Future financial impact of the current health financing system

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Abstract

Major political parties remain publicly committed to Medicare and community-rated voluntary health insurance. It is important to understand the future financial consequences of this policy in order to assist community debate about whether such a commitment is appropriate or some other policy should be developed.

This paper describes development of, and results from, the APHA health financing model. It suggests that health expenditure would represent 12.9% of gross domestic product by 2021, compared to 8.5% in 1995. Increasing per capita expenditure is the major contributor to the growth, with demographic changes responsible for only 14.3%.

Introduction

Problems with the current health financing scheme are well known in the health policy community. For example, concern about fragmentation (see Paterson 1996) has led to coordinated care trials under the auspices of the Council of Australian Governments (1995, 1996). Similarly, the instability in private health insurance has led to a range of legislative changes, reports and proposals (for example, see Industry Commission 1997).

Nevertheless, major political parties remain publicly committed to Medicare and community-rated voluntary private health insurance. It is therefore essential to understand the future financial consequences of the policy. This would allow community debate to determine whether such a commitment is appropriate or some other policy should be developed.

Several authors have undertaken studies to assess future health expenditure. Goss et al. (1994) focused on the proportion of the elderly within the population and the consequential burden on the population of health expenditure for the elderly. Importantly, they included a correction to adjust expenditure per elderly person for years to death rather than merely assuming that a person aged 70 in 40 years time has the same 'healthiness' as a person aged 70 in the initial year.

Walker (1996) did not include a life expectancy correction. However, he considered utilisation growth (based on historical results) as well as demographic changes.

This article draws on, and extends, these ideas to provide an alternative projection. It describes development of, and results from, a model (APHA Health Financing Model V1.1) with the following characteristics.

- Projections are based on 1994–95 Australian expenditure data and 1995 population projections (Australian Bureau of Statistics series A).
- Government expenditure, as well as total expenditure, is estimated.
- Growth due solely to population changes is reported as well as growth including per capita expenditure changes.
- A correction is included for changes in life expectancy to reflect the fact that some extension of life is healthy years and some is less healthy years.
- Expenditure per person aged 18 to 64 is reported as an indicator of the relative burden of health expenditure on the productive population.
- Major component health expenditure (for example, hospitals) can be separately analysed.

Methodology

In principle, the projected cost of the health system is easy to calculate. Health expenditure is highly dependent on demographic factors. Thus, population projections can be combined with per capita health expenditure for population subgroups to estimate the total future health expenditure. If desired, an annual growth figure can be incorporated to reflect changes in expenditure per person.

Construction of per capita costs

Per capita costs, within age gender sub-populations, were calculated for five expenditure categories: hospital, in-hospital medical, other medical, pharmaceutical, and other health (nursing homes, allied health care, capital expenditure, and so on).

Where possible, the sub-population distribution of expenditure by government was calculated separately from the total health expenditure distribution. If separate distributions were not available, government expenditure was calculated as a constant proportion of total expenditure.

Hospital expenditure data were constructed from age group by gender cost weight data in the *Australian Casemix Report on Hospital Activity 1995–96* (Commonwealth Department of Health and Family Services 1997, Table 1.8). The number of separations and average cost weight of those separations for the population subgroup were combined with population statistics for 1995 to estimate average cost weight per person for each subgroup. The all-hospitals result was used for total expenditure and the public hospitals result for government expenditure.

Note that the use of Australian national diagnosis related group (AN-DRG) information to describe the demographic profile of hospital expenditure is likely to underestimate increased expenditure arising from ageing of the population. This classification is known to underestimate length of stay for older sub-populations (Gillett & O'Connor-Cox 1996).

Medical expenditure data were constructed from unpublished 1996–97 data provided by the Commonwealth Department of Health and Family Services. Published Medicare statistics combine in-hospital and other medical services but these services were reported separately in the provided information. The 'fees charged' item was used for total expenditure distribution and 'benefits paid' for the government distribution.

Pharmaceutical expenditure distribution was estimated from 1995 National Health Survey unpublished data. This survey includes age (individual to 99 and grouped for 100+), gender and number of medications. Number of medications was used as the basis of pharmaceutical expenditure from all sources. This assumes that drugs used by each demographic group involve the same average expenditure. More recent work by Walker, Percival and Harding (1998) may provide an opportunity to assess the impact of this assumption.

As the Pharmaceutical Benefits Scheme data collections do not record age or gender of benefit recipients, there is no information available about the profile of government contributions to pharmaceutical expenditure. Therefore, a constant proportion was assumed across the demographic groups.

