Capital investment in public hospitals

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Abstract

Capital investment is a major concern for public hospitals. Relative to operating expenditures, it has been almost constant for 40 years, despite great changes in technology and patient throughputs. Research studies during the last decade suggest that over that time almost all investment has been on simply replacing existing assets. Per person, the total capital stock has actually declined. However most replacement outlays are predictable. Although major building outlays may still need some central supervision, equipment replacement can be projected with enough confidence to fund it through operating grants. Using data from several surveys, some capital-weighted DRGs have been developed and a funding system suggested.

Background

This paper is concerned with capital investment in Australian public general hospitals, its history, the way in which capital is currently used, the likely cost of maintaining the public hospital capital stock and whether some principles can be devised for making capital allocation more transparent. It comes when capital use throughout the public sector is being increasingly scrutinised and measures like capital charging are being proposed. The approach and most of the data come from studies which the author has conducted over the past ten years. It would be useful to compare their results with similar information from other sources in Australia and overseas but there are no directly comparable data. Hospital design and the selection of specific equipment have quite substantial literatures and there is a growing body of reports on capital charging. However none have quantified the capitalisation of a whole hospital system. The nearest published approximation has been an Australian one (for the South Australian Public Accounts Committee in 1986) although that was based on modelling rather than survey (Parliament of South Australia 1986).

The paper is in three parts. Part I looks at actual expenditures on hospital capital over recent years. Part II compares them with the outlays predicted from a 'life cycle' model of investment. It suggests that almost all public hospital investment in the last ten years can be conceptually regarded as replacement spending, with very little increase in the total capital stock. Part III applies some of the data to issues in the funding of capital expenditures and in the capital charging debate. In these contexts, 'capital' means the stock of durable goods used in the provision of hospital services (buildings, equipment, etc). 'Investment' is the creation of these goods. Because capital is continually consumed through use or obsolescence, some investment is needed to maintain the stock. The question underlying the research reported here was whether the current flow of investment was sufficient to do that at levels consistent with the community's social and technological expectations. Total investment spending is routinely reported. However separating its 'gross' and 'net' components required information on the size and composition of the existing capital stock, its age and its expected economic life which had never been available before.

Capital expenditures for health, 1980-81 to 1999-2000

Because it is our reference point, this section looks at actual capital expenditures for health and public hospital services over the past twenty years. A long time period is necessary because capital expenditure is inevitably irregular, particularly that on long-lived buildings. Reports routinely point to its 'lumpiness', its technological dependence and the difficulty of establishing consistent trends. However the long term course of Australian outlays for health service capital is clear. In current prices, the 1999-2000 figure was six times that in 1980-81. In constant prices it had approximately trebled. But so had operating expenses and capital expenditures have actually been remarkably stable when related to current operating costs. Table 1 shows capital expenditures for all health services, public and private, as a percentage of all operating outlays in the twenty years from 1980-81. Separate figures for public hospitals only are in Table 2 and these are shown graphically in Figure 1.

As can be seen, the investment/recurrent expenditure ratio for all services varied very little. Public investment was slightly higher in the last ten years than in the first ten, though most of the increase was at the very end. The private proportion was virtually constant. For public hospitals only, the year-to-year differences were somewhat larger and the increase was slightly greater. However the average annual investment since 1990-91 - equal to about 7.9% of current public hospital expenditures - was only slightly higher than the average for the first ten years (7.1%) and then mainly because of some major hospital rebuilding in Queensland. That state invested over $1.5 billion in the four years to 1999-2000.

Table 1. All health services: Capital expenditure as a percentage of all recurrent expenditures, 1980-1981 to 1999-2000*

Financial year	Government	Private	Total
1980-81	3.0	2.3	5.3
1981-82	2.4	1.6	4.9
1982-83	2.2	1.6	3.8
1983-84	2.7	1.7	4.4
1984-85	2.8	2.2	5.0
1985-86	2.3	2.5	4.8
1986-87	2.5	3.3	4.8
1987-88	3.0	2.9	5.9
1988-89	2.9	2.7	5.6
1989-90	3.1	2.3	5.4
1980-81 to 1990-91 (average)	**2.7**	**2.2**	**4.9**
1990-91	3.0	2.0	5.0
1991-92	2.9	1.6	4.5
1992-93	2.9	2.1	5.0
1993-94	2.9	2.5	5.4
1994-95	2.7	2.2	4.9
1995-96	2.5	2.1	4.6
1996-97	2.9	2.3	5.2
1997-98	3.3	2.3	5.6
1998-99	3.5	2.3	5.8
1999-00*	3.3	2.2	5.4
1989-90 to 1999-00 (average)	**2.9**	**2.2**	**5.1**

* Preliminary

Source: Australian Institute of Health and Welfare (AIHW), *Australian Health Expenditure,* 1970-71 to 1984-85, 1988; *Health Expenditure Bulletins,* Nos 8, 15, 16, 17. Figures for 1999-2000 are preliminary

Table 2. Public acute care hospitals: Capital expenditures in current prices ($ million) and as a percentage of recurrent expenditures.

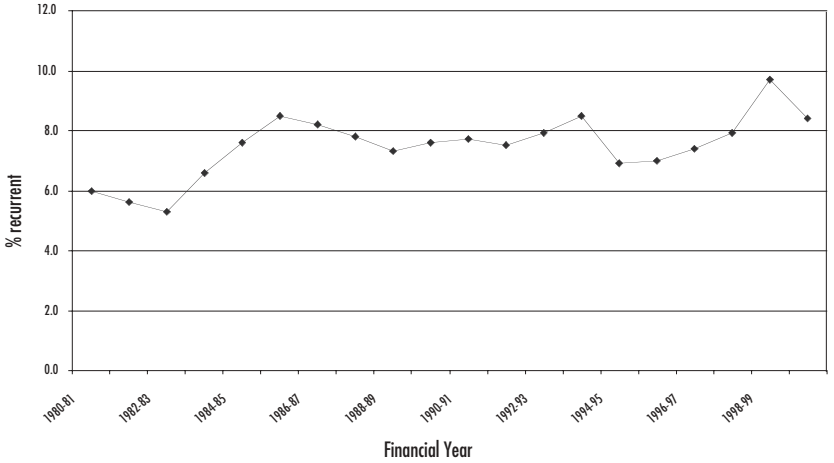
Financial year	Capital expenditure	Percentage recurrent
1980-81	192	6.0
1981-82	204	5.6
1982-83	207	5.3
1983-84	292	6.6
1984-85	340	7.6
1985-86	425	8.5
1986-87	468	8.2
1987-88	491	7.8
1988-89	510	7.3
1989-90	660	7.6
1980-81 to 1989-90 (average)		**7.1**
1990-91	715	7.7
1991-92	721	7.5
1992-93	768	7.9
1993-94	843	8.5
1994-95	724	6.9
1995-96	778	7.0
1996-97	943	7.4
1997-98	919	7.9
1998-99	1368	9.7
1999-00*	1201	8.4
1990-91 to 1999-00 (average)		**7.9**

*Preliminary

Source: AIHW figures derived from the Australian Bureau of Statistics, public finance series. Figures for 1999-2000 are preliminary.

There are no published data of the form of this investment, although observation and the work reported later suggest that a high proportion must have been on replacement; and that although buildings represent over 80% of the hospitals' capital stock, relatively short lived medical equipment would have taken at least a third of it. Compared with the broader building programs of the two decades before, the 1980s and 1990s concentrated on technological upgrading and the re-development/re-location of major metropolitan hospitals. There were several Commonwealth-funded teaching hospital enhancement programs in this time, together with a substantial rearrangement of hospital capacity. Staff accommodation virtually disappeared. Nominally at least, over 20% of all in-patient beds were closed. However total public hospital admissions rose by over 50% and both the diagnostic and the procedural content of hospitalisation grew considerably.

Figure 1. Public hospital capital expenditures as percentage of recurrent expenditures, 1980-81 to 1999-00.



Source: Table 2

These were, then, decades of quite rapid change. However, on average, the ratio of capital expenditure to operating costs has been almost identical for nearly forty years. When the first Australian health expenditure estimates were compiled for the middle 1960s, capital spending (from 1961 to 1967) averaged 7.2% of current outlays. Except for a few years in the mid-1970's - when the Whitlam government's hospital development program raised it temporarily - the figure has hardly changed. At face value, that would support the way in which many health administrators see capital allocation, namely as a competition for funds whose total is fixed by some unfathomable budget process in which political sensitivity, historical precedent and rules of thumb are as important as demonstrated need. However the outcome could not have been entirely arbitrary. Stability for such a long period suggests that at least some basic requirements were being met.

Estimating replacement expenditures

All of the methods and data reported here come from four related studies conducted in the 1990s through the National Centre for Epidemiology and Population Health at the Australian National University, namely;

- A 1991 sample survey of the capital stock in 30 public hospitals in the five mainland states and the ACT, by States, and stratified into teaching hospitals, referral/base hospitals and district hospitals. The results were weighted to reflect the state and national supply of beds in each category, to give estimates of the national capital endowment, annual capital consumption and projected capital expenditures over the next ten years. They were first published in 1992 (Deeble 1992).
- A study in 1993 for the Health Department, Queensland, intended mainly to confirm and extend the Queensland results in the national survey but also to examine its capital needs in more detail. The 48 hospitals which it covered contained about 87% of all the capital estimated for the state. Results were not formally published but key figures have been used for comparative purposes with the Department's permission.
- A consultancy to the Victorian Department of Health and Community Services completed in early 1995. It covered the 63 hospitals which provided 96% of all the casemix funded separations in the State during 1993-94. Its analysis of capital use was more detailed and the practicality of funding equipment replacement through the casemix payment system was examined. Results were published by the Department in 1996 (Department of Health and Community Services 1996).
- In 1999, a consultancy for the Health Department, WA into the possibility of developing some hospital capital standards, using additional data provided by Victoria.

All the surveys used the same 'life cycle' model of investment under which outlays are driven entirely by the age and composition of the existing capital stock. Replacement is needed to maintain the value of that stock, though not always in its present form, and that replacement is seen as pre-determined. The model makes no attempt to spread the cost of past investment or evaluate the conceptual 'worth' of current capital - which is why neither depreciation nor 'depreciated capital value' emerge from it. Neither concept has any direct significance for public hospital management (except perhaps when sale is in prospect) whereas the cost of preserving an effective capital endowment does. Everything is therefore valued at full replacement cost. The National, Queensland and Victorian surveys all reported total capitalisation, its composition, asset age structure, projected replacement expenditures and 'capital consumption' estimates. However because the latter were based on current values, they were more like provisions for replacement than historically based depreciation.

Methodology

Replacement cost valuation avoided one of the major and potentially prohibitive problems of conventional depreciation, namely estimating the age and historical cost of hospital assets accumulated over many years with minimal recording. Very few institutions of any age exist in their original form. Almost all have had some extension, refurbishment or functional re-allocation, frequently uncapitalised. How would one compare a hospital built in 1950, extended in 1960 and completely refurbished in 1989 with one constructed in 1978 in which only the operating theatres had been recently upgraded?

