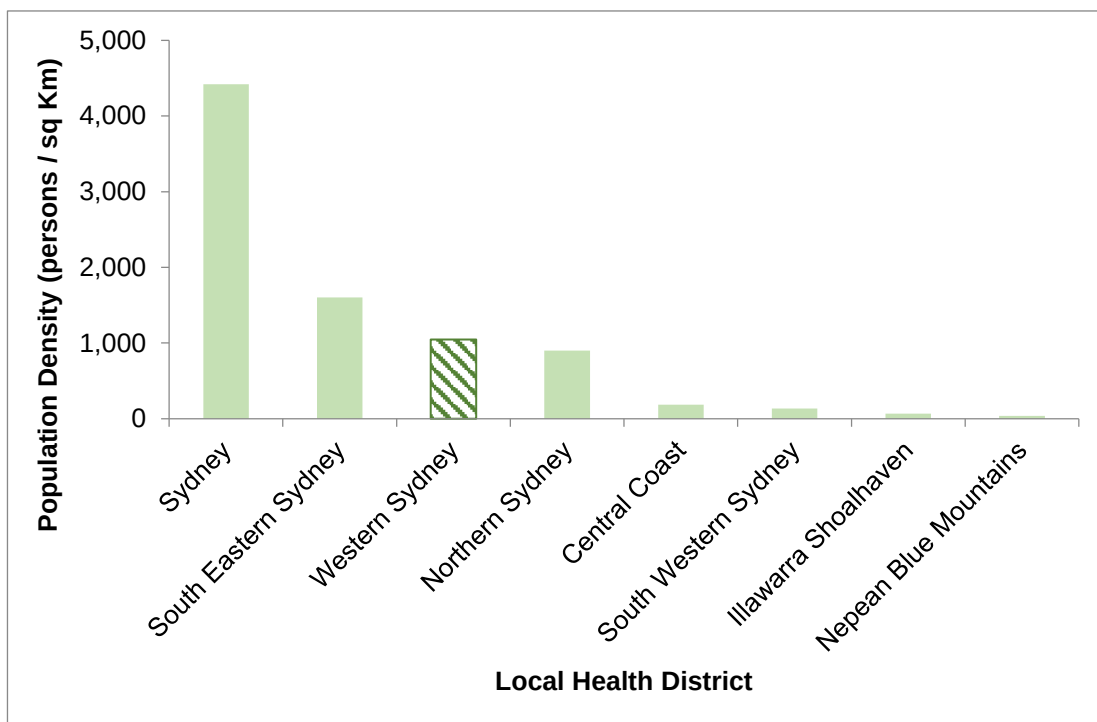
The Western Sydney Local Health Districts had the youngest age profile of all the Metropolitan Local Health Districts, while two of the peripheral

Metropolitan Local Health Districts (Illawarra Shoalhaven and Central Coast) had the oldest age profile.

Population density in Metropolitan Local Health Districts

The geographic area covered by each of the Metropolitan Local Health Districts varies widely, from 123 square km (Sydney Local Health District), to 9,122 square km (Nepean Blue Mountains Local Health District). The population density of each of the Metropolitan Local Health Districts is shown in Figure 2.3. The population density is the population of the Local Health District (persons) divided by the total area of the Local Health District (square km).

Figure 2.3: Population density of each Metropolitan Local Health District

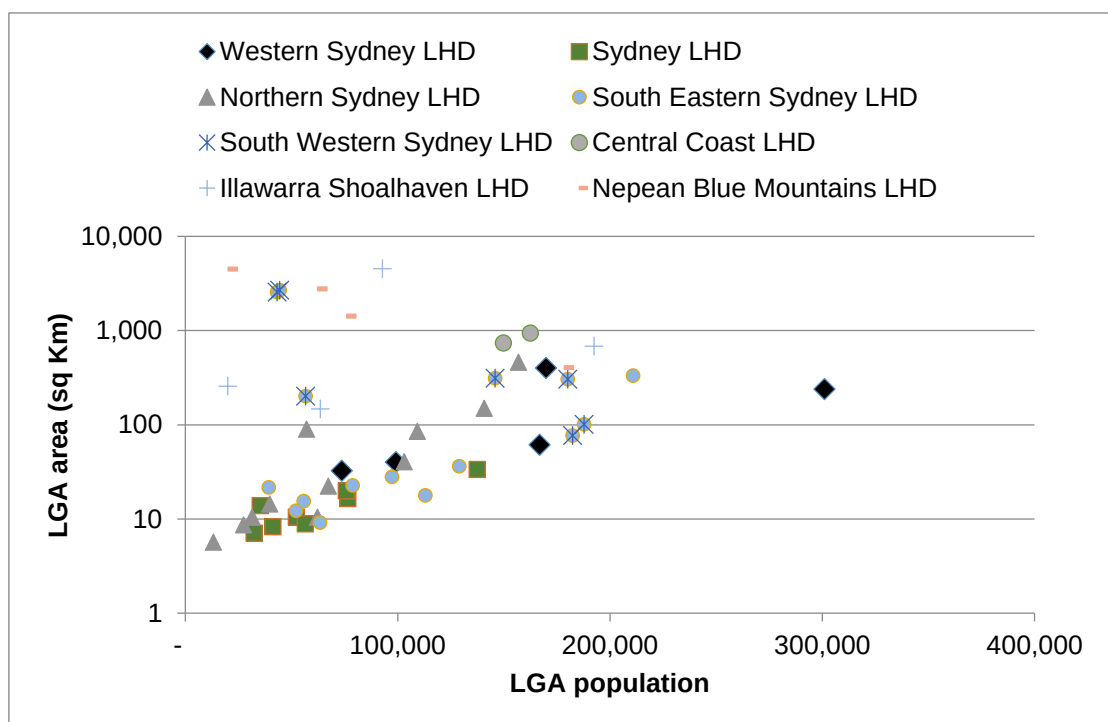


Four of the central Local Health Districts illustrate the progressive reduction in population density from the centre of Sydney to its periphery, while the

population density of each of the others is less than 200 persons / square km. The population density of the Western Sydney Local Health District lies in the mid-range for the Metropolitan Local Health Districts.

The mid-range position of the Western Sydney Local Health District is partly accounted for by the diversity of its constituent LGAs. Figure 2.4 shows the area of each of the constituent LGAs of the eight Metropolitan Local Health Districts plotted against its population. The geographic area is plotted on a logarithmic scale to accommodate the thousand-fold range in geographic area of the LGAs. The five LGAs of the Western Sydney Local Health District are shown as black diamonds.

Figure 2.4: Area and population of each LGA of the Metropolitan Local Health Districts



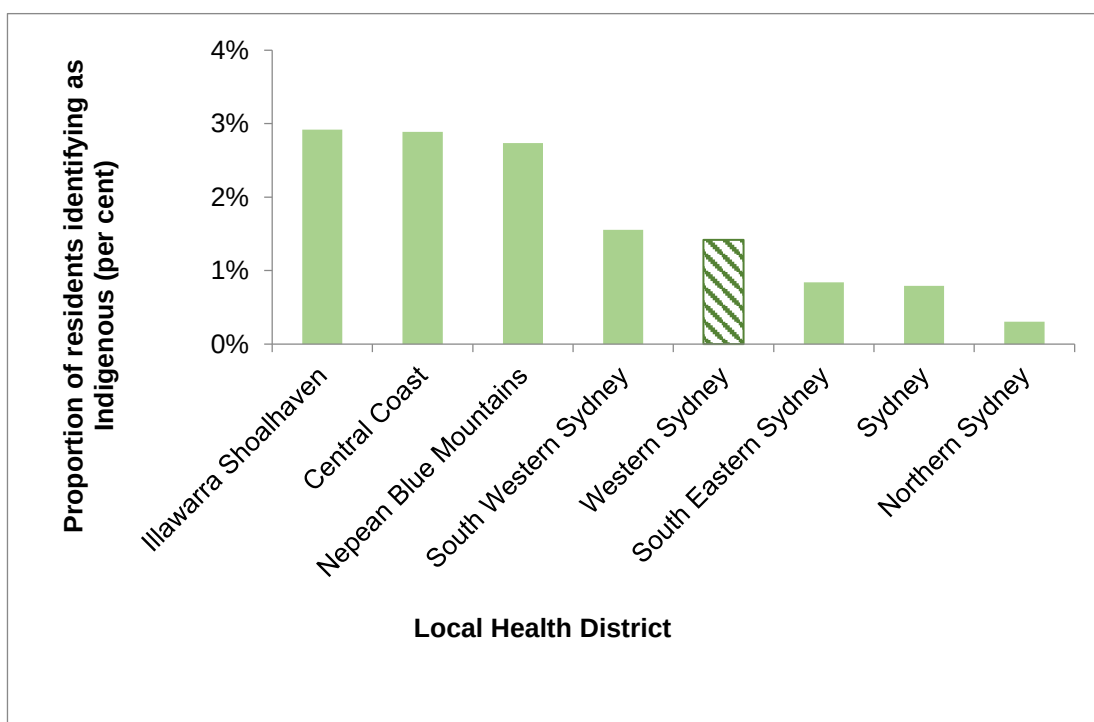
While four of the Western Sydney LGAs lie within the general cluster of the Metropolitan LGAs, the fifth, the Blacktown LGA, which covers a substantial

area in the west of Sydney, and is relatively densely populated, is an outlier. Indeed, its 2011 population of 301,099 was half as large again as the next most populous Metropolitan LGA, which was the Sutherland Shire, with a 2011 population of 210,863.

Indigenous population in Metropolitan Local Health Districts

The proportion of people who identified as Indigenous (i.e. Aboriginal, Torres Strait Islander, or both), varies considerably from Local Health District to Local Health District. Figure 2.5 shows the proportion of people in each of the Sydney Metropolitan Local Health Districts who identified as Indigenous.

Figure 2.5: Proportion of Indigenous residents in each Metropolitan Local Health District



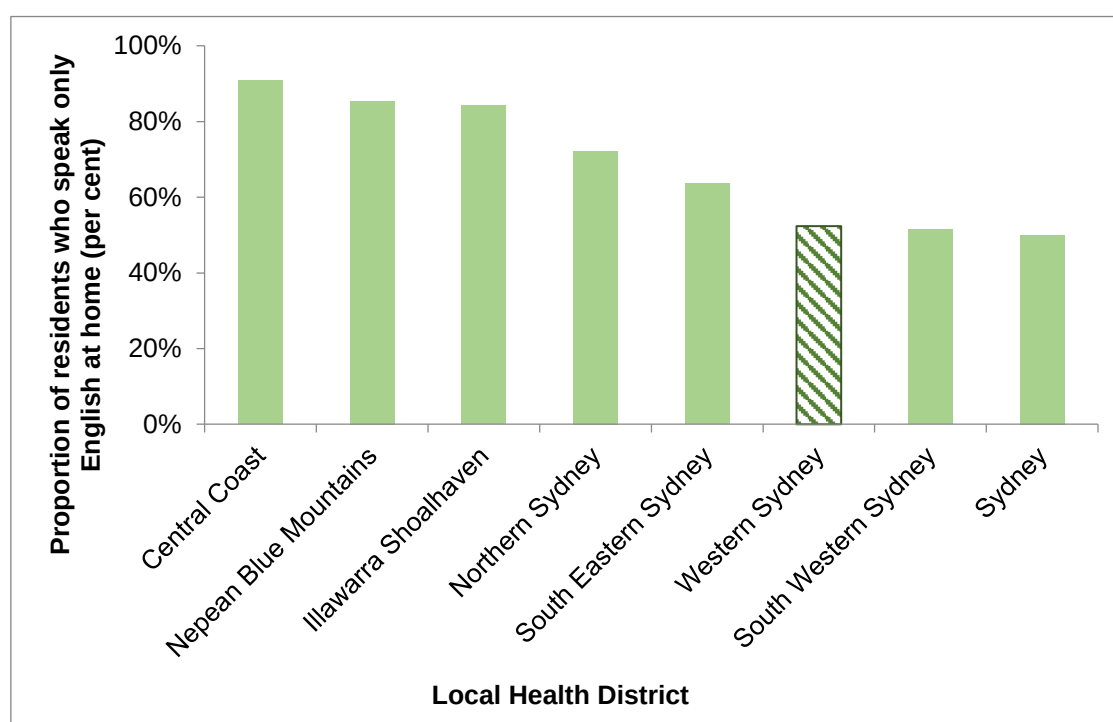
In respect of the proportion of the 2011 population that identified as Indigenous, the Western Sydney Local Health District lies in the mid-range of

the central Metropolitan Local Health Districts. The proportion of residents identifying as Indigenous was higher in the peripheral Local Health Districts.

People of non-English-speaking background in Metropolitan Local Health Districts

The proportion of people whose only language spoken at home was English was taken to be an (admittedly inverse) measure of non-English-speaking background, because the alternative Census description 'Other language' included 'Inadequately described' and 'Non-verbal, so described', and was thought to be potentially less precise. The proportion of people whose only language spoken at home was English varied considerably from one Local Health District to another. Figure 2.6 shows the proportion of people in each of the Sydney Metropolitan Local Health Districts whose only language spoken at home was English.

Figure 2.6: Proportion of residents in each Metropolitan Local Health District whose only language spoken at home was English

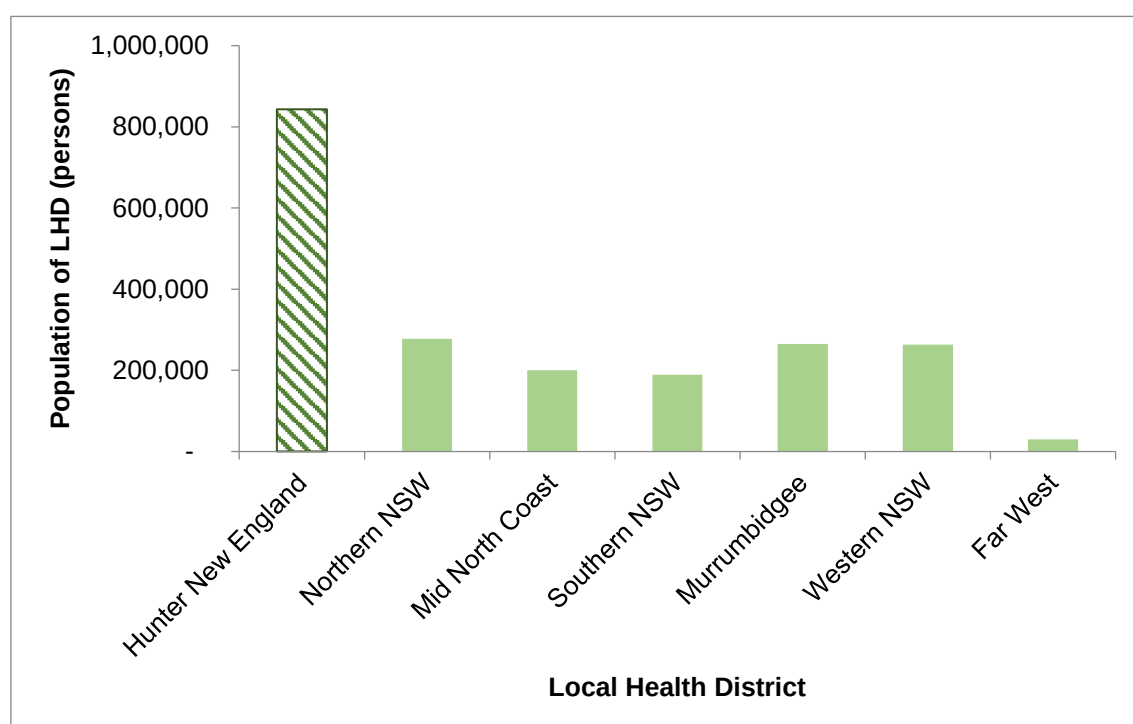


In the Western Sydney Local Health District, the proportion of people who spoke only English at home was relatively low, largely because of the substantial immigrant populations in the Auburn LGA, where the proportion of households where ‘only English spoken at home’ was only 21 per cent.

2.3.2 Demographic Characteristics in Regional Local Health Districts

The total population of each of the seven Regional Local Health Districts is shown in Figure 2.7.

Figure 2.7: Total population of each Regional Local Health District

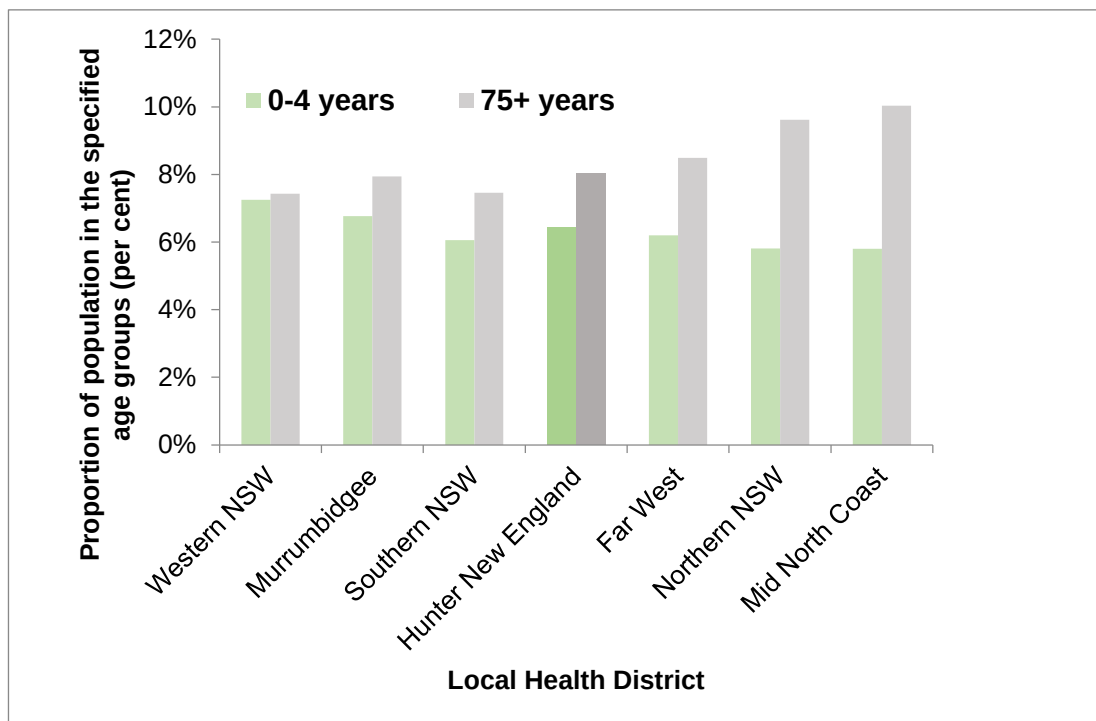


In 2011, five of the seven Local Health Districts each had a population of approximately 200,000, while that of the Hunter New England Local Health District was just over 800,000. Thus the Hunter New England Local Health District is larger than the other Regional Local Health Districts in terms of its

total population, and contained 41 per cent of the population of the seven Regional Local Health Districts in 2011.

The relative proportions of the very young and the very old in each of the Regional Local Health Districts (ranked by difference between proportions of young and old populations), are shown in Figure 2.8

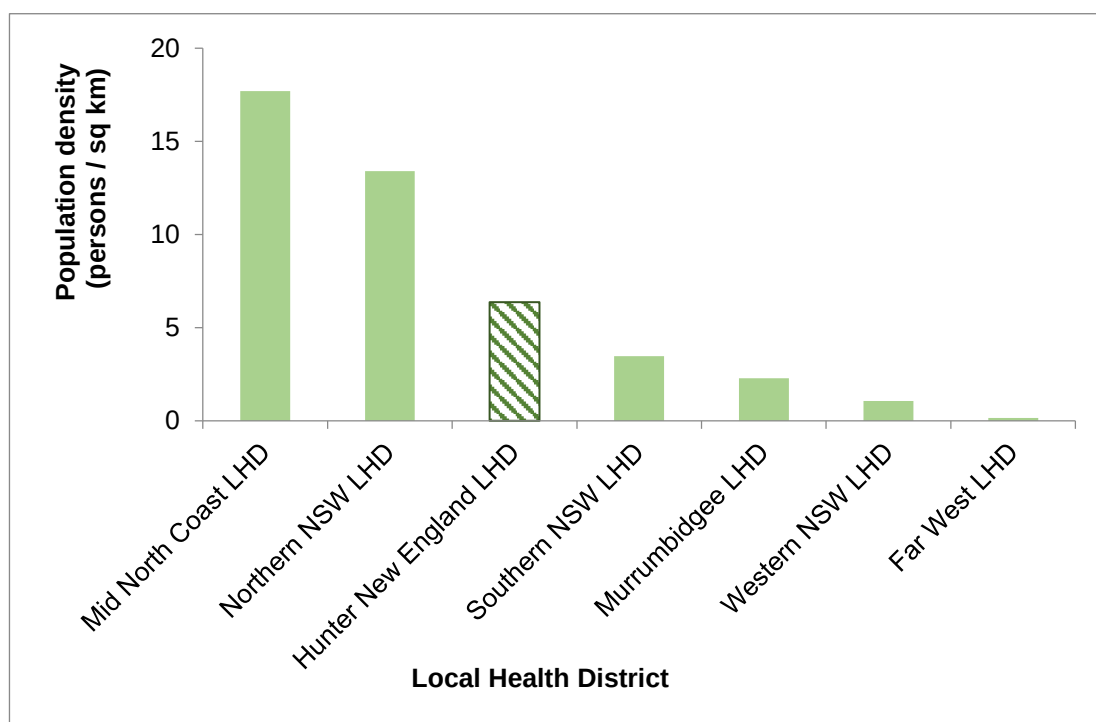
Figure 2.8: Proportions of those aged 0-4 years, and aged 75 years and older, in each Regional Local Health District



The proportion of older people (aged 75 years and older), exceeded that of the very young (aged 0-4 years) in all the Regional Local Health Districts, with the difference being greatest in the populations of the Northern NSW and Mid North Coast Local Health Districts. The difference for the Hunter New England Local Health District lies in the mid-range.

The geographic area covered by each of the Regional Local Health Districts varies widely, from 249,803.2 square km (Western NSW Local Health District), to 11,324.2 square km (Mid North Coast Local Health District). The population density of each of the Regional Local Health Districts is shown in Figure 2.9.

Figure 2.9: Population density of each Regional Local Health District

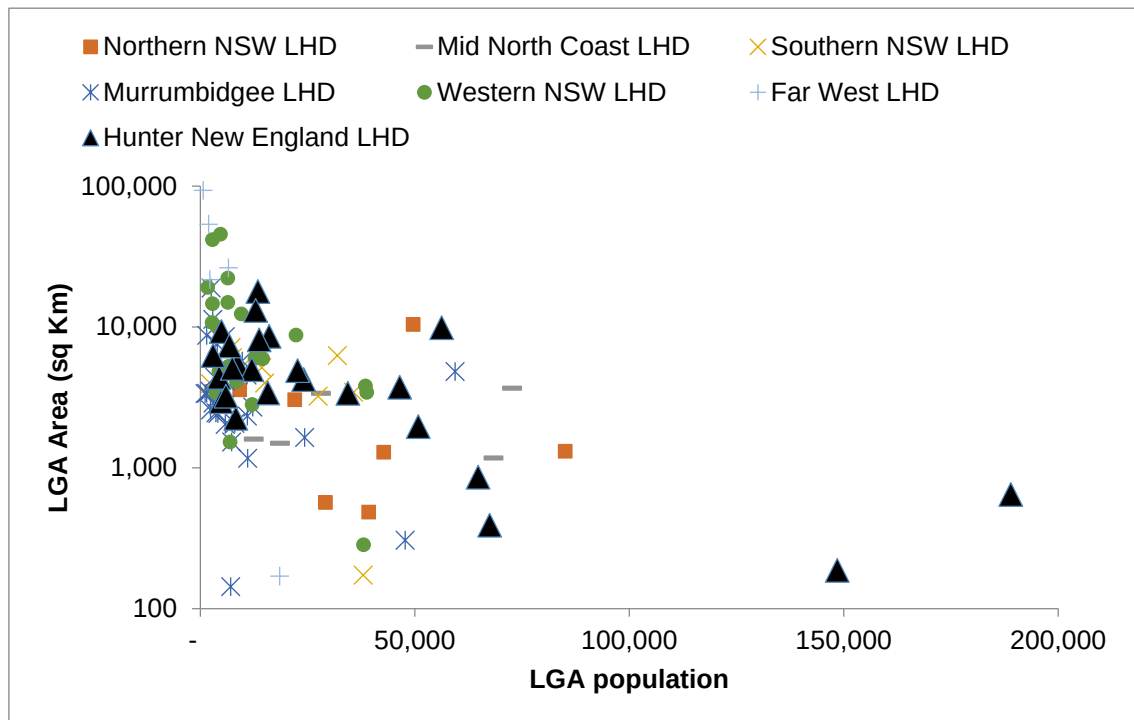


There is a considerable range of population densities among the Regional Local Health Districts, ranging from 17.7 persons / square km (Mid North Coast Local Health District), to 0.2 persons / square km (Far West Local Health District). The Hunter New England Local Health District occupies an intermediate position, with a population density of 6.4 persons / square km.

Figure 2.10 shows the area of each of the constituent LGAs of the seven Regional Local Health Districts plotted against its population. The geographic area is plotted on a logarithmic scale to accommodate the five hundred-fold

range in geographic area of the LGAs. The 25 LGAs of the Hunter New England Local Health District are shown as black triangles.

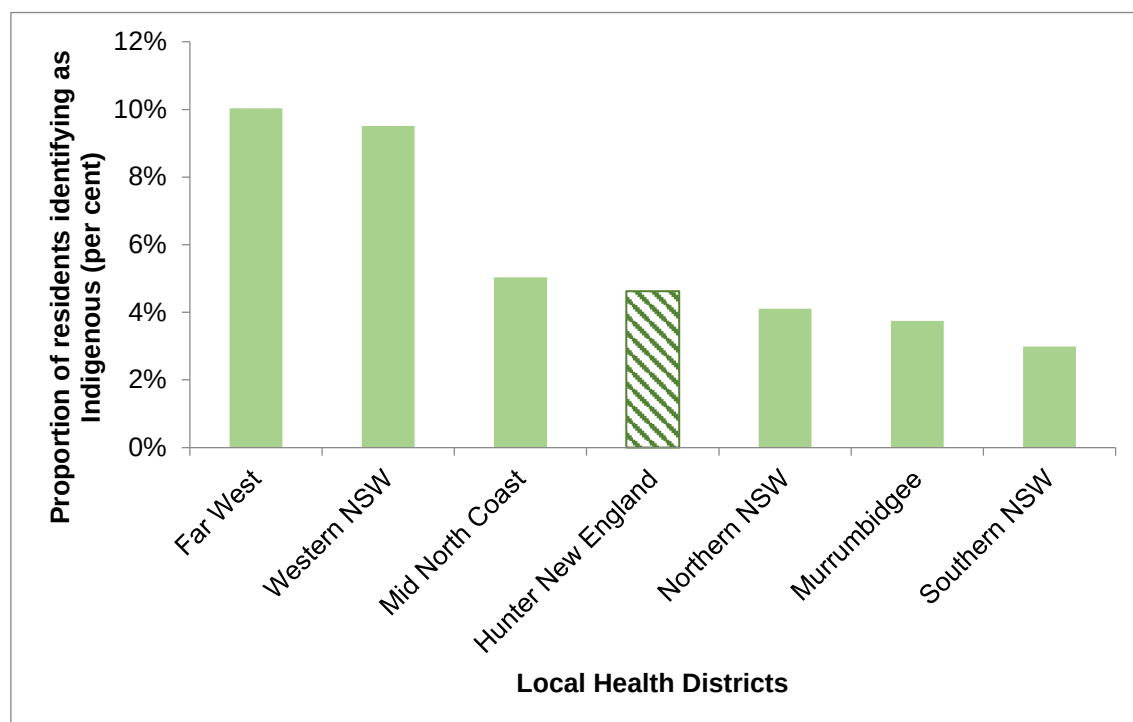
Figure 2.10: Area and population of each LGA of the Regional Local Health Districts



While most of the Hunter New England LGAs lie within the general cluster of the Regional LGAs, the LGAs of Newcastle and Lake Macquarie, which are densely populated, and urban in character, are outliers.

Figure 2.11 shows the proportion of people in each of the seven Regional Local Health Districts who identified as Indigenous.

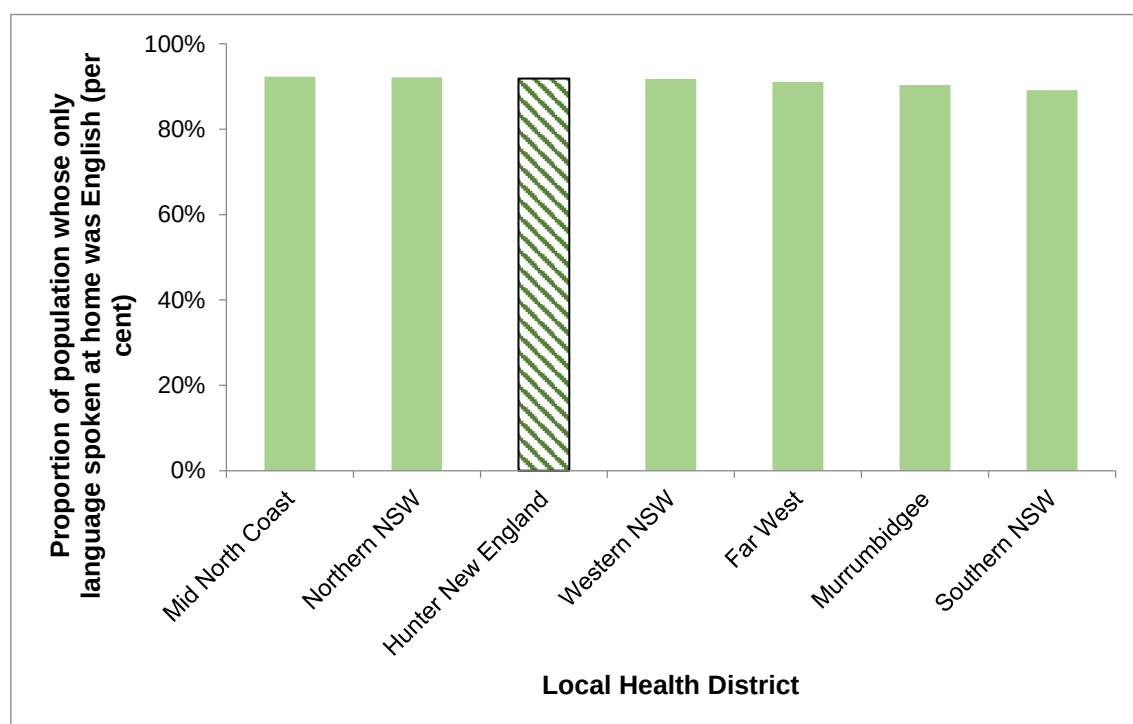
Figure 2.11: Proportion of Indigenous residents in each Regional Local Health District



The proportion of people who identified as Indigenous (i.e. Aboriginal, Torres Strait Islander, or both), varied considerably from Local Health District to Local Health District, ranging from 10 per cent in the Far West of the State, to 3 per cent in the South. In the Hunter New England Local Health District, 4.6 per cent of the 2011 population identified as Indigenous, placing the Local Health District in the mid-range of the Regional Local Health Districts.

The proportion of people whose only language spoken at home was English was taken to be the measure of non-English-speaking background, which varied considerably from Local Health District to Local Health District. Figure 2.12 shows the proportion of people in each of the seven Regional Local Health Districts whose only language spoken at home was English.

Figure 2.12: Proportion of residents in each Regional Local Health District whose only language spoken at home was English



In the Regional Local Health Districts, including Hunter New England, most people spoke only English at home, and the proportion of people of non-English-speaking background was consistently low across all Regional Local Health Districts.

In summary, the 50 LGAs which make up the eight Local Health Districts in the Metropolitan area exhibit a substantial variation in their demographic characteristics, and it would be surprising if any one Local Health District could be taken to be representative of the whole group. However, the demographic characteristics of the Western Sydney Local Health District are sufficiently similar to those of at least the central group of Metropolitan Local Health Districts as to suggest that it is not unreasonable, at least in the first instance, to extrapolate (hereafter to transfer) the findings from the Western Sydney Local Health District to the other Metropolitan Local Health Districts.

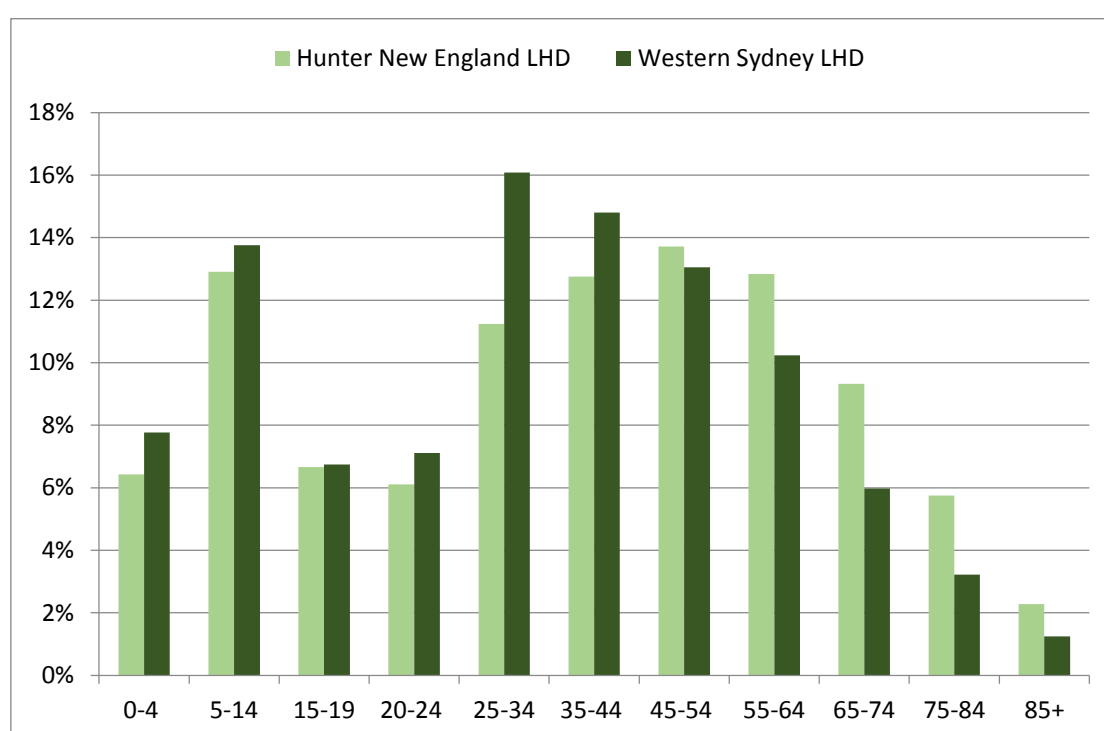
As might be expected, the 103 LGAs which make up the seven Regional Local Health Districts also exhibit a substantial variation in their demographic characteristics. The Hunter New England Local Health District is by far the largest in population terms, but is in the middle of the range of Local Health Districts in respect of the other demographic characteristics: age profile, proportion of Indigenous residents, proportion of people whose only language spoken at home is English. It is not unreasonable, therefore, at least in the first instance to consider the findings from the Hunter New England Local Health District as transferable to the other Regional Local Health Districts.

The demography of the Western Sydney and Hunter New England Local Health Districts is compared below. This analysis shows that there are differences between the demographic characteristics of each Local Health District. All these characteristics have implications for the delivery of health services to residents. For example, Regional patients are likely to experience greater difficulties in accessing health services than their Metropolitan counterparts.

2.4 Differences between Local Health Districts

The Western Sydney Local Health District has demographic characteristics which are similar to those of other Metropolitan Local Health Districts, as does Hunter New England to other Regional Local Health Districts. However there are differences in the demographic characteristics of the two Local Health Districts, as shown below in Figures 2.13 and 2.14.

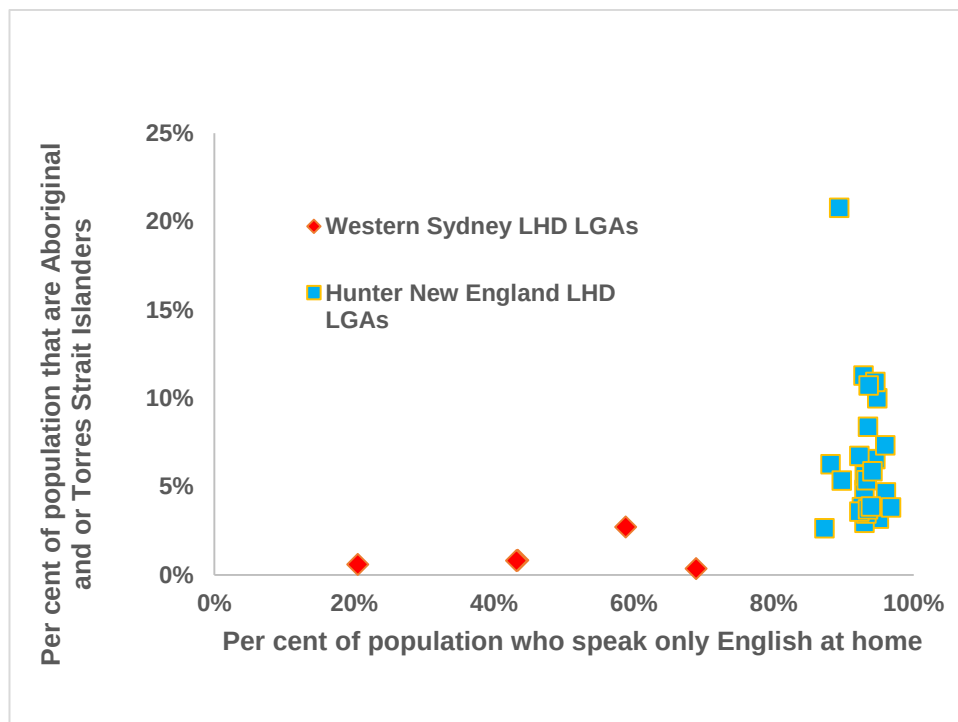
Figure 2.13: Distribution of age groups in the populations of the Western Sydney and Hunter New England Local Health Districts



Compared with the Western Sydney Local Health District, a greater proportion of the resident population is older (>45 years) in the Hunter New England Local Health District. The age distribution of the Hunter New England is consistent with that of other Regional areas (not illustrated). A greater proportion of younger people (<45 years) live in Western Sydney Local Health District, and this distribution is also consistent with that of other Metropolitan areas (again, not illustrated).

Figure 2.14 shows a comparison of the proportions of Indigenous people, and those whose language spoken at home is other than English, in the LGAs of the Western Sydney and Hunter New England Local Health Districts

Figure 2.14: Prevalence of Aboriginality vs. only English spoken at Home in each LGA



Indigenous people comprise a greater proportion of the resident population in the LGAs of the Hunter New England Local Health District, compared with the LGAs that comprise the Western Sydney Local Health District, where a smaller proportion of people speak only English at home.

So far, a justification has been given for selecting the Western Sydney and Hunter New England Local Health District for the case-studies in this thesis, and a demonstration that the geography and demographic characteristics of each are not greatly different from their respective Metropolitan and Regional counterparts. While there is considerable variation between the Local Health Districts in each of the (Metropolitan and Regional) groups of Local Health

Districts, there is little evidence to suggest that it is inappropriate, at least in the first instance, to transfer the findings from the two selected Local Health Districts to the other Local Health Districts in their respective group. This conclusion counters the first reason cited by Hollingsworth and Peacock (2008) and Weidmann and Duckett, (2014) for believing that the findings of health system research are not generalisable on account of demographic differences.

The second reason cited by those authors for caution in generalising the results of local health system research to other health services, using of inpatient data, is that there are differences in health status among populations (Hollingsworth & Peacock 2008; Weidmann & Duckett 2014). The use of data collected from patients who are admitted to hospital (inpatient data) as a proxy for measuring or for reporting differences in health status, is problematic because those data tend to reflect the supply of hospital and/or health services. Therefore, inpatient data alone should not be used to reflect the health status of a population. If there is no consensus on what data can be used to measure the health status of a population or an individual, and if the health status of populations or individuals are not routinely measured, it is difficult to see how health status can be used as an argument against generalisability.

The third reason cited by those authors for caution in generalising the result of health system research is the low quality of health data. Richardson (2005) has also reported unexplained variations in service provision and cost across large sectors of the health system, which were claimed to be associated with poor-quality data. However, a higher degree of consistency has been introduced recently into the collection and monitoring of, and reporting on, activity in Local Health Districts (COAG 2012). The introduction of ABF has increased this need for accuracy in the collection of data and in coding to classify each patient's episode of care, using the Diagnosis Related Group (DRG) classification system refined for Australian conditions called the

Australian Refined - Diagnosis Related Groups (AR-DRGs), details of which are described in chapter three.

This emphasis on improving the accuracy of data has been reinforced at a hospital level, and has resulted in standardisation of: data definitions, coding, data collection, storage and reporting in all hospitals in NSW, and beyond. Data definitions are now standardised for the following datasets - Admitted Patient Services, Outpatients, Emergency Department activity, Residential Care and Community Health. Patient-based financial accounting and reporting are also standardised. All hospital managers are now expected to meet the same set of performance targets, over the same time periods, such as meeting benchmark times for patients to be seen on presentation to an Emergency Department, the length of time patients wait for surgery, and the overall financial performance of the Local Health District (COAG 2012).

Therefore, it is argued here that data quality has improved to the extent that comparisons can be made between comparable facilities in Metropolitan and Regional Local Health Districts. These improvements in the quality of the collection and reporting of data now make it possible for those data to be used for identifying variations between comparable clinical services and hospitals, as shown by Duckett *et al* (2014). Given those improvements, the low quality of health data is not a valid reason to question the generalisability of the research findings in this thesis.

The fourth reason cited by those authors for caution in generalising the results of health system research is that there are differences in the referral networks operating in different Local Health Districts. In chapter one, it was reported that in Australia and in most OECD countries, the 'bio-medical' model is the dominant model which underpins the provision of health services. The dominance of this model of service provision has resulted in a strong 'bio-medical' culture which is reinforced in Australia through undergraduate, graduate and postgraduate medical education, and by various interest groups. This culture is evident in everyday clinical decision-making regardless of

where professional staff are located, or in which location health care is provided, and it is likely to remain stable for the foreseeable future.

The resilient structure of the health system influences medical referral patterns (Gardner 1996). Referral patterns are known to be based on professional networks and organisational linkages, such as links between teaching hospitals and university undergraduate and postgraduate training sites, and between tertiary and district hospitals. These networks and linkages enable patients to have access to different levels of clinical care, which are considered to be necessary by their treating clinician, but the mix of services and the type of service offered is similar across hospitals of comparable Role Delineation Levels (MoH 2002). In essence Role Delineation means that the role assigned centrally by the NSW Ministry of Health to each hospital, limits the type, mix and range of available services able to be offered by that hospital to patients.

The Role Delineation level of a hospital (or speciality health service) describes 'the complexity of the clinical activity undertaken by that service and is chiefly determined by the presence of medical, nursing and other health care personnel, and the availability of support services and equipment' (MoH 2002, p. i-ii). These necessities are 'backed up with formal appointment and credentialing of medical practitioners' (MoH 2002, p. i-ii). Due to the geographic distribution of the current workforce, and the requirement for quality and safety in the delivery of health care, it is unlikely that the existing Role Delineation Levels of hospitals will change in the near future. As a result, hospitals with the same core and support services Role Delineation Level provide similar types and levels of health care to patients (Hindle 2002).

Suffice to say, in each Metropolitan and Regional Local Health District there are hospitals and health services, general practices, and health related non-government organisations, but compared with Metropolitan Local Health Districts, Regional Local Health Districts usually have a lower level of health services available locally (less specialist care), and the travel distance to access health services, particularly specialist services, is greater (MoH 2013).

It is therefore argued here that the health care that patients receive will be of the same general nature, whether a patient receives their care in a metropolitan or regional hospital of a comparable Role Delineation Level. Therefore the fact that different referral networks operate in different regions should not prevent generalisability, because the services available are fixed, the general principles of medical decision-making are uniform, and the underlying medical culture is stable.

The final reason cited by Hollingsworth and Peacock (2008, p. 101) and Weidmann and Duckett, (2014, p. 1) to caution against generalising the results of health system research, is 'Omitted Variable Bias'. The only way to guard against Omitted Variable Bias is to be aware of the phenomenon, and to identify potential variables that could unwittingly influence the research results. Potential variable biases are identified in this thesis. For example, changes in patient throughput could be due to changes in the way in which public hospitals conduct their business, or could be a result of other simultaneous changes in the health sector.

