STAGE 1 REPORT

THE FINANCING OF PUBLIC HEALTH LABORATORY SERVICES

ISSUES PAPER

May 1999

Commissioned by the National Public Health Partnership from the National Centre for Epidemiology and Population Health of The Australian National University

This report was commissioned by the National Public Health Partnership Group from the National Centre for Epidemiology and Population Health (NCEPH) of the Australian National University.

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Introduction

Background to the study

1.1 This report on the financing of laboratory activity of public health significance in relation to the control of communicable disease in Australia, is the product of a consultancy commissioned by the National Public Health Partnership with the participation of the Public Health Laboratory Network, and the National Centre for Disease Control of the Commonwealth Department of Health and Aged Care.

1.2 Its main purpose was to "identify mechanisms, including financial ones, to improve, wherever necessary, the accessibility and use of laboratory services and information for public health purposes", specifically in relation to communicable disease control. In the course of that work, we were asked to:

(a) identify issues and gaps in the use of laboratory services for communicable disease surveillance,

(b) assess the capacity of present systems to address current demand and future needs,

(c) discuss possible approaches, including the use of financial tools, to address the gaps and issues identified.

1.3 The tender brief contained the following background specifications:

"Laboratory services perform a variety of public health functions including:

· routine diagnostic testing, analysis and reporting of notifiable or other infectious diseases (this includes confirmatory and sensitivity testing);

· additional specialised testing on routine specimens (eg, by larger laboratories to detect clusters or outbreaks, emergence of new strains, or for patient management etc). In some cases this will be done an a routine basis, in others only when an outbreak is suspected;

· special epidemiological surveys to determine the prevalence and incidence of infection, antibiotic susceptibility or to monitor the success of immunisation;

· the control of communicable disease outbreaks which may involve additional testing, population sampling, use of more specific testing procedures; and

· the ongoing development, validation and introduction of new procedures required for effective public health management.

The functions, organisation and financing of laboratory services for public health purposes are varied. Various specialised services are provided both through single laboratories and networks and are financed in different ways. The following broadly describes the situation:

· Private and public diagnostic laboratories report on notifiable diseases and other conditions, detected by testing patient specimens, to state health departments and other surveillance programs. Initial specimen testing is funded from Medicare rebates or hospital budgets, but no additional funding is provided for collecting and transmitting data for surveillance purposes.

· Reference, public health and specialist laboratories of various types generally receive specimens from smaller laboratories for specialised or supplementary testing, storage of reference isolates and sera etc. These laboratories include:

(a) designated state health laboratories, either stand-alone or co-located with large public hospital laboratories, usually funded by block grants from health authorities,

(b) public health laboratories which provide reference services for either their own health areas or more widely. These are usually funded from hospital departmental budgets or through special grants.

(c) specialist research or reference laboratories funded by various combinations of the above"

1.4 Most of these activities are organised and financed at the State and Territory level, although some national reference laboratories receive some Commonwealth grants for highly specialised services (eg. high security quarantine, HIV, influenza, and animal health) and there are some WHO Collaborating Centres which provide more specific information for regional disease surveillance and the development and monitoring of vaccines. However these receive little or no external funding and are mostly supported by host institutions. There are also some continuing interactions. For example, the blood bank laboratories provide the National HIV Reference Laboratory with data from their routine screening programs on the prevalence of blood borne infections in the blood donor population.

1.5 In general though, collaboration has depended mainly on informal networks based on the common interests of individual scientists. It is only since the establishment of the Public Health Laboratory Network (PHLN) in 1997 that these have had any recognised base. As an expert advisory group to the Communicable Disease Network of Australia and New Zealand, the PHLN has been asked, amongst other things, to establish targets for turnaround times in identifying salmonella species to a level (serotype, phage type, etc) at which possible outbreaks can be identified; and to establish specific interest groups, including for measles, pertussis and listeria to ensure that appropriate sero-epidemiological data, confirmatory tests for diagnosis and supporting quality assurance programs are available. It should perhaps be pointed out that the report on which the PHLN's establishment was based - the National Communicable Disease Surveillance Strategy - identified almost all of the issues on which this consultancy was based. Gilbert (1996) has specified the fundamental need for "epidemiological data relating to specific infections' including;

* the prevalence and incidence of clinically significant disease and sub-clinical infection,
* clinical recognition of disease with confirmation and/or identification of the cause by laboratory testing,
* notification by the treating doctor and/or diagnostic laboratory,
* appropriate epidemiological studies such as surveys of seroprevalence or carriage rates.

1.6 The diagnostic laboratory role demands.

* an accurate diagnosis of current, recent or past infection by culture, serological testing, or direct antigen or nucleic acid detection,

* precise information about the sensitivity, specificity and predictive values of laboratory tests and their reproducibility between laboratories,

* appropriate specimen collection, transport and laboratory processing, with consistent test performance, quality control and interpretation of results.

1.7 The public health laboratory task is then to provide, analyse and disseminate epidemiological information *additional to that required for the immediate treatment of patients*. This may include confirmatory testing and often involves the characterisation of bacteria and viruses using molecular typing techniques. There is of course a public health information content in much of the diagnostic testing and the laboratory responsibility includes capturing it. However, the distinction between activities which are *primarily* diagnostic or *primarily* public health in nature is generally understood, even if it cannot be precise in practice. It depends upon how problems present themselves and the way in which the health services are organised. The latter is particularly important in financing work. Reporting tends to follow organisational structures rather than purpose and within similar groupings of scientific discipline or technique, the difference between diagnostic and public health activity is not normally addressed directly. But there is some practical assistance in how the providers are paid. Medicare benefits are in principle limited to diagnostic services and whether a laboratory procedure is covered by them is a *de facto* identification between the two.

Epidemiology of communicable diseases in Australia

1.8 At the end of the 20th century, Australia is relatively free of serious disease thanks to public health initiatives over the last 100 years as well as improvements in sanitation, living conditions and nutrition. Towards the end of the 1970s there was a belief - often explicitly stated - that communicable disease no longer posed a threat to the Australian population and the relevant infrastructure, at the state level in particular, was allowed to run down.

1.9 However the advent of the HIV/AIDS pandemic together with concerns about such other blood borne diseases as hepatitis B and C, some outbreaks of serious food borne illness, growing concern over antibiotic resistance and the ever present threat of new influenza epidemics has forced a reappraisal. Internationally, the re-emergence of such

old diseases as tuberculosis and dengue and the emergence of new diseases many of which have been shown to be zoonoses - such as Japanese B encephalitis, lyssa and Hendra viruses -or to have animal reservoirs, has led to special WHO initiatives in coordinating a cross-national response.

1.10 At the same time the Australian public has become both more sophisticated and more demanding of protection against risks to health. In particular, it seeks safe food and water, protection from insect vectors, safe blood transfusions, safe medical/surgical procedures and safe immunisation against vaccine-preventable diseases. However despite considerable success there remain pockets of controllable diseases in parts of the country. The most glaring of these is the very high rate of rheumatic fever in some Indigenous populations. The high prevalence of ear infection in the same population is also of great concern, as is the fact that hook worm infestations are still found in some remote communities with poor sanitation (although laboratory facilities will not of themselves reduce these infection rates). The current burden of communicable disease in Australia can be broadly summarised as follows;

Vaccine Preventable Diseases

1.11 Successful immunisation campaigns and implementation of routine immunisation according to the NHMRC schedule over the years has resulted in effective control over measles, diphtheria, tetanus, pertussis, rubella, poliomyelitis, mumps and invasive *Haemophilus influenzae* type b (Hib). The possibility of epidemics of pertussis and measles always remain as long as the immunisation coverage is less than complete.

Food Borne and Gastrointestinal Diseases

1.12 Gastrointestinal infections are an important cause of illness in Australia and are, in all likelihood, markedly under reported. While hepatitis A, salmonellosis, campylobacteriosis, yersiniosis, listeriosis, shigellosis, cryptosporidiosis and enterohaemorrhagic *E.coli* (EHEC) are all notifiable diseases in some states there is no uniformity in reporting legislation and practices.

HIV/AIDS

1.13 The annual incidence of new HIV infections remains around 800, which is a dramatic improvement on the rate in 1985 when it peaked at over 2,500. This disease has demonstrated the importance of excellent laboratory diagnosis, strong epidemiological backup, clear lines of reporting of data and analysis of the data at the national level. It provides a model to be followed in the monitoring and control of other communicable diseases.

