



National Approach to Health Call Centres

Lessons from existing services

Prepared for Australian Health Ministers

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ACIL Tasman

Economics Policy Strategy

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Executive summary

Purpose and Background

ACIL Tasman has been commissioned by the Australian Government Department of Health and Ageing to conduct the study of existing health call centre services (HCCs), in Australia and overseas. This Study was requested by Australian Health Ministers to assist their decision making about a national approach to health call centres. We have been asked to pay particular attention to the issues of costs and clinical effectiveness, but with a brief that also considers wider impacts on the health system.

HCCs in the UK, New Zealand, Canada, the US, Western Australia, and the ACT and other trial or specialised telephone triage facilities in other parts of Australia have all been subject to extensive review processes in recent years – and these reviews are well known to all jurisdictions. There is little to be gained from trawling over the same ground yet again, with a scheme-by-scheme review.

Instead, we have focused on what have emerged as key issues of remaining concern or controversy. For these, we have sought to assess the strength of the available evidence from existing reviews, updated where possible through consultations and fresh analyses, and have tried to identify the remaining information gaps that appear to be of strategic importance. We have not sought to reproduce all the relevant analysis – rather to focus on the picture that emerges and that can be supported by the experience to date.

We have sought to do this within a framework that is relevant to examining the case for HCCs, and especially for coordinated, large-scale HCCs – including national coordination – using conventional policy analysis principles.

The study is not designed to address questions related to the potentially varying business requirements for HCCs across different jurisdictions. It looks instead at the implications of moving to a broadly consistent set of arrangements across jurisdictions, with scope for some tailoring to the needs of individual jurisdictions and, possibly, smaller regions.

Key Messages

It is clear that HCCs offer a complex mix of benefits and opportunities to patients, carers, providers and health system managers. It would be dangerous to think of HCCs in terms of just triage service providers without recognising their wider range of activities, impacts and future opportunities – from information, referral and booking services through to disease management.

Failure to do so would almost certainly imply undervaluation of investment in HCCs and could encourage systems to be designed and managed in ways that limit the value that could be achieved cost effectively.

HCCs are investments in adaptable service platforms

It is clear that the Australian jurisdictions with HCCs in place, and those well advanced in planning for HCCs, recognise that much of the value and justification for HCC investment lies in the value of the call centre *platform* – as a base that can be developed to deliver an expanding range of services in cost effective ways. Some of these ideas have yet to be tested while for others promising experience is emerging. Modern investment theory stresses the importance of recognising and valuing the flexibility inherent in an investment, including the flexibility to accommodate services not yet planned for.

The evidence gained from existing call centres, and from analyses using the resource management systems of established Australian call centres, supports five strong conclusions:

Popularity

1. HCCs are extremely popular with users, indicating that they supply a *valued* service.
 - Whether the value is in perceptions of better health outcomes or satisfying a demand for information and for reassurance in times of health crisis is less clear.

ED call traffic diversion

2. HCCs clearly offer an effective instrument for reducing, and even eliminating, the demands on emergency departments *for telephone advice*.
 - Where a health call centre is already in place for other reasons, this outcome is almost certainly highly cost effective.

Quality of triage advice need not be compromised

3. Quality-controlled telephone triage arrangements involving nurses using advanced decision support software and information databases need not compromise the quality of the triage advice that results.
 - Reviews of existing services indicate that this model can offer effective triage, with particular attention to the safe triage of high acuity cases.
 - While this involves a level of erring on the side of caution, the evidence points strongly to telephone triage reducing the number of callers advised to seek urgent care.

Economies of size & scope

4. There are large size and scope economies in delivering health call centre services – the bigger the catchment and average call volume, and to an extent the more diverse the range of services offered, the lower the *average cost per call*.
 - These economies can arise, in part, from greater concentration of calls (for example, diverting emergency department calls from several hospitals in a city to a single site).
 - … Larger volumes allow greater predictability and hence more efficient matching of service capacity to actual demand, while maintaining acceptable response times.



- The economies gained from coordinating several physical sites across a large geographical area can also be large. This is especially true where coverage spans areas with multiple time zones hence offering the opportunity to spread the demand peak.
 - … The need for reliable access to qualified nursing call staff without causing adverse consequences elsewhere in the health system can be another reason favouring a spread across multiple sites.
 - Similarly there can be economies of scope from a mix of call types, involving different timing or different discretion as to the timing of call-backs etc.
 - The economies are not trivial. A nationally coordinated scheme has the potential to offer a service more cheaply for all jurisdictions.
 - … The cost per call could be more than halved for the smallest jurisdictions in Australia operating stand-alone schemes or for local services linked to after-hours GP facilities.
 - … The cost reduction compared to the average if all jurisdictions operate on a stand-alone basis is likely to be around 25 per cent.
5. There are large size economies of a different type, reflected in the *incremental costs* of expanding call volumes – whether through growth in demand for existing services or through the addition of new services.
- Indicatively, a national approach is likely to be able to offer additional services at an average cost per additional call around a third lower than the average of individual state schemes – and very much lower than the smallest jurisdictions.
 - It is this incremental cost of system expansion that underscores the value of future options to add services such as disease management.

These points alone constitute a solid case for considering a national approach, at least *if* we assume that health call centres are going to be implemented in most jurisdictions anyway.

The popularity of these schemes with the public has been universal and politically powerful. Even without a national approach, the likelihood is that there will be progressive extension of HCC services to much of Australia in the next few years. This evolution would be analogous to the trends in New Zealand, the UK, Canada and the US. Greece and Portugal are also moving this way.

If this is to be the trend, the presence of size and scope economies underpins a strong case for considering enough coordination to tap into at least some of these potential economies.

Case for a national approach if the likely roll out of jurisdictional arrangements is accepted.



Moving up to a state-wide scheme is a bigger decision than coordinating state schemes

Essentially, the commitment to large catchment, including jurisdiction-wide, schemes *constitutes the key service decision*. It is also potentially the most *controversial* in that this is the decision that *may* change, in a reasonably fundamental way, the scope of the health services on offer. Relative to stand-alone, jurisdiction-wide schemes, a national approach is unlikely to fundamentally alter the services provided. It does however change the cost economies (including in planning, monitoring and evolving the system as well as day to day operations), and has the potential to better manage limitations such as the availability of suitable staff.

Localisation vs large area size economies

The Australian Medical Association (AMA) has expressed concerns that call centres operating on this scale may threaten the emergence or sustainability of high quality after-hours GP services, which provide integrated telephone triage services, tailored to local after-hours service capabilities and patient knowledge, and with links into local hospital services. The primary concern appears to be the threat that this after hours GP model may be ‘crowded out’ by a cost competitive, publicly accessible and widely publicised model that the AMA believes may deliver poorer outcomes – for patients and GPs.

Trade-off is not essential

The AMA may be justified in seeing a threat to truly locally provided after hours *telephone triage services*. However, our view is that there is not *necessarily a consequential threat* to the viability or effectiveness of *localised after hours primary care arrangements* – and find support for this in the current review of the after hours trial sites. The threat is likely to come more from cost economies, and possibly quality assurance protocols, than from essential changes in service characteristics for consumers.

It is possible to address localisation concerns in the design of any call centre arrangements and the contracts to deliver the services could be developed to ensure there is *flexibility* to meet emerging needs. With such attention, larger catchment call centres could offer a highly competitive option for meeting the telephone triage demands of after hours GP services, including significant localisation where the cost is justifiable.

There should be scope for larger catchment call centres to integrate fairly seamlessly with a range of more local after hours GP and wider primary health care arrangements, even to the extent of localised ‘branding’ of the services if required.

The service would be different from the perspective of some users – realistically the call would not be handled by someone who knew the caller and the local providers. However, current and emerging information and communication technologies could go a long way towards eliminating the perceived quality of service trade-off. It should be possible to match, or even exceed, the quality of the triage provided, to book services relevant to local



conditions and to involve designated GPs and other professionals in triage decisions and subsequent responses (including through conference calling).

Some of the potential savings available through scale economies could be reinvested into improving the local information contained in decision support systems and information databases.

There is another balancing of competing demands to be considered – optimisation of the arrangements in respect of the established patients of cooperating GP services vs optimisation across the larger population of people who might benefit from access to telephone triage arrangements. After hours GP services are sometimes restricted to patients who have an established relationship with a participating GP. Even where the services are willing to take other cases, the local nature of the operation may mean that there is limited knowledge of the service and there may be a reluctance to contact an unknown GP out of hours – even though this is the normal point of access for these services. The service provided to established patients may well be excellent, but not be equally accessible to the wider community. Hence for non-established patients of these GP After Hours models the service actually received may be decidedly inferior to that which could be delivered through an open access call centre.

Balancing these considerations is likely to favour (though not require) the larger catchment model, because the benefits of localisation, including patient knowledge, will necessarily be diluted when the needs of the wider community are taken into account.

Moving from a jurisdiction-level scheme to one involving some national coordination and networking need not involve the same concerns with changing the character of the service. It should allow cost savings while, from the user perspective, the service is virtually unchanged. National co-ordination should make the call centre solution even more cost competitive – and could afford scope to divert some of the cost savings into developing even more effectively tailored call handling arrangements. Of course, it does introduce the complexities of cross-jurisdictional planning and decision making.

There are few surprises in the above assessment. It reflects conventional wisdom and, to an extent, common sense. It also reflects recent developments in relevant software and technologies. It highlights the continuing policy debate about the trade-off between highly localised services and larger catchment services that have access to size economies. It also reflects the wider economics of call centre operations that have been commercially tested in a range of sectors over recent years.

Access limited to established patients vs wider community access

National networking does not complicate the trade-off issues



Two important areas of limited information

1. Impact on service usage

More surprising, from our point of view, is how little can be said, even several years into the lives of health call centres, about some of the other impacts, including impacts that formed a central part of the early case for moving into call centres.

- Direct evidence that call centres have reduced unnecessary demands on emergency departments – along with costs and possibly the effectiveness of treatment of those cases where emergency treatment is appropriate – is weak and patchy.
 - This is probably more a commentary on data quality than on actual impacts.
 - Some understanding of these effects is a key ingredient in understanding effective impacts on system costs.
- Direct evidence of impacts on clinical outcomes, at least in an epidemiological sense, is almost non-existent.
 - While not historically a key driver of decisions to implement HCCs, knowledge of these effects has implications for cost justification and for the detailed design of HCCs.

2. Impact on clinical outcomes

Triage advice favours a marked shift in usage patterns

Patterns in Health Service Usage

There is strong evidence that, *were users of the call centre services to comply* with the triage advice of the call centres, this *would* effect a significant shift in the pattern of health service use – broadly away from ambulances and emergency departments and towards GPs, other services and self-care – with an implied reduction in ED attendance. Pre- to post-call intention figures from both WA and ACT suggest that the reduction could be around 40 per cent (of those who *first call the HCC*). It is quite plausible that at least some of these gains are being realised, but this is not self-evident from the data gathered to date. Drawing of strong inferences from the available data is constrained by several factors:

- Only a relatively low proportion (less, sometimes much less, than 10 per cent) of those presenting at emergency departments has done so *after using telephone triage* – a large shift in a small proportion is still a small proportion that may not be discernible against the ‘noise’ of high volatility and trend in general rates of presentation.
 - 40 per cent of 10 per cent is only 4 per cent – that needs to be set in the context of recent 30 per cent movements in 12 months observed in 4/5 category presentations to ACT emergency departments, for example.
- Telephone triage involves a mix of recommending emergency department attendance to those who were not intending to present, as well as recommending against attendance in some cases.

- It is possible to achieve significant, and beneficial, movement in both these components while having only a modest impact on aggregate presentations – with aggregate presentations being all that is currently measured.
- Other factors influencing presentations include:
 - Trends that vary sharply across regions, in the availability and cost of after hours GP access – and even expectations of same day access to GP services.
 - The fact that emergency department consultations are free to patients while there has been a trend away from bulk billing and towards higher fees for GP service usage – relative prices have been trending in favour of emergency departments.
 - The fact that symptoms can change subsequent to call centre triage.

Evidence of reasonably good compliance

There is clear evidence that compliance with call centre advice falls short of 100 per cent, though some studies – such as the WA studies linking call centre data with subsequent actual presentations – support the view that a reasonably high level of compliance, at least in respect of emergency department presentations, can be achieved. These studies also suggest that the triage emphasises ensuring the identification and appropriate triage of high acuity cases.

Need for more sophisticated analysis...

The above complexities almost certainly mean that any serious attribution of changes in service demand to call centre operations will need to use more complex analytical methods than the plotting of trends – as has been commonly used to date. Such plots cannot usually separate out the other influences. Modelling tools are needed.

...based on more sophisticated data generation and collection

Furthermore, the development of more complex models that could withstand critical scrutiny may require, and could certainly benefit from, some sophistication in the planning and timing of the rollout of services to new areas, and associated data gathering. It may not now be possible to extract strong conclusions from analysing the historically generated data.

National coordination may allow better quality data to be generated

Management of the implementation process, to allow it to incorporate some elements of an experimental design, may be possible without compromising scheme objectives and may allow more definitive data to be obtained. This would support more efficient evolution of the nature of the arrangements. This is also likely to be easier to do in the context of a nationally coordinated arrangement than via stand-alone jurisdictional roll-outs, especially if these have different characteristics.



Costs

Need to distinguish direct HCC costs from net costs to the health system

The available reviews are of limited value in probing the costs of call centre operations – because the technologies are rapidly changing; because the costs will be highly sensitive to site specific requirements; because there is constant probing of more efficient ways of operating the systems; and because there is only limited reporting of actual costs. Importantly, one of the key information gaps – the impact of the scheme on wider system usage – is critical to any credible assessment of *net cost*, inclusive of cost offsets achieved elsewhere in the health system.

However, reasonable prediction of direct scheme costs is feasible, based on the recent experience of the ACT and WA schemes and the costing algorithms used by the major service providers.