In response to such possibilities, explanations for change observed in health service use, as alternative explanations to ABF, are identified where appropriate in this thesis, and their potential impact on patient throughput is assessed. The results of each of these analyses are provided in chapters, four to six. It is contended that differences in the demographic characteristics and other variables, put forward by previous authors as reasons for caution about generalising the findings of health system research, are less important than the existing homogeneous medical culture, health policies and structure of the health system, that collectively result in the same general type of health care being received by patients, regardless of a patient's geographic and/or demographic characteristics, or the location where that care is provided (Metropolitan or Regional hospital).

If the same general type of care is received by patients regardless of those factors, then it is reasonable to assert that the findings from this thesis, if not generalisable, are at least transferable to other comparable Local Health

Districts. This conclusion is also supported by the research on which Hollingsworth and Peacock (2008) based their proposition, when they used health outputs or health outcomes in order to compare economic efficiency across health service facilities. Similarly, Weidmann and Duckett (2014, p. 1) described their research as 'an exercise in benchmarking hospital performance', where hospital level comparisons were made between like-kind health services (and the associated costs).

In contrast, in this thesis, inpatient and Emergency Department data are examined within, as well as between, hospitals, to detect changes in the number of patients admitted (or who presented) to each facility over time. Therefore, each hospital included in the analysis can act as its own control. Further, the research design is a multi-case study, which was selected because it is more robust than a single-case study approach (Yin 2003).

In this section it has been established that the geographic and demographic characteristics of Metropolitan and Regional Local Health Districts, and the level of health services they provide, are different, and that those differences have the capacity to influence the level, range and type of health services available to their respective residents. The rationale for selecting each Metropolitan and Regional Local Health District has been given, and the proposition is made that each is likely to be sufficiently representative of other Metropolitan or Regional Local Health Districts, to the extent that inferences can be drawn (and results transferred) from the research findings of this thesis to other comparable Local Health Districts.

Having established that the research findings from this thesis are transferable to other comparable Local Health Districts, the next step is to present the methods used: to identify hospitals that receive ABF in the two Local Health Districts; to select appropriate clinical conditions for analysis; to extract from the datasets the data variables which are required for analysis; and to show how those data are analysed to answer the research question.

2.5 Hospitals, clinical conditions and variables for analysis

This Section describes three different, but related data management steps, and how the resulting data were analysed to answer the research question. The first step was to identify those hospitals in each Local Health District that are funded on the model of ABF. Those hospitals were identified from a list of hospitals contained in Appendix 'C' in the publication titled '*NSW ABF and Small Hospitals Operational Specifications 2013-14*' (Activity Based Funding Taskforce [ABFT] 2013a). The four general hospitals in the Western Sydney Local Health District in descending order of complexity, based on the Role Delineation level of the Emergency Department for each hospital) are: Westmead, Blacktown, Auburn, and Mount Druitt (ABFT 2013a).

The eight general hospitals in the Hunter New England Local Health District in descending order of complexity, based on the Role Delineation level of the Emergency Department for each hospital, are: John Hunter Hospital, Calvary Mater Newcastle Hospital, Maitland Hospital, Manning Base Hospital, Belmont Hospital, Tamworth Base Hospital, Armidale and New England Hospital, and Kurri Kurri District Hospital (ABFT 2013a). The inclusion of Kurri Kurri District Hospital in the ABF group is interesting, since the total annual number of admissions was consistently less than 3,500, which is the minimum volume (throughput) generally used to identify hospitals which are appropriate for receiving ABF (ABFT 2013a). However, for completeness this hospital was included in the initial analyses.

The second data management step was to select specific clinical conditions from a list that, identified conditions that are potentially 'eligible' for treatment in a setting other than that of an inpatient in an acute hospital (AIHW 2015). Three clinical conditions described as chronic (i.e. the clinical condition is ongoing, and the patient can be treated but is unlikely to be cured) were selected: chronic obstructive airways disease (COAD), diabetes and cellulitis (MoH 2014b).

A number of different systems are used to classify clinical conditions. The principal one used in this thesis is the Australian Refined-Diagnosis Related Group v6.X, (AIHW 2015). The validity of using this classification system was checked through the use of the International Classification of Disease (ICD-10), 'a disease classification system which promotes compatibility in the collection, processing, and presentation of mortality statistics internationally' (Culyer 2005, p. 180; World Health Organisation [WHO] 2015).

Having selected these three clinical conditions, the third data management step was to obtain data on hospital admissions of patients with each of these conditions. On request, the NSW Ministry of Health provided an inpatient dataset which contains a set of 25 descriptive variables for each inpatient admission to each of the study hospitals in the Western Sydney and Hunter New England Local Health Districts over the period from 1 July 2008 to 30 June 2013 (about 1.8×10^6 admissions). Table 2.2 gives a list of the inpatient data items extracted from this dataset, and used in this thesis.

The data items were used in one of two ways: either filtering to extract the data relating to patients to be included in an analysis (in **bold typeface** in the Table), or for undertaking the analysis itself.

Table 2.2: Inpatient data items and their purpose in analyses

Data items	Purpose in analyses
AR-DRG	to identify patients admitted to ABF hospitals in each Local Health District for each selected AR-DRG for chronic obstructive airways disease, or diabetes or cellulitis
ICD-10 codes	to check the validity of using AR-DRGs to assign patients admitted to hospital as either being 'eligible' or 'ineligible' for treatment in a setting other than that of an acute hospital
facility_identifier	identification of ABF hospital in which treatment was provided
date_of_admission	calculation of duration of a patient's stay in hospital (mean, median, minimum, maximum)
date_of_discharge	calculation of throughput of patients in each financial year (2009 to 2013) calculation of duration of a patient's stay in hospital (mean, median, minimum, maximum) estimation of the number of hospital bed-days occupied (for calculation of PARI)
sex	description of patient demographics
year_of_birth	calculation of age of patient analysis of potential change in patient demographics
postcode_of_residence	analysis of potential change in patient demographics identification of residents of the Local Health District and inflows of patients from other Local Health Districts analysis of social factors as a possible explanation for change observed
Aboriginality, non-English speaking background	analysis of potential change in patient demographics
final NWAU Inlier cost / price weight	an indicator of the relative resource use in providing treatment for each patient admitted
disposition	destination once discharged from hospital
Community_Health_Flag	number (and %) of patients referred to a Community Health Service when discharged from hospital

Source: MOH 2013.

Either of two of the variables extracted in this third data management step could potentially be used to identify patients admitted to hospital with one of the selected clinical conditions: the AR-DRG, or the ICD-10. To make a decision as to which of these classification systems to use, the hospital admission data for people with each of the selected clinical conditions were filtered using each of these variables separately, and the output from the two extractions was compared.

Data for each of these identifiers were extracted from the dataset using SAS Basic / SAS Enterprise Guide v8, and the resulting tables were saved to Microsoft Excel spreadsheets for analysis. The data outputs for AR-DRGs and ICD-10 were compared. As an example, the two sets of data relating to people with diabetes admitted to hospitals in Western Sydney were compared, as follows.

First, the data were extracted by filtering for the two diabetes AR-DRGs codes (K60A and K60B) at the four Western Sydney hospitals (Westmead, Blacktown, Auburn, and Mount Druitt), and the number of admissions coded to each was analysed. In a second operation, the data were extracted by filtering for the diabetes ICD-10 codes (E10 to E16) at the same hospitals, and the number of admissions coded to each of the two AR-DRGs was analysed. The two methods of extracting the data yielded exactly the same number of admissions to each hospital coded to each of the diabetes codes K60A and K60B, although filtering for the diabetes ICD-10 codes (E10 to E16) yielded many more admissions coded to a number of AR-DRGs other than K60A or K60B.

The question then became: *should any of these other AR-DRGs be used to identify people admitted with diabetes but who could reasonably have been treated in a clinical environment other than that of an inpatient in hospital?* To answer this question the list of extracted AR-DRGs was reviewed, using the clinical judgment of the investigator, to identify admissions of people who were likely to be 'ineligible' for care in a less clinically sophisticated environment than in an acute hospital.

AR-DRGs were identified as 'ineligible' either because they required access to an operating room, or they involved procedures which were judged to be unsafe or inappropriate to be undertaken outside a hospital setting, or which were coded as having catastrophic or severe complications or co-morbidities. This resulted in the identification of a group of AR-DRGs which were assigned to a category which was designated 'ineligible'. The remaining AR-DRGs were identified as being 'eligible' for care in a less clinically sophisticated environment, on the grounds that the criteria for ineligibility were clearly not met, and the condition was comparatively minor and not life- or health-threatening. AR-DRGs in this category were designated 'eligible'.

Further confirmation of the appropriateness of the assignment of each AR-DRG as being 'eligible' for treatment in a setting other than that of an inpatient in hospital, was obtained by reviewing the National Weighted Activity Unit (NWAU) Inlier Price Weight for each candidate AR-DRG. The NWAU Price Weight '...expresses relative resource use for services funded on an activity basis..' and was obtained from Appendix G in *'NSW ABF and Small Hospitals Operational Specifications 2013-14'*. Thus, the low Inlier Price Weight for AR-DRGs assigned to the 'eligible' category provided further confidence in the appropriateness of the assignment to that category.

In a separate operation, ICD-10 codes for diabetes (i.e., E10.0 to E10.9.....E14.0 to E14.9 only) that had been identified as '...potentially preventable hospitalisations...'; published by the Australian Institute Health and Welfare, and included in the National Health Care Agreement 2015, were aggregated and analysed for each Local Health District (AIHW 2015b). This exercise enabled comparison of the number of admissions identified by using the selected range of ICD-10 codes for diabetes, with the number resulting from application of the more restricted set of codes, published by the AIHW (AIHW, ICD 2015).

This exercise revealed that when the AIHW list of codes was applied, the number of admissions were fewer, but 95 per cent of admissions for diabetes to hospitals in the Western Sydney Local Health District were accounted for

by two AR-DRGs (K60A and K60B), compared with 67 per cent using the selected ICD–10 codes for diabetes. In the Hunter New England Local Health District, when the AIHW list of codes were applied, the number of admissions were again fewer, but over 99 per cent of admissions for diabetes were accounted for by the two K60 AR-DRGs, compared with 60 per cent using the selected ICD–10 codes for diabetes. Based on this result, and to simplify the complexity of the analysis, the two AR-DRGs, K60A and K60B, were used as the final filter, because they captured all admissions coded to the selected ICD-10 codes, and gave a greater number of admissions for analysis.

The category of patients identified as ‘ineligible’ for receiving their treatment in a setting other than that of an acute hospital were identified as those coded to AR-DRG - K60A (diabetes with severe complications and comorbidities). The category of patients identified as ‘eligible’ for receiving their treatment in a setting other than that of an acute hospital were identified as those coded to AR-DRG - K60B (i.e., diabetes without complications or co-morbidities). The assignment of AR-DRGs to each category (‘eligible’ or ‘ineligible’) was reviewed by a senior clinical specialist (a Professor of Medicine and Specialist Endocrinologist) who confirmed that the assignment of AR-DRGs for diabetes to these categories was clinically appropriate (personal communication, 20 March 2015).

Similar analyses were conducted for both of the other selected clinical conditions: COAD, and cellulitis. Table 2.3 shows the AR-DRG for each clinical condition selected as ‘eligible’ or ‘ineligible’, and their respective NWAU Inlier Price Weights (ABFT 2013a).

Table 2.3: AR-DRGs, description of diagnosis, and NWAU Inlier Price Weight

	Australian Refined Diagnosis Related Group (V6.X) and Code		Australian Refined Diagnosis Related Group (V6.X) and Code	
Selected condition	'eligible' AR-DRGs	NWAU Inlier Price Weight	'ineligible' AR-DRGs	NWAU Inlier Price Weight
Chronic obstructive airways disease	E65B COAD without catastrophic complications or co-morbidities	1.0331	E65A COAD with catastrophic complications or co-morbidities	2.0699
Diabetes	K60B Diabetes without catastrophic or severe complications or co-morbidities	0.9543	K60A Diabetes with catastrophic or severe complications or co-morbidities	2.2639
Cellulitis	J64B Cellulitis without catastrophic or severe complications or co-morbidities	0.7763	J64A Cellulitis with catastrophic or severe complications or co-morbidities	2.0681

Source: ABFT 2013.

In summary, the AR-DRGs which identify patients who could potentially be treated safely and effectively in a less resource-intensive setting than that of an acute hospital ('eligible' category), and the corresponding AR-DRGs for the 'ineligible' category, have been identified for the three clinical conditions under study in the ABF hospitals in each Local Health District.

Although the emphasis of the analysis is on hospital admissions of those patients coded to an 'eligible' category, the analyses are sometimes extended to include (separately) those in the 'ineligible' category, to enable comparisons between the throughput of patients with, and without, complications, and to provide a picture of changes in patient throughput for the clinical condition as a whole.

The next task is to describe the other data variables selected for analysis to answer the research question, to show how these data were analysed, and for what purpose. Before describing the other data variables, two modifications to the inpatient dataset were made, which enabled data to be manipulated for specific analyses: 1) a SAS program was written to enable calculation of the duration of each patient's stay in hospital, by subtracting the 'date of admission' from the 'date of discharge', and saving the output to a new column (LoS) created in the SAS inpatient dataset; and 2) a SAS macro was created which, when applied to each patient's date of discharge from hospital, enabled a patient's data to be allocated to one of the five financial years (1 July 2008 to 30 June 2013) covered by the study data.

The data for variables relating to patient admissions to ABF hospitals in each of the two Local Health Districts in the five financial years for each selected clinical condition, were extracted using SAS Enterprise Guide v8. As appropriate, variables were extracted as frequency distributions or cross-tabulations, and descriptive statistics were calculated (e.g., number, mean, median, minimum, and maximum). The resulting output was saved to Microsoft Excel spreadsheets for further analysis and display, such as the construction of graphs or charts.

On request, the NSW Ministry of Health also supplied a dataset which contained a set of 18 descriptive variables for each presentation to the Emergency Departments in the study hospitals in the Western Sydney and Hunter New England Local Health Districts over the same period (from 1 July 2008 to 30 June 2013) (about 2.6×10^6 presentations). To enable each patient's data to be allocated to one of the five financial years (1 July 2008 to 30 June 2013) of the study data, the SAS macro created for the inpatient dataset, was also applied to the 'date of arrival' in the Emergency Department dataset. Table 2.4 gives a list of the Emergency Department data items used in this thesis.

Table 2.4: Emergency Department data items and their purpose in analyses

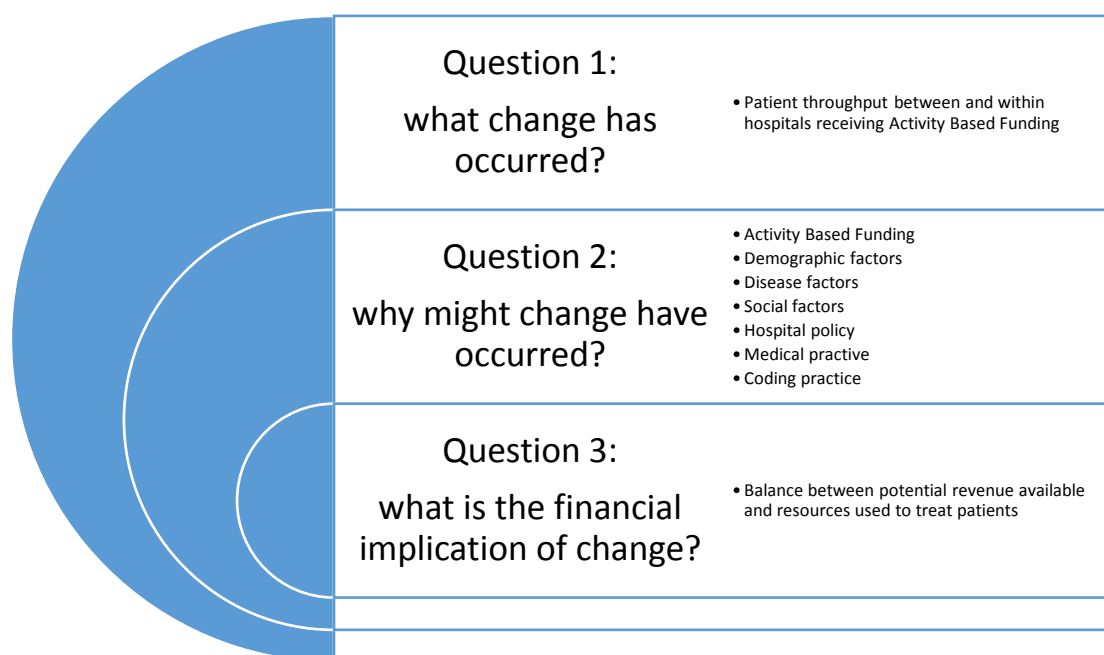
Data items	Purpose in analyses
hoscode	identification of Activity Base Funding hospital Emergency Department in which treatment was provided
ICD-10d1 codes (see Appendix B)	number (and %) of presentations to an Emergency Department coded according to ICD-10 in Hunter New England hospitals patients access through an Emergency Department to an inpatient bed
SNOMED-CT codes (see Appendix C)	number (and %) of presentations to an Emergency Department coded according to SNOMED-CT in Western Sydney hospitals patients access through an Emergency Department to an inpatient bed
date_of_arrival	Allocation of each patient presentation to a study year (2009 to 2013)
triage_category	Indicator of severity of patient's clinical condition on arrival in an Emergency Department
departure_status	where patients went once treatment in the Emergency Department was completed
postcode_of_residence	mapping catchment population inflow of patients from other Local Health Districts
year_of_birth	calculate age of patient change in patient demographics
Aboriginality, non-English speaking background	change in patient demographics

Source: MoH 2013

2.6 Analysis of data

For each selected clinical condition, the analyses are intended to answer three sequential questions, shown in Figure 2.15.

Figure 2.15: Each Question to be answered by the data analysis and the focus of analysis for each



2.6.1 Question 1: what change has occurred?

This analysis uses the relevant AR-DRGs and the facility identifier (see Table 2.2), to extract the relevant data to answer a specific question. As an example, the variables in a data file might include the: AR-DRGs for a selected clinical condition coded to the 'eligible' category and those coded to the 'ineligible' category; the facility identifier (i.e., hospital); date of discharge from hospital; and disposition (i.e., the destination of patients when they were discharged). Selected data variables were compared, year-on-year and before-and-after the introduction of ABF in 2011, to identify change in the

throughput of patients in the hospital, and in the patients' destination when discharged from hospital.

After initial analysis of the data for 'eligible' and for 'ineligible' patients, the analysis was narrowed to concentrate on only those patients who were identified as being 'eligible' for treatment in a setting other than that of an acute hospital. The rationale for this concentration was that with the introduction of ABF it was anticipated that patients who were 'eligible' for treatment in a setting other than that of an acute hospital, would be treated in an alternative setting, such as an non-admitted patient (or a service provided under a Medicare Local). If such service substitution occurred, which was one of the intended outcomes of ABF, the number of admissions to hospital for this category of patient would fall. Thus, examination of data for this category of patients is more relevant to the research question, because those patients admitted to hospital who had catastrophic complications and co-morbidities ('ineligible' category) are likely to have continued to require hospitalisation for adequate treatment of their clinical condition. Patient.

The number of admissions of patients with a selected clinical condition, coded to the 'eligible' category, to each hospital receiving ABF in each Local Health District, were plotted for each of the five years of the study. Linear regression trend data were calculated, for the data from all five years combined and, separately, for the years 2009 to 2011, and 2011 to 2013. For those hospitals where there appeared to be a change in throughput, further analyses were undertaken to establish whether the throughput was statistically significantly different from zero i.e., the change which had occurred was more than could be expected by chance. If the number of admissions varied greatly between the hospitals in a group, the slope of the linear regression line was also standardised as the change per 100 admissions to each hospital, thus providing an index which related the annual change in admissions to the throughput of the hospital.

For those hospitals where the change in throughput was statistically significant for patients 'eligible' to be treated in a setting other than that of an acute

hospital, possible explanations for that change were examined, as described in Question two.

2.6.2 Question 2: *why might this change have occurred?*

This analysis examines possible explanations for any statistically significant change in the throughput of patients that emerged in the answers to Question one, classified under seven possible categories of explanation. Each category was examined in turn, until the analysis reached the point where further exploration of possible causes was unlikely to be productive, or the data to pursue these were not available. The seven possible categories are: ABF itself, demographic factors, disease factors, social factors, hospital policy, clinical practice, and coding practice.

Examination of the possible explanations often required analysis of more than just the simple metrics of patient numbers, and involved analysis of additional data variables extracted from: (i) the inpatient dataset; or (ii) the Emergency Department dataset, or (iii) reports prepared by other agencies such as the Australian Institute Health and Welfare, and the NSW Ministry of Health. The results of those analyses are provided, when relevant, in Chapters four to six, in which the findings of the analyses for each clinical condition are reported. The methods used in examining each possible explanation for a change in throughput, i.e., a change in the number of patients admitted to those hospitals receiving ABF, 2009 to 2013, are described below.

Activity Based Funding: a possible explanation for a decline in the number of patients admitted to hospital, coded to the 'eligible' category, is that those patients are receiving more of the treatment for their condition in a location other than that of an acute hospital, thus obviating their need for their admission in the first place - which is an intended outcome of ABF.

If this were the case, the number of patients admitted to hospital, and coded to the 'eligible' category would decline, and the number of patients coded to the 'ineligible' category would not change greatly over the same period. This pattern of change for each clinical condition is the benchmark from which a

decision was made about whether (or not), ABF had achieved one of its intended objectives: when appropriate, to divert patients from an acute to a non-acute location for treatment of their condition (ABFT 2013b).

The findings from the analysis of data conducted in Question one, were used for this purpose. The numbers of admissions of patients with the selected clinical condition, coded to the 'eligible' category, and to the 'ineligible' category, were calculated for each ABF hospital in each Local Health District, and plotted for each of the five years of the study, year-on-year. Statistical tests were applied to those data, and the data were graphed to show the relationship between these two categories of patients, 2009 to 2013.

If the expected pattern of change was not evident, the analysis was continued and the next of the remaining six categories of explanation was examined.

Demographics: a possible explanation for the decline in the number of patients admitted to hospitals, and coded to the 'eligible' category, is that there was a change in the demographic profile of those patients. For example, a change in the age-distribution of patients within the catchment population of the hospital for patients admitted with the specified clinical conditions, and within each condition for both the 'eligible' and 'ineligible' category of patients.

The cumulative age-distributions of patients were calculated from their date of birth, thus enabling the construction of graphs showing the age-distribution of patients with COAD, or diabetes, or cellulitis, who were 'eligible' for treatment in a setting other than that of an acute hospital, but who were admitted to hospital. If there was no evidence that change in the demographic profile of patients might have been a possible explanation for the change in throughput, the analysis was continued, and the next of the remaining five categories of explanation was examined.

Disease Factors: a possible explanation for a decline in the number of patients admitted to hospital, and coded to the 'eligible' category, is that there was a reduction in morbidity from the condition in the community i.e., fewer people were suffering from, and being diagnosed with, the condition.

To determine whether or not there had been a change in the incidence or prevalence of COAD, or diabetes, or cellulitis, is outside the scope of this thesis. However, the pattern of presentations to the Emergency Departments of the hospitals does shed some light on this question. If there was a decrease in community morbidity for the clinical condition under study, a decline would be expected in the number of people, and/or in the severity of their clinical condition, when they presented to an Emergency Department for treatment, and fewer of those who did present would require admission to hospital. Therefore, Emergency Department data were used to explore the possibility that disease factors in the community might account for the changes in patient throughput.

On presentation to an Emergency Department, patients are registered and assigned to a Triage Category (1 to 5) based on the severity of their clinical condition (MoH PD2013_047). Patients who require resuscitation, i.e., treatment required within seconds of their arrival are assigned to Triage Category 1; patients who should receive emergency treatment within 10 minutes of their arrival are assigned to Triage Category 2, etc., through to Triage Category 5 (see Appendix A). Therefore, a change in the proportion of patients assigned to the various Triage Categories can be used as an indication of the seriousness (or otherwise) of their clinical condition.

Diagnoses in Emergency Department data were coded using SNOMED-CT (for the Western Sydney Local Health District) and ICD-10d1 (for the Hunter New England Local Health District) (see Appendices B and C). Records where the relevant principal provisional diagnosis was consistent with the selected clinical condition were extracted from this dataset, and those data were grouped by hospital, Triage Category, year of presentation, and departure status. These data were then analysed to identify any change, over the five years of the study, in the number or seriousness of the clinical condition of patient presentations in each hospital, and the number and proportion of those who, having received initial treatment in the Emergency Department, were admitted to the hospital.

If no evidence of community morbidity was forthcoming as a possible explanation for the change in the throughput of patients in hospital, the analysis was continued, and the next of the remaining four categories of explanation was examined.

Social factors: a possible explanation for a decline in the number of patients admitted to hospital, and coded to the 'eligible' category, is that there was an increase in the level of support available in the community to care for these often chronically unwell patients, and to treat their chronic illnesses. Greater access to general practice clinics, or Medicare Locals or other community-based health services, could result in the same patient being admitted to the same hospital, with the same condition, on fewer occasions.

Thus the number of admissions of patients to hospital might include data from multiple admissions of the same patient, rather than a single admission of each of a number of different patients. However, the inpatient dataset does not identify individual patients, only individual episodes of admission.

Nevertheless, an decrease (or increase) in the frequency of admissions in a relatively circumscribed patient group, for example, those born in a given year and residing in a given postcode, could be due either to a change in the number of single admissions of individuals in such a group, or to a change in the number of multiple admissions of the same individual.

From the inpatient dataset, all patients with COAD, or diabetes, or cellulitis, who were admitted to a hospital receiving ABF in each Local Health District, in 2009 and in 2013, were identified and counts were made of the number of patients with the same clinical condition, and year of birth, and residing in the same postcode, admitted to hospital in 2009 and in 2013. The frequencies of admission to hospital of this select group of patients were plotted, and the difference between the data for 2009 and 2013 was analysed (chi-squared test).

If no evidence was obtained that multiple admissions were a possible explanation for the change in throughput, the analysis was continued, and the next of the remaining three categories of explanation was examined.

Hospital Policy: a possible explanation for a decline in the number of patients admitted to hospital, and coded to the 'eligible' category, is that there was a change in the discharge policies in that hospital's Emergency Department, or in the State policies governing Emergency Departments.

If a change had occurred in the State discharge policies, in line with the objectives of ABF, patients who presented to an Emergency Department and were assessed as requiring semi-urgent or non-urgent treatment (Triage Category 4 or 5), might have been referred to an alternative service provider located in the community, rather than being admitted to hospital.

The NSW Ministry of Health policy titled: *Departure of Emergency Department Patients 2014*, and the NSW Ministry of Health policy for *Triage of Patients in NSW Emergency Departments 2015*, were inspected (MoH PD2013_047; MoH PD2014_025) (MoH 2014c, 2015a). There has been no substantial change in the content of these policies since 2010. Thus it is reasonable to conclude that change in these policies would not account for a decline in the number of patients admitted from the Emergency Department to hospital.

It is possible that there might have been changes in the discharge policy in an individual Emergency Department for patients who presented with selected clinical conditions (a change in clinical policy or guideline). This analysis would be more accurate if it were possible to track individual patients on their departure from the Emergency Department to their next destination, but this is not possible, due to the limited demographic data and lack of relevant data variables available in the datasets supplied.

However, some insight into this question may be obtained from analysis of changes in the number or proportion of patients admitted to the hospital from the various Triage Categories (1 to 5). Therefore, for this analysis, data were extracted from the Emergency Department dataset, using SNOMED-CT or

ICD-10d1 codes as appropriate, where the principal provisional diagnosis was chronic obstructive lung disease² (hereafter referred to as COAD), or diabetes, or cellulitis; for each of the five years of the study. The dataset contained: the hospital, the Triage Category to which each patient was assigned, and their departure status.

If fewer patients who presented to an Emergency Department for treatment and who were assigned either to Triage Category 4 or 5, were admitted to (the same or another) hospital following initial treatment in the Emergency Department, it might be a result of a change in clinical policy, resulting in more of those patients being referred to another service location for their on-going care, such as to a community health service, or to a local general practitioner.

For this analysis, patient numbers were aggregated for adjacent Triage categories in which there were small numbers of patients. For example, patient numbers in Triage Category 5, were aggregated with those in Triage Category 4. For the same reason the number of patients assigned to Triage Category 1 were aggregated with those in Triage Category 2. Triage Category 3 remained un-aggregated.

If there was no evidence that hospital policy might be a possible explanation for the change in throughput, the analysis was continued and the next of the remaining two categories of explanation was examined.

Clinical Practice: a possible explanation for a decrease in the number of patients admitted to hospital, and coded to the 'eligible' category, is a change in the way in which clinicians practise medicine. For example a change in the treatment of individual patients, and/or the recording of clinical information in their medical record, and/or the assignment of Triage Categories of people who present to an Emergency Department for treatment.

² Chronic obstructive lung disease is the name of the disease category in the SNOMED CT classification, used in the Emergency Department dataset for the Western Sydney Local Health District.

The recording of additional clinical data might result in 'up-coding' - the assignment of a patient episode to an AN-DRG which would result in an increased ABF payment to the hospital (Steinbusch, Oostenbrink, Zuurbier & Schaepkens 2007). If this was the case, it is likely to result in a greater identification of patients with severe complications and comorbidities (the 'ineligible' category), rather than without complications and comorbidities (the 'eligible' category), and the absolute number of patients admitted to hospital would remain constant.

This assignment would result in fewer admissions coded to the latter, less severe category. If there was no change in the balance between patients coded to the 'eligible' and 'ineligible' categories, then 'up-coding' and/or changes in *medical record keeping* would be unlikely to explain the observed change in throughput. This possible explanation was tested by analysis of changes in the number of admissions of patients with a selected clinical condition, coded to the 'eligible' category, and to the 'ineligible' category over the five years of the study.

If there was no evidence that a change in clinical practice was a possible explanation for the change in throughput, the analysis was continued, and the last remaining category of explanation was examined.

Coding Practice: a possible explanation for a decline in the number of patients admitted to hospital, coded to the 'eligible' category, is a change in the written instructions contained in the policy and procedures Manual used by Medical Record personnel (Coders) to assign patients, once discharged from hospital, to a specific disease category (i.e., to an AR-DRG).

The NSW Ministry of Health policy titled: *Health Care Records - Documentation and Management 2012*, contains instructions for hospital Coders as to the features of the medical record which determine the assignment of a patient to one of the two alternative AR-DRGs used in this thesis to code patients' 'ineligible', or 'eligible' (MoH PD2012_069). This policy was inspected, and no change was identified in this policy since the

introduction of ABF. Thus it is reasonable to conclude that change in this policy would not account for a decline in the number of 'eligible' patients admitted to hospital.

While all categories of explanation both for the 'eligible' and 'ineligible' patient groups were explored, only those results that might explain the reduction, or increase, in throughput of 'eligible' patients are reported in chapters, four to six. Having described the methods used to examine several categories of explanation for a decline in the number of 'eligible' patients admitted to those hospitals that received ABF, it is acknowledged that there might be other possible, but unidentified, explanations of why there might have been either no change, or an increase in the number of patients admitted to hospital, over the course of the study period. The elimination of alternative explanations for change in hospital throughput other than ABF, would be enhanced by an in-depth account of the implementation of ABF. However, the provision of such a detailed account is outside the scope of this thesis'.

Such outcomes may be the result of externalities, for example a change in clinical staff turnover, or finance having been diverted to another purpose, or changes in the availability of services in the community. The change observed may also be a result of instability in the system while ABF was being fully implemented, rather than an outcome of ABF *per se*. For example, at the time of writing this thesis, ABF was still in the process of being implemented in some health services, the result of which is that, because the intervention has been gradual or minimal, there is no defined time-point from which change can be measured accurately.

Additionally, the data available for analysis in this study only relate to inpatient admissions and to presentations to Emergency Departments, but not to the activity levels of the health services to which patients would be diverted if ABF had achieved the objectives set for it. The available data only cover the first two years since a national approach to the implementation of ABF was agreed (2011), and this may not be enough time for changes to be observed in this

study, and perhaps by the national and State entities set up to monitor the consequences of its implementation.

Having described the methods used to analysis patient throughput and the limitations, the next step is to describe the method for conducting the analysis to answer Question three.

2.6.3 Question 3: what are the financial implications of these changes?

Question three explores the extent to which public hospitals might gain or lose resources since the introduction of ABF. The analysis uses the numbers of patients treated in a hospital, the severity of their condition (NWAU Inlier Price Weight), and the duration of their stay in hospital to construct an Index called the Potential Available Resources Index (PARI), from which is calculated the balance between the revenue derived from ABF and the resources required to treat patients. This Index is applied to the throughput of patients coded to the 'eligible' category for each clinical condition, in each hospital, in each Local Health District.

The PARI is used as a measure of the extent to which hospitals might gain (or lose) resources as a result of the introduction of ABF, enabling comparison between the performance of hospitals, or groups of hospitals, when changes to funding arrangements were made. Before describing the method used to calculate the PARI, the influence of the duration of a patients' stay in hospital on the resources available and used to treat patients is explained.

A reduction in the length of time spent by a patient in a hospital has two potential benefits for the facility: there is a reduction in the cost per patient treated, and it enables greater throughput of patients for the same number of beds, which, under the ABF, would attract new revenue for the hospital. However, it is possible that the savings achieved on the care of patients with selected clinical conditions by reducing the duration of their stay in hospital might be swallowed up by less-efficient care of hospital patients with other conditions, or by sicker patients who require a longer stay in hospital than that

incorporated in the calculation of the NWAU Inlier Price Weight. The logic underpinning the development of the Index, how it is constructed, how it is operationalised, and its limitations are presented.

The resource implication of changes in the duration of patients' stay in hospital can be calculated from routinely available hospital admission data. For each clinical condition (AR-DRG), the Independent Hospital Pricing Authority has determined a "National Efficient Price" (NEP) for the hospital care of a patient coded to that AR-DRG, based on a nationwide economic analysis of the cost of providing care for such a patient during their hospital stay (ABFT 2013b).

The major component of the price payable to a hospital for a patient's episode of care is the NWAU Inlier Price Weight for the AR-DRG to which the patient's stay has been coded, with adjustments to accommodate factors such as a protracted hospital stay, or a requirement for Intensive Care. The resulting price-weight is multiplied by a dollar amount (\$ 4,993 in 2013-14) to give the price payable by the Commonwealth government to a State government for a patient's stay in hospital.

However, in the case of NSW this is not the actual amount of revenue received by the hospital, because the NSW Ministry of Health does not pass on the full Commonwealth amount to Local Health Districts, (the NSW unit price was \$4,671 in 2013), and a Local Health District may not pass on the full amount it receives to the hospital – "top-slicing" occurs (ABFT 2013a). Nevertheless, for the present purposes, the price payable by the NSW Ministry of Health for each admission can be used as a reasonable proxy for calculating the amount of revenue received by each hospital based on its patient throughput.

Notwithstanding some imprecision in calculating the precise revenue paid for an admission, in principle the funding received for the admission of a group of patients who are coded to the same AR-DRG is the product of the number of admissions, and the NWAU Inlier Price Weight, and the dollar figure which is paid for an admission whose Price Weight equals 1.000. It is acknowledged

that, although the NWAU Inlier Price Weight does not apply to every admission, the assumption that it does apply to the majority of admissions for the 'eligible' clinical conditions under study was tested by examining the effect of substituting the NWAU Final Price Weight; an item also available for each admission in the inpatient dataset, for the generic NWAU Inlier Price Weight, which applies to admissions coded to that AR-DRG, Appendix G in '*NSW Activity Based Funding and Small Hospitals Operational Specifications 2013-14*' (ABFT 2013a).

In this test, the individual NWAU Final Price Weight for each admission to the Hunter New England ABF hospitals, and coded to the 'eligible' category for COAD was extracted from the dataset. Although data were missing from 22 per cent of the 5,659 records available for study, the mean of all the 78 per cent remaining available NWAU Final Price Weights was 98 per cent of the NWAU Inlier Price Weight for this category (1.0173 instead of 1.0331). It is concluded that, for the purposes of calculating the PARI, the NWAU Inlier Price Weight is an acceptable proxy for the NWAU Final Price Weight.

Clearly, the cost of the resources required to provide hospital care for a patient depends on the complexity of the case (represented by the NWAU Inlier Price Weight, and multiplied by the appropriate dollar figure), and on the duration of the patient's stay in hospital. These resource requirements do not, of course increase linearly with the duration of patient stay, but, for the present purposes, a reduction in length of stay would result in at least some reduction in the resources required to care for that patient.

With the approximations acknowledged above, the ability of a hospital to provide the resources for patient care (the PARI) is the balance between the revenue it receives for that care, and the estimated cost of the resources required to provide it, as shown in Box 1.

Box 1: Balance between revenue available and resource requirement

$$\frac{\text{Revenue available}}{\text{Resource Requirement}}$$

This can be regarded as an index of the potentially available resources to provide care for an admitted patient – ‘potentially’, because there is no guarantee that the revenue received in respect of a patient admission will be applied to the provision of resources for caring for similar patients. For the purpose of this thesis the PARI is constructed, as follows, for a given AR-DRG. It will be seen that most of the variables in the numerator and denominator of the expression cancel out, leaving the Index as the reciprocal of the Average Length of Stay.

Box 2: Calculation for a given AR-DRG for a single hospital

$$\frac{\text{number of admissions} * \text{NWAU Inlier Price Wt} * \$ \text{ paid for that Price Wt}}{\text{number of admissions} * \text{average Length of Stay} * \text{NWAU Inlier Price Wt}}$$

$$* \$ \text{ paid for that Price Wt}$$

$$* \$ \text{ paid for that Price Wt}$$

$$\text{Reciprocal of ALoS} = \frac{1}{\text{Average Length of Stay}}$$

If data on the average Length of Stay of patients are available for two or more time periods, then the reciprocal³ of the average Length of Stay can be used to calculate the PARI, to indicate whether a hospital has more or fewer resources available to provide care for the patients who are admitted to it in the second or subsequent time-periods. It is customary to designate the Index for the first time-period as 100. Having described the logic underpinning the construction of the PARI, how the PARI is operationalised is presented.

While the PARI can be applied either to: a single AR-DRG or to several groups of AR-DRGs, or hospitals, or Local Health Districts, in this thesis it is used to show the balance between the revenue available and resources used to treat patients with selected clinical conditions (one AR-DRG), coded to the 'eligible' category, for each of the hospitals, and for the Local Health District as a whole.

2.6.3.1 *PARI calculation for several hospitals for a single AR-DRG*

From the inpatient database, data were extracted on all patients whose admission had been coded to 'eligible' category for each selected clinical condition. These data were used to calculate the total number of patients admitted to each of the hospitals receiving ABF in each of the Local Health Districts, year-on-year, 2009 to 2013. Data for the same period were also extracted on the average Length of Stay of those patients, which, multiplied by the number of such patients in each category, gives an estimate of the number of hospital bed-days occupied by these patients in each year.

However, basing the starting point at an index of 100 for an AR-DRG for each hospital in a given group of hospitals implies that they are starting from the same performance base, which is not usually the case. This can be circumvented by setting the combined performance of the whole group of

³ *Definition: "reciprocal" is the quantity obtained by dividing the number one by a given quantity (Oxford English Dictionary 2008).*

hospitals at 100. This gives a baseline against which the initial performance of each hospital can be measured, and also provides a base value for measuring the combined performance of the whole group of hospitals in subsequent years.

However, this raises the question of how to combine the performance of different hospitals into a single Length of Stay performance measure for the whole group. This was achieved by summing the number of admissions to all the hospitals, and summing the occupied bed-days for all the hospitals, for a given year. The sum of the total number of occupied bed-days was divided by the sum of the total number of admissions to give the average Length of Stay for all the hospitals in the group for that year, as shown in Box 3.

Box 3: Calculation for a given AR-DRG in a group of hospitals

$$\text{ALoS} = \frac{\text{Number of occupied bed-days}}{\text{Number of admissions}}$$

$$\text{Reciprocal of ALoS} = \frac{1}{\text{ALoS for whole group}}$$

The reciprocal of the average Length of Stay for the first time period became the benchmark, and this was standardised to give a PARI value of 100. The PARI values for each hospital and each year were then calculated. For each hospital, the 2009 starting value was calculated in relation to the base value for the whole group of hospitals combined, to reflect the hospital's relative Length of Stay performance relative to the whole group. The values for each hospital for subsequent years were then based on the 2009 starting value for

that hospital. The findings from the calculation of the PARI for each selected clinical condition, in each of the ABF hospitals (with the exception of Mount Druitt and Kurri Kurri Hospitals, as explained below), in each of the Local Health Districts are provided in Chapters four to six.

At Mount Druitt Hospital, the Length of Stay for many patients who were admitted with the selected clinical condition did not fall “between the statistically high and low boundary points for ...casemix class”, and therefore for these clinical conditions the hospital stay did not fulfil the definition of an “Inlier Episode” and therefore would not receive funding through the mechanism of ABF (ABFT 2013b). At Kurri Kurri Hospital only a small number of patients were admitted to the hospital with each of the selected clinical conditions, and the Lengths of Stay were variable, which resulted in data from this hospital skewing the overall picture for the Local Health District. Therefore, the data from these two hospitals have not been included (or illustrated) in the calculation of the PARI for each of the selected clinical conditions.

It is acknowledged that the construction of the PARI requires a number of assumptions, in particular that quantities in the numerator and the denominator of the expression are identical, and can therefore be cancelled out in the calculation. While this is true for the number of admissions, the NWAU Inlier Price Weight might not be an accurate estimate of the actual contribution of this factor to the hospital’s revenue, both because of the “top-slicing” which occurs at the NSW and Local Health District levels, and because the NWAU Inlier Price Weight is not an accurate reflection of the actual price weight applied to the set of admissions. Although the relative accuracy of this proxy for revenue has been demonstrated, no such confirmatory estimate is available for the cost of the resources actually required to provide care for those admitted patients.

2.7 Conclusion

This chapter has presented a description of the research design and the rationale for using a multi-case study of one Metropolitan and one Regional Local Health District, and the method used: (i) to answer a subsidiary question, about the extent to which each of those selected Local Health Districts is representative of other Regional or Metropolitan Local Health Districts; (ii) to select three clinical conditions for analysis; (iii) to identify the data items which characterise those conditions, and the variables used to answer three Questions, each of which completes a step in the analysis of data to answer the research question. The findings from those analyses are presented in chapter four to six.

The next chapter presents background information necessary to understand the NF Reform and how it was implemented in NSW.

Chapter 3: National Health Funding Reform

3.1 Introduction: NH Reform

This chapter outlines the incentives for State governments to sign the National Health Reform Agreement (2011), the salient elements contained in that Agreement; and the infrastructure established for its implementation. This is followed by a description of the model of ABF used to fund public hospital services, and how it was operationalised in one State; NSW. A history of the development of DRGs and the risks associated with using this disease classification system for funding purposes are discussed. This background information is important because it conveys the complexity of, and the ideology underpinning, the NH Reform, which Griffith (2008) alleged was based on neoclassical economics. However as will be shown, the characteristics of the NH Reform suggest rather that it is underpinned by neoliberal ideology.

In signing the NH Reform Agreement (2011), the Commonwealth and State governments made a commitment to work in partnership to implement new arrangements for a nationally unified but locally controlled health system, with the aim 'to improve health outcomes for all Australians and the sustainability of the Australian health system' (COAG 2011, p. 5). This Agreement provides the detail of that commitment, and makes explicit that the Commonwealth funding contribution was under a model of ABF (COAG 2011).

The States' interest in signing the NH Reform Agreement (2011) was to ensure that the Commonwealth shared the risk of hospitals requiring further increases in funding to meet future demand for acute services. In 2012, NSW spent 30 per cent of its total budget on healthcare; this level of funding was claimed not to be sustainable, putting pressure on clinicians, managers and administrators working in the health system to find ways to reduce the escalating cost of providing publicly-funded health services. Duckett and Willcox (2011, p. 56) noted that, if not curtailed, the current level of health

funding would exceed the States' total budget by the year 2045-2046. These authors claimed that, by using the 'National Efficient Price as the basis for funding public hospital services, a saving of between \$570 and \$1,300 million per annum' could be made (Duckett & Willcox 2011, p. 304). Such a saving, coupled with the Commonwealth's commitment to provide future public hospital growth funding, were attractive economic incentives for the States to adopt this new funding model (COAG 2011, Schedule A).