Blood Borne Diseases

1.14 In addition to HIV there are other important viral diseases such as hepatitis B, C and D that can be transmitted by blood. Fortunately the Australian blood banking system is believed to be secure but the spread of hepatitis C, particular among injecting drug users, is becoming a major public health problem. It has been estimated that in 1995 there were 1,400 new symptomatic cases of hepatitis C. The number of asymptomatic infections with this virus can only be guessed at but must be many times that of the symptomatic cases.

Sexually Transmitted Diseases (other than HIV)

1.15 In 1996 the number of syphilis cases notified nationally was 1,523 which was the lowest for over 20 years. However the number of cases of chlamydial (8,420) and gonococcal infection (4,173) was higher than in previous years. In the Northern Territory donovanosis remains an important STD, as is trichomonas vaginalis and there is a special need for a diagnostic capability in that jurisdiction. High rates of STDs in remote areas have the potential to enhance the transmission of HIV.

Vector Borne Diseases

1.16 These have become of increasing concern in recent years as mosquito transmitted diseases such as Ross River virus (7,823 cases notified in 1996) and Barmah Forest virus disease (837 cases in 1996) continue to recur. While Australian encephalitis has not reappeared in the eastern states since 1974 the arrival of Japanese B encephalitis in the Torres Strait in 1995 and later in north Queensland triggered emergency responses and urgent use of the protective vaccine.

1.17 Dengue has been a constant worry for the tropical public health unit in Cairns with infections from all four types having been reported over the last few years. As yet there have been no cases of haemorrhagic dengue.

New Zoonoses

1.18 New diseases of animal origin occurring in humans have been described in Australia in the last few years. The Hendra (bat paramyxo) virus outbreak which caused disease in horses and humans in Queensland, the lyssavirus cases causing neurological (rabies like) illness in bats and humans, and more recently the Menangle disease outbreak in animals with potential for human spread, has highlighted the need for Australia to be vigilant about monitoring this group of diseases. The involvement since 1994 of the Australian Animal Health Laboratory in investigating these latter diseases has been crucial to their successful diagnosis

and management but, as discussed elsewhere, no health sector funding has been provided to it for this work.

Other Diseases of Concern

1.19 Tuberculosis remains a concern due to its world wide resurgence but more particularly from Australia's viewpoint the appearance of drug resistant strains of the mycobacterium in countries where treatment has been inadequate. Resistance to antibiotics generally is growing and the rates of resistance in pneumococci both in the hospital setting and the community are worrying.
Molecular typing techniques allow the identification of modes of transmission and the establishment of reactivation or new mycobacterial infections.

1.20 Diseases such as meningococcal meningitis and haemolytic uraemic syndrome may be relatively uncommon but with high case fatality rates they have the capacity to create considerable alarm in the community. Real or perceived threats to large populations are both potentially serious and politically sensitive – witness the Sydney water scare over giardia and cryptosporidium contamination in 1998. The apparently fortunate outcome in Sydney does not reduce the need for vigilance. There is, in addition, a need for the surveillance of other diseases of public health importance which are not currently notifiable, such as respiratory viruses and enteroviruses, especially rotavirus with the likely introduction of a vaccine.

Summary

1.21 Communicable diseases may range from the very rare to the very common and from the exotic to the mundane. The ranges of climate, topography and population density in Australia mean that some parts of the country will regularly experience diseases which will never or rarely be seen in others. In some cases, past failures to deal effectively with diseases which have been eradicated elsewhere - such as hookworm and rheumatic fever in northern Australia - pose particular challenges to public health services and the laboratories which support them.

1.22 All states need, and most have the capacity to deal with common problems, such as measles, food borne infections, TB, hepatitis, STDs and HIV. However only some will need to manage such geographically limited conditions as leptospirosis, dengue and Japanese B encephalitis and even amongst the relatively common conditions there will be cases whose identification and typing require expertise beyond the reach of every jurisdiction. Lines of cooperation and communication are therefore essential, as are national-level services which can both perform the most specialised tasks and act as repositories of scientific data on the state of the nation's efforts in communicable disease control.

The organisation of public health laboratory activities

Scope of the study

2.1 As has been observed in other contexts, the organisation of public health laboratory services differs by States and Territories, although the essential tasks are the same. Bureaucratically, they vary in the institutional location of different types of work, the role of the public and private sectors and the relationship between the Health Departments - as the immediate users of their services - and the laboratories themselves. Although some remain part of the various Health departments and subject to their budgetary control, most are managerially independent with formal or informal service contracts as their only legal link with the public health surveillance mechanism. However the separation is often more apparent than real. A great deal of the operation still relies on a range of understandings and agreements which the formal arrangements cannot easily specify and which are quite different to those in the standard purchaser-provider relationship.

2.2 The summary which follows is not a comprehensive listing of facilities, organisations or tests available in each state or territory. That information has been gathered at other times by other groups and will be well known to the Public Health Partnership. It is rather our view of the present situation in the light of our particular terms of reference, namely, the financing of public health laboratory services generally and those linked to communicable diseases in particular. We were not asked to assess the public health policies of the various health authorities or the quality of the scientific work. That limited our remit substantially - amongst other things, only microbiological activities were specified (see Appendix 1). However we *were* requested to 'identify gaps in the services and measures, including financial ones which would improve access to those services' and was almost impossible to do so without some consideration of the contexts in which they were provided. These include, in general, the distribution of responsibilities between organisations and laboratories, the link between microbiological and other public health functions and each government's policy position in relation to specific threats to health. A list of the individuals and organisations consulted is in Appendix 2. Because they are separately funded, we were not asked to consider HIV/AIDS programs but at the suggestion of the Steering Committee we interviewed several individuals whose experience in that area was particularly relevant to public health laboratory work. At this stage, we have not considered the role of private laboratories or met with their representatives.

Current Status

Major States

New South Wales

2.3 The New South Wales system is organisationally the most complex of the states. Historically, public health functions have been distributed over a number of laboratories, mostly hospital-based, mostly diagnostic in origin and mostly related to institutional development and the interests and expertise of individuals. Public health activities were largely a by-product of their clinical work. The problems in this arrangement were that it diffused scarce skills, provided no coordinated response to possible disease outbreaks and no clear lines of communication with the Health Department which was ultimately responsible for communicable disease control. There were also problems with the health care financing system in New South Wales under which Area Health Services were responsible for all public services to people in their region, including public health. The Health Department has made no direct payments for public health laboratory services since that system began. Facilities and expertise are not evenly distributed but for diagnostic testing cross-area purchasing arrangements were originally seen as meeting the need. However it is difficult to organise state wide services in that way - the 'free rider' problem which is characteristic of all public health activities applies just as much to health authorities as individuals.

2.4 A Public Health Laboratory network was therefore established in 1996 under which five laboratories were designated as having prime responsibility for seventeen identified public health functions, together with six 'hub centres' which would coordinate the activities of area laboratories associated with them. Advisory services to the Department of Health were also strengthened. Consistent with the Department's policy of contestable purchaser-provider contracting, the 'designated laboratory' role was to be open to competitive tendering for a fixed period, with the cost of their public services to be clearly identified.

2.5 While this arrangement worked well in some respects, a review in 1998 found that it had not provided the visibility or the leadership envisaged in the PHLN structure. The recently accepted Watson report therefore recommended that while the network system should continue, one of designated laboratories

take on a coordinating role under a direct (and contestable) contract with the Health Department. It should also undertake any residual functions not allocated to a "designated' laboratory and its funding through the relevant Area Health Authority should be guaranteed. The Department should set aside a small contingency provision for dealing with outbreaks and problems of a state-wide nature.