Other health expenditure was distributed from data using disease costing methodology (Mathers et al. 1998, Table C.2). This technique attributes costs to particular diseases and then examines the population distribution of the diseases to estimate the population distribution of the costs. The data provided separate distributions for various elements, including dental services and nursing homes, which were combined to construct the expenditure profile for other recurrent health costs. Capital expenditure was allocated equally per person.

A constant proportion was applied for the government distribution for each major component of other health expenditure. There are obvious problems with this assumption, such as inclusion of nursing homes in this component where government expenditure is clearly age-specific. The separate proportion allocated for each expenditure category available from the disease costing methodology reduces these problems. However, the combined proportion is applied for projected future expenditure even though the age profile may have changed significantly.

Finally, a normalisation factor was introduced for each component. These factors were applied across each distribution profile so that component expenditure for the 1995 population would be estimated to equal the 1994–95 component expenditure as reported by the Australian Institute of Health and Welfare (1997).

Life expectancy correction

For older sub-populations in longer term projections, part of the growth in population reflects longer life expectancies, where some of the additional years will be healthy years and some will be unhealthy years. Thus, for a particular age, it is likely that the average person in the future will be healthier than an average person at that age in the initial year.

In the model, health costs were adjusted to reflect changes in life expectancy by lowering deemed ages in the population projections by the change in life expectancy at age 65 (Australian Bureau of Statistics 1996). For example, if life expectancy at age 65 increased by 2.5 years since 1995, then all persons aged at least 70 in the projected population were assigned the 1995 health costs of a person aged 2.5 years younger.

As age bands were used in assigning costs, it was not possible to directly assign costs for persons at particular deemed ages. Instead, piecewise linear approximations to the per capita cost function by age were calculated and these approximations used. Each piece of the linear function is defined by two points, given by average age (by 1995 population) in an age band and the per capita cost for that age band.

This approximation reintroduced differences from the reported expenditures for 1994–95. Thus a correction factor was included to normalise to those reported figures. This correction assumes that estimates for projected populations will be incorrect to a similar extent as for the 1995 population. Medical and pharmaceutical expenditure needed negligible amendment, hospital expenditure had an intermediate result and the expenditure for the 'other health care' component required the greatest correction (of less than 4%).

Figure 1 displays the change in projected health expenditure arising from the life expectancy correction. In general, the impact of the life expectancy correction should increase for the longer period projections. That is, the proportional difference between uncorrected and corrected expenditure should consistently increase. This is because the impact on the deemed age increases over time and the proportion of the population affected by the correction (those aged at least 70) increases over time.

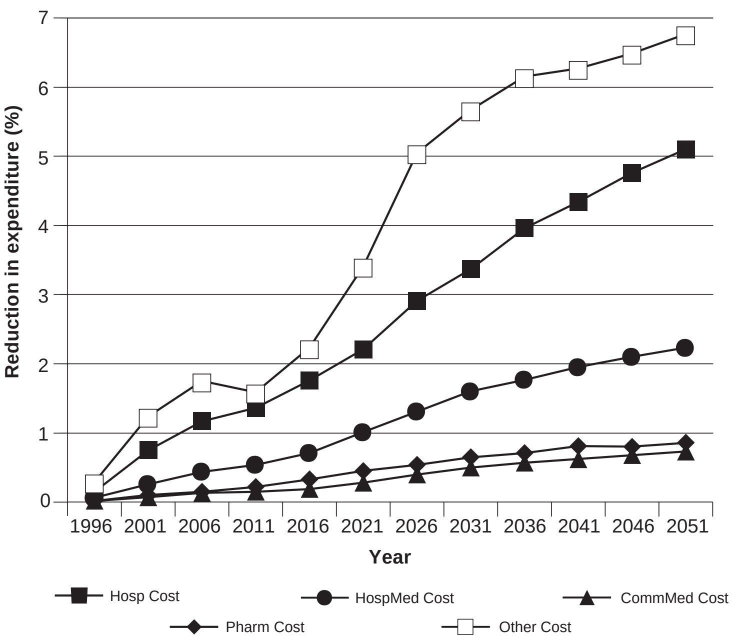


Figure 1: Impact of the life expectancy correction

Goss et al. (1994) used a different method of correcting for life expectancy. They estimated that health expenditure would grow by 72.2% between 1995–96 and 2030–31 without life expectancy correction. With correction, the corresponding growth was approximately 65.6%, a reduction of 6.6 percentage points or 9.8%. The equivalent figure from the APHA model (with zero expenditure growth) is 64.0%, corrected to 58.7%, a reduction of 8.4%.