While all the Schedules included in the NH Reform Agreement (2011) are of relevance to a number of health policies, two are most relevant in this thesis. These are: Schedule A which makes explicit the Commonwealth funding commitment to the States, and that funding for public hospital services would be based on a national efficient price, which is the basis on which ABF operates; and Schedule D, which set out the local governance and includes an objective, 'to provide more health care in non-acute settings, when appropriate' which is the premise on which this thesis is based. This objective was assigned to Medicare Locals (and Super Clinics), which are private entities supported by Commonwealth government grants and established through public-private partnerships, and to Local Hospital Networks, which consist of a group of public hospital services located within a defined geographic area (COAG 2011, Schedule D & E).

The creation (or expansion) of Medicare Locals, Super Clinics, and Local Hospital Networks was intended to 'improve local accountability and responsiveness to the health needs of their communities' (COAG 2011). These organisations were expected to work together to provide seamless care to patients, and for that care to be efficient. How efficient health care would be measured was not clearly defined. Nor was any detail provided about how these interest groups would work together to co-ordinate patient services more effectively. Professional and organisational tensions continue to exist between these service providers, tensions which Hancock (1999, p. 138), asserted caused 'fragmentation of services associated with over-specialisation and hostile relationships, poor communication, and poor

discharge planning'. This structural divide is a known impediment to integrated health care, leaving open the question of how these entities will coordinate their respective services to meet the clinical needs of patients, particularly those suffering from chronic disease (Leeder 1999).

However, the Agreement lists a number of service types that could be considered as public hospital services for the purpose of ABF funding, which encourages greater use of non-admitted patient services (COAG 2011). This inclusion provided an incentive for Local Hospital Networks to provide treatment to patients in non-acute settings, where appropriate. The Agreement states that:

..if a Local Hospital Network is able to operate more efficiently than the level of funding set by the State under the Local Hospital Network Service Agreement, the Local Hospital Network will be able to retain and reinvest the benefits accruing from efficiency in service delivery and in accordance with State policy and practice, as guided by the Service Agreement (COAG 2011, Schedule A-64).

A further incentive for Local Hospital Networks to develop new models of care, with the aim of gaining efficiency through service substitution (i.e, more health care provided in non-acute settings), was that, it would reduce the demand on acute hospital beds (COAG 2012; MoH 13).

A number of publicly-funded structures were created to operationalise the NH Reform, particularly its policy on ABF. These included: a National Health Performance Authority to monitor performance reporting, and a Performance and Accountability Framework to improve accountability; a new Australian Commission on Safety and Quality in Health Care, to improve and monitor the standards of clinical care provided in hospitals (COAG 2011 Schedule B & C). A national Independent Hospital Pricing Authority, whose task was to set a price which is paid for each episode of patient care, regardless of the setting in which that care is provided, where the funding follows the patient (IHPA 2011).

Activity Based Funding, based on the 'National Efficient Price', is the mechanism that government(s) now use to fund public hospital services. It is believed that ABF will enable greater efficiency and effectiveness of the delivery of health services in public hospitals, the more efficient allocation of resources, and better patient access to integrated care, as well as the identification of incentives that will facilitate positive change in the health system (IHPA 2011).

If this mechanism was successful, funding of the delivery of health services would be more transparent. The number and type of diagnostic services, treatments and medications provided to each patient while in hospital would be known, allowing the consequences of clinical decision-making to be observed. In time, over-servicing, and/or under-servicing would be reduced, and clinical pathways would become explicit, resulting in a stronger emphasis on medical interventions being standardised and clinically appropriate for the medical condition being treated. It would be possible for the cost for each episode of care to be compared with the corresponding allocated 'National Efficient Price', and clinicians would be encouraged to reduce any variation.

It was also anticipated that patients would be enabled to make choices about the type of health care they need, and to access it when required, preferably in the community (seamless care) (COAG 2011, Schedule A & B; IHPA 2012). These outcomes were to be achieved by enabling as many patients as possible to receive health care, and for each to experience the best possible health outcome from the care provided (Duckett & Willcox 2011). Collectively the above changes, if successful, would address many of the current criticisms of the health care system, some of which drove the need for a national approach to health reform.

If these changes occurred, the social basis of clinical practice would also change. As more comprehensive general practice clinics and primary health care services were established under Medicare Locals, more patients with the chronic conditions and diseases associated with ageing could be cared for in the community, which, in turn would result in fewer people with those

conditions having to be admitted to an acute hospital. This change in clinical practice would also be likely to reduce the number of times that a patient would be re-admitted to hospital for treatment of the same condition (multiple admissions). Those admitted would spend fewer days in hospital and, when discharged from hospital, more would be referred to their general practitioner, community health or other community based service for any necessary on-going care.

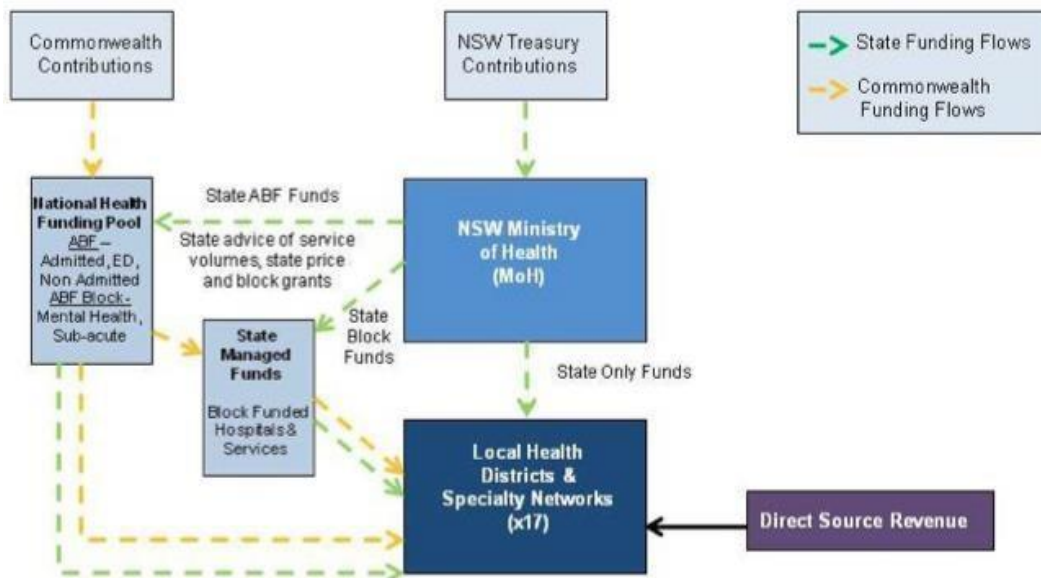
3.2 Implementation of ABF in NSW

Prior to 2009 most States, including NSW used the AR-DRG classification system to count inpatient activity, and used some form of casemix funding to fund public hospitals. From 2012, in NSW, ABF was the funding mechanism for patient services in Local Health Districts and Speciality Health Networks (ABFT 2013a).

Using NSW as an example, many of the structural elements created at a national level to support the implementation of the ABF policy, are duplicated at a State level. The NSW Bureau of Health Information has a similar role to that of the National Health Performance Authority (COAG 2011 Schedule B & C; Bureau of Health Information [BHI] 2013). The NSW Clinical Excellence Commission monitors, reports on, and undertakes interventions to improve the quality and safety of health care and the systems that underpin that care (Clinical Excellence Commission [CEC] n.d). Those objectives are similar to those outlined in Schedule B, for the creation of the Australian Commission on Safety and Quality in Health Care (COAG 2011). The NSW Independent Pricing Authority, sets its own price for each episode of care provided by public hospitals, and allocates funding to Local Health Districts for distribution to those hospitals for which they are responsible (ABFT 2013b). This function is consistent with that of the national Independent Hospital Pricing Authority (IHPA 2011).

In addition to the above structural elements, under the National Healthcare Agreement (2012), a National Health Funding Pool was created (a centralised repository for Commonwealth and State health monies). The Commonwealth and NSW Treasury funding for publicly-funded health services, is pooled and a formula is agreed for the allocation of those funds (Griffith 2006). The NSW Ministry of Health provides hospital patient data which determine the level of funding received by NSW from the National Health Funding Pool, to which it has contributed funds (COAG 2011). Those data are used to determine not just the base price, but an adjustment to the base price which depends on a patients' status. For example, differential weights are applied for patients who are Aboriginal, or who live in regional or remote locations, or who received specialised paediatric hospital care, or who are a privately insured patient in a public hospital (ABFT 2013a). In turn, the NSW Ministry of Health allocates funds to Local Health Districts and Specialty Networks to provide health services. The governance structure for the allocation, distribution and accountability for expenditure of those funds is shown below in Figure 3.1.

Figure 3.1: Governance structure for the administration of funds from the National Health Funding pool



Source: MoH 2013.

The Ministry's formula for allocation of funding to Local Health Districts is determined by multiplying the total units of activity (weighted) by a price set by the NSW Independent Pricing Authority, which is a dollar amount paid for each unit of patient care. This price takes into account the volume and type of patients, the complexity of the patients' clinical condition, and the cost of services, based on standards and weighted averages. However, the Local Health Districts allocation of those funds to hospitals is (usually) based on the previous years' annual budget, and projected activity targets.

Over and above the funding provided through the National Healthcare Agreement (2012), the NSW Ministry of Health provides separate funding for a range of central publicly-funded health and support services. These are: population health, Aboriginal health, Ambulance services, Justice Health, and central agencies including: Local Health Districts, the Clinical Excellence Commission, the Health Education and Training Institute, the Agency for

Clinical Innovation, the Bureau of Health Information; and the administrative divisions within the Ministry of Health itself (ABFT 2013a).

The NSW Ministry of Health is also known to approve either one-off or longer-term funding to some Local Health Districts during a financial year, but the criteria for those decisions remain unclear. The Ministry may also provide Transition Grants, which do provide some assurance that patient care will not be compromised if the cost of providing care exceeds the ABF price paid for it. Such grants are expected to be phased out over time, as Local Health Districts become more efficient. Whether the provision of those grants is successful in achieving better economic or technical efficiency in the long term or, whether they provide an incentive to maintain the *status quo*, remains to be seen. It is clear from this account that the implementation of ABF in its pure form has been so diluted that it may in fact have little impact on the way that public hospitals conduct their business.

In summary, using ABF for funding hospital services devolves responsibility to each clinician in each clinical unit to document all treatment and movement of patients while they are in the hospital, so that the full cost of their care is captured. In so doing, it was expected that, in time, this would improve the quality of health data, and would contribute to a change in the established culture of the medical profession, which is viewed as being inefficient (ABFT 2013b). The provision of primary care would be improved, and the proportion of potentially preventable hospital admissions would be reduced (COAG 2012).

Further, the benefits of using ABF as the technical tool by which to fund public hospital services was promoted because it was claimed to be simple to use, it was consistent with international standards, it promoted cost control, and the financial risk was shared between the funder and the provider of health services (NSW Health 2005). The risks of using this funding model for funding hospital services were well-known at that time, which was made explicit by the inclusion in the NH Reform Agreement of a mechanism for monitoring over-servicing. These risks are those associated with using the classification

system of DRGs as a funding tool, details of which are presented next. This classification system is not only the basis for coding each patient's episode of care, on which ABF operates, but it is also the basis on which data have been selected (and analysed) to answer the research question.

More than forty years ago in the USA, academics from Yale University developed a system of DRGs in an effort to analyse and understand the costs of healthcare. This system was identified as a tool with which hospitals could 'reduce costs, increase benefits and improve system quality' (Leister & Stausberg 2005, p. 47). In the USA system, each episode of patient care was assigned to one of (originally) 467 DRGs, based on diagnosis, procedure, age, sex, discharge destination, and the presence of complications or co-morbidities. Costing studies then enabled a dollar cost to be assigned to each DRG, which meant that, in principle, it would be possible to pay a hospital a pre-determined amount (a prospective payment) for treating a patient assigned to that DRG, irrespective of what was actually spent on the patient during their hospital stay. Thus a set fee could be paid for each unit of care, regardless of the cost of the treatment provided (Leister & Stausberg 2005). In such a system, payment will, of course be retrospective, in that the hospital would be paid in arrears, for patients to whom treatment had been provided and a DRG and assigned.

This retrospective payment is made for each unit of care, and is partly based on the number of days that a patient assigned to that DRG would normally be expected to stay in hospital. For example, a hospital was not paid more money if a patient's stay in hospital was longer than the average stay for all patients for that specific DRG, which was an incentive to discharge patients within the benchmark length of stay, and is designed to encourage patients' treatment in hospital to be replaced with treatment and therapy in a (less costly) outpatient setting (Leister & Stausberg 2005).

Leister and Stausberg (2005) critiqued the strengths and weaknesses of the DRG cost-accounting method among three countries: USA, Switzerland and Australia. They found that it was able to control costs well (one of its design

features), and that many service delivery objectives had been achieved through the use of the DRG system, making its introduction attractive to governments which are driven by economic incentives.

However, they made a number of criticisms, and their overall rating of the DRG cost-accounting system was more negative than positive in those countries (Leister & Stausberg 2005). One criticism is that perverse incentives are embedded within it: for example, it does not reward activities which improve the quality of health care but which cost more; nor does it encourage innovations in health care which may require funding in the short-term, but may reduce costs in the longer term; nor does it discourage the health risk behaviours which are known to contribute to many lifestyle-related illnesses, for example diabetes and cardio-vascular disease (Leister & Stausberg 2005). Another unintended consequence of the DRG system reported by Leister and Stausberg (2005), and in a recent Productivity Commission Report (2015), is that it rewards health service providers who act in ways that can impact negatively on the quality of the care they provide, for example, by discharging patients from hospital earlier than their clinical condition warrants.

Further, the DRG system, on which the policy of ABF is based, requires accurate recording of each patient's clinical details in their medical record, and subsequent review of the medical record by trained coders, who assign the patient's episode of care to the correct DRG (Steinbusch *et al* 2007). This is a time-consuming process, and is open to manipulation if there is the possibility of recording clinical details in such a way that the patient is assigned to a higher-cost DRG than their episode of care actually warrants, thus attracting more money to the hospital (Steinbusch *et al* 2007; Collier 2008). Steinbusch *et al* (2007, p. 290) referred to this practice as 'up-coding', which was reported to be influenced by factors such as the size of the hospital, the internal and external control mechanisms for coding, and characteristics embedded in the classification system, such as the 'ambiguity of the DRG classification criteria'.

Since its introduction in the USA, the DRG system has undergone considerable development and expansion to cover non-hospital care, and has now been adapted for use in a number of other countries, including the United Kingdom (UK), the Netherlands, Germany, and Australia (Ham 1994; Leister & Stausberg 2005; Steinbusch et al 2007). In Australia, this clinical costing classification system has been modified to reflect Australian clinical practice and use of hospital resources, and given the title 'Australian Refined – Diagnosis Related Groups' (AR-DRGs). The current set of AR-DRGs is the outcome of many years of repeated modification of this disease classification system (every two-years), and the refinements, are reported to have removed some of the unintended consequences that resulted from the use of DRGs for funding health care in other countries (Leeder 1999; Leister & Stausberg 2005).

Leister and Stausberg (2005) noted that many of the observed negative consequences of using DRGs were associated with its implementation, rather than a fundamental flaw in the DRG system itself. For example, concern about the quality of data was heightened when inconsistencies were noted in reports from different agencies containing data which had originated from the same source (Pollicino, Viney & Haas 2002).

Traditionally, funding of hospitals has been determined using historical data, which meant that each year hospitals received the same amount of funding as the previous year, with an adjustment for inflation. This mechanism provides little incentive for clinicians and hospital managers to seek internal efficiencies. It has resulted in the production of financial information whose poor quality makes it less than optimal for making decisions about setting priorities for funding, leaving the way open for decisions about the re-allocation of resources which may have political consequences (Abernethy 1995; Croxin 2011). The use of historical data for the allocation of funds has also been alleged to encourage cost-shifting (Richardson 2005; Griffith 2006).

In spite of the risks associated with using DRGs as a funding tool, these were not thought to be of a scale sufficient to warrant the development of an alternative model to ABF for funding public hospital services. The benefit of using DRGs to classify inpatient episodes of care is that the 'classification system groups patient stays in hospital into 'clinically meaningful categories of similar levels of complexity (outputs) that consume similar amounts of resources (inputs)' (Duckett 2007 p.152). As a consequence this DRG prospective payment system was introduced by many countries, including Australia, as a powerful way to rein in hospital expenditure, and to influence the clinical and diagnostic choices made by medical staff, which are two major drivers of hospital costs. It was also claimed that it had the capacity to limit the power of unions, and, in so doing, gave hospital managers more control to contain expenditure (Evans *et al* 2006).

As described in Chapter 1, the origin of the development of ABF, and a national approach to the funding of hospital services in Australia can be traced back to 1988, when the Commonwealth and State governments signed the Medicare Agreement (Leeder 1999). This Agreement made Commonwealth funding available to undertake the necessary work on the refinement of the classification of DRGs to make them suitable for use in the Australian health system (Casemix Development Program) (Leeder 1999; Duckett 2007).

Victoria and South Australia were the first States to introduce a model of casemix funding using DRGs as the basis for funding public hospitals (Leeder 1999; Hancock 1999 p. 141). By 2009, most States were funding public hospitals using some form of casemix funding, but the funding methods used were not uniform (Hancock 1999). This changed in 2011 with the signing of the NH Reform Agreement, and, as a consequence, a nationally consistent approach to the funding of hospital services, rather than hospitals per se, using ABF where practicable, was implemented (COAG 2011). For the first time the Commonwealth had a uniform model for funding hospital services across all States. Hospital 'activity is now described using a single National Weighted Activity Unit (NWAU), which is set using a measure of central

tendency of the distribution of hospital costs (the median cost is preferred over the average') (Health Policy Solutions [HPS] 2011 p.7). The same price is paid for episodes of patient care/treatment regardless of the setting in which the service is provided. The price paid by the Commonwealth to the States for each episode of patient care is set by the IHPA, which is an independent national agency established under the NH Reform Agreement for this purpose.

In a review of the early introduction of ABF in Western Australia (2011), interviewees stated that: "ABF has bought rigor and transparency and encouraged efficiency and effectiveness. It had promoted an extensive reporting culture at both finance and activity levels, together with key performance indicators. It was well embedded at executive level and was moving mindsets, however it still had to filter down the organisation". On the other side of the equation it was stated that: "ABF costing has the potential to drive up hospital activity. No causal link was found between the reduction in length-of-stay and ABF" (Scott 2011 p. 13).

Thus, the imperative of the best allocation of resources to obtain the best possible outcome (economic efficiency) has overridden the priority for public hospitals to focus on achievement of technical efficiency. Technical efficiency objectives, if met, would provide early identification of any unintentional adverse effects of the health reform on the quality and safety of care provided to patients while in hospital (Scotton & Ferber 1978; COAG 2011). However, measuring technical efficiency would require measuring the impact of providing more (or less) resources, on the health benefit gained by patients who receive care through the use of those resources (a health outcome), or alternatively, an improvement in the delivery of services provided to patients (a system outcome) (Culyer 2005). While some objectives included in the NH Reform documentation incorporate technical efficiency, these are secondary in importance to those associated with economic efficiency.

This emphasis on economic efficiency reinforces the perception that the increasing cost of health care in Australia is not affordable, which has driven

the NH Reform agenda (Duckett *et al* 2014). However, the Commonwealth Government's recent statement that it is reconsidering its commitment to increase its share of the growth in public hospital funding, and that future Commonwealth funding to the States will be linked to population growth and the Consumer Price Index⁴, is a strong indication that the risk associated with using the AR-DRG classification system for funding purposes should not be underestimated (Bundey 2014; Productivity Commission [PC] 2015).

3.4 Conclusion

This chapter has presented the incentives for the States to sign the NH Reform Agreement, the objectives of the Reform, the values inherent in the rhetoric, and the mechanisms introduced for it to be operationalised. Some of the changes that would be expected in public hospitals if the model of ABF, has been successful in meeting its objectives are given. The DRG classification system is described, which is the basis from which ABF was developed to fund public hospital services. The strengths and weaknesses of using this system for funding purposes, and its development to reflect the Australian health system (AR-DRGs), and why it was initially introduced as a tool from which to classify each episode of clinical care provided to patients (Duckett 2007). ABF is built on the use of the AR-DRG classification system, and this thesis relies heavily on those data to answer the research question.

The findings from the analysis of data are now presented in chapters four, five and six.

⁴ The Consumer Price Index is 'a measure of the weighted price change, over a period of time, of a bundle of goods purchased' (Culyer 2005, p. 68).

Chapter 4: Chronic obstructive airways disease

4.1 Introduction

The focus of this chapter is those patients admitted to hospitals that receive ABF with a primary diagnosis of COAD, coded as being without catastrophic complications or co-morbidities (the 'eligible' category), or with catastrophic complications or co-morbidities (the 'ineligible' category). The reason for examining the throughput of hospital patients with COAD is that it is a chronic condition, exacerbations of which may not necessarily require hospital treatment (MoH 2013).

COAD is one of the diseases that affect the lungs and airways, which are also described as diseases of the pulmonary (respiratory) system. It is a chronic inflammatory condition resulting in persistent secretion of mucus which obstructs the air passages, and predisposes the patient to emphysema, bronchitis and pneumonia and similar conditions (AIHW 2010). Air pollution and cigarette smoking are examples of social factors known to contribute to the development and clinical progression of these conditions (WHO 2014; ABS 2014).

In 2008-2009 the national cost of treating COAD was estimated to be \$929 million. Over 57 per cent of that expenditure was on patients admitted to hospital (public and private acute hospitals, psychiatric hospitals, and medical services provided to private admitted patients in public hospitals) (AIHW 2014). Out-of-hospital medical services for COAD patients accounted for a further 19.5 per cent of the total expenditure. There is no evidence to suggest that the distribution of expenditure on COAD patients in NSW is different.

The chapter is structured as follows. It begins with a summary of the overall throughput of patients with COAD in each of the two Local Health Districts, and proceeds with a more detailed presentation of changes in the throughput of COAD patients over the five years of the study. For those hospitals where

a change in throughput of patients coded to the 'eligible' category was found to be statistically significant, seven categories of explanation for those changes are explored. The overall findings from the analyses are discussed. The focus of the analysis is then expanded to examine the balance between the potentially available revenue and the resources required to treat this category of patient, in each hospital, in each Local Health District.

4.2 Patient throughput

Four hospitals in the Western Sydney Local Health District receive ABF: Westmead, Blacktown, Auburn, and Mount Druitt. Over the five years of the study, 8,268 patients were admitted to those hospitals with a principal diagnosis of COAD, of whom 75 per cent were coded to the 'eligible' category, i.e., without catastrophic complications or co-morbidities, who could potentially be treated in a setting other than that of an acute hospital.

This picture is not dissimilar to that in the Hunter New England Local Health District, in which eight hospitals receive ABF: John Hunter, Calvary Mater, Maitland, Belmont, Manning Base, Tamworth Base, Armidale, and Kurri Kurri. Over the five years of the study, 7,611 patients were admitted to these hospitals with a principal diagnosis of COAD, of whom 74 per cent were coded to the 'eligible' category.

Figures 4.1 and 4.2 present the number of hospital admissions in the two Local Health Districts of all patients with COAD who were coded as being 'eligible' for treatment in a setting other than that of an acute hospital.

Figure 4.1: Admissions of patients with COAD, coded as 'eligible', to Western Sydney hospitals, 2009 to 2013

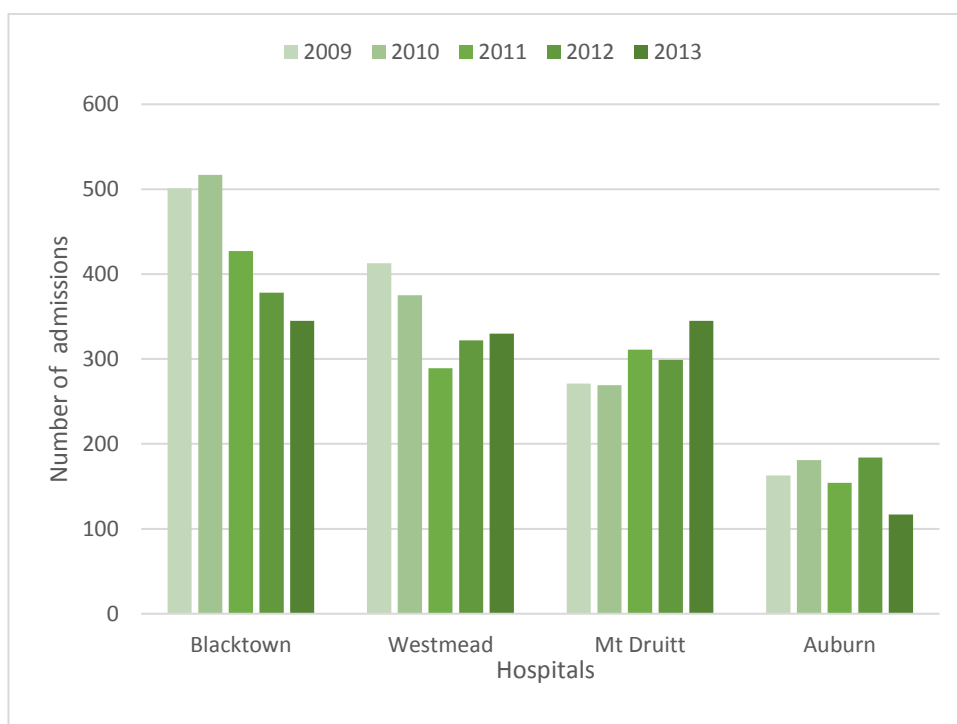
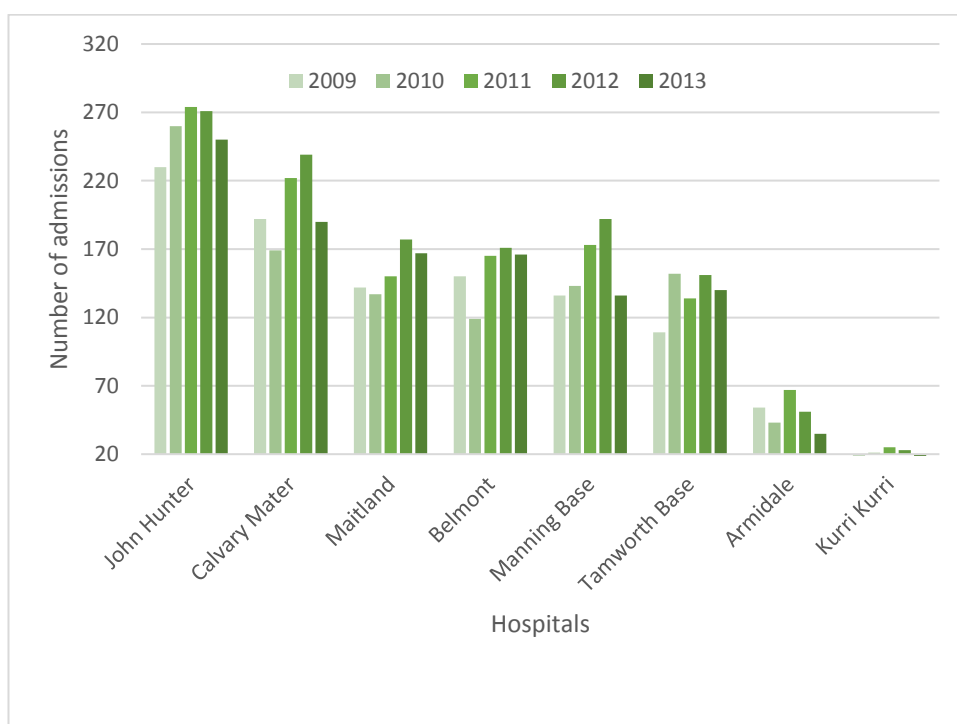


Figure 4.2: Admissions of patients with COAD, coded as 'eligible', to Hunter New England hospitals, 2009 to 2013



For this patient category in the Western Sydney Local Health District, there was an increase in the number of patients admitted to Blacktown Hospital in 2010 and a steady decline thereafter. Westmead Hospital, had an initial decline in patient admissions, which then rose in 2012 and 2013. There was a slight decline in throughput of patients at Auburn Hospital, and an increase at Mount Druitt Hospital. The decrease in the number of patients admitted to Blacktown and the increase in admissions to Mt Druitt Hospital were both statistically significantly different from zero ($0.02 > p > 0.01$, and $0.05 > p > 0.025$ respectively). The overall decline in admissions over the study period was not significant at Westmead or Auburn Hospital.

All Hunter New England hospitals showed a similar trend: an increase in the number of patients admitted until 2012, then a decline in the following year. The Armidale Hospital was the only hospital which, after 2011, showed a decrease in admissions, which was statistically significant ($p < 0.001$).

To enable comparison of patient throughput between hospitals the annual admission rate per 100 admissions, for each hospital, and for all hospitals combined in each Local Health District, were calculated. Figures 4.3 and 4.4 present those data.

Figure 4.3 Annual standardised admission rate for patients with COAD, coded as 'eligible', in Western Sydney hospitals

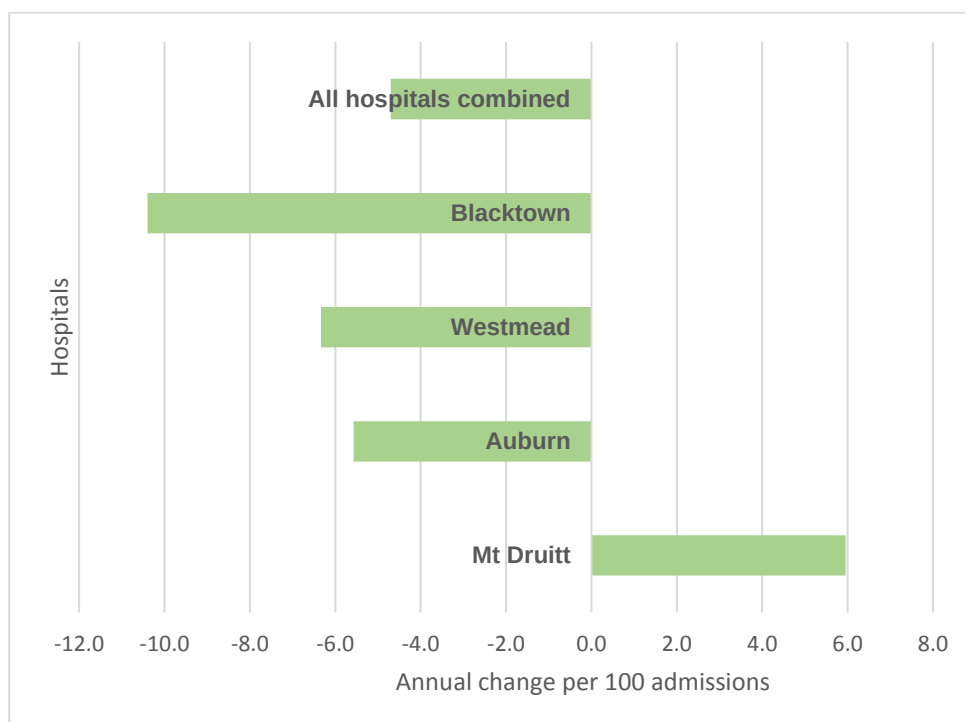
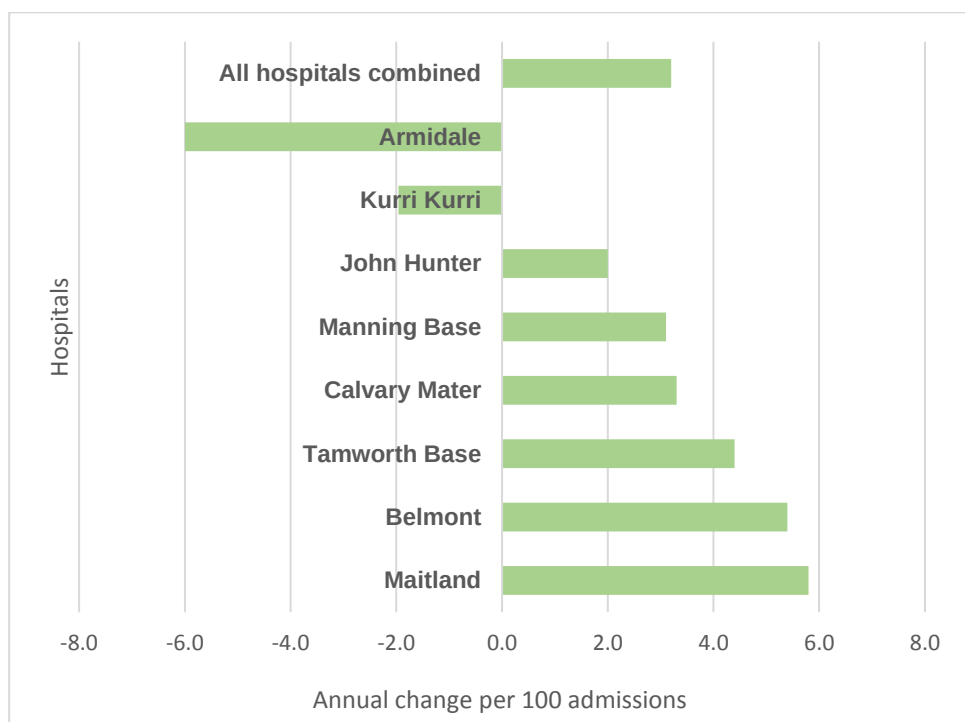


Figure 4.4 Annual standardised admission rate for patients with COAD, coded as 'eligible', in Hunter New England hospitals



For this category of patients', there was a decrease in the number of patients admitted to all the ABF hospitals in the Western Sydney Local Health District over the study period, with the exception of Mount Druitt Hospital where, for every 100 patients admitted, there was an average increase of six standardised admissions per year. The greatest decline in the number of standardised admissions was at Blacktown Hospital, and the slopes of the linear regression lines for 2009 to 2011 and 2011 to 2013 (before and after the introduction of ABF) were not greatly different; -32.0 and -41.0 respectively (not illustrated).

In the Hunter New England Local Health District hospitals, the rate of increase in standardised admissions was greatest at Maitland Hospital, where there was an average increase of six admissions per year, but the probability that this trend was significantly different from zero is only 0.07, which fails to reach the traditional level of statistical significance ($p < 0.05$). The only hospital to experience a statistically significant decline in the number of standardised admissions of patients coded to the 'eligible' category was the Armidale Hospital. However, the number of admissions to this hospital was small, contributing less than five per cent of all the admissions coded to the 'eligible' category in the Hunter New England hospitals. Therefore, it is difficult to draw any generalisable inference from the reduction in admissions to this particular hospital.

The increase in the number of admissions to Mount Druitt Hospital reached the traditional level of significance, however detailed exploration of possible explanations for that change is not warranted for the reasons given at the end of this chapter. Thus Blacktown was the only hospital in which the decrease in patient throughput was substantial and statistically significantly different from zero ($0.02 > p > 0.01$). The analyses now focus on possible explanations for this result.

4.3 Possible explanations for the change in COAD patient throughput at Blacktown Hospital

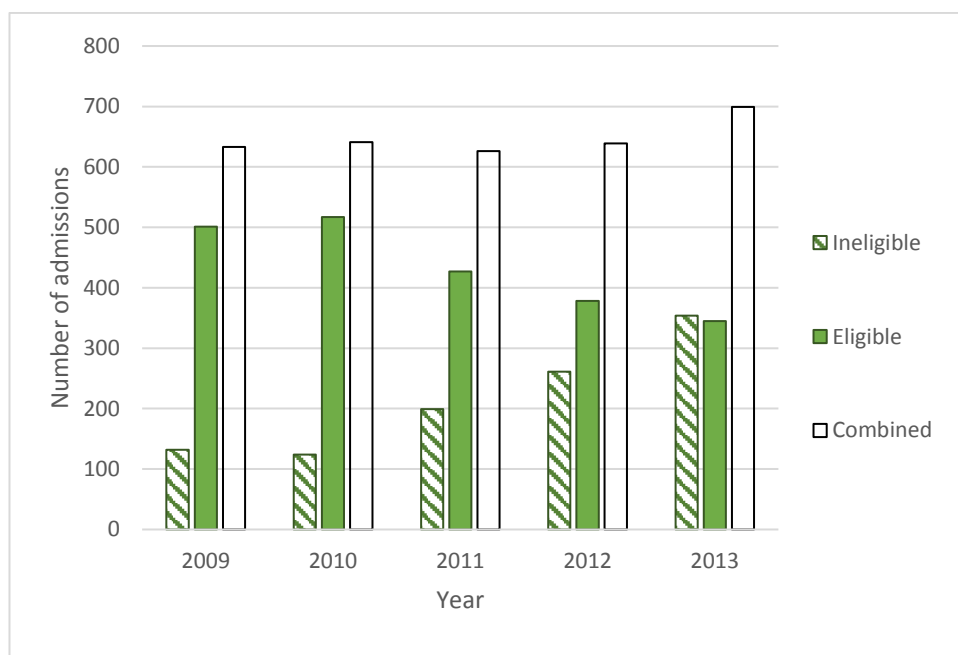
Seven possible explanations are categorised as: ABF; demographic factors; disease factors; social factors; hospital policy; clinical practice; and coding practice.

4.3.1 Activity Based Funding

One possible explanation for the decline in the number of patients admitted to Blacktown Hospital is that more patients with COAD were receiving treatment for their condition in a location other than that of an acute hospital - which is an intended outcome of ABF. If this were the case, the number of patients admitted to hospital and coded to the 'eligible' category would be expected to decline, and the number of patients coded to the 'ineligible' category would not change greatly over the same period.

Figure 4.5 presents the change in admissions of these two categories of patients in Blacktown Hospital.

Figure 4.5: Admissions of patients to Blacktown Hospital with COAD, coded as 'eligible', or 'ineligible', 2009 to 2013



From 2010 to 2012, the total number of patients admitted to Blacktown Hospital with COAD remained relatively constant. However, those coded to the 'ineligible' category nearly trebled, while those coded to the 'eligible' category declined by one-third. These trends in admission for each category of patients were statistically significantly different from zero ($0.02 > p > 0.01$).

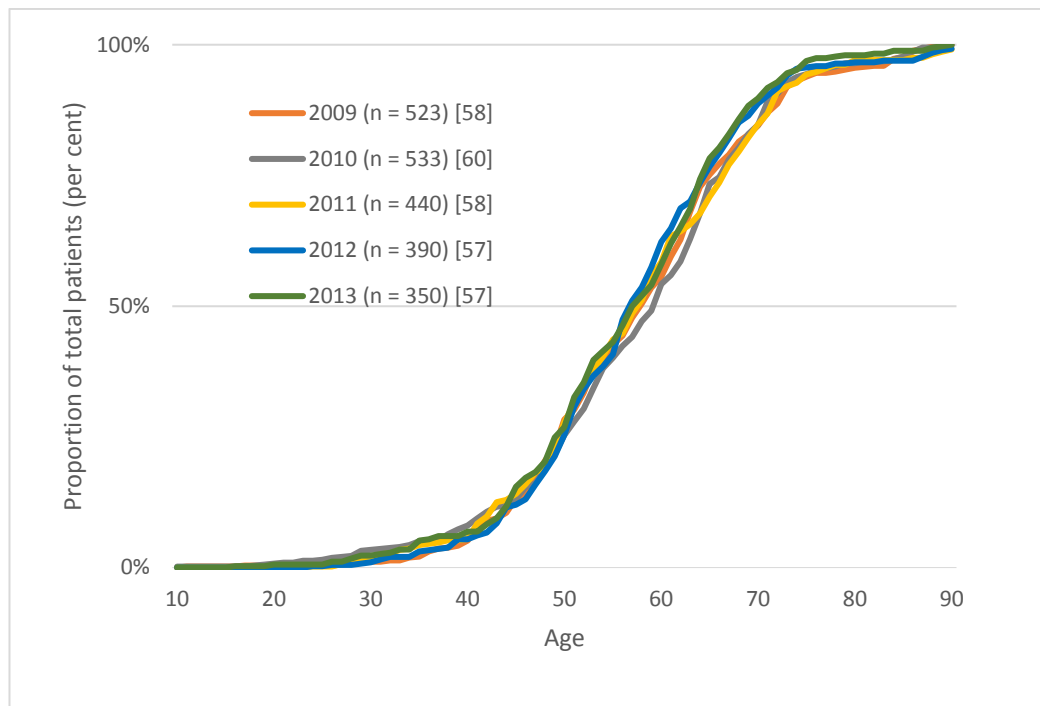
This pattern of change is inconsistent with that intended by the introduction of ABF, and therefore other possible explanations for the changes in the throughput of patients were sought.

4.3.2 Demographic Factors

A possible explanation for the decrease in the number of patients admitted is a change in the demographic profile of those patients. If patients are diagnosed with COAD at a younger age, early intervention (and effective treatment) may delay the progression of the condition, resulting in fewer of those patients in the older age groups being admitted to hospital and coded to the 'eligible' category.

Figure 4.6 presents the cumulative age-distribution calculated for patients admitted to Blacktown Hospital with COAD, and coded to the 'eligible' category, as well as the annual number of admissions, and the median age of these patients.

Figure 4.6: Age-distribution of patients admitted to Blacktown Hospital with COAD, coded as 'eligible', 2009 to 2013



Note: n= total number of admissions in each of the five years of the study; figures in square brackets denote the median age of each cohort of patients

The median age of patients admitted to Blacktown Hospital who were coded as 'eligible' for treatment in a setting other than that of an acute hospital did not vary greatly, over the five years of the study, and the trend was not statistically significant, ($0.30 > p > 0.20$).

The change in age distribution is therefore unlikely to account for much, if any, of the changes in the numbers of patients with COAD, and coded to the 'eligible' category admitted over the five-years of the study.

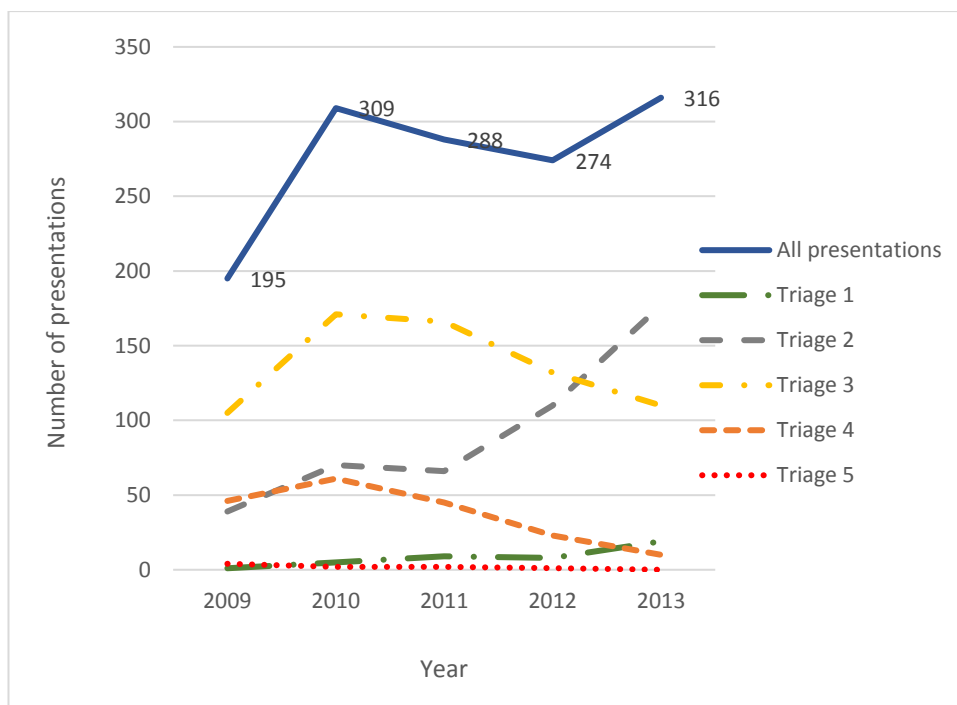
4.3.3 Disease Factors (community morbidity)

Another possible explanation for the decline in the number of patients, and coded to the 'eligible' category, is a reduction in the prevalence of this condition in the community i.e., fewer people were suffering from, and being diagnosed with COAD. If there was a decrease in community morbidity, it would be expected that fewer people would present to the Emergency

Department of Blacktown Hospital with COAD. Further clarification may arise also from analysis of the assignment to one of the five Triage Categories of each person who did present to the Emergency Department.

Figure 4.7 presents the number of presentations to the Emergency Department of Blacktown Hospital of people coded to COAD, and their distribution between the five Triage Categories, 2009 to 2013.

