

**Health and Ageing in 2025:
the 'boomers' go grey**

La Trobe University

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Worner Research Lecture 2005

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Biography



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Professor Hal Swerissen was previously Director of the Australian Institute for Primary Care, Faculty of Health Sciences, La Trobe University. He has extensive experience in health and community services research and consultancy. He has been a senior policy adviser to the Commonwealth Government on health and community services, including primary care and disability services, health insurance and financing and Commonwealth-State relations. He has also been an advisor to the Victorian Government on community services, including disability services and the Home and Community Care program.

Professor Swerissen has extensive research and consultancy experience. He has conducted a number of public consultations on health, aged care, disability and acute care services for government. He has completed consultancy reports and provided advice on the development, organisation, funding and effectiveness of health and community services for government and non government organisations. Professor Swerissen was one of the key designers of the Commonwealth COAG health reform process and an architect of the coordinated care trials. He has been a member of Board of the Moreland Community Health Service and is past president of the Victorian Healthcare Association community health division.

He has published more than 60 books, articles, reports and conference papers on health and community services policy and programs. Professor Swerissen teaches in health policy analysis, program development and evaluation, research methods and community health in the School of Public Health at La Trobe University.

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Introduction

It is a great pleasure to have been invited to present the Worner lecture this year. This lecture is named after Howard, Neil and Hill Worner, who studied at the Bendigo School of Mines, a forerunner of La Trobe University. They all went on to make very significant contributions in science and engineering. Appropriately, in the spirit of the Worner brothers, the aim of this lecture series is to promote research conducted at La Trobe University.

Taking up this challenge, I want to use this occasion as an opportunity to reflect on the challenge of population ageing for health policy-makers over the next two decades.

Demographic ageing

Born between 1946 and 1964, the baby boomers are ageing. The first of the boomers will be 65 in 2010. The boomers are literally a product of a time when fertility rates were much higher than they are now. In 1961 the fertility rate was 3.5 babies per woman of fertile age. Today it is about 1.75.¹ Proportionally, there are simply more people in the boomer age cohort than in others. Therefore, as the boomers age, so will the overall profile of the population.

In fact the proportion of the population aged over 65 is predicted to grow from 13 per cent today to about 25 per cent in 2044–45.² Currently 2.5 million people are aged 65 and over. This is estimated to rise to 5 million by 2024 (21% of the population). As a result, the aged dependency ratio (the number of people aged 65 and over relative to the number aged between 15 and 64) will fall from 1:5.2 to 1:2.4 over the next 40 years. This will not be significantly offset by declining numbers of young people.

While the proportion of the population aged over 65 has progressively increased over the past century, the predicted rise over next three decades is much more significant because of the baby boomer cohort effect. In 1900, four per cent of the population was aged over 65. This rose to, and stabilized at about 8–9 per cent from 1950 through to 1970. From 1970 to 2010 the proportion will rise again to about 14%. The proportion is predicted to rise much more quickly thereafter as the baby boomers age.

The changing pattern of health and illness

The increasing proportion of older people from 1900 to 1950 largely reflects a decrease in deaths caused by infectious disease in infancy and, to a lesser extent, in adulthood. The infant mortality rate has declined from about 120 deaths per 1000 live births at the beginning of the last century, to about 6 per 1000 today.

The plateau in life expectancy between 1950 and 1970 occurred during a period when lung cancer and cardiovascular disease rates for men rose rapidly, largely as a result of increasing tobacco use, high levels of saturated dietary fat intake, and reducing physical activity. Declining standardized mortality rates for cardiovascular disease since the 1970s have coincided with falling tobacco use, reductions in dietary saturated fats, and improvements in treatment of cardiovascular disease.³

While in general there have been very substantial improvements in health outcomes over the past century, significant variations across different population groups remain. In particular, life expectancy for Indigenous people remains about 20 years less than for the non-Indigenous population and infant mortality rates remain about three times greater.⁴ Similarly, and in part reflecting higher Indigenous populations,

rural Australians experience worse health outcomes, higher levels of health risks, and lower access to services than those living in metropolitan areas.⁵

Notwithstanding risks associated with new infectious diseases like avian influenza - which are serious - today, chronic diseases are the major cause of the overall burden of disease experienced by the population.