Despite this simplification, the valuation task was still complex. Because their expected lives are greatly different, hospital assets were divided into the three categories of buildings (including installed plant), equipment (medical and other) and furniture and furnishings. Only acute care facilities were included, which meant identifying and excluding those used for non-acute patients, university services, externally funded research and a raft of 'non-operating' activities. Assets held for investment only were automatically excluded.

All buildings and equipment were valued at the current cost of items as functionally similar to the present stock as possible. For buildings that generally meant new construction. However hospitals differ in their use of space by function and construction costs vary across the functional areas. Buildings were therefore measured and different replacement costs applied to each functional area. Dates of original construction were generally known but those for additions and refurbishment were somewhat uncertain. Replacement was costed for facilities with exactly the same area and functional division as at present but not in the piecemeal form which history has bequeathed to many hospitals. The standard assumed was greenfield site construction of multi-story, air conditioned facilities for hospitals of over 75 beds, integrated single story construction for others. Costs were derived from industry sources and records of the most recently commissioned institutions. That implied an upgrading for some facilities but a much more efficient outcome for others.

Equipment data were obtained from the asset registers of hospitals, the quality of which varied considerably. However, 70% were sufficiently reliable and detailed to allow replacement costs to be attributed and about 60% gave enough information for likely replacement expenditures to be projected for the ensuing ten years. There was no identifiable bias in the sample of usable registers and because virtually every item had been bought by some hospital in the last two years, prices could be established. However some upward drift is inevitable in the valuation method because the technology of new equipment is generally superior and its service capacity is often larger than its predecessors, albeit at a higher cost. That is not peculiar to hospital equipment - a new car now is not the same as it's equivalent of 20 years ago. Upgrading is built in and the same process applied here.

Furniture and furnishings (beds, etc.) were not valued directly. They are rarely included in asset registers. However where their value was known for newly commissioned buildings it followed floor areas very closely. Based on the most recent data, a standard cost was therefore applied (of about $80 per square metre of used space in 1997-98 prices). Again, there may be some element of upgrading implied but only to the extent that the most modern facilities offer higher standards of amenity.

The resulting database was very large indeed. One hundred and forty one hospitals were surveyed, over 2.5 million square metres of hospital space were measured, valued and allocated to specific service use; and about 50,000 equipment items were identified and priced.

Asset lives

Main building structures were assumed to be economically useable for 50 years, although their mechanical and electrical components (lifts, electricity supply, communications systems, etc) have useful lives of only 15-30 years. Together with finishes and fittings, they account for about 40% of total building cost. Overall, the flat-rate consumption of building capital was therefore estimated at just under 3% per annum - 2% for main structures and about 4.3% for the remainder.

These are Australian construction industry standards. The American Hospitals Association recommendation for major buildings is a little lower at 40 years, although that might well be influenced by US financing arrangements and tax laws. On the other hand, a 1991 NHS publication on capital charging in the UK observed that "the Government expects building lives for depreciation purposes not to exceed 100 years" (Department of Health, UK 1989). The concept is obviously flexible. Since the survey data showed that about 20% of Australian hospital buildings were at least 50 years old in the early 1990s, retirement is not inevitable. However few of them were being used for patient services and some have already been replaced, not necessarily on structural grounds but because they have become outdated functionally.

Estimates of the expected lives of medical and other non-plant equipment were obtained from several sources, principally the American Hospital Association standards for depreciable hospital assets, as modified by consultation with Australian buyers. Generally, Australian expectations were for economic lives about 25% longer than in the United States, although the differences varied by equipment category. For such large and expensive items as linear accelerators, for example, the Australian expectation was nearly twice that in US hospitals, whereas for smaller and relatively standard items the differences were much less. Details were provided in the 1992 report of the national survey.

Life expectancies ranged from 5 to 20 years. Averaged over all items, the expected life of all non-plant equipment was about 11 years but because the most expensive items were expected to last a little longer, the cost-weighted figure was 11.4 years. The resulting rate of capital consumption was therefore 8.8% per year. Furniture and furnishings absorb the remaining capital investment. For such high-use items, they are surprisingly long lived. On both US and Australian standards they averaged 15 years of economic life, equivalent to a 6.6% consumption of their current replacement value every year.

Capital consumption and the projection of future expenditures

As pointed out earlier, the reported studies produced figures for capital consumption which were more provisions for replacement than measures of the cost of capital use. However they are similar in the sense of annualising, in a regular way, some large and irregular outlays. Ultimately, such provisions would match actual expenditures but only over a period as long as the life of the longest-lived asset, which may well exceed fifty years. In any shorter term, they will not, especially when past investment has fluctuated.

Projecting actual expenditure requirements therefore required a different though related calculation, based on the position of every capital item in its own life cycle. In practice, that can easily be outside the ranges posited above, ie. there may be a replacement backlog. For buildings in particular, refurbishment is an option and there are very few hospitals of any age which have not been modernised to varying degrees. The projections thus involved some assumptions as to how a strictly life cycle model might be modified in practice. They were that over the next ten years;

- on average, equipment, furniture and furnishings would be replaced within their economic lives. Any existing backlogs would be eliminated.
- expenditures on building replacement and refurbishment would be;
  a) on buildings less than 25 years old - nil. Routine maintenance would be met from operating funds,
  b) on buildings aged between 25 and 45 years - refurbishment equal to 35% of replacement cost,
  c) on buildings aged 45 years and over - half to be replaced, half to be refurbished at 35% of replacement cost.

Up to 45 years of age, the projected refurbishment reflects the expected life of component services quite closely. However experience in the 141 hospitals surveyed suggested that a rigid 50- year-retirement rule would be unrealistic for all facilities and that some refurbished ones would be retained in an appropriate use.

Results

The National, Queensland and Victorian studies were effectively a single, extended project conducted over a number of years. Their spread over several years has been adjusted by expressing all of the results in constant 1997-98 prices, the year for which some additional Victorian data were collected. However the initial results were potentially subject to sampling error. The Queensland study was primarily intended to validate the sample survey's finding of a (then) relatively low capitalisation in Queensland hospitals and replication was a major objective of the Victorian work. Identical methodologies were therefore used, although both the analysis and the detail were progressively extended. That gave some checks on the reliability of the national estimates. If they were not significantly modified, the three surveys could be combined.

In fact, the differences between sample results and those from nearly full enumeration were minimal. Table 3 shows some key data, in constant 1997-98 prices. There was some variation at the state level. The total capitalisation of Queensland hospitals (where the country component is highest) was initially under-estimated by about 5%, but the first Victorian estimate was slightly high. Taken together, the two-state figures for total capitalisation increased by only 0.4%. Given the 2-3 year difference in timing, the increase was probably real. The ABS price index for public capital formation showed no change from 1991 to 1994.

Table 3. Capital investment in public hospitals, Victoria and Queensland, as surveyed in 1994 and 1993 and as estimated from the 1991 sample study ($ million,1997-98 values).

	Victoria		Queensland	
	Estimated 1991	Survey 1994	Estimated 1991	Survey 1993
By type of hospital:				
Teaching & special	2,068	1,922	1,011	1,093
Referral/Base	967	934	855	1,000
District	1,752	1,816	843	762
Total	**4,787**	**4,672**	**2,709**	**2,855**
By type of asset:				
Buildings	4,031	3,892	2,245	2,351
Equipment	632	649	376	414
Furniture & furnishing	124	131	88	90
Total	**4,787**	**4,672**	**2,709**	**2,855**

Source: Deeble, 1992, p 7; unpublished data from the National, Victorian and Queensland surveys.

There were also some differences in composition. In both states, equipment values were underestimated in the sample survey, slightly more for Queensland than Victoria. However in this case the differences were almost certainly in the original data. Both asset registers and our analysis of them were better in 1994 than 1991. The sample results were therefore adjusted accordingly.

Otherwise, the correspondence was very close indeed. In Queensland, the 23% of hospital building space aged 45 years and over in 1993 was exactly the same proportion as that estimated in 1991 and the 25.2% recorded for Victoria was only 1% above the earlier figure. The age distributions of equipment were also very similar. While not directly relevant, the two states were actually very comparable in their application of capital, despite total investment per person being about 8% higher in Victoria than in Queensland. Validating their data does not of course confirm all of the national survey results. Replication in NSW would improve confidence. However it does suggest that the methodology was robust and that sampling errors were unlikely to have been large.

The national estimates

In 1997-98 prices, the main results were as follows;

Total investment

- The replacement value of all Australian public hospitals was estimated at $21.24 billion in 1990-91.
- Buildings and plant accounted for $17.91 billion (83.4%). Equipment was valued at $2.78 billion (13.1%) and furniture and furnishings at $ 550 million or 2.6% of the total.
- Over one third of this (36%) was in the major metropolitan teaching hospitals.
- On a population basis, investment varied considerably across the States and Territories. It was highest in Western Australia ($1,544 per person in 1997-98 prices) and lowest in Queensland, Victoria and the Territories -$991, $1,067 and $1001 per person respectively.
- Less than half of all hospital building space was used for patient services directly. In Victoria the proportion was under 44.5% and the Queensland figure was only 47% on average. In particular, the area used for in-patient wards was much lower than might be supposed - 17% in Victoria and 20% in Queensland.
- In contrast, nearly 85% of all non-plant equipment was used for patient services. By value, over half of it was in organ imaging, pathology, surgical services and critical care.

Age of assets

- Nationally, about 20% of all building space was over 50 years old in 1991, 34% was aged between 25 years and 49 years and about 46% had been built within the last 25 years. The Victorian and Queensland distributions were similar, though the proportions of both old and recently constructed buildings were slightly higher and that attributable to the middle period was correspondingly less.
- About 17% of all hospital equipment had reached the end of its economic life. The two state studies gave similar results - about 16% in Queensland, 15% in Victoria.

Capital consumption

- At replacement values, annual capital consumption was estimated at $800 million nationally. $544 million was for buildings, $224 million for equipment and $32 million for furniture/furnishings. That represented 3.77% of total asset values, a figure very close to the 3.95% estimated by the earlier study in South Australia. It equated to just under 8.3% of current operating costs. The two state surveys gave almost identical figures.

Projected replacement expenditures

- Based on asset age, replacement was estimated at $7.16 billion over the ten years to 2000-01. It comprised $4.64 billion for buildings (65%), $2.20 billion for equipment (31%) and $320 million for furniture and furnishings. The projected annual outlay of $716 million equalled 3.37% of total asset value and 7.2% of operating expenditures in 1990-91. It was less than annualised capital consumption because only 10% of Australia's public hospitals would be fully replaced in the ten years and much of the most expensive equipment was relatively young.

What does all this mean?