Figure 4.7: Total presentations for COAD to the Emergency Department of Blacktown Hospital by Triage Category, 2009 to 2013



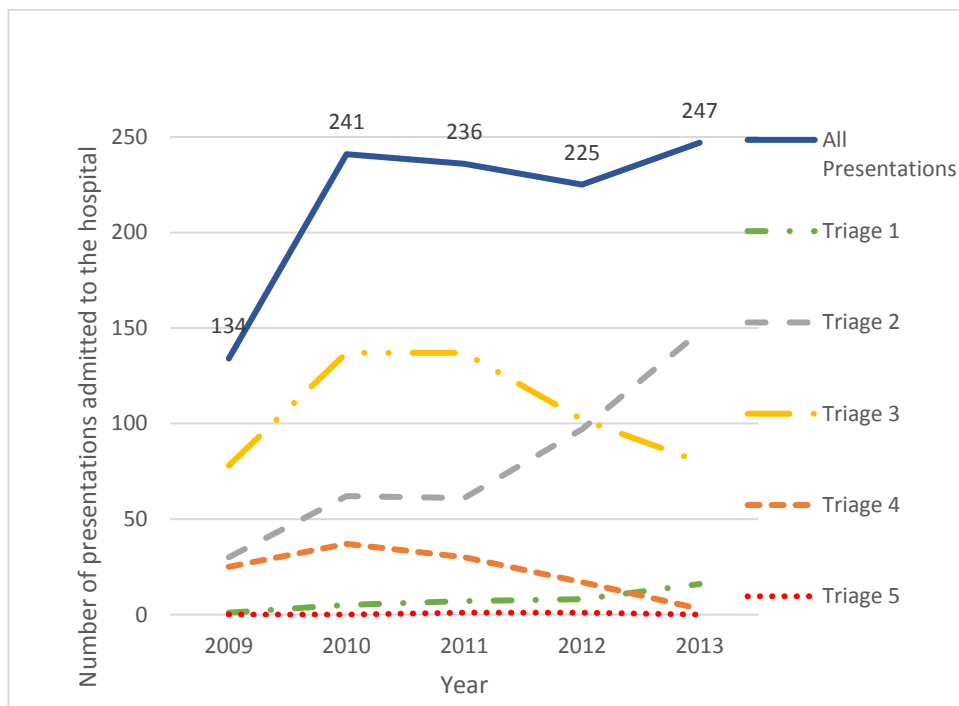
The total number of presentations rose substantially from 2009 to 2010, but remained relatively steady thereafter. However, from 2011 to 2013, the number of patients requiring Resuscitation or Emergency care (Triage Categories 1 and 2) quadrupled, while those people requiring Urgent or Semi-Urgent care (Triage Categories 3 and 4) halved.

These changes could be the result of increasingly serious community morbidity, which is consistent with the change in the ratio of 'eligible' and

‘ineligible’ admissions shown in Figure 4.5, where more patients were admitted to hospital with catastrophic complications or co-morbidities, over the study period.

The explanation of increased community morbidity can be tested by analysing the number of admissions to the hospital from the Emergency Department, which would be expected to show a similar pattern to that shown in Figure 4.7. Figure 4.8 shows the result of this analysis.

Figure 4.8: Total presentations for COAD treated in the Emergency Department of Blacktown Hospital and subsequently admitted to the hospital, by Triage Category, 2009 to 2013



The total number of people admitted to the hospital from the Emergency Department, rose sharply from 2009 to 2010, but remained relatively steady thereafter. Admissions from Triage Categories 1 and 2 rose substantially from 2011 onwards, accompanied by a decline in admissions from Triage Categories 3 and 4.

This pattern in both the number of presentations and admissions could be the consequence of increasingly serious community morbidity. The decline in the number of admissions of less-seriously ill people in Triage Categories 3 and 4 could also be due to improved community-based services which provide care for such people outside the hospital setting. If this were so, it should be reflected in increased numbers of patients being discharged from the Emergency Department without being admitted to hospital.

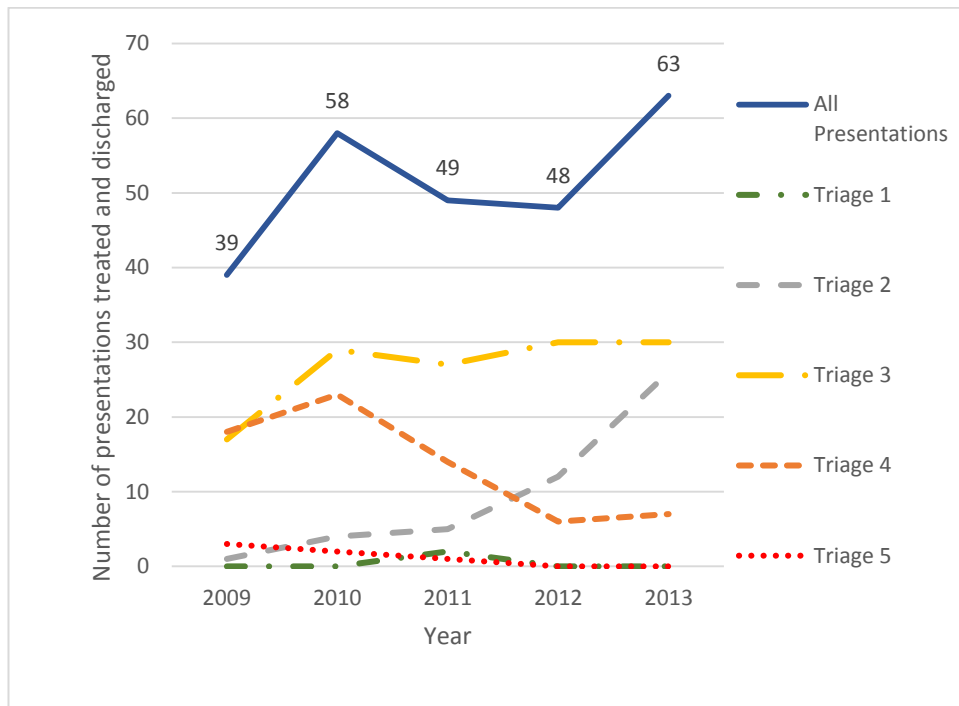
Therefore, the next step in this analysis is to examine the possibility that these social factors might account for the change observed for this category of patient at Blacktown Hospital.

4.3.4 Social Factors

Another possible explanation for a decline in the number of patients admitted with COAD, and coded to the 'eligible' *category*, is that there was an increase in the level of support available to care for these patients, and to treat their chronic illnesses in the community, either after they were discharged from hospital, or reducing the need for their admission in the first place.

If this were the case, more of those people who presented to the Emergency Department would be treated within, and then discharged from, the Emergency Department, rather than being admitted to the hospital. Figure 4.9 shows these data.

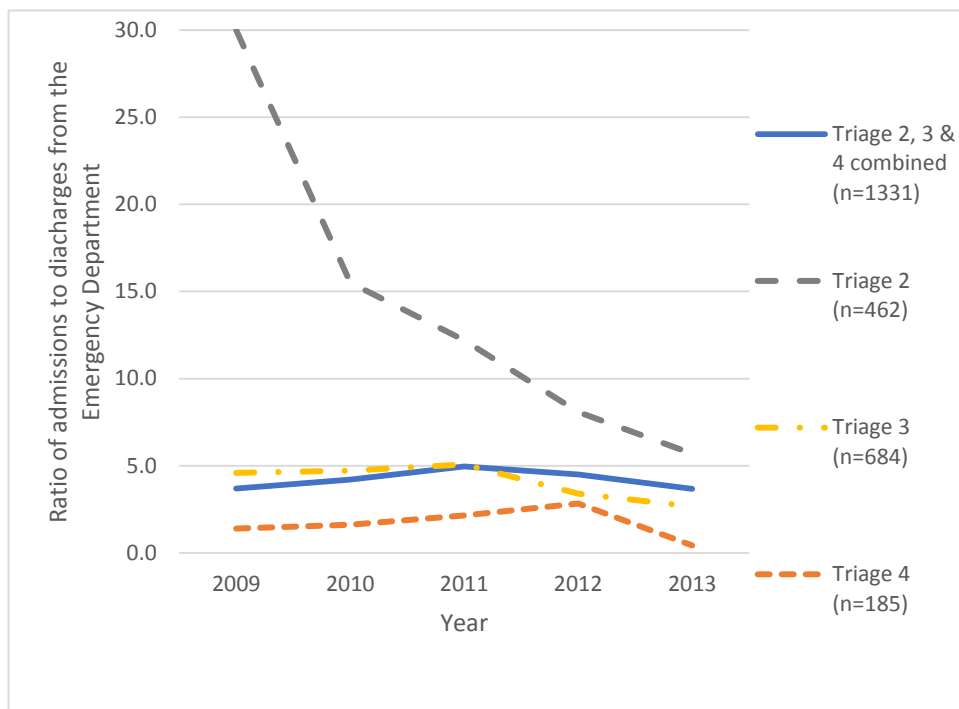
Figure 4.9: Total presentations for COAD treated in, and discharged from the Emergency Department of Blacktown Hospital, by Triage Category, 2009 to 2013



There was a modest increase in the number of people who presented, were treated and then discharged from the Emergency Department, without being admitted to the hospital. Interestingly, most of this increase was accounted for by (the relatively unwell) people assigned to Triage Category 2, although the numbers in all Triage Categories are comparatively small. The changing balance between admission to hospital, and discharge from the Emergency Department for people with COAD can be seen in the ratio of hospital admissions to discharges, as shown in Figure 4.10.

This analysis focused on patients in Triage Categories 2, 3 and 4, since the numbers in Triage Categories 1 and 5 were small, making the admission-to-discharge ratio less meaningful for these Categories.

Figure 4.10: Ratio of hospital admissions to discharges from the Emergency Department of Blacktown Hospital, 2009 to 2013



Note: n = total number of presentations over the five years of the study

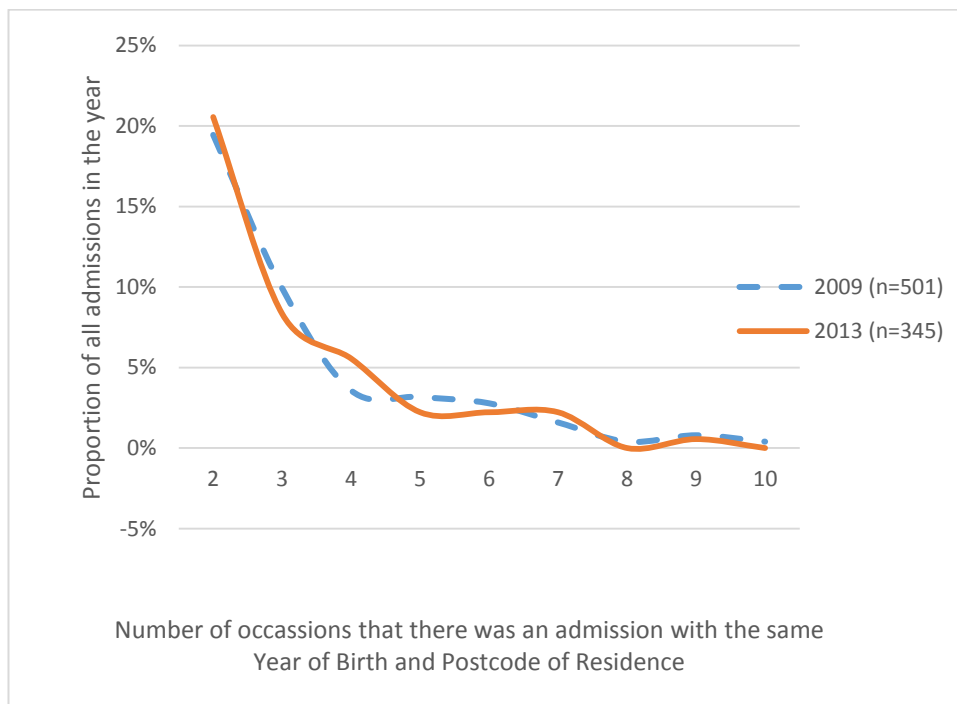
The ratio of admissions to discharges from the Emergency Department, for the three Triage Categories (Triage Category 2, 3 and 4) combined, remained between four and five, and did not change greatly over the five years of the study. However, there was a pattern of decline in the ratio of admissions to discharges from the Emergency Department across the years, in each of the three Triage Categories, in the face of evidence consistent with increasing community morbidity from COAD (Figure 4.7), and consistent with the development of improved community-based facilities which were able to provide care for people with COAD outside the hospital (Figure 4.9).

Nevertheless, it is also possible that the change that occurred in the proportion of patients assigned to each Triage Category from 2011 to 2013 reflects a policy change in the triaging of patients at Blacktown Hospital. This explanation is explored under the heading of Hospital Policy. It is also

possible that an increase in the level of support which was available to care for these patients in the community once they were discharged from hospital, might result in the same patient being admitted to the same hospital, for the same condition, on fewer occasions. It is not possible to identify individual patients, or the appearance of the same patient in more than one dataset, since the data in the datasets contain no unique patient identifier. The best that can be done is to identify the hospital admissions of people with the same Year of Birth, and residing in the same Postcode.

Figure 4.11 presents the frequency distribution of the number of times that patients with the same Year of Birth, and residing in the same Postcode, were admitted to Blacktown Hospital with COAD, and coded to the 'eligible' category, in the years 2009 and 2013. Because the absolute number of admissions declined, the ordinate is expressed as a proportion of admissions, not the total number.

Figure 4.11: Proportion of occasions on which a patient with the same Year of Birth and residing in the same Postcode was admitted to Blacktown Hospital, 2009 and 2013



Note: n= total number of admissions in each year

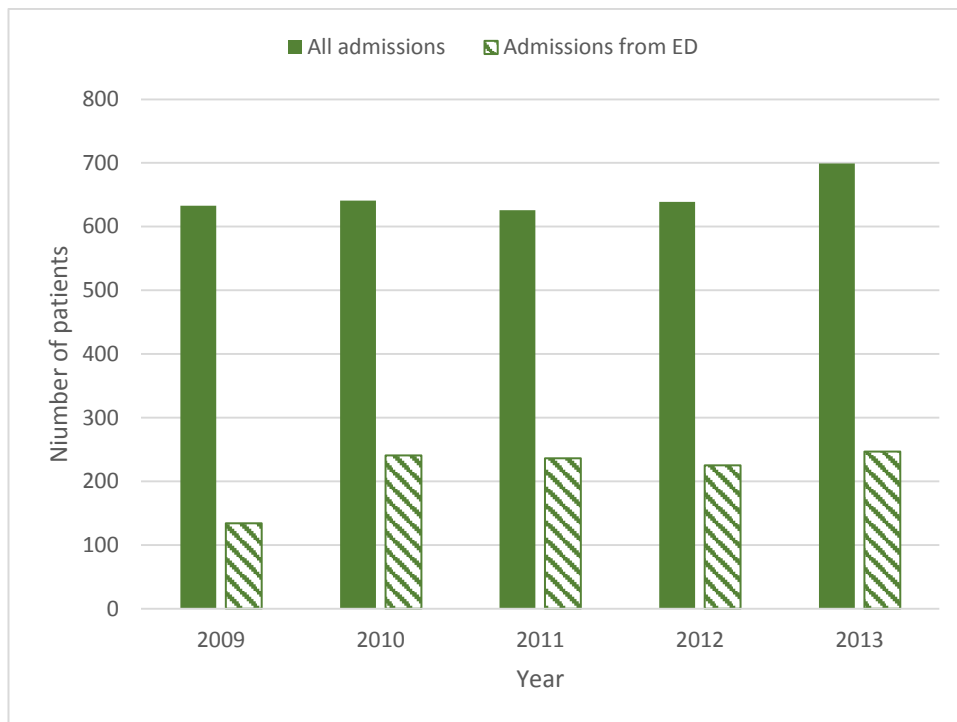
For this category of patients at Blacktown Hospital there were fewer multiple admissions in 2013 than in 2009, although this failed to reach statistical significance (chi-squared = 7.2, df = 5, $0.30 > p > 0.20$). It can be concluded that a reduction in the number of multiple admissions of the same patient is unlikely to have contributed to the increase in the number of admissions to Blacktown Hospital of patients with COAD coded to the 'eligible' category. The next step in this analysis is to examine the possibility that changes in hospital policy might account for the changes in patient throughput.

4.3.5 Hospital Policy

If a change had occurred in the State discharge policies, in line with the objectives of ABF, patients who presented to an Emergency Department and were assessed as requiring semi-urgent or non-urgent treatment (Triage Category 4 or 5), might have been referred to an alternative service provider located in the community, rather than being admitted to hospital. The number of patients admitted to Blacktown Hospital with COAD, and coded to the 'eligible' category, declined over the five years of the study (Figure 4.1), while the number admitted from the Emergency Department rose (Figure 4.7).

The hospital inpatient data set does not include information on the source of the admission, and so data on both 'eligible' and 'ineligible' admission categories must be combined so that the number of admissions from a source other than the Emergency Department can be calculated by subtraction. These data are shown in Figure 4.12.

Figure 4.12: Source of admissions of patients with COAD, to Blacktown Hospital, 2009 to 2013



From 2009 to 2010, although the total number of patients admitted remained steady, a change occurred in the balance between those patients admitted from the Emergency Department and those from other sources, with the latter falling as the former rose. After 2010, the number of patients who were admitted from the Emergency Department remained relatively steady, although as shown in Figure 4.8, there was an increase in the number of patients admitted from Triage Categories 1 and 2, which was balanced by a decline in admission of those in Triage Categories 3 and 4.

The modest increase in admissions which occurred after 2010 was due almost entirely to an increase in the number of patients with COAD admitted from sources other than the Emergency Department. There is no immediately obvious explanation for these changes, which may have been due to changes in hospital admission policies between 2009 and 2013.

This leads to the next step in this analysis which is to examine the possibility that changes in clinical practice might account for the changes in patient throughput.

4.3.6 Clinical Practice

Another possible explanation for the decline in the number of patients with COAD and coded to the 'eligible' category, is a change in the way in which hospital clinicians practised medicine i.e., a change in the treatment of individual patients, and/or the recording of clinical information in the medical record.

With the introduction of ABF, medical staff were encouraged to ensure that they made an accurate record of all clinical phenomena. If this emphasis had resulted in 'up-coding', this would result in a greater identification of patients with severe complications and comorbidities (the 'ineligible' category), rather than without complications and comorbidities (the 'eligible' category), and the absolute number of patients admitted to hospital would remain steady.

The major change observed at Blacktown Hospital was in the balance between patients with COAD who were coded to the 'eligible' and to the 'ineligible' categories (Figure 4.5), and the most likely explanation for this result is a change in the quality and comprehensiveness of medical record keeping after 2011. However, it is also possible that changes in coding practice might account for the change in patient throughput.

4.3.7 Coding Practice

Another possible explanation for the decrease in the number of patients with COAD, and coded to the 'eligible' category, is a change in the written instructions contained in the Policy and Procedures Manual used by Medical Record personnel (Coders) to assign patients to a specific disease category (an AR-DRG).

The NSW Ministry of Health, *Health Care Records - Documentation and Management 2012*, (PD2012_069) policy directive, contains no information

which suggests that any changes had taken place in the instructions given to hospital Coders as to the features of the medical record which would determine the assignment of a patient with COAD to one or the other AR-DRGs, 'ineligible' or 'eligible'.

Discussion of the significance of these explanations for Blacktown Hospital will be deferred until after the changes in throughput at Mount Druitt Hospital have been considered.

Change in throughput at Mount Druitt Hospital: having explored the seven possible explanations for the change in throughput at Blacktown Hospital, the changes in patient throughput at Mount Druitt Hospital are now discussed. The trend in the increase in the number of admissions to Mount Druitt Hospital reached the traditional level of statistical significance, however those admissions represented only 13 per cent of all admissions of this category of patient within the Western Sydney Local Health District.

While patients with COAD, coded to the 'eligible' category, generally remained in the other hospitals for between four and seven days, 79 per cent of these patients who were admitted to Mount Druitt Hospital were transferred quickly (in less than one day) to another hospital, while one per cent were transferred to a nursing home, and the remainder were discharged.

A similar pattern was observed in the analysis of patients who presented for treatment of their COAD to the Emergency Department at Mount Druitt Hospital. Of the 1,348 patients who presented to the Emergency Department with this condition, only one per cent were admitted to Mount Druitt Hospital, and the remainder were either transferred to another hospital (65 per cent), or discharged home following treatment (28 per cent), or departed for another clinical service location (five per cent).

It is concluded that these atypical features of the management of patients with COAD at Mount Druitt Hospital do not justify detailed exploration of the possible reasons for the increase in the throughput of these patients.

4.4 Discussion of changes in hospital patient admissions

The increasing presentation of patients to the Western Sydney hospitals' Emergency Departments with COAD over the period of the study, and the apparent increase in the clinical severity of those presentations, suggests that a review of the records of the Environmental Protection Agency for data on air quality in Western Sydney over the period of the study might be indicated. A deterioration in local air quality would be expected to result in an increase in the number of patients who presented to the Emergency Department with a range of respiratory conditions, including COAD, asthma and others. However, the conduct of such a review is outside the scope of this thesis, and was not pursued.

At Blacktown Hospital the decline in the number of admissions of patients with COAD, and coded to the 'eligible' category, was accompanied by an increase in the number of patients admitted and coded to the 'ineligible' category, while the total number of patients admitted year-on-year did not change greatly.

There are two possible explanations for this result: an increase in the prevalence of COAD in the community, which is unlikely, given that the absolute number of patients admitted to this hospital did not change greatly; and/or a change in the documentation in the medical records of patients at Blacktown Hospital. There is some evidence consistent with progressive 'up-coding' in the case of Blacktown Hospital (Figure 4.5), most possibly as a result of more accurate recording of patients' clinical condition in their medical record.

Patients who were initially admitted to Mount Druitt Hospital were transferred to another hospital comparatively quickly, and the Length of Stay for the majority of patients in the 'eligible' category admitted to that hospital was less than one day. This pattern of the throughput of patients at the Mount Druitt Hospital, suggest that this hospital acts more like a casualty clearing station than an acute hospital. The data from this hospital contributed little to answering the research question, and they have been excluded from the analysis reported in the next section.

In spite of variations between the performance of the ABF hospitals, in both the Western Sydney and Hunter New England Local Health Districts, it may reasonably be concluded that there was no overall policy shift by the Local Health Districts in response to the introduction of ABF, or, if there was such a shift, it proved ineffective in its implementation.

The findings from analyses to answer Question three: *what is the financial consequences of these changes, expressed in terms of the balance between available revenue and resource use?* - are presented next.

4.5 Financial implications of Activity Based Funding

The PARI is an indicator of the balance between the potentially available revenue and the resources required to treat patients with COAD, and coded to the 'eligible' category for each hospital receiving ABF, and for the respective Local Health District as a whole. For each Local Health District, the PARI for all hospitals combined is anchored at 100 for 2009. The trend of a rise in the PARI, over the five years of the study, is caused by a decline in the duration of hospital stay for these patients.

Figures 4.13 and 4.14 present the PARI performance of the individual hospitals in the Western Sydney, and Hunter New England Local Health Districts, in treating patients admitted with COAD, who were coded as 'eligible' for treatment in a setting other than that of an acute hospital, and compared with the combined performance of all the hospitals in the Local Health District, from 2009 to 2013. The data for Mount Druitt Hospital and Kurri Kurri Hospital have not been included, for the reasons stated previously.

Figure 4.13: PARI for each Western Sydney hospital, and for all hospitals combined, for patients with COAD coded as 'eligible', 2009 to 2013

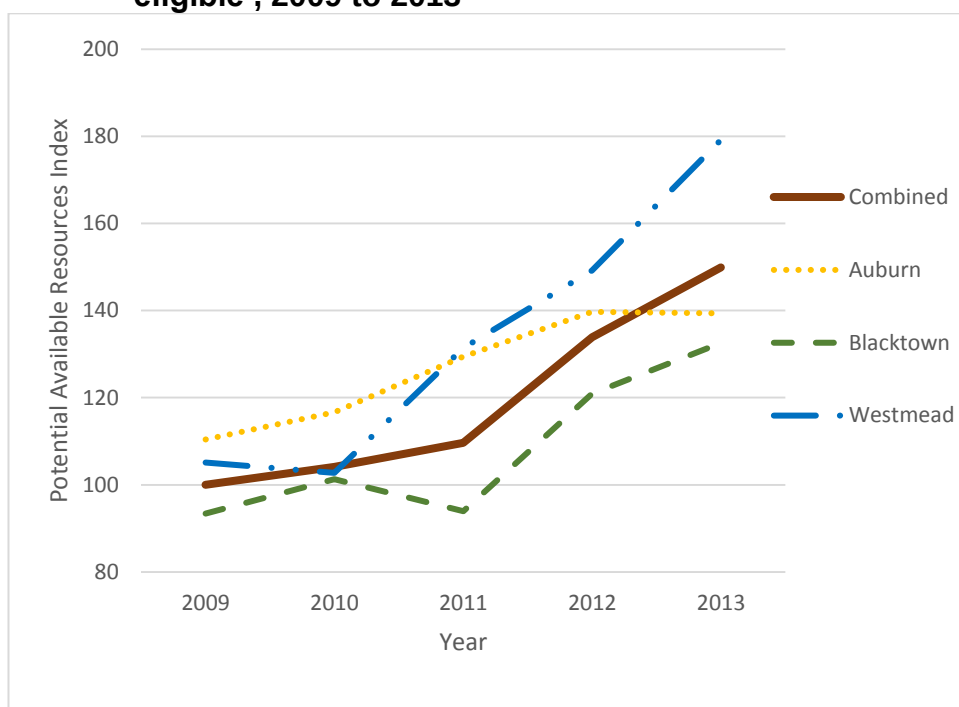
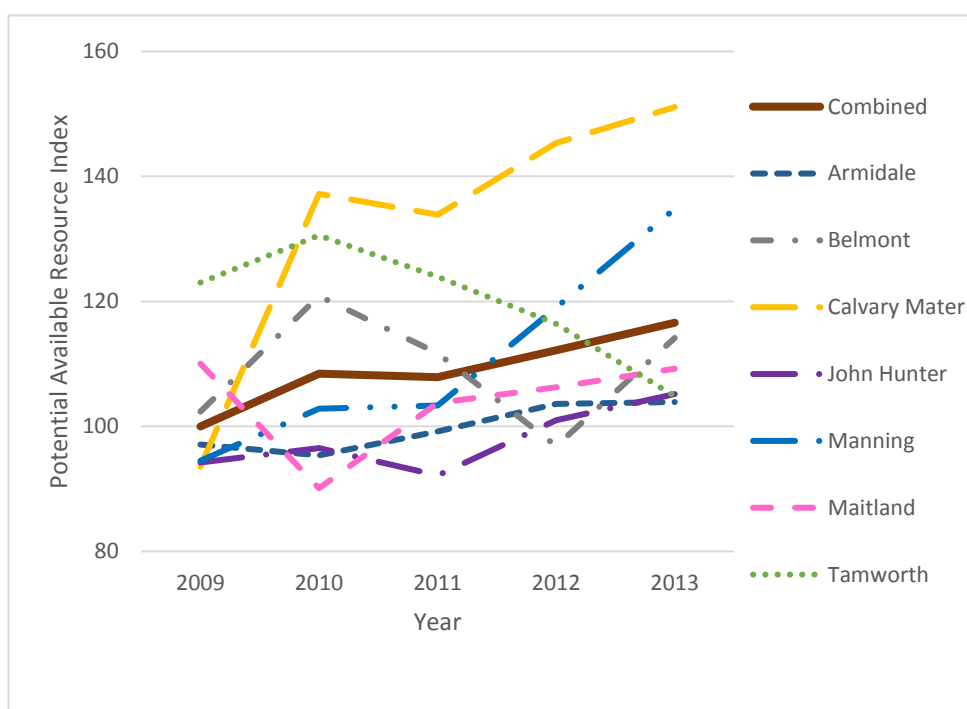


Figure 4.14: PARI for each Hunter New England hospital, and for all hospitals combined, for patients with COAD coded as 'eligible', 2009 to 2013



The combined PARIs for Western Sydney and for Hunter New England both showed an increase, which became more marked after the introduction of ABF in 2011. The principal contributor to the Western Sydney hospitals' rise in PARI was Westmead, with Auburn showing a less marked rise. For Blacktown Hospital, the PARI was low initially, but rose steadily after 2011. If the revenue from ABF were to be passed on to individual hospitals, Westmead and Auburn Hospitals would benefit most. While initially Blacktown Hospital appeared to use more resources to treat those patients than would have been available from ABF, this trend was reversed after 2011.

The principal contributors to the Hunter New England hospitals' rise in PARI were the Calvary Mater and Manning Base Hospitals, while Belmont Hospital showed variation in the rise and fall in the PARI over the five years of the study. If the revenue from ABF were to be passed on to individual hospitals, the Calvary Mater and Manning Base Hospitals would benefit most. The John Hunter Hospital initially used more resources to treat these patients than would have been available from ABF but this trend was reversed in 2012, and by 2013 the PARI for John Hunter Hospital was 104.

These findings suggest that ABF may have acted as a financial incentive for hospitals to reduce the duration of patients' stays in hospital, with the exceptions of Belmont and Tamworth Base Hospitals in the Hunter New England Local Health District. The final conclusion to be drawn from these findings, and the implications, are presented in chapter seven.

Chapter 5: Diabetes

5.1 Introduction

The focus of this chapter is those patients admitted to hospitals that receive ABF in the Western Sydney and Hunter New England Local Health Districts, with a primary diagnosis of diabetes, coded as being without catastrophic complications or co-morbidities (the 'eligible' category), or to diabetes with catastrophic complications or co-morbidities (the 'ineligible' category). The reason for analysing the throughput of patients hospitalised with diabetes is that this is a chronic condition, exacerbations of which may not necessarily require treatment in hospital (MoH 2013).

Diabetes is a chronic disease, which occurs when the pancreas does not produce enough insulin, or when the body cannot use effectively the insulin produced by the pancreas (AIHW 2015). This leads to an increased concentration of glucose in the blood (hyperglycaemia). There are three types of diabetes. Type 1 diabetes is characterised by a lack of insulin production by the pancreas. Type 2 diabetes is caused by the body's ineffective use of insulin. It often results from excess body weight and physical inactivity. The third type, gestational diabetes, is hyperglycaemia that is first recognised during pregnancy (AIHW 2015).

Diabetes is claimed to 'affect more than four per cent of Australians, at least 10 per cent of the elderly, and up to 30 per cent of some Aboriginal communities' (AIHW 2014). In 2012–2013, the total national expenditure on the treatment of patients with diabetes was estimated to be \$138.7 billion, of which \$55.9 billion was for hospital care (AIHW 2014). The average annual cost for each patient diagnosed with diabetes in 2015 was about \$1,700 for men and \$2,100 for women. Twenty nine per cent of these costs were for hospital care, 20 per cent for pharmaceuticals, and 14 per cent was expended on medical services' (AIHW Media Release, 17 May 1999).

The chapter is structured as follows. An overview is given of the hospital throughput of all patients with diabetes in each Local Health District. The analysis then focuses on more detailed changes in the throughput of patients with diabetes over the five years of the study. For those hospitals where a change in throughput of patients coded to the 'eligible' category was found to be statistically significant (or was very close to being so), seven categories of explanation for those changes are explored. The overall findings from the analyses are discussed. The focus of the analysis is then expanded to examine the balance between the potentially available revenue and the resources required to treat this category of patient, in each hospital, in each Local Health District.

5.2 Patient throughput

Over the 5 years of the study, 3,299 patients with a principal diagnosis of diabetes were admitted to one of the four hospitals in the Western Sydney Local Health District that received ABF, of whom 76 per cent were coded to the 'eligible' category.

Over the same period, 3,345 patients with a principal diagnosis of diabetes were admitted to one of the eight hospitals in the Hunter New England Local Health District that received ABF, of whom 75 per cent were coded to the 'eligible' category.

Figures 5.1 and 5.2 present the number of admissions of all diabetic patients, coded as 'eligible' for treatment in a setting other than that of an acute hospital, for the two Local Health Districts.

Figure 5.1: Admissions of patients with diabetes, coded as 'eligible', to Western Sydney hospitals, 2009 to 2013

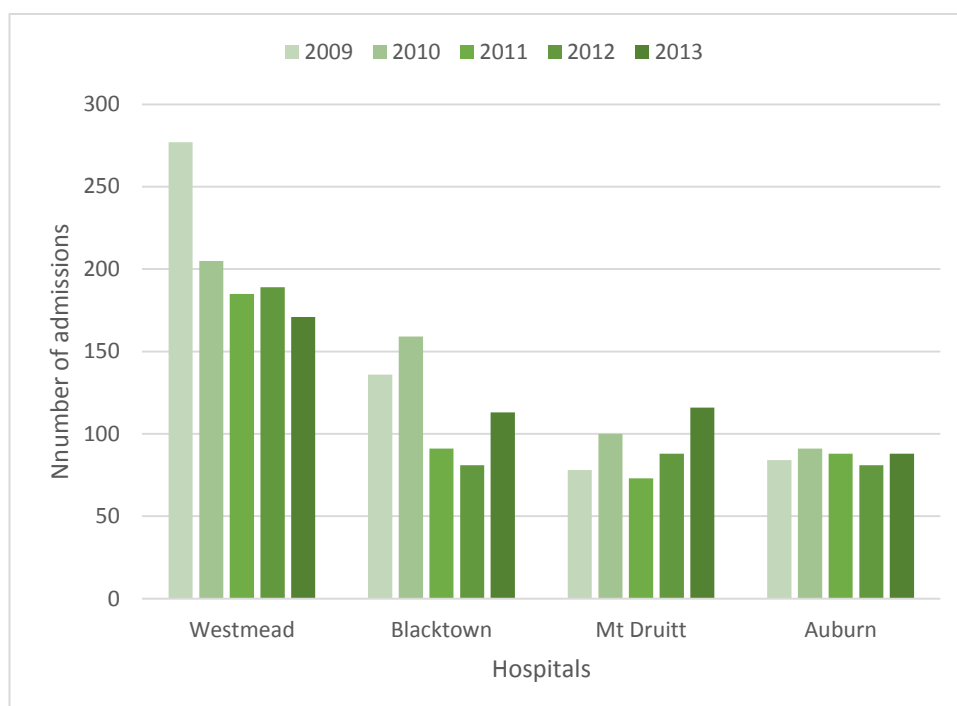
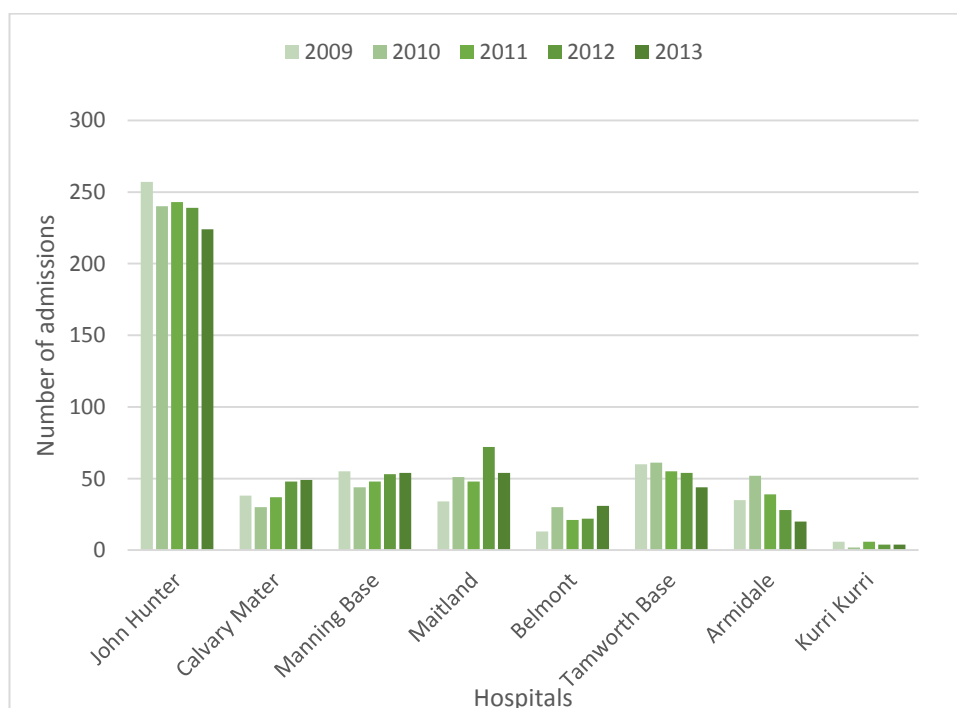


Figure 5.2: Admissions of patients with diabetes, coded as 'eligible', to Hunter New England hospitals, 2009 to 2013



For this patient category in the Western Sydney Local Health District, there was a trend of gradually declining admissions to Westmead Hospital. At Blacktown and Mount Druitt Hospitals, patient admissions varied from one year to another, while at Auburn Hospital there was little change in the throughput of patients over the study period. None of these changes were statistically significantly different from zero.

In the Hunter New England Local Health District the number of patients admitted with diabetes, and coded to the 'eligible' category in each of the hospitals, varied over the study period. The annual number of admissions to each of these hospitals was less than 70, with the exception of the John Hunter Hospital, which admitted around 250 patients each year. For the John Hunter, Tamworth Base and Armidale hospitals, there was a non-significant trend of declining admissions, 2009 to 2013. For the Calvary Mater and Maitland Hospitals there was a trend of an increase in the number of admissions from 2009 to 2012, followed by a decrease in 2013. For each year at Belmont and Kurri Kurri Hospitals, less than 30 patients were admitted with diabetes and coded to the 'eligible' category.

Thus, for this category of patient, there was no consistent pattern of change across the Western Sydney Local Health District, as a whole. And, in the Hunter New England Local Health District hospitals, there is little to be inferred from the individual patterns of change observed.

Figure 5.3 and 5.4 present the admission rates (standardised to 100 admissions per year) for each hospital, and for all hospitals combined, in each Local Health District.

Figure 5.3 Annual standardised admission rate for patients with diabetes, coded as 'eligible', in Western Sydney hospitals

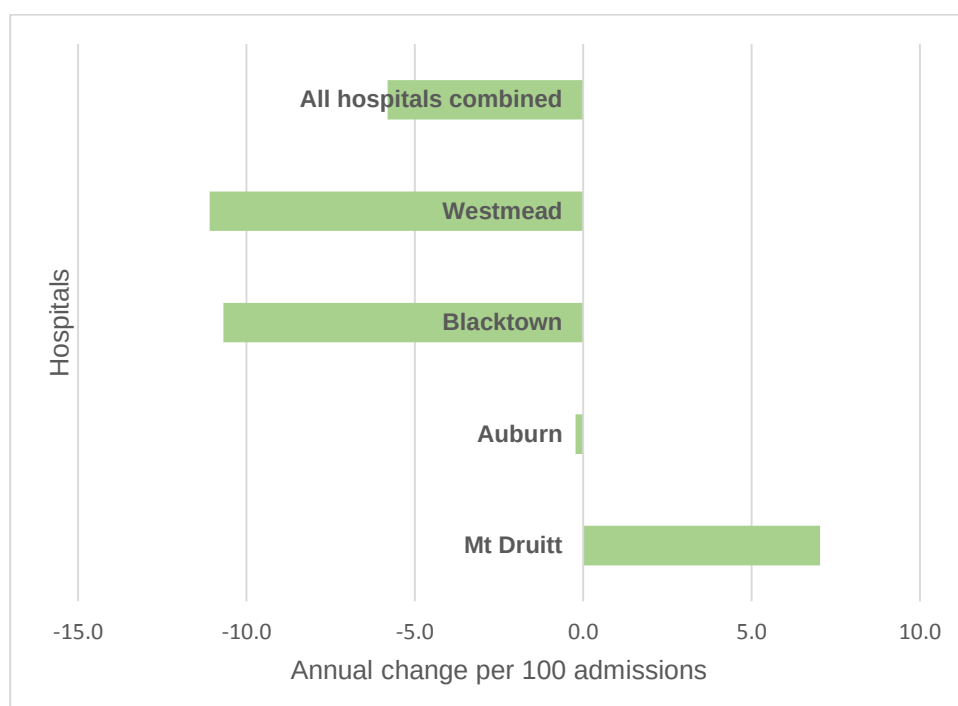
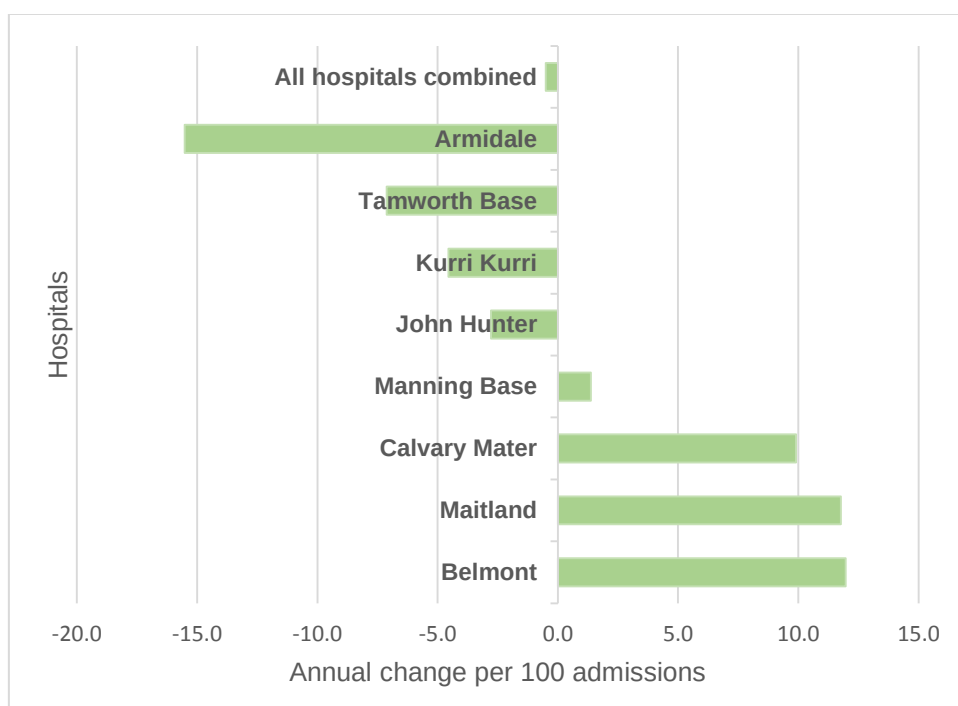


Figure 5.4 Annual standardised admission rate for patients with diabetes, coded as 'eligible', in Hunter New England hospitals



For this patient category there was a decrease in the standardised annual number of patients admitted to each of the hospitals in the Western Sydney Local Health District, over the study period, with the exception of Mount Druitt Hospital, where for every 100 patients admitted there was an average increase of seven admissions per year. The greatest decline in admissions was observed at Westmead and Blacktown Hospitals. However, even for Westmead Hospital the rate of decline (11.1 admissions) was not statistically significantly different from zero, although it did approach that level ($p=0.054$), which makes it worthy of further exploration.

In the Hunter New England Local Health District, the greatest increase in the number of standardised admissions each year was at Belmont Hospital (12.0 admissions), followed by Maitland (11.8 admissions), Calvary Mater (9.9 admissions), and Manning Base Hospital (1.4 admissions). Over the five years of the study, all the other ABF hospitals experienced a decline in the number of admissions per year. The probability that any of these trends was statistically significantly different from zero, failed to reach the traditional level of significance, with the exception of the John Hunter Hospital where the decline in the number of admissions to this category of patient was statistically significantly different from zero ($0.05 > p > 0.025$).

Therefore, for seven of the eight hospitals in the Hunter New England Local Health District, no inference should be drawn from the small reductions or increases in admissions of this category of patient. The decline in the number of admissions at the John Hunter Hospital, does warrant further investigation to determine whether the change observed could be accounted for by the introduction of ABF.

Because Westmead and the John Hunter Hospital had the greatest number of admissions for patients with diabetes, and the greatest change in throughput, possible explanations for the changes observed in the throughput of patients, at these two hospitals are explored further.

5.3 Possible explanations for the changes in throughput at Westmead and John Hunter Hospitals

Seven possible reasons are categorised as: ABF; demographic factors; disease factors; social factors; hospital policy; clinical practice; and coding practice.

5.3.1 Activity Based Funding

One possible explanation for the decline in the number of patients admitted to Westmead Hospital and to the John Hunter Hospital with diabetes, and coded to the 'eligible' category, is that more patients with diabetes were receiving treatment for their condition in a location other than that of an acute hospital, which is an intended outcome of ABF. If this were the case, the number of patients admitted to these hospitals with diabetes, and coded to the 'eligible' category would decline, and the number of patients coded to the 'ineligible' category would not change greatly over the same period.

Figures 5.5 and 5.6 present the changes in admissions of these two categories of patients ('eligible' and 'ineligible') to the Westmead and John Hunter Hospitals.