Ageing and chronic illness

Ageing is closely associated with increasing prevalence and incidence of many chronic diseases.⁶ These include cardiovascular disease, cancer, type 2 diabetes, renal disease, musculoskeletal disease, and chronic obstructive pulmonary disease. Depression, which is a significant co-morbidity for these conditions, is also age related. The majority of these are now included in the health priorities adopted by Australian Health Ministers.

By definition, chronic diseases are relatively ongoing. They are often progressive. Many have significant effects on quality of life and a number are life threatening. They are complex and our understanding of them is limited. As a result, treatment is relatively ineffective, often focusing on slowing progression or palliation rather than cure.⁷

The burden of disease associated with chronic disease can be measured as years of life lost due to premature death and years of life lost due to disability. These can be added for populations to create Disability Adjusted Life Years (DALYs). The total burden of disease and injury for a population can be measured in DALYs. The DALYs attributable to particular conditions can also be expressed as the proportion of the total burden.⁸

The top ten causes of the burden of disease for women, which contribute about 45% of the total burden, are all chronic diseases. Eight of the top ten for men are chronic diseases, making up about 40% of the total burden.

Currently, two-thirds of Australians die of heart disease and cancer. In Australia, it is estimated that chronic illnesses are responsible for approximately 80% of the total burden of disease, with an estimated three million Australians suffering from one or more chronic illnesses.⁹

The age-related incidence and prevalence of chronic disease varies, depending on the disease. For example, asthma is more prevalent in younger age groups. Diabetes and heart disease become more prevalent in middle age and continue to rise thereafter. Dementia is largely restricted to older age groups. Nevertheless, in general, the incidence and prevalence of chronic disease increases significantly for age groups over 65. This is particularly reflected in their impact on disability and activity limitation. While less than 5% of 15 to 64 year olds have profound or

severe activity limitation, almost 50% of those aged over 85 experience these problems.¹⁰

Ageing and health care costs

Australian expenditure on health and aged care in 2002–03 was \$72.2 billion or 9.5% of GDP. The rate of increase in expenditure is currently well above inflation, at about 10% per annum.¹¹ Health expenditure is strongly related to ageing.

Older people have greater health needs and use proportionately higher levels of health care than younger people. On average, those aged over 65 use about four times the resources per person used by those aged less than 65. Per capita usage is significantly higher again for those aged over 80¹² but falls for very old age groups where intensive and aggressive treatment is seen as less appropriate.¹³ Aggregate health care costs peak between 80 and 90.¹⁴ Per capita aged care costs for home and community care and residential care are also much higher for older age groups.

It is highly likely that the incidence and prevalence of chronic disease will increase significantly as the population ages over the next three decades or so. This will almost certainly lead to a significant increase in aggregate demand for health services.¹⁵

Health care costs increase rapidly over the age of 70. The number of people aged over 70 will double over the next two decades.

However, the potential impact of ageing on health costs is not uncontested. Counter arguments include: older people are now healthier so costs will not increase; we will become wealthier and therefore any increased costs will be affordable; technology not ageing drives costs; and, we can make policy choices in our response to potential increased demand. I would like to examine some of these arguments before considering the health care system we will need for the future.

Compression or expansion of morbidity?

Interestingly, despite the dramatic increase in average life expectancy, there has not been an increase in maximum life expectancy. Maximum life expectancy remains below 120 years. If, at least for the moment, maximum life expectancy is relatively fixed, there are at least two possibilities for the future distribution of illness and death in older age.