Default per capita expenditure growth

The model allows the user to enter per capita expenditure growth figures for use in the projections. These are estimates of the annual per capita increase in health expenditure, in excess of that arising from changes in the population profile. In addition, the user can specify whether the growth is to be projected as linear or exponential growth, or some combination of the two. The APHA model provides default values for these parameters which reflect recent historical trends.

Health expenditure data, which provide separate figures for hospital services, medical services and pharmaceuticals as well as total health expenditure, have been published by the Australian Institute of Health and Welfare since 1980–81. These reported data (Australian Institute of Health 1988; Australian Institute of Health and Welfare 1995, 1997) were corrected to constant (average 1994–95) prices using deflators implicit from the institute's total health expenditure, which is published as both current and constant prices. (Note that this contrasts with the institute's practice of using separate deflators for each component). Per capita actual expenditure (total and component) was calculated using Australian Bureau of Statistics population estimates.

Separately, the demographic cost profile from the model was applied to Australian Bureau of Statistics historical population profiles to estimate component health expenditure for the years from 1981–82 to 1996–97. Per capita projected health expenditure (total and components) was calculated for each year.

For each year between 1981–82 and 1994–95, the effect of demographic changes was removed by calculating the difference between the projected expenditure for that year and the projected expenditure for 1981–82. This difference was subtracted from the actual expenditure for the year.

Demographic adjusted per capita growth was calculated from the annual increase in the demographic corrected per capita actual expenditure figures. The best fit linear and exponential curves were calculated against the 13 annual growth figures for each health expenditure component. The growth values from these curves provided the basis of the default growth parameter values.

The default values adopted for the model and used in this analysis are:

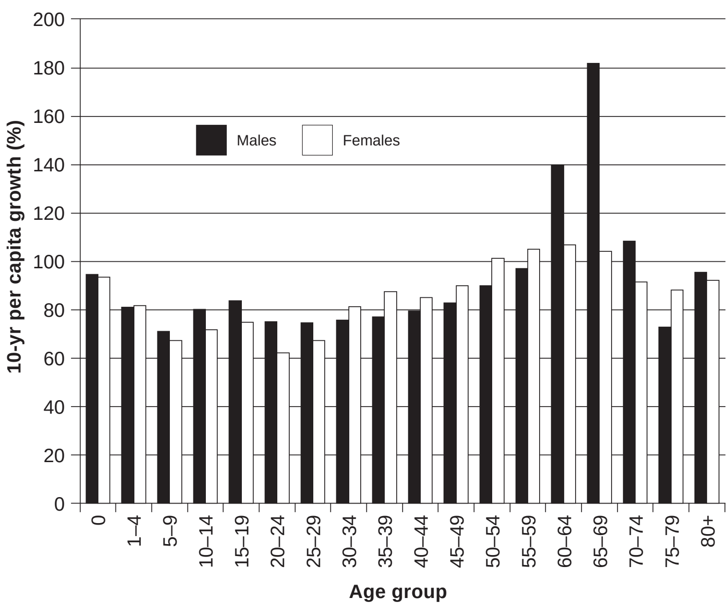
- hospital – 0.40% growth and fully linear
- in-hospital medical – 3.91% growth and halfway between linear and exponential
- community medical – 4.29% growth and halfway between linear and exponential

- pharmaceutical – 4.74% growth and fully exponential
- other health – 3.29% growth and fully linear.

Assumption of constant annual growth across demographic profile and time

Annual per capita expenditure growth (combining number of services and expenditure per service) in excess of that arising from demographic changes is applied to each demographic group equally. For example, if the average pharmaceutical expenditure is 20% higher in 2010 than in 1995, then that growth is applied to the average pharmaceutical expenditure for the 24-year-old males groups and the 80-year-old females group.