Figure 5.5: Admissions of patients to Westmead Hospital with diabetes, coded as 'eligible', or 'ineligible', 2009 to 2013

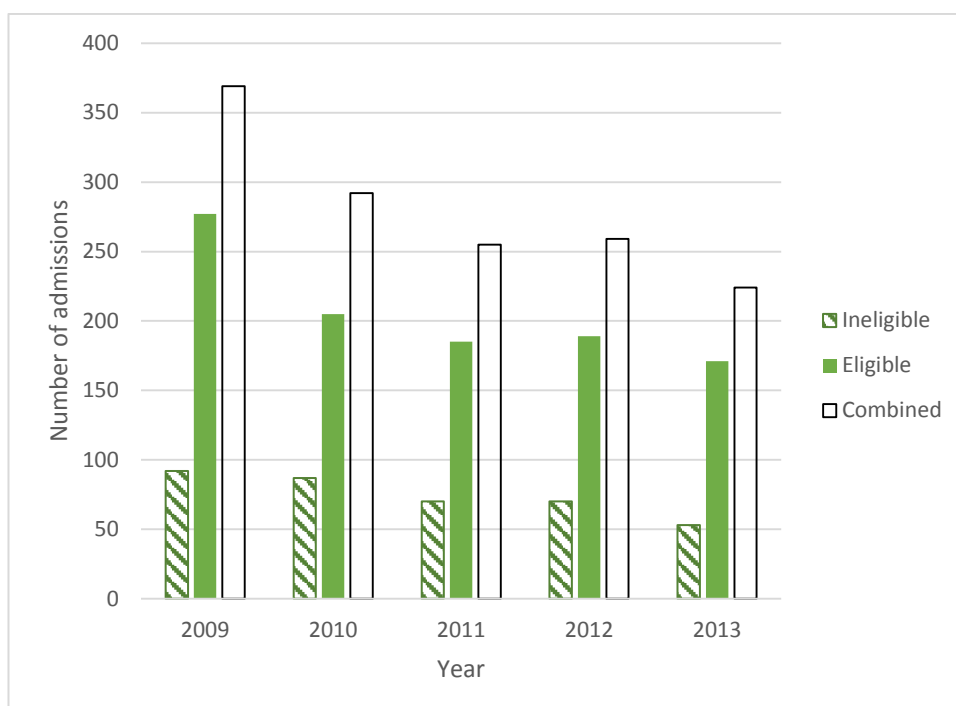
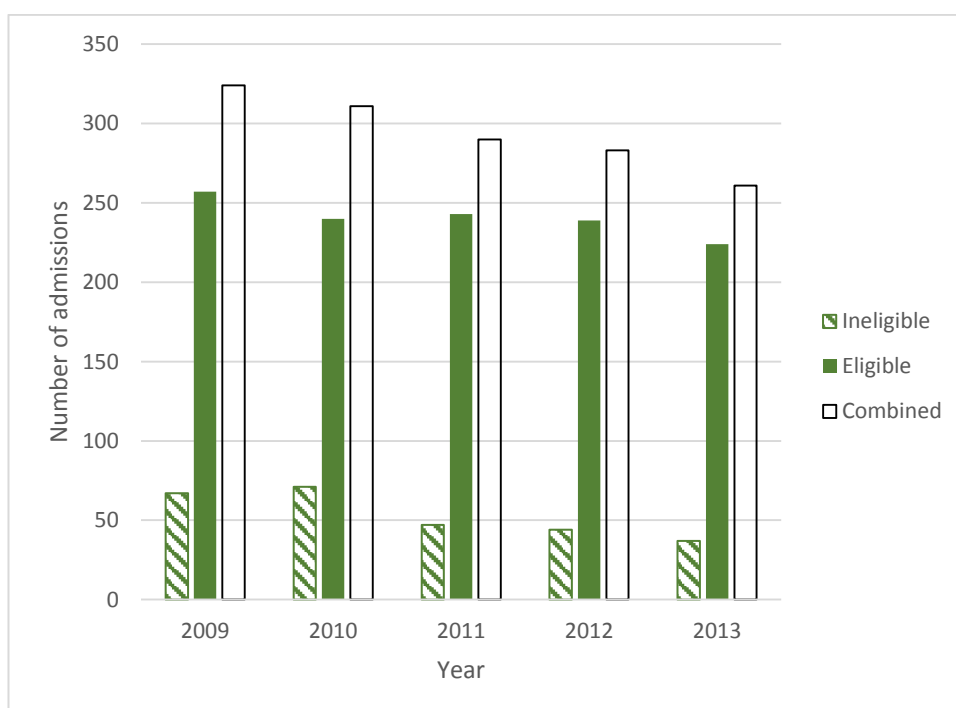


Figure 5.6: Admissions of patients to John Hunter Hospital with diabetes, coded as 'eligible', or 'ineligible', 2009 to 2013



From 2009 to 2013, the number of patients admitted to Westmead Hospital and to the John Hunter Hospital with diabetes declined, both in the 'eligible' and in the 'ineligible' patient categories. For Westmead Hospital the trend of change in the total number of admissions (for both categories combined) was statistically significantly different from zero ($0.05 > p > 0.025$). For the John Hunter Hospital the declines in both the 'eligible' and 'ineligible' patient categories were statistically significant. The probability of the difference from zero occurring by chance for both categories of patients was $0.05 > p > 0.025$.

These patterns of reduction in the throughput of patients with diabetes, and coded to the 'eligible' category, are consistent with that intended by the introduction of ABF, but the corresponding decline in the 'ineligible' category is not. Therefore, other possible explanations for the changes in the number of patients admitted to these two hospitals, were sought.

5.3.2 Demographic Factors

Another possible explanation for the decline in the number of patients admitted with diabetes, and coded to the 'eligible' category is a change in the demographic profile of these patients. If patients are diagnosed with diabetes at a younger age, early intervention (and effective treatment) may delay the progression of the disease, resulting in a greater number of younger patients, when they are admitted to hospital, being coded to the 'eligible' category.

Figures 5.7 and 5.8 present the cumulative age-distribution calculated for patients admitted to Westmead Hospital and to the John Hunter Hospital with diabetes, and coded to the 'eligible' category, as well as the annual number of admissions, and the median age of these patients.

Figure 5.7: Age-distribution of patients admitted to Westmead Hospital with diabetes, coded as 'eligible', 2009 to 2013

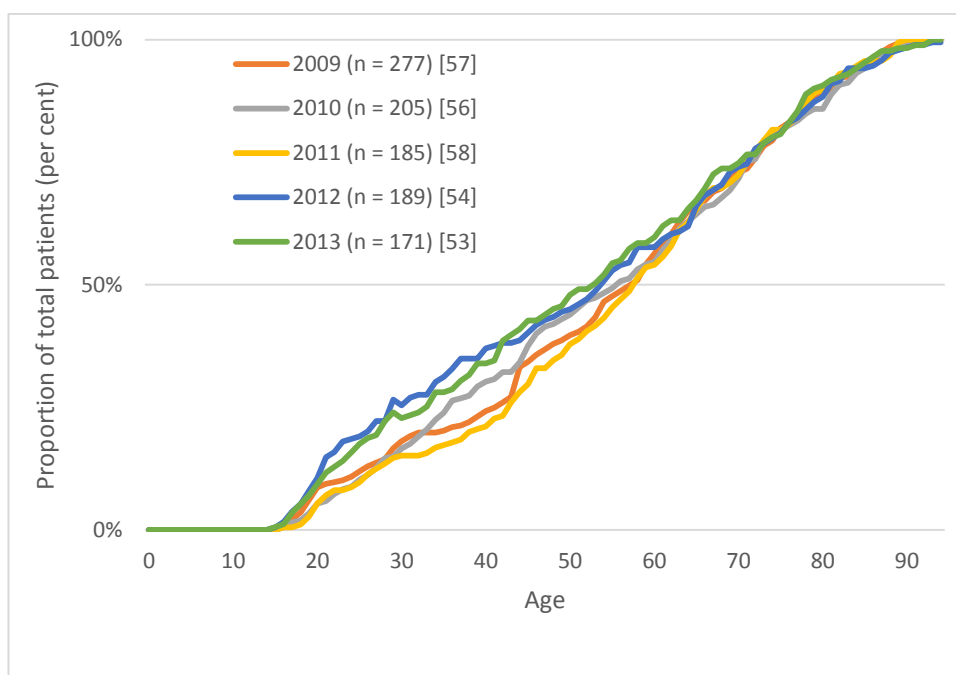
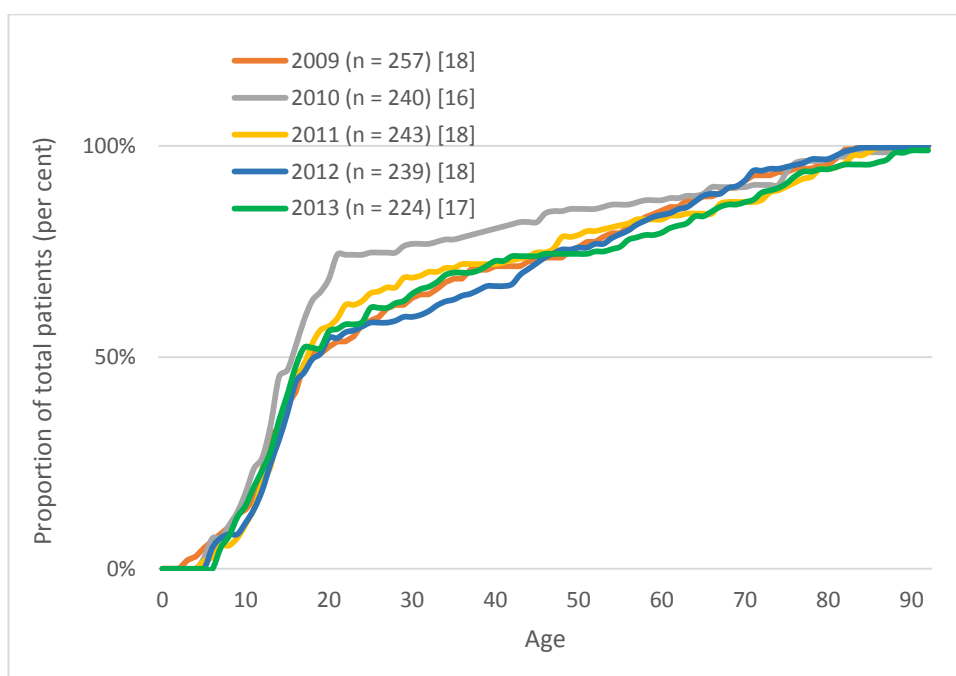


Figure 5.8: Age-distribution of patients admitted to John Hunter Hospital with diabetes, coded as 'eligible', 2009 to 2013



Note: n= total number of admissions in each of the five years of the study; figures in square brackets denote the median age of each cohort of patients

The median age of patients admitted to the Westmead Hospital with diabetes, who were coded as 'eligible' for treatment in a setting other than that of an acute hospital, declined over the five years of the study. However, this trend was not statistically significant ($0.10 > p > 0.05$).

The demographic profile of this category of patient at the John Hunter Hospital did not change greatly over the five years of the study. The relatively young median age of patients admitted to hospital with diabetes, and coded to the 'eligible' category may reflect the predominance of Type 1 (rather than Type 2) diabetes in this population.

The conclusion is that, while the demographic profile of this category of patient changed in both hospitals, these changes, were not statistically significantly different from zero, and, at Westmead Hospital, are unlikely to account for the decline in the number of patients admitted in the 'eligible' category.

This leads to exploration of community morbidity as a possible explanation for the changes observed.

5.3.3 Disease Factors (*community morbidity*)

Another possible explanation for the decline in the number of patients with diabetes, coded to the 'eligible' category and admitted to Westmead Hospital, and to the John Hunter Hospital, is a reduction in the prevalence of this condition in the community i.e., fewer people were suffering from, and being diagnosed with, diabetes. If there was a decrease in community morbidity, fewer people would be expected to present to the Emergency Departments for treatment of their diabetes and of those who did present, fewer would require immediate treatment on their arrival.

Therefore, evidence of a reduction in the prevalence of diabetes in the community as a possible explanation for the changes observed in hospital admissions may emerge from analysis of the numbers of people who presented to the Emergency Departments of Westmead Hospital and the John Hunter Hospital with diabetes, and their distribution between the five Triage Categories.

Figures 5.9 and 5.10 present the number, and distribution across the five Triage Categories, of all patients presenting to the Emergency Departments of Westmead and to the John Hunter Hospital, and coded to a principal diagnosis of diabetes, 2009 to 2013.

Figure 5.9: Total presentations to the Emergency Department of Westmead Hospital, by Triage Category, 2009 to 2013

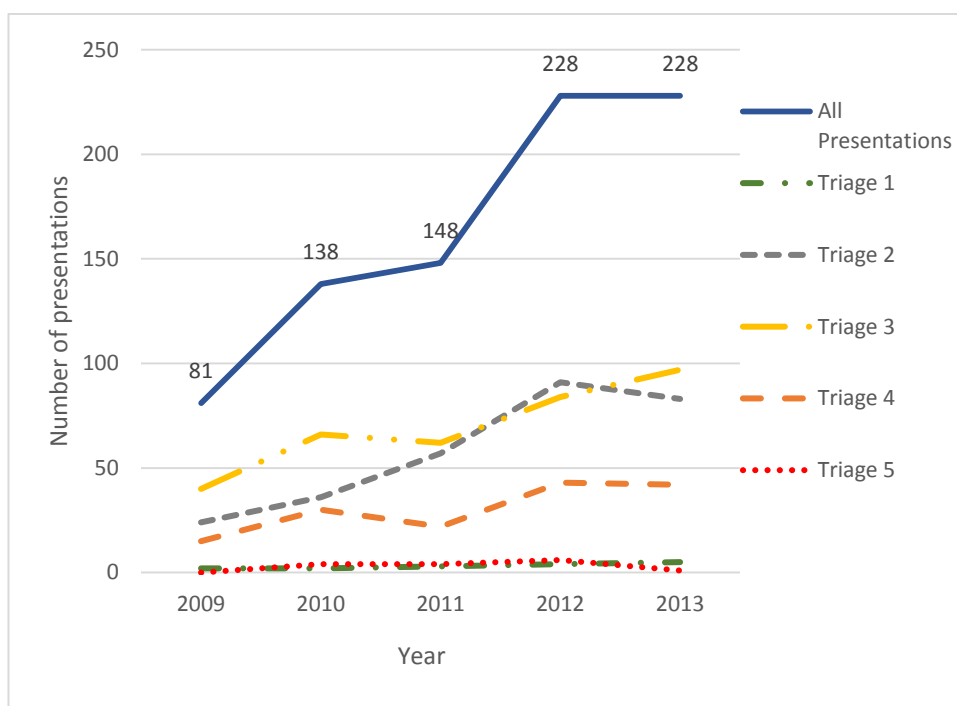
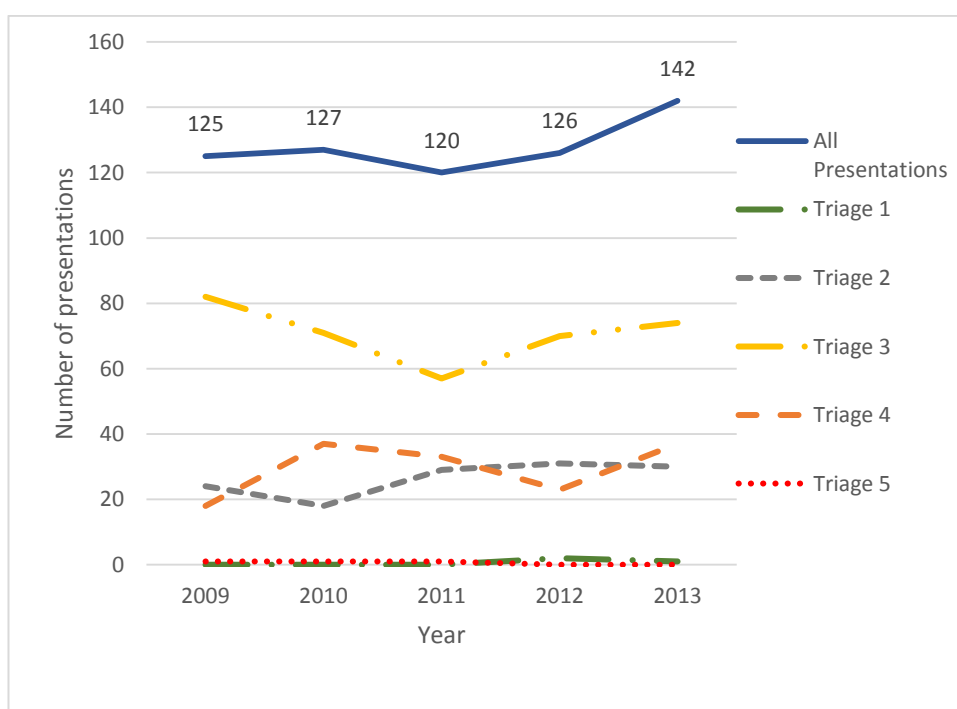


Figure 5.10 Total presentations to the Emergency Department of John Hunter Hospital, by Triage Category, 2009 to 2013



The total number of people attending the Emergency Department of Westmead Hospital for treatment of their diabetes increased more than three-fold over the five years of the study. Most of the increase was in those who, on their arrival at the Emergency Department, required Emergency treatment (Triage Category 2); with a slight increase in the number who required Urgent treatment (Triage Category 3), and only a slight increase in those requiring Semi-Urgent treatment (Triage Category 4). The numbers of people who required Resuscitation (Triage Category 1), or Non-Urgent treatment (Triage Category 5), were small and did not change.

Thus, not only were more people with diabetes presenting to the Emergency Department of Westmead Hospital for treatment, but those who did present were more unwell, and it would be expected that they would be more likely to require admission to hospital.

Over the five years, there was a modest upward trend (14 per cent over the five years) in the number of people presenting to the Emergency Department of John Hunter Hospital for treatment of their diabetes, although there was little change in the relative urgency of their need to receive treatment. The majority of these patients (55 per cent) required Urgent treatment (Triage Category 3).

The destination of these patients after their treatment in the Emergency Department may shed further light on their level of unwellness. Figures 5.11 and 5.12 present the number of admissions to these two hospitals from their respective Emergency Departments each year.

Figure 5.11: Total presentations for diabetes treated in the Emergency Department of Westmead Hospital and subsequently admitted to the hospital, by Triage Category, 2009 to 2013

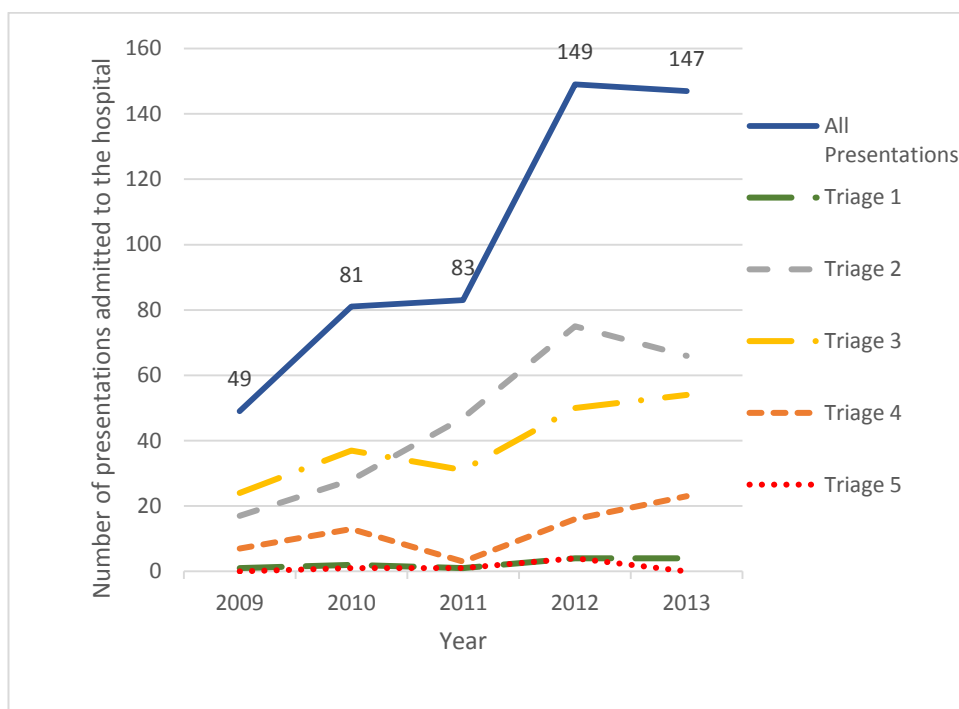
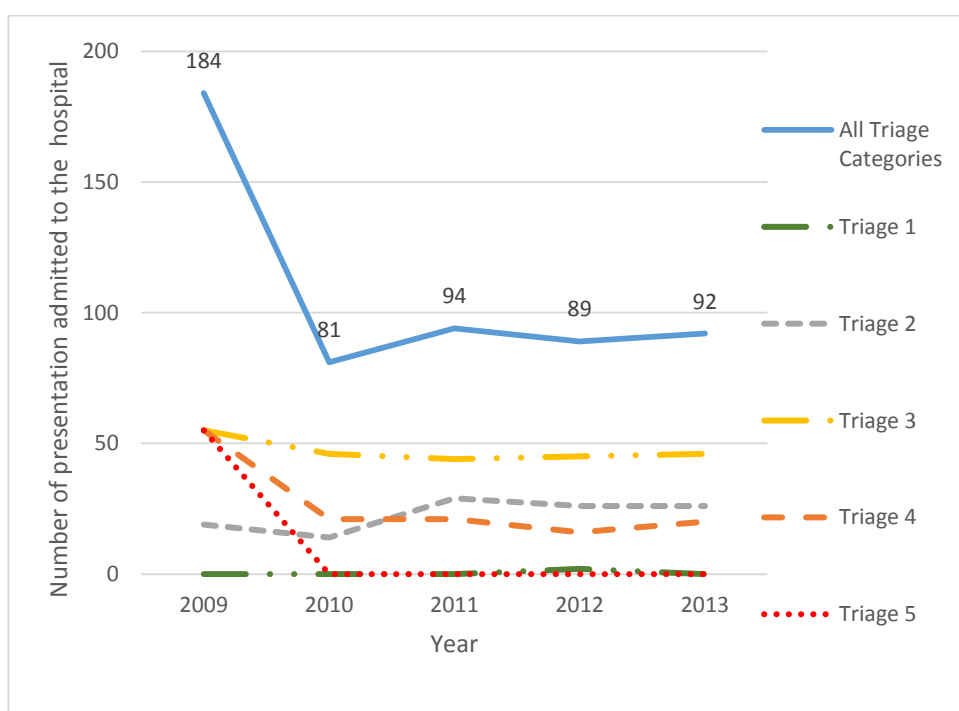


Figure 5.12: Total presentations for diabetes treated in the Emergency Department of John Hunter Hospital and subsequently admitted to hospital, by Triage Category, 2009 to 2013



The total number of people who, having presented to the Emergency Department of Westmead Hospital with diabetes, were admitted to hospital, also trebled over the five years of the study. Admissions from Triage Categories 2 and 3 rose substantially from 2011 onwards, while a less marked rise was observed for admissions from Triage Category 4. However, the proportions of patients admitted from the different Triage Categories remained relatively stable over the study period, pointing to a possible increase in community morbidity, rather than any change in admission policy.

Of all the people who attended the Emergency Department at the John Hunter Hospital for treatment of their diabetes, about 69 per cent were admitted to the hospital (to a ward or to the Intensive Care Unit), but the number was small and after an initial decrease in 2010, the number of patients admitted did not change greatly from year to year.

These findings suggest that decreasing morbidity in the community does not explain why there was a decline in the absolute number of patients admitted to the John Hunter Hospital. Nor does it appear that the change can be explained by the way that the hospital admitted, treated, or recorded the clinical details of these patients.

This leads to the next step in this analysis which is to examine the possibility that social factors might account for the change observed for this category of patient.

5.3.4 Social Factors

Another possible explanation for a decline in the number of patients admitted with diabetes, and coded to the 'eligible' category, is that there had been an increase in the level of support available to care for these patients, and to treat their chronic illnesses in the community, either after they were discharged from hospital, or reducing the need for their admission in the first place.

If this were the case, more of those people who presented to the Emergency Department with diabetes would be treated within, and then discharged from, the Emergency Department, rather than being admitted to the hospital.

Figures 5.13 and 5.14 show the data.

Figure 5.13: Total presentations for diabetes treated in, and discharged from the Emergency Department of Westmead Hospital, by Triage Category, 2009 to 2013

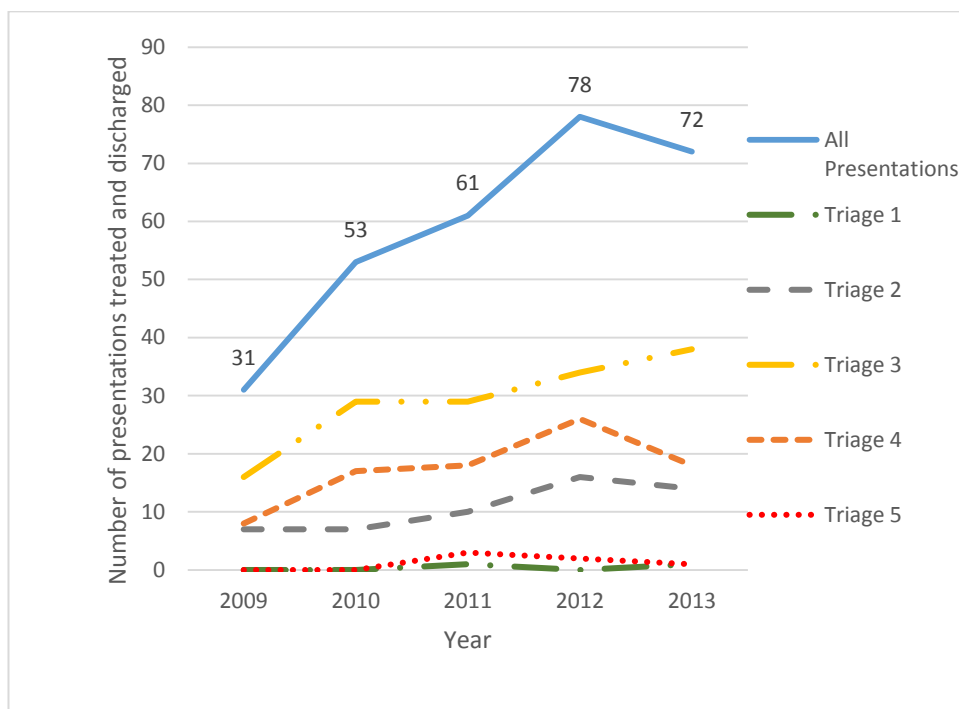
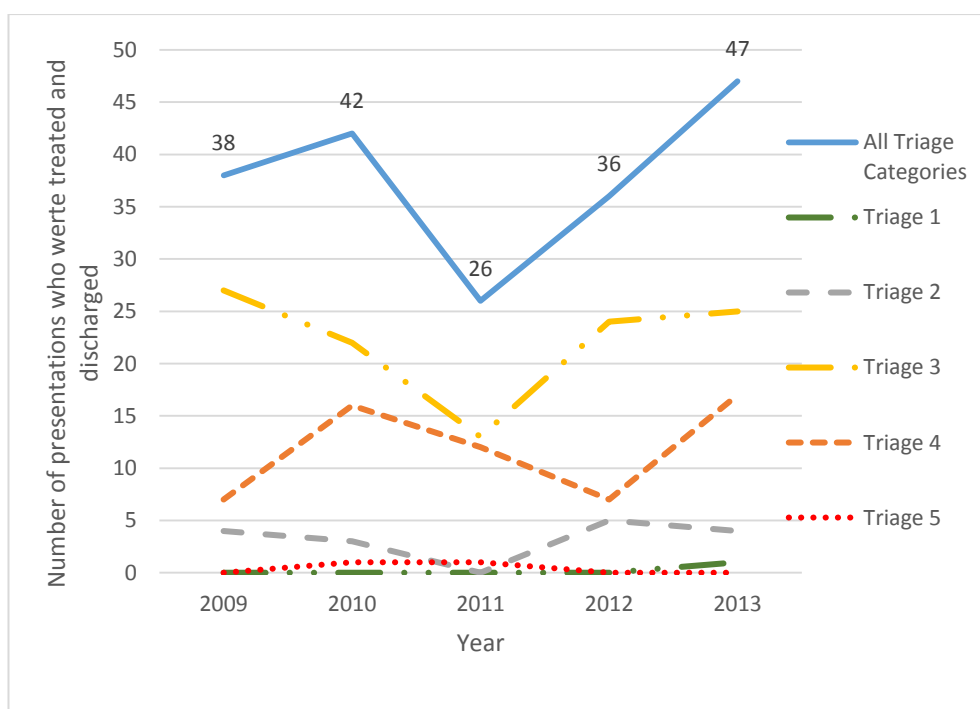


Figure 5.14: Total presentations for diabetes treated in, and discharged from the Emergency Department of John Hunter Hospital, by Triage Category, 2009 to 2013



There was a steady increase in the number of people who presented to the Emergency Department of Westmead Hospital and who, after treatment, were discharged from it without being admitted to the hospital. However the numbers who were treated in, and discharged from the Emergency Department each year were small, ranging from 31 in 2009, to reach a peak of 78 in 2012 (Figure 5.13).

After 2011, more patients who presented to the Emergency Department of John Hunter Hospital for the treatment of their diabetes were discharged without being admitted to hospital, principally from Triage Categories 3 and 4 (the less unwell patients).

The changing balance between admission to hospital, and discharge from the Emergency Department for people with diabetes can be seen in the ratio of hospital admissions to discharges, as shown in Figures 5.15 and 5.16. This analysis focused on patients in Triage Categories 2, 3 and 4, since the numbers in Triage Categories 1 and 5 were small, making the admission-to-discharge ratio less meaningful for these Triage Categories.

Figure 5.15: Ratio of hospital admissions to discharges from the Emergency Department of Westmead Hospital, 2009 to 2013

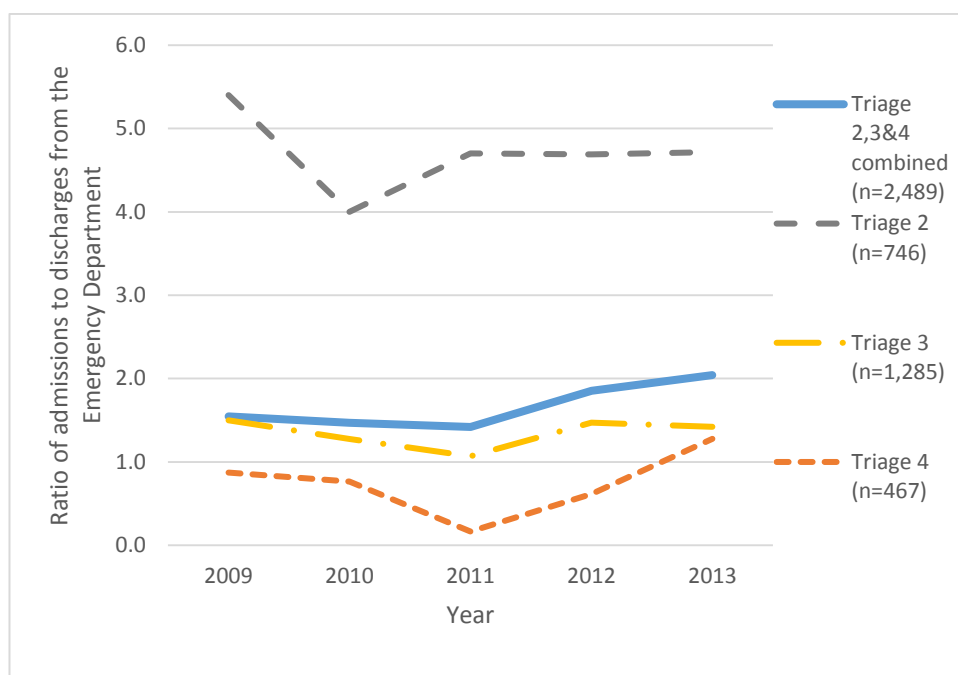
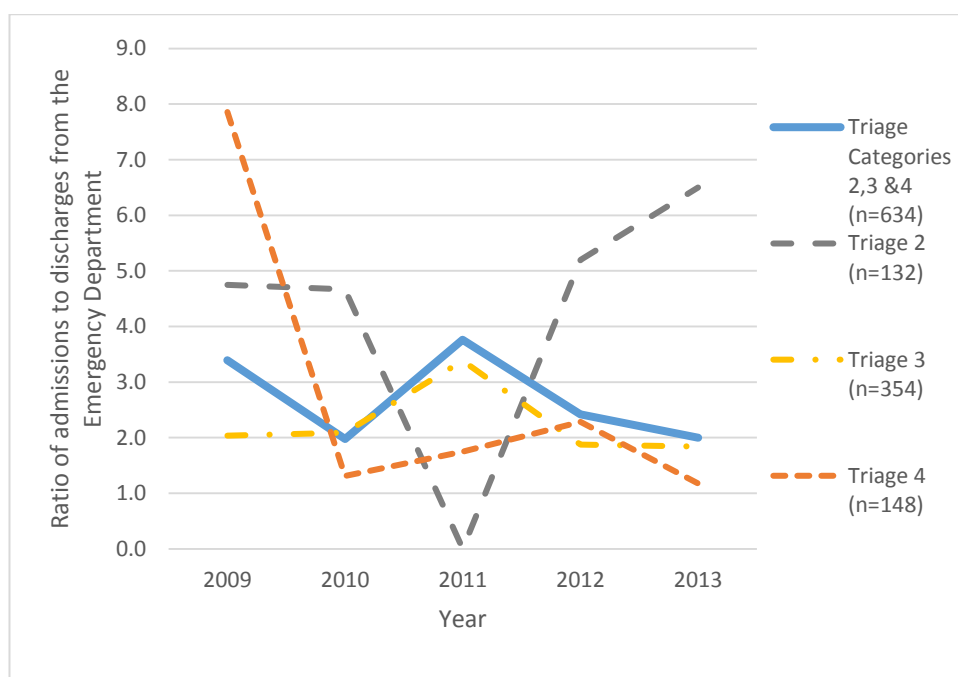


Figure 5.16: Ratio of hospital admissions to discharges from the Emergency Department of John Hunter Hospital, 2009 to 2013



Note: n = total number of presentations over the five years of the study

The ratio of admissions to discharges from the Emergency Department of Westmead Hospital, for the three Triage Categories (2, 3 and 4 combined), remained low (1.5 to 2), and did not change greatly over the five years of the study. It is possible that the change that occurred in the proportion of patients assigned to each Triage Category in 2013 reflects a policy change in the triaging of patients at Westmead Hospital. This explanation is explored under the heading of Hospital Policy.

At John Hunter Hospital, the ratio of admissions to discharges fluctuated from year to year, but showed a declining trend over the five years. There were quite wide variations within the Triage Categories, but there was a trend towards a reduction in admissions from Triage Category 4, and an increase in the ratio of admissions for the (more unwell) patients in Triage Category 2.

It is possible that an increase in the level of support which was available to care for these patients in the community once they were discharged from hospital, might result in the same patient being admitted to the same hospital, with the same condition, on fewer occasions (a reduction in the number of multiple admissions). As explained in the previous chapter, it is not possible to identify individual patients, or the appearance of the same patient in more than one dataset, since the data in the datasets contain no unique patient identifier. The best that can be done is to identify the hospital admissions of people with the same Year of Birth, and residing in the same Postcode.

Figures 5.17 and 5.18 present the frequency distributions of the number of time that patients with the same Year of Birth, and residing in the same Postcode, were admitted to Westmead Hospital or to the John Hunter Hospital and coded to the 'eligible' category, in the years 2009 and 2013.

Figure 5.17: Proportion of occasions on which a patient with the same Year of Birth and residing in the same Postcode was admitted to Westmead Hospital, 2009 and 2013

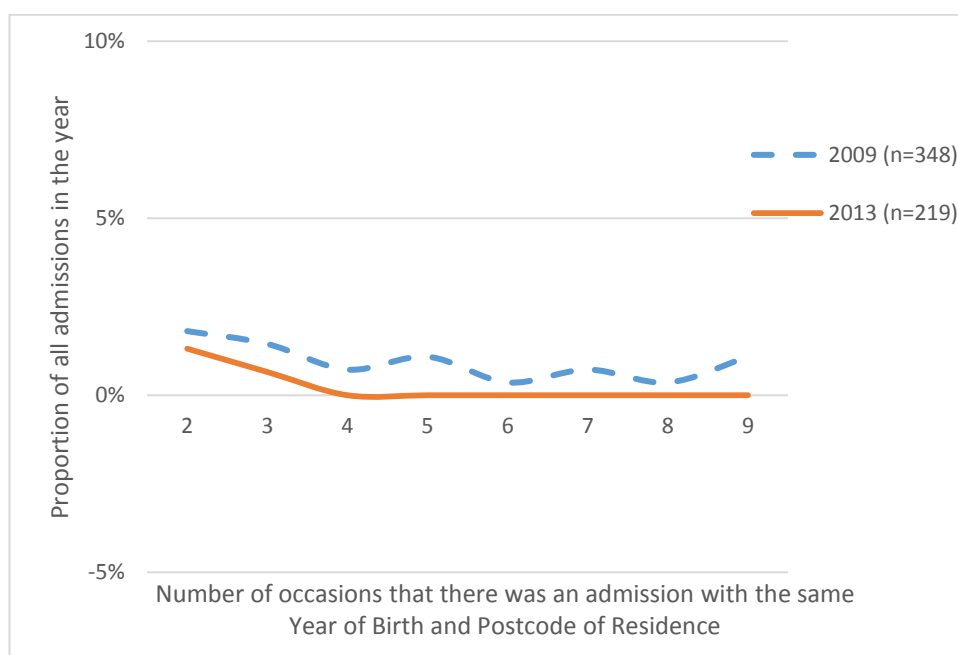
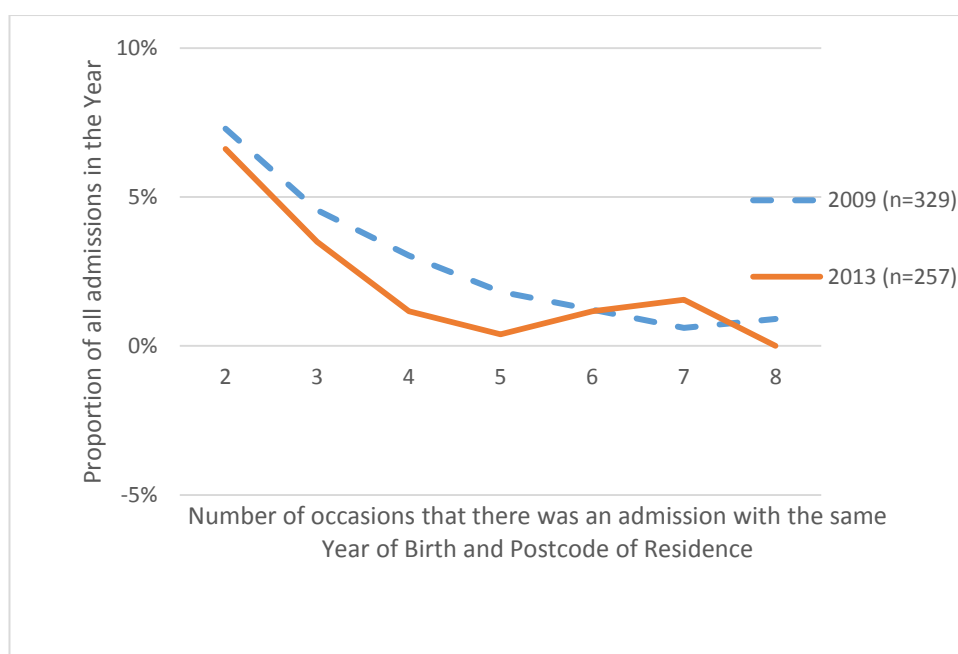


Figure 5.18: Proportion of occasions on which a patient with the same Year of Birth and residing in the same Postcode was admitted to John Hunter Hospital, 2009 and 2013



Note: n=total number of admissions in each year

For this category of patients at Westmead Hospital there were fewer multiple admissions in 2013 than in 2009, a difference which was statistically significant (chi-squared = 22.03, df = 2, $p < 0.0005$). However, this decline represented only 34 admissions, which would account for only one-third of the decline of 106 in the total number of patients admitted to this hospital with diabetes, who were coded to the 'eligible' category.

For this category of patients at the John Hunter Hospital there were fewer multiple admissions in 2013 than in 2009, a decline which was also statistically significant (chi-squared = 13.59, df = 6, $0.05 > p > 0.025$). This decline represented 60 admissions, which, if they were in fact different patients would be more than sufficient to account for the decline in the total number of patients admitted with diabetes, and coded to the 'eligible' category, over the period of the study.

It can be concluded that a decrease in multiple admissions of the same patient is unlikely to have been a major contributor to the decrease in the number of admissions of patients with diabetes, and coded to the 'eligible' category at Westmead Hospital. The converse was true for John Hunter Hospital. The decrease in multiple admissions, if they were of the same patient, could well account for the decrease in the number of admissions of patients to this hospital.

Even though this possibility exists for the John Hunter Hospital, for completeness of the overall analysis, examination is continued for the other four possibilities that might have also contributed to the decline in admissions. The next step is to examine the possibility that changes in hospital policy might account for the changes in patient throughput.

5.3.5 Hospital Policy

If a change had occurred in the State discharge policies, in line with the objectives of ABF, patients who presented to an Emergency Department and were assessed as requiring semi-urgent or non-urgent treatment (Triage

Category 4 or 5), might have been referred to an alternative service provider located in the community, rather than being admitted to hospital.

The number of patients admitted to Westmead Hospital with diabetes, and coded to the 'eligible' category, declined over the five years of the study (Figure 5.1), while the number of patients admitted to hospital from the Emergency Department doubled (Figure 5.11).

The number of patients admitted to the John Hunter Hospital with diabetes, and coded to the 'eligible' category, declined over the same period (Figure 5.2), while the number of people admitted from the Emergency Department did not change greatly (Figure 5.12).

The hospital inpatient dataset does not include information on the source of the admission, and so data on both 'eligible' and 'ineligible' admission categories must be combined so that the number of admissions from all sources other than the Emergency Department can be calculated by subtraction. The data are shown in Figures 5.19 and 5.20 respectively.

Figure 5.19: Source of admissions of patients with diabetes to Westmead Hospital, 2009 to 2013

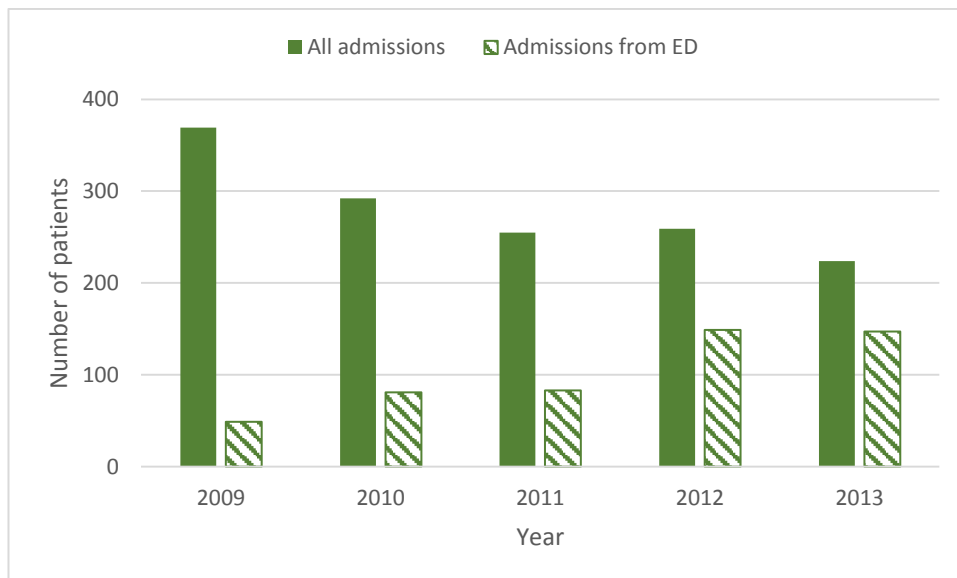
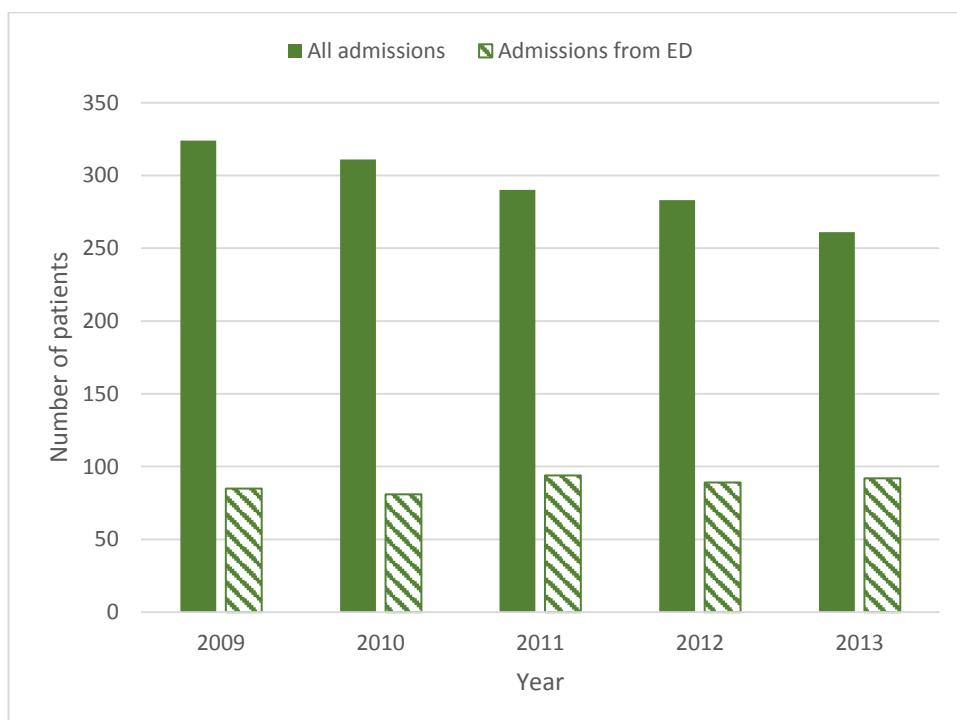


Figure 5.20: Source of admissions of patients with diabetes to John Hunter Hospital, 2009 to 2010



The trend of increasing admissions from the Emergency Department of Westmead Hospital was offset by a larger trend of declining admissions to the hospital from other sources, resulting in an overall decline in the absolute number of patients admitted. The most plausible reason for this change is that more people presented to the Emergency Department of Westmead Hospital for treatment of their diabetes, rather than attending another health service, such as a local general practitioner.