The first is known as the 'compression of morbidity hypothesis'.^{16,17} It proposes that primary prevention reduces distress and disability caused by chronic disease more than it increases life expectancy. In so doing, distress, disability and disease are compressed around the time we die. Given that maximum life expectancy appears to be relatively fixed, if this hypothesis holds, we can therefore increasingly expect to live with less and less illness and disease before we die.

Alternatively, we may experience an expansion of morbidity. This is sometimes known as the 'Medawar hypothesis'.¹⁸ Effectively, this hypothesis proposes that systemic failure in old age is inevitable and that the delay in the onset of chronic conditions will be less than the delay in death associated with the prevention and treatment of fatal conditions. Extension of life expectancy can therefore only be achieved at the cost of an increasing experience of illness and disability as the fatal consequences of chronic disease are delayed.

Although the data are not yet conclusive, what there is tends to support the compression of morbidity hypothesis. Over time, there appears to have been a greater decline in morbidity than mortality. This suggests that there is significant benefit both to life expectancy and to quality of life in promoting measures to prevent chronic disease, including for those in middle adulthood who are at risk but not yet symptomatic.

However, it is worth noting that there may be limits in the extent to which morbidity can be compressed. Extension of morbidity-free life at very old ages may be more difficult. As average life expectancy increases the apparent trend toward compression may stabilize or reverse. Up to a certain point increased years of life lived without disability may not contribute significantly to additional health expenditure.¹⁹ Thereafter, gains may only be obtained at increasing life time cost.

It is also important to disentangle the effect of prevention on increased life expectancy and the demographic impact of the baby boomers on population ageing. Even if prevention compresses morbidity with increasing life expectancy, as the absolute number of older people increases dramatically over the next three decades there will be an absolute increase in the number of people with chronic disease who need treatment. This will have a significant impact on health care costs.

Lubitz studied the impact of demographic ageing on US Medicare expenditure (which covers health care costs for people aged over 65). He found that three-quarters of additional US Medicare expenditure will result from the larger baby boomer birth cohort.²⁰ For the baby boomers, demographic ageing has a far greater impact on health expenditure than increasing life expectancy.

It has also been argued that increased health care costs associated with ageing are largely associated with the costs of dying.²¹ If this is true, as life expectancy increases, costs would be deferred. The data indicates that about 30% of US Medicare costs²² (about 10 to 12% of total US health care costs²³) are incurred in the last year of life. Other costs associated with ageing apart from the final year of life therefore contribute to increased expenditure. Overall, costs for those aged over 65 appear to remain about the same despite increased life expectancy. As a result, the absolute increase in the number of older people associated with the baby boomer

cohort will see a sharp increase in the death rate over the next three decades. Currently the crude death rate is about 7 per 1000. It is expected to increase to around 11 or 12 per 1000.²⁴

The data therefore show that even if increased life expectancy as such does not have a particularly significant impact on health expenditure, the increased number of older people resulting from the baby boomer cohort will.

The impact of technology

Real health expenditure has grown significantly. Historically, technology has made a more significant contribution to increased health expenditure than increased life expectancy. Technological innovation in pharmaceuticals, diagnostics, pathology, communication and specific treatment modalities can lead to more effective and efficient health care, sometimes reducing costs for particular conditions and treatments (for example, by reducing length of hospital stay). It also opens up new assessment and treatment options. Overall costs increase as more people take up these options. However, the evidence also suggests that there are significant benefits from the introduction of new treatment options in increased life expectancy and reduced morbidity.²⁵

Over the past 20 years ageing has contributed about 0.5% real growth per year, while technology and greater demand has resulted in about two to three per cent growth.²⁶ However, ageing and technological innovation interact. Growth in technology-related expenditure is higher for older age groups.²⁷ Population ageing over the past two decades has been slow compared to the growth trend over the next three decades. Additionally, as treatment improves, there is a propensity to provide treatment to older age groups for whom it previously would not have been considered appropriate. Consequently, we can expect more rapid real growth in health expenditure in the future. Changes in technology are likely to continue to have a significant impact, but innovation in pharmaceuticals, diagnostics and treatment are hard to predict.