The surveys provided a good deal of other information on the current use of capital assets, some of which will be referred to later. But in relation to the major question, the implications are clear. We can now compare actual outlays over the past ten years with those projected for replacement by the studies reported here. If both the valuations and the investment model were correct - and there are indications that they are at least replicable - then almost all public hospital capital outlays over the past ten years can be regarded conceptually as replacements. Actual outlays averaged 7.9% of current operating costs. The projections from the studies above averaged 7.2% per annum. That necessarily included some upgrading. Building replacement was costed at current standards and replacement equipment was assumed to embody all the current technologies. However in value the 1991 stock would have barely been preserved. Because it totalled over twice the annual operating cost, 'new' spending would have increased it by only 0.4% per year.

Given the very large increase in hospital throughput over the last ten years and its technological enhancement, one might have expected a good deal more. Complaints over capital funding thus seem to have been well founded. Investment has been shifted from buildings, particularly in-patient accommodation, to other, more high-technology uses. But adjusted for population growth, the total endowment has actually been falling.

Issues in financing

Traditionally, capital funding has been highly centralised. Governments raise the money centrally and bear its costs. The justification has been the effective planning of public services generally. Hospitals must compete for resources with other activities through a process which is expected to reflect community attitudes and preferences. Within the sector, they must do the same. However that process has been increasingly questioned on efficiency grounds. Its perceived weaknesses are that;

- It requires a centralised mechanism for allocating capital between competing services,
- Under modern conditions, the ability of any central agency to marshal both the data and the techniques required for an efficient capital allocation in highly specialised areas is doubtful,
- For the competing services, the direct cost of capital is zero and there is no immediate reason for economising behaviour in their use of it,
- Supply is therefore rationed by administrative means which give undue weight to subjective factors and, ultimately, political influence. As the Chair of one of the District Health Authorities in Britain has observed:

  " I and my colleagues learnt that, when it came to investment, there were two kinds of money–'our' money and 'their' money. Our money came from internal sources–to tease this money out of revenue budgets was difficult, required foresight, careful planning, the co-operation of staff and fine judgement. 'Their' money, ie. regional capital, was totally unpredictable in its timing and size, and its allocation seemed to many to depend on luck, the marginality of the constituency, on the possibility and actuality of scandal and on the personal influence of the chairman. In an attempt to capture some of this [free regional] money we … gambled for all or nothing, the schemes were extravagant in concept and often in revenue consequences" (Association of Health Service Treasurers 1985).

Variants of this familiar story underlie much of the pressure for shifting decision making closer to the final users of capital–where costs and benefits are, presumably, better known–and ultimately for such apparently self-regulating devices as capital charging. It is similar throughout the public sector. Many of the proposals make good sense. However in the hospital area their application requires a great deal more knowledge of both capital use and investment requirements than has existed to date. The studies reported above provided some of that information. This section discusses their application to several policy issues.

Some broad implications

For policy purposes, their main contribution was a conceptual one, namely that in the long term most capital outlays can be seen as simply maintaining a given stock of capital goods. Except for extraordinary technological breakthroughs, replacement is largely determined by asset age. That means, first, that most outlays are foreseeable and can be provided for; and second, that many replacement decisions will be relatively routine. Only those related to buildings and major medical equipment raise significant options and opportunities to change the shape of service delivery.

However, major building replacement arises only every 40 years or so (although refurbishment may offer alternatives) and the costs of shifting capital at other times can be quite high. Closure is often the only answer. Equipment is more often renewed but the most technologically important items are quite narrowly distributed. Of the 40,453 items identified and priced in the Victorian survey, only 72 absorbed nearly $64 million or 16% of all equipment capital and the figures would have been even higher had the Peter MacCallum Institute been fully detailed (it was moving at the time). All but 8 of these were in the major metropolitan hospitals and/or Geelong.

The implication, then, is that a good deal of decision making can be decentralised without any loss of central planning influence and that indeed it should be. Except for significant building works and major medical equipment, the central authorities are not in a position to question the hospitals' (and/or regional) decisions and they rarely do so seriously now. Influence does not require participation in everything. However some formula for allocating investment money would have to be devised because all hospitals are not equally well endowed. Allocation based on their present capital stock alone would simply perpetuate inequities.

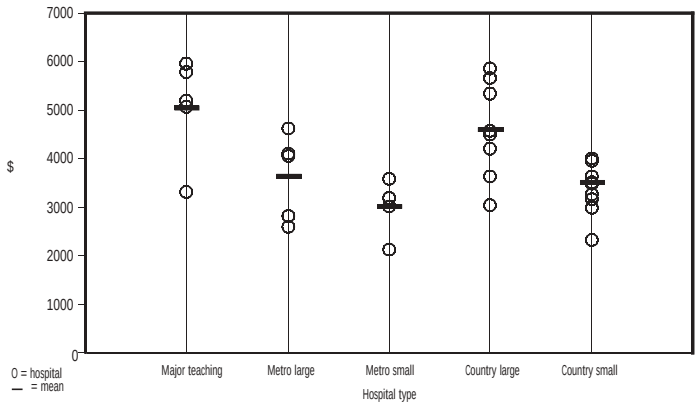
Some allocation options

The allocation options which follow envisage a capital replacement fund to which provisions for capital consumption would be credited and actual expenditures charged. It would be an accounting entity only. Cash would still be appropriated annually. Credits to it would be based on the initial capital endowment of each hospital but withdrawals would follow whatever formulae were agreed upon. The fund would record each hospital's notional contribution and it's projected 'entitlement' to capital replacement funding in each year. Hospitals would be able to bring forward expenditures by up to, say, two years but only within their total capital credits and the overall allocation for replacement. Establishment would require, initially, the same valuation and projection exercises as in the projects described earlier, an accurate recording of capital transactions thereafter and periodic revaluations for price change. On the state level, none of these tasks are major and the templates for them already exist.

These are but the bare bones of a financing scheme. They are very similar to some 'capital credit' proposals by David Mayston and others for the UK where limited capital charging applies (Mayston 1990); and to proposals by Professor Duckett in 1994 under which a Capital Planning Board would supervise the conversion of capital credits into a funded capital works program (Duckett 1994). Some such arrangement would clearly be necessary for major buildings which are long lived, expensive, crucial to the types of service provided and whose replacement on the same site may not be automatic. For them, a central management seems unavoidable, if only because the present age distribution of hospital buildings is such that, starting now, the older ones would never earn sufficient credits.

But there are more fundamental reasons. A decentralised system would have to be formula-based and any credible formula would need to put hospitals on as level a playing field as possible, relative to the volume and types of services they render. For buildings, that relationship is often tenuous. Much of the stock accumulated over 50 years or more would never be replicated now and no hospital administrator would take seriously any formula-based standards which ignored inheritance. In the Queensland survey, building capital per bed varied by up to 70% in hospitals of similar size and function and the range in Victoria was just as great. Beds are of course a measure of capacity rather than activity and then for some services only. But even on the more sophisticated output measure then available in Victoria (Weighted Inlier Equivalent Separations or WIES, adjusted for outpatient activity) the differences were still quite large. Figure 2 shows the relevant data. Methods of adjustment are in the Appendix.

Figure 2. Victorian survey hospitals with full data. Building capital per adjusted WIES, by type of hospital, 1994, in 1997-98 prices



Source: HCS, 1996, Table 11, adjusted to 1997-98 prices.

In contrast, funding equipment replacement seems relatively straightforward. It accounted for nearly one third of all the replacement expenditure projected over the last ten years. Because its expected life is comparatively short, a level playing field is easier to reach. Its service distribution is also quite different to that of building space. Table 4 summarises, from the 54 separate functions identified in hospitals, the distribution of all operating space in the Victorian study, together with that for non-plant equipment. As reported earlier, nearly 85% of equipment investment was in direct patient care, with the diagnostic and surgical services of most importance. One would therefore expect its level and distribution to broadly parallel case volumes and case mix. If so, some realistic standards should be possible.

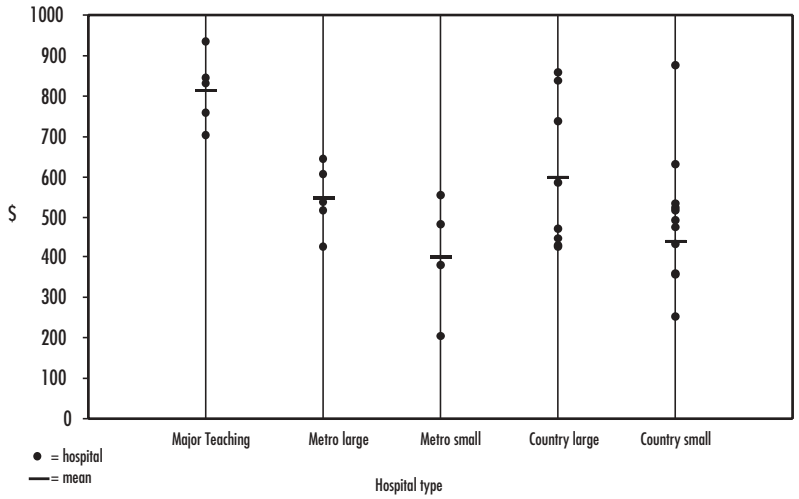
Table 4. Distribution of building space and equipment, by services, Victoria 1994.

Services	Buildings (% area)	Equipment (% value)
Patient services:		
Wards	17.0	4.6
Allied health	4.1	1.1
Emergency/OP	3.3	3.7
Surgery	3.9	12.6
Critical care	1.0	5.4
Organ Imaging	2.5	27.1
Pathology	4.5	13.7
Other	8.2	16.4
Total	**44.5**	**84.6**
Supporting services:		
Circulation	16.3	–
Plant	9.0	–
Food & domestic services	6.3	4.2
Administration	6.1	8.2
Staff/public amenities	4.5	–
Other	13.3	3.0
Total	**55.5**	**15.4**

Source: Department of Health and Community Services, Victoria, (HCS), *Capital Investment in Victorian Public Hospitals,* 1996, Tables 5, 8.

Figure 3 tests this proposition by showing the equipment capital per 'adjusted WIES' in the 34 Victorian general hospitals for which full details were available, by type of hospital and size. The process adjusts for both the in-patient case mix and the relative importance of casualty/outpatient work in each hospital. As in the distribution of building space, there were obvious differences between the different types of hospital. Investment in the major teaching hospitals was very much higher than in the others - nearly 50% more per adjusted WIES than in the larger metropolitan institutions and about twice the average for small hospitals. Equipment levels in the non-teaching hospitals declined with size and the range of services they offered. Both the inter-group and intra-group differences were proportionately larger than for buildings. However they were absolutely much smaller and if only a global estimate of likely replacement outlays was needed, provision based on the average capitalisation of each hospital group would have probably sufficed. Higher investment in the country hospitals – by 10% on average - could be justified by the need to provide some necessary services at less than optimum scale. In contrast, a relatively low equipment investment per WIES in the larger metropolitan 'workhorses' might be explained by their size and, possibly, the ability to shift some of the most complex cases upwards.

Figure 3. Victorian survey hospitals with full data. Equipment capital per adjusted WIES, by type of hospital, 1994, in 1997-98 prices



Source: HCS, 1996, Table 11, adjusted to 1997-98 prices.