From 2009 to 2013, the total number of patients admitted to John Hunter Hospital with diabetes declined steadily, due almost entirely to a reduction in the number of patients admitted from other sources, while the number admitted from the Emergency Department remained steady.

There is no immediately obvious explanation for this pattern of change at John Hunter Hospital, which was unlikely to have been due to changes in hospital policies, but the pattern of discharges from the hospital suggests that, even if such policy changes had been promulgated, compliance with them was patchy.

This leads to the next step in this analysis which is to examine the possibility that changes in clinical practice might account for the changes in patient throughput.

5.3.6 Clinical Practice

Another possible explanation for the decline in the number of patients with diabetes and coded to the 'eligible' category who were admitted to Westmead Hospital, or to the John Hunter Hospital, is a change in the way in which hospital clinicians practised medicine, i.e., a change in the treatment of individual patients, and/or the recording of clinical information in their medical record.

There is anecdotal evidence that, with the introduction of ABF, medical staff were encouraged to ensure that they made an accurate record of all clinical phenomena. If this emphasis had resulted in up-coding, this would result in a

greater identification of patients with severe complications and comorbidities (the 'ineligible' category), rather than without complications and comorbidities (the 'eligible' category), and the absolute number of patients admitted to hospital with diabetes would remain steady.

The data presented in Figure 5.5 and Figure 5.6 are inconsistent with this description. There was a decline in the number of patients admitted to hospital in both the 'eligible' and 'ineligible' categories of patients, and this pattern suggests that there is limited evidence of up-coding in the case of either Westmead or John Hunter Hospital.

Thus, on balance, there is little convincing evidence that changes in medical record keeping contributed to the decrease in the number of patients admitted to either of these two hospitals with a primary diagnosis of diabetes in the five years covering the introduction of ABF.

5.3.7 Coding Practice

A change in coding practice is the final possible explanation for the decline in the throughput of patients with diabetes, and coded to the 'eligible' category. However, as discussed in chapter four, there is no evidence that any changes had taken place in the instructions given to hospital Coders as to the features of the medical record which would determine the assignment of a patient with diabetes to one or the other AR-DRGs, 'ineligible' or 'eligible'. It is therefore reasonable to conclude that change in coding policy would not account for a decline in the number of 'eligible' patients admitted to hospital.

5.4 Discussion of changes in hospital patient admissions

For those patients admitted to Westmead Hospital in the Western Sydney Local Health District with diabetes, and coded to the 'eligible' category, there was a trend of decrease in admissions of patients, coded both to 'eligible' and to 'ineligible' categories. These declines in the number of admissions to the hospital occurred in the face of increasing numbers of people with diabetes

presenting to the Emergency Department of the hospital, as well as an increase in the clinical severity of those patients condition.

There are two possible, but not mutually exclusive, explanations for these apparently contradictory changes. The first explanation is that the documented increase in the number of people presenting to the Emergency Department of Westmead Hospital is a corollary of an increase in the prevalence of diabetes in the community. Proving that there was a change in community morbidity for diabetes is beyond the scope of this thesis, but there is some evidence to suggest that this explanation is plausible, since increasing numbers of people with diabetes presented to (all) the Western Sydney hospitals' Emergency Departments over the period of this study, as well as an increase in the clinical severity of those people's diabetes.

The second explanation is that the declines in the number of admissions to hospital represent either an improving ability of people with diabetes to self-manage their condition, and/or that more support is available to care for people with diabetes in the community, which was an objective of ABF. However, the more likely explanations for this increase in presentations to the Emergency Department of Westmead Hospital are an increase in community morbidity for diabetes, and/or that more people with diabetes, attended the Emergency Department as their preferred choice of service when they required medical care. The majority of these patients were clinically assessed and treated in a timely way (BHI 2010-2013).

At the John Hunter Hospital the decline in the number of patients with diabetes, and coded to the 'eligible' category, was associated with a decline in the number of patients who were readmitted to hospital for treatment. The most likely explanations for this result are, again, that these patients' were able to self-manage their condition better, and/or, that there was more support available in the community to care for this category of patient after they were discharged from hospital.

The former explanation is the more likely. The median age of this cohort of diabetes patients' at the John Hunter Hospital was 16 to 18 years: these patients were making the transition from childhood to adulthood, which is often accompanied by short-term instability in maintaining good glycaemic control (Hartl, Seiffge & Laursen 2015). Stabilising glycaemic control might require additional supervised adjustment in diet, exercise and medication in the short-term.

The conclusion from these results is that, for people with diabetes, the consequences of the implementation of ABF have been variable, at best, and have not been uniform across all ABF hospitals in either Local Health District. The findings from analyses to answer Question three: *what is the financial consequence of these changes, expressed in terms of the balance between available revenue and resource use?* are presented next.

5.5 Financial implications of Activity Based Funding

The PARI is an indicator of the balance between the potentially available revenue and the resources required to treat patients with diabetes, and coded to the 'eligible' category for each hospital receiving ABF, and for the respective Local Health District as a whole. For each Local Health District, the PARI for all hospitals combined is anchored at 100 for 2009.

Figures 5.21 and 5.22 present the PARI performance of the individual hospitals in the Western Sydney and Hunter New England Local Health Districts in treating patients admitted with diabetes, who were coded as 'eligible' for treatment in a setting other than that of an acute hospital, and compared with the combined performance of all hospitals in the Local Health District, from 2009 to 2013. The data for Mount Druitt Hospital and Kurri Kurri Hospital have not been included in the calculation of the PARI.

Figure 5.21: PARI for each Western Sydney hospital, and for all hospitals combined, for patients with diabetes, coded as 'eligible', 2009 to 2013

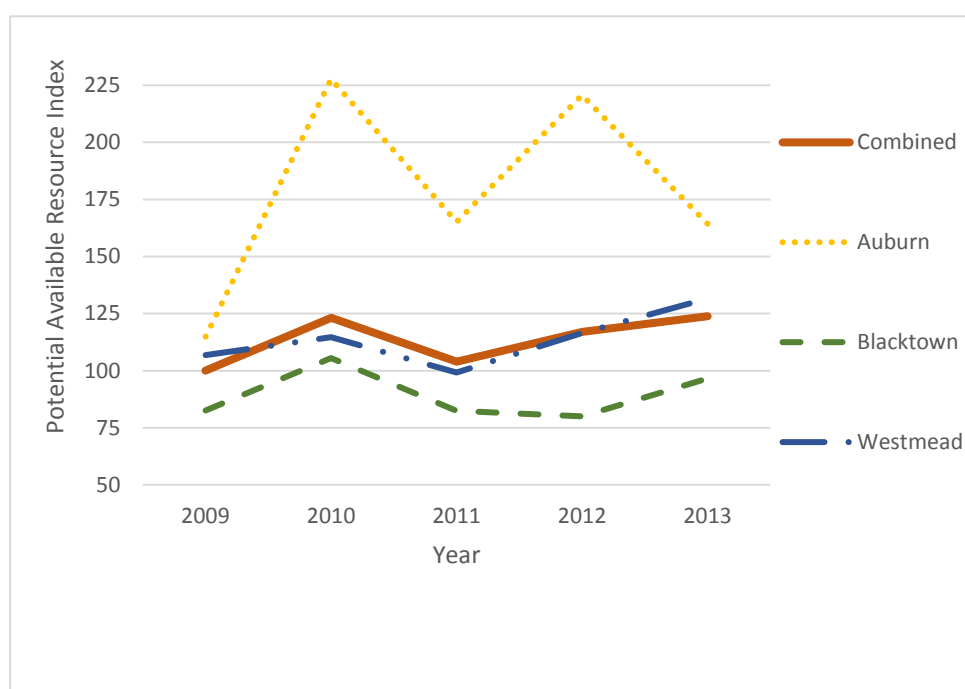
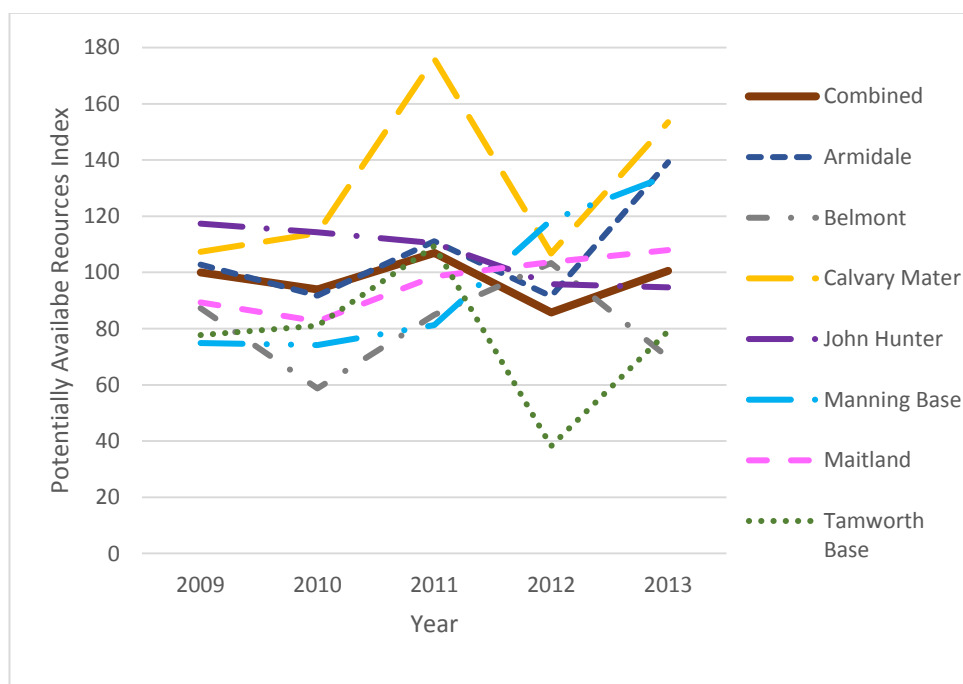


Figure 5.22: PARI for each Hunter New England hospital, and for all hospitals combined, for patients with diabetes, coded as 'eligible', 2009 to 2013



In Western Sydney, the PARI fluctuated over the five years of the study, and rose to reach a value 124 in 2013. This rise in PARI results from a decrease in the duration of patients' stay in hospital. Both Westmead and Auburn Hospitals were the principal contributors to the Western Sydney ABF hospitals' rise in PARI, while for Blacktown Hospital the PARI remained consistently below the index of 100, except in the year 2010 when it rose briefly to 106.

If the revenue available from ABF were to be passed on to individual hospitals, the hospitals that would benefit most would be Auburn, followed by Westmead Hospital. Blacktown Hospital consistently appeared to use more resources to treat these patients than would have been available from ABF.

All ABF hospitals in the Hunter New England Local Health District showed some variation in the rise and fall of the PARI, over the study period. In 2013, the principal contributors to the rise in PARI were the Calvary Mater, Armidale and Manning Base Hospitals, while the PARI for the John Hunter, Tamworth Base and Belmont Hospitals all remained close to the index of 100.

The potential financial implications of ABF are that over the five-year period of this study, the Calvary Mater, Armidale and the Manning Base Hospital would, to a greater or lesser extent, use fewer resources to treat these patients than the resources available from ABF, while the John Hunter, Tamworth Base and Belmont Hospitals would use more. The net result is that in 2013, the increases and decreases in the PARI had cancelled out, with the result that a PARI of 100 was achieved for the Local Health District as a whole. These findings suggest that ABF did not act as a financial incentive for these hospitals to reduce the duration of hospital stay for patients with diabetes category. The final conclusion to be drawn from the findings of this study, and the implications are discussed in chapter seven.

Chapter 6: Cellulitis

6.1 Introduction

The focus of this chapter is those patients admitted to hospitals with a primary diagnosis of cellulitis, and coded as being without catastrophic complications or co-morbidities (the 'eligible' category), or with catastrophic complications or co-morbidities (the 'ineligible' category). The reason for analysing the throughput of patients hospitalised with cellulitis is that it is a chronic condition, exacerbations of which may not necessarily require treatment in hospital (MoH 2013).

Cellulitis is the name given to a bacterial infection of the deepest layer of the skin. Bacteria enter through a break in the skin from a cut, scratch, or bite. With proper care, an infection of the superficial layers of the skin usually heals of its own accord. But, in cellulitis, the deep skin tissues in the infected area become inflamed - red, hot, and painful, and the condition persists and requires medical treatment (AIHW 2015).

The disease burden of cellulitis in Australia is unlikely to be substantially different from that in the US, where the 'incidence of cellulitis is reported to be 16.4 to 24.6 per 1000 person years. It accounted for 14 per cent of all visits to the Emergency Department and contributed up to seven per cent of hospital admissions' (Yuxin Tay, Fook-Chong, Chiat Oh, Thirumoorthy, Min Pang & Yueh Lee 2015). In the US, each admission to hospital is estimated to cost \$US 13,000 (Yuxin Tay *et al* 2015).

The chapter is structured as follows. It begins with a summary of the overall throughput of cellulitis in each of the two Local Health Districts, and proceeds with a more detailed presentation of changes in the throughput of cellulitis patients over the five years of the study. For those hospitals where a change in the throughput of patients coded to the 'eligible' category was statistically significant, seven categories of explanation for those changes are explored.

The overall findings from the analyses are discussed. The focus of the analysis is then expanded to examine the balance between the potentially available revenue and the resources required to treat this category of patient, in each hospital, in each Local Health District.

6.2 Patient throughput

Four hospitals in the Western Sydney Local Health District receive ABF. Over the five years of the study, 7,330 patients were admitted to those hospitals with a principal diagnosis of cellulitis, and 88 per cent of those patients were coded to the 'eligible' category, i.e., those patients without catastrophic complications or co-morbidities, who could, potentially, be treated in a setting other than that of an acute hospital.

Eight hospitals in the Hunter New England Local Health District receive ABF. Over the five years of the study, 5,617 patients were admitted to these hospitals with a principal diagnosis of cellulitis, of which 76 per cent of patients were coded to the 'eligible' category.

Figures 6.1 and 6.2 present the number of hospital admissions in the two Local Health Districts of all patients with cellulitis who were coded as 'eligible' for treatment in a setting other than that of an acute hospital.

Figure 6.1: Admissions of patients with cellulitis, coded as 'eligible', to Western Sydney hospitals, 2009 to 2013

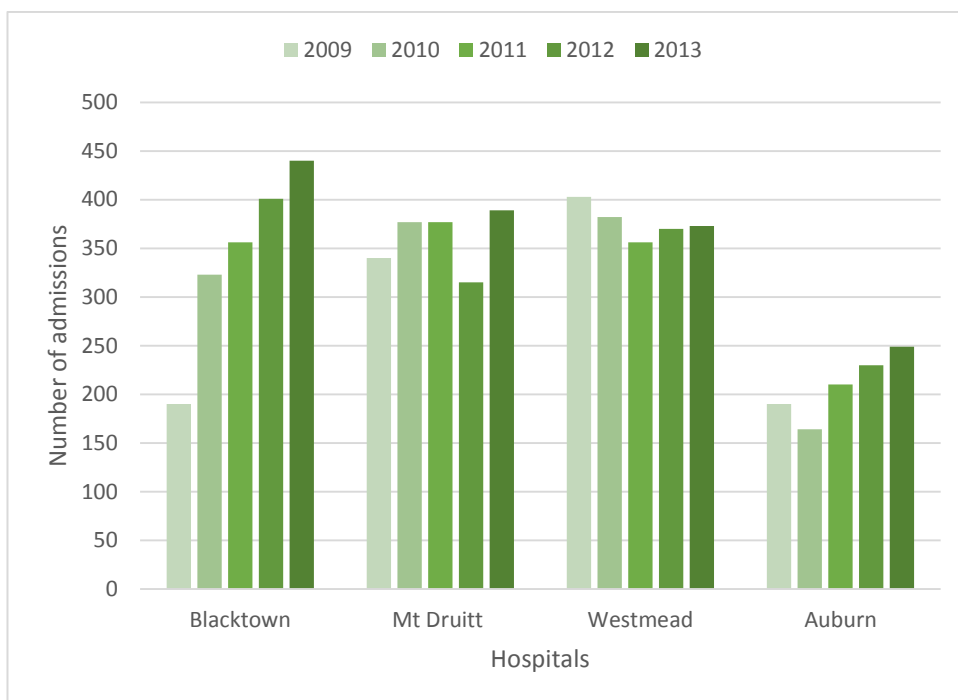
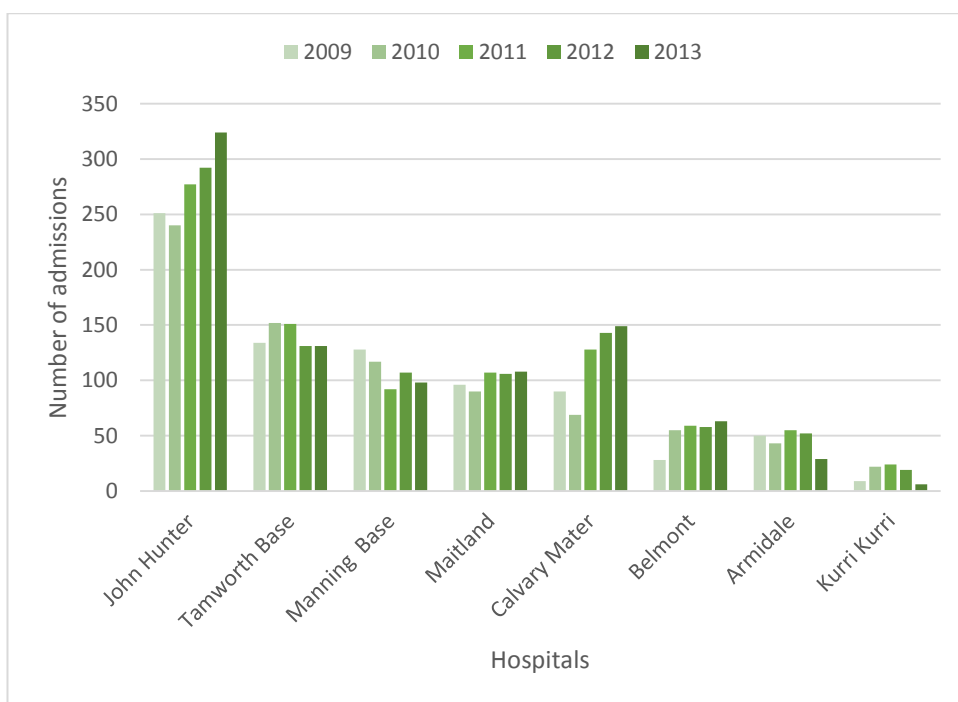


Figure 6.2: Admissions of patients with cellulitis, coded as 'eligible', to Hunter New England hospitals, 2009 to 2013



In the Western Sydney hospitals, there was an overall trend of decline in the number of patients admitted with cellulitis to Westmead Hospital, which was not statistically significantly different from zero ($0.30 > p > 0.20$). The increase in the number of patients admitted to Blacktown Hospital continued unabated during the study period, and this trend was statistically significantly different from zero ($0.02 > p > 0.01$). The smaller increase at Auburn Hospital did not reach the traditional level of statistical significance. There was no real change observed in the number of patients admitted to Mount Druitt Hospital.

In the Hunter New England hospitals, there was a trend of decline in the number of the patients admitted with cellulitis to the Manning Base, Tamworth Base, Armidale and Kurri Kurri Hospitals, but these all failed to reach the traditional level of statistical significance. There were less than 25 admissions each year to the Kurri Kurri Hospital. For the John Hunter, Calvary Mater and Belmont Hospitals, there was a trend of increase in the number of patients admitted. The trend for the John Hunter Hospital was statistically significantly different from zero ($0.02 > p > 0.01$).

For consistency in the analysis of data across the three clinical conditions included in this study, the annual admission rate per 100 admissions was calculated for each hospital receiving ABF. Figures 6.3 and 6.4 show those data.

Figure 6.3 Annual standardised admission rate for patients with cellulitis, coded as 'eligible', in Western Sydney hospitals

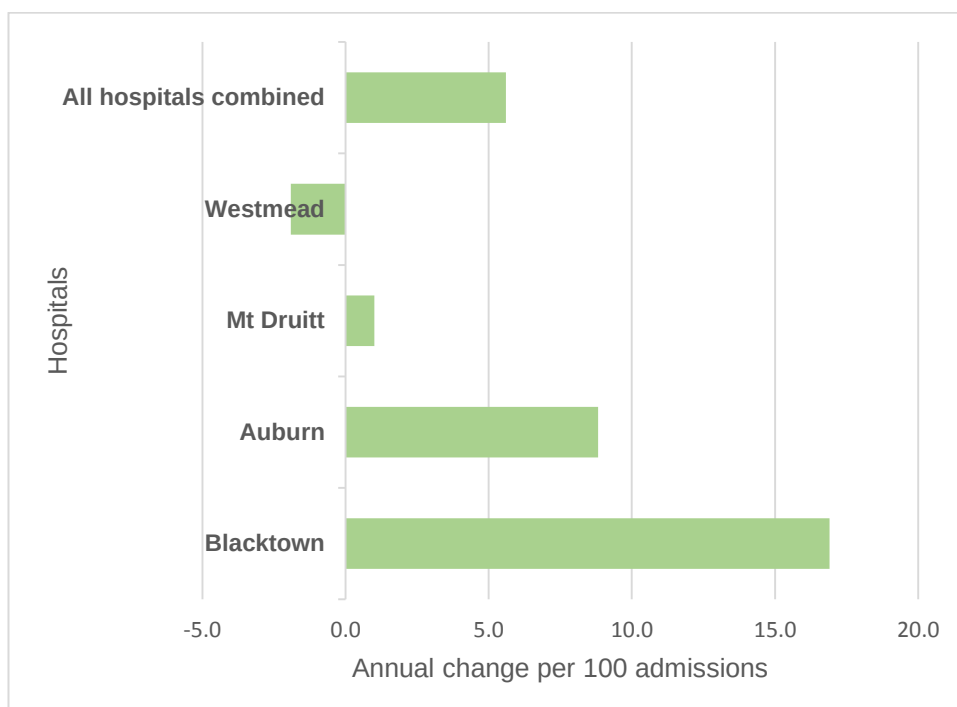
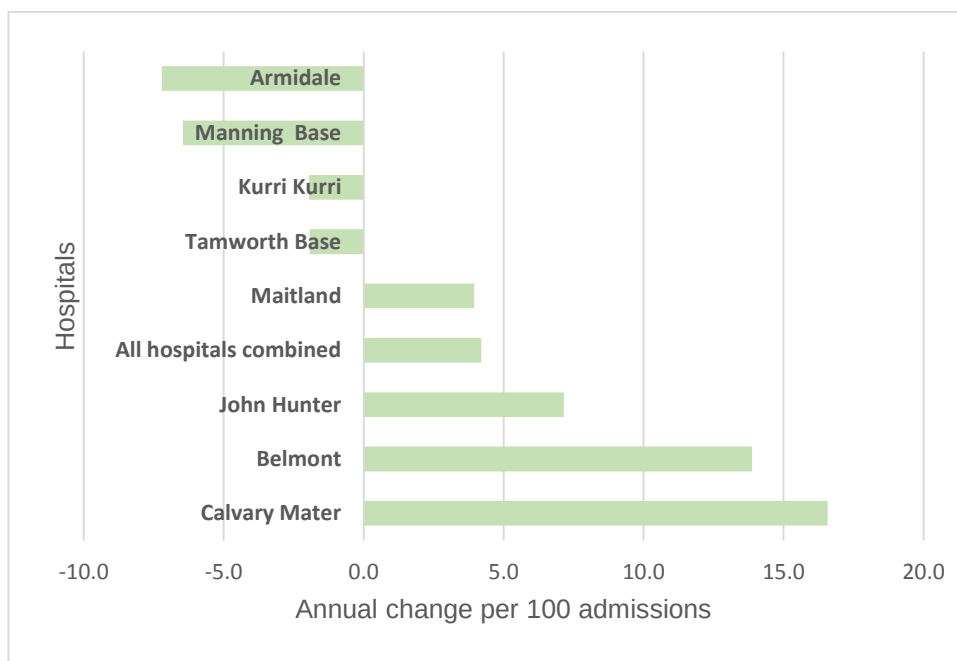


Figure 6.4 Annual standardised admission rate for patients with cellulitis, coded as 'eligible', in Hunter New England hospitals



For this patient category there was an increase in the number of patients admitted to each hospital in Western Sydney Local Health District over the study period, with the exception of the Westmead Hospital, where for every 100 patients admitted, there was a decline of about two patients per year, which was not statistically significant.

The increase in the standardised annual admission rate to Hunter New England Local Health District hospitals was greatest in the Calvary Mater (16.6 admissions) and Belmont Hospitals (13.9 admissions), followed by the John Hunter (7.2 admissions) and Maitland (3.9 admissions). The other three hospitals showed an annual decline of two to seven patients.

Because the annual increase in the number of admissions both to Blacktown Hospital and to John Hunter Hospital were statistically significant ($0.02 > p > 0.01$), possible explanations for those changes at these two hospitals are explored further.

6.3 Possible explanations for changes in throughput at Blacktown and John Hunter Hospitals

Seven possible reasons are categorised as: ABF; demographic factors; disease factors; social factors; hospital policy; clinical practice; and coding practice.

6.3.1 Activity Based Funding

The difference in the ratio of 'eligible' and 'ineligible' categories of all patients admitted to Blacktown Hospital or to John Hunter Hospital with cellulitis, are shown in Figure 6.5 and 6.6, respectively.

Figure 6.5: Admissions of patients to Blacktown Hospital with cellulitis, coded as 'eligible', or 'ineligible', 2009 to 2013

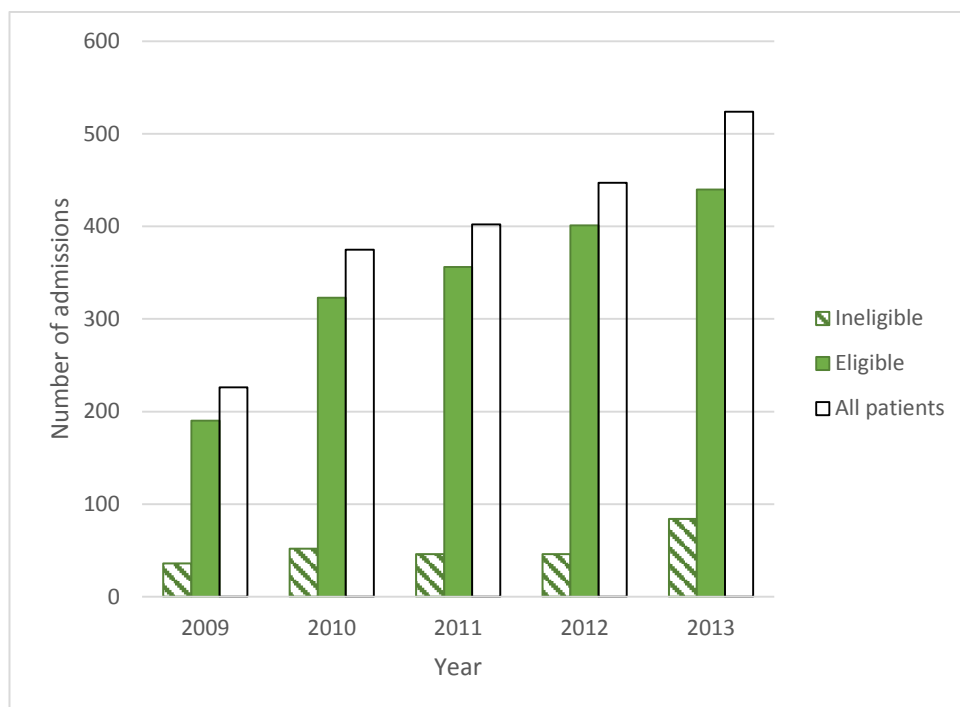
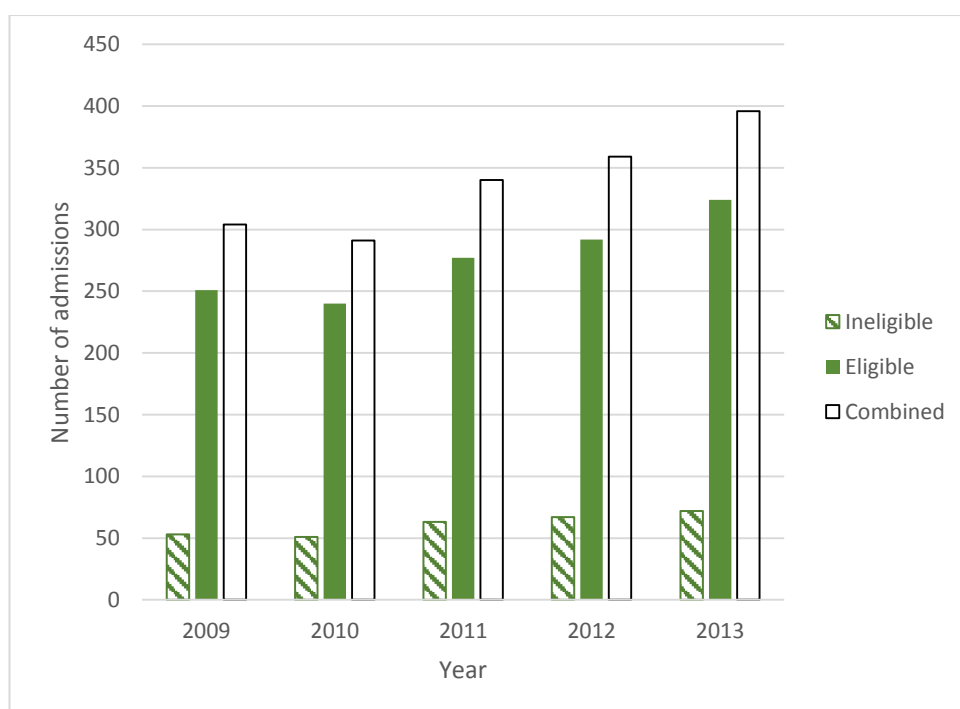


Figure 6.6: Admissions of patients to John Hunter Hospital with cellulitis, coded as 'eligible', or 'ineligible', 2009 to 2013



There was a substantial, and statistically significant, increase in the number of patients admitted to Blacktown Hospital with cellulitis, coded to the 'eligible' category, which continued for the duration of the study period. Over the same period there was little change in the throughput of patients coded to the 'ineligible' category, until 2013 when there was an increase in the number of admissions.

The increase in the total admissions to the John Hunter Hospital from 2009 to 2013, was mainly due to a steady increase in the admission of patients coded to the 'eligible' category, which was statistically different from zero ($0.05 > p > 0.025$). There was a slight increase in the number of admissions coded to the 'ineligible' category over the study period, but the actual number was small and the trend was not statistically significantly different from zero.

These patterns of change are clearly inconsistent with that intended from the introduction of ABF, but it is instructive to pursue possible explanations for the significant increase in admissions. Thus, other possible explanations for the change in the throughput of patients were sought.

It is possible that demographic factors might explain the increase in the number of patients who were admitted to these hospitals over the study period.

6.3.2 Demographic Factors

Figure 6.7 and 6.8 present the cumulative age-distribution calculated for Blacktown Hospital and for John Hunter Hospital for patients admitted with cellulitis, and coded to the 'eligible' category. The annual number of admissions, and the median age of those patients are also shown.

Figure 6.7: Age-distribution of patients admitted to Blacktown Hospital with cellulitis, 2009 to 2013

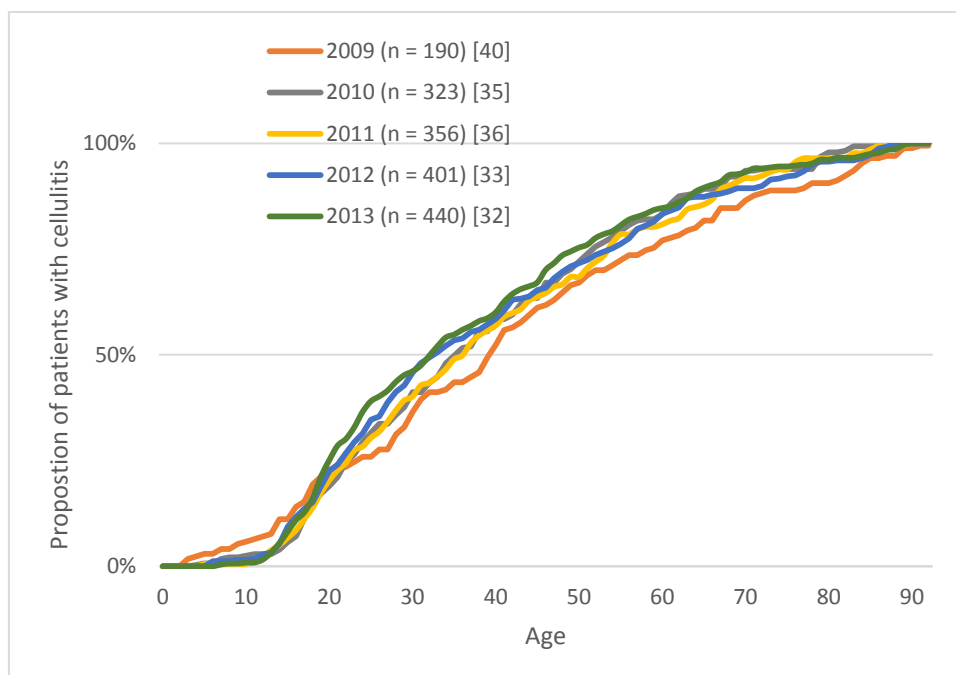
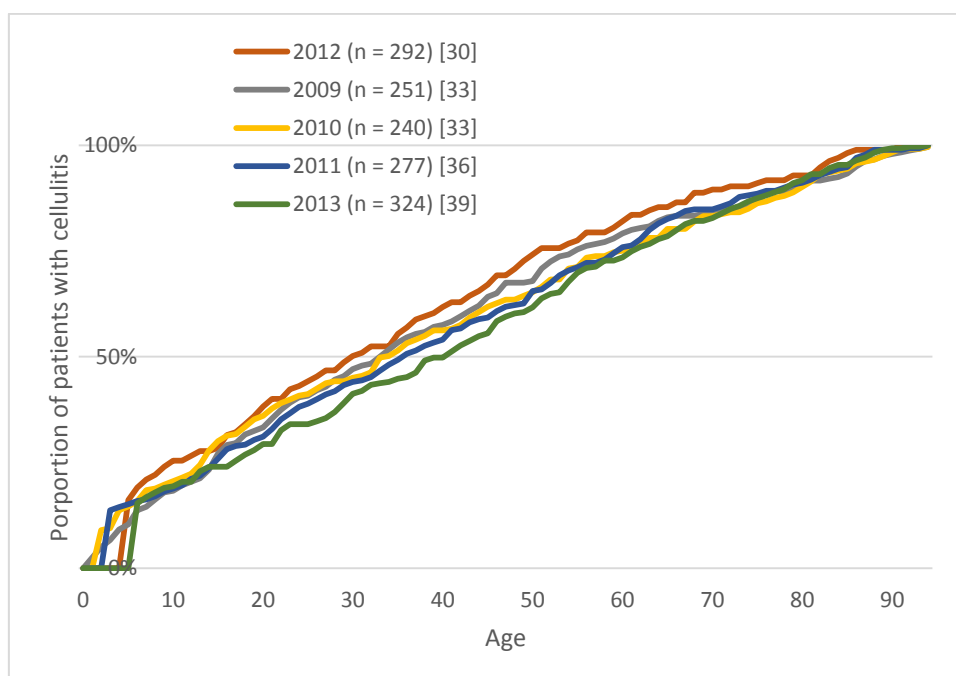


Figure 6.8: Age-distribution of patients admitted to John Hunter Hospital with cellulitis, 2009 to 2013



Note: n= total number of admissions in each of the five years of the study; figures in square brackets denote the median age of each cohort of patients.

The median age of patients admitted to Blacktown Hospital who were coded as 'eligible' for treatment in a setting other than that of an acute hospital declined over the study period, which indicates that an increased number of people with cellulitis were being diagnosed at a younger age.

The median age of patients admitted to John Hunter Hospital with cellulitis rose over the same period, although the number of 'eligible' patients admitted each year remained relatively stable, until it rose in 2013. While the demographic profile of these patients did change, this pattern of change is unlikely to account for all of the increase in the number of these patients who were admitted to Blacktown Hospital or to John Hunter Hospital.

6.3.3 Disease Factors (*community morbidity*)

Another possible explanation for the increase in the number of admissions of patients with cellulitis at Blacktown Hospital and at John Hunter Hospital is that there was an increase in the prevalence of cellulitis in the community i.e., more people were suffering from, and being diagnosed with, cellulitis. If an increase in prevalence of this condition were the cause, an increase would be expected in the number of patients presenting to the Emergency Department at these hospitals for treatment, and a greater number of those patients would be sufficiently un-well to require being seen by a medical practitioner sooner after their arrival, and more of those patients who presented would be likely to require admission to hospital.

Figure 6.9 and 6.10 present the number of presentations to the Emergency Departments of Blacktown Hospital and the John Hunter Hospital with cellulitis, and their distribution between the five Triage Categories, 2009 to 2013.

Figure 6.9: Total presentations for cellulitis to the Emergency Department of Blacktown Hospital, by Triage Category, 2009 to 2013

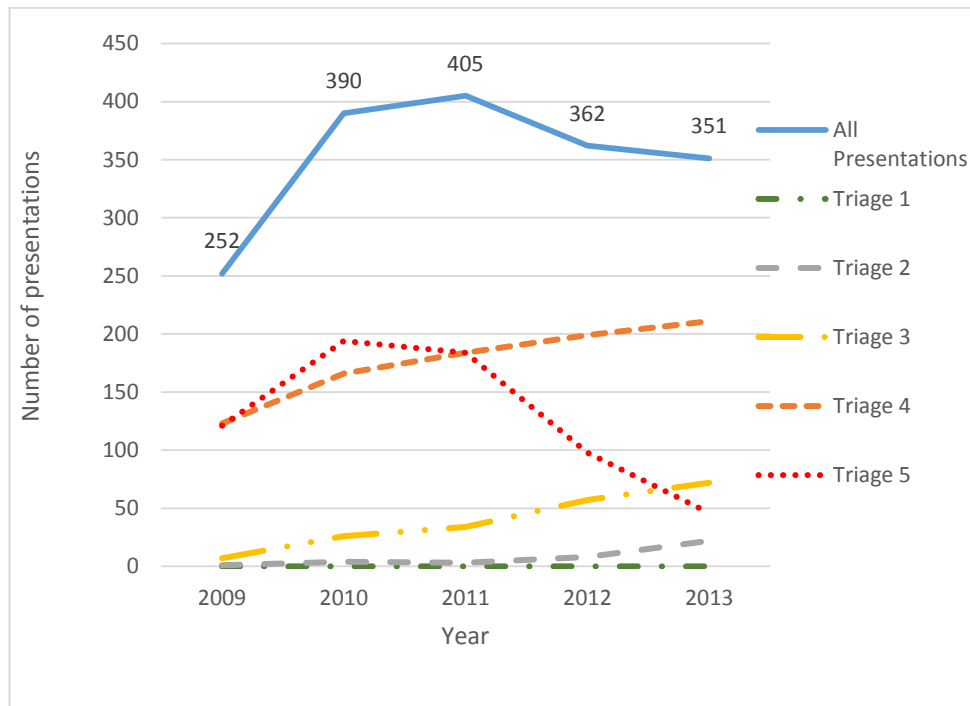
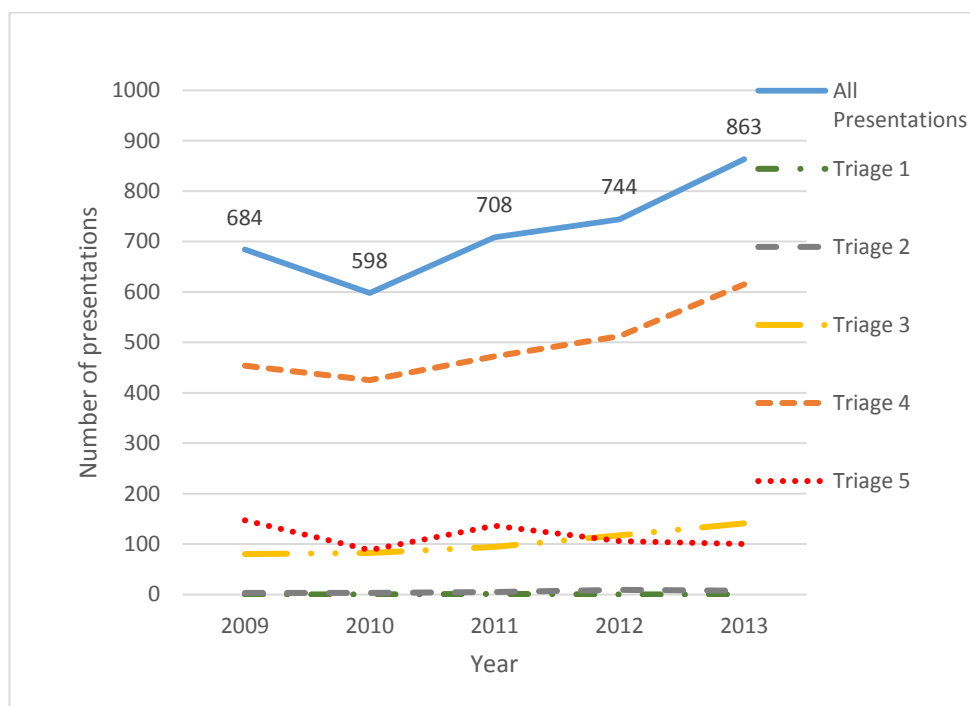


Figure 6.10: Total presentations for cellulitis to the Emergency Department of John Hunter Hospital, by Triage Category, 2009 to 2013



The total number of people who presented to the Emergency Department at Blacktown Hospital from 2009 to 2011 increased substantially from 252 to 405, but then declined slightly. Over the five years of the study, the increase in the number of patients who presented to the Emergency Department was not statistically significantly different from zero.

There was a trend of a steady increase in the number of people who required to be seen by a medical practitioner within 10, 30 or 60 minutes of their having arrived in the Emergency Department (Triage Category 2, or 3, or 4). Those requiring Non-Urgent treatment (Triage Category 5) declined over the same period, and no person who presented for treatment of their cellulitis required resuscitation (Triage Category 1). Thus there was evidence of a modest increase in severity in those presenting to the Emergency Department at Blacktown Hospital over the study period.