Overall impact on demand

Overall, the Productivity Commission report on the economic implications of an ageing population estimates that total government expenditure on health as a proportion of GDP will have to increase by 45% in the next two decades to meet projected demand. The impact of population ageing produced by the baby boomers accounts for about a quarter of this change. Over the same period, demand for residential and community aged care places is projected to double.²⁸

Policy choices

Although the baby boomers are likely to significantly increase demand for health and aged care services, 'demography is not destiny'.²⁹ Health care expenditure will reflect policy choices. In 2001, Portugal spent about US\$1,600 per capita on health, Australia about US\$2,500 and the United States about US\$4,800. Despite the fact that the United States spends three times as much per capita on health care than Portugal and twice as much as Australia, life expectancy in these three countries is about the same. But in Botswana, which spent \$US380 per capita, it was 40 years.³⁰

For countries like the United States, health expenditure is a 'luxury good' with relatively marginal returns on population health for increased expenditure. Clearly this is very different for countries like Botswana. Despite marginal returns, affluent countries not only spend more per capita on health, they spend more of their national income. Expenditure is a matter of policy (and individual) choice. Crucially, our capacity to afford increased health care will depend on continuing economic growth.

In introducing the National Health and Pensions Bill into the Australian Parliament in 1938, Treasurer Casey pointed out that by 1965 the proportion of people aged over 65 would be 6.5% of the population. Consequently he argued that:

In view of the impending inability of the existing pensions scheme, I say quite frankly that, unless something is done to put these schemes on a contributory basis, no government of the future however well intentioned could embark upon any worthwhile extension of our social services without seriously threatening the whole financial fabric of the Commonwealth (CPD 155: 799, 1938).

Casey did not get his Bill through (we had to wait until the 1970s for Medicare and the 1980s for contributory superannuation) — there was a significant expansion in productivity and GDP growth, the proportion of people aged over 65 is now 13%, and we were not ruined.

On balance, we can conclude that it is likely that population ageing will lead to a 25% increase in demand for health services and nearly double demand for aged care services. How we respond will depend on a range of factors, but in particular on our overall level of economic growth. However, it is important to recognize that how we respond to these emerging demands depends critically on the policy choices, today.

The changing context for the health system

A range of social, technical and economic pressures affect the organisation of the health care system. I have previously summarized these in an article for the *Australian Journal of Primary Care*.³¹ Over the past century family size has declined,

women have entered the paid workforce and geographic mobility has expanded dramatically. As a result the availability of informal care has dramatically declined and will continue to decline as the population ages over the next two decades.³²

More recently, there has been a substantial expansion of social rights for people with disabilities. Today we expect to be able to live in the community if we have a chronic illness or a disability. With some limited exceptions, large-scale residential institutions are a thing of the past.

At the same time, as noted above, there has been a dramatic growth in demand and expenditure for hospital services, in part related to population ageing but mainly as a result of new health care technologies. As costs have increased, funders have become increasingly interested in strategies to improve the efficiency of service delivery, particularly through introduction of new funding systems. Health care providers have responded by decreasing the cost per person or episode of care, primarily by reducing the average length of stay in hospitals.³³

In response to the decreasing availability of informal care, decreasing acceptability of residential care and the pressure on length of stay in acute (and sub-acute) care, there has been significant expansion and development of the primary care and community support sector. In disability and mental health services this has led to community housing, day programs and support employment services. In aged care there has been a massive expansion of home and community care.

We now have an extensive range of health and community support for people with disabilities and chronic illness who want to continue to live at home and participate in the community. These services are largely complementary to informal care and support provided by partners and children.

Current and emerging problems

From a population health perspective, three types of problems contribute to avoidable burden of disease: there is an under-investment in prevention, the organisation of treatment and intervention is inefficient, and access to services is inequitable.