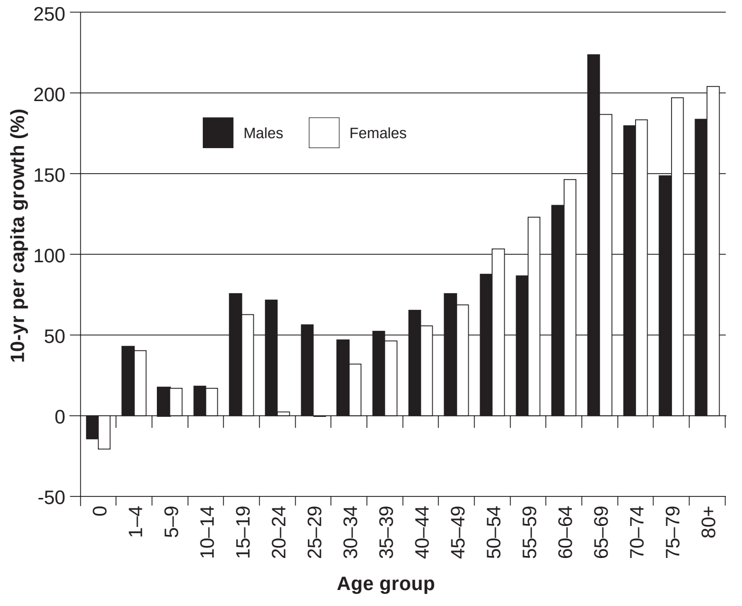
Figure 2 shows the growth between 1986–87 and 1996–97 in fees charged for out-of-hospital medical services by age and gender group. From the graph, although there are some groups (notably the males aged between 60 and 69) with very different growth rates, the assumption of equal growth appears reasonable.



Source: Unpublished Medicare statistics provided by the Department of Health and Family Services.

Figure 2: Ten-year growth in fees charged for out-of-hospital medical services

In contrast, Figure 3 shows that the assumption breaks down for fees charged for in-hospital medical services. For this item, the growth is much higher in older age groups. Further, there is negative fees growth for some younger age groups. These results are similar as those reported by Walker (1996) for growth in hospital admissions and occupied bed-days.



Source: Unpublished Medicare statistics provided by the Department of Health and Family Services.

Figure 3: Ten-year growth in fees charged for in-hospital medical services

Overall, the assumption of equal per capita expenditure growth across the demographic profile is likely to lead to an underestimate of future health expenditure. This is because, in combining the various components of health expenditure, there is higher growth in the older age groups than in the younger age groups in those components for which data are available. As these older age groups are also those attracting the higher health expenditure, an underestimate of annual expenditure growth in these older groups and an overestimate of growth in the younger groups leads to an overall underestimate of health expenditure.

The growth parameters are also assumed to be the same over time. From historical expenditure, growth is highly variable over time. However, applying constant growth would only cause significant inaccuracy if there is a systematic increase or decrease in growth. Such a systematic change is not easily predictable. Potential influences include the number and distribution of providers, changes in technology and impact of prevention programs.

Health insurance changes

Since 1994–95 the government has increased its share of the hospital and other health care expenditure by providing rebates to lower income earners with health insurance. Thus, normalisation to 1994–95 expenditure results would underestimate current government contribution to health expenditure. The model addresses this subsidisation by allowing the user to enter additional government expenditure on hospital care, in-hospital medical care and other health care. The analysis in this article assumes subsidies derived by applying the incentives to the 1995 National Health Survey population.

Subsidies were incorporated in the projections by increasing government expenditure in accordance with the initial year adjusted for insurance membership and population growth. The size of the change to government expenditure is given by:

$$\Delta G = \frac{I}{I_0} \times S_0 \times \frac{N}{N_0}$$

where: I is insurance membership (as a proportion of population)
S_0 is the value of the initial year subsidies
N is population.

For subsidies to other health care (ancillary insurance rebates), membership was assumed to change in proportion to membership of hospital insurance. Thus the same formula applies, with *I* still referring to the proportion of the population with private hospital cover.

Since 1994–95 (the normalisation year) the government has also increased its share of health expenditure due to a reduction in the insured population. The impact of changes in ancillary insurance membership is negligible because insurance redistributes private expenditure (between insurance and other private expenditure) on items included entirely within the other health care component of the model.

In contrast, changes in hospital product private health insurance membership may have a significant impact on projections of government hospital expenditure. Of course, the transfer from private expenditure to government expenditure would not be a simple proportion of insurance contributions for two reasons:

1. People choosing to rely on Medicare are likely to be those receiving least value from private hospital cover, that is, people of lower risk. Thus the proportion of hospital expenditure transferred between private and government sources would be less than the proportional change in insurance participation.
2. In addition, there are some differences between the public and private sector that could result in different expenditures for persons of the same risk. These factors include reduced access in public hospitals compared to private

hospitals (perhaps avoiding some admissions) and a higher level of amenity in private hospitals (differences in infrastructure, leading to different costs). Also, some private expenditure incurred by individuals (out-of-pocket costs) is transferred to government as health insurance membership declines.