2.6 The New South Wales system is thus a compromise in many directions - between traditional alliances and the demands of public accountability; between the arguments that the skills needed to respond to emerging public health threats can only be developed in a central location and those which hold the links with clinical care to be essential; and between the principles of Area Health Service responsibility and the funding of population-wide services. The present arrangements are dominated by three large, hospital-based laboratories - The Institute of Clinical Pathology and Medical Research at Westmead Hospital (ICPMR), the South East Area Laboratory Service (SEALS) and the South West Area Pathology Service (SWAPS). Two of these have a strong historical association with public health. The ICPMR was originally co-located with the government's Division of Analytical Laboratories (DAL) at the old Lidcombe Hospital site -which is where DAL remains - and the SEALS structure brings with it the infectious disease tradition of the old Prince Henry Hospital at Little Bay. The allocation of reference laboratory functions reflects this history. Of the 17 identified specialties, the ICPMR (including DAL which the ICPMR now manages) is the designated reference laboratory for thirteen. The HIV laboratory at St Vincent's Hospital is the designated centre for that function. SEALS is the responsible laboratory for influenza and *Neisseria* - although some aspects of *N. meningitidis* are also allocated to the SWAPS - and it is jointly responsible for vaccine preventable diseases with ICPMR As yet, the hepatitis public health laboratory has not been designated. Details are in Appendix 3. However the major metropolitan area laboratories are not limited to their state reference functions and in principle at least, may provide some public health services in addition to their diagnostic work. SWAPS is a large diagnostic laboratory with a relatively limited presence in public health. The South East Area Laboratory Service is also large, provides a similar range of diagnostic services to ICPMR and has a continuing interest in communicable disease pathology.

2.7 The Department has designated some contingency funds for outbreaks and the hub laboratories would negotiate for additional funding in that event. As yet there are no IT links between laboratories in the NSW Public Health Network and NSW Health although this is recognised as a future project. A link has recently been established between ICPMR and the Department's Food Branch to enable electronic reporting of food-borne diseases. The law requires notification of designated disease cases but the system is paper based, dependent on the cooperation of doctors and laboratories and, anecdotally, is much less than complete. One paper has shown that of 461 cases of infectious disease reported from the Eastern Area of Sydney over a 6 month period, 75% were reported by the laboratory alone, 20.2% by doctors alone and only 4.8% by both. For laboratory-investigated cases, medical under-reporting was clearly very large (Rushworth et al, 1991). Furthermore, public health responsibility in NSW has always been divided on disciplinary levels. The major hospital-based laboratories have been seen as handling the primarily medical aspects, with the DAL providing forensic services and its environmental microbiology laboratory giving scientific support to the State's surveillance activities in relation to the health risks associated with food and water. It has had the main responsibility for food testing, for the quality of drinking water in rural areas and for a range of forensic services. However it has not had responsibility for metropolitan drinking water quality - that still remains with the supplying utility - and in the forthcoming review its public health and forensic roles may well be split. As in most states, the responsibility for actually collecting food and water samples is with local government.

2.8 How well the funding arrangements will work remains to be seen. Three Area authorities fund much of the state's laboratory activity - Western Sydney through ICPMR, South Eastern Sydney through SEALS and South Western Sydney through the Liverpool laboratory. All of them will need to identify the cost of their public health work and ICPMR is currently attempting to do so. There are, of course, historical guidelines and in the short run only the impact of the new system may need evaluation. However there are concerns over how well the public health financing can be 'ring fenced' in a predominantly clinical environment and how growth will be provided for. The issue is not confined to operating costs alone. ICPMR has no independent capital budget and no indirect access to such funds but its capital requirements are large and it has borrowed significantly for refurbishment and new equipment over recent years. As corporatised Business Units all of the area laboratories have a similar capacity to borrow. However it may be much harder to establish a purely business case for investment in public health facilities than in the higher turnover diagnostic areas of a large laboratory's activity.

Victoria

2.9 The Victorian system is more centralised but not entirely so. The responsible Department - Human Services - supports the four main public health laboratories within the state. They are the Victorian Infectious Diseases Reference Laboratory (VIDRL) funded through the North Western Health Care Network; the Microbiological Diagnostic Unit, located

in the University of Melbourne's Department of Microbiology and Immunology, the Victorian Institute of Animal Sciences (VIAS) at Attwood (for its participation in the arbovirus surveillance program); and the State Chemistry Laboratories which have now been corporatised within the Department of Natural Resources and Environment. The two major laboratories are complementary. VIDRL provides viral isolation, serology and mycobacteriology; MDU provides bacteriology. This is largely for historical reasons - the MDU was actually established in the bacteriological heyday of last century, whereas VIDRL originated much later in the old infectious diseases hospital at Fairfield. VIDRL operates the national High Security quarantine laboratory. The MDU is a national (and WHO) reference centre for phagetyping of *Salmonella* Typhimurium and a small part of its health department funding comes from the Australian Health Ministers Advisory Council for the National Enteric Pathogen Surveillance system. It is also the main centre for food poisoning investigation. The only significant laboratory outside this system is at the Royal Women's and Children's Hospital which plays a major role in EHEC work. It is financed by the Western Metropolitan Area Network from its own funds.

2.10 The funding and service agreements with the four main laboratories cover routine and sporadic tests of public health significance; laboratory testing to assist in outbreak control, technical advice, and where necessary site attendances; reference laboratory roles at both state and national levels and participation in training, committees and working groups. Research and specific projects are funded separately from project grants. MDU is responsible for the molecular typing of vancomycin resistant enterococci (VRE) and for managing the Victorian Hospital Pathogen Surveillance System. An infection control practitioner is funded by the Department in a joint appointment with the unit. As in other states, major research projects at both laboratories are funded through the private/commercial sector.

2.11 No routine food sampling is carried out by Food Safety Victoria (part of the Public Health & Development Branch, Department of Human Services). Local government is required to take 3 samples per year per 1000 population. Analysis is carried out by analysts in the private sector and paid for by local government. There is a legislative requirement to notify certain organisms isolated from food. Victorian legislation requires all registered food premises and food vehicles to have a food safety program as a condition of their registration.

2.12 A similar policy applies to public diagnostic testing. Although both MDU and VIDRL have provided some diagnostic services to private hospitals and doctors on request, they do not offer them generally or actively compete with private pathology providers, particularly since a case was raised against MDU in relation to the pricing requirements of the National Competition Policy.

2.13 Routine testing of drinking water is performed by the state water laboratory, which has been taken over by the corporatised Sydney Water Laboratory (Water Ecoscience). Some private laboratories test water samples at large cost. MDU tests swimming pool waters and cooling tower water but only when these are perceived to be public health problems and it has no ongoing responsibility for drinking water quality.

2.14 The Department of Human Services is developing a new software system for notifiable infectious diseases and is working towards electronic data transfer from laboratories utilising HL7. The current system, of notification by doctors and private laboratories is paper-based, although the data base is computerised. The quality of reporting is unknown.

Queensland

2.15 Queensland has recently transferred all public pathology laboratories from the control of individual hospitals to a new entity known as Queensland Health Pathology and Scientific Services and in the process has almost completely separated public health laboratory work from diagnostic testing. The public health laboratories at Coopers Plains (previously called the Laboratory for Microbiology and Pathology) has been reconstituted and combined with the State Analytical Laboratories (chemical) and the state forensic pathology service under the title of Centre for Public Health Services. They are co-located with the National Research Centre for Environmental Toxicology and are the state reference laboratories for leptospirosis, legionella as well as a WHO designated arbovirus laboratory. Serology is now undertaken at the Royal Brisbane Hospital, diagnostic mycobacteriology (including TB) by the Prince Charles Hospital. Although both centres retain some public health functions, the laboratories at Coopers Plains do most of the population-based work. The only services currently outside the system are those of a few hospital laboratories in far north Queensland for basic testing. Salmonella serotyping is done at Coopers Plains but Queensland does not have the capacity to phage type. Isolates of *S.* Typhimurium are sent to the MDU in Melbourne, those of *S.* Virchow and *S.* Enteritidis to the IMVS in Adelaide.

2.16 The Queensland reforms are new and there are concerns in the diagnostic laboratories over the transfer of scarce expertise to the central body. There are parallel concerns amongst users over delays in serotyping at Royal Brisbane Hospital. However most public health personnel appear to support the move, one consequence of which is the opportunity to develop a standardised computer system allowing access to patient data from any facility linked to the

central laboratory. This system will be linked to the Notifiable Diseases System (NODS) of Queensland Health allowing a timely electronic transfer of information using standard test codes. By the end of 1999 approximately 30 hospital laboratories will be on-line (from a total of 37). Although the laboratory reporting system selected (AUSLAB, developed by a Victorian company) is reportedly excellent for Queensland's needs it is not compatible with the variety of systems used in other states. However Queensland Health is planning HL7 data transfer from both private and public laboratories for notifiable diseases and the AUSLAB link will be through HL7 protocol.