Average call costs could range between \$20 and \$60

On the basis of consultations with these groups, and some specific scenario costing prepared for us by McKesson, the firm providing the services in the ACT and WA and providing some more targeted services in NSW, we can provide the following indications of direct costs for schemes with characteristics, including call volumes relative to population, similar to these schemes:

- The costs of a stand-alone scheme for a jurisdiction the size of the ACT is high – with the current contract costing almost \$60 per call.
- WA is now operating at a direct cost of the order of \$26 per call, and this is more reflective of the average costs likely for a stand-alone jurisdiction.
 - The larger states could expect to achieve somewhat lower costs, but still of this order of magnitude.
- Co-ordination of operations across all jurisdictions, with sharing of the costs of developing, implementing and operating the arrangements, including load sharing across jurisdictions, could possibly deliver cost savings of the order of 20 per cent, compared to the aggregate cost of each jurisdiction running its own scheme.
 - Indicatively, this suggests an average direct cost of the order of \$20 per call might be achievable, though some of these potential savings might be redirected at localising the arrangements to specific requirements of individual jurisdictions and even regions within jurisdictions.
 - These savings would imply an average price across the country lower than could be achieved by any jurisdiction on its own.
 - There would be some flexibility as to how these costs would be shared across jurisdictions, based on size, the nature of existing investment and, presumably, a requirement that no jurisdiction should face a higher cost than would arise were they to implement a stand-alone scheme.



Incremental costs could range from \$10.60 to much more than \$15.60.

A range of strategies for achieving other reductions in direct costs

Range of cost offsets

- Modelling done for the 2002 evaluation of the After Hours Primary Medical Care Trial pointed to prospects for even lower costs, as does the fact that the above figures include no allowance for economies through the use of some administrative personnel in answering calls, nor the gains from service diversification.
- Incremental costs of expanding throughput are estimated at around \$10.60 per additional call for a national platform, and around \$15.60 (averaged across jurisdictions) per additional call for individual state schemes (though these costs would then vary substantially across jurisdictions, depending on size).

Further economies could be achieved in a number of ways. Spreading the peak in call demands, through information and demand management; adding complementary services that make fuller use of the infrastructure (and take advantage of the lower incremental costs); using different models for call answering, including 2-tiered assessment involving some non-nurse personnel; and/or prioritisation and call-back arrangements could all have an impact.

For reasons mentioned above, the data are not available to support high reliability estimates of net costs. However, a number of comments can be made to suggest that net costs are likely to be substantially less than the above direct costs:

- Already, a substantial proportion of this call traffic involves calls diverted from hospitals – in many cases, calls that would otherwise have gone into emergency departments.
 - To the extent that these calls would need to be handled anyway, it is likely that the use of the call centre would reduce overall costs – or else free resources in hospitals to deliver higher quality core services.
- Similar comments could be made to the extent that the call centres reduce the demands for telephone triage services to be provided by other facilities, such as after-hours GP services.
 - If these services are to be provided directly by the after-hours facilities, these costs (without access to size economies) will become factored into the costs of these services, with the costs presumably being shared between government, patients and the services.
- To the extent that the call centres are effective in diverting callers from ‘unnecessary’ presentations to emergency departments to lower cost GP services and self-care, net costs would be further reduced.
- To the extent that investment in the call centre infrastructure could allow other health services to be delivered at lower cost – by utilising the HCC infrastructure – these prospective cost savings are reasonably attributable to the original investment as cost offsets.



Competition Implications of Coordination

Savings from implementing same system

The potential for cost savings through national coordination and networking would be greatest if essentially the same system were implemented across jurisdictions. This would be a key ingredient in allowing load sharing across jurisdictions; in achieving economies in the planning of the system; and in managing the ongoing improvement of the system, including possible transfers to new providers or software systems.

National coordination may limit effective competition in the market in these services

The same standardisation would tend to encourage a degree of 'lock-in' to a single provider – at least for the software system. It could limit the scope for comparing within-Australia experience with competing products and for tapping into the potential benefits that might flow through competition over prices and over service innovation.

But the risks are manageable

That said, we have concluded that the associated risks are limited and manageable, provided that they are addressed head on from the start. Specific considerations include:

- Software choices would, we expect, be made from products available internationally and subject to international competition that is driving ongoing product innovation and scope for benchmarking of costs.
- It is feasible, though not costless, to change software products – the issue with coordination is that there will be strong incentives for any change to apply to all systems in Australia.
- It is certainly feasible to separate software provision from system operator, and to have different operators in different jurisdictions.
 - It could be feasible to test the market for system operation quite separately from testing the market for software provision.
- The nature of the contracts, IP controls and transfer provisions are all of importance in minimising these risks and costs.

Clinical Effectiveness

Realistically, the direct evidence on clinical effectiveness currently available is little more than anecdotal – beyond the substantial evidence that well-run telephone triage need not add to risk of adverse clinical outcomes.

Effectiveness needs to be judged relative to 'fallback', not necessarily best practice triage

The standard against which clinical impact is to be judged is important here. Many callers to a HCC, especially late at night, might well have seen the alternative response to mid-range symptoms being either to wait till morning or to discuss with a family member – the practical alternative is not GP or emergency department triage in all cases. Studies that compare HCC triage recommendations with subsequent emergency department triage decisions need to be interpreted in this context.



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Economics Policy Strategy

National Approach to Health Call Centres

Earlier appropriate intervention

The possibility that HCCs could result in earlier appropriate intervention, by delivering *earlier triage* to cases that may benefit from this, is one mechanism for delivering improved clinical outcomes – but one that has received relatively little coverage in the literature.

The studies matching pre-intention to subsequent advice do provide some insight into possible benefits here. For example, recent ACT data suggests that, of callers using Health First with a stated pre-intention of self-care, about 20 per cent are advised to seek urgent attention. A similar percentage of those planning a routine visit to a GP are advised to seek urgent attention. A 000 ambulance call is advised in about 2 per cent of these cases.

While there is probably a safety first buffer built into these triage decisions, it does point to the possibility of bringing earlier professional attention to potentially serious problems.

It may well be that the major opportunities for improved clinical outcomes lie with some of the wider options that might be built onto the triage platform, including disease management and public health services. This view has been expressed strongly in the course of consultations with WA, ACT, Queensland and NHS Direct.

1 Purpose

The last meeting of Australian Health Ministers in July 2004 considered the question of a national approach in respect of health call centres (HCCs). It did not at that stage reach a firm policy position. Instead it requested that the Australian Government arrange for a further review of the available evidence from existing Australian and overseas health call centres. Ministers requested that this study focus on the costs, clinical effectiveness and broader impacts of these services and include some stakeholder consultation. It was further requested that a report of the study be presented to the November meeting of the Australian Health Ministers' Advisory Council (AHMAC). The Department of Health and Ageing has engaged ACIL Tasman to conduct this study.

It was agreed that the study would have a tight focus – directed at information gaps and issues most relevant to the current policy deliberations.

2 Scope

2.1 National vs State

The key issue faced by Health Ministers remains that of a national approach – whether it is justified and, if so, the form it should take and, presumably, how it should be funded. In principle, this is different from the question of whether health call centres constitute good policy.

- HCCs may make sense, at least for some jurisdictions, even without a national approach – consistent with the commitments already made by some jurisdictions.
- HCCs may make sense for other jurisdictions, in part because of the access to size economies that a national approach may bring – and/or because of implied changes to the way in which the costs are shared.
- HCCs may make sense in principle, but not in fact stand up well to close scrutiny on cost-effectiveness grounds – because costs are excessive (inclusive of the opportunity cost of the resources required) or because the realized benefits fall short of expectations.

This study is essentially informational – we have not been asked to provide a specific recommendation but rather to address specific information gaps. Given this, it has been sensible to conduct an assessment that allows comments to be made about both stand-alone jurisdictional call centres and national co-ordination. However, consistent with the study objectives, the primary emphasis is on the national level.

2.2 Definition of a call centre

Large catchment focus

A health call centre has been defined by the HCC Jurisdictions Group¹ as *a health service that enables integrated delivery of health care for consumers using information and communications technologies that have the capacity to handle high volumes of transactions for large catchments. The range of services provided can include information, triage, advice, referral, counselling, assessment, intake and/or health management.*

For the purposes of this study, and reflecting the nature of the present Australian HCCs, we have focused on HCCs offering a broad point of access for handling health concerns, especially where the major concern relates to the possible need for urgent intervention. This may include patients with no established health care provider relationships.

Basic service with expansion options

We are not focusing on highly specialist service provision to patients with an established relationship to a service provider, though there may well be scope for attaching such services to a call centre backbone that is already in place – with scope for overhead and call load sharing. Such opportunities, if significant, may add to the cost justification for a call centre investment.

The above definition is not specific as to the technology involved, though most commonly there is a presumption of a high level of telephone usage, in which highly tailored decision support software plays a key role. This approach is very much the focus of this study, reflecting the mainstream options currently available and in place in a number of jurisdictions.

Nonetheless, it is appropriate to recognise that there is natural complementarity between:

- telephone-based decision-support software, along with the databases of providers, provider services, contacts etc, needed to support an ability for appropriate triage and other tailored services that reflects the location and needs of callers; and
- a range of possible other ways to access this information, including publication (both paper and internet); pure internet-based ‘self-assessment’ software; and internet-based software that allows escalation of an assessment to email and/or telephone-based enquiry.
 - These alternatives are likely to target different groups in the community very differently, though these differences may narrow in time.

¹ The HCC Jurisdictions Group was a collaborative working group of all Australian governments established in 2001 to prepare advice and recommendations on health call centres in Australia. The Group was superseded when AHMAC established the Senior Officials Group (HCC) in October 2003 to oversee the development of a national action plan for HCCs.

- We are aware of planning to expand the range of options for accessing the information in the present Australian systems.

Recognising these possibilities is important in addressing the true costs of telephone-based call centre investment. If there were a likelihood that alternative models for information access and triage would be developed rapidly, this could reduce the demand for the telephone-based system or offer more effective, or cost effective, solutions. This would have an impact on both the cost justification and the form of the most appropriate policy response. In practice, these trends seem likely to be too slow to make a major difference to the immediate strategy.

GP after hours telephone triage needs to be addressed

In principle, the above definition probably excludes local GP after-hours telephone triage, as built into local after-hours support arrangements. It would not preclude larger call centres being used, under contract, to deliver such after-hours arrangements. However both are important. The GP after hours models are appropriately considered within the scope of this study as they offer an alternative model for addressing at least some of the same concerns. It is also a model that currently has significant support from the AMA and from a number of service providers.

Assessment of the costs and benefits of HCC investments needs to be done relative to the alternatives that might otherwise be pursued. At present, and probably conditional on continued federal funding, such after-hours arrangements do offer an alternative approach to providing telephone triage services – and are an important part of the policy debate.

2.3 Yet another review?

HCCs in Australia, New Zealand, the UK, Canada and the US have been subjected to extensive reviews in recent years. The lessons from those reviews are well understood across the Australian jurisdictions and there is little to be achieved through yet another general review.

The fact that this review has been requested and the particular emphasis it has been given do, however, highlight two key impressions that have emerged from the documented experience to date and that have been prominent in the policy debate:

- call centres tend to look expensive when costs are expressed on a direct cost per caller basis; and
- the reviews to date have come close being silent on the question of clinical effectiveness – if interpreted as evidence of improved clinical outcomes.

In fairness to the latter point, none of the reviews we have read seeks to establish improved clinical outcomes as a key objective or performance

indicator – even though any improvement would certainly be desirable. There are, however, clear concerns across the reviews in probing whether call centres may create risks of poorer clinical outcomes.

2.4 Focus of the study

This review is focused on specific issues

Against this background, we have focused the study on the following:

- The reasons behind continuing debate as to the most appropriate level at which to provide telephone-based health support services – local, state or national;
- Probing the costs of call centres, with a particular emphasis on potential size economies that might be achieved in other jurisdictions or across Australia.
- Probing the evidence, both from the published reviews and more recent (limited) evidence sources, in support of the claimed benefits, including clinical benefits.

We have not attempted a comprehensive collation of all available evidence. There are significant differences in the philosophy, demographic and cultural setting, and style of operation of the overseas schemes.

Selective in use of evidence, emphasising local experience where possible

Not long ago, the US and UK schemes offered the only established experience of any duration. Now there is a growing body of experience from WA and the ACT, as established, jurisdiction-wide schemes. Valuable insights are being provided from other trial and smaller area sites in Australia and from the growing New Zealand experience, which is probably a closer fit for Australia than that offered by the other overseas schemes. We have been highly selective in the evidence explicitly quoted, though we have probed for situations where the evidence from different schemes points to a different conclusion.

Direct costs drawn from several sources, including specific modelling

In looking at direct costs, the body of available reviews was of little use. We have had experience of actual costs in WA and the ACT and specific estimates of the costs of national coordination have been developed as part of this study. These have also allowed the estimation of incremental costs of system expansion or diversification. We have also been able to draw on recent estimates of the costs of telephone triage in some of the after hours primary medical care trial sites. These are more timely, relevant, informative and probably reliable than any in the overseas studies examined.

3 Background

Health call centres, within the above definition, are a relatively recent phenomenon, starting in the US in the 1980s and moving into a range of other

regions through the 1990s. However, telephone-based health advice and triage are not new concepts. Essentially since the introduction of the phone, telephone contact with health providers has been added to list of viable ways of seeking advice – and in many cases advice is sought from relatives without any medical training. In some cases, this may be eminently appropriate.

Telephone advice on health matters is common

Seeking initial advice through telephone contact with health services is now common – whether directed to GPs, emergency departments, ambulance services, the Flying Doctor Service or HCCs. These are complemented by other services, often long standing services, offering specialized advice – such as poisons information centres.

The wisdom and value in telephone advice on health matters is essentially beyond dispute. Since the late 1990s there has been an almost inexorable roll-out of such services across the English-speaking world and into a range of other countries. There does remain some active debate as to the most appropriate form, including mix, of such services – and some questioning of whether the tangible (but still poorly measured) benefits match the (still real) benefits attributable these services offering psychological support in stressful conditions for callers.