However the unexplained differences were still too large for any real delegation to management. Some quite small country hospitals had an equipment investment approaching a major teaching hospital and there were others whose endowment was implausibly low. In some cases, high values reflected history and medical culture. But low figures often came from a separation of the diagnostic services which commonly take over 40% of all equipment value. They were either privatised or provided by independent regional services. Either way, the relevant assets were not owned by the hospital.

Adjustment for contracting-out removed those anomalies. However there was also a systematic source of error. Standardising for case complexity through adjusted WIES alone implies that, for each case type, capital expenditures follow the composition of operating expenses. That is not true. Some of the major components of operating cost – nursing and drugs for example – have relatively low equipment needs, whereas the less operationally expensive diagnostic services have very high ones. In economic jargon, their capital/output ratios are quite different. What was needed were some capital weighted DRGs.

Capital DRGs

Although the data were not ideal it was possible to calculate these entities. Table 5 shows, in the 'cost buckets' used for DRG calculation, the value and composition of the average Victorian WIES value in 1998 and, in 1997-98 prices, the value and composition of equipment capital per adjusted WIES in 1994. The classifications were not entirely comparable because the DRG methodology of aggregating nursing and medical services required some re-estimation of the capital use data. However the errors are unlikely to be large. Column 3 shows the capital backing per service as a percentage of operating DRG costs. As can be seen, it varied markedly. Imaging required an equipment investment of over twice its operating cost per case. Pathology and operating theatres needed a backing of 95% and 25% respectively, whereas for nursing the ratio was 9% and for pharmacy it was only 6%. On average, equipment capital per WIES equalled about 28% of operating costs.

Table 5. Victoria: ratio of equipment capital per WIES to average operating cost per WIES, by services, in 1997-98 prices ($).

Services	Operating cost	Capital investment	Capital:operating ratio
Direct:			
Nursing	562.1	50.6	0.09
Medical	353.3	66.4	0.19
Emergency/OP	63.8	30.0	0.47
Critical care	149.2	50.6	0.34
Operating theatres	339.8	84.8	0.25
Imaging	76.6	162.5	2.12
Pathology	86.0	81.9	0.95
Pharmacy	126.3	7.6	0.06
Allied Health	42.0	5.4	0.13
Other direct	32.8	0.5	0.02
All direct service	**1811.9**	**540.3**	**0.39**
*Indirect services**	556.9	125.3	0.22
All services	**2368.8**	**665.8**	**0.28**

* Equivalent to the 'Supporting Services' in Table 4.

Source: data on DRG composition provided by HCS, Victoria: unpublished breakdown of the data in HCS, 1996, Tables 5, 8.

The procedure was then to re-weight the relative DRG values for every patient in every hospital according to the separate capital-output ratios above. I am indebted to Steve Gillette of the Department of Human Services, Victoria, for performing this substantial task. The outcome was a new set of 'capital-weighted' DRG throughputs for each hospital.

Table 6 shows the results. Actual investment is compared with that projected from the average capital-related DRG values in Table 5, namely

- $666 per case when all services are hospital-provided,
- $587 when pathology is contracted out and
- $318 when neither pathology nor diagnostic imaging services are rendered by the hospital.

The broad pattern was similar to that suggested earlier. The major teaching hospitals are clearly in a class of their own. Their equipment investment per case was 21% above the average, even after adjustment for a relatively capital-intensive case mix and present allocations presumably take that into account. But both between and within the hospital categories, variability was much less than when adjusted for operating WIES levels only. There were still four major outliers – all country hospitals – which had developed some specialisations which only history can explain. For the others though, the projected figures were close enough to the actual for some standard replacement provisions to be made. They could be paid as a supplement to the existing casemix amounts. On a capital consumption of 8.8% per annum, the 1998 rates would have been about $71 per case in the teaching hospitals; in the others, about $59 per case for hospitals providing all services, $52 per case for those not providing pathology and $37 for those in which both pathology and diagnostic imaging had been contracted out. Hospitals could then make their own investment decisions. Some capital redistribution would ultimately result but it would be slow enough to be acceptable. Any 'new' investment could be financed separately.

Table 6. Victorian hospitals with full equipment data: actual and projected totals, 1994 in 1997-98 prices ($ million)

Hospital/Group	Actual	Predicted	Actual/predicted
Major teaching:			
Alfred	52.05	43.07	1.21
Austin	41.00	29.74	1.38
Monash	37.14	35.82	1.04
Royal Childrens	25.13	21.19	1.19
St Vincents	39.81	31.37	1.27
Total	**195.13**	**161.19**	**1.21**
Metropolitan large:			
Dandenong	14.65	17.69	0.83
Geelong*	22.65	21.15	1.07
Mercy	10.09	10.95	0.92
PANCH	16.69	16.76	1.00
Western	18.01	27.94	0.65
Total	**82.09**	**94.49**	**0.87**
Metropolitan small:			
Angliss	6.76	7.25	0.93
Maroondah*	6.68	7.39	0.90
Sandringham*	3.22	3.74	0.86
St Georges*	1.86	3.10	0.60
Williamstown*	3.09	4.21	0.73
Total	**21.61**	**25.69**	**0.84**
Country large:			
Bairnsdale	4.41	3.73	0.85
Ballarat	10.88	12.02	0.90
Echuca	2.37	1.85	1.28
Gippsland	7.56	5.43	1.39
Hamilton	5.38	4.09	1.31
Swan Hill	2.80	3.80	0.74
Warrnambool	5.28	6.76	0.78
Wodonga*	3.39	3.70	0.92
Total	**42.07**	**41.38**	**1.02**
Country small:			
Ararat*	1.99	2.06	0.97
Bacchus Marsh*	0.69	0.96	0.72
Benalla*	1.50	2.06	0.73
Kyabram*	1.45	1.50	0.97
Kyneton*	0.81	0.79	1.02
Nhill*	1.12	1.31	0.85
Portland	3.98	2.88	1.38
Westernport*	0.67	0.69	0.97
Wonthaggi*	2.05	1.98	1.07
Alexandra*	0.65	0.79	0.82
Sth Gippsland*	0.39	0.63	0.62
Total	**15.30**	**15.65**	**0.98**

* No hospital pathology, and some/all radiology outsourced

Capital charging

Would capital charges alter this conclusion? The standard case for them is that access to free capital encourages an inefficient use. On that basis, funding asset replacement routinely would be regarded as the worst possible policy.

That is a serious objection. Most Australian governments have, in principle, mandated capital charging in the public sector although money rarely changes hands. It is seen as making agencies 'responsible', particularly when used for benchmarking public services against their private counterparts. Charges are inherent in any user-pay system which seeks to recover full costs; and also in the two or three way splits of funders, purchasers and providers which are so popular today. Even where capital raising continues to be centralised, as in the UK and New Zealand health services, it can be charged for internally. There are many people who believe that this is the only way to impose some discipline on spending.

However there are formidable difficulties. Because the cost of raising capital is an indicator of investment opportunities lost, most proposals seek a return sufficient to cover it. But in a non-market system where services are valued at cost, that is quite easy to achieve. You simply revalue the output for which the government, or any other collective purchaser, pays. All public charging systems face this essentially circular reasoning. They can alter the relative prices of capital-intensive and non-capital-intensive services but until some user valuations can be put on them, the result has little meaning. It is not enough to simply minimise capital use, which is what many of the less sophisticated schemes amount to. In practical terms, adding capital charges would make any formula-based funding system even more open the strictures outlined earlier, namely that its outcomes be demonstrably 'fair' and in accordance with the service demands which hospitals now face.

The question is really one of how many choices the public hospitals are assumed to have. The suggestions outlined here imply that while they can certainly choose the type of capital goods they need, further reducing their overall stock is not amongst them. That assumption may not be valid forever. Technologies may change. However a great deal more information would be needed to deny it now.

Summary

This paper has suggested several major conclusions. The first is that although there has been some increase in public hospital capital over the past ten years, almost all investment over that time can be regarded as replacement. Relative to population, total capital has actually fallen. Whether this was efficient or inadequate we cannot say.

Secondly, the predictability of replacement expenditures means that capital allocation need not approximate a lottery. Although outlays on buildings and, probably, major equipment items should continue to be centrally controlled, most equipment expenditure can and should be scheduled and funded for application by the hospitals, either when replacement arises or as an ongoing addition to casemix-based payments. A formula for doing so has been suggested. The numerical results will all have changed by now. In Victoria, one of the surveyed hospitals has since been closed, a new one has opened, one of the teaching hospitals has been largely rebuilt and another has substantially increased its equipment stock. In Queensland, a re-development program has completely changed the profile of its metropolitan hospitals. However these are but examples of the lumpiness of investment and how what are conceptually replacement expenditures actually appear in practice. None of the principles have changed.

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Appendix

Methods

Price adjustment
Conversion to 1997-98 prices used the ABS price index for Gross Fixed Capital Formation by State and Local Governments, as reported in the AIHW Health Expenditure Bulletins.

Calculation of Adjusted WIES
Because buildings and equipment support both in-patient and emergency/outpatient services and there was no way of separating them, the WIES numbers for every hospital were expanded by a factor derived in several ways from four separate sources;

- operating budgets for non-inpatient services in each hospital,
- data on cost-weighted Outpatient Occasions of Service (WOOS) for each hospital, using the three categories of emergency, other medical and allied health
- HCS estimates of average cost per occasion of service in each category,
- AIHW data of the estimated division of all expenditures between in-patients and others.

The alternative methods gave almost identical conversion factors of sixteen 'WOOS' per 'WIES', which suggests that all the calculations used a similar methodology.

Planning Australia's hospital workforce

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Abstract

Growing government support has been evident during the past decade for macro-level workforce planning to ensure that future populations have access to appropriate health care services. Population ageing is impacting on workforce requirements and on workforce supply within Australia and internationally. Changes in financing and the organisation of health services are impacting on the availability of training and on the quality of working life. The age and gender profile and career expectations of young Australians are changing. These factors are all adding to the importance and complexity of workforce planning. This paper draws on data from various sources to describe Australia's hospital workforce, to explore supply-side workforce trends and to discuss some contemporary issues of concern to policy makers and workforce planners. The paper finds that in recent years there has been a 3 per cent decline in the number of full time equivalent staff in public hospitals, while the number in the private hospital workforce has increased by 28 per cent. The paper concludes that, nationally, there are serious limitations in the data available to describe and monitor the hospital workforce and that there is a need to remedy this situation.

Introduction

The hospital has traditionally been one of the key settings for the provision of health care with all hospitals requiring an adequate supply of appropriately trained health professionals. It follows that change and evolution in the delivery of hospital services requires change in the skill mix of its workforce. Among the forces for change are advances in health technology and practice, competition for limited resources, and workplace reforms to improve the quality, safety and effectiveness of hospital services. At the same time change in the nation's health workforce has important implications for hospital management.