2.17 Queensland differs from other states in several ways. First, the Department of Health is responsible for food sampling, with samples collected by environmental health officers employed by the public health units, not by the municipalities. Costs are met by the Centre for Public Health Services, which is also responsible for both chemical and microbiological testing. Its recorded outlays may therefore be somewhat higher than for similar organisations elsewhere and will probably increase if, as is planned, food surveillance and environmental sampling are improved. On the other hand, the Department of Primary Industry (DPI) laboratories are relatively large and handle animal-related diseases of human importance to a greater extent than elsewhere. However the two have worked together on several issues, eg, Japanese B encephalitis, bat lyssavirus and Hendra virus (previous called equine morbillivirus).

South Australia

2.18 The Institute of Medical and Veterinary Science (IMVS) is set up under an Act which requires it to meet any reasonable requests from the Department of Human Services in relation to public health laboratory work. The two bodies have a health services agreement but no formal contract. IMVS does most of the public health work in South Australia but it is also the major diagnostic laboratory for the public hospital system and competes with private sector for out-of-hospital diagnostic services. It also operates a private company under the name of MEDVET which provides services to the animal and food processing industries on commercial terms. Its latex agglutination anti-sera are sold both nationally and internationally. In the human health area, IMVS is one of two National Reference Centres for salmonella identification and is quantitatively important in that field. In HIV testing it does all Western blots and with the Flinders Medical Centre group handles all of the viral load. It also does some of the public health testing for the Northern Territory, particularly from the Alice Springs area. The NT is charged for STD testing but not for National Reference Centre work.

2.19 With Western Australia, South Australia has by far the most centralised laboratory system. IMVS is a substantial operation, with an annual budget of over $65 million (of which about $30 million is met by the Commonwealth through a Health Program Grant for diagnostic testing) and it has expertise across all laboratory fields. The only state-designated reference centre outside IMVS is the Women's and Children's Hospital for meningococcal work and EHEC. This is also the only area where any significant number of isolates are sent interstate (to SWAPS in New South Wales for strain differentiation).

2.20 However IMVS does not do all public health examinations. South Australian Water, a government owned corporation under the Government Corporations portfolio runs its own laboratories and charges the health authorities for any testing on other than drinking water. While there are agreed protocols for testing as between SA Water and the Health Commission, there is a general belief that since corporatisation community-based work has fallen off (SA Water only test where they take water from, not rivers generally) and that work on organisms such as blue green algae has largely ceased. The Health Commission monitors water quality in remote communities although there are difficulties in organising appropriate microbiological testing. IMVS does legionella testing on air conditioning towers but this is paid for by local councils and some of them use private laboratories, Gribbles Pathology in particular. However there are no real data problems in this area.

2.21 All public testing of food is done by IMVS but industry testing under the food acts (and for commercial protection) is handled almost entirely by private contractors. There is concern over this - for example, in the Garibaldi exercise, the private laboratory is believed to have been aware that the sausages were contaminated but it had no legal obligation to inform the Health Commission. There are similar concerns over the lack of veterinary data (eg, Q fever in animals) since the IMVS is no longer allowed to provide routine diagnostic services in the veterinary area.

2.22 Both doctors and laboratories are required to notify specified diseases. The two main private laboratories, Clinpath and Gribbles Pathology, report well. Clinpath does so electronically but the Gribbles system cannot as yet. The Commission's OASIS computer system was intended to cover both doctor and laboratory notifications but for budgetary reasons that is no longer proceeding. Other laboratory systems, such as the GGG system now under investigation, are designed more for laboratory management and report production than for the capture of scientific data.

Western Australia

2.23 The Western Australia structure is similar to that in South Australia. PathCentre originated from a public health laboratory in the 1960s located at the Sir Charles Gairdner hospital as a TB hospital. Its present form comes from an amalgamation of the State Health Laboratory Service (for non-teaching hospitals), the pathology laboratory of the Perth Medical Centre (ex Sir Charles Gairdner Hospital) and the service laboratory for University of Western Australia. It was corporatised four years ago.

2.24 As with the IMVS, PathCentre provides diagnostic services to the public hospital system (though not to the other teaching hospitals which have their own laboratories) and competes with the private laboratories for other work through a Medicare health program grant, mainly in country areas. It is organised in four divisions, one of which is microbiology, including virology, bacteriology and public health. Its annual turnover is about $40 million of which about one third is Medicare money. The remainder comes mostly from the WA Health Department, for the public health laboratory component through a formal purchaser/provider contract. It provides all the microbiological testing of water and food. PathCentre is the WA reference centre for virology, serology and HIV, mycobacteria, listeria, vancomycin resistant enterococci, legionella, listeria and salmonella up to the phage typing stage. *S.* Typhimurium, typhoid and paratyphoid isolates are sent to MDU in Victoria and *S.* bovismorbificans and other identifications to IMVS. Turnaround times are an issue. PathCentre has developed nucleic acid techniques which provide a more rapid result and allow investigation to continue while awaiting the outcome of standard methods. PathCentre does most of the viral serology for the Northern Territory.

2.25 However as in South Australia, it does not do all of the WA public health work. The Royal Perth Hospital is the reference laboratory for Gram positive organisms, funded by the Health Department; the Princess Margaret Hospital is recognised for meningococcal disease and there is an arbovirus surveillance group at the University of Western Australia, also with Health Departmental support. The chemical testing of food, which is what absorbs most of the food surveillance budget, is largely done at the Chemical Centre (Department of Mines and Energy) and the Department of Primary Industry laboratory.

2.26 The laboratory services appear to work well but there are problems in communicating results to the Health Department. The food, water and clinical areas of PathCentre all use different computing systems. Data is sent electronically but it needs to be downloaded to departmental databases. PathCentre and all teaching/metropolitan hospitals are currently working on a system which would allow daily transfers of data (ULTRA, which is the same system as is used by the largest private laboratory, Western Pathology, and which does send in some data). However there is still no legal requirement for laboratories to report on notifiable diseases, only doctors. Departmental officers were unable to estimate medical compliance generally but it is believed to be low. For example, only 50% of STD cases and 70% of malaria cases are thought to be reported.

Tasmania, ACT and Northern Territory

2.27 Tasmania and the two Territories suffer from the disadvantages of small scale and, in the Northern Territory case, that of remote area provision as well. They all rely to varying degrees on interstate services but because both their geography and their economic circumstances are different, the adequacy of their arrangements must be judged on different criteria.

Tasmania

2.28 Tasmania has four major hospitals, two main public hospital laboratories and three large private pathology services. Most public diagnostic work is done at the Royal Hobart Hospital, which is the state reference laboratory for HIV, and does some specialised PCR work for hepatitis C etc. Launceston hospital has its own microbiology laboratory for routine work and the Burnie Hospital has a service agreement with it. The remainder of the North West coast is fully privatised through a consortium of the three major private laboratories, which use a common computer system, common purchasing etc. A small and very basic public health laboratory is run by the Health Department within the Royal Hobart Hospital but it is has no formal connection with the hospital and is almost entirely devoted to effluent, potable water and shellfish water testing for the Tasmanian Shellfish Quality Assurance Program and for local authorities, many of which use private laboratories in Tasmania and Victoria for most of their work. The Government Analytical Laboratories in Hobart - now part of the new Department of Primary Industry, Water and the Environment - have done some work in food and water testing and there is talk of amalgamating the two. Some food and water microbiology is also done for northern Tasmania at the Animal Health Laboratory in Launceston, which has a containment facility for viral work. None of these organisations could cope with a medium to large outbreak without private laboratory help.

2.29 Otherwise, most public health laboratory work is sent interstate, largely according to the preferences of the individual public and private laboratories. Serology is sent to the ICPMR at Westmead, to VIDRL in Melbourne, IMVS in Adelaide but also to private laboratories in Sydney and Melbourne. Legionella serology goes to VIDRL for urinary antigen testing, salmonellas to MDU. TB isolates are actually

sent to PathCentre in Perth - the low incidence in Tasmania makes local testing prohibitively expensive. However there are problems in these arrangements, particularly in relation to response times (partly due to 'batching' at the Tasmanian end) and gaps in reporting requirements to the Health Department. There is no legal requirement for mainland reference laboratories to do so and local laboratories may overlook the need to provide the additional information obtained from the reference services. However Tasmania has solved one of the problems commonly referred to in all States, namely, the practice of food manufacturers sending samples interstate in order to avoid any adverse reporting to the local health authority. Since 1997, the Tasmanian manufacturer or initiator of a test must report any positive result, wherever the test is performed.