There is a significant under-investment in primary and secondary prevention for chronic disease. In a large-scale study in New Zealand Jackson and Tobias³⁴ estimated that approximately one-third of hospitalisations for people aged 0–74 were potentially avoidable. Of these, approximately two-thirds were potentially avoidable through more effective primary health care services. Effective secondary prevention programs focused on behavioural and physiological risk factors and early stages of chronic disease remain relatively underdeveloped. Although there is considerable evidence that organized self-management programs can significantly improve health outcomes and reduce utilization, they have not been systematically integrated into primary care.³⁵

More broadly, there is considerable evidence that primary prevention strategies to reduce risk factor prevalence and strengthen protective factors are likely to lead to improved health outcomes. We have seen significant population health programs for the prevention and management of risk factors such as smoking, alcohol, nutrition, hypercholesterolemia and hypertension. However, primary health care services remain heavily focused on treatment and secondary prevention.

As primary health and community support services have expanded, continuity of care and the integration of services to produce efficient and effective care have become problematic. Over time, there has been a progressive layering of primary health and community care service providers as more functions have been allocated to this sector. This has led to a proliferation of service agencies and funding programs in the community.

In a study of service coordination we conducted in Victoria in 2002, we found enormous variation in the way agencies deal with the management and coordination of care. There were over 350 different processes to document client information, assess needs, make referrals and coordinate services across the 800 agencies that made up the primary care system.³⁶ Government funds these agencies through a variety of programs. Each has its own policy, organizational, costing, reporting and accountability arrangements. As a result transfer of information between agencies is problematic. Eligibility criteria and treatment approaches for the same conditions vary across agencies, leading to inconsistent access and treatment.

This may not matter much for simple self-limiting conditions, but it does for those that are complex and require ongoing care and support from a range of providers. Consumers are inconvenienced. Referral processes do not work well and they waste time and incur costs in accessing services across providers. Often assessments are duplicated and they have to repeat information to different providers. This has the potential to result in errors and avoidable mistakes.³⁷

We know that a range of people with chronic conditions receive sub-optimal care in the primary care system. Conditions such as hypertension, hypercholesterolemia and type 2 diabetes are often undiagnosed. For those receiving treatment, the evidence suggests that a significant proportion do not have their condition managed according to good practice guidelines.³⁸

We have not yet developed systemic organizational models for primary and community care based around geographic catchments or enrolled populations, despite the strong evidence that these approaches lead to better outcomes. Planning arrangements, clinical data systems, decision support systems, accountability and governance arrangements do not adequately support care planning, service integration and continuity over time and across service boundaries.

Inadequate service system organisation is compounded by the current capacity, skills and organisation of the health workforce. The current workforce, which developed around specializations and interlocking roles suited to hospital and residential care settings, is not well suited to integrated, multidisciplinary service delivery in community settings. While there are now a range of shortages, providing more of the same is unlikely to solve the problems of the future.³⁹

The introduction of Medicare ensured reasonably equitable access to primary medical services, but significant problems have now emerged. Increasingly, a maldistribution of general practitioners has reduced access to primary medical services in rural and metropolitan fringe settings; long waiting times for routine appointments are now being reported in some areas. Recently, the incidence and magnitude of co-payments has increased with the likely effect of disproportionately reducing access to primary medical services for people on lower incomes.^{40,41,42}

The Pharmaceutical Benefits Scheme (PBS) has also ensured reasonably equitable access to a national formulary. However, recent increases to co-payments, in response to concerns about rapidly increasing costs associated with the introduction of new products on the PBS, are likely to have an inequitable effect on access for people on lower incomes who are ineligible for concessional access to the scheme if they are introduced.⁴³

Notwithstanding emerging issues, access to general practice and pharmaceuticals is much more equitable than for other primary care services. Access and utilisation for dental, allied health and counselling services vary significantly with location and income. Those with higher incomes who live in metropolitan areas are more likely to use private providers for these services.⁴⁴ For those on lower incomes, publicly provided services are budget capped and rationed. In Victoria, for example, it is common for people on low incomes to wait a month or more to get an appointment for publicly funded allied health services and much longer for routine public dental treatment. With the effective abolition of the community health program during mid-1980s, there has been no national framework to address these issues for nearly two decades.⁴⁵ As a result service mix and eligibility criteria vary across jurisdictions.