Like the general population the health workforce is becoming older and more culturally diverse. Other broad health workforce changes can be anticipated as a result of changes in education and training policies and other considerations associated with pursuing a career in the health industry. For example, in recent years many postgraduate nursing courses have become fee-paying and new career opportunities have become available within Australia and overseas. Universities have changed their admissions procedures and curricula to improve the skills of graduate doctors and nurses to meet patient expectations. The cost of professional indemnity insurance is increasing at unprecedented rates and this is occurring unevenly across disciplines, affecting both medical workforces, such as neurosurgery, and non-medical workforces, such as midwifery. In recent years the Commonwealth Government has funded a range of initiatives to encourage more doctors to practise in a rural area.

Traditionally, public hospitals have been the main providers of vocational training and work experience with state/territory governments being the main source of funding. There has been an expectation that dedicated young health professionals will work long hours. Hospital work rosters have frequently lacked flexibility with few opportunities to work and train part-time. These expectations are being challenged, particularly with respect to the medical workforce, in the interest of patient safety and trainee health and wellbeing (Australian Medical Association [AMA], 2001a and AMA 2001b). In recent times, public hospitals have undergone significant

change due to increased demand for services, limited resources to meet these demands and management initiatives to contain costs and increase productivity. The number of days that patients remain in public hospitals has declined and some services once provided in public hospitals are now being provided in the private sector. These changes are affecting the vocational training opportunities available to health professionals within public hospitals.

The changes that are occurring within many of the professional health workforces and in the wider health environment have increased the importance of national health workforce planning. Nationally, the medical workforce has been comparatively well catered for through the work of the Australian Medical Workforce Advisory Committee (AMWAC), which was established in 1995 (AMWAC Review Team 2002). Nursing workforce planning has had less of a national focus and most planning has been ad hoc and focussed more at the state/territory level. This lack of national focus for nursing workforce planning is well recognised and national efforts are now co-ordinated through the Australian Health Workforce Advisory Committee (AHWAC). In a government sense, the allied health professions have been largely neglected from a planning perspective. The inconsistency of these approaches has manifested in a lack of planning for the hospital workforce per se. This may be due to the combined factors of poorly developed hospital workforce data collections, and that hospital workforce planning is perceived as more the domain of state/territory governments and individual hospitals.

This paper examines Australia's approach to planning the health workforce and describes the composition and distribution of this large, diverse workforce. This is the context for an examination of the professional hospital workforce, including some supply-side trends. The latter are used to highlight areas of current and future workforce concern.

Sources of data and their limitations

Data from various sources are used to describe the composition and distribution of the workforce, including, hospital workforce data from the ABS Census of Population and Housing and relevant data collections of the Australian Institute of Health and Welfare (AIHW). The latter include the annual hospital data collections from private and public hospitals and the labour force collections from various health occupation workforces. Each of these data sources has strengths and weaknesses but all are in broad agreement as to the size of the hospital workforce. The ABS Census is the most comprehensive source of all the occupations in the hospital workforce with the disadvantage that it reports at five-yearly intervals, the most recent available data being the 1996 Census. (It should be noted that 2001 Census data was not available for use in drafting this article.) The ABS data may also understate (by approximately 5%) the number of persons employed in hospitals due to non-response to the occupation or industry questions. The annual hospital statistics data compiled by the ABS and AIHW generally report equivalent full-time (FTE) employment data in broad occupation groups. The occupation group data in some States or Territories may be suppressed because of the small number of hospitals in the jurisdiction with consequential effect on the comprehensiveness of the national data. The AIHW health labour force data is only for the registered professions and is unable to present a complete overview of hospital employment. None of the sources is able to provide accurate data on the workforce contribution of visiting medical officers in hospitals.

Australia's approach to planning the health workforce

In Australia, Commonwealth and State/Territory governments have supported national workforce planning initiatives in the interest of gaining accurate and timely information about workforce supply, distribution and future requirements with a view of informing workforce, and broader health system, policies. The preferred planning approach has been data-driven workforce change with key stakeholders involved in the process – governments, service providers, professions, consumers and educators and trainers.

Despite growing experience with national workforce planning, predicting workforce requirements remains a challenge. For example, while there is growing consensus over demand-side and supply-side measures, opinions are varied as to whether workforce planning should focus on a single discipline (eg general practice) or be multidisciplinary. A multidisciplinary approach increases the complexities associated with planning because it requires consensus among the key stakeholders as to: 1) the appropriate mix and number of service providers required for any given stream of care (eg the cancer care workforce or the mental health workforce); and 2) the workload appropriate for each discipline to provide optimal care of patients with particular conditions and in different health care settings (eg acute care, rehabilitative care, palliative care).

These qualitative workforce issues are becoming increasingly important given mounting evidence of the link between staffing levels and quality of patient care. For example, in a study involving 799 US hospitals, Needleman et al., (2002) observed that lower levels of staffing by nurses were associated with an increased risk that patients will have complications or die. Theoretically it should be possible to link workforce numbers and organisation to an optimal model of care, which is based on providing the best quality and outcomes. However at present there is not a sufficiently developed evidence base to inform this process. This approach is likely to be usefully applied in the hospital setting.

In supply terms, Australia's health workforce policy has been national self-sufficiency. However, maldistribution of the workforce has been a constant challenge to policy makers, and has necessitated the development of a range of incentive based initiatives coupled with the supplementation of the Australian trained workforce with overseas trained doctors and nurses. The overseas workers have been employed in particular areas of need – mostly rural general practice and the public hospital system, both urban and rural.

Policies arising from most medical macro workforce planning initiatives have typically attempted to influence supply-side initiatives, such as intake into medical schools and specialist vocational training programs (AMWAC 2000a; Duckett 2000). For example, since 1995, AMWAC has recommended increases in specialist training program intakes across 22 of the 24 medical workforces that it has reviewed, with first year vocational training places increasing by 111 between 1998 and 2002 (viz., from 1,369 to 1,483). At the same time, medical school commencements have increased by 105 (from 1,221 to 1,326), while the number of medical school completions has declined slightly, from 1,206 to 1,195 (AMWAC 2000b; Committee of Deans of Australian Medical Schools 2002).

Australia's health workforce

Drawing on ABS Labour Force Survey data, the AIHW (2002a) estimated that in 2000, the health workforce accounted for 643,500 persons (Table 1). This represented 7.1% of employed Australians. In total, 63.5% of the health workforce were employed within hospitals and nursing homes, 20% within medical and dental services, and the remaining 16.5% in a range of other health settings, excluding veterinary services. Data from the 1996 ABS Census suggests that of people employed in hospitals and nursing homes, approximately 26% are associated with the latter.

Compared with the total civilian workforce in which 44% were female and 26% were part-time, the health workforce was predominantly female (78%), and a greater proportion were part-time (viz., 40%). Of the people working part-time in the health industry, 92% were women. The trend toward part-time work can be expected to continue given that between 1995 and 2000, there was an increase in part-time employment in the health industry of 19%, compared with an increase of 7.5% in full-time employment. During this same period, the health workforce increased by 12%, while the total civilian workforce increased by 9.6% (AIHW 2002a).

Table 1. Health industry employees, 2000

Industry	Total persons	Percent of total health employees	Percent part-time	Percent female
Hospitals and nursing homes	408,500	63.5	38.8	81.4
Medical and dental services	129,500	20.1	43.6	73.4
Other health services	105,500	16.4	39.3	71.1
Total health service	**643,500**	**100.0**	**39.9**	**78.1**
Total Australian civilian workforce	9,009,300	-	26.3	43.8

Note: Annual figures are the average for the four quarters.

Source: ABS Labour Force Survey data, from AUSTATS reported in Australian Institute of Health and Welfare (AIHW) (2002), *Australia's Health 2002: The Eighth Biennial Health Report of the Australian Institute of Health and Welfare,* Canberra

Table 2 indicates that Australia is making greater use of overseas-trained health professionals across a range of health disciplines. For example, between 1993-94 and 1998-99 the use of temporary resident overseas-trained health professionals increased by 165%, with doctors accounting for 66% and nurses 23%, with the remaining 11% made up of other health professional groups. This table also shows that there has been a marked increase in the number of permanent resident overseas-trained nurses arriving in Australia (AIHW 2000b). The use of overseas-trained health professionals highlights areas of current workforce shortage. For example, with respect to the medical workforce, the greatest contributions of temporary resident doctors are to the rural general practice workforce and the public hospital and locum workforces, both urban and rural (AMWAC 1999).

Table 2. The increasing use of overseas trained health professionals, 1993-94 and 1998-99

Discipline	1993-94	1998-99	% change
Temporary residents			
Medical practitioners	893	2,224	149.0
Nurses & midwives	261	772	195.8
Optometrists	23	101	339.1
Pharmacists	27	89	229.6
Medical imaging professionals	18	68	277.8
Physiotherapists	10	32	220.0
Other	50	109	118.0
Total	**1,282**	**3,395**	**164.8**
Permanent residents			
Nurses & midwives	870	1,080	24.1
Medical practitioners	445	408	-8.3
Pharmacists	72	120	66.7
Optometrists	15	98	553.3
Physiotherapists	77	90	16.9
Medical imaging professionals	44	53	20.5
Other	192	181	-5.7
Total	**1,715**	**2,030**	**18.4**

Source: Australian Institute of Health and Welfare (2000), Australia's Health 2000, AIHW, Canberra (p 265).

Australia's hospital workforce

As indicated in Table 3, the largest single occupational category in the hospital workforce in 1996, was registered and enrolled nurses (41%), a further 4% were nurse assistants and therapy aides. In total, 7% of the hospital workforce were medical practitioners, 4% allied health professionals, 0.6% pharmacists, 0.1% dentists, while 43% were made up of a range of other health related occupational categories (AIHW 2001a).

In 1999-00, expenditure on salaries and wages for the workforce employed in all hospitals (viz., public, private and day hospitals) amounted to $12,464 million (AIHW 2002b). This represented 68% of total hospital expenditure, which was $18,806 million (Table 4). In the public sector, salaries and wages accounted for 71% of total expenditure, while in the private sector it accounted for 57% and in free-standing day hospitals it represented 41%. In 2000-01, salaries and wages accounted for 62.5% of total public hospital recurrent expenditure, which amounted to $15,545 million (see Hargreaves et al., in this issue of the journal) (AIHW 2002b).

In 2000-01, expenditure on salaries and wages in public acute and psychiatric hospitals amounted to $9,722 million. Table 5 indicates the distribution of this expenditure by broad workforce category. The table shows that nurses accounted for 45% of expenditure, salaried medical officers 18%, diagnostic and health professionals 13%, administrative and clerical staff 12%, domestic and other staff 10%, and personal care staff and other categories of staff accounted for the remaining one per cent. In addition, payments to visiting medical officers amounted to $599 million and superannuation payments $814 million (AIHW 2002b).