Australian Capital Territory

2.30 The ACT population is smaller than Tasmania's but its health services serve much of the surrounding area of New South Wales and its capacity to provide specialised services is greater. Its public health pathology is split in two ways. General microbiology is divided between the Canberra Hospital laboratory (through ACT Pathology, a business unit of the hospital offering a free service to private community doctors in the ACT for the clinical management of patients and for inpatient services at the public and private hospitals) and Capital Pathology, a private provider. The Health Department regards their service as of similar quality and uses whichever can respond most rapidly for public health work. The hospital's microbiological laboratory has a contract with the hospital which specifies that it must undertake public health work. Capital Pathology has an agreement with the Department which has not been specifically costed but relies on historical payments for similar volumes of service.

2.31 Environmental health testing - food, water (drinking and recreational), legionella testing etc - is undertaken by the ACT Government Analytical Laboratory at Holder. Food sampling is a Health Department responsibility. The water authority has its own laboratory and the Analytical Laboratory has not sampled domestic water to date. However it is about to audit the water authority's program. Salmonella typing is the only significant function sent out - to the MDU in Melbourne. The volume is small (about one per week) but there are concerns about delay in the return of results. The laboratory also performs extensive testing for forensic toxicology.

Northern Territory

2.32 The Northern Territory has the smallest population of any jurisdiction with the most demanding distribution in terms of remote area service delivery, special public health problems associated with its tropical location and the highest proportion of Indigenous people who are at special risk (27% of the NT population are Aboriginal and Torres Strait Islanders). At the Departmental level it has a wide range of public health programs and in fact it devotes the highest proportion of its total health expenditure to public health of all the States and Territories.

2.33 However its public health laboratory services are the most diffused and its capacity to monitor food borne communicable diseases is the most limited. Its only dedicated medical facility is the microbiological laboratory at Royal Darwin Hospital which performs primary cultures for organisms of public health significance. Serology is performed for HAV, HBV, HCV, HIV, HTLV-1 but most other serology goes interstate. The Centre for Disease Control in the Territory Health Services funds two public health positions in the laboratory. It had subsidised PCR testing for *N. gonorrhoeae* and *Chlamydia trachomatis* but this has now ceased. There is no formal contract for services and the under the current policy of cost recovery, the hospital finds it difficult to fund public health work from its general budget.

2.34 Otherwise, the Territory relies heavily on transfers interstate and on the two main private laboratories which service most of the area's diagnostic work - Western Diagnostic Pathology (Perth) covers approximately 60% of all pathology, QML Pathology (Queensland) about 28% with the remainder done by Royal Darwin Hospital. The Alice Springs area sends much of its public health to IMVS and/or PathCentre in Perth. The private laboratories do some public health work for the Territory without charge, anecdotally through Medicare.

2.35 There is no public health food surveillance in the Northern Territory, although the Department of Primary Industries and Fisheries has an animal health laboratory capable of limited biological analysis. Water testing is the responsibility of the Department of Power and Water. The IMVS, AGAL in Melbourne and two Perth-based private analysts have been accredited under the relevant Health Act, but the extent of their usage is unknown.

2.36 The Territory's concerns include the costs of transporting specimens - about $65,000 per year for the Royal Darwin Hospital alone - but they are mainly with the delays which make effective public health responses impossible. Delays of up to three months have been noted between the sending of isolates and the reporting of results (via local public health units) to the Centre for Disease Control in Darwin.

Australia wide services

2.37 The Commonwealth is not actively engaged in laboratory work and the grants which it makes to some of the National Reference Laboratories and associated linkage programs are a very small part of the total operating cost - about $140,000 in 1997-98. Reference centre status does not necessarily involve national funding, although some small grants have been made by the Australian Health Ministers Advisory Council of which the Commonwealth is a member. Otherwise, its main contributions are in data gathering through the National Centre for Disease Control and in supporting the National Communicable Diseases Surveillance Strategy and the Public Health Laboratory Network. It also provides some indirect support through its separate funding of HIV/AIDS services, including its grant of about $1.3 million annually to the National Serological Reference Laboratory (NRL) in Melbourne which has evolved from an HIV laboratory to a quality assurance centre over a wide range of serological work. For example, it is currently receiving a one-off Commonwealth grant of $550,000 for a year to establish quality assurance panels for measles, rubella and chlamydia diagnostic technology and for continued quality assurance in HIV and HCV.

2.38 Outside the National Reference Laboratories the most significant national service is the Australian Animal Health Laboratory run by the CSIRO at Geelong, Victoria. The first isolation of Hendra virus (equine morbillivirus) in 1994 was performed by the laboratory in collaboration with the Queensland Departments of Health and Primary Industry. Since then, it has had a greatly increased role in the development of tests for zoonotic diseases and in their routine diagnostic and public health application to humans. The laboratory has provided facilities for testing of Hendra virus; human diagnostic testing for bat lyssavirus as well as testing on bats; Menangle virus in pigs and the screening of humans; and Japanese B encephalitis on Badu Island. Currently, one bat is examined each week at a cost of about $1000 each. The laboratory is also the Australian Rabies and Brucella reference laboratory. The rabies work has involved virus serology following vaccination and the testing of exposed travellers and animal handlers. The laboratory estimates that its human diagnostic testing costs at around $250,000 per year (about $1 million from 1994 to mid-1998) for which it receives no health sector funding. Its development work on Hendra virus has cost over $1.5 million since 1994. Bat lyssavirus has cost about $800,000 in development, but in this case it has received $600,000 in health funds. It has an informal association with VIDRL, has invested heavily in isolation laboratories and it is keen to extend its work, possibly through a greater participation in epidemiological studies.

2.39 There are two high level security containment facilities in the country, both located in Victoria. One is at VIDRL, the other at the Australian Animal Health Laboratory at Geelong. Both operate at highest level of security (PC4) and the AAHL claims to have exceeded that level in some respects. The VIDRL laboratory was recently used in a possible case of viral haemorraghic fever and the emergence of highly virulent strains of animal-based infection has meant that the Geelong facility is now in continuous operation, much of it for work of human health importance. Partly because of a breach of safety procedures in a university laboratory handling Japanese B encephalitis virus, the NHMRC has recently distributed a draft review paper on Pathogenic Microorganism Infection Containment in Australia, with the responses to be considered at the next meeting of the Australian Health Ministers' Advisory Council. The issues involve not only the levels of physical security required but also the special training of staff. PC4 level facilities are expensive to both establish and operate.

2.40 Finally, there are a number of networking arrangements which draw support from a variety of sources, including industry. The Australian Group on Antibiotic Resistance receives some drug industry support for a program which involves a group of hospitals sending 100 specific isolates annually for investigation, including staphlococci, pneumococcus, *E. coli*, and MRSA. The National Antimocrobial Resistance Surveillance Program is a related data collection service under which laboratories send routine data for evaluation of reliability. The National Enteric Pathogens Surveillance Scheme, based on the MDU, is a voluntary laboratory-based program which receives some national funding (through AHMAC) as does the National Neisseria Network based in New South Wales. We have not investigated all these linkages, partly because most of their support is either voluntary or covered by existing laboratory allocations or derived externally from industry.

Issues raised in consultations

Operational

Organisation

2.41 The most contentious issues, voiced by almost all participants but strictly outside our terms of reference, involved the organisational structure of the whole laboratory program - that is, whether public health testing should be centralised or decentralised, whether it should be linked with routine diagnostic work or separated from it, how much chemical and microbiological work should be co-located or further

linked, whether expertise should be concentrated in certain national centres or widely disseminated and so on. The State and Territory systems exhibit almost every combination. Two States - Victoria and Queensland - have almost completely separated diagnostic and public health work but only Queensland has concentrated most public health laboratory functions in a single institution. In Western Australia and South Australia a dominant institution combines most public health microbiological work with diagnostic services to both hospitals and doctors, but without performing all laboratory functions. New South Wales has the most decentralised public system, mostly hospital-based, but it is moving to stratify it rather more and to transfer the responsibility for environmental testing (food and some water) into the Health portfolio from another jurisdiction. Tasmania and the Territories rely, to varying degrees, on the services of both specialised laboratories in other states and private providers.