Access to community-based continuing care services varies significantly across people with very similar needs, depending on the historical evolution of programs and eligibility criteria. For example, while the Home and Community Care Program has very dramatically expanded community support for older people with disabilities, comprehensive national programs for other groups with continuing care needs have not developed. As a result, people with mental illness, chronic disease, post-acute care needs, alcohol and drug problems, and younger people with physical and intellectual disabilities, have much more variable access to publicly funded primary health and community care services across jurisdictions.

Directions for the future

I would argue that the prevention and management of chronic disease is the main challenge for the future. While our understanding of the complex and multifactorial causal pathways for chronic diseases remains limited, an emerging population health framework for understanding population risks has emerged. A population health approach emphasizes the importance of an integrated approach to primary, secondary and tertiary prevention illness across the life span. Health services focus on the health of catchments and populations as well as individuals. Services are team based and multidisciplinary. A systemic approach to continuity and integration is adopted. Australian Health Ministers have endorsed an approach to chronic illness prevention and management that incorporates these features.⁴⁶

There is considerable potential for the prevention of chronic disease. We have already seen a dramatic reduction in death rates for cardiovascular disease (including ischemic heart disease and stroke) and some cancers associated with reductions in behavioural risk factors, better management of physiological risk factors and improvements in treatment for acute episodes.⁴⁷

In particular, there have been significant declines in alcohol, tobacco and nutritional risk factors and we have seen much better management of physiological risks such as hypertension, hypercholesterolemia, protein in urine and impaired blood glucose metabolism, and significantly more effective emergency treatment of acute cardiovascular events. There is now overwhelming evidence that the effective prevention and management of specific behavioural and physiological risks reduces morbidity and mortality from chronic disease.⁴⁸

More generally, social, environmental and economic factors are associated with health outcomes. It is clear that poverty,⁴⁹ lower levels of education,⁵⁰ and lower levels of social support and cohesion⁵¹ are related to worse health outcomes. In Australia, differences in social determinants and their impact on health outcomes are most notable for Indigenous and rural populations. Improvements in social determinants are generally associated with improvements in health outcomes.

Integrated chronic disease prevention and management, which includes the management of behavioural and physiological risks, self-management, care coordination, community rehabilitation and home-based care, significantly improve health outcomes, improve quality of life and reduce utilization of hospital and residential care services.⁵² Collaborations, partnerships and networks across providers are increasingly being trialled to build care pathways and service delivery organization along these lines.

Improved organisation of the care pathways and service agencies is critical if better integrated care is to be delivered. In the past I have argued that we should establish

fund-holding community health networks, which would be responsible for and coordinate the delivery of services for the populations of one or two local government areas across a range of primary health and community support agencies.⁵³ In the United Kingdom arrangements like this have now been implemented as Primary Care Trusts, which hold funds for both community and hospital services for local catchment populations. In New Zealand this function is conducted by District Health Boards.

Alternatively, rather than having responsibility for a geographic population, health care can be integrated for enrolled or registered populations. This model has been adopted in the United States where a range of managed care organizations have developed.

A critical feature of these enrolled population models is that there is an organized or systemic approach to the health of the enrolled population. Funders and agencies have incentives and are accountable for the overall health outcomes of the population for which they are responsible, rather than simply the delivery of specific services.