Planning for, introduction of and progressive expansion of a HCC service (NHS Direct) in Britain, from 1997, probably promoted a growing interest in this option for Australian states. Since then HCCs have been established in Western Australia (HealthDirect, 1999), the ACT (Health First, 2001) and New Zealand (Healthline, 2000). Canada has implemented HCCs in seven provinces, and the remaining six provinces have identified the need. We have drawn on these experiences in probing the questions raised for this review. We have not looked in any detail at the US experience, given the big differences in health systems, and we have made relatively light use of the Canadian experience.

4 Rationale for HCCs

Early drivers were cost based, but growing appreciation of service quality

A range of arguments has been raised for moving to introduce HCCs. The early drivers appear to have been largely cost-based – HCCs were seen as offering cost effective ways of safely influencing demand for health services and satisfying demands for information. There has been growing appreciation of the potential for HCCs to offer higher quality services, in at least some areas, relative to traditional approaches.

Expanding emphasis, taking in disease management

The early emphasis on triage and information has been gradually shifting with recognition of wider possible benefits from other forms of service, such as mental health and disease support and public health campaigns – in some cases

involving a shift in emphasis from reactive responses to incoming calls to more proactive engagement with patients, including outbound call traffic. For reasons addressed later, these trends have had, or hold prospects for having, the effect of allowing efficiencies through workflow smoothing – though only of course to the extent that the add-on services offer real value.

HCCs are extremely popular

From very early on, it has been apparent that HCCs are popular with users. A large part of this popularity and associated value may be psychological or reflect convenience. For reasons discussed later, the evidence that call centres, at least in their basic triage function, have substantially improved clinical outcomes is not strong.

Improved clinical outcomes not the main emphasis

This latter fact is not intended as a criticism – improved clinical outcomes appear never to have the primary rationale for promoting the service. There has been a recognition that cost control could allow resources to be reallocated elsewhere, possibly in ways that would improve outcomes elsewhere in the system – and it seems likely that there has been an *assumption* that better information, and the introduction of better decision support systems, could probably deliver direct clinical benefits even if not measurable. These matters are addressed further below.

A probably far more important argument for clinical benefits lies with the case for the HCC platform being extended to provide other services – such as support for disease management, mental health care and residential aged care. For the schemes considered here, this largely relates to the value of future options rather than past performance. This argument, and the wider question of clinical effectiveness, are discussed later.

Range of non-clinical benefits

It is easy to imagine a range of non-clinical benefits from a soundly-based telephone advice service.

- For patients and carers, avoiding the stress, possible pain and discomfort, outgoings and lost time from unnecessary recourse to emergency department or out of hours GP services.
- Similarly for emergency departments, ambulance services and GPs, reduced demands for unnecessary service delivery, and reduced stress on GPs after hours.
- Reduction in the stress caused by uncertainty as to whether the appropriate course of action is being followed.
- For the health system generally, the possibility the maximising the value of a group of highly skilled nurses who might otherwise not be available to the system, or in offering more diverse and adaptable career opportunities for these professionals.
- Easy access to information on how to better access and use the health system.

5 Issues

While the focus of this review is on HCCs, in the above sense of large area operations with the possibility of national coordination, it became clear early in the study that examining this question in isolation would not be particularly fruitful. Key issues link back into alternative models for delivering telephone-based health services, including more local services.

Despite the obvious attractions, and strong popularity, the trend into *larger scale* HCCs still involves some controversy. The debate appears not to be about whether to offer telephone health services, but about the scale and the form, especially how they relate to other health services. Essentially there are three different models to consider.

Local scheme linked into other services

- One model would build on a base of local GP after hours services and linkages into local hospitals and clinics, integrating their own dedicated telephone triage services, usually using trained nurses based at local hospitals or clinics but with scope for escalating the triage decision to participating doctors.
 - The telephone service is seen as part of an integrated service, not as a stand-alone service, and tends to be only an after-hours service with a strong emphasis on triage.
 - The service may or may not use decision support software, but it is assumed that they do involve triage protocols.
 - The Tasmanian service, GP Assist (Tasmania), is a prominent example of this arrangement, though its coverage relative to the whole of state makes it perhaps atypical; the Central Grampians After Hours Primary Care Trial is perhaps more representative of the structure of this type of option operating at a level well below the whole jurisdiction.

Jurisdiction-wide scheme

- A second model would look to a jurisdiction-wide solution, involving one or linked triage centres, and with computer-based decision support systems.
 - These systems rely heavily on the quality of the underlying information databases and interrogation processes to establish links to accessible local services and service providers.
 - The WA and ACT services, and the proposed arrangements for Queensland as we understand them, are examples of this model – and these mirror the broad approach adopted by most Canadian States.
 - The WA and ACT systems illustrate near extremes in terms of jurisdictional size, though NSW or Victoria could offer greater throughput opportunities than WA.
 - The early UK approach of 22 regional sites also fits this model, though as a very large population model involving some national coordination across a number of centres etc – it is also representative of the third

model below. (In early 2004, the UK established NHDirect as a new special health authority – a single national organization. The new NHDirect has strong links with the new national program for IT and is expected to involve consolidation to five networked, regional sites.)

National scheme

- The third model would involve either significant coordination, and probably networking, between the different jurisdictional models or a specially designed national approach. The aim of the coordination would be to reduce costs or relax resource constraints, and could involve any or all of the following measures:
 - Agreements on standards and monitoring and reporting arrangements.
 - Agreement on system specification – in terms of software, primary database design etc (individual jurisdictions could decide whether to run their systems in-house or to outsource, response time requirements, jurisdictional detail, etc).
 - Agreement on and joint sourcing of a system supplier covering software and support, recruitment, training, operation and reporting.
 - Use of networking capabilities to spread load as a means of achieving cost economies and/or addressing skill.
 - Elements of this approach are already reflected in the coordination between the ACT and WA systems, including use of a common service provider and software platform and scope for load sharing (or backup service in the event of system failure); the UK system could be viewed in these terms; the NZ system formally fits, but on a scale that is more akin to a single Australian jurisdiction model.

**Local vs large area concerns
service character and cost**

The choice between the first two models *appears* to involve choice between two approaches involving the delivery of *very different services* and probably involving very different costs. For reasons discussed in some detail later, we are not convinced that the services being delivered *need* differ all that much, but it is clear that some doctors consider that the second approach would entail significant compromise of service standards relative to the first approach. Discussions with the AMA have confirmed a formal preference for the first model.

In terms of the cost of the telephone triage function, the first approach is likely to be significantly more expensive than the second (especially if both models were required to provide equitable access), and these costs are discussed further below. There may be a trade-off issue needing to be addressed, if the service differences are important and cannot be overcome, or are not offset by aspects of quality difference.

**State vs national mainly
about cost economies**

In many respects, movement from the second to the third approach is much more straightforward. As was noted above, the technology is available and the model has been tested to some level by the two existing jurisdiction-wide

schemes – WA and ACT – have already started moving in this direction. The systems are networked, with scope for load sharing and backup, and with cooperation on system evolution. Other jurisdictions with an interest in providing an analogous service could do so, on a stand-alone basis or with similar cooperation.

Strong incentives for at least autonomous cooperation

Realistically, if other jurisdictions were to implement their own jurisdiction-wide arrangements, it is highly likely that sound commercial planning would result in high levels of coordination emerging, either from the start or through the lives of these schemes. Size economies, that are discussed in detail later, would provide powerful incentives for this.

Looking at the recent developments in New Zealand and the UK, there is also a question of whether there may be additional value in designing a networked system from the outset.

The more difficult question is whether a whole of Australia approach, involving all jurisdictions, would be appropriate. This could result in HCC services being made available in some jurisdictions earlier than would otherwise have been the case, but also bringing forward for these jurisdictions a set of investment and operational costs. It may impose some constraints on choices to be made by individual jurisdictions, though presumably within a paradigm that requires that no jurisdiction consider itself worse off than would be the case were it to establish and maintain a stand-alone facility.

On the other hand, there is no fundamental reason why coordination and networking need prevent jurisdiction-specific attributes being included in the system, ranging from branding through to specific protocols, response times etc.

Local, state, national nomenclature

In brief, then, there is a 3-tiered hierarchy of models – differentiated effectively by the size of catchment used and possibly (but not necessarily) by the nature of the integration with other health services. For simplicity, these might be referred to as local, state and national models of call service delivery.

In terms of issues:

- There is an argument, supported by the AMA, that the local model allows tailored service delivery, reflecting local knowledge, which could not be achieved with a state or national system.
 - The case for local over state or national models has been presented largely as an argument about quality of service, interpreted in an integrated primary care setting.
 - Though this case also needs to look at cost differentials, and the cost effectiveness of any attributed quality differences.

- The state and national models typically involve large enough catchments that the issue of ensuring that triage advice adequate reflects local conditions and services needs to be handled through database and system design and management.
 - Quality differences are not likely to be the main issue, though differences in jurisdictional preferences might create some incentives for slightly different capabilities.
 - The key issue in comparing state to national models is likely to involve the cost differences – and possible jurisdictional views as to the appropriateness of load sharing.
- The AMA has expressed the concern that state or national models would effectively crowd out the local model opportunity – to the detriment of the after hours primary care models that are seen as important for both GPs and their patients. They do however appear to accept that nurse based telephone triage is safe as part of an after hours solution.

In the remainder of this paper, we focus on costs and cost differentials, and service type and quality differentials, which might arise across these models. We also look at what can be said about the clinical effectiveness of the arrangements – though here again the critical question is effectiveness relative to what alternative.

Of course, none of this is meant to hide the complex issues that still arise in focusing on the details of the arrangements, timing of introduction, level of resourcing and the focus of the services to be offered. We touch on all these matters, but they are not the primary focus of this study.

There is a different, but related, issue that is also addressed here. It links into considerations of both costs and clinical effectiveness, but has assumed a life of its own as an elusive indicator of performance. It has been raised during this study as an indicator of the limited effectiveness of large catchment HCCs, at least when applying a fairly narrow interpretation of the purpose of the HCCs.

Issue of whether impact on demand for emergency services can be demonstrated

The issue is that the available evidence that HCCs reduce the use emergency departments through attendance is quite thin. We know that telephone triage tends to recommend lower levels of use of emergency departments than callers would otherwise have intended (even though it advises some callers to present where they would not otherwise have done so). The evidence that this translates into reality is rather less convincing. The issues are complex and will tend to be jurisdiction- and region-specific, but they will be an important part of the overall design and ongoing monitoring of any HCC model.

6 Major Lessons

Consideration of past reviews and consultations with individual service providers and jurisdictions point to some immediate lessons that are not particularly controversial, but that provide a useful backdrop to the consideration of the ‘harder’ questions:

6.1 Robust, accepted conclusions

Popularity

- HCCs are extremely popular with users, indicating that they supply a *valued* service;
 - Whether the value is in perceptions of better health outcomes or satisfying a demand for information and for reassurance in times of health crisis is less clear.
 - It is probably fair to say that, in most locations where HCCs have been introduced, their removal would be almost impossible politically.

ED call traffic diversion

- HCCs clearly offer an effective instrument for reducing, and even eliminating, the demands on emergency departments *for telephone advice*;
 - This can be done through automatic routing of calls, as well as through publicising the alternative number.
 - If it were given that a health call centre would in any case be in place, offering substantial throughput economies, this capability would almost certainly be highly cost effective.

Size economies

- There are large size economies in delivering health call centre services – the bigger the catchment and average call volume, the lower the cost per call.
 - To an extent these economies may involve greater concentration of calls (for example, diverting emergency department calls from several hospitals in a city to a single site).
 - However, the economies in coordinating several physical sites across a large geographical area can also be large;
 - … indeed coverage of an area that spans multiple time zones offers particular advantages by spreading the demand peak; while
 - … the use of multiple, geographically diverse sites may be essential if cost effective access to sufficient qualified nursing call staff is to be achievable without adverse consequences elsewhere in the health system.
 - The actual size of these economies is addressed in some detail in Section 7 below.

6.2 Safety

HCCs can be as safe in their triage as the realistic alternatives

There is another conclusion that emerges fairly consistently from past reviews, but that remains somewhat more contentious. This is the conclusion that quality-controlled telephone triage arrangements involving nurses using advanced decision support software and information databases need not compromise the quality of the triage advice that results, and in particular the safety of that advice relative to the alternatives that might otherwise apply. A number of points are relevant here:

- This conclusion is not the same as saying that these telephone triage systems offer perfect triage – they do not, and no system does.
 - Triage algorithms are constantly being monitored and adjusted.
- In many cases, telephone triage provides triage to individuals who had indicated that their alternative would have been self-care.
 - The alternative is not necessarily GP or ED triage – and any assessment of effectiveness and risk should be based on the alternative that would be used.
- The evidence strongly supports the fact that the triage algorithms tend to be conservative in relation to high acuity symptoms, effectively resulting in what might be viewed retrospectively as ‘over-triage’ and offering possible scope for future improvement in decision support tools.
 - However, where there is uncertainty, such conservatism may be fully justified and cost effective.
 - Greater risks of ‘under-triage’ are likely to be acceptable and cost justifiable with low acuity symptoms.
 - A level of *under-triage*, assessed *ex post*, is probably an essential consequence of containing the extent and costs of over-triage.

For example, Munro *et al* (2003), in their evaluation of NHS Direct, considered 2,778 cases across 3 centres and judged a level of 13% of unnecessarily high triage and 1% of under-triage.

The 2002 audit of the NZ Healthline scheme, by The Massey University School of Health Sciences, concluded that Healthline:

“...offers a safe and effective clinical advisory service that operates in a manner which is consistent with New Zealand Nursing Council Guidelines.”

A recent review of the 7 province-wide HCCs in Canada, Stacey D *et al* (2004), concluded in respect of safety:

“Teletriage reduces the number of immediate visits to physicians without causing adverse outcomes such as subsequent hospitalizations, visits to the emergency departments or deaths.”