2.42 As pointed out earlier, there are supporters of all these arrangements. Laboratories in the more centralised states point to the economies of scale and the concentration of expertise which it provides; those who support decentralisation emphasise immediacy and the benefits of closer association with clinical services. There are even some who believe that technology has now reached the point where almost all accredited laboratories, public and private, should be able to perform all but the most exotic of investigations and that the major public health task will lie capturing the information contained in their results.

Information technology

2.43 All participants saw this as crucial. Most emphasised the need for data to be available in real time. Most collection is now done manually, as is the return of results from reference laboratories to referring laboratories and public health authorities, although there are cases where, fortuitously, compatible computer systems allow electronic transfer and access (laboratory notifications in Western Australia, for example). The integrated Queensland system has progressed the most. By the end of the year, almost all public laboratories will be recording standardised, accessible data using the same system, which will in turn be compatible with that used in Department's public health surveillance. Other jurisdictions are working towards it but there is no agreement on the most appropriate system and the existing investment of both public and private laboratories makes them very reluctant to change. National standardisation may be years off, if ever, but compatibility within the separate systems is an urgent priority.

Transport of specimens

2.44 This was raised in every State and Territory, though with most vigour by the smaller, more outlying jurisdictions. Anecdotally, it is also a major concern for private laboratories. It has been highlighted by the new IATA rules for the air transport of specimens or isolates which require high standards of protective packaging. The cost - about $110 per package - is the same whether one sample or ten samples are sent. Laboratories therefore tend to 'batch' their samples until an economic number is reached or, at the extreme, use other testing methods. The resulting delay has no effect on patient management but it may prevent effective public health action. Some data provided by MDU showed that although most specimens were sent in reasonable time, delays of weeks were not uncommon and up to a month or more was not unknown.

2.45 As will be shown later, this reaction may be more emotional than rational and that the costs of transport may not, in aggregate, be a significant burden. However for the smaller and more remote laboratories they may well be important and a solution needs to be found.

Turnaround times

2.46 Public health officials in States and Territories which sent significant numbers of specimens interstate consistently complained of unacceptable delays in the return of results. Delays of weeks or more were said to be common. Tasmania and the ACT were particularly concerned with salmonella typing but also (for Tasmania) with the results of TB testing interstate. The Northern Territory had similar complaints - about different laboratories - over a range of testing. There was a feeling that interstate requests were treated as 'second class' although all of the reference laboratories denied it. There were, equally, complaints about in-state services - about delays in serology at the Royal Brisbane Hospital for example, or over Legionella testing in north Queensland. Some of this may have been due to the referring laboratories batching specimens for complex testing or to transport delays of which the senders were unaware but whatever the reasons effective public health action is compromised.

Diversity of test procedures

2.47 In many cases several tests are available to reach a diagnosis. However different results may be obtained, making interpretation difficult. This applies to both requesting and reference laboratories for which Quality Assurance programs and a degree of test standardisation are seen as highly desirable. It is particularly important in the food and water areas - in testing for cryptosporidium the three main water

laboratories use three different techniques - and should involve proficiency testing. Standardised diagnosis reporting would also be valuable.

Diversity of reporting procedures

2.48 States and Territories have different reporting requirements in relation to notifiable communicable diseases and the responsibility for it. Requirements to report on pathogens isolated from food and water are even less formal. There is a substantial loophole in most State regulations which require the reporting of positive results only on foodstuffs produced in the state. It is common for samples to be sent interstate to avoid that commercially damaging possibility.

Gaps in services

2.49 Many identified gaps in services were related to local conditions rather than national deficiencies. However there were several common observations. The first, which is of relevance to the AAHL case, was that with the privatisation of veterinary services in several states (one of which subsequently failed) the information on zoonoses relevant to human health has been substantially reduced. The second was that data on antimicrobial resistance is not collected routinely. There are several special interest groups examining it but the information is not coordinated or necessarily used by the public health authorities. One laboratory in New South Wales (the South Western Area Pathology Services) estimated that in the six hospitals it services, infection control took up to 50% of its public health work. Although the hospitals are charged for infection control surveillance, it can not recover the cost of molecular epidemiology or the investment in expertise needed to support this work. Infection control is primarily a hospital responsibility but it has a public health impact and much of the necessary knowledge resides in the public health laboratories.

Financial

2.50 Except for Tasmania and the Northern Territory, where budget limitations were clearly important, the laboratories did not consider their operating budgets to have been particularly limiting historically and although there had been some tightening in recent years they did not regard their present allocations as inadequate. There have never been identified contingency funds for outbreaks but the political impact of any significant threat to health has generally produced an adequate response. In contrast, they all saw equipment and development budgets as a major problem, particularly where government funding is indirect and the laboratories have to compete with acute care facilities for capital funds. IT equipment is one of the major items.

2.51 However all believed that the position would change with the further implementation of purchaser-provider arrangements with formal service contracts. Public health laboratory funding has traditionally been an interactive process in which programs and service levels have been negotiated with as much input from the expert providers as from the conceptual purchasers and operational adjustments have been accommodated by agreement as necessary. Although the service agreements now in place are relatively benign there is a general belief that the experience in privatised water services will be emulated - that is, only those services which are specifically paid for will be provided - and that the nature of public health does not allow a legally binding specification of its precise content. Investment in expertise would be a particular problem, particularly if contracts were short-term. Three to five year agreements are seen as necessary. Some of these issues are further discussed in the chapter on financing.

Summary

2.52 Table 1 summarises selected aspects of State and Territory laboratory services and our assessment of their capabilities in selected areas, after discussion with participants. Table 2 shows the issues regarded as particularly significant in each State or Territory.

TABLE 1 Capacity of public health laboratories, by State/Territory

Services	NSW	VIC	QLD	SA	WA	TAS	ACT	NT
PH Lab(s) part of Health Dept			–			–	–	
PH Lab(s) funded By Health Dept	Via areas	–		–	–			limited
Can handle appropriate human Microbiology within PH labs	–	–	–	–	–	X	Hospital +Private + PH lab	X
Routine testing of food and water in PH Lab	–	X	–	Food only	–	limited	limited	X
Can handle appropriate PH microbiology relating to food	–	–	–	–	–	limited	–	X
Can handle appropriate PH microbiology relating to water	–	–	–	–	–	limited	limited	X
Private sector involvement in PH work						–	–	–
State ref. Labs								
Virus typing	–	–	–	–	–	X	limited	X
Serology/HIV	–	–	–	–	–	X	limited	X
Salmonella typing								
- ex. phage	–	–	–	–	–	X	X	X
- phage	X	–	X	–	X	X	X	X
TB identification/ sensitivity	–	–	–	–	–	X	X	X

TABLE 2 Issues identified as significant by health authorities and/or laboratories

Identified concerns	NSW	VIC	QLD	SA	WA	TAS	ACT	NT
Transport costs	–	–	–	–	–	—	–	—
Reference lab. turnaround times					–	–	–	–
IT facilities/ electronic data transfer	–	–	–	–	–	–	–	–
Delays in reporting to PH Units	–	–	–	–	–	–	–	–
Guidelines for referral of specimens					–	–		–
Reference lab. communication and advice on interpreting results	–	–	–	–	–	–	–	–
Service contracting and privatisation				–	–	–		–
Budgets, including capital funding	–	–				–	–	–
Standardised test methods			–	–	–		–	
Quality Assurance of reference labs		–		–	–			–

Financing

Expenditures

3.1 Any examination of public health laboratory financing should start with some estimates of the size of expenditures on this activity and their composition. The figures will always be estimates because in a system where public health and personal care are mixed, separating the public health component from the diagnostic services needed for the care of individuals will necessarily involve some judgement. As discussed earlier, the criterion is really a negative one - only those tests which are not used for the present treatment of patients should be included - and even then the allocation of costs must be somewhat arbitrary, whatever rules are used, because many of the costs are joint – in sample collection, for example. Most diagnostic tests have been only approximately costed and most of the public health ones not been valued at all.

3.2 Unfortunately even the broadest estimation is problematic at this time. It is not so difficult in the States and Territories where public health activities are centralised and separated, ie, in Queensland, Victoria and the ACT, though even in these jurisdictions there are many uncertainties. We attempted to collect whatever figures are available but the estimates which follow are very approximate indeed and are included only for discussion.

