Network Report.
Laboratory Network
2008 and 2009

This final report describes chlamydia testing and test results in the ACCESS Laboratory Network for years 2008 and 2009 and describes the trends between the two calendar years.

The data in this report remains governed by the ACCESS collaborators and is not for general dissemination. Contact and further information at the ACCESS study website www.access-study.org

Key findings for Laboratory Network

Site participation
- 15 laboratories agreed to participate (4 private and 11 public).

Chlamydia tests:
- Data were available from all 15 laboratories;
- 438,172 chlamydia tests were collated over a two year period;
- 416,996 test results were included in analyses;
- Among those aged 16-29 years, 21.0% of tests were in 16-19 year olds, 42.9% were in 20-24 year olds and 36.1% were in 25-29 year olds;
- 68.7% of tests were in females; 72.9% were aged 16-29 years;
- 45.8% of female samples were urines
- 79.9% of male samples were urine;

Chlamydia tests results:
- Of the 416,996 test results, 29,112 were positive, giving a positivity rate of 7.0%;
- Chlamydia positivity was higher in males (8.7%) than in females (6.2%);
- In females, the highest positivity rate was in 14 and 15 year olds (13.9 and 13.7% respectively), and chlamydia positivity decreased steadily as the age increased;
- In males, chlamydia positivity was highest in 16-19 year olds (14.4%) and only after 24 years did the chlamydia positivity begin to decline steadily.

Funding
The ACCESS project is funded by the Australian Government Department of Health and Ageing (DoHA) through the Chlamydia Targeted Grants Program. A contract was signed between the Burnet Institute, University of New South Wales (UNSW) and the Australian Government Department of Health and Ageing (DoHA).

ACCESS Collaborating Organisations
- Centre for Population Health, Burnet Institute, Melbourne, VIC
- National Centre in HIV Epidemiology and Clinical Research (NCHECR), UNSW, Sydney, NSW
- National Serology Reference Laboratory Australia (NRL), Melbourne, VIC
- Perinatal and Reproductive Epidemiology Research Unit (PRERU, incorporating the National Perinatal Statistics Unit [NPSU]), UNSW Sydney, NSW

Laboratory Network Steering Committee Membership
- Wayne Dimech (Chair), National Serology Reference Laboratory, Australia, Fitzroy, VIC
- Fabian Kong, Centre for Population Health, Burnet Institute, Melbourne, VIC
• Assoc. Prof. Sepehr Tabrizi, Faculty of Medicine, Dentistry and Health Department of Obstetrics and Gynaecology University of Melbourne, VIC

1. Introduction

Since the 1990s in Australia there has been routine reporting of chlamydia diagnoses through the notifiable disease surveillance but no national collation of laboratory tests, the type of tests performed, the brand of tests used or their performance. The only routinely collected testing data source arises from Medicare which only represents Medicare rebated chlamydia testing and excludes large numbers of tests performed in public settings.

Collation of testing data is important to interpret passive surveillance trends. A small percentage increase in testing across Australia can result in a major increase in diagnoses reported. Without knowledge of the numbers of individuals screened and their associated patient information, interpretation of trends in passive surveillance data is difficult.

Collation of chlamydia testing data also enables monitoring of the accuracy of chlamydia testing being undertaken. Chlamydia tests are not regulated by the Australian government and a wide variety of commercial and in-house nucleic acid testing (NAT) assays are employed. NAT results can be influenced by poor sensitivity and specificity of the assays (especially poorly designed in-house assays), by cross-contamination of the test, leading to false positive results (1) and inhibition, leading to false negative results. (2)

In Australia only about 50 laboratories routinely test for chlamydia and about 75% of testing is conducted by 15-20 large laboratories. These 15-20 laboratories provide an opportunity to collect information from a large number of patients undergoing testing for chlamydia.

2. Objectives

The objectives of the ACCESS Laboratory Network are:

1) To establish a national network of laboratories for chlamydia sentinel surveillance.
2) To enhance data management systems of the laboratories with a view to routinely sending chlamydia surveillance data in an electronic format to the a central agency;
3) To monitor the extent and outcomes of chlamydia testing; and
4) To monitor the types of specimens being collected.

3. Methods

3.1 Sites and target population

All Australian laboratories testing for chlamydia were invited to participate in the ACCESS Laboratory Network. Laboratories were invited to participate through annual presentations at the National Serology Reference Laboratory, Australia (NRL) Workshop on Serology in 2007 to 2009 inclusive, advertisements in the NRL newsletter, through email, telephone calls and on-site visits.

Several documents detailing the ACCESS Laboratory Network program were sent to laboratories that expressed an interest in the program. These documents included: i) detailed description of the project; ii) a description of the project in lay terms; and iii) a technical bulletin detailing the technology requirements (Appendix A, B and C).

Twenty laboratories were approached and 15 (see Table 1) agreed to participate. Four other laboratories declined the invitation due to competing demands from other projects; two in Victoria, 1 in South Australia (SA) and 1 in Western Australia (WA). One other laboratory in New South Wales (NSW) was interested in participating but declined as they were due to change their information technology system.