Table 3. Representation of persons employed in health related occupations, by occupational category and industry, (ABS 1996 Census)

Industry	Doctors	Dentists	Pharmacists	Allied health	Nurses	Nurse assistant	Therapy aide[1]	Other occupations	Total
Hospitals	6.7	0.1	0.6	3.7	41.2	1.3	3.3	43.1	100.0
Nursing homes	0.1	0.0	0.0	1.0	30.7	18.5	3.5	46.2	100.0
General practice	69.3	0.1	0.1	2.3	13.4	0.2	0.3	14.3	100.0
Specialist med. services	53.9	0.1	0.0	14.5	14.6	0.3	0.3	16.4	100.0
Dental services	1.0	70.0	0.0	0.9	4.0	0.2	0.2	23.6	100.0
Pathology services	20.4	0.0	0.1	1.6	38.1	0.2	1.0	38.5	100.0
Community Health	2.8	0.3	0.2	10.2	28.3	1.1	1.2	55.8	100.0
Other health industry	3.8	0.1	0.1	35.2	25.7	1.9	1.2	31.9	100.0
Child care services	0.0	0.0	0.0	0.1	2.5	0.0	0.0	97.3	100.0
Accom.for the aged	0.0	0.0	0.0	0.7	16.8	9.5	9.0	63.9	100.0
Residential & non-resid.	0.3	0.0	0.0	3.4	6.1	1.5	2.4	86.3	100.0
Government admin.	3.1	0.1	0.5	6.8	11.8	0.3	0.8	76.6	100.0
Education	1.4	0.1	0.1	3.8	4.6	0.1	0.3	89.4	100.0
Defence	19.2	5.5	1.7	11.5	19.5	5.5	8.9	28.1	100.0
Other	2.7	0.3	13.7	6.7	10.4	1.5	2.0	62.8	100.0
Total	**7.4**	**0.9**	**1.5**	**6.3**	**24.6**	**3.3**	**2.3**	**53.7**	**100.0**

1. Includes Therapy Aides and Personal Care Assistants

Source: Australian Institute of Health and Welfare (2001) Health and Community Services Labour Force, 1996, AIHW, Canberra.

Table 4. Hospital expenditure ($'000), by public/private sector and free-standing day, 1999-00

Expenditure category	Public acute & psychiatric hospitals	Private acute & psychiatric hospitals	Free-standing day hospitals	All hospitals
Wages and salaries including on-costs1	10,226,596	2,170,827	67,102	12,464,525
Drugs, medical and surgical supplies	1,820,653	630,788	35,912	2,487,353
Food supplies	165,373	78,807	-	244,180
Other domestics services	520,106	77,109	-	597,215
Administrative expenses	897,721	291,741	29,454	1,218,916
Repairs and maintenance	348,611	73,522	-	422,133
Other2	461,352	471,240	30,241	962,833
Total	**14,350,411**	**3,794,034**	**162,710**	**18,307,155**
% wages and salaries	71.3	57.2	41.2	68.1

Notes: 1. Includes payments to visiting medical officers and superannuation for public hospital s
2. Domestic services for day-hospitals, repairs and maintenance, interest, depreciation, patient transport, contract services and other

Sources: Australian Institute of Health and Welfare (2001) Australian Hospital Statistics 1999-2000, AIHW, Canberra; Australian Bureau of Statistics, Private Hospital Statistics, ABS Catalogue 4390.0.

Table 5. Recurrent public acute and psychiatric hospital wages and salaries expenditure ($'000), by category of staff, 2000-01

Recurrent expenditure category of staff	S('000)	Percent of total salaries and wages expenditure
Nurses (RNs, ENs, students, trainees/pupils)	4,338,403	44.6
Salaried medical officers	1,791,450	18.4
Diagnostic and health professionals	1,298,687	13.4
Administrative and clerical	1,167,750	12.0
Domestic and other staff	1,019,239	10.5
Other personal care staff	48,006	0.5
Not allocable to a salary expenditure category	58,516	0.6
Total	**9,722,051**	**100.0**

Source: Australian Institute of Health and Welfare (2002) Australian Hospital Statistics 2000-2001, AIHW, Canberra.

The average annual salary for all full time equivalent public hospital staff in 1998-99 was $48,670 and in 2000-01 was $53,118, with wide variation by State/Territory and between broad occupational categories (Table 6). For example, for 'other personal care staff' the average annual salary in 2000-01 was $31,298, for salaried medical officers it was $103,487, for nurses $52,602, for diagnostic and health professionals it was $54,565, for administrative and clerical staff it was $41,867 and for domestic and other staff it was $35,558 (AIHW 2002b).

Table 6. Average salary ($) of full time equivalent staff[a], public acute and psychiatric hospitals, by occupational category and State/Territory, 2000-01

Occupational category	NSW[b]	Vic[c]	Qld	WA	SA[b]	Tas[d]	ACT	NT	Total[e]
Salaried medical officers	98,152	125,505	95,858	104,031	81,656	104,610	106,667	123,628	103,487
Nurses	50,548	58,589	52,061	51,517	47,652	50,792	49,851	57,868	52,602
Other personal care staff	n.a.	27,085	35,647	31,342	n.a.	n.a.	34,998	37,727	31,298
Diagnostic & health professionals	49,626	64,576	53,146	48,665	47,891	54,185	55,498	68,288	54,565
Administrative & clerical staff	43,106	45,279	38,764	39,182	36,428	37,489	45,847	43,382	41,867
Domestic & other staff	34,956	37,866	34,406	35,712	30,318	44,536	33,922	44,231	35,558
Total staff	50,961	60,916	50,780	50,965	47,180	52,247	54,271	58,804	53,118

(a) Where average full-time equivalent (FTE) staff numbers were not available, staff numbers at 30 June were used.

(b) Other personal care staff are included in Diagnostic & allied health professionals and Domestic & other staff.

(c) FTEs may be slightly under-enumerated with a corresponding overstatement of anerage salaries.

(d) Data for three small hospitals not supplied. Other personal care staff are included in domestic & other staff.

(e) The totals for Other personal care staff, diagnostic & health professionals and domestic & other staff are affected by reporting arrangements noted above.

(f) n.a. not available

Source: Australian Institute of Health and Welfare (2002) Australian Hospital Statistics 2000-01, AIHW, Canberra.

Based on the 1996 Census data, Table 7 shows that 72% of the hospital workforce was employed within public hospitals and 28% within private hospitals. The table also indicates that across State/Territories there was variation in the proportion of the workforce employed within the public and private sectors. For example, in Victoria, 36% of the hospital workforce was employed in the private sector, while the comparative figures for New South Wales and the Northern Territory were 21% and 12%, respectively (AIHW 2001a).

Table 7. Industry sector distribution of the hospital workforce, by State/Territory, 1996

Industry sector	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Government	79.0	63.8	63.4	74.4	75.7	70.6	88.2	76.6	71.5
Private	20.7	35.8	36.2	25.4	23.9	28.9	11.7	23.1	28.1
Not stated	0.3	0.4	0.4	0.3	0.3	0.4	0.2	0.3	0.4
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Australian Institute of Health and Welfare (2001) Health and Community Services Labour Force, 1996, AIHW, Canberra.

Table 8 indicates that in 1996, 67% of the hospital workforce resided in a capital city, 7% in an 'other metropolitan centre' (viz., Gosford Wyong, Newcastle, Wollongong, Queanbeyan, Blue Mountains, Geelong, Gold Coast, Tweed Heads, or Townsville), while the remaining 26% resided in a rural or remote region of Australia. Rural and remote regions are all locations outside of a capital city or other major urban centre. This distributional pattern is similar to the distribution of the Australian population in which 64% reside in capital cities, 8% in 'other metropolitan centres', while the remaining 28% reside in a rural or remote region (ABS 1996 Census). This workforce distribution pattern is likely to have been largely influenced by the distribution of the nursing workforce. The AIHW (2002a) observed that in 1997, 63% of employed registered and enrolled nurses had their main job in a capital city, 7% in an 'other metropolitan centre', while the remaining 30% were located in a rural or remote area.

Table 8 also shows wide variation in the geographic distribution of the hospital workforce by State/Territory. Obviously, these variations were linked to the distribution of hospitals within each State/Territory in 1996. States with an above average concentration of the hospital workforce in urban regions were Western Australia, South Australia and New South Wales, while in Queensland, Tasmania and the Northern Territory more than 30% of the workforce was located in a rural or remote region (AIHW 2001a). (For information about the geographic distribution of hospitals and hospital beds see Wilkinson in this issue of the journal.)

Table 8. Geographic distribution of the hospital workforce, by State/Territory, 1996

Region of usual residence	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Capital city	65.3	70.6	54.1	78.2	79.1	45.9	56.0	99.9	67.0
Other metropolitan centre	12.5	3.0	12.0	-	-	-	-	-	7.0
Large rural centres	5.9	6.0	14.8	2.0	-	27.5	-	-	7.0
Small rural centres	6.2	5.4	3.8	3.8	4.0	7.7	-	-	5.1
Other rural areas	9.3	14.8	10.6	14.7	8.5	18.1	4.7	0.1	11.4
Remote zone	0.8	0.2	4.7	1.3	8.4	0.7	39.3	-	2.4
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Australian Institute of Health and Welfare (2001) Health and Community Services Labour Force, 1996, AIHW, Canberra.

Changes in the staffing and utilisation of Australian hospitals

Between 1993-94 and 1999-00, the number of full time equivalent staff in public hospitals decreased by 3% (from 180,513 to 175,291), while in private hospitals the number of FTE staff increased by 28% (from 33,758 to 43,120) and in free-standing day hospitals there was a 135% increase (from 653 to 1,537) (Table 9) (AIHW 2001b).

Table 10 shows that during this same period, the average length of stay declined from 4.7 days to 3.8 days. However, this decrease was largely attributable to the increase in same day patients (see Hargreaves et al., in this issue of the journal). Hargreaves et al., also observe that between 1995-96 and 1999-00 there was a slight shift from the use of public acute hospitals to private hospitals with 70% of patient days in public hospitals in 1995-96 compared with 67% in 1999-00.

Table 9. Full time equivalent staff, by hospital sector, 1993-94 to 1999-00

Industry sector	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	% change
Public and repat. hospitals	180,513	179,355	184,494	174,695	175,024	175,535	175,291	-2.9
Private hospitals	33,758	36,589	39,100	40,908	41,566	43,053	43,120	27.7
Free-standing day hospitals	653	755	890	1,011	1,220	1,319	1,537	135.3
Total hospital FTE staff	**214,924**	**216,699**	**224,484**	**216,613**	**217,809**	**219,907**	**219,948**	**2.3**
% staff in public and repat. hospitals	84.0	82.8	82.2	80.6	80.4	79.8	79.7	

Sources: Australian Institute of Health and Welfare (2001) Australian Hospital Statistics (various years), AIHW, Canberra; Australian Bureau of Statistics (2001), Private Hospital Statistics, ABS Catalogue 4390.0.