As there are no agreed estimates of the impact of these two effects, they have been included in the model as input parameters. The first has no effect on overall hospital expenditure but changes the expenditure by government. The second factor affects estimates of both government expenditure and overall expenditure on hospital care.

If: I is insurance membership (as a proportion of population)
E_0 is the relevant initial expenditure by health insurance funds
C is the relative cost parameter
R is the relative risk parameter of those people changing insurance status
P is the population per capita cost of hospital (including medical) expenditure compared to 1995 values
N is population

the *increased* burden on government (G) of hospital and in-hospital medical expenditure is given by:

$$\Delta G = \frac{I_0 - I}{I_0} \times E_0 \times C \times R \times P \times \frac{N}{N_0}$$

the *decrease* in all sources (T) hospital and in-hospital medical expenditure is given by:

$$\Delta T = \frac{I_0 - I}{I_0} \times E_0 \times (1 - C) \times P \times \frac{N}{N_0}$$

Note that if $I < I_0$ (that is, insurance membership decreases), G increases and T decreases. However, if relative cost is large (that is, public hospital care costs more for the same risk status person as private hospital care), a decrease in health insurance membership increases total expenditure. The opposite is true for membership increases. This analysis has set each parameter (C and R) to 100%, a neutral assumption.

A reduction in membership of hospital cover products also reduces government expenditure by reducing the liability for insurance incentive rebates. This reduction is assumed to be proportional to the reduction in membership.

Results

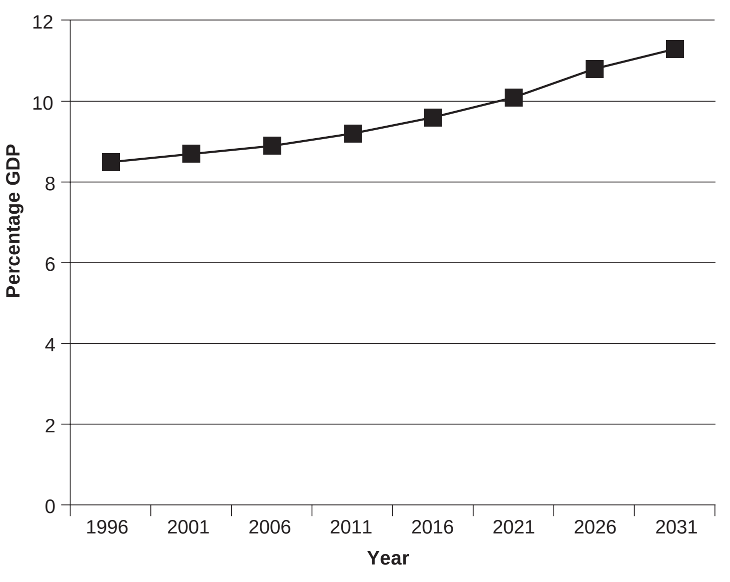
Multiple effects are combined in the model. This analysis considers the effect of each separately, but stated projection results combine the effects.

Effects of demographic changes

In order to estimate the impact on health expenditure of demographic changes, the model was run with zero growth, stable health insurance membership and stable government subsidies for insurance. The burden of health expenditure was estimated by dividing the total expenditure by the number of people aged between 18 and 64.

Projected total health expenditure is $3461 per person aged between 18 and 64 in 1996, increasing to $4029 in 2021. (Note that all results are in constant 1994–95 dollars.) Government expenditure per person aged between 18 and 64 increases from $2357 to $2753. That is, demographic changes increase the financial burden of health care by 16.4% over the 25-year period.

This means that, if the 1996 population had the same demographic profile as the projected 2021 population, health expenditure would have represented 9.9% of gross domestic product in 1996. Figure 4 displays this health expenditure burden of changing demographics.



Source: APHA Health Financing Model V1.1.

Figure 4: Impact of changing demographics, no change in productivity

This does not mean that the projected level of health expenditure for 2021 is 9.9% of gross domestic product. First, per capita expenditure changes have not been included in this projection. Also, productivity (per person) would be expected to increase over this period. Nevertheless, this result demonstrates that growth in health expenditure is a problem that must be properly examined and that the changing demographics must be considered for any health financing system to be stable in the longer term.