An overview of the safety evidence was provided by Roland (2002):

“A key question is whether such services are safe. A report of the UK service identified three cases out of over 280 000 where the advice given might have resulted in an avoidable serious outcome. A randomised controlled trial of a computer-assisted nurse telephone consultation service found no increase in deaths or serious adverse events resulting from nurse telephone advice. It seems likely that, in terms of avoiding serious adverse events, nurse-led services are at least as safe as other forms of care. However, US studies of simulated patients have documented substantial variability and incorrect advice, and early evaluation of the computer programs in *NHS Direct* reported similar levels of variability. For example, the proportion of callers in the first three *NHS Direct* sites advised to seek immediate GP care varied nearly threefold between sites (from 10% to 29%), and there was agreement on management between sites for only 39% of 119 standardised evaluation calls. Further studies of safety and consistency of advice are clearly needed. These should include evaluating telephone advice given by both nurses and doctors. Indeed, doctors have expressed concern about safety of the increasing amount of advice which they themselves give over the telephone.”

That commentary related to experience based on triage algorithms that have undergone significant refinement since the commentary, and even more so since the studies on which it was based. It correctly recognises the issue as being one of safety relative to the alternatives – although it needs to be stressed that self-diagnosis and triage is one of the alternatives.

Potential safety value in local services

In relation to local vs state/national models of telephone triage, there are legitimate questions of whether local knowledge – of either or both of the patient and the current detail of the local services – could offer a safer triage capability. These questions are addressed further in Section 12 below.

7 Direct costs of HCCs

In this section, we explore the available evidence on the direct costs of running HCCs across the different models. Precise costs will, of course, depend on the details of the schemes to be specified. We have taken as a baseline the form of WA’s HealthDirect scheme. This happens to place relatively low emphasis on the information function and relatively greater emphasis on the triage function – compared, for example, to a UK model.

Balancing the mix between triage and information

Important decisions are taken when establishing and promoting this type of scheme. Included here is the range of service coverage (to which we return) and the nature and intensity of promotion. In the UK, NHS Direct is promoted as a broad shop front for health information. This results in a high proportion (around 50 per cent) of calls being for general information and can be expected to increase the level of calls, expressed on a per head of population basis – indeed, this is in an important sense an objective of the UK promotion. These translate into implications for the aggregate cost of the scheme. The high level of information calls has underscored the case for

NHSDirect using a mix of trained nurses and administrative personnel in answering calls, with scope for escalating triage calls to a nurse as appropriate.

HealthDirect has a significantly lower rate of information calls² and has worked on the basis that a better service can be offered by avoiding the need to escalate triage calls – the person taking the call usually ‘owns’ it for its duration. With the different mix of calls, this approach may well be cost effective, though probably not cost minimizing. We understand that Queensland is looking seriously at the administrative/nurse mix in the design of their arrangements – and at placing somewhat greater emphasis on the information function.

7.1 Direct cost drivers

In terms of the primary purpose of this study, the key direct cost factors include:

Size economies in establishment

- Large *size economies in establishing* and progressively improving the system, in the sense that the implications of these costs for the average cost per call taken will fall very rapidly with increasing call volumes.
 - Essentially, scope for *overhead sharing*.

Size economies in operation

- Large *size economies in operating the system*, in the sense that increasing call volumes, for the same service type and speed of response requirements, can allow substantial reductions in operating cost per call.
 - This is likely to be true for the progression through local to small jurisdictional to large jurisdictional to national arrangements.
 - Essentially tied into the statistics of random call patterns³, with *declining volatility* and uncertainty of call levels as catchment size rises – and better utilisation of the nurse resources.

Economies from geographic spread

- Potentially significant *economies of geographic scope*.
 - Having call centres located in different time zones affords scope for spreading peak demand periods, and backup in the event of communications failure at a specific site or region.
 - Having call centres drawing from different populations may afford more cost effective access to sufficient nurses – and reduce any consequential pressures on availability of nurses for other activities.

Economies from service diversity

- Potentially significant *economies in expanding the scope of the service*.

² Curtin Consultancy Services (2001) reported, for the period July 2000 to May 2001, 94,228 calls, of which 4.3 per cent were deemed not to require triage.

³ The basis for the statistical modelling, including the established use of the Erlang distribution for modelling queuing times, has been described in Centre for Health Program Evaluation (2002).

- At the simplest level, this can simply add to throughput and deliver size economies as above.
- A different form of economy can flow from additional services that have a different spread of demand relative to the evening peak for normal triage advice calls – allowing spreading of the call distribution, and greater utilisation of the nursing resources.
 - … The extreme version of this would be outcall services, initiated by the nurses as part of disease monitoring programs, where there may be substantial scope for locating these calls into periods of low other demand.
 - … However, a range of other services can be expected to offer a different time profile of incoming calls, or to lend themselves to messaging and call-back arrangements, where there is some scope for discretion as to timing.

Differences in incremental costs

- Sharp differences, between the different models, in the *incremental cost* of expanding service demand.
 - … This influences the value of the expansion options provided by the HCC platform.

Economies from non-HCC activities

- Possible scope for *different forms of overhead sharing* in local after hours arrangements that are broader than just a telephone service, that may not be so readily available with a formal call centre model.
 - For example, in the Grampians scheme, calls received between 10:30PM and 8:30AM are taken by the nursing night supervisor at Stawell Hospital; in this case facilities overheads and even nurse time are likely to be largely fixed costs that would arise even if a telephone triage service were not being offered.

There is little to be gained by trying to develop highly precise estimates of these costs in the context of this study, because these will be heavily dependent on the detailed form of the services. For the same reasons, there is little to be gained from trawling the costs of overseas schemes that do differ in significant ways. However, a useful feel for the ranking of direct costs can be obtained and has important implications for HCC strategy.

7.2 Approach to estimating cost differentials

A mix of tools has been used in developing an overview of the nature of the cost differentials implied by the different models – including costs based on the accounts of working models and specific budgeting for alternative models.

After hours trials provide some cost estimates

In relation to local services, we have drawn on information assembled as part of the October 2004 Draft Phase 1 Report of the Evaluation of the After Hours Primary Medical Care Trial Sites. These figures have been developed in the context of accounting for overall scheme costs, and as such may not be

ideal estimates of the incremental cost attributable to the provision of telephone triage services. It also appears likely that different methodologies, and cost attribution methods, have been used for different schemes. However, they do provide a starting point.

ACT and WA provide jurisdiction-wide costs

For the ACT and WA schemes, we have good estimates of the effective charge per call that is being achieved under current contracting arrangements – this need not match the cost per call, but should stand as an indicator, especially since these rates were determined in a competitive environment. There may well be scope for some further economies through renegotiation in the future, but again these offer a useful benchmark. It is relevant to note that the number of nurses typically rostered for calls in the ACT is broadly similar to the peak period coverage of the Grampians After Hours Service – with broadly similar indicated costs per call.

Centre for Health Program Evaluation (2002) developed estimates of call costs for various forms of integration, based on the use of synthetic budgets. These reinforced the view that there are likely to be dramatic size economies in moving through increasing catchment size. The results are reproduced in Table 1 and Table 2.

These tables tell a stark story, but the poor fit between these modeled estimates and recent cost estimates (Table 3 below), especially for local centres, suggests some caution is in order. Instead of the synthetic budgeting, we have favored estimates from actual trials, or based on the costing algorithms used to manage actual facilities. This brings its own concerns in terms of consistency of methodology, but does suggest a more conservative picture than that provided by the above analyses. The above figures for large scale operations may point to potential further economies to be achieved, over and above those reflected in experience to date.

Table 1: Local call centres: estimated costs of the model by trial area

POPULATION AREAS	POP*N ¹	CALLS PA/POP*N (10%)	AFTER HOURS CALLS PER HOUR	STAFF COSTS	OTHER COSTS	TOTAL COSTS	COSTS PER CALL	OPERATOR UTILISATION RATE
Broken Hill	20,929	2,093	0.35	678,926	101,839	780,765	373.05	30%
Central Grampians	21,259	2,126	0.35	678,926	101,839	780,765	367.26	30%
Maitland	83,359	8,336	1.39	678,926	101,839	780,765	93.66	30%
SW W Australia	122,211	12,221	2.04	756,926	113,539	870,465	71.23	30%
Hobart	229,019	22,902	3.82	678,926	101,839	780,765	34.09	30%
Central Sydney	539,030	53,903	9	1,613,701	242,055	1,855,756	34.43	47%
Perth Metro Area	1,449,729	144,973	24.19	2,827,090	424,064	3,251,154	22.43	48%

Note: 1: As at June 2000

Source: Centre for Health Program Evaluation (2002), Table 8.3

Table 2: Local call centres: estimated costs of the model by trial area

Population Areas	POP'N ¹	CALLS PA/POP'N (10%)	AFTER HOURS CALLS PER HOUR	STAFF COSTS	OTHER COSTS	TOTAL COSTS	COSTS PER CALL	OPERATOR UTILISATION RATE
NT	198,432	19,843	3.31	756,926	113,539	870,465	43.87	30%
ACT	313,383	31,338	5.23	1,057,389	158,608	1,215,998	38.8	30%
Tasmania	470,529	47,053	7.85	1,469,237	220,386	1,689,623	35.91	30%
South Australia	1,499,216	149,922	25.02	2,827,090	424,064	3,251,154	21.69	48%
Western Australia	1,892,880	189,288	31.59	3,205,553	480,833	3,686,386	19.48	49%
Queensland	3,579,828	357,983	59.74	5,654,180	848,127	6,502,307	18.16	60%
Victoria	4,736,903	473,690	79.05	6,711,570	1,006,735	7,718,305	16.29	67%
NSW	6,463,426	646,343	107.87	9,160,197	1,374,029	10,534,226	16.3	58%
Total State Based	19,154,597	1,915,460	319.66	30,842,14	4,626,321	35,468,465	18.52	57%
Total Australia	19,154,597	1,915,460	319.66	23,150,878	3,472,632	26,623,509	13.9	81%

Note: 1: As at June 2000

Source: Centre for Health Program Evaluation (2002), Table 8.4

Modelling of national costs

To provide alternative estimates, based in actual experience, of the possible implications of national coordination, we requested that McKesson (as service provider in the ACT and WA) use their internal resource planning systems – in place for the day to day management of the WA and ACT centres – to model the costs that would arise under 2 different circumstances:

- A stand-alone facility in each jurisdiction except Tasmania and the Northern Territory, based on the structure, call response rate requirements and call rate per head of population, of WA.
 - This would have Tasmanian and NT calls handled by one of the other centres – notionally Victoria and Western Australia.
 - Extension of call centres to these facilities would push up costs but would, of course, be feasible.
- Coordinated planning across all jurisdictions, designed to deliver the same functionality as the above, but through rationalization of the number of sites and load sharing across jurisdictions.
 - Actual modelling was based on sharing the design and establishment costs and use of 4 primary sites to provide access to geographic spread in respect of both time zones and sourcing of personnel.
 - This has been done to provide broad indicators of the cost *potential* – it does not reflect any specific strategic recommendation.

For each of these two main alternatives, we also had analyses done of the implications of increasing call levels on each by 20 per cent, and sought information on the implications of some other modifications, such as mixing administrative with nursing staff (with escalation of triage to a nurse).

In working with McKesson on these analyses, we are making no judgments as to whether they offer the most appropriate model for service supply. The form of modelling used offers broad compatibility with the approach to

costing that underpins actual WA and ACT figures, and we believe implied cost relativities should be reasonable. Figures generated out of the systems in place to manage the existing WA, ACT and other call centres operated by McKesson do represent valuable information provided by the existing HCC experience in Australia.

Plausible alternatives to the ‘turnkey’ approach represented by these systems might include any or all of:

- in-house provision;
- separation of software from call centre operation;
- separation of nurse employment responsibilities from centre management; and
- separation of triage algorithms from information software systems.

Also we are not suggesting that McKesson’s modelling would match precisely the outcome of a competitive market tendering process – that might well discover additional opportunities for cost efficiencies, from either McKesson or a competitor.

In relation to triage decision support software and possible provision of an alternative turnkey solution we also consulted with CAS Services (whose product is used in the UK and in a number of smaller sites in Australia). We believe that the differences in product structure need not have major ramifications for system functionality, though there are clear product differences. These differences do not alter the basic statistical characteristics of call demand driving the pattern of size and scope economies. Issues in converting between such systems – and possible cost consequences – are discussed later.

7.3 Cost estimates

Table 3 and **Table 4** assemble an overview of the cost estimates. The first relates to reported costs of existing schemes.

We have not been able to vet these in any detail in respect of costing methodology, but assume they imply a reasonable estimate of the operating cost per call, plus some recovery of initial investment in systems, recruitment, training etc.

It is important to recognise that the first three services operate only as out of hours services, while Health First and HealthDirect are 24 hour services. Logically, the question needs to be addressed as to whether 24 hour operation is appropriate. Contraction of hours of operation could be expected to lower costs of the service, to increase costs per call (because overheads would not be

spread as far) and probably to reduce any cost offsets resulting from changes in service usage patterns.

Table 3: Reported costs of operating HCCs and Local Models

	Reported cost per call
Grampians after hours service, Phase 3	\$72.42
Grampians after hours service, Phase 4	\$54
GP Assist (Tasmania)	\$75.54
Health First, ACT	\$58
HealthDirect, WA	\$26

Sources: Grampians and GP Assist drawn from Division of Health Sciences (2004). Health First and HealthDirect from consultations with the agencies.

Note that the 2 local schemes are likely to entail a lower proportion of ‘information’ calls than would the ACT and WA schemes, and this is likely to have some impact on costs.

Restriction of services to after hours only operation might allay some concerns that the service could compete with mainstream services, including GP services. On the other hand, the arguments (developed more fully below) of the economies of scope, and the value of options to extend services into areas such as disease management and residential aged care support would argue strongly for a basic system that is available also during normal hours. If there is a desire to focus triage calls into the after hours time, this might be better pursued via the way the schemes are promoted rather than via restrictions on hours.

For the comparisons of state and national models, we have obtained the data sufficiently disaggregated to allow the calculation of an appropriate annuitised cost per call⁴, factoring in a discount rate that we have assumed to be 7% – similar to the real discount rates used by most jurisdictions for program benefit cost assessments.