Table 10. Patient separations and average stay (days), all hospitals, 1993-94 to 1999-00

	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	% change
Separations ('000s)	4,734	4,980	5,254	5,408	5,627	5,846	6,020	27.2
- Same-day	1,691	1,945	2,226	2,423	2,610	2,813	2,973	75.8
- Overnight stay	3,043	3,035	3,028	2,985	3,017	3,033	3,047	0.1
Average stay (days)	4.7	4.4	4.3	4.2	4.0	3.9	3.8	
- Same-day	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
- Overnight stay	6.8	6.6	6.7	6.8	6.7	6.5	6.5	

Sources: Australian Institute of Health and Welfare (2001) Australian Hospital Statistics (various years), AIHW, Canberra; Australian Bureau of Statistics (2001), Private Hospital Statistics, ABS Catalogue 4390.0.

The professional hospital workforce

Using data from the 1996 Census, Duckett (2000) observed that of the people employed in the health industry, approximately one third were health professionals. In this section the focus is the professional hospital workforce and the aim is to analyse changes in the supply of this workforce during the past decade. Four broad health professional groups have been selected for analysis, viz., medical practitioners, registered nurses, allied health professionals and managers.

Data from the AIHW (2001b), indicate that in 1998-99, nursing staff represented 48% of the hospital workforce, salaried medical officers and other diagnostic and health professionals accounted for 19%, administrative and clerical staff 14% and domestic and other staff 19% (Table 11). Table 11 also shows variation by hospital sector in the representation of workforce categories. For example, medical officers and other diagnostic professionals accounted for 22% of the public hospital workforce, and only 5% of the private hospital workforce, while nursing staff accounted for 60% of the private hospital workforce and 45% of the public hospital workforce.

Medical practitioners

In 1998, there were 41,605 doctors practising as clinicians in Australia (this figure does not include 4,473 specialists-in-training). This represented 223.8 clinicians per 100,000 persons and was somewhat less than the average for the 29 OECD countries in 1997 (viz., 253.4 clinicians per 100,000 population) (AIHW 2000a; AMWAC 2001).

Table 11. Full time equivalent hospital staff, by occupational category and hospital sector, 1999-00

Occupational category	Public hospitals (including psych.)	Private acute & psych. hospitals	Free-standing day hospitals	All hospitals
Salaried medical officers and other diagnostic and health professionals	39,144	2,125	.	41,269
Nursing staff	78,319	25,670	746	104,735
Administrative and clerical staff	26,410	5,687	443	32,540
Domestic and other staff	31,662	9,571	130	41,363
Total staff	**175,535**	**43,053**	**1,319**	**219,907**
% medical officers and other diagnostic and health professionals	22.3	4.9	.	18.8
% nursing staff	44.6	59.6	56.5	47.6
% administrative and clerical staff	15.0	13.2	33.6	14.8
% domestic and other staff	18.0	22.2	9.8	18.8

Sources: Australian Institute of Health and Welfare (2001) Australian Hospital Statistics 1999-2000, AIHW, Canberra; Australian Bureau of Statistics (2001), Private Hospital Statistics, ABS Catalogue 4390.0.

The hospital medical workforce

Acute care hospitals were the main work setting for 31% (15,313) of medical practitioners, for 58% the main work setting was their private rooms, while for the remaining 11% a variety of settings were nominated (eg residential services, Aboriginal health services and educational institutions) (AIHW 2000a). However, many practitioners with private rooms also work in hospitals. Table 12 shows that in 1998, 21,793 medical practitioners spent some of their work time in a public hospital and 6,459 spent some work time in a private hospital. Of doctors working in public hospitals, 52% were specialists, a further 18.5% were specialists-in-training, while 13% were primary care practitioners, 12.5% were hospital-non-specialists and 4% were non-clinicians (eg administrators, educators and researchers) (AIHW 2000a). Table 12 also shows that, of doctors working in private hospitals, 61% were specialists, only 7% were specialists-in-training, 24.5% were primary care practitioners and 5% were hospital-non-specialists. Clinicians represented 97% of doctors working in private hospitals, while non-clinicians accounted for 3% (AIHW 2000a).

Table 12. Medical practitioners who spend some of their time working in public and private hospitals, by occupation of main job, 1998

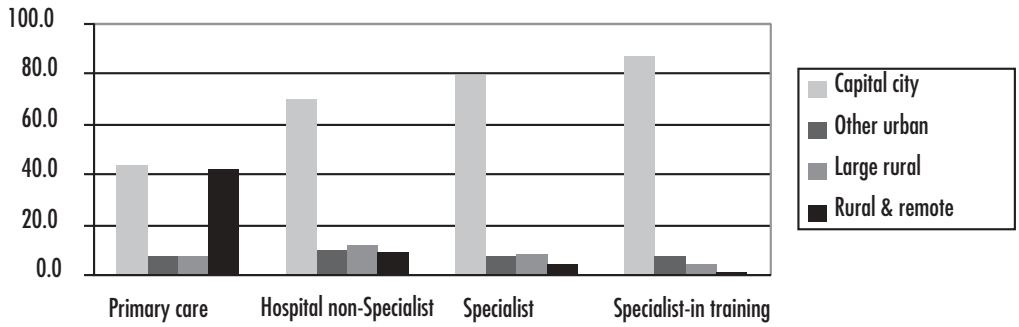
Occupation of main job	Public hospitals	Percent	Private hospitals	Percent
Primary care	2,843	13.0	1,580	24.5
Hospital non-specialist	2,719	12.5	319	4.9
Specialist	11,252	51.6	3,922	60.7
Specialist-in-training	4,039	18.5	429	6.6
Total clinicians	**20,853**	**95.7**	**6,250**	**96.8**
Non-clinicians1	940	4.4	209	3.3
Total medical practitioners	**21,793**	**100.0**	**6,459**	**100.0**

1. Non-clinicians include administrators, teacher/educators, researchers, public health physicians and occupational health physicians.

Source: Australian Institute of Health and Welfare (2000) *Medical Labour Force Report, 1998*, AIHW, Canberra.

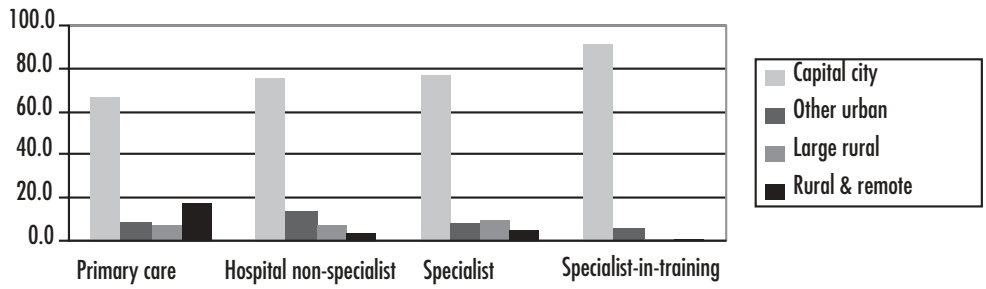
Figure 1 indicates that, except for primary care practitioners, the public hospital medical workforce is predominantly located in capital cities. The capital city bias is even more evident with respect to the private hospital medical workforce (Figure 2) (AIHW 2000a).

Figure 1. Geographic location of medical clinicians working in public hospitals, by main job, 1998



Source: Australian Institute of Health and Welfare (2000), *Medical Labour Force Report, 1998*, Canberra.

Figure 2. Geographic location of medical clinicians working in private hospitals, by main job, 1998



Source: Australian Institute of Health and Welfare (2000), Medical Labour Force Report, 1998, Canberra.

Medical workforce trends and the staffing of hospitals

Between 1993 and 1998, the number of commencing and completing medical students (Australian citizens and permanent residents) increased by 2% (AMWAC 2000a), the total clinician workforce increased by 9%, while the Australian population increased by 6% (AIHW 2000a). During this same period, the public hospital FTE salaried medical officer workforce increased by 26% (Table 13). Comparative data were not available for private hospitals. As indicated in Table 13, the private hospital data include both salaried medical officers and other diagnostic and health professionals. This workforce increased by 62% between 1993-94 and 1998-99 (AIHW 2001b).

Table 13. Full time equivalent salaried medical officers, by hospital sector, 1993-94 to 1998-99

	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	% change
Public[1] and repatriation hospitals	13,082	13,094	13,361	14,210	15,387	16,458	25.8
Private acute and psychiatric hospitals[2]	1,310	1,609	1,653	1,765	2,055	2,125	62.2

1. Public psychiatric hospitals are included from 1995-96. 2. Includes salaried medical officers and other diagnostic and health professionals.

Source: Australian Institute of Health and Welfare (2000) *Medical Labour Force Report, 1998*, AIHW, Canberra.

During the past decade, important changes have occurred in the demographic profile of medical students and the medical workforce. In brief, medical students are older when they commence their studies, the workforce has grown older and more women have undertaken medical studies and entered the workforce. In 1999, 20.3% of commencing medical students were aged 25 years and over compared with 6.2% in 1993, while for the same years, the representation of women among this group of students increased from 47% to 53% (AMWAC 2000b). These changes are affecting the type of work that doctors do, where they choose to locate their practice, the hours they work, and their choice of discipline within medicine (AMWAC 2000b and 2000c; Tolhurst 2002). For example, in 2000, 65% of paediatric vocational trainees and 60% of general practice trainees were women, compared with 13% of trainee surgeons and 23% of trainee pathologists (AMWAC 2000b). Disciplines favoured by female doctors tend to be those with more flexible training and work environments and predictable work hours (AMWAC 1998). This is reflected in the different work patterns of male and female vocationally registered general practitioners. The AIHW reported that in 1998, 53% of female GPs worked less than 35 hours per week compared with 11.5% of male GPs (AIHW 2000a). However, among specialists-in-training no gender-based differences were observed in the hours worked. On average, male and female trainees worked 50.2 hours per week and 21% of trainees worked more than 65 hours per week (AIHW 2000a).

Typically, teaching hospitals have been the places where most postgraduate doctors, nurses and allied health professionals have gained their vocational training. In the process, these graduates have made a significant contribution to the hospital workforce. However, changes in the nature of the work being undertaken in these hospitals means that alternative avenues of clinical training experience may be required in some disciplines. These changes include the focus on acute and super-acute services and the virtual elimination of specialist outpatient services. Furthermore, the workforce shift from public to private hospitals has obvious vocational training implications. The interface between training and service delivery has of course always been complex and while in the past these arrangements have worked well, the benefit to trainees, and ultimately the future of the professions, may be starting to blur, especially in medicine. Horvath (2002) proposes that medical training arrangements may need to change and that in the future we may need to consider adopting the principle of ensuring that trainees follow the work and that the funding for training and education follows the trainees. The impact on the hospital workforce may be quite profound but it should not be considered insurmountable and there may in fact be better ways of achieving the necessary hospital workforce supply and organising service provision.

Registered nurses

To present a reasonably comprehensive profile of the nursing workforce, this section contains information about registered and enrolled nurses.

Data from the AIHW (2002c), indicated that in 1999, there were 179,948 employed registered nurses, representing 149,995 FTEs. At the same time there were 45,447 enrolled nurses representing 35,700 FTEs. There were 800 FTE registered nurses and 190 FTE enrolled nurses per 100,000 persons. The figures presented in the following tables are based on FTEs. They have been calculated by multiplying the number of employed registered or enrolled nurses by the average hours worked in each work setting and dividing by 38, the standard weekly hours in most nursing awards.