Of the 15 participating laboratories, 11 were public laboratories and four were private. The 15 participating laboratories represented four jurisdictions in Australia (Table 1). No laboratories were recruited from Australian Capital territory (ACT), Northern Territory (NT), WA and SA. A formal agreement to participate was not deemed
necessary by the laboratories. All participating laboratories were provided with surveillance reports, an external quality assessment scheme for chlamydia and quality control samples. These quality assurance programs provide evidence of accuracy of testing and monitored variation in test performance. They also served to collect information on which assays were used by the laboratories at the time of testing.

The target population was all patients tested for chlamydia since October 2007.

**Table 1**: Participating sentinel sites, 2008 and 2009, Australia. Source: ACCESS Laboratory Network-sentinel sites

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<th>Address</th>
<th>Public/Private</th>
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<td>NSW</td>
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<tr>
<td>2 St.Vincent's Hospital</td>
<td>Institute of Laboratory Medicine - SydPath Level 6, Xavier Building, Victoria St, DARLINGHURST, 2010</td>
<td>Public</td>
<td>NSW</td>
</tr>
<tr>
<td>3 Douglass Hanly Moir Pathology Pty Ltd</td>
<td>14 Giffnock Avenue, MACQUARIE PARK, 2113</td>
<td>Private</td>
<td>NSW</td>
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<tr>
<td>4 Southern Health Pathology</td>
<td>Monash Medical Centre, 246 Clayton Road, CLAYTON, 3168</td>
<td>Public</td>
<td>VIC</td>
</tr>
<tr>
<td>5 Dorevitch Pathology</td>
<td>18 Banksia St, HEIDELBERG, 3084</td>
<td>Private</td>
<td>VIC</td>
</tr>
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<td>6 Royal Melbourne Hospital</td>
<td>Grattan Street , PARKVILLE, 3050</td>
<td>Public</td>
<td>VIC</td>
</tr>
<tr>
<td>7 Royal Women’s Hospital</td>
<td>Flemington Rd PARKVILLE, 3052</td>
<td>Public</td>
<td>VIC</td>
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<td>8 Victorian Infectious Disease Reference Laboratory</td>
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<td>Public</td>
<td>VIC</td>
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<tr>
<td>9 Clinpath Laboratories</td>
<td>19 Fullarton Rd KENT TOWN, 5067</td>
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<td>SA</td>
</tr>
<tr>
<td>10 Adelaide Pathology Partners</td>
<td>Ground Floor, Hilton Central, 50-56 Sir Donald Bradman Drive, Building 1C Hilton Central, MILE END, 5031</td>
<td>Private</td>
<td>SA</td>
</tr>
<tr>
<td>11 Royal Hobart Hospital</td>
<td>Campbell Street, HOBART, 7000</td>
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<td>TAS</td>
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<tr>
<td>12 Mater Adult Public Hospital</td>
<td>6th Floor, Mater Adult Public Hospital, Raymond Terrace, SOUTH BRISBANE, 4101</td>
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<td>QLD</td>
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<tr>
<td>13 Pathology Queensland - Central Laboratory (RBWH)</td>
<td>Sir Raphael Cilento Building, Cnr Bowen Bridge &amp; Herston Roads, Herston Hospitals' Campus, HERSTON, 4006</td>
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</tr>
<tr>
<td>14 Pathology Queensland - Cairns Laboratory</td>
<td>Cairns Base Hospital, Block 3 Gate 3, Lake Street CAIRNS, 4870</td>
<td>Public</td>
<td>QLD</td>
</tr>
<tr>
<td>15 Pathology Queensland - Townsville Laboratory</td>
<td>Townsville Hospital 100 Angus Smith Drive, DOUGLAS, 4810</td>
<td>Public</td>
<td>QLD</td>
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</tbody>
</table>
Funding of chlamydia testing in Australia comes from either Medicare funded testing or operational budgets of the hospitals under State-based funding. Generally, most of the testing from private laboratories can be assumed to be funded through Medicare. However, it is noted that some testing will be “coned out” i.e. not funded due to the restrictions placed on the number of funded tests allowed by a requesting clinician during a single patient episode. The proportion of tests in the Public Hospitals that are funded by Medicare varies widely depending upon the number and type of outpatient clinics and non-hospital based surgeries serviced. It is estimated that anywhere between 10-90% of all tests performed in Public Hospitals being funded through Medicare.

3.2 Data collection, extraction and management

Based on the variables known to be routinely and systematically recorded by laboratories, the following surveillance variables were collated in a line-listed format:

- Unique identifier*
- Doctor name
- Patient first name *
- Clinic name
- Patient surname* 
- Patient date of service
- Patient postcode 
- Patient date of test
- Result of chlamydia test

* These data were used to produce a non-reversible identifier for each patient but were not sent outside the laboratory’s information technology security system.

All test results from October 2007 onwards were included in the extract. Participating laboratories were asked to extract specific data from their Laboratory Information System (LIS) and GRHANITE software then captured these extracted data. The software de-identified the patient details, converted these data into a standardised format and sent the information to a central database via the Internet. All processes were automated and required little effort by the laboratory’s information technology staff. The software was designed and operated by Melbourne University and provided to the participating laboratory at no charge.