We have also assumed a 10-year life for the investment, and effectively written off the investment over this time. This may not be entirely fair – planning for these systems is typically based on the assumption that they will evolve over time and extend well beyond the 10 years. However, 10 years is substantially longer than the typical contract period and it is likely that by then the up-front investment will to a large extent have been turned over as part of the on-going support of the system. For the purposes of giving an indication of likely costs, and especially cost differentials, these assumptions seem reasonable.

In this indicative modelling, there has been no assumption of growth in call volumes over the time period. This could be easily factored in, but the

⁴ This is the conventional approach for taking into account time effects, the effective up-front cost implications of committing to a system such as this and the potential for demand growth. The measure is described in more detail in the Glossary.

estimates in Table 1 are based on an assumed constant volume of calls. Any growth trend would reduce cost per call (and increase aggregate costs and the present value of costs).

Table 4: Modelled cost of state and national alternatives

Year	National Model, 2m/annum	State Model, 2m/annum	National Model, 2.4m/annum	State Model, 2.4m/annum
0	\$13.8m	\$19.0m	\$14.8m	\$21.4m
1-10, per annum	\$43.6m	\$54.3m	\$49.5m	\$62.9m
Costs Present value, 7% discount rate	\$299.2m	\$374.4m	\$338.7m	\$432.9m
Nominal cost	\$449.9m	\$562.3m	\$509.7m	\$650.5m
Call volume, PV	13.13m	13.13m	16.86m	16.86m
Annuitised cost/call	\$22.79	\$28.52	\$20.09	\$25.68
Nominal cost/call	\$22.50	\$28.12	\$21.24	\$27.10

Sources: Scenario modelling by McKesson and ACIL Tasman analysis.

Striking size economies

Between them, the two tables lay out a fairly stark representation of the size and scope economies that might be achievable through collaboration. In principle, there might be even greater gains to be had from further rationalization of numbers of centres, though this would need to be balanced against constraints in sourcing suitable qualified personnel.

State vs local involves biggest movement in average costs per call

In broad terms, the figures suggest a halving of costs in moving from a local (or very small jurisdiction) level to an average jurisdiction level, and a further reduction by around 25 per cent in introducing cross-jurisdiction co-ordination. Note that the use of an annuitised cost per call calculation produces a greater estimated reduction in price flowing from the increased call volume.

7.4 Incremental costs

The same modelling allows inferences to be drawn as to the incremental cost of additional calls, though only on the basis of the same time profile of calls – ie, the call traffic is scaled up but keeps the same peak/off-peak characteristics. Additional calls with different time profiles could, in many cases, be accommodated at substantially *lower cost* than these calculations suggest. The relevant estimates are:

National vs state involves large differential in incremental cost per call

- National scheme: **\$10.60** per call, a 53 per cent reduction from the average cost per call
- State scheme: **\$15.69** per call, a 45 per cent reduction from the average cost per call

Difference is important to the HCC strategy

This difference is quite stark – state scheme incremental costs are almost 50 per cent higher (at the modeled utilisation rates) than those modeled for the national scheme – and we expect this differential to be of strategic importance. The reason for the differential is clear and reasonable – under the state scheme, the 20 per cent increase in demand is added to a jurisdiction-level call volume where prices are still falling rapidly with increased volumes. For the national scheme, far more of those potential economies have already been realized, offering this much lower incremental cost base.

Low incremental costs translate in high value for any expansion options

On its simplest level, this analysis highlights the fact that the national scheme would be able to accommodate growth in demand – as a result of growth in population and/or awareness – much more cheaply than could the state model.

More generally, a differential of this order of magnitude has significant implications for the *value created* as a result of investment in HCCs, viewed as offering a *platform* for introducing a wider range of products and services. We return to this issue later, but the value of these *platform options* is directly related to the incremental cost implied for introducing these services, not to the average cost per call.

The above analysis flags that – over and above any cost advantage the national arrangements may have for the provision of basic triage, referral and information services – the national scheme offers much greater value in relation to any opportunities for expansion and diversification of product offering.

More detailed modeling needed to cost specific options

This statement should remain true across a diverse range of implementations of a national scheme, ranging from agreement on standards and loose networking and call back capabilities, through to a fully integrated and centrally managed system. *Actual cost differentials across the different models would require much more detailed modelling or market testing than has been done here.* In weighing alternatives of this type, there are a number of relevant considerations:

- Even if complete integration suggests nominal cost advantages, these should be weighed against the possibly stronger incentives and opportunities for innovation across a somewhat looser network.
 - This innovation could deliver a longer-term cost trend that outweighs the initial benefits of integration.
- Any decision on form will need to take into account existing investments, contracts and political commitments.
 - The best ‘greenfields’ solution may not be as cost effective as some form of building off the base that is already in place.
 - This may, of course, allow for progressive transition towards a preferred long term strategy.

Of course the above numbers should be treated with some caution. Some of the reasons are already flagged. Variations in the detail of how a national scheme might be defined and operated, and variations in the services to be provided could have a significant impact. However, we would expect that, under a fairly wide range of variations, the broad relativities would remain. As noted above, incremental costs of adding new services with a different time profile could well be lower than is indicated – assuming call durations are comparable or less.

7.5 Comments on benefit sharing

We have not been asked to address the question of how a nationally coordinated HCC would be financed. However, the above conclusions as to the structure of costs prompt a few observations:

- The indicated size economies strongly suggest that a national scheme, relative to stand alone state schemes, could allow comparable HCC services to be provided in all participating jurisdictions at a lower average cost per call than could be achieved by *any* single stand-alone jurisdiction – or subset of cooperating jurisdictions.
- Setting aside the question of Federal funding, the net benefits of moving to an arrangement involving a single rate cost per call arrangement would fall very differently across jurisdictions – ranging from modest for large jurisdictions through to very large for the smaller jurisdictions.
 - However, this would not imply any cross-subsidisation in an economic or appropriate policy analysis sense – if no party is worse off than would be the case without the national arrangement, then there are no cross-subsidies.
- This does not mean that there is not scope for valid discussion as to how the costs should be shared. In economic and policy terms, there would be a range of ways of allocating the costs, with the only requirements for policy efficiency being:
 - No jurisdiction or group of jurisdictions should face higher costs (or lower net benefits) than they could achieve by not participating in the national arrangement; and
 - All jurisdictions should face the true national scheme incremental costs in assessing whether there are any jurisdiction-specific additional services to be offered off the platform.

National cooperation in extending the service into new service areas would create additional costs that should comply with the same basic principles.

8 HCCs as platform investments

The last discussion leads naturally into a consideration of the *option value* of the basic investment in HCCs.

Shift in emphasis towards diversification options

We found a striking difference in matching the body of reviews of HCCs, most of which were undertaken well over a year ago, and the views expressed in subsequent consultations. This difference was the introduction of a much stronger, or certainly much more explicit, emphasis on the ‘real value’ of HCCs lying in the *new products that could be rolled out* using the basic infrastructure platform. These views were expressed very clearly by WA, the ACT and the UK in respect of their established systems, and were clearly prominent in Queensland’s planning.

It is clear that there has been a longer awareness of these possibilities, but they seem now to have a central role to play in the justification of the scheme.

Experience with the integration of these sorts of services into a diversified, wide catchment HCC is limited. However, there is growing experience with the use of a telephone service in areas such as mental health support in NSW and residential aged care in WA. We are aware of no evidence to suggest significant difficulties with – and are aware of support from the HCCs for – implementing these services as part of a large catchment HCC operation offering economies of size and scope.

More generally, there seems also to be growing awareness of options for HCC services to dovetail with, and lend support for, national strategies in relation to health information and chronic disease care. The information systems that need to be in place if appropriate HCC services are to be available, and that require substantial investment in establishment and maintenance, are likely to have substantially wider value if these systems can be dovetailed with other initiatives in respect of eHealth for example.

Emphasis consistent with modern investment theory

We have no problems with this line of argument. Indeed, this emphasis on the value of the options created by the establishment of the basic HCC infrastructure closely reflects recent developments in investment theory – in particular, the emergence of real options⁵ as an alternative, and in many ways much more powerful, basis for valuing investments than traditional methods. Key features of this approach include:

Value of flexibility

- Recognizing that the value of an investment is heavily dependent on the flexibility it offers management to adapt the investment strategy to changing circumstances and opportunities; and

⁵ An overview of the approach and its implications for management is provided in Amram and Kulatilaka (1998)

Prospects for new options

- Recognising that this value rises with increasing prospects for such opportunities emerging – whether as a result of rapid improvements in technical capabilities (through R&D for example) or through high levels of uncertainty as to future requirements.

This is not the place to roll out a treatise on option valuation, but it is important to recognise that the set of options offered by an investment are, in many cases, substantially more valuable than is indicated by the initial application of the investment.

We are now hearing arguments that this is likely to be true of HCCs. We can certainly understand how extensions to services such as disease management could deliver significant value – including but not restricted to demonstrable improvements in clinical outcomes and patient safety.

Two specific insights that have come out of this development of options theory as applied to major investments, which seem particularly pertinent to HCC strategy. They are:

Case for designing the strategy to maximise option value

- If the investment is being valued in a way that *incorporates the value of the options* that it provides, then it is appropriate to *design* the structure of the investment to maximise the value inclusive of those options.
 - In general, this will favour investment strategies that offer cheaper, or more easily used, *flexibility*; that *defer* where possible the *irreversible commitment* of resources whose justification depends on information not yet known; and that actively invest in *clarifying the critical uncertainties* before those irreversible commitments are made.
 - Rather than optimize the design for current needs, consideration should be given to other features that will add to the value of the available options – and this can include investment in information and monitoring that assists in developing the strategy over time.

HCCs can be viewed as platform options

- An important class of options, that has received significant attention in the literature, has been what are referred to as *platform options* – systems that provide platforms from which new products can be rolled out at low incremental cost.
 - Networks – marketing, telecommunications; skilled workforces; and customer and supplier databases are classic examples of this; but
 - … the concept is equally applicable to HCC systems, the nurses and other staff, the information and clinical support databases etc.

Cost deferral and designing for flexibility

These principles strongly favour investment in systems with low incremental costs, with ready capabilities to modify entries or to add new entries etc, and with scope for scaling up without unnecessary constraints on sourcing additional skilled personnel.

Further work required re best models

While the time and scope of this study has not allowed close probing of the value of some of these options, it would appear to be a question that lends itself to such probing. This may well assist in the design of the best arrangements. It should be relatively straightforward to assess the impact of variations that involve a different time of call profile and/or different call duration, for example.

9 Impacts on health system usage patterns

Triage advice favours a marked shift in usage patterns

There is strong evidence that, *were users of the call centre services to comply* with the triage advice of the call centres, this *would* effect a significant shift in the pattern of health service use – away from emergency departments and towards GPs and self-care – with an implied reduction in ED attendance of around 40 per cent (of those who first call the HCC) being indicated in both WA and the ACT.

It is quite plausible that at least some of these gains are being realised, but this is not self-evident from the data gathered to date. Drawing of strong inferences from the available data is constrained because:

Low level of 'filtering' ED calls through HCCs

- Only a relatively low proportion (less than 10 per cent) of those presenting at emergency departments has done so after using telephone triage – a large shift in a small proportion is still a small proportion that may not be discernible given other sources of volatility and trend in rates of presentation.

Offsetting impacts

- Telephone triage involves a mix of recommending emergency department attendance to those who were not intending to present, as well as recommending against attendance in some cases.
 - It is possible to achieve significant, and beneficial, movement in both these components while having only a modest impact on aggregate presentations – with aggregate presentations being all that is currently measured.
 - That said, the usual pattern involves a strong net effect in favour of reduced emergency department attendance.
- Other factors influencing presentations include:
 - Trends, that vary sharply across regions, in the availability and cost of after hours GP access – and even expectations of same day access to GP services.
 - The fact that emergency department consultations are free of charge to patients while there has been a trend away from bulk billing and towards higher fees for GP service usage.
 - The fact that symptoms can change subsequent to call centre triage.

- The way, and the effectiveness with which, the scheme is presented to prospective users.

Evidence of reasonably good compliance

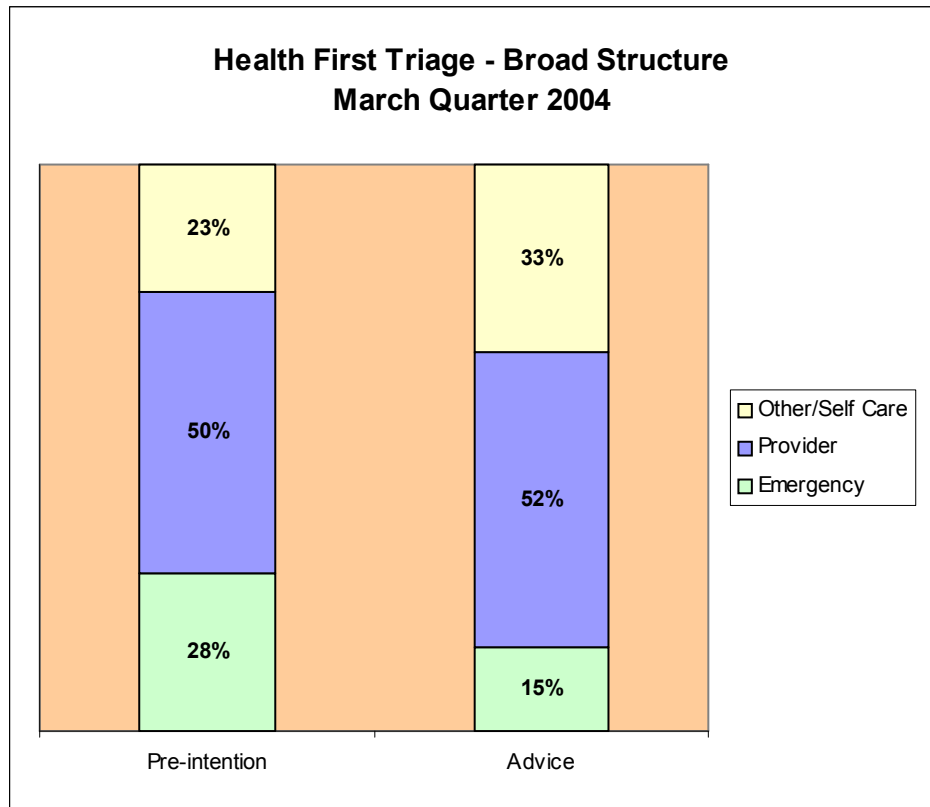
There is clear evidence that compliance with call centre advice falls short of 100 per cent, though some studies – such as Sprivulis *et al* (2001), linking call centre data with subsequent actual presentations – support the view that a reasonably high level of compliance, at least in respect of emergency department presentations where advised, can be achieved. These studies also suggest that the triage emphasises ensuring the identification and appropriate triage of high acuity cases.