3.3 For the three 'separated' systems the preliminary results were as follows;

Queensland. The 1997-98 budget allocation to Queensland Health Pathology and Scientific Services was $13.75 million, but that included the forensic division and chemical/environmental services. The microbiology budget was about $5.2 million. Adding the serological work at the Royal Brisbane Hospital, the TB reference work at the Prince Charles Hospital and the basic public health services in smaller north Queensland laboratories gives an estimate of just over $6 million or about $2 per person covered per year. This is almost certainly an underestimate. The budgetary structure of Health Pathology and Scientific Services does not exactly parallel the split between communicable disease work and other activities, no administrative costs have been included and there may still be some activities hidden in the formally separated diagnostic services.

Victoria Human Services Department grants to VIDRL and the MDU totalled about $8 million in 1997-98. Core contracts with other laboratories (VIAS and the corporatised State Chemistry Laboratory) totalled $400, 000, but about $100,000 was paid for additional project work. Adding the relatively small expenditures of the Women's and Children's hospital group and the separate grants which VIDRL and MDU receive from the Commonwealth (ie, other than through the State) gives a total of around $8.8 million, or just under $2 per person covered. Note that in Victoria almost all of the routine testing of food and water is outside the public health budget.

ACT The Health Department laboratory spent $550,000 in 1997-98 on food testing, including sample collection, and water testing (recreational water, air conditioning towers, etc). Expenditures on microbiology by the Canberra hospital and under contract by the private laboratory have been estimated at about $200, 000, giving a total of around $750,000. For a population of 308,000, the average was $2.40 per person. The Health Department did no drinking water testing in that year.

3.4 For the other States and Territories, estimation is much more difficult and we did not have the resources to attempt it. The only 'mixed' laboratory which tried to separate its public health and diagnostic work, at our request, was PathCentre in Perth. Its estimate of purely public health outlays was between $1.4 and $1.5 million last year (or about $1 per person covered), but this was only part of the Western Australian effort. The cost of food testing by the Chemical Laboratories and that of microbiology at the other hospital and university laboratories is currently unknown. The South Australian Health Commission grant to IMVS for 'public health' was about $8 million last year. However this appears to have been related to all non-patient services and the communicable disease proportion is uncertain. We have no reliable data for New South Wales. The ICPMR is currently working to isolate its public health costs and the state's networking system will require their identification in other laboratories as part of its contestability provisions. However we could not pursue them in the time available.

3.5 If the separated state systems are a guide, the average laboratory expenditure on communicable disease testing may have been between $2 and $3 per person covered in 1997-98, or between $37 million and $55 million nationally. However there are so many differences in responsibility, service coverage and accounting methods that an extrapolation would be very hazardous as yet. Any serious discussion of financing options must have much better data as a

base. The figures above are order-of-magnitude indicators only.

Financing issues

3.6 This report covers only the first part of a larger study of the financing of public health laboratory activities. Its main purpose was to analyse the operational and financing structures, identify issues of importance to participants and consider the contribution which changes in financing might make to a better delivery of services.

3.7 As pointed out earlier, in most states operational funding was **not** seen as the major current concern by either the laboratories or the Health departments. With the exceptions of Tasmania and the Northern Territory, recurrent budgets while not necessarily generous were regarded as 'adequate', although access to funds for capital investment and development was a much greater problem. Both parties appeared to be more concerned with procedural improvements and a better handling of information than with quantitative expansion *per se*.

3.8 Some of this apparent satisfaction may relate to the elastic nature of the public health task and the way in which its budgetary allocations have been decided. It is not subject to the immediate demands of patients and doctors or to the technological imperatives which drive them. There are no absolute standards of adequacy, only different levels of risk management which may or may not be acceptable. More than in any other area, resource allocation has been by 'gentlemen's agreements' under which both funders and providers recognised the uncertainty of their commitments. Even now, the contracts or service level agreements in place demand only the meeting of 'all reasonable requests' by funders. No more precise specification is yet possible.

3.9 This situation will undoubtedly change, although public health activities will never be open to the same level of categorisation as, say, acute hospital care. But on accountability principles, attempts to do so will persist. All of the laboratories we visited were apprehensive of the result, in the belief that it would limit and mechanise their work. More importantly though, technology could put the whole organisation of laboratory work in question, since most of the community-based pathology services might soon be able to do most of the necessary tests at reasonable cost. However the implications are beyond the scope of this report. A simple transfer to Medicare funding would be inappropriate because public health activity is primarily concerned with intelligence gathering and the capacity to respond, whereas fee-for-service funding works best for the repetitive performance of recognised procedures. Some mixed arrangement might nevertheless be possible.

3.10 Within our present remit, there are several findings of financial significance which might be further examined. The first is the urgent need for better information handling and in particular, the upgrading and standardising of laboratory IT. Left to themselves, the separate jurisdictions may not agree for years and, as mentioned earlier, their existing (and new) investment makes change extremely difficult. Although national standards may not eventuate for some time, interfaces should be possible. This is an area in which a Commonwealth presence, through the NPHLN, may be very productive. A consultancy is currently under way to investigate the IT capacity of States and Territories in relation to the reporting of communicable diseases.

3.11 The second issue is more mundane. We noted earlier the impact which the cost of specimen transport appears to have on delays in obtaining test results, particularly for interstate referrals to specialised laboratories. IATA packaging rules for carriage by air were often mentioned. Batching of specimens is said to result. However, it is not clear what the aggregate costs actually are and whether the laboratories' reaction is justified. Data for salmonella phage typing requests to the MDU, the most commonly mentioned case, suggest that it and the IMVS received only about 5,000 out-of-state referrals in 1997. For each requesting laboratory, the transport cost was therefore relatively small, although for each item it may appear to be high. While interstate movements are only a small proportion of all specimen transport, a detailed study of them would be very useful. If movement expenses are delaying transmission, much of the test value may be lost and the intervention opportunities foregone may well outweigh the cost of meeting transport expenses in some way.

3.12 Finally, the funding of the Australian Animal Health Laboratory for human health work may need to be addressed, particularly its high security virus facility. Although it only involves some internal reallocation of federal government funding, the increasing separation and 'corporatisation' of Commonwealth agencies - together with substantial cuts to CSIRO finances over recent years - may mean that the public health services' interest in this facility needs a more formal support than the present *ad hoc* arrangements provide. Given the increasing importance of animal-based infections, there is no doubt about the need for its work or about the substantial investment which the AAHL has already made. The issue is administrative, not scientific and is unlikely to be clarified by further research.

Future work

3.13 The most obvious need is to establish more accurately the present level of expenditures on public health laboratory work and the levels of testing activity which that expenditure supports. The estimates we

have provided for those jurisdictions with 'separated' services are broad approximations only, largely because of organisational differences in the range of services covered, particularly food and water testing. Standardisation would require some detailed analysis, even at the aggregate expenditure level, because it would often cross departmental and/or authority boundaries. But it would not be technically difficult, given the cooperation of the States and Territories involved. Nor would the separation of the diagnostic and public health components of integrated laboratories' work. In Western Australia, PathCentre has already done so at our request, using the *'not for patient care'* criterion, although we have not had the chance to check the basis for calculation. The New South Wales proposals explicitly require it under the contestability provisions and as pointed out earlier, the ICPMR is working towards that end. It would be surprising if the records of IMVS in Adelaide were insufficient to allow a broad separation. Many tests may fall almost automatically into one or the other category and most laboratories should be able to estimate their direct costs with reasonable accuracy.

3.14 The task might nonetheless be somewhat time consuming for the providers. However such information would be needed whatever financing system was proposed. Fee for service funding explicitly separates unit costs from service volumes and although we would not favour it for public laboratories (because expertise and response capacity are as important as routine testing levels), there may be some circumstances in which the separate payment of direct costs is warranted. But even under block funding the relationship between payments made and work done cannot be avoided. Much of the laboratories' apprehension over purchaser-provider contracts is based on a fear that they might define the public health task too narrowly and ultimately resemble fee for service, without its demand-satisfying justification. Our preferred proposal would be for the present levels of outlay be 'ring fenced' on a population basis until issues of that kind are resolved, but this will still require better data for both expenditures and levels of activity than we have at present.

3.15 The second requirement is to explore the possible role of private pathology laboratories. As stated, we have not investigated it nor met with their representatives. It may turn out to be relatively limited. Although individual practitioners have previously expressed an interest and the necessary technology is certainly present in the private sector, the business imperative has always been more towards the high-volume, low-cost end of the market than the reverse. However the cost of specimen transport may be as important an issue for private providers as public ones and at the least, their possible participation in whatever funding arrangements might emerge should be canvassed.