In Australia, virtually all jurisdictions have recognised these issues and are experimenting with innovations to address them, but generalised systemic changes to national policy, funding and organisational arrangements have yet to be agreed and implemented to consolidate these arrangements. It is arguable that we now need national leadership to address these issues. In particular, as I have argued previously, we need a national primary care policy framework.⁵⁴

However, in the absence of Commonwealth leadership to address these issues, local innovation and development remains the main option to pursue. In any case this will contribute to our knowledge about what works and what does not, but trials should now be population catchment and system focused.

Conclusion

The baby boomers will have a significant impact on the age profile of the Australian population over the next 20 years. I have argued that this will lead to a significant increase in demand for health and aged care services. These services are already under significant pressure. While I do not subscribe to a doomsday scenario for the impact of the baby boomers, neither is it credible to do nothing and wait.

My argument is that the focus needs to be on the management of the health system for individuals and particularly for those with chronic disease, who are the greatest users. This requires us to take a population or health systems perspective focused either on geographic or enrolled (registered) populations. Arrangements need to be put in place to facilitate integrated care for local health systems. This will require new arrangements for funding, clinical information, decision support, clinical governance, and professional roles.

Ideally, we need national leadership, but in its absence we should not wait. Local trials and innovations should be developed, but these should be focused on catchment populations and local health systems.

Finally, it is worth noting that those of us who are baby boomers have a significant stake in the outcome of current reform proposals. We are more affluent, better educated and more demanding than our parents. There are also more of us. It is unlikely we will be satisfied with the current arrangements for the health and aged care system when we become heavy users. It is in our interests to see that change occurs now.

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The Worner Research Lecture Series

The annual Worner Research Lecture forms a series of public lectures at La Trobe University, Bendigo. The aim of the series is to publicise research carried out at La Trobe University, Bendigo.

The University is proud to be associated with the Worner brothers, Howard, Neil and Hill, who were students at Bendigo School of Mines, a forerunner of La Trobe University, Bendigo. The three brothers were raised on a farm in the Mallee. In the early 1930s, they studied at Bendigo School of Mines: Howard and Hill for a Diploma of Industrial Chemistry and Neil for a Diploma of Civil Engineering. All three brothers later won prestigious scholarships to The University of Melbourne.

Howard Worner's distinguished career in academia and industry led him to his present honorary professorship at the University of Wollongong, where he has been Director of the Microwave Applications Institute since 1989. In 1994, La Trobe University conferred on him the degree of Doctor of Science (honoris causa).

Neil Worner pursued a career in civil engineering, including the position of Chief Civil Engineer with the Snowy Mountains Hydro-Electric Authority. His career continued in senior and advisory capacities in Australia and overseas on projects such as the design and construction of major dams.

Hill Worner's career included several years on the Executive of the CSIRO, 22 years as Professor of Metallurgy and three as Dean of Engineering at The University of Melbourne. Sadly Hill passed away in 2002.

Lecturers in the series so far have been the following:

- 1995 R. J. Seviour, *Micro-organisms: the Good, the Bad and the Ugly*
- 1996 T. M. Mills, *Join the Dots and See the World*
- 1997 Howard K. Worner and R. Findlay Johnston,
Bendigo Gold: Past Present and Future
- 1998 John Humphreys, *Rural Health and the Health
of Rural Communities*
- 1999 Vaughan Prain, *Learning in School through New Technologies*
- 2000 Bruce Johnson, *Soils: Our Interface with the Environment*
- 2001 Jill Francis, *I Would be Good, I Should be Good,
but gee, oh gee oh gee: The development of a psychological theory*
- 2002 Ruth Endacott, *Developing Clinical Wisdom:
a Challenge for Academia and Health*
- 2003 Roger Sworder, *Is the Poetry of Homer Philosophical?*
- 2004 Rhett H. Walker, *On the Value of a University - A Journey of Discovery*
- 2005 Hal Swerissen, *Health and Ageing in 2025: the 'boomers' go grey*