Effects of per capita changes in expenditure

Annual per capita expenditure growth arising from changes in utilisation and in cost per service has a much greater potential impact on health expenditure than demographic changes. It is also more difficult to estimate. Improved technology may lead to higher utilisation of health services, for example, where ongoing treatment is available for a previously fatal condition. On the other hand, improved technology may also produce cures to replace ongoing treatment, thereby reducing utilisation.

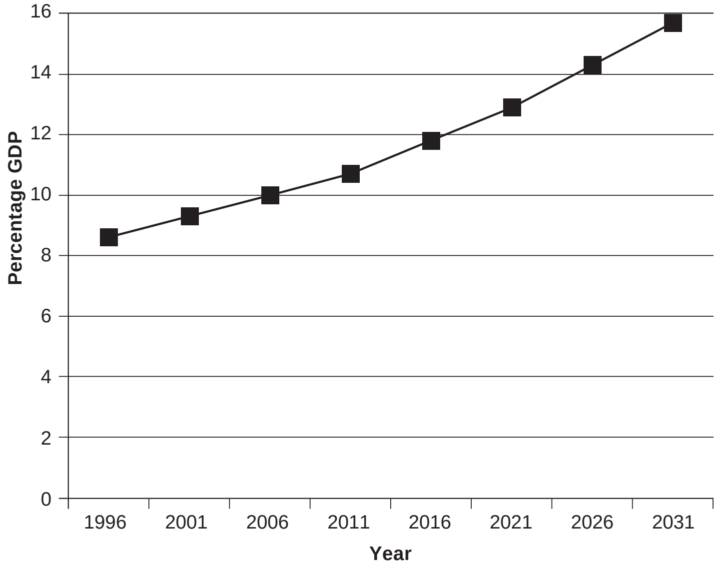
The benefits of public health programs would also be expected to reduce utilisation. In some cases, however, they could have the opposite effect. For example, a previously fatal disease with no available treatment could be eliminated and the proportion of the population suffering from treatable health problems would then increase.

In addition, governments have introduced measures intended to control utilisation growth. These measures include episodic payment with utilisation targets in some public hospitals and limiting eligibility for Medicare provider numbers. The government may also attempt to limit increases in expenditure per service through such measures as limiting fee increases in the Medicare Benefits Schedule.

The effect of each of these changes is unpredictable, and their combination even less predictable. In projecting future expenditure, this analysis uses average annual per capital expenditure growth between the years 1981–82 and 1994–95 as the growth values.

With these figures, in 2021 the projected health expenditure is $4572 per person, or $7526 per person aged between 18 and 64. Compared to 1996, this is a projected increase of 106% and 112% respectively. In 1996 terms, this expenditure would represent 18.5% of gross domestic product.

Even assuming significant annual productivity increases of 1.4% per person aged between 18 and 64, the projected health expenditure in 2021 would represent 12.9% of gross domestic product. Note that using Clare and Tulpulé's gross domestic product projections (1994, p 23), the equivalent value is 12.1% of gross domestic product.



Note: Assumes annual productivity growth of 1.4% per person aged 18 to 64.
Source: APHA Health Financing Model V1.1.

Figure 5: Projected health expenditure on current trends

The increase in government expenditure on health is similar to the combined private and government increase in health expenditure. With the default growth values, in 2021 the projected government contribution to health expenditure is $3042 per person, or $5007 per person aged between 18 and 64. Compared to 1996, this is an increase of 102% and 107% respectively.

Conclusion

The current health financing arrangements involve significant increases of expenditure on current trends. Demographic changes are an important contributor to this increase. Even if per capita expenditure growth is halted, health care per person aged between 18 and 64 would cost 16.4% more in 2021 than in 1996.

In order to minimise expenditure growth, the key change required is control of per capita expenditure growth. This could involve community debate about rationing, but growth could also be moderated with appropriate incentives inherent in a new system. Even with moderate expenditure growth, strong productivity growth is necessary to avoid an excessive health expenditure burden.

The actual year at which the system reaches breaking point is, of course, dependent on the level at which government and the community is willing to finance health services. It is clear, however, that major system redesign should commence so that there is sufficient time to develop a stable health financing arrangement with broad community support.

Unrealistic expectations should be avoided. Governments and the community must recognise that Australia's health system will increase in cost over time and a choice must be made between allocating the required resources or reducing care. Continual efficiency improvements have not been sufficient in the past to control health expenditure and are unlikely to be sufficient in the future.

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Note

The views expressed in this article are those of the author and are not necessarily shared by the Australian Private Hospitals Association or its members.

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