From 2010 to 2013, there was a steady increase in the number of people who presented at the Emergency Department at the John Hunter Hospital. The majority of those who presented were required to be seen by a medical practitioner within 60 minutes of having arrived to the Emergency Department (Triage Category 4), and there was a slight but steady increase in the number of people who required to be seen within 30 minutes of having arrived at the Emergency Department (Triage Category 3). However, none of these changes were statistically significantly different from zero.

The explanation of increased community morbidity can be tested by analysing the number of admissions to the hospital from the Emergency Department, which would be expected to show a similar pattern to that shown in Figures 6.9 and 6.10.

Figure 6.11 and Figure 6.12 show the number of people who presented to the respective Emergency Departments for treatment of their cellulitis, and were admitted to the hospital.

Figure 6.11: Total presentations for cellulitis treated in the Emergency Department of Blacktown Hospital, and subsequently admitted to the hospital, by Triage Category, 2009 to 2013

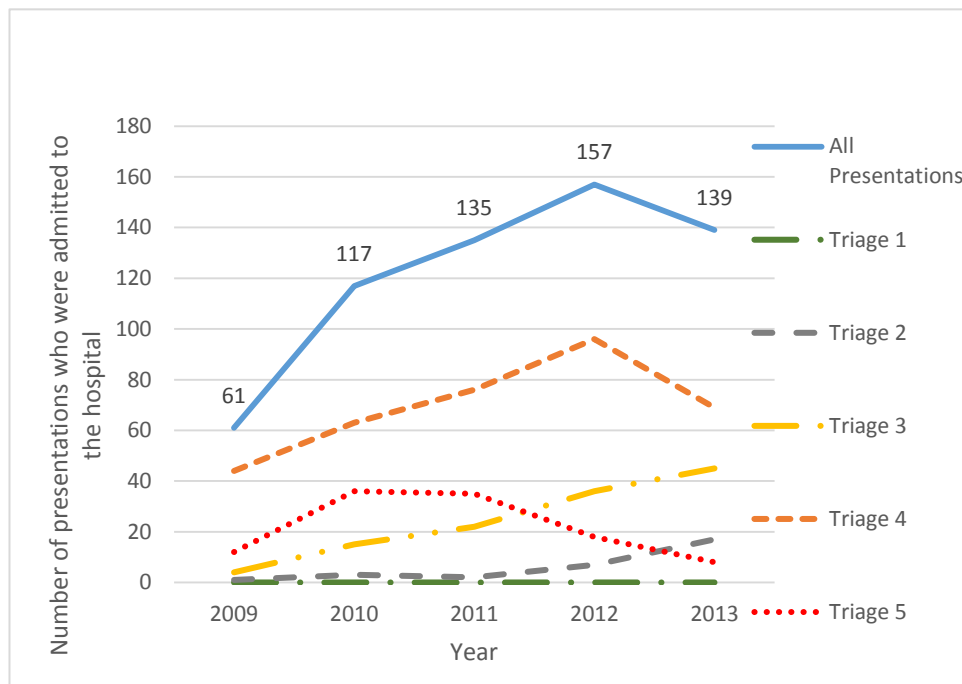
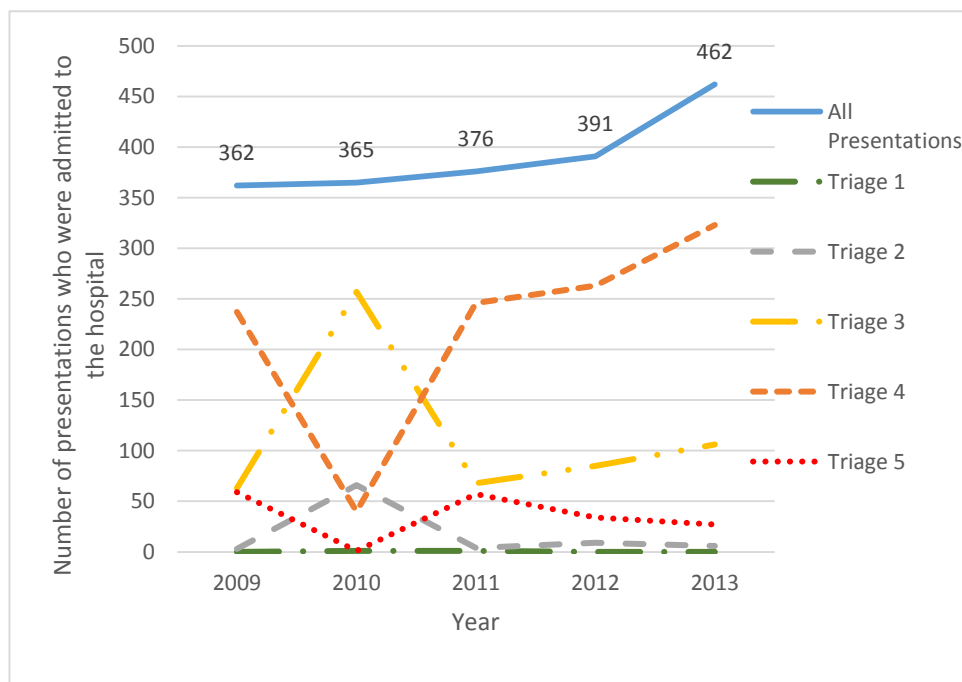


Figure 6.12: Total presentations for cellulitis treated in the Emergency Department of John Hunter Hospital, and subsequently admitted to the hospital, by Triage Category, 2009 to 2013



From 2009 to 2012, an increasing number of those who presented to the Emergency Department for treatment of their cellulitis were admitted to Blacktown Hospital, and the proportion of admitted patients increased from 25 per cent of all patients who presented in 2009, to 50 per cent in 2012. This trend was reversed in 2013.

The total number of people who, having presented to the Emergency Department with cellulitis, were admitted to John Hunter Hospital, remained steady until 2012, after which it then rose sharply. The balance between admissions to this hospital for Triage Categories 4 and 3, in 2010 and 2011 is an indication that there might have been a change in the triaging of patients within the Emergency Department at the John Hunter Hospital. This possibility will be explored under the heading of Hospital Policy.

From these results, there is little convincing evidence that an increase in the prevalence of cellulitis in the community could account for the increase in the number of people presenting to either of these hospitals' Emergency Departments with cellulitis.

The pattern observed at Blacktown Hospital is consistent with the apparent increase in severity of the condition in those presenting to the Emergency Department, but it could also be due to social factors, such as a decline in the availability of care for these people outside the hospital setting. This possibility is now examined.

6.3.4 Social Factors

Another possible explanation for the increase in the number of patients admitted with cellulitis, and coded to the 'eligible' category, is that there was limited support available to care for these patients and to treat their chronic illnesses in the community, either after they were discharged from hospital, or reducing the need for their admission in the first place.

If this were the case, it would be expected that fewer of those people who presented to the Emergency Department for treatment of their cellulitis would be treated within, and then discharged from, the Emergency Department, rather than being admitted to the hospital. Figures 6.13 and 6.14 show those data for Blacktown Hospital and John Hunter Hospital respectively.

Figure 6.13: Total presentations for cellulitis treated in, and discharged from, the Emergency Department of Blacktown Hospital, by Triage Category, 2009 to 2013

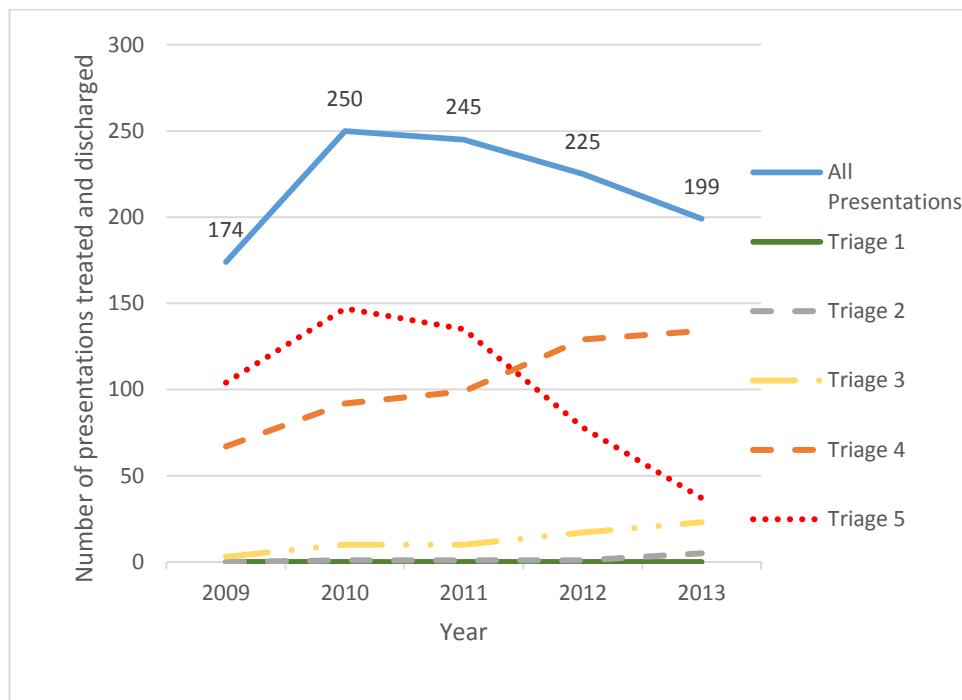
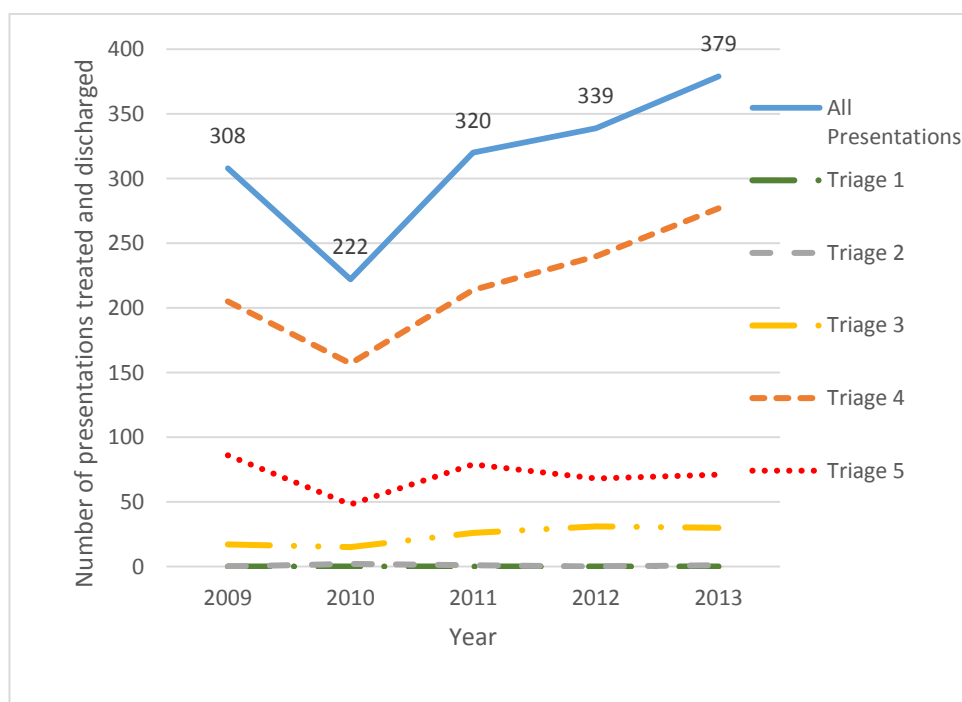


Figure 6.14: Total presentations for cellulitis treated in, and discharged from, the Emergency Department of John Hunter Hospital, by Triage Category, 2009 to 2013



The number of people who presented to the Emergency Department of Blacktown Hospital for treatment of their cellulitis, and were discharged from it without being admitted to hospital, rose initially, but then from 2010 declined steadily over the remainder of the study period. This pattern is similar to that seen in Figure 6.9.

Figure 6.14 shows the reverse trend for John Hunter Hospital, where there was a decline initially (in 2010) and then a steady increase in presentations, mainly accounted for by patients requiring non-urgent treatment (Triage Category 4).

The changing balance between the admissions of people with cellulitis to Blacktown Hospital, and the discharges from the Emergency Department can be seen in the ratio of hospital admissions to discharges, as shown in Figures 6.15 and 6.16. This analysis focused on patients in Triage Categories 2, 3 and 4, since the numbers of patients in Triage Categories 1 and 5 were small, making the admission-to-discharge ratio less meaningful for these Categories.

Figure 6.15: Ratio of hospital admissions to discharges from the Emergency Department of Blacktown Hospital, 2009 to 2013.

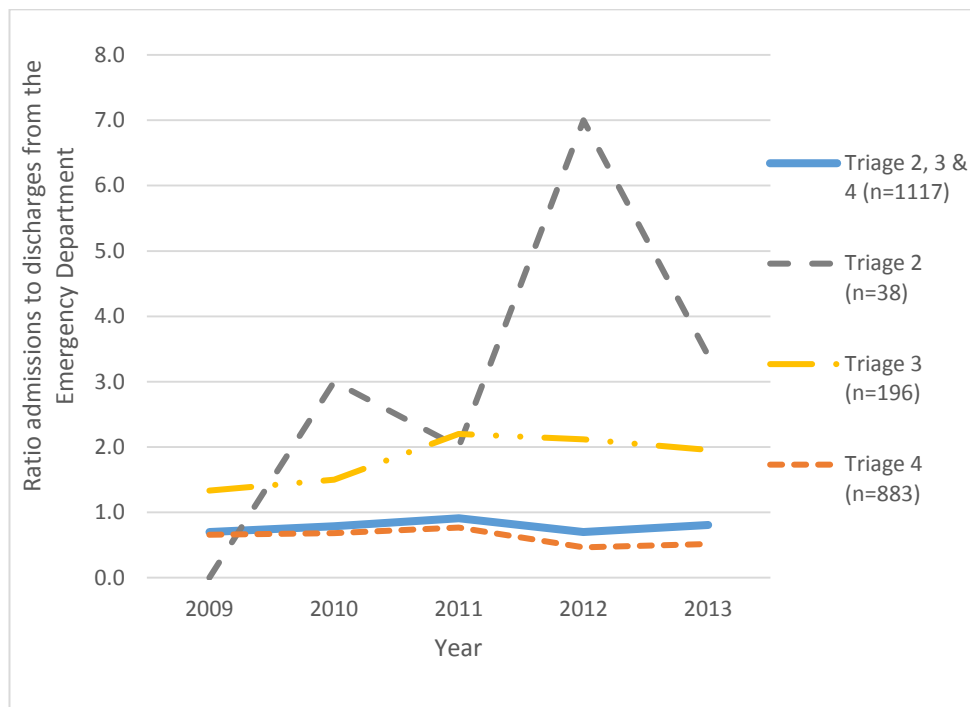
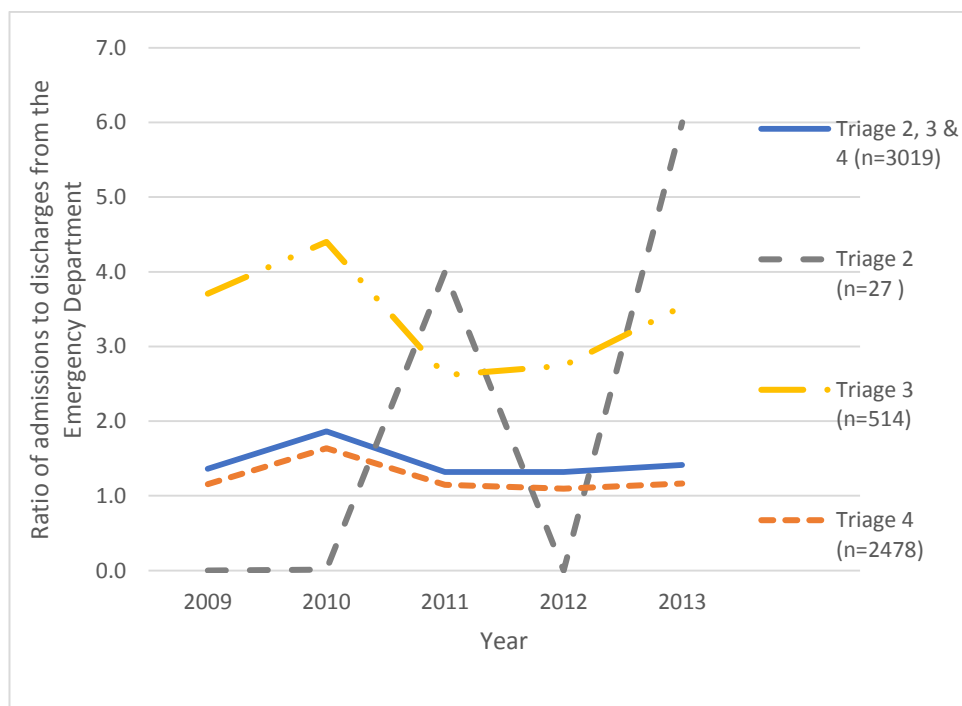


Figure 6.16: Ratio of hospital admissions to discharges from the Emergency Department of John Hunter Hospital, 2009 to 2013



At Blacktown Hospital, the ratio of admissions to discharges for Triage Categories 2, 3 and 4 combined, was less than unity, and did not change much over the period of the study. However the ratio of admissions to discharges of patients in Triage Category 2, rose steeply and, in 2012, for every patient who was treated and discharged from the Emergency Department without being admitted, seven patients were admitted. It is possible that this change was associated with a change in the level of support to care for these patients in the community.

At the John Hunter Hospital, the ratio of admissions to discharges from the Emergency Department for Triage Categories 2, 3 and 4 combined, did not change greatly over the period of the study. The ratio of admissions to discharges in Triage Category 2, fluctuated, but, because of the small number of presentations, little can be inferred from these data.

If there was limited support to provide care for people with cellulitis in the community, it might result in the same patient being admitted to the same hospital, with the same condition, on more occasions (an increase in the number of multiple admissions).

Figure 6.17 and 6.18 present the frequency of the number of times that patients with the same Year of Birth, and residing in the same Postcode, were admitted to the Blacktown Hospital or to the John Hunter Hospital and coded to the 'eligible' category, in the years, 2009 and 2013.

Figure 6.17: Proportion of occasions on which a patient with the same Year of Birth and residing in the same Postcode was admitted to Blacktown Hospital, 2009 and 2013

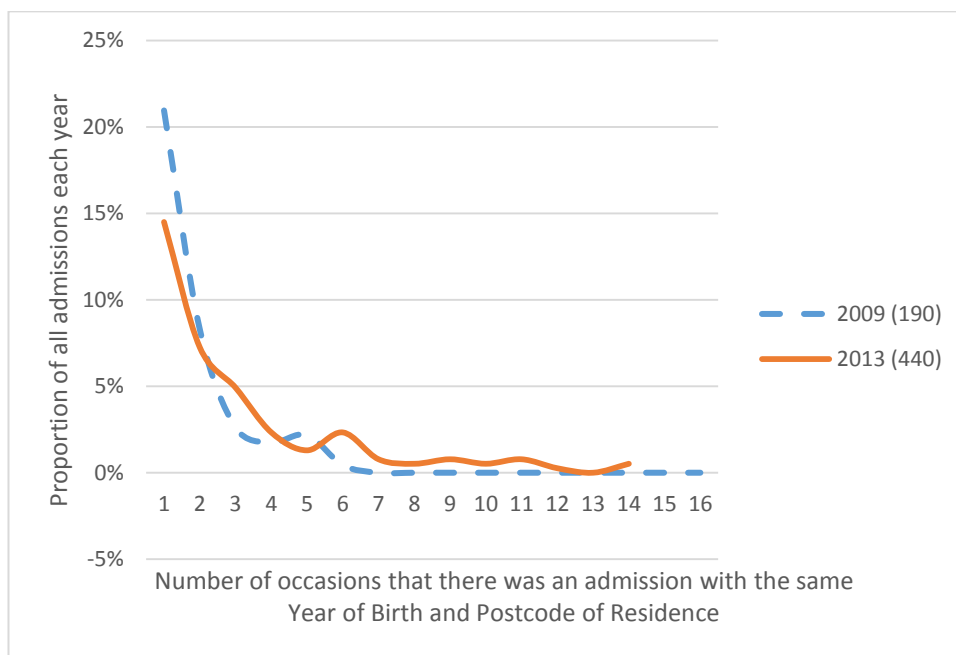
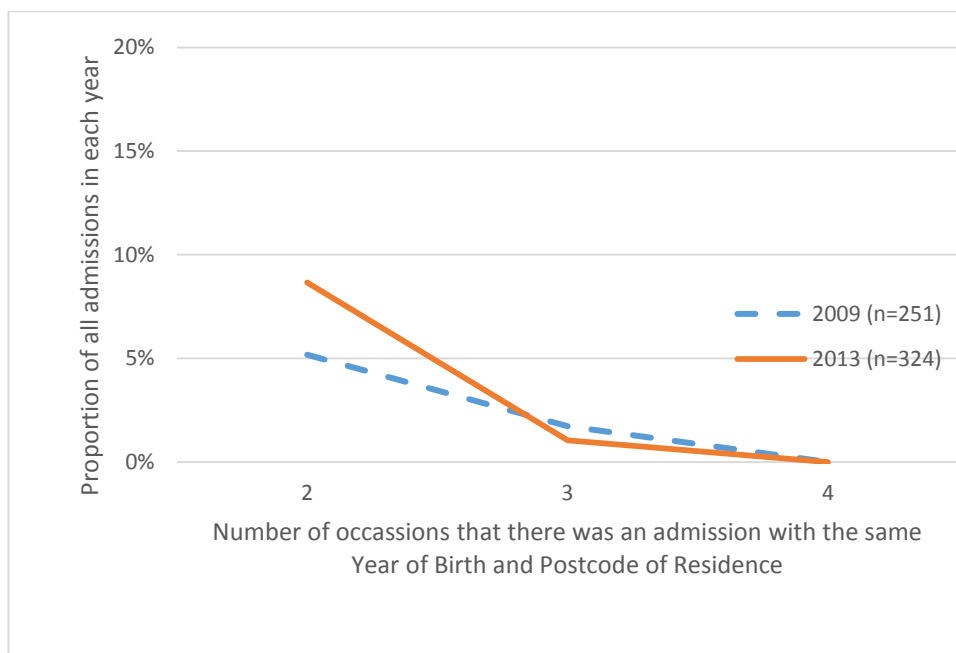


Figure 6.18: Proportion of occasions on which a patient with the same Year of Birth and residing in the same Postcode was admitted to the John Hunter Hospital, 2009 and 2013



Note: n= total number of admissions in each year

For this category of patients at the Blacktown Hospital there were more multiple admissions in 2013 than in 2009, and this trend was statistically significant (chi-squared = 20.37, df = 6, $p=0.0005$). This increase represented 61 admissions, which would be sufficient to account for the increase in the total number of patients admitted with cellulitis, coded to the 'eligible' category, if some or most of these were in fact multiple admissions of the same individual, rather than of different people sharing the same Year of Birth and Postcode of residence.

For this category of patients at the John Hunter Hospital, four per cent more patients in 2013 than in 2009 were admitted with cellulitis, and coded to the 'eligible' category with the same Year-of-Birth and the same Postcode of Residence, but this represented only 17 admissions, and the trend was not statistically significant (chi-squared = 2.5, df = 2, $p>0.05$). Even if these were all multiple admissions of the same patient, they are not sufficient to account for the increase in the total number of admissions to the John Hunter Hospital.

If multiple-admissions accounted for the increase in the number of admissions to hospital, it might be because there was limited support to provide care for this category of patient in the community, as is suggested for Blacktown Hospital. The next step in this analysis is to examine the possibility that changes in hospital policy might account for the changes in patient throughput.

6.3.5 Hospital Policy

The hospital inpatient data set does not include information on the source of the admission, and so data on both 'eligible' and 'ineligible' admission categories must be combined so that the number of admissions from a source other than the Emergency Department can be calculated by subtraction. These data for Blacktown Hospital and for the John Hunter Hospital are shown in Figures 6.19 and 6.20, respectively.

Figure 6.19: Source of admissions of patients with cellulitis to Blacktown Hospital, 2009 to 2013

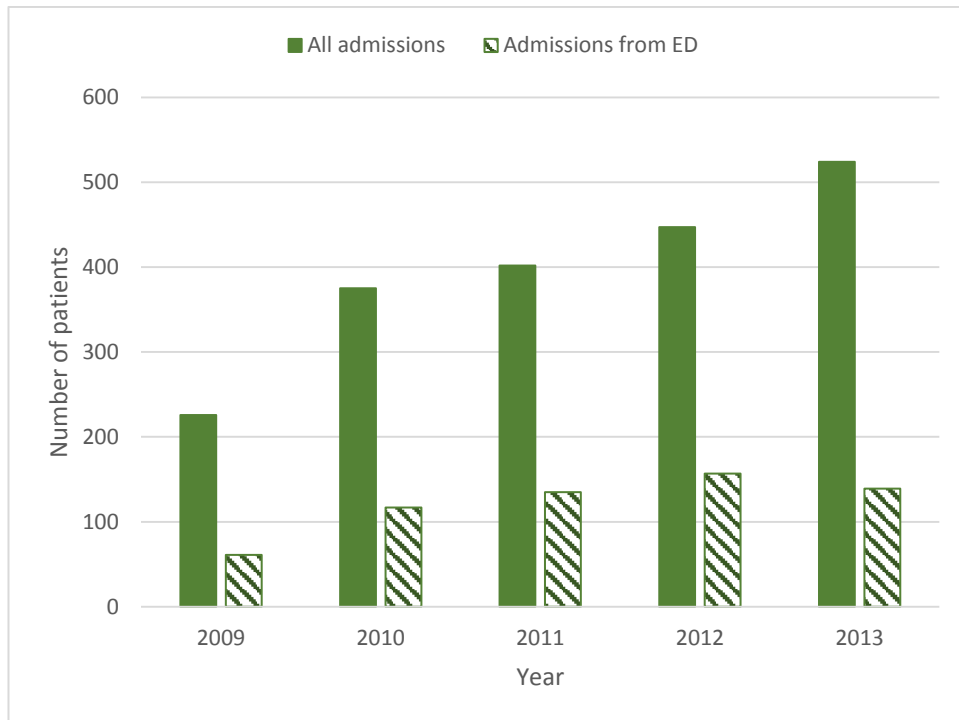
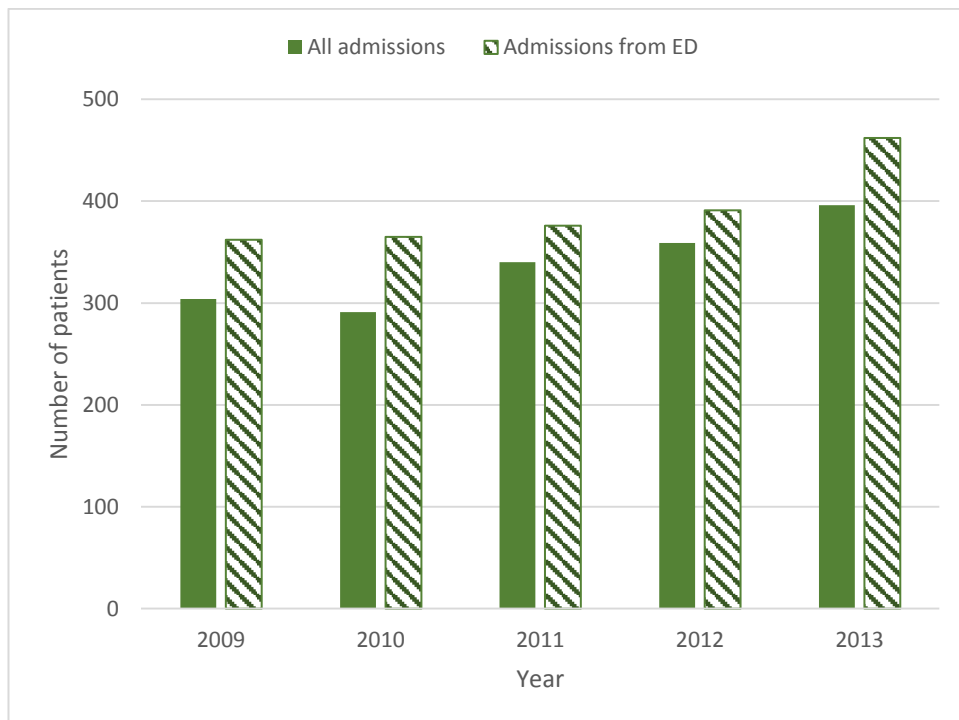


Figure 6.20: Source of admissions of patients with cellulitis to John Hunter Hospital, 2009 to 2013



The number of patients admitted with cellulitis to Blacktown Hospital, increased over the five years of the study (Figure 6.5), as did the number of people who presented to the Emergency Department for treatment of their cellulitis (Figure 6.9). However, the proportions of the source of those admissions did not change greatly over the same period, implying that there was no great change in hospital admission policy.

The number of patients admitted to the John Hunter Hospital with cellulitis, increased over the five years of the study (Figure 6.6), as did the number of people admitted from the Emergency Department (Figure 6.11). The only explanation which can account for the anomalous finding shown in Figure 6.20, that apparently, more people were admitted from the Emergency Department to the hospital than the total number of admissions appearing in the inpatient database, is that there was a change in documentation in the medical records of patients once they were admitted.

This leads to the next step, which is to present the findings from analysis of the possibility that changes in clinical practice might account for the increase in patient throughput.

6.3.6 Clinical Practice

Another possible explanation for the increase in the number of patients admitted to Blacktown Hospital or John Hunter Hospital with cellulitis and coded to the 'eligible' category, is a change in the way in which hospital clinicians' practised medicine, i.e., a change in the treatment of individual patients, and/or the recording of clinical information in their medical record.

With the introduction of ABF, medical staff were encouraged to ensure that they made an accurate record of all clinical phenomena. If this emphasis resulted in up-coding, it would result in a greater identification of patients with severe complications and comorbidities (the 'ineligible' category), rather than without complications and comorbidities (the 'eligible' category), and the absolute number of patients admitted to hospital with cellulitis would remain constant.

The data presented in Figure 6.5 and 6.6 are not consistent with this description, which suggest that changes in medical record keeping (clinical practice) does not account for the increase in the number of people admitted to these hospitals, over the five years of the study.

However, it is also possible that changes in coding practice might account for the change in patient throughput.

6.3.7 Coding Practice

Another possible explanation for the increase in the number of patients admitted with cellulitis and coded to the 'eligible' category, is a change in the written instructions contained in the Policy and Procedures Manual used by Medical Records personnel (Coders) to assign patients to a specific disease category (AR-DRGs).

However, as discussed in chapter four, there is no evidence that any changes had taken place in the instructions given to hospital Coders as to the features of the medical record which would determine the assignment of a patient with COAD to one or the other AR-DRGs, 'ineligible' or 'eligible'. It is therefore reasonable to conclude that change in coding policy would not account for an increase in the number of 'eligible' patients admitted to hospital.

6.4 Discussion of changes in hospital patient admissions

At both the Blacktown Hospital and the John Hunter Hospital, there was an increase in the number of admissions of patients with cellulitis coded to the 'eligible' category. The most likely explanation for the trend of increasing number of admissions at Blacktown Hospital is a lack of support to care for these patients in the community, resulting in multiple admissions of some of these patients.

For the John Hunter Hospital there are two possible, but not mutually exclusive, explanations for the increase in the throughput of this category of

patient. The first explanation is that the documented increase in number of people presenting to the Emergency Department for treatment of their cellulitis is the expression of an increase in community morbidity for cellulitis. Proving that there was a change in community morbidity for cellulitis is beyond the scope of this thesis, but there is limited evidence to support this explanation. Although increasing numbers of people with cellulitis presented to all the Hunter New England hospitals' Emergency Departments over the period of the study, there was no great increase in the clinical severity of those people's cellulitis (Figure 6.10).

The second explanation is that the documentation in the medical record of people with cellulitis, from which their clinical diagnosis is determined, changed for many of those people after they were admitted from the Emergency Department to the hospital, which explain the anomalous source of admission data. The principal Emergency Department provisional diagnosis is based on an assessment of the clinical condition of each person when they present to the Emergency Department. It is therefore possible that, after the patient was admitted to the hospital, this diagnosis was revised, based on the results of laboratory and other diagnostic tests undertaken in the hospital.

It is also possible that this unexpected result might reflect inconsistent documentation of the triaging of patients in the Emergency Department. Even if a change in triaging policy and processes within the Emergency Department did occur, it does not account for the increase in the number of people who presented there initially for treatment. Nor does it account for the increase in the number of admissions of patients in the John Hunter Hospital with cellulitis who were coded to the 'eligible' category.

The overall conclusion reached from these findings is that the pattern of change observed in throughput for this category of patient in all these hospitals is inconsistent with that intended by the introduction of ABF. The patterns of change support the possibilities of there being both an increase in the prevalence (or incidence) of cellulitis in the community, and a change in the triaging processes within the Emergency Department.

If there had been a change in the triaging processes within the Emergency Department it was specific to individual hospitals, and not associated with any documented change in the NSW State policy. It is recognised that the assignment of patients to Triage Categories is a dynamic process, and the initial clinical assessment of patients is subjective C (NSW Ministry of Health 2012).

Having discussed the findings from the analysis of the throughput of patients with cellulitis, the next step is to present the findings from the calculation of the PARI for each hospital, in each Local Health District.

6.5 Financial implications of Activity Based Funding

The PARI is an indicator of the balance between the potential revenue received and the resources required to treat patients with cellulitis coded to the 'eligible' category, for each hospital receiving ABF, and for the respective Local Health District as a whole. The PARI for all hospitals combined is anchored at 100 for 2009.

The data for Mount Druitt Hospital and Kurri Kurri Hospital have been included in the calculation of the PARI. The rationale for the inclusion of data from Mount Druitt and Kurri Kurri Hospital here, having excluded them from the calculation of the PARI for other clinical conditions, is as follows. Patients who were initially admitted to Mount Druitt Hospital, were transferred to another hospital comparatively quickly, and in the years 2011 to 2013 the Length of Stay for the majority of patients in the 'eligible' category admitted to that hospital with cellulitis, was less than one day (0.9 days), and therefore would not attract ABF. However, over the whole five-year period of the study, 85 per cent of these patients experienced a length of stay which fell "between the statistically high and low boundary points for ...casemix class", and thus the hospital care did fulfil the definition of an "Inlier Episode" of care, and would therefore have received funding through the mechanism of ABF (ABFT 2013b). Although the number of patients admitted to Kurri Kurri Hospital was

small, the duration of patients' stay was greater than one day, thus, for consistency, data from this hospital were included in the calculation of the PARI for cellulitis in the Hunter New England Local Health District.

Figures 6.21 and 6.22 present the PARI performance of individual Western Sydney and Hunter New England Local Health District hospitals in treating patients, who were coded as 'eligible' for treatment of their cellulitis in a setting other than that of an acute hospital, and compared with the performance of all the hospitals combined, from 2009 to 2013.

Figure 6.21: PARI for each Western Sydney hospital, and for all hospitals combined, for patients with cellulitis coded as 'eligible', 2009 to 2013

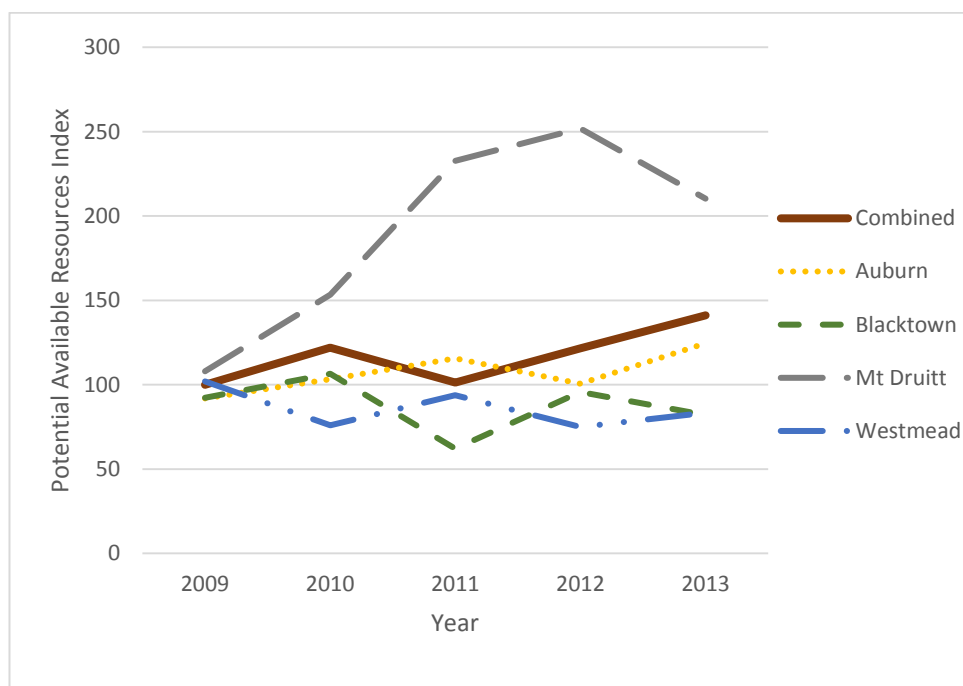


Figure 6.22: PARI for each Hunter New England hospital, and for all hospitals combined, for patients with cellulitis coded as 'eligible', 2009 to 2013

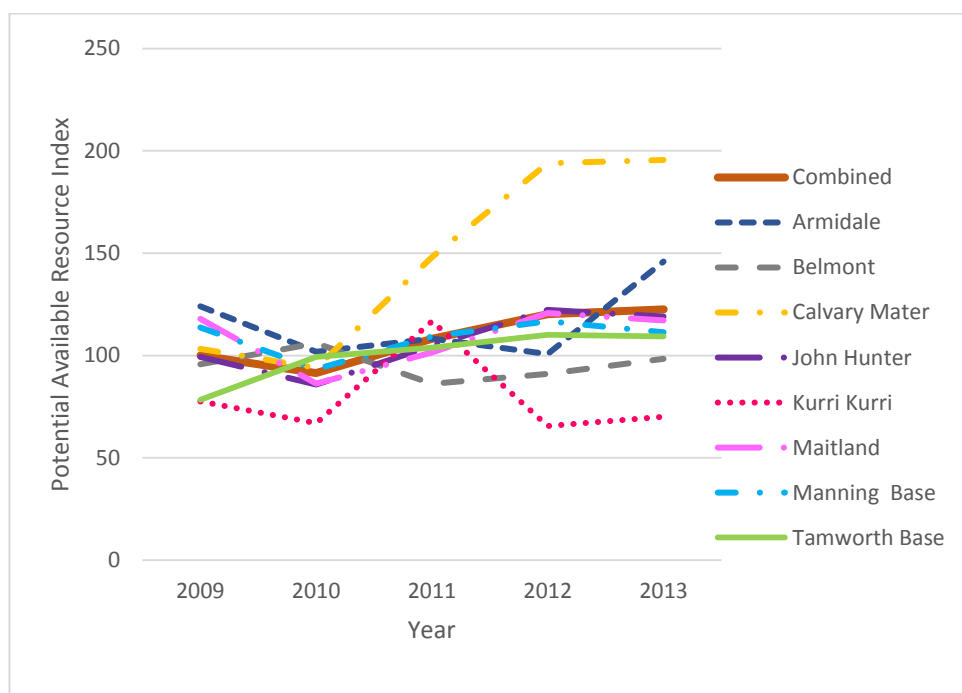


Figure 6.21 shows that the PARI rose substantially over the study period, which is the result of including data from Mount Druitt Hospital in the calculation. Mount Druitt, and Auburn Hospital were the principal contributors to the rise in the PARI in the Western Sydney Local Health District as a whole. If the revenue available from ABF were to be passed on to individual hospitals, the hospitals that would benefit most would be Mount Druitt, followed by Auburn Hospital. While, in terms of the PARI, both Blacktown and Westmead Hospitals would have used more resources to treat these patients, than was available from ABF.

For the Hunter New England Local Health District as a whole, the principal contributors to the rise in PARI were the Calvary Mater and Armidale Hospitals, while at the Kurri Kurri Hospital there was instability in the PARI over the five years of the study, probably due to the relatively small numbers of admissions. The PARI was reasonably stable over the study period at Belmont Hospital, while the John Hunter, Manning Base and Tamworth Base hospitals contributed less to the general rise in PARI over the period of the study.

The potential financial implications of ABF for the treatment of patients with cellulitis who were 'eligible' for treatment in a setting other than that of an acute hospital, are that over the five-year period of this study, all hospitals, with the exception of Belmont and Kurri Kurri Hospitals, would, to a greater or lesser extent, use fewer resources to treat those patients than those available from ABF. If this revenue were to be passed on to individual hospitals, the hospitals that would benefit most would be Calvary Mater and Armidale hospitals.

The final conclusion to be drawn from these findings, and the implications, are presented in chapter seven.

Chapter 7: Conclusion and implications

It is claimed that publicly-funded health care in Australia is provided by, and delivered within, a dynamic system of competing interests and interest groups. Accordingly, each is motivated either to maintain the *status quo*, or to support change only if it has the potential to maximise their respective utility and/or to give a competitive advantage (Johnston & Duffield 2002). It is within the context of these claims that the findings presented in the preceding chapters are now discussed. The findings are discussed at three levels: first, the micro level (public hospitals and patient care); second, the meso level (public health policy for publicly-owned and operated health services); and third, the macro level (the role of the state vis-à-vis capital accumulation, interest groups and the global health market).

If the introduction of ABF in public hospitals had achieved one of its intended outcomes, ‘...to reduce the proportion of potentially preventable hospital admissions’ by diverting less-ill patients to a non-acute location (e.g., a general practice clinic, or a hospital non-admitted patient service), then the admissions of patients ‘eligible’ to be treated in a setting other than an acute hospital would fall, and the admissions of patients who are ‘ineligible’ for treatment other than in an acute hospital, would remain steady (AIHW 2015). A decline in the duration of ‘eligible’ patients’ stay in hospital would be also expected, because some chronically unwell patients could be discharged earlier, as more community support became available for their care. If ABF has led to a decline in patient throughput, or in the duration of patient hospital stays, these findings would be expected to occur more or less consistently for each of the clinical conditions selected for study, in each hospital receiving ABF.

For the 36 cases analysed (three clinical conditions in 12 ABF hospitals), a statistically significant trend of a decline in the number of patients admitted to hospital, and coded to the ‘eligible’ category in only three of these cases was

found - COAD patients admitted to Blacktown, and diabetes patients admitted to Westmead and John Hunter Hospital. However, for each of these cases there are credible alternative explanations for those declines other than the implementation of ABF.

These alternative explanations include: more accurate clinical documentation in medical records of COAD patients, and fewer re-admissions of the same patient for treatment of their diabetes. Suffice to say that in both of the Local Health Districts, the changes observed in the throughput of patients with each of the three chronic conditions are not consistent with those intended as an outcome of the introduction of ABF. Therefore it may reasonably be concluded that the implementation of ABF did not result in an overall shift in clinical policy and/or practice in either Local Health District, or, if there was a shift, it proved ineffective in engaging clinicians ('professional monopolists') at a micro level. Three sets of implications arise from the finding of this study.

At a micro level, using health policy to achieve sustainable change in patient throughput requires the deployment of incentives which take account of the clinical practices and behaviours of 'professional monopolies' and 'corporate monopolists' who work within public hospitals. The NH Reform contains strategies designed to achieve the engagement of these interest groups more broadly, by providing financial incentives to States' and their Local Hospital Networks, and by creating Medicare Locals using public-private partnerships. However these strategies provide no incentives for greater technical efficiency at the public hospital or general practice level. Nor do these strategies address the impediments that Hancock (1999) identified as hindering the coordination of patient care among these services.

In essence, the apparently unchanged *modus operandi* of the 'professional monopolies' and 'corporate monopolists' who work in public hospitals indicates that the policy of ABF has not been successful in changing their practice or behaviour. Indeed, the reverse may occur, partly driven by the way that non-hospital services operate. When people seek health care from a private medical practice (e.g., a Medicare Local service), an appointment may not be

immediately available, a fee may be required at the point of care (over and above the Medicare rebate) and patients access to many private practices is not available on week-ends or after-hours. For example, between 2003 and 2014, fewer general practitioners were working in practices that provided their own after-hours service ('43.6 compared with 30.7 per cent'), and general practitioner referrals to Emergency Department's increased (Britt, *et al* 2013 p.31). Thus access barriers exist for those people who require medical services in a timely way (the 'repressed structural interests' may be disadvantaged).

In contrast to the provision of private health care, public hospital services cannot refuse to give treatment to a patient if it is required, and there is no out-of-pocket expense at the point of care for patients for whom treatment is provided, nor are there any time restrictions on access to treatment (public hospital Emergency Departments do not close). These characteristics of public hospital services give consumers' access to health care when they need it, regardless of their health status or their capacity to pay. Therefore, in the absence of the availability of, and easy access to, Medicare fully-funded health services located in the community that offer services after-hours and on week-ends, (which the Australian Medical Association would be unlikely to support), people in need of health care will continue to access the Emergency Departments of public hospitals, either of their own accord or referred by their general practitioner as reported by Scotton and Ferber (1980) and Britt *et al* (2013), and as was observed in this study.