Need for better methods to attribute cause and effect

The above complexities almost certainly mean that any serious attribution and credible quantification of changes in service demand to call centre operations will need to use *more sophisticated analytical methods* than the plotting of trends – as has been commonly used to date.

Two interesting sets of results are relevant here.

Figure 1: Comparison of caller intention vs advice, ACT



Source: Health First data

Figure 1 provides an overview of the difference between the structure of Health First caller intentions, at the time they place the call, and the advice given by the telephone triage nurse – *not necessarily the action subsequently taken*.

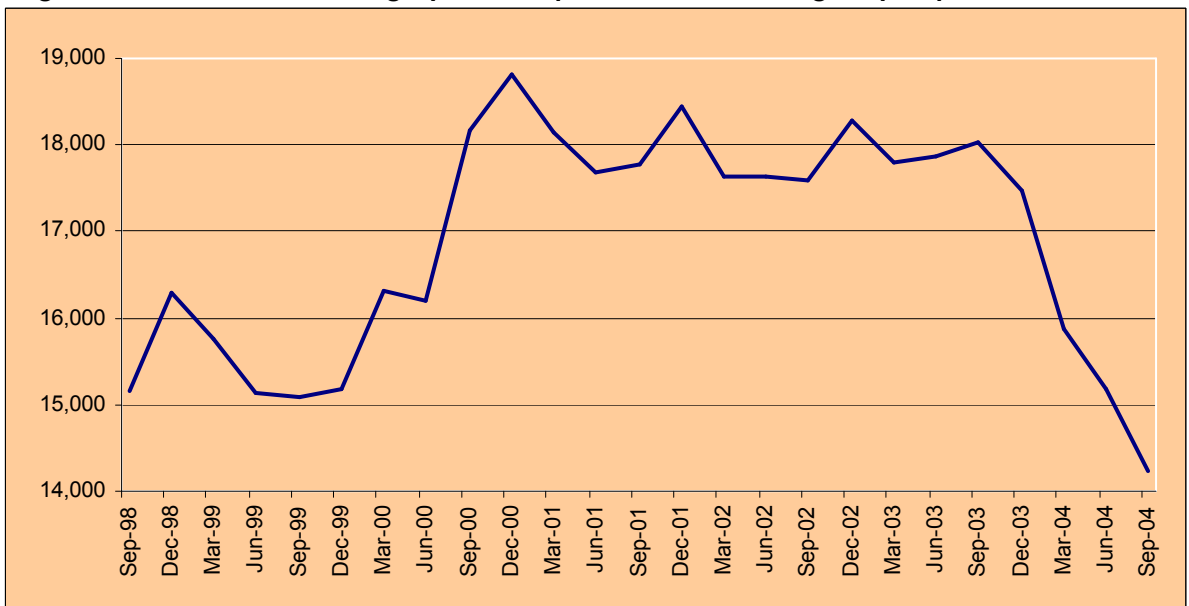
This broad pattern occurs across the studies, though the detail of the composition is dependent on the HCC and can change over time. It is important to recognise that Health First receives a large number of calls that are diverted from the ACT hospitals – implying a relatively high rate of intention to access emergency services (000 ambulance, emergency department) in the first place.

Advice to callers to change their response

What the chart indicates is that the triage results in advice that about half of these callers should adopt a different strategy – seeing or speaking to a GP, or self care. The net effect, if the advice were taken, would be a small increment in GP service demand and a substantial increase in self care and non-professional advice – in addition to a reduction in emergency department presentations.

Figure 2 highlights the dilemma in trying to spot the implied emergency department trend in raw ACT emergency department presentation data. The data span a period from well before commencement of Health First (2001) up to the present. It is clear that the data are volatile – and prone to sharp trend movements over time, suggestive of structural change.

Figure 2: Movements in category 4 and 5 presentations, emergency departments, ACT



Source: Data provided by ACT Health

The very recent trend is strongly downwards. However, the three years prior to that – that straddle the introduction of the scheme – display little trend and nothing that correlates well with the introduction of the scheme. Before that, there was a strong rise in presentations, across 2000. These correlate with some clinic closures, showing how a small jurisdiction can respond substantially to a few ‘lumpy’ changes.

High sensitivity to other factors

GP service access – especially out of hours but even same day normal hours attendance – can, we believe be difficult in the ACT. After hours clinics may not offer a service to people who are not established patients. These factors may well limit people’s ability to accept advice to see a GP urgently, and dissuade them from seeking a next day visit, resulting in their coming to an emergency department anyway. Contraction in bulk billing access across the central 3-year period may also have placed general pressure on emergency department attendances that would mask any actual response to the HCC, even if it did persuade some to go elsewhere.

This raises the question of how to interpret the recent decline. It is certainly suggestive of a structural shift but, given the history preceding that trend, a link to Health First is far from convincing. Almost certainly other effects predominate.

The extent of the movement is too large relative to call traffic and the triage advice to explain an effect this large. This observation emphasises a different perspective – unless a much higher proportion of those attending emergency as 4/5 category triage cases start calling Health First before attending, there is limited scope for Health First to influence the outcome.

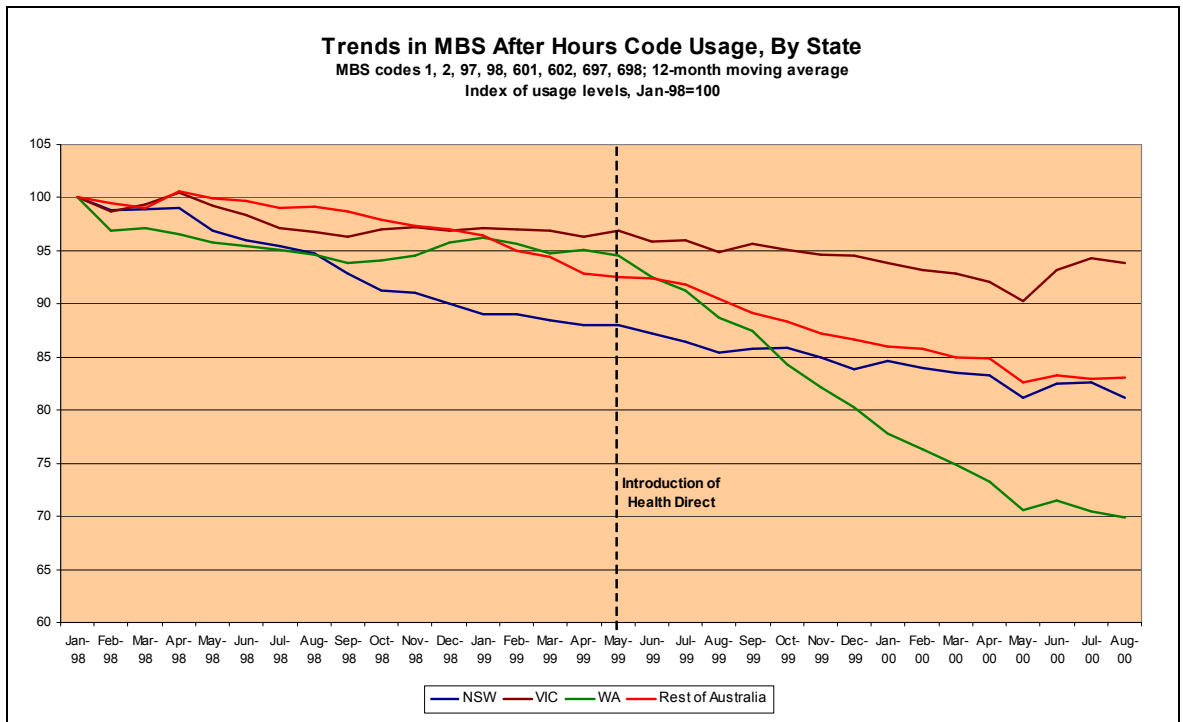
Limits on effectiveness – but other possibilities

This may have some message for the way the scheme is publicised and promoted – but it also probably says something about what can reasonably be expected from the scheme in terms of emergency department throughput. On the other hand, the large structural shifts in the data do suggest that there may be other instruments available that could have a large effect.

Another trend pattern was analysed in respect of HealthDirect in the course of the 2002 National Evaluation of the After Hours Primary Medical Care Trials. In this case there is evidence of a striking impact on some health system uses, but again definitive attribution proves difficult.

Figure 3 reflects an attempt to attribute cause to a pattern in the data by comparing different jurisdictions around the time that HealthDirect was introduced in WA. If there is a big change in WA relative to other jurisdictions, this supports the view that the cause may involve the HCC investment that occurred in WA but not elsewhere.

Figure 3: MBS After Hours Usage, Trends by Jurisdiction



Source: Based on data presented in Centre for Health Program Evaluation (2002)

Dramatic association between HealthDirect and MBS after hours code usage

Superficially, the pattern is extremely impressive. Effectively, starting in the month when HealthDirect commenced, WA veered sharply down in its usage of MBS after hours codes, and sustained that trend (noting that the use of a lagged moving average calculation). None of the other jurisdictions displays a comparable pattern. All trend downwards, but without the evidence of a sharp and sustained structural change. For WA, it is clear that there was a structural change in, or very close to, May 1999, the month that HealthDirect commenced. What is striking here is not so much the long term trend as the precision of the timing, relative to the ‘shock’ introduced to the system by HealthDirect. It is this sort of pattern that social scientists who are unable to impose experimental designs on their data gathering, typically look for in seeking to attribute cause. We return to this point below.

But other explanations

Centre for Health Program Evaluation (2002) made the assumption that the trend could be fully attributed to HealthDirect for purposes of assessing cost impacts (while noting that this might involve some over-attribution of the trend to HealthDirect). Unfortunately, it needs to be recognised that at almost exactly the same time, a number of after hours GP facilities opened in WA – and these would also have encouraged, and possibly forced, a movement out of these MBS codes. It is possible that the data reflect a move into the usage of the after hours GP facilities for reasons that have little to do with HealthDirect.

In fact, it seems highly likely that the pattern is the result of both influences. HealthDirect may have been successful in triaging some cases away from out of hours treatment. It may also have been well placed to take advantage of these after hours facilities and to triage callers to these facilities. An important feature of HealthDirect has been its ability to triage to the after hours GP facilities callers who are not established patients of the GPs involved in the facilities. The protocols certainly allow for triage patterns consistent with the chart. How different would the pattern have been if the after hours GP clinics had opened, but HealthDirect had not commenced – difficult to say from the chart alone.

9.1 Role of modelling tools

Simple trend analysis is inadequate

Such plots cannot usually separate out the other influences. They will tend to confirm the views of some, but be too vulnerable to counterargument to change the views of others. This seems very much to have been the pattern of policy debate around these system usage questions.

Modelling tools are almost certainly needed. If 2 shocks have coincided as above, there is a question of whether we can bring to bear the experience where only one of those shocks occurred – in WA or elsewhere. Can this experience be used to untangle the different effects and to allow some attribution?

One approach would involve looking to the timing of the introduction of after hours GP facilities in the other jurisdictions and/or at other times in WA – and comparing patterns of response. This might be best done using data at a level below that of individual jurisdictions.

Very little use of modelling tools in past reviews

In working through the past reviews there is virtually no use of modelling tools – in the sense of structural modelling of usage or demand patterns. Of course there is a need to recognise that models can be abused, but it is also important to recognise that sound management and evolution of these HCC systems require decisions to be taken based on assumptions that can only be tested using modelling tools.

Some precision is needed for good HCC design

It may well be possible to justify investment in HCCs on grounds that do not require sophisticated modelling – for example, community popularity and management of hospital calls may be enough. However, it will not be possible to determine the detail of the HCC arrangements, the level of resourcing that is cost justifiable, the nature and extent of appropriate promotion activities etc, without a better understanding of impacts than has been obtained using the types of trend analysis that have predominated to date.

It is appropriate to recognise that HCC policy requires decision making in circumstances of substantial uncertainty. HCCs make use of quite sophisticated decision support tools on-line. The planning of HCC resourcing etc uses sophisticated statistical tools that model volatility in call volumes and duration etc as a basis for decision.

Extension of the use of decision tools to HCC strategy

HCC policy development could, in principle, make similar use of *risk-based investment decision tools* – to guide both immediate strategy and the planning for data monitoring to support cost effective development of the policies over time.

One of the difficulties in attributing cause lies in the way that the analyses are being planned and undertaken *after* the data are in. This is typical in a lot of social sciences and some physical sciences. Economists and climate modellers have little scope for imposing experimental designs on their data gathering – they cannot push up tax rates, while keeping other factors fixed, just to see what is happening. They cannot stop carbon emissions to observe system response. They have to work with the natural volatility of the systems. Quite sophisticated tools have been developed for doing this, but the strength of the analysis is invariably weakened.

Scope for generating better data through adjustment to details of strategy rollout

The roll out of HCC schemes is, in principle, different. Decisions can be taken as to the timing of rollout out, and the timing and geographical focus of awareness raising programs. In theory at least, there would have been scope, and may still be some scope, for using the discretion available here to generate data that allow much stronger conclusions to be drawn. It will not be possible to control all the other factors, but it may be possible to manage their impacts through some ‘randomisation’ and through selection of timing of HCC decisions to produce data that lends itself to better modelling – through introducing elements of experimental design. Such methods are designed to allow adjustment/correction for effects for which effective control is not feasible.