Table 14 indicates that in 1999, 69% of registered nurses and 56% of enrolled nurses were employed in hospitals. This table also shows that by broad category of work setting, registered nurses accounted for 84% of the hospital nursing workforce, 62% of the aged accommodation nursing workforce, 87% of the community health nursing workforce and 81% of the nursing workforce in other work settings. The majority of FTE registered nurses (72%) were employed in the public sector with the remaining 28% employed in the private sector (AIHW 2002c).

Nursing workforce trends and the staffing of hospitals

In common with the Australian labour force in general (ABS 1998), more nurses are choosing to work part-time and the workforce is ageing (AIHW 1998). For example, between 1994 and 1997, the average age of the nurse workforce increased from 39.1 years to 40.4 years and the average age of students commencing undergraduate nursing courses increased from 22 to 25 years (AIHW 1998).

Table 14. Full time equivalent1 employed registered and enrolled nurses, by work setting, Australia, 1999

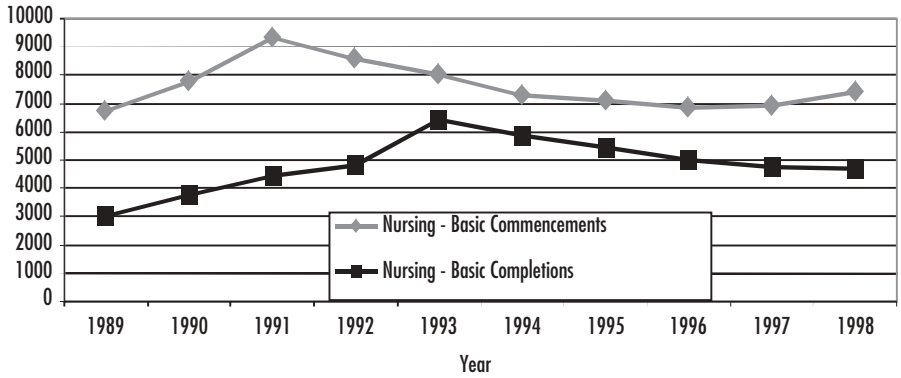
	Hospitals	Aged accommodation	Community health	Other	Total	% Employed in hospitals
Registered nurses	104,108	16,785	16,227	12,825	149,995	69.4
Enrolled nurses	19,847	10,378	2,315	3,159	35,700	55.6
Total	**123,956**	**27,164**	**18,593**	**15,984**	**185,695**	**66.8**
% Registered nurses		84.0	61.8	87.3	80.2	80.8

1. Full time equivalents have been calculated by multiplying the number of employed nurses, by the average hours worked in each work setting and dividing it by 38 (the standard hours in most nursing awards).

Source: Australian Institute of Health and Welfare (2002) *Nursing Labour Force Report 1999*, AIHW, Canberra.

Figure 3 indicates a strong correlation between course commencements and course completions in undergraduate nursing courses once account is taken of the three years that it takes to complete a basic nursing degree. This data suggests that the attrition rate from basic nursing courses is about 30%. It also shows that course commencements peaked in 1991 at a little over 9000, and that since then have declined to just over 7,000 (AIHW 2001c). Between 1993 and 1999, the AIHW (2002c) observed a decrease of 5.6% in the number of nursing registrations (viz., from 270,720 to 257,662).

Figure 3. Course commencements and completions in undergraduate nursing courses, 1989-1998



Source: Derived from data supplied by AIHW (2001) from the Department of Education, Training and Youth Affairs data.

Table 15 shows that between 1993 and 1999, there was an increase of 6.5% in the FTE registered nurse workforce and a decrease of 16% in the FTE enrolled nurse workforce. Table 15 also shows variation by work setting in the growth of the FTE registered nurse workforce during the past 5 years, with the largest increase (63%) in community health. During this period, the hospital RN workforce grew by 11%, while decreases occurred in aged accommodation (-5.5%) and 'other' work settings (-34.5%). During this same period the number of FTE enrolled nurses employed in 'aged accommodation' decreased by 29.5% (AIHW 2002c). The reason for this decline in the employment of nursing staff in this sector is not known and comparative data about people working as assistants-in-nursing or as personal care assistants in 'aged accommodation' were not available.

Palmer and Short (2000) note that between 1992 and 1996, there was a significant rise in vacancies for registered nurses due to many nurses moving out of the workforce, either permanently or temporarily. High levels of stress associated with technological developments in hospitals, overwork, inflexible rosters, plus a lack of recognition for the work that nurses do have been found to be among the factors 'pushing' trained nurses out of the workforce. This workforce remains predominantly female (AIHW 2002c). It follows that, as with women in the medical workforce, female nurses may have a preference for flexible work hours and family friendly working conditions.

Table 15. Full time equivalent employed registered and enrolled nurses, by work setting, Australia, 1993-99

Work setting	1993	1994	1995	1996	1997	1999	% change
Registered nurses							
Hospitals	93,504	97,819	99,153	101,639	100,190	104,108	11.3
Aged accommodation	17,770	17,553	17,008	17,159	17,267	16,785	-5.5
Community health	10,014	11,455	12,536	12,789	13,664	16,277	62.6
Other	19,568	20,543	18,747	18,485	15,968	12,825	-34.5
Total registered nurses	**140,856**	**147,370**	**147,444**	**150,072**	**147,089**	**149,996**	**6.5**
Enrolled nurses							
Hospitals	19,981	20,468	20,250	20,367	19,875	19,847	-0.7
Aged accommodation	14,714	13,995	12,503	11,899	10,820	10,376	-29.5
Community health	1,717	1,694	1,695	1,571	1,889	2,315	34.9
Other	6,255	6,516	5,601	4,860	3,819	3,159	-49.5
Total enrolled nurses	**42,667**	**42,673**	**40,048**	**38,697**	**36,403**	**35,700**	**-16.3**

1. Full time equivalents have been calculated by multiplying the number of employed nurses, by the average hours worked in each work setting and dividing it by 38 (the standard hours in most nursing awards).

Source: Australian Institute of Health and Welfare (2002) *Nursing Labour Force Report 1999*, AIHW, Canberra.

Table 16. Allied health professionals employed in hospitals, 1996

Professional discipline	All hospitals except psychiatric	Psychiatric hospitals	Total	%
Medical Imaging Professionals	2745	3	2748	20.4
Physiotherapist	2528	22	2550	19.0
Occupational Therapist	1479	142	1621	12.1
Social Worker	1476	143	1619	12.0
Hospital Pharmacist	1276	34	1310	9.7
Dietitian	905	4	909	6.8
Clinical Psychologist	568	184	752	5.6
Speech Pathologist	576	10	586	4.4
Community Worker	488	42	530	3.9
Welfare worker/welfare centre manager	225	54	279	2.1
Retail Pharmacist	228	9	237	1.8
Podiatrist	121	0	121	0.9
Drug & Alcohol Counsellor	83	5	88	0.7
Rehabilitation Counsellor	38	6	44	0.3
Family Counsellor	30	3	33	0.2
Natural Therapy Professionals	13	0	13	0.1
Optometrist	6	0	6	0.0
Total	**12,785**	**661**	**13,446**	**100.0**

Source: Australian Institute of Health and Welfare (2001) *Health and Community Services Labour Force-1996*, AIHW, Canberra.

The allied health professions

Limited data were available to describe the workforce of allied health professions employed in Australian hospitals. Data from the ABS Census indicated that in 1996, there were approximately 13,446 allied health professionals employed in all hospitals, including psychiatric hospitals (Table 16) (AIHW 2001a). As indicated in Table 16, four disciplines accounted for 63.5% of this workforce, these were medical imaging professionals (20%), physiotherapists (19%), occupational therapists (12%) and social workers (12%), while at least 13 other disciplines were represented among the remaining 36.5%.

Table 17 shows that the distribution, by State/Territory, of the allied health professional hospital workforce was consistent with the distribution of the Australian population (AIHW 2001a).

Table 17. Employed allied health professionals in hospitals (including psychiatric hospitals), by State of usual residence, 1996

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Allied health professionals	33.8	26.6	17.4	8.6	8.5	2.8	0.9	1.6	100.0
% Australian population	33.9	24.8	18.4	8.0	9.7	2.6	1.0	1.7	100.0

Source: Australian Institute of Health and Welfare (2001) *Health and Community Services Labour Force-1996*, AIHW, Canberra.

The allied health professions: workforce trends and the staffing of hospitals

Palmer and Short (2000) note that demand for the services provided by the allied health professions has increased during the past decade. They also observe that these workforces tend to be female dominated and that typically many women, in common with women in other labour forces, plan and modify their professional careers to accommodate their family/social roles. For many of these professionals, private practice tends to provide a more flexible, and perhaps lucrative, option than does employment in the public sector.

Health services managers

To practice as a health services manager does not require registration or completion of a clearly defined educational program (Palmer and Short 2000). For this reason there are no reliable or comprehensive statistics on this workforce. The ABS 1996 Census contained limited data about people employed in hospitals who classified themselves as 'Managers and administrators', 'Generalist managers' and 'Specialist managers'. Based on these occupational groupings, Table 18 indicates that there were 5,993 managers employed in Australian hospitals (AIHW 2001a).

Table 18. Employed managers in hospitals (including psychiatric hospitals), by State of usual residence, 1996

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Managers	2,023	1,643	958	575	463	160	88	83	5,993
State / Territory %	33.8	27.4	16.0	9.6	7.7	2.7	1.5	1.4	100.0

Source: Australian Institute of Health and Welfare (2001) *Health and Community Services Labour Force-1996*, AIHW, Canberra.

Health services managers: workforce trends and the staffing of hospitals

As with the medical workforce, evidence from the membership database of the Australian College of Health Service Executives (ACHSE) (2002) indicates that during the past decade the representation of women in this workforce may have increased. Today, 47% of ACHSE members are women, compared with only 20% ten years ago. This database also indicates that this is a highly qualified workforce with many managers holding clinical and managerial qualifications. As with the nursing workforce, members of the health service management workforce (male and female) are experiencing stress associated with job insecurity, working long hours and working more intensively (Harris et al., 1998).

Conclusions

Australian hospitals will have a continuing need for a well trained, skilled health professional workforce of sufficient size and discipline mix to meet future population requirements. It is possible that such a workforce will emerge as a result of existing education, vocational and employment opportunities, but it is not likely. Urban drift, an increasingly market oriented and growing private sector, an ageing community, a preponderance of chronic, degenerative conditions requiring complex, multidisciplinary and extended care all suggest that the health workplace of the future will be different in important respects. The only way to ensure that the nation has a workforce equipped to deal with emerging health care needs is to plan carefully, comprehensively and continually. As this article illustrates some of the next efforts in this area will need to be directed at a better and more comprehensive understanding of the hospital workforce. Only when this is available will Australia have sufficient data and information that can be used as an evidence base to inform thinking about the future of the hospital workforce and its role within the broader health system.

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