An increase in the number of patients presenting to an Emergency Department for treatment of their clinical condition was found. In spite of the absolute increase in patients, the majority of whom were clinically assessed and treated in a timely way, a consistent pattern was observed. Between 60 and 70 per cent of patients left the Emergency Department after treatment, and about 35 per cent required admission to hospital. Of all those admitted to hospital with COAD, diabetes or cellulitis, over 70 per cent were coded as 'eligible' to receive their treatment in a setting other than as an inpatient in an acute hospital. Nevertheless, these patients were admitted to hospital.

There is nothing to suggest that these patterns of presentation and clinical management will not continue. The consequence is that, as more patients attend Emergency Departments for treatment, a greater absolute number will be admitted, thus creating additional demand for more public hospital beds, staff and goods and services, and therefore, an increase in hospital expenditure. The increased demand for beds will place pressure on clinicians to reduce the length of a patient's hospital stay.

Analysis of lengths of stay showed that there was a decline in the duration of the stay of patients with COAD, diabetes, and cellulitis coded to the 'eligible' category in many of the ABF hospitals in both Local Health Districts. However, over the period 2009 to 2013, only three hospitals showed a trend of decline in the length of stay of patients which was consistent across all three clinical conditions: Auburn Hospital (Western Sydney), and Armidale and Calvary Mater Hospitals (Hunter New England).

There is, of course, some financial advantage in reducing the duration of a patient's hospital stay, as was demonstrated by the use of the PARI in this thesis. Fewer resources are required for a shorter stay, which also has the potential to increase throughput (i.e., the absolute number of patients admitted and discharged). If a shorter patient stay enables another patient to be admitted, that admission will generate another item of ABF revenue for the hospital. There are two potential implications of shorter hospital stays. For interest groups who rely on public hospitals for their employment, there is a disincentive to take any action that will enable the treatment of patients to occur in a setting other than that of an acute hospital. At the same time, there is an incentive to reduce the duration of patient stays in order to maximise revenue and minimise expenditure. Thus, not only does ABF contain no incentive for the publicly-funded health system to treat 'eligible' patients outside hospital, but it contains perverse incentives for 'professional monopolies' or 'corporate monopolists' working in public hospitals not to do so.

Some health administrators and policy-makers might present the increase in the number of admissions and a decline in the patient length of stays as the achievement of greater economic and technical efficiency, but this is not the case. The more people who attend an Emergency Department or are admitted to hospital, with a condition that could be treated elsewhere, the greater are the avoidable costs, i.e., costs that were unnecessarily incurred in that hospital care, as was pointed out by Duckett *et al* 2014.

Additionally, the consumers of health services ('repressed structural interests') expect that their treating doctor will provide them with the best possible care, regardless of cost. Thus, on the one hand, doctors ('professional monopolists') are being trained to put patients' clinical needs at the centre of the care they provide, and to be the patients' agents in their quest for a good health outcome. On the other hand, doctors are asked by hospital administrators to provide the most efficient care possible by curbing expenditure (Niessen *et al* 2000; Hollingsworth & Peacock 2008). In response to these competing priorities at a micro level, doctors continue to provide the best clinical care for patients, leaving the responsibility for the implementation of any new policy directive to administrators and managers of health services ('corporate monopolists') (Leeder 1999).

These factors make the containment of costs a challenge. The main drivers of expenditure that contribute to the escalation of the cost of running a hospital, are the continuation of the traditional role and function of public hospitals, coupled with little administrative control over doctors' clinical decision-making. This challenge is not being met by managers and administrators, who continue to seek the greatest possible share of the public funding for their sector of the health system, as they always have. Additionally, these 'corporate monopolists' are resistant to changing their current practices if change means a loss of inpatient beds (to which their salary and prestige is often pegged). Conversely, they will support changes which result in additional beds.

Other 'professional monopolies', such as trade unions, welcome changes that will result in attracting new members but, they too remain resistant to any change that impacts negatively on their membership. The same considerations apply to the community in general, who recognise that the more beds in the local hospital, the greater are the opportunities for employment for members of their community. Finally, universities and other education and training institutions, who rely on public hospitals as a venue for the training and education of their students, welcome expansion in these facilities. As reported by Hollingsworth and Boyer (1997) and Evans *et al* (2006) the professional and economic survival of those interest groups who rely on public hospitals for their employment, or who benefit most from the current model of health service delivery, have a vested interest in the model remaining relatively unchanged. It is concluded that, at a micro level, not only has ABF had no impact on the current model of the delivery of public hospital services, but the current model is likely to remain unchanged.

This leads to the implications of the finding at a meso level, which is about the passage of legislation and its associated regulations and health policies. Governments use these mechanisms to implement change and/or to have influence in the health market. Medicare (and ABF), the PBS, the TGA, PHI, are health policies that govern the provision of health care in Australia, all of which have common characteristics. The objectives stated for each are normative, and none have been evaluated to determine its benefit in terms of public-good. Embedded in all of these policies is the implicit support of government for greater involvement of the private sector in the provision of health-related goods and/or services; a neoliberal phenomenon that has been reported by both Stilwell (2011) and Spies-Butcher (2014). While all these health policies enable the private sector to have legitimate access to taxpayer dollars, the private health insurance industry stands out because it has been so heavily subsidised by government grants, with the objective of creating competition. In contrast, the policies of the PBS and the TGA, were formulated mainly (but not entirely) to contain expenditure, and at the same time to provide some benefit to the public-good.

The characteristics described above are also evident in the NH Reform, which contains two very different strategies. The aim of one strategy is to achieve greater efficiency in public hospitals through the implementation of the ABF policy. The aim of the other strategy is to increase the level of health service infrastructure in the community through the creation of public-private partnerships, with the overall intention of enabling more health care to be provided in the community. Local Hospital Networks and Medicare Local services are expected to work together, but communication barriers exist between these entities, which hinder any change in clinical practice. In hospitals, clinicians report to clinical managers, while operational staff report to corporate managers. Community-based services have different reporting arrangements as do services provided under Medicare Locals, and, as reported by Hancock (1999), coordination of services across these groups remains a challenge. For example, the failure of the Community Health Program to reduce 'institutionalisation, or provide a saving in health care costs' has been attributed to the tension between health service providers (Hancock 1999, p. 173). Yet, to meet some of the objectives of ABF, coordination and communication among these various service providers is a necessary prerequisite.

The conclusion drawn in this thesis is that neither of these strategies/policies have achieved their intended goal, and the outcome of their implementation combined, provide the condition for the introduction of further 'programs of market-oriented reform' (Peck 2010). For example, The Hon. Julian Skinner MP, NSW Minister for Health and Minister for Health Research, announced recently the intent to privatise some NSW public hospitals (Media Release, 15 September 2016). Further, in the 2014-15 budget papers, the Commonwealth government has pulled back from the previous Gillard Labor government commitment to increase the Commonwealth's share of the growth in public hospital funding, which was reported by Bunday (2014). More recently in a Productivity Commission Report (2015) it was stated that, after July 2017, when the Commonwealth and States sign the new National Health

Agreement, the Commonwealth funding share to the States will be linked to population growth and the Consumer Price Index.

These statements have created a level of uncertainty about the future funding of public hospitals. One of the incentives for States to sign the NH Reform Agreement (2011) was to share the risk of the increasing cost of running public hospitals with the Commonwealth. The National Health Agreement will be re-negotiated in 2017 but, in the interim, public hospitals, Local Health Districts, and the NSW Ministry of Health, are required to continue to meet the objectives of the original Agreement, and ABF remains the official mechanism by which funding is provided to public hospital services (Bundey 2014).

It is anticipated that the changes to the arrangements for the funding of public hospital services is likely to put further pressure on hospitals, in particular on their capacity to provide timely services. If this occurs, more consumers will be forced to seek health services in the private sector, which will require them to have private health insurance. Alternatively, they will be required to meet more of their health care costs from their own pocket. The implication is that, as less funding becomes available, public hospitals will not have the resources to continue to provide the level of service which is currently provided. In spite of this concern, and the growing doubt that a funding model based on the use of AR-DRGs will improve the efficiency of hospitals, in the long-term, Duckett (2007) and other health policy commentators, continue to commend the value of using ABF to fund hospital services (Hancock 1999). Eventually, as foreshadowed by Johnson (2011b, p. 283) and Spies-Butcher (2014) this will lead to public hospital services being 'hollowed-out' in the long-term.

However this outcome would only be achieved if comparable services were available in the private sector. The second major strategy embedded in the NH Reform is the development of public-private partnerships to provide the necessary infrastructure to meet the anticipated increase in demand for health services located in the community. These non-hospital health service

providers are encouraged by government to improve their capacity to support people, particularly those living with chronic conditions, to achieve and maintain good health in the community.

These services are paid for by government grants, and through the Medicare Benefits Schedule, which is a list of the health services that can be provided in the private sector. Reimbursement for services provided is then claimed from Medicare, on a fee-for-service basis. Over-servicing and cost-shifting are unintended consequences of this model of funding, which were known to policy makers prior to the introduction of the NH Reform. These consequences are now being addressed. In response to the over-servicing by some service providers working in the private sector (and other outcomes), the Federal Health Minister, the Hon. Sussan Ley, M.P., recently announced a review of the Medical Benefits Schedule. However, this Review is clearly not designed to make any substantial contribution to removing the now well-known structural (and cultural) impediments to improving the health of the public (DoH 2015). The Terms of Reference (2015) of the review are limited to some moderate housekeeping (removing some items from the Schedules and including others).

Another recent decision of the Commonwealth government was to replace the 61 Medicare Locals (established through public-private partnerships) with 30 Primary Care Networks. This change in policy is an indication that these partnerships might have failed in their ability to support the objectives outlined in the NH Reform (PC 2015). As illustrated by the history of Medicare, such incremental change creates an unproductive cycle of change in policy, which does not address the underlying defects that undermined it originally, and thus the *status quo* is reinforced.

These policy decisions have raised suspicion that the current government is attempting to change the ratio of public to private services. In so doing it is shifting more of the costs of health care from the taxpayer to the consumer, rather than obtaining efficiency in the provision of health services, or providing a sustainable public-good (Bundey 2014; Chester 2014). This

suspicion is fuelled by legislation that allows private providers to charge a co-payment for the provision of health services, which is not covered by the Medicare rebate, as was reported by Baker (2014).

Today taxpayer dollars flow easily from the public to the private sector under neoliberal health policies. About \$100 billion of taxpayer dollars are spent each year on providing health care, which is distributed by a number of agencies, governed by regulations and health policies. The Medicare Benefits Schedule enables grants and subsidies to flow to the private sector unabated. The private health insurance industry costs the taxpayer \$5.5 billion annually, and the cost to the taxpayer of the PBS is estimated to be an annual \$8.8 billion. The more taxpayer dollars that flow to the private sector, the less are available to provide publicly-owned and operated health services, or the infrastructure necessary to support the continuum of care for patients when they are discharged from hospital.

The above examples demonstrate that while the Government continues to support a greater involvement of the private sector in the provision of health services, it has only limited influence in managing service providers whose decision-making is based on a profit motive. In terms of the hierarchy of interests operating at a meso level, little has changed since Alford (1975) first identified interest groups within the health system. What has changed since 1975 is that there is now a greater interest by, and involvement of the interest groups that operate multi-national companies globally, and the growing influence of these companies has increased their ability to secure, both from their home state and other governments, policies that consistently meet their own business objectives.

The implication of the rise of these 'corporate monopolists' and their increasing dominance in the health market globally (the macro level) is that, these companies now operate 'global supply chains' for the supply of health service infrastructure (e.g., medical technology) and other health-related goods and services (e.g., pharmaceuticals and diagnostic services). Additionally, these companies have been successful in establishing a

relationship with government in their home state, which not only favours the accumulation of capital which these states gain through taxation revenue, but it has enabled them to gain and/or maintain their influence in the health market.

Australia does not benefit greatly as a beneficiary of tax revenue from this source. As reported by Gardner (1996) Australia no longer has a strong manufacturing industry for health-related infrastructure and goods and services. Thus Australia is increasingly dependent on the importation of these necessary items. The dependence on imports, coupled with the continued support of these multi-national companies by the Australian government, has limited the government's capacity to meet its obligation to provide public-good for its citizens. This interdependence between government and multi-national companies is likely also to hinder the development of a strong domestic industry for the production of those items which, if allowed to flourish, would enable more of the health dollar to remain and circulate in Australia.

The former Prime Minister, Tony Abbott, demonstrated his Government's priority support for these companies when he stated that he was not opposed to the use of an Investor-State Disputes Settlement clause in Free Trade Agreements. This clause is used effectively by multi-national companies to protect their market share globally. An example reported by Ranald (2014) is the Philip Morris Tobacco Company's pending legal challenge, in which it is seeking to overturn the Australian government's legislation which mandates plain packaging of cigarettes. The current Conservation Coalition Government has also agreed to the inclusion in the Trans-Pacific Partnership Agreement, of an extension of the life of patents (Legge *et al* 2014). The outcomes of this decision was reported by Legge *et al* (2014) to benefit large multi-national pharmaceutical companies (and their home state), but to delay the availability of cheaper medications to Australian citizens.

The concept of competitive advantage underpins Free Trade Agreements, which West (2011) has reported have, in the past, been used to focus economic development in Australia on the exploitation (and export) of its

natural resources such as coal, while other industries were neglected. Ranauld (2014) and Legge *et al* (2014) have both pointed out the folly of this approach when they reported that free trade agreements support the global market, and undermine the power of the state to protect its own domestic market. Other authors, such as George (2013) went further to claim that trade agreements are underpinned by neoliberal ideology, which has been described by David Harvey (2012, p. 6) in an interview as a 'project of class power'. Neoliberal ideology is known to result in negative outcomes for everyone, except the wealthy individuals and powerful corporations which operate globally (George 2013). The implication is that, increasingly, multi-national companies will dominate the global supply of health-related, and other goods and services, aided and abetted by their home state, as was reported by Legge, *et al* (2014, p. 113). Mikler (2012) has argued that these influences will ultimately change the role of the state. While Galbraith (2011) contended that the likely result of the increasing influence of multi-national companies is that, the state's legislation and its associated regulations and health policies, are likely to become ineffective in enabling it to maintain any influence in what is now a global health market.

Unlike publicly-funded health services, which have been paralysed by constant policy change, private sector services have been able to maintain their policy focus and corporate knowledge. This has enabled many companies to be opportunistic when there is a change in government, and for them to resist any change in public policy that may detract from their market share. Multi-national companies will continue to operate in this way, as long as governments continue to support them in ways which not only enable them to access public monies globally, but which weaken the bargaining power of customer states in their providing public-good (Mikler 2012; Spies-Butcher 2014).

Suffice to say that the existence of a global health market, which favours investment that provide quick returns, has had a profound effect on the ability of government to reform the health system, even if it were committed to

achieving this as an outcome of its health policies (Galbraith (2011). Coriat and Weinstein (2005) have argued that, this health market is based on a social system of production. Here, power is institutionalized in the structure of society, and the values held in society are embedded in regulations and health policy decisions, which change (to varying degree) depending on which political party is in power. In this market, as reported by Swiercz and Skipper (1982), the impediments that must be overcome for health reform to be successful remain those associated with the culture and activities of the vested interest groups. Given the influence of all these interests and interest groups, and their alliances with government, it is hard to see how the implementation of the most recent NH Reform and its policy of ABF could have been successful in achieving its policy objectives.

The result of these dynamics has been reported widely, and the conclusion is that, regardless of the need to change the current health system to meet the health needs of the population, publicly-funded health services, as a commodity, are likely to remain stationary, or to change only very slowly. This is in spite of growing public dissatisfaction with the current health system, which was claimed by Richardson (2005) to have placed avoidable financial and human costs on the community. In other words, as Anderson (1968) has reported, the health system possesses remarkable resilience, in spite of attempts to change it.

The 'professional monopolies' remain the most dominant interest group in the current health system, while 'corporate rationalisers' are less dominant. Consumers and others ('repressed structural interests') remain those least dominant in the health system, as was the case in 1975. It is predicted that the ability of 'corporate monopolists' to influence governments (and their formulation of public health policy) will, now and in the future, challenge all other interest groups, including the state, and will become the most dominant influence in the health market globally.

The question as to the degree to which, there has been a 'hollowing-out' of public hospital services in Australia, given the Government's commitment to

neoliberalism and the rise of multi-national companies, and whether, as a result, the state will lose its influence in the health market globally, are subjects worthy of future research.

Bibliography

Activity Based Funding Taskforce 2013a, *Activity Based Funding (ABF) and Small Hospitals Operational Specifications 2013/14*, SHPN: 130255, ISBN: 978-1-7-4187-833-2, ABFT, NSW Ministry of Health.

Activity Based Funding Taskforce 2013b, *The Next Step: Funding Reform-A Practical Guide to the NSW Funding Model 2012-13*, SHPN: 130322, ISBN. 978-1-74187-893-6, ABFT, NSW Government Health.

Abernethy, M 1995, 'Costing Systems in Hospitals: Relevance for Economic Evaluation Studies', *Economic Evaluation in Australia Health Care*, Commonwealth of Australia, Ch. 5, ISBN 0 644 45124 6, Australian Government Publishing Service.

Alford, R 1975, *Health care politics: health science, ideology and interest group barriers to reform*, University of Chicago Press, Chicago.

Anderson, T 1968, 'Some thoughts on methods of political economy', *Journal of Australian Political Economy*, vol. 54, pp. 135-146.

Anderson, T 2014, 'Unlikely Partners: Challengers for Australian-Cuba Collaboration in Public Health', Special Issue, ISSN 0156-2826, Addressing the Real Disease? The Political Economy of Health, *Journal of Australian Political Economy*, vol. 73, pp. 200-223.

Australian Bureau of Statistics 2011, *Census of Population and Housing Basic Community Profile*, cat. no. 2001.0, ABS, New South Wales, viewed 20 March 2014,
<http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofile?s?opendocument&navpos=230>

- Australian Bureau of Statistics 2014, *4364.0.55.001-National Health Survey: First Results, 2014-15*, ABS, viewed 29 December 2015, <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4364.0.55.001~2014-15~Main%20Features~Smoking~24>
- Australian Bureau of Statistics 2015, *Experimental Estimates for the Manufacturing Industry*, cat. no. 8155, Australian Industry, cat. no. 8159, ANZSIC Class 184, ABS, viewed 2 February 2015, <http://www.industry.gov.au/industry/IndustrySectors/PharmaceuticalsandHealthTechnologies/Pharmaceuticals/Pages/PharmaceuticalsIndustryDataCard.aspx>
- Australian Institute Health and Welfare 1999, 'Cardiovascular disease and diabetes cost us dear', *Media Release 7 May 1999*, AIHW, viewed 30 June 2015, <http://www.aihw.gov.au/media-release-detail/?id=6442464304>
- Australian Institute Health and Welfare 2010, *Australian Health series*, no. 12, cat. no. AUS 122, ISBN 9781 724 249 0021, AIHW, Canberra.
- Australian Institute Health and Welfare 2014, *Health expenditure Australia 2012–13: analysis by sector*, Health and Welfare Expenditure Series, no. 53, cat. no. HWE 62, AIHW, Canberra.
- Australian Institute Health and Welfare 2015, *Australian Health Care Agreement PI 18-Selected potentially preventable hospitalizations 2015*, METeOR identifier 559032, AIHW, viewed 15 May 2015, <http://meteor.aihw.gov.au/content/index.phtml/itemId/559032>
- Barraclough, S & Gardner, H 2008, *Analysing Health Policy: A Problem Oriented Approach*, ACN 0001 002357, Elsevier, Australia.
- Baum, F 2008, *The New Public Health*, Oxford University Press.
- Baker, D 2014, 'Cutting Health Costs: Lowering Out of Pocket Expenses by Changing Processes', Special Issue, ISSN 0156-2826, Addressing the Real Disease? The Political Economy of Health, *Journal of Australian Political Economy*, vol. 73, pp. 40-57.
- Blewett, N 2000, 'The Politics of Health', *Australian Health Review*, vol. 23, no. 2.

- Boxall, A & Gillespie, J 2013, *Making Medicare: the politics of universal health care in Australia*, UNSW Press.
- Bundey, F 2014, 'Putting the \$7 Co-Payment in Context: Australia's Increasingly Financialised System of Healthcare', *Journal of Australian Political Economy*, vol. 73, pp. 58-75.
- Bureau of Health Information 2010-2013, *Performance Profiles, Emergency Department Care, Hospitals Quarterly Report*, BHI, viewed 17 March 2016, http://www.bhi.nsw.gov.au/publications/hospital_quarterly_nsw
- Britt, H, Miller, G, Henderson, J, Charles, J, Valenti, L, Harrison, C, Bayram, C, Chambers, T, Zhang, C, Pam, Y, O'Halloran, J, Pollack, A 2013, *A decade of Australia general practice activity 2003-04 to 2012-13*, general practice series no. 30, ISBN 978-1-74332-379-3, Sydney University Press.
- Broom, D & Primrose, D 2014, 'Editorial: renewing the Political Economy of Health and Healthcare in Australia', *Journal of Australian Political Economy*, vol. 73, pp. 6-17.
- Cahill, D & Paton, J 2011, 'Thinking Socially About Markets', *Journal of Australian Political Economy*, vol. 68, pp. 8-19.
- Cahill, D 2013, Actually Existing Neoliberalism and the Global Economic Crisis, *Journal Labour and Industry: a journal of social economic relations of work*, pp. 289-316, viewed 24 September 2016, <http://www.tandfonline.com.ezproxy1.library.usyd.edu.au/doi/pdf/10.1080/10301763.2010.10669405?needAccess=true>
- Chave, S 1987, *Recalling the Medical Officer of Health*, London: King Edward's Hospital Fund for London, 1987, attributed to Dr R Barnes, (NSW MoH, Shoreditch), pp. 51.
- Chester, L 2014, 'The participation of vulnerable Australians in Markets for essential goods and services', *Journal of Australian Political Economy*, vol. 64, pp. 169-193.
- Checkland, K, Harrison, S, & Coleman, A 2009, 'Structural Interests in Health Care: Evidence from the Contemporary National Health Service', *Journal of Social Policy*, vol. 38, no.4, pp. 607-625.

- Clinical Excellence Commission n.d, *About the Clinical Excellence Commission*, CEC, New South Wales, viewed 4 January 2016, <http://www.cec.health.nsw.gov.au/about>
- Coriat, B & Weinstein, O 2005, 'The Social Construction of Markets', *Issues in Regulation Theory*, vol. 53, pp. 1-4.
- Council of Australian Governments 2011, *National Health Reform Agreement 2011*, COAG, viewed 10 October 2012, http://www.federalfinancialrelations.gov.au/content/npa/health_reform/national-agreement.pdf
- Council of Australian Governments 2012, *National Healthcare Agreement 2012: Intergovernmental Agreement on Federal Financial Relations*, COAG, viewed 10 January 2013, <http://www.federalfinancialrelations.gov.au/content/npa/healthcare/national-agreement.pdf>
- Croxin, K 2011, 'Prediction Markets: Theory and Applications', *Information Markets for Decision Making: performance and feasibility*, edited by Williams, L, Routledge, London and New York.
- Culyer, A 2005: *The Dictionary of Health Economics*, 3rd Edn, ISB 978-1-7800-175-, Elgar, Cheltenham UK and Northampton MA.
- Davidson, B 2011, 'Contestability in Human Services Markets', *Journal of Australian Political Economy*, vol. 68, pp. 215-239.
- Deeble, J 2009, 'Public Hospitals not failing just starved of funds', *Sydney Morning Herald* 9 October, viewed 1 January 2016, http://www.smh.com.au/execute_search.html?text=Deeble&ss=National
- Department of Health 2011, *National Health Reform Progress and Delivery*, SBN: 978-1-74241-546-8, Online ISBN: 978-1-74241-547-5, DoH, viewed 18 September 2016, <http://webarchive.nla.gov.au/gov/20140801015101/http://www.yourhealth.gov.au/internet/yourhealth/publishing.nsf/Content/nhr-progress-delivery>

- Department of Health 2015, *Medical Benefits Schedule Review Taskforce: 2015*, DoH, Commonwealth, viewed 26 November 2015, <http://www.health.gov.au/internet/main/publishing.nsf/Content/healthiermedicare>
- Department of Prime Ministers & Cabinet 2015, *Reform of the Federation Green paper 2015*, Commonwealth, Federation Discussion Paper, DPM&C, viewed 1 February 2015, https://federation.dpmc.gov.au/sites/default/files/publications/reform_of_the_federation_discussion_paper.pdf
- Duckett, S 1984, 'Structural Interests and Australian Health Policy', *Social Science Medical Journal*, vol. 18, no. 11, pp. 959-966.
- Duckett, S 2007, *The Australian Health Care System*, 3rd Edn, Oxford University Press Australia and New Zealand.
- Duckett, S & Willcox, S 2011, *The Australian Health Care System*, 4th Edn, pp. 76-105, Oxford University Press, Australia and New Zealand.
- Duckett, S, Breadon, P, Weidmann, B, & Nicola, I 2014, *Controlling costly care: a billion dollar hospital opportunity*, ISBN: 978-1-92501552-2, Grattan Institute, Melbourne.
- Eager, K, Garrett, P, & Lin, V 2001, *Health Planning Australian Perspectives*, Allen Unwin.
- Evans, F, Gil-Soo Han, & Madison, J 2006, *Healthcare Reform and Interests Groups: the case of rural Australia*, University Press of America Inc.
- Ewig, C 2009, *Second Wave Neoliberalism: Gender, Race and Health Sector Reform in Peru*, The Pennsylvania State University Press, University Park, Pennsylvania.
- Feingold, E 1977, 'Who Controls the Medical Care System?' *The Academy of Political Science, Health Services: The Local Perspective*, vol. 32, no. 3, pp. 193-199, viewed 16 June 2013, JSTOR database
- Galbraith, J 2011, 'The State and the Good Society', *Readings in Political Economy, Economics as a Social Science*, 3rd Edn, pp. 281-286, Tilde University Press Ltd, Australia.

- Gardner, H 1996, *The Politics of Health: the Australian experience*, 2nd Edn, Churchill Livingstone, Australia.
- George, S 2013, 'The rise of illegitimate authority and the threat to democracy', *Journal of Australian Political Economy*, vol. 72, pp. 5-22.
- Griffith, G 2006, 'Commonwealth-State Responsibilities for Health – "Big Bang" or Incremental Reform?' Briefing paper 17/06, *NSW Parliamentary Library Research Service*, ISSN 132-5142, ISBN 0 7313 18137, viewed 19 January 2014, http://www.parliament.nsw.gov.au/WEB_FEED/PHWebContent.nsf/PHPPageS/LibraryPublications
- Ham, C 1994, *Management and Competition in the New NHS*, Radcliffe Medical Press, Oxford and New York.
- Hancock, L 1999, *Health Policy in the Market State*, ISBN 1 86448 724 0, Allen Unwin.
- Hartl, A, & Seiffge, K, & Laursen, B 2015, 'Body image mediates negative family climate and deteriorating glycaemic control for single adolescents with type 1 diabetes', *Journal of Collaborative Family Healthcare*, Issue 4, vol. 33, pp. 363-371.
- Harvey, D 2012, 'Contesting capitalism in the light of the crisis: a conversation with David Harvey', interview conducted by David Primrose, *Journal of Australian Political Economy*, 2014, vol. 71, pp. 7.
- Health Services Act 1997*, (NSW) no. 154, viewed on 3 April 2016, <http://legislation.nsw.gov.au/inforcepdf/1997-154.pdf?id=59d71b18-59e1-693c-e068-b6c6de1d2851>
- Hindle, D 2002, 'Health care funding in New South Wales: from health care needs to hospital outputs', *Australian Health Care Journal Review*, vol. 25, no. 11.
- Hollingsworth, J & Boyer, R 1997, *Contemporary Capitalism: the embeddedness of Institutions*, Ch. 2, Cambridge University Press, Cambridge.
- Hollingsworth, B & Peacock, S 2008, *Efficiency Measurement in Health and Health Care*, Routledge, London and New York.

Independent Hospital Pricing Authority 2011, *Literature Review: Efficiency, international best practice in ABF and future payment reform*, IHPA, viewed 18 September 2013, <http://www.IHPA.gov.au>

Independent Hospital Pricing Authority 2012, *The Pricing Framework for Australian Public Hospital System*, 30 May 2012, IHPA, viewed 12 October 2012, <http://www.ihpa.gov.au/internet/ihpa/publishing.nsf/Content/NEP-determ-12-13>

Independent Hospital Pricing Authority, Industry briefing paper, 14 August 2013, IHPA, viewed 23 September 2013, <https://www.ihpa.gov.au/>

Jennett, C & Stewart, R 1990, *Hawke and Australian Public Policy: consensus and restructuring*, The Macmillan Company of Australia Pty Ltd.

Johnston, J & Duffield, C 2002, 'Strategic Public Governance in Australia Health: The "Unsmart" Incapacitated State', *Administrative Theory and Praxis*, vol. 24, no 1, pp. 125-144.

Johnson, M 2011a, 'Meeting Australia's Infrastructure', *Readings in Political Economy, Economics as a Social Science*, 3rd Edn, pp. 325-330, Tilde University Press Ltd, Australia.

Johnson, M 2011b, 'Transforming the Public Sector', *Readings in Political Economy, Economics as a Social Science*, 3rd Edn, pp. 281-286, Tilde University Press Ltd, Australia.

Leeder, S 1999, *Healthy Medicine, Challenges facing Australia's health services*, ISBN 1 86508 054 3, Allen Unwin.

Legge, D, Gleeson, D, Lofgren, H, & Townsend, B 2014, 'Australia's Position on Medicines Policy in International Forums: Intellectual Property Protection and Public Health', Special Issue, ISSN 0156-2826, Addressing the Real Disease? The Political Economy of Health, *Journal of Australian Political Economy*, vol. 73, pp. 103-131.

Leister, J, & Stausberg, J 2005, 'Comparison of cost accounting methods from different DRG systems and their effect on health care quality', *Health Policy*, vol. 71, no.1, pp. 46-55.

- Loeppky 2014, 'Canada, Health and Historical Political Economy', Special Issue, ISSN 0156-2826, Addressing the Real Disease? The Political Economy of Health, *Journal of Australian Political Economy*, vol. 73, pp.172-184.
- McTaggart, D, Fudlay, C, & Parkins, M 1996, *Economics*, 2nd Edn, Addison-Wesley Publishing Company, Sydney.
- Medical Training Review Panel 2013, *Sixteenth Report*, Appendix d, Table D9. Canberra, Commonwealth of Australia, viewed 23 January 2016, <http://www.health.gov.au/internet/publications/publishing.nsf/Content/work-pubs-mtrp-16-toc~work-pubs-mtrp-16-appendices~work-pubs-mtrp-16-appendices-appendix-d-extended-data-trend-tables~work-pubs-mtrp-16-appendices-appendix-d-extended-data-trend-tables-d1-d9>
- Media Release 2016, 'Partnerships to deliver hospital up-grades sooner', The Hon. Julian Skinner MP, Minister for Health and Minister for Health Research, 15 September 2016, viewed 25 September 2016, http://www.health.nsw.gov.au/news/Documents/20160915_00.pdf
- Media Release 2015, 'Abbott Government to deliver a healthier Medicare', The Hon Sussan Ley MP, Minister for Health, Minister for Sport, 22 April 2015.
- Mikler, J 2012, 'The Illusion of the Power of Markets', *Journal of Australian Political Economy*, vol. 68, pp.41-61.
- Murray, G & Peetz, D 2013, 'Restructuring of Corporate Ownership in Australia through the Global Financial Crisis', *Journal of Australian Political Economy*, vol. 71, pp. 76-105.
- Niessen, L, Grijseel, E, & Rutton, F 2000, 'The Evidence-based approach in health policy and health care delivery', *Social Science and Medicine*, vol. 51, pp. 859-869.
- NSW Ministry of Health 2002, *Guide to Role Delineation of Health Services 2002*, 3rd Edn, State Health Publication, No. SWS 990186, ISBN 0734731019, MoH, viewed 22 August 2014, <http://www.health.nsw.gov.au/services/Publications/guide-role-delineation-health-services.pdf>

- NSW Ministry of Health 2012, *Health Care Records - Documentation and Management 2012*, PD2012_069, MoH, viewed 19 September 2015, http://www0.health.nsw.gov.au/policies/pd/2012/PD2012_069.html
- NSW Ministry of Health 2014a, *Local Health Districts and Specialty Networks: 2014*, MoH, viewed 8 May 2014, <http://www.health.nsw.gov.au/lhd/pages/default.aspx>
- NSW Ministry of Health 2014b, *Annual Report 2013-2014*, MoH, SHPN (SRC) 140421, ISSN 0815-4961, viewed February 2015, <http://www.health.nsw.gov.au/publications/Pages/annualreport14.aspx>
- NSW Ministry of Health 2014c, *Departure of Emergency Department Patients 2014*, PD2014_025, MoH, viewed 19 September 2015, http://www0.health.nsw.gov.au/policies/pd/2014/pdf/PD2014_025.pdf
- NSW Ministry of Health 2015a, *Triage of Patients in NSW Emergency Departments 2015*, PD2013_047, MoH, viewed 19 September 2015, http://www0.health.nsw.gov.au/policies/pd/2013/PD2013_047.html
- NSW Ministry of Health 2015b, *Hospital Triage*, MoH, viewed 19 September 2015, http://www0.health.nsw.gov.au/hospitals/going_to_hospital/triage.asp
- Numata, Y, Schulzer, M, Van Der Wal, R, Globerman, J, Semeniuk, P, Balka, E, & FitzGerald, J 2006, 'Nurse staffing levels and hospital mortality in critical care settings: literature review and meta-analysis', *Journal of Advanced Nursing*, vol. 55, no. 4, pp. 435–448.
- Nurses and Midwives Association, 'Public Health System 2015 Campaign', New South Wales, N&MA, viewed 21 March 2016, <http://www.nswnma.asn.au/get-involved/ratios-put-patient-safety-first/public-health-system-2014-campaign/>
- Organisational for Economic Cooperation and Development 2013, *Health expenditure in OECD Factbook 2013: Economic, Environmental and Social Science*, OECD ISSN 2075-8480, OECD, Health Data: Health Statistics database.

- Offe, C, & V, Ronge 1975, 'Theses on the Theory of the State', *New German Critique*, no. 6, pp. 137-147, viewed 24 February 2014, JSTOR database.
- Oxford 2008, *Oxford English Dictionary* 3rd Edn (revised), ISBN 978-0-19-956174-2, Oxford University Press.
- Peck, Jamie 2010, *Construction of Neoliberal Reason*, ISBN 9780199580576, Oxford University Press.
- Peterson, C 2005, 'Employee Retention: The Secrets behind Wal-Marts Successful Hiring Policies', *Human Resource Management*, Spring vol. 44, no. 1, pp. 85-88.
- Pharmaceutical Benefits Scheme 2013, *Expenditure and prescriptions twelve months to 30 June 2014*, Commonwealth, PBS, viewed 1 January 2016, <http://www.pbs.gov.au/statistics/2012-2013-files/expenditure-and-prescriptions-12-months-to-30-06-2013.pdf>
- Pollicino, C, Viney, R, & Haas, M 2002, 'Measuring health system resource use for economic evaluation: a comparison of data sources', *Australian Health Review: a publication of Australian Hospital Association*, vol. 25, no. 3, pp. 171-178.
- Private Health Insurance Act 2007, Act No. 31 of 2007 as amended*, Australian Government. Federal Register of Legislation, AG, viewed 27 August 2016, <https://www.legislation.gov.au/series/C2007A00031>
- Productivity Commission 2015, *Efficiency in Health*, Commission Research Paper, JEL codes: 110,118, ISBN 978-1-74037-545-0, PC, Canberra.
- Ranald, P 2014, 'Addressing the Real Disease? The political economy of health in Australia, Expropriating Public Health Policy: Tobacco Companies' Use of International Tribunals to Sue Governments Over Public Health Regulation', Special Issue, ISSN 0156-2826, Addressing the Real Disease? The Political Economy of Health, *Journal of Australian Political Economy*, vol. 73, pp. 76-102.

- Richardson, J 1999, 'The Health Care Funding Debate', in Mooney G and Scotton R, editors, *Economics and Australian Health Policy*, Ch.10, Allen and Unwin, Sydney.
- Richardson, J 2005, 'Priorities of health policy: cost shifting or population health' *Journal of Australian and New Zealand Health Policy*, vol. 2, no. 1, doi: 10.1186/1745-6482-2-1.
- Ryan, M 2016, Contesting 'Actually Existing' Neoliberalism, *Journal of Australian Political Economy*, vol 76, pp, 79-102, viewed 29 August 2016, <http://australianpe.wixsite.com/japehome/pastissues>
- Sarantakos, S 2005, *Social Research*, 3rd Edn, Palgrave Macmillian.
- Scotton, R & Ferber, H 1978, *Public Expectations and Social Policy in Australia: The Whitlam Years 1972-75*, vol. 1, ISBN 582 710839, Longman Cheshire Pty Ltd.
- Scotton, R & Ferber, H 1980, *Public Expectations and Social Policy in Australia: The First Fraser Years 1976-78*, vol. 11. ISBN 582 710855. Longman Cheshire Pty Ltd.
- Scotton, D 1995, 'Managed Competition: Issues for Australia', *Australian Health Review*, vol. 18, no. 1.
- Seah, S, Cheong, T, & Anstey, M 2013, 'The Hidden cost of private health insurance in Australia', *Australian Health Review*, vol. 37, pp. 1-3.
- Seven Thirty Report 2014, television broadcast, Australia Broadcasting Commission, Sydney, reporter Sarah Ferguson 23 July 2014, viewed 2 January 2016, <http://www.abc.net.au/7.30/content/2014/s4052418.htm>
- Spies-Butcher, B 2014, 'Markets, Universalism and Equity? Medicare's Duel Role in the Australian Welfare State', Special Issue, ISSN 0156-2826, Addressing the Real Disease? The Political Economy of Health, *Journal of Australian Political Economy*, vol. 73, pp.18-40.
- Steinbusch, P, Oostenbrink, J, Zuurbier, F, & Schaepkens, F 2007, 'The risk of upcoding in casemix systems: A comparative study', *Health Policy*, vol. 81, pp. 289-299.

- Stilwell, F 2011, 'The State: Competing Perspectives', *Readings in Political Economy, economics as a social science*, 3rd Edn, pp. 274-277, Tilde University Press Ltd, Australia.
- Stilwell, F 2012, *Political Economy: the contest of economic ideas*, 3rd Edn, Oxford University Press.
- Swiercz, P, & Skipper, J 1982, 'Labour Law and Physician' Privileged Position. An Example of Structural Interest Influence', Original Article on Professionalism and Law, *International Journal of Health Services*, vol. 12, no. 2.
- Sydney and Blue Mountains Street Directory 2011*, ISBN 978 0 7319 2452 3, 46th Edn, UBD, Sydney Universal Publishers Pty Ltd.
- Taylor, R 1977, 'Review of: Alford's Health Care Politics: Health Science, Ideology and Interest Group Barriers to Reform', *Contemporary Sociology*, vol. 6, no. 5, pp. 530-533.
- Therapeutic Goods Administration 2013, *TGA statutory advisory committees*, TGA, viewed 14 October 2013, <http://www.TGA.gov.au/about/committees.tgc.htm>
- Weidmann, B, & Duckett, S 2014, *Quantifying variation in Australian acute-care costs*, Technical Appendix to Controlling Costly Care, Grattan Institute, Melbourne.
- Woodruff, T 2015, 'Moving towards a two-tiered system', *ABC News*, Australian Broadcasting Commission, The Drum opinion by Tim Woodruff 2015, viewed 16 March 2015, <http://www.abc.net.au/news/2015-01-14/woodruff-doctor-fees/6016436>
- World Health Organisation 2014, *Burden of disease from Ambient Air Pollution for 2012*, WHO, viewed 29 December 2015, http://www.who.int/phe/health_topics/outdoorair/databases/AAP_BoD_methods_March2014.pdf?ua=1
- World Health Organisation 2015, *International Classification of Disease ICD 10*, WHO, viewed 20 August 2016, https://www.google.com.au/search?q=chronic+obstructive+pulmonary+disease+icd+10+code&ie=utf-8&oe=utf-8&gws_rd=cr&ei=DXHyVISGMcPKmwWr5oB4

- van Gool, K 2007, 'Funding Public Health in Australia'. *Health Policy Monitor*, viewed 20 November 2014, <http://www.hpn.org/survey/au/a9/1>
- Yin, R 2003, *Case Study Research: design and method*, 3rd Edn, vol. 5, SAGE Publications Thousand Oaks, London, New Delhi.
- Yuxin Tay, E, Fook-Chong, S, Chiat Oh C, Thirumoorthy, T, Ming Pang S, Yueh Lee, H 2015, 'Cellulitis Recurrence Score: A tool for predicting recurrence of lower limb cellulitis', Jan 2015, *Journal of American Academy of Dermatology*, vol. 72, no.1, pp.140–145, viewed 14 September 2015, <http://www.sciencedirect.com.ezproxy2.library.usyd.edu.au/science/article/pii/S0190962214018921>

Appendices

Appendix A: Emergency Department Triage Categories

Triage Category	Description
1	Resuscitation – People who need to have treatment immediately or within two minutes are categorised as having an immediately life-threatening condition. People in this group are critically ill and require immediate attention. Most would have arrived in Emergency Department by Ambulance. They would probably be suffering from a critical injury or cardiac arrest.
2	Emergency – People who need to have treatment within 10 minutes are categorised as having an imminently life-threatening condition. People in this group suffer from a critical illness or are in very severe pain. People with serious chest pains, difficulty in breathing and severe fractures are included in this group.
3	Urgent – People who need to have treatment within 30 minutes are categorised as having a potentially life-threatening condition. People in this group suffer from severe illness, bleed heavily from cuts, have major fractures, or be dehydrated.
4	Semi-Urgent – People who need to have treatment within one hour are categorised as having a potentially serious condition. People in this group have less severe symptoms or injuries, such as a foreign body in the eye, sprained ankle, migraine or earache
5	Non-Urgent – People who need to have treatment within two hours are categorised as having a less urgent condition. People in this group have minor illnesses or symptoms that may have been present for more than a week, such as rashes or minor aches and pains.

Source: MoH 2015b.

**Appendix B: ICD10d1 codes for each selected clinical condition in the
Hunter New England Local Health District, Emergency
Department**

Disease	ICD10d1 Code	Description
COAD	J44.0	chronic obstructive pulmonary disease with acute exacerbation, unspecified
	J44.1	chronic obstructive pulmonary disease with acute exacerbation, unspecified
	J44.8	other specified chronic obstructive pulmonary disease
	J44.9	chronic obstructive pulmonary disease, unspecified
	J98.9	respiratory disorder unspecified
Diabetes	E16.2	hyperglycaemia, unspecified
	E23.2	diabetic insipidus
	E10.11	insulin dependent diabetes mellitus with ketoacidosis stated as uncontrolled
Cellulitis	L03.01	cellulitis of finger
	L03.03	cellulitis of toe
	L03.9	cellulitis unspecified
	L03.10	cellulitis
	L03.11	cellulitis of other parts of limb
	L03.221	cellulitis of neck
	L03.211	cellulitis of face

	L03.81	cellulitis of other sites
	L03.31	cellulitis of trunk

Source: MoH 2013.

Appendix C: SNOMED-CT codes for each selected clinical condition in the Western Sydney Local Health District Emergency Department

Disease	SNOMED-CT Code	Description
COAD	13645005	chronic obstructive lung disease (disorder)
	285381006	acute infective exacerbation of chronic obstructive airways disease (disorder)
Diabetes	80394007	hyperglycomia
	402864004	diabetic wet gangrene of the foot
	302866003	hypoglycemia
	237598005	hyperglycemic disorder
	33747003	glucose measurements
	420422005	ketoacidosis in diabetes mellitus
	237623001	acute hyperglycaemia
Cellulitis	128045006	cellulitis (disorder)
	385627004	cellulitis (morphologic abnormality)
	238402004	cellulitis of leg (disorder)
	109245003	cellulitis of periorbital region (disorder)
	13301002	cellulitis of knee (disorder)

	200682008	cellulitis and abscess of ankle
	200630006	cellulitis and abscess of finger
	59883002	cellulitis of abdominal wall
	62837005	cellulitis and abscess of leg
	75817003	cellulitis of breast
	267782008	cellulitis and abscess of leg

Source: MoH 2013.