10 Cost offsets

Direct costs probably overstate net costs

The earlier discussion of direct costs involves a quite *partial* coverage of the cost implications of HCCs. Unfortunately, direct costs are the easy costs to grapple with – clinical impacts, with possible longer term health system cost implications are discussed later. The possibility of either or both of cost offsets, or increased costs, elsewhere in the system as a result of the operation of HCCs is addressed here.

Some opportunities for offsets are quite clear, though not necessarily easily costed, for reasons related to the above discussion of impacts on health system usage patterns:

Reduced calls to hospitals

- Where HCCs handle some or all of the call traffic that would otherwise have been directed to hospitals, including emergency departments, there is a clear offset.
 - Whether that offset is ultimately captured by reducing the staffing of the hospitals to reflect the reduced call traffic, or redirected into more valuable hospitals services, is a matter for judgment within funding and policy constraints.
 - However, the achievable reduction in costs should place a *lower bound* on the value of the offset – a decision to take the saving in another form should presumably reflect the view that the other form is even more valuable.
 - This effect does lend itself to valuation – based on calculating the true incremental cost of meeting the call traffic demands from with the hospitals and emergency departments.
 - … HCC management of these calls provides access to the above size economies and allows the demand for nurses for the telephone services to be separated geographically from the demand for emergency department nursing services.
 - … Certainly if an HCC is already in place, it should be able to handle diversion of call traffic in a highly cost effective manner, by tapping into these economies.

Changed pattern of health service use

- If the HCC is effective in altering the service usage patterns of a reasonable proportion of callers, this could result in at least a change in the composition of other costs and possibly a reduction.
 - Any appropriate diversion from either emergency department or after-hours GP services to self-care or normal hours GP services should afford offsets.
 - Any appropriate diversion from other high cost treatment patterns to lower cost ones, including community services, could also offer offsets.
 - Again there are questions of how the offsets are to be captured – as lower costs or more effective services where resources have been freed – and again the potential cost reduction should place a lower bound on the value delivered.

Earlier detection and intervention

- If access to the HCC results in a caller seeking medical attention for a serious condition earlier than would otherwise be the case, this may allow earlier intervention involving substantial lower costs than for a more advanced problem.
 - This could range from early detection of heart problems or cancer through to oral health problems.

- In terms of individual cases, the potential gains through health system costs avoided could be very substantial.
- These possibilities may be greater for older patients, and possibly especially for older men, in which case the current bias in HCC usage towards very young patients and women would not be helpful – though this could point to opportunities in the way the system is promoted.
- Evidence of the propensity of the system to deliver earlier intervention is discussed in relation to clinical effectiveness below.

It is also appropriate to recognise the potential for cost offsets that accrue to call system users – avoidance of unnecessary travel, lost time, stress and the real costs of illness that might be lessened through superior triage. Only some of these costs are financial.

Credible estimates of offsets not available...

The magnitude of cost offsets is clearly going to be heavily dependent on the structure of the surrounding health system, with overseas studies being of limited value. Centre for Health Program Evaluation (2002) did attempt an assessment of offsets from HealthDirect, and to extrapolate to all of Australia, assuming a national scheme. It concluded that the effect would be small and insufficient to cover scheme costs – estimating an “upper limit for savings” of \$7m per year, the upper limit stemming from the (very legitimate) concerns for over-attributing trend in MBS code usage to HealthDirect.

...but offsets could be substantial

However, this assessment made no allowance for potential benefits from earlier detection of serious conditions and did not incorporate potential benefits from diversion of call traffic from emergency departments. It is certainly plausible that the true, system-wide offsets could be substantially larger.

11 Clinical effectiveness

Safe and cost effective triage could be considered clinically effective

Assessment of clinical effectiveness depends very much on what is meant here by effectiveness. On one level the earlier evidence that soundly managed telephone triage, especially if applied conservatively, need be no less safe than the alternatives could be taken as an indication of clinical effectiveness. It appears probable that it can deliver clinical outcomes in terms of safety that are comparable to the alternatives. Again, this does not mean that there will be *no* instances of adverse outcomes relative to some alternatives – it is a statement about the balance of risks and it legitimately takes into account the risks and costs of over-triage as well as under-triage, especially if under-triage can be biased heavily towards low acuity cases.

Several ways to improve clinical outcomes

However, it is reasonable to ask whether the system may have delivered, or be capable of delivering, *improved* clinical outcomes. This seems highly likely,

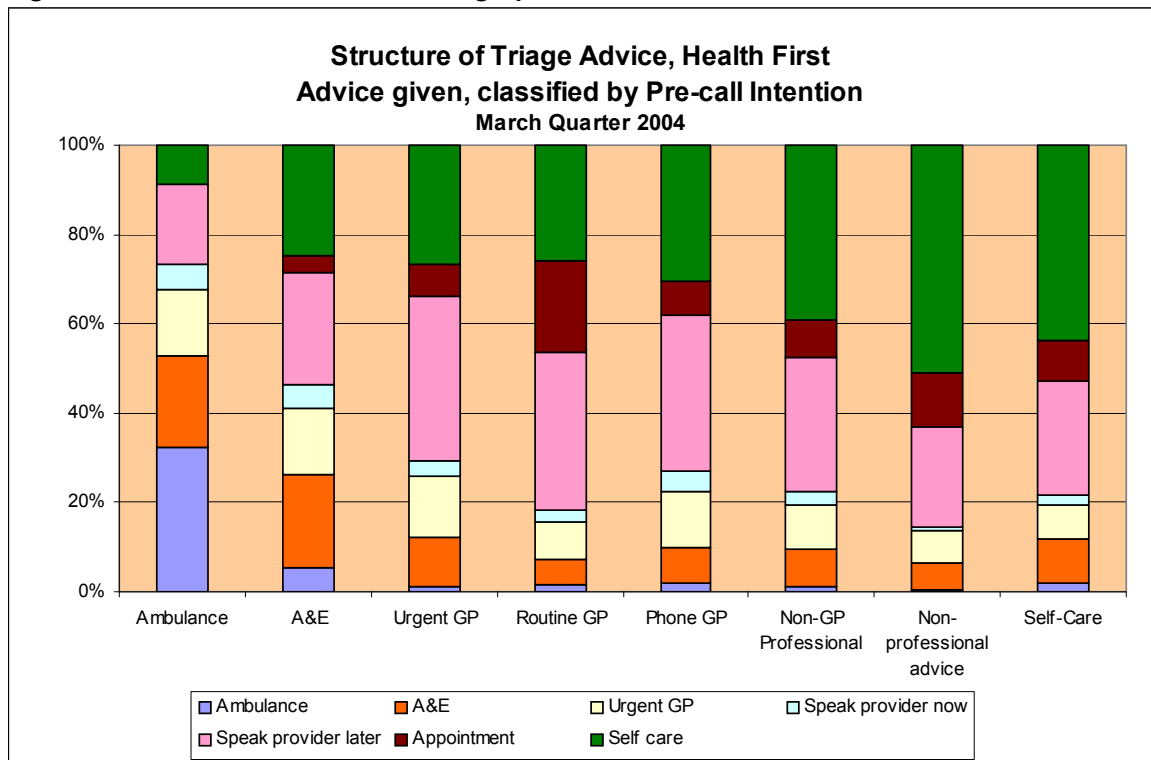
based on both first principles and available evidence of triage outcomes. Ways in which this might happen include:

- Avoidance of unnecessary travel for an ill patient – travel that may worsen symptoms with no offsetting benefits.
- Avoidance of unnecessary contact of carers and patients with other ill patients, with associated risks of other infections.
- Earlier identification of serious problems – linked to the discussion of offsets above.

We discussed earlier the evidence, from most reviews of HCCs, of a marked difference in pre-intention of callers and the triage outcome. The change in the pattern illustrated by Figure 1 does not provide very good insight into the propensity of HCCs to encourage some people to seek more immediate attention than they were otherwise intending. This is because the figures include the combined effects of advice that works in opposite directions – some people are deflected from using emergency services and some are deflected to their use.

Figure 4 draws on the same underlying ACT data as did Figure 1, but presents it in a different form:

Figure 4: Detailed breakdown of triage patterns, ACT



HCCs can upgrade triage

This figure illustrates clearly the fact that Health First (and the same appears true of all other HCCs for which analogous break-ups have been prepared) has

a small but significant potential for advising callers to elevate the seriousness of their response to the symptoms:

- Of those intending self-care, 12 per cent were advised to immediately call an ambulance or attend an emergency department, and almost 20 per cent were advised to take urgent action.
 - A significant proportion of these cases is likely to relate to symptoms such as chest pain, where the protocols play safe – but they do so for the reason that a proportion of those presenting with these systems would benefit, clinically and substantially, from urgent attention.
- Broadly similar patterns apply to those intending other forms of non-urgent treatment.
- In aggregate, over 13 per cent of all callers to Health First (including those diverted from calls to hospitals) stated a pre-intention of pursuing a non-urgent course of action and were advised instead to take urgent action.

We would not want to place too much emphasis on the precise numbers – increasing the conservatism of the protocols will increase the number advised to take more urgent actions – the challenge is to get the balance right. However, assuming that a proportion of these callers does actually follow through on the advice, it would be reasonable to expect this to flow through to earlier intervention in respect of some potentially serious problems. The scope for delivering some clinical benefits would seem high. While there may well be some cost offsets to this effect, through triage upgrade that proves unnecessary, we can see no reason to expect offsetting clinical harm.

Clinical effectiveness need not be cost effective, but the prospects here are good

Of course, this need not necessarily be cost effective – the issue is essentially a variant of the argument about cost effective levels of disease screening, vaccination etc. What is different here, however, is that these cases of advice for more urgent intervention (with associated costs) are *outweighed* by advice that others take less urgent action (presumably, with safe triage, involving associated avoidance of costs as was discussed earlier).

In line with the earlier discussion, there is some evidence of reasonable compliance with advice to attend the emergency department – for example, Sprivulis *et al* (2001) in respect of HealthDirect. Furthermore, the above callers to the Health First are asked at the end of their session if they intend to follow the advice. Around 90 per cent say they will, though it would be reasonable to expect an upwards bias in this figure – with respondents being reluctant to tell the nurse they would ignore her advice. Nonetheless, it would seem probable that advice to take urgent action might have a higher compliance rate than advice to downgrade the response to symptoms for people who had been sufficiently concerned to place a call.

Curtin Consulting Services (2001) reported, based on a follow-up survey 72 hours after the call, a lower self-reported compliance with advice (measured in terms of actually seeing doctors etc) of 66%, but also noted that only 18.4 per cent of those advised to seek immediate care failed to do so.

There is no cross-linking with pre-intention and there may well have been lower compliance amongst those whose pre-intention had not been to seek urgent attention. However, none of these figures suggest that there would not be a significant number of people seeking earlier attention, based on potentially serious symptoms, as a result of the HCC advice.

12 Addressing the local/HCC trade-off

While not at the centre of the purpose for this study, we return briefly here to the perceived trade-off between the local, after-hours GP service-linked triage model and the larger catchment state and national models. This is done because of the way in which this matter, and of course the associated need for provider support, have arisen as key issues.

The earlier analysis strongly suggests that the size economies offered by the state or national models, relative to local triage as part of after hours arrangements, are large – with likely cost differentials of the order of \$30 per call⁶. These costs have received government funding through the after hours primary care trials, and may continue to do so – though we would anticipate some demands to demonstrate cost effectiveness in sourcing of these services arising out of these cost differentials (especially if there was to be a greater rollout across Australia).

Logically, the difference raises some important questions:

Could triage function be matched?

- Could a state or national model deliver the capabilities, in the telephone triage function, that those arguing for the embedded local system see – or offset any shortfall in capability through other functions that would be hard to achieve with the local system?
 - And could this be done at lower cost than through the local models?

Is a service gap cost justifiable?

- If there were a demonstrable quality of service gap, that would favour the local model, is the cost of filling the gap justifiable – given the other ways in which the resources could be directed into after hours, primary care or other aspects of health care?

⁶ In fact, the cost differential could be substantially higher if state or national models were to progress into the supply of a wider range of services. Indeed, if commitment to local arrangements would undermine the economics of a state or national model, some of the costs would take the form of loss of access to these wider opportunities.

Could local services provide a 'satellite' function?

- Is there scope for integrating some local telephone triage services, as 'satellites', into a state or jurisdiction model?
 - The timing of these after hours services would suggest they may offer some scope for peak load management.

The first issue, of course, is whether the perceived quality differences are real. The history of HCCs has been one that has involved rapid reductions in local provider concerns once the services are established in an area. To an extent, resistance to the approach may be a change management issue based on lack of understanding and legitimate conservatism in relation to a significant change in the way health services are structured. It could certainly point to deficiencies in the communication process, in advance of and possibly after implementation of the HCC.

BRC (2002) highlight the improvement in provider attitudes to Healthline in just the 4 month operating period of June to October 2001.

Role of careful consultation throughout the process

Similarly, there are indications that working closely with local service providers *in advance of* deciding on, and agreeing the form of, a state model can go a long way towards addressing and alleviating these concerns. The Queensland experience, Queensland Department of Health (2004), is pertinent here and we understand that the consultative processes have been seen as both crucial and extremely fruitful.

On the other hand, where a sound after hours GP service has been developed, and incorporates telephone triage, we can understand concerns with a wider policy development that may threaten that service. It would seem that an obvious path into probing this concern would be a serious exploration of how a state or national program could be organised to meet the needs of a GP after hours service while providing equity of access. What information would need to be available to the nurse, what capabilities would be needed in terms of access doctors, conference calling or transferring triage? What needs to be known of local conditions and how rapidly do these change relative to the update capacities of the system? The costs of such capabilities would need to be considered, along with a realistic assessment of any remaining gaps.

It would certainly be appropriate to probe whether the state or national system could not offer greater functionality – higher quality assessment of conditions, stronger links into information beyond the immediate local area that may be relevant to the health concern, etc.