Appendix 1

Laboratory Testing Covered by the Study

- These should include all tests related to notifiable infectious diseases (other than initial diagnostic culture).
- Tests of public health significance undertaken in microbiology and serology laboratories including STDs.
- Antimicrobial susceptibility testing where this is of public health significance, for example *Mycobacterium tuberculosis, Streptococcus pneumoniae, Neisseria gonorrhoeae.*
- HIV/AIDS would not be included in this project as it continues to be funded separately.
- Emerging pathogens with public health significance which may not be covered under notifiable diseases. For example, vancomycin resistant enterococci and MRSA.
- Zoonoses not covered under notifiable infectious diseases, for example bat lyssavirus equine morbillivirus or other emerging viral infections.
- Molecular microbiology and other subtyping (eg, phage typing) which allows further identification of isolates to aid in epidemiological investigations.
- Food microbiology relating to outbreaks of food borne illness including Shiga-like toxin (verotoxin) producing *E.coli* (EHEC).
- Water microbiology relating to outbreaks of water borne illness – this may need to include specialised water testing laboratories especially if the investigation relates to giardia and cryptosporidium.
- Water microbiology relating to legionella.
- Consideration should be given to the capability to perform rarely requested tests, the need to have the expertise and the lead time required to enable the test to be run within “emergency situations”.

Appendix 2
Organisations and people consulted

Date	Organisation	Interviewees	Position
9 Nov 98	Canberra Hospital, ACT	Dr Peter Collignon	Convenor, National Antimicrobial Resistance Surveillance Program (NARSP); also Australian Group on Antimicrobial Resistance (AGAR)
13 Nov 98	Commonwealth Dept of Health & Family Services	Ms Claire Caesar	Director, Surveillance and Management Section, Communicable Diseases and Surveillance Branch
		Dr Cathy Mead	Branch Head, National Centre for Disease Control
	ACT Department of Health and Community Care	Ms Irene Passaris	Director, Health Protection
		Paul Reedy	Director, Scientific Services
16 Nov 98	Queensland Health Department	Dr Linda Selvey	Communicable Diseases Unit
		Peter Lewis-Hughes	State Manager, Queensland Health Pathology and Scientific Services
		Jim Dodds	Manager, Environmental Health Unit
	Centre for Public Health Services, Coopers Plains	Dr Michael Moore	Director
		John Bates	Microbiology
		Alexander (Sandy) Findlay	Public Health
		Greg Smith	Virology
	Royal Brisbane Hospital	Dr Joan Faoagali	Director of Medical Microbiology
17 Nov 98	Queensland Health Department	Dr Diana Lange	Chief Health Officer
		Dr Rod Davison	Public Health Registrar, Brisbane North Public Health Unit
18 Nov 98	NT Health Services	Dr Vicki Krause	Director, Centre for Disease Control
		Dr Angela Merianos	Head Immunisation/Surveillance, CDC
		Dr Jan Savage	
		Dr Jacki Mein	Coordinator, NT AIDS/STD Program
		Ms Kerry-Ann O'Grady	MAE Scholar
		Dr Christine Connors	MAE Scholar
			District Medical Officer, Rural Health Services
	Royal Darwin Hospital	Dr Bart Currie	ID Physician
		Dr Gary Lum	Director of Pathology & Microbiology
		Jim De Boer	Head Scientist, Microbiology
		Richard Powell	Lab Manager, Pathology Department
19 Nov 98	South Australian Department of Human Services	Dr Rod Givney	Medical Officer, Communicable Diseases Control Branch
		Dr David Cunliffe	Scientific Officer, Environmental Health Branch
		Mr Brian Delroy	Manager, Food Section
20 Nov 98	IMVS	Prof Barrie Vernon-Roberts	Director
		Prof Chris Burrell	Head, Infectious Diseases Laboratory

Date	Organisation	Interviewees	Position
20 Nov 98	South Australian Department of Human Services	Dr Brendan Kearney	Executive Director, Statewide Services
23 Nov 98	Health Department of Western Australia	Dr Jag Gill	Director, Communicable Diseases
		Dr Tony Watson	Medical Coordinator, Communicable Diseases
		Mr Kim Leighton	Food Scientist, Environmental Health Service
24 Nov 98	Pathcentre	Dr David Smith	Director, Microbiology Laboratory
		Mr John Fryer	Financial Controller
		Mr Ray Mogyorosy	Scientist in charge, Food and Water
25 Nov 98	Dept of Human Services, Victoria	Dr William Hart	Chief, Health Intelligence and Diseases Control, Public Health and Development Division
		Dr John Carnie	Head, Disease Control Section
		Ross Andrews	Manager, Surveillance and Risk Assessment, Disease Control Victoria
		Rodney Moran	Financial Controller, Population and Risk Reduction Unit, Disease Control Victoria
		Ellen Kitson	Food Safety Victoria
		Jan Bowman	A/g Head, Community Program Development Section
		Martyn Kirk	Epidemiologist, Environmental Health Unit
	Australian Animal Health Laboratory, Geelong	Dr Tony Della-Porta	Manager, Technical and Support Services
		Deborah Middleton	
		Harvey Westbury	Manager, Diagnostic Services
26 Nov 98	National Serology Reference Laboratory	Dr Elizabeth Dax	Director
	Victorian Infectious Diseases Reference Laboratory	Dr Mike Catton	Head, Virology
		Dr Heath Kelly	Head, Public Health and Epidemiology
		Dr Gad Trevaks	General Manager
		Renato Raimondi	Business Manager
		Dr Geoff Hogg	Head, Microbiology & Laboratory Services
	Microbiological Diagnostic Unit, University of Melbourne	Dr Geoff Hogg	Director
27 Nov 98	Tasmania Dept. of Health and Human Services	David Coleman	Scientific Officer, Communicable Diseases Surveillance
		Eric Johnson	State Food Officer, Environmental Health
		Peter Carmichael	Business Support Officer
	Public Health Laboratory	Jane Hudspeth	Microbiologist
	Government Analytical and Forensic Laboratory	Stephen Dolliver	Manager
		Ros Pyrke	A/g section head, Analytical Chemistry
		Jim Atkinson	Business Manager

Date	Organisation	Interviewees	Position
30 Nov 98	NSW Department of Health	Ross O'Donoughue	Head, Health Protection
		Helen Cox	Principal Lab. Liaison Officer
	National Centre for HIV Epidemiology	Dr John Kaldor	
1 Dec 98	Institute of Clinical Pathology and Medical Research (ICPMR)	Prof Cres Eastman	Director
		Prof Lyn Gilbert	Director, Microbiology
		Ray Mallon	Manager, Microbiology
		Dr Ed Crematy	Director, DAL
		Dr George Ibrahim	Deputy Director, Food Science Services, DAL
		Graham Cook	Deputy Director, Environmental Science Services, DAL
	South East Area Laboratory Service, Prince of Wales Hospital, Randwick	Prof Syd Bell	Director
		Prof John Tapsall	Senior Microbiologist
		Prof Bill Rawlinson	Senior Virologist
		Dr Peter Robinson	Senior Serologist
		Paddy Hoban	Business and Finance
	South West Area Pathology Service, Liverpool Hospital	Prof. Rosemary Munro	Director, Microbiology & Infectious Diseases
		Wyndham Timmins	Operations Manager
12 Jan 99	ICPMR	Dr Ross Vining	Deputy Director
13 Jan 99	Animal Health Laboratory, Launceston	Trevor Pickett	Senior Admin Officer

Appendix 3

New South Wales Public Health Laboratory Network: designated reference laboratories.

Laboratory	*Function*
ICPMR/DAL	Arboviral diseases Enteric and food borne diseases Legionella Medical entomology (other than arboviral) Malaria and parasitic diseases Quarantinable and other imported diseases Vaccine preventable diseases (with SEALS) STDs TB and other mycobacteria Zoonoses
SEALS	Influenza Neisseria (*N.gonorrhoeae* and *N.meningitidi*s) Vaccine preventable diseases (with ICPMR)
SWAPS	*N. meningitidis* (with SEALS)
DAL	Water borne diseases
ST VINCENTS	HIV/AIDS