Significant technical opportunities

Our impression is that a state or national system that includes access to rapidly updatable (via web access if desired) local information is certainly achievable from a *technical* point of view; actual provisions for allowing such changes would be a policy question. We would expect the provider information for any

sustainable state or national scheme would need to be appropriate. We would expect no difficulty in identifying a patient as having a provider relationship with the GP service through early questioning. We would anticipate no technical problems with a facility being able to escalate the triage, including bringing in doctors in accordance with locally appropriate protocols, provided that these satisfy wider standards. In principle, calls diverted from a GP after hours service or GP, or using a number obtained by phoning a participating doctor, could be answered in the name of that service or GP – though that may raise issues for the management and branding of the state or national service.

13 Competition and Innovation

The potential for cost savings through national co-ordination and networking would be greatest if essentially the same software systems were implemented across jurisdictions. This would be a key ingredient in allowing load sharing across jurisdictions, in achieving economies in the planning of the system, in managing the ongoing improvement of the system and in accommodating mobility of trained nurses.

System identity is probably not essential. Certainly coordination in respect of standards could occur independently of system choice. But software differences would either make load sharing more difficult, or would entail up-front investment in building in the appropriate compatibility and then the costs of maintaining compatibility as system requirements evolve. This will favour standardisation for reasons of cost effectiveness.

National coordination may limit effective competition in the market in these services

However, the same standardisation would tend to encourage a degree of ‘lock-in’ to a single provider – at least for the software system (or module). It could limit the scope for comparing Australian experience in using different competing products and for tapping into the potential benefits that might flow through competition over prices and over innovation.

But the concerns are manageable

That said, we have concluded that the associated risks are limited and manageable, provided that they are addressed head on from the start. Specific considerations include:

- Software choices would, we expect, be made from products available internationally and subject to international competition that is driving on-going product innovation and scope for benchmarking of costs.
- It is feasible, though not costless, to change software products – the issue with coordination is that there will be strong incentives for any change to apply to all systems in Australia.

- It is certainly feasible to separate choice of software provision from choice of system operator, and to have different operators in different jurisdictions.
 - It would be feasible to test the market for system operation quite separately from testing the market for software provision.
 - It would also be quite feasible to separate the information database from the triage support system.
- Any provider bidding to supply the system would recognise, and value, the potential for locking in the customer.
 - Provided that the tender is competitive, and seen as such by the bidders, the potential advantage this offers should be capitalised into a lower bid price – any ‘back end risk’ should be funded through a ‘front end competitive price reduction’.
- Similar considerations apply as a contract is coming up for retender. The service provider (whether providing software and support or a turnkey solution) would need to recognise that customer perceptions of an excessive exploitation of market power would be likely to influence the decision for the replacement contract.
- Of course, the nature of the contracts, whether the contracts are let as a block or by each jurisdiction, the nature of IP requirements and requirements for system transfer etc are all of great importance in ensuring a sensible outcome.

Intervention failure risks

The decision to implement a state or national scheme, relative to local schemes, does appear to imply greater government involvement – a more ‘hands on’ policy approach. There may well be philosophical differences about this – and we have heard stakeholder arguments that highly coordinated arrangements, while possibly having theoretical attraction, may be prone to costly intervention failure.

This is a legitimate area of concern with any major policy push, but we recognise that substantial government involvement can in any case be anticipated through the funding requirements of local arrangements, and likely funder demands to satisfy quality assurance protocols.

The above discussion indicating benefits from standardisation should not be taken to imply standardisation around the systems currently in place in the ACT and WA. There may be some cost advantage in exploiting aspects of the existing investment, and these should be factored into the planning. However, planning for a national approach, and tapping into the associated economies, may make it cost effective to introduce changes, based on lessons learnt to date, that would not be otherwise justifiable.

14 Addressing information gaps

Despite the large volume of program assessments conducted to date, a range of central issues remain effectively unresolved. A level of remaining uncertainty is inevitable and, as with most modern policies, sensible adaptive processes are needed to deal with these limitations.

Information gaps impede sound strategy

The significance of the current gaps in our knowledge is, we suspect substantial. It is difficult at this stage to decide whether increased utilisation of existing systems would add to or reduce whole of health system costs. There are large differences across implementations, and planned implementations, of HCCs regarding the emphasis given to promotion of the schemes and provision of information as a primary purpose – with little information on which to base these judgments. A lot of the argument for HCCs is now linked into the value of the platform of options it provides – yet we have seen virtually no addressing of what this implies for the ideal structure for the initial investment, and have seen no application of options valuation tools in weighing alternatives, even though it is clear that the different approaches imply very different sets of future options.

Role for more sophisticated tools for attributing cause to effect

In line with the discussion in Section 9.1, we strongly suspect that some investment in the application of more sophisticated modelling tools to some of the key issues may be cost effective. As was noted there, this could involve a combination of modelling tools applied to existing data, and investment in generating data that is more suited to modelling and resolving some of the important issues. It may well be that approaching the investment opportunities more systematically, viewed as investments in options, and the application of some of the tools appropriate to such investments – broadly speaking, risk-based investment planning tools – would be of particular value.

With decisions still being taken in respect of local, state and possibly national models, there may be scope for careful planning of these decisions – timing, detail of form, coordination with other system changes, data gathered and on-going monitoring arrangements – to improve data quality. These methods can be powerful ways of generating data suited to separating out the complex interactions that have interfered with these assessments to date. The careful consultation process, taking in all major stakeholders, that will be an essential part of the planning and implementation processes should add to the scope for identifying implementation strategies that will deliver both a sound platform and the information needed to guide its on-going evolution.

There are, of course, constraints on how far these methods should be pushed, but we have little doubt that some movement in this direction will make sense – and deliver value to planners.

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National Approach to Health Call Centres

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A Glossary

- Annuitised cost/call:** is a conventional measure of the average annual cost of establishing and operating an investment or facility that correctly factors in the opportunity cost of the resources involved. In the present context, it seeks to calculate a cost per call in a manner that takes account of the costs that are loaded at the front of establishing the service and of possible growth in call levels. Assume the investment is to be funded by borrowing at the discount rate to fund establishment and initial operating costs of the service, and whenever the cash flow is negative. Assume also a 'payment' is made equal to the annuitised cost per call whenever a call is taken. These payments are used to acquit debt if there is debt remaining, or are invested at the discount rate if there is a cash surplus. At the end of the life of the investment there would be neither surplus nor deficit. The annuitised cost per call can exactly fund the investment through its life. It is calculated as the present value of the costs incurred over the life of the investment divided by the present value of the call volumes across that life.
- Crowding out:** is a term used in policy analysis to describe a situation where a government policy has the effect of rendering unattractive an alternative market response to the same issue. In the context of this study, an HCC with widely publicised 1800 number access and free advice might reduce the commercial viability of services provided within a GP after hours facility. Where crowding out occurs, it is important when assessing then value of the policy, to judge it relative to what would *otherwise have been available*, not relative to a situation in which there is no telephone triage available.
- Economies of size:** arise if scaling up the system size to handle more calls of the same type results in a lower cost per call. This is usually due to the ability to spread, over more calls, the overhead costs associated with the planning, design, implementation and running of the system.
- Economies of scope:** arise if the cost per call can be reduced by expanding the range of services provided from the same basic system. These are especially likely where the different services can contribute to smoothing out the peaks and troughs in levels of demand for services, increasing resource utilisation. Where economies of scope exist, additional services can be offered at *incremental costs* less than the costs that would arise were a stand-alone investment to be made to deliver the new services.
- Ehrlang distribution:** A statistical distribution used to describe the length of a queue where people join the queue in a random pattern. It allows for a given pattern of callers, duration of calls and number of staff taking calls, estimation of the

proportion of calls that would not be answered within a given period of time – for example, it might show that 20% of calls would take more than 30 seconds to be answered. It is used to plan call centre staffing to meet performance requirements.

Health call centre: was defined by the HCC Jurisdictions Group as a health service that enables integrated delivery of health care for consumers using information and communications technologies that have the capacity to handle high volumes of transactions for large catchments. The range of services provided can include information, triage, advice, referral, counselling, assessment, intake and/or health management.

Incremental costs: measures the *extra* costs that arise as a result of scaling up, or expanding the scope of, the services provided. They do not include any costs that would be incurred in any case, even if the expansion were not to take place. For this reason, they are sometimes referred to as the *avoidable costs* associated with the expansion.

Infrastructure platform: is an investment in infrastructure that offers economies of size and/or scope, and that can therefore provide a ‘platform’ from which to grow a diversified investment in which the different products and market growth can be delivered at lower cost than would be possible if each were handled through separate investments. Call centre infrastructure is an example – as are a computer that runs several software packages; national or international distribution systems for goods; and supermarket shelf space. An infrastructure platform provides access to *platform options*.

Load shifting involves actions taken by the call centre that have the effect of changing the pattern of calls. Introducing a facility to take messages and call back away from periods of peak demand; blending demands across different time zones; and introducing new services (especially but not only outcalls) with a different pattern of calls can all result in load shifting.

Local model: is a shorthand term used in this paper to describe the provision of health call services, most typically triage services, at a level below that of a whole of jurisdiction model. The telephone triage facilities integrated into after hours GP operations are the main example considered in this study.

Lock-in: is a term used to describe barriers to changing product or service provider – effectively the flip-side of barriers to entry. Where a service requires substantially up-front investment, then an incumbent who has won a contract can often have a substantial cost advantage when the contract is up for renewal – because costs that are sunk (and usually at least partially funded from the completed contract) to the incumbent are fresh costs to any competitor. It is not necessarily a problem – there are efficiencies for

customers in having access to prices based on sunk costs and it may be possible for contracts to ensure continued access to the investment – but it can, if not well managed, limit the scope for effective competition.

National model:

is used in this study to describe any of a range of call centre models that involve substantial coordination across jurisdictions to provide access to economies. The form of cooperation could range from centralised planning and management through to relatively light handed networking and information exchange protocols. In this study, it has usually been assumed that there is enough coordination to allow transparent load shifting across jurisdictions – this does not necessarily require identical systems at all sites, nor identical information requirements in all jurisdictions.

Platform options:

are closely related to *infrastructure platforms*. The term describes the set of *options* for expanding the scale or scope of operation, with access to associated *economies of scale or scope*. It is not necessary to have identified all options before attributing value – a platform with clear flexibility and substantial scale and scope economies via low *incremental costs* might be valued for these features without a firm expansion strategy being defined. This can simply reflect the value of access to *options* to adapt to changing information.

Option:

is a term used in economics and finance, and increasingly in other fields, to describe an opportunity that allows for choice. If you hold an option, you have the right to do something but are not required to do so; options will usually only be exercised if the holder of the option judges the costs of exercising the option to be more than outweighed by the benefits as seen at the time.

The key thing about an option is that the decision to exercise the option need not be taken at the time the option is acquired, it can be delayed and the decision can be based on the information available at the later date. For example, an option to buy 100 shares at \$5 would only be exercised if the shares themselves were trading for more than \$5. Medical R&D can generate a range of options for dealing with medical problems – many of them not even dreamt of at the time the R&D commences. Whether these options are exercised will depend on the information available in the future.

Having a call centre in place, providing a core of services, offers options to provide other services at reduced costs; the extent of those options and their value is likely to depend on the detail of the call centre, and especially on its *incremental costs*. Options can be valuable in managing risks while still retaining access to upside opportunities – they allow costs to be deferred, and even avoided, while keeping open access to opportunities.

Consequently, designing options into an investment, even if this involves somewhat higher up-front cost, can be an important means of both limiting risk and increasing expected value.

Option value: Options can be valued, based on the likelihood that it will make sense to exercise the option and the likely net gains from the exercise of the option. Sophisticated algorithms have been developed in the finance and investment sectors for valuing options, but the principles are as relevant to most investments. In general, greater volatility and uncertainty about the future leads to an increase in option value – so that options can be devices for extracting value from uncertainty.

Real options: is a term that has emerged over the last 20 years to describe an approach to planning and valuing investments. It starts with the view that an investment's value is defined by the value of the options that flow from the investment. Investing in R&D provides value as a result of the options it creates – to produce new medicines for example. It is not necessary to script the outcomes from the research to value the investment – as long as something can be said about the likelihood of the research producing value, possibly based on track record. The power of the approach lies in the way it handles uncertainty and flexibility much better than did traditional investment valuation tools.

Risk-based investment decision tools: is a term applied to the systematic application of a range of methods designed to deal appropriately with uncertainty. Triage software is a case in point, but more generally it includes option valuation methods, the use of decision trees and of methodologies for probing the range of plausible outcomes under different strategies. The tools are being increasingly applied to mainstream investment planning, especially where there are high levels of uncertainty involved.

Satellite call site: is a small call centre that is geographically separated from a larger 'hub' centre and that draws management and support services from the hub.

State model: is a term used in this paper as shorthand for a jurisdiction-wide call centre implemented as a stand-alone call centre in a state or territory. It falls between the *Local model* and the *National model*.

Structural shift: is a term in economics describing a fundamental change in the underlying pattern of supply and demand for a service – as distinct from more random volatility. It will usually be reflected in a lasting change in trend or usage patterns.

B Consultations and Systems Considered

This report was prepared within a limited time frame that did not allow for comprehensive consultations. However, in addition to working with the existing literature we held discussions with:

- Officials from ACT Health, mainly in relation to experience with Health First.
- Officials from the Western Australian Department of Health, principally in relation to HealthDirect.
- Officials from Queensland Health, principally in relation to advanced plans for a HCC in Queensland.
- Officials from the South Australian Department of Health, in relation to their recent updating of the evidence across call centres.
- Officials from Thames Valley and Northamptonshire NHS Direct, in relation to lessons from NHS Direct.
- A senior representative of McKesson Asia-Pacific, in relation to operator experience with HealthDirect, Health First and Healthline.
- A senior representative of CAS Services, as the supplier of the main software system used by NHS Direct, and of related services to some sites in Australia.
- The Australian Medical Association, especially in relation to their stated policy on HCCs.