3.3 Governance and ethics

A steering committee was formed to oversee the Laboratory Network (see section page 1) with communication largely by email. The Chair of the ACCESS Laboratory Network was responsible for all contact with potentially participating laboratories and initiated the interaction between the participating laboratories and Melbourne University. The Network also sought regular input from the ACCESS coordinating committee which consisted of the ACCESS investigators.

The information collated by the ACCESS Laboratory Network was derived from routine clinical testing initiated by a requesting clinician and all personal patient information was de-identified using GRHANITE prior to being sent to the ACCESS database. Therefore, no ethical approval was deemed to be required which was confirmed by the Southern Health Research Directorate (Research Project Application number 09115Q) and Royal Hobart Hospital (Reference number H11120). Ethical approval had also been from other clinical networks, which all mentioned the collation of laboratory data in their applications. (Appendix D and E)

3.4 Data analysis

Data were analysed descriptively by age, sex and specimen site. The anatomical site of swabs collected by one site was not provided in their extract. Specimen sites were grouped as follows:

- Cervical
- Eye
- Genital – including all non-cervical, vaginal or urethral samples
- Rectal
- Swab - Site Not Stated
- Thin Prep (usually cervical swabs)
- Throat – including all upper respiratory tract samples
- Urethral – including penile and meatus samples
- Urine – including first stream, mid stream and unspecified collections
- Two further categories of “Other” and “Not stated” were used.
Chlamydia positivity was then calculated by dividing the number of positive results by the number of test performed. The 95% confidence intervals (CI 95: ) were calculated for these estimates using the MS Sequel function. Chlamydia positivity was estimated according to age, sex and specimen site. Indeterminate/unequivocal results and invalid information (e.g. vaginal swab results from male patients) were excluded from the analysis. For the overall estimates by age and sex, unknown specimens were included in the analysis with the assumption that they were genital specimens.

4. Results

Information on 438,172 (188,772 in 2008 and 249,400 in 2009) patient test results were collated by the GRHANITE software. Information was provided on all tests irrespective of the age of the patient, except Dorevitch Pathology were the data in 2008 only pertained to those aged 16 to 29 years. A total of 294,699 individuals were tested over the two year period. This represents approximately 1.5 tests per individual, ranging from 1.1 to 4.1 tests per individual depending upon the laboratory. Further analysis is required to determine if the increased numbers of tests per individual at certain laboratories were due to multiple sample sites being tested at a single episode and/or if the individual re-presented multiple times during the course of the study period.

4.1 Data quality

Data completeness was very high. A total of 438,172 (188,772 in 2008 and 249,400 in 2009) patient test results were collated by the GRHANITE software. Data was removed where the patient’s age was >90 or 0 years or left null (n=2,437), the gender was unassigned (n=15,510), or the results were equivocal or missing (n=3,229).

4.2 Chlamydia testing

Of the 438,172 tests, 21,176 were excluded due to incomplete or invalid information, leaving 416,996 tests (177,913 in 2008 and 239,083 in 2009). Of these tests, 286,485 (69%) were in females and 130,511 (31%) in males. A total of 288,671 tests (69% of the total) were conducted in 16-29 year olds. Table 2 shows the age and sex breakdowns of testing. There was an increase of approximately 20% in the numbers of chlamydia tests performed between 2008 and 2009.

Breakdown by States

No test results were contributed by any laboratory in WA, ACT or the NT. The proportion of all results obtained from participating States was 33.4% from Queensland, 32.1% from Victoria, 29.8% from New South Wales, 2.7% from South Australia and 2.1% from Tasmania with similar proportions of male and female specimens collected between each state.

Females

Among 16-29 year old females, 42.8% of tests were in 20-24 year olds compared with 34.7% in 25-29 year olds. About half the samples collected were urine with the other half being swabs from genital sites or site not specified, 3.1% were ThinPrep (taken for Pap testing) and only 0.4% were throat swabs.

Males

Among 16-29 year old males, 43.4% of tests were in 20-24 year olds compared with 39.6% in 25-29 year olds. The majority (85.9%) of male samples collected were urines, 2.8% were rectal swabs, 3.1% were urethral swabs and 2.5% throat swabs. Rectal swabs most likely reflect testing in men who have sex with men (MSM).
Table 2. Age and sex of patients tested for chlamydia, 2008-2009, Laboratory Network, Australia. Source: ACCESS LAB Network-sentinel sites

<table>
<thead>
<tr>
<th>Year</th>
<th>Age group (years)</th>
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<td>Overall (16-29)</td>
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<td>73</td>
<td>35,330</td>
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<td>130,319</td>
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<td>2009</td>
<td>16-19</td>
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<td>16</td>
<td>7,442</td>
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<td>20-24</td>
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<td>Overall (16-29)</td>
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<td>31,004</td>
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<td>Overall (16-29)</td>
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<td>73</td>
<td>78,266</td>
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<td>288,671</td>
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3.2 Chlamydia positivity rates

Of the 416,996 valid test results, 29,112 were positive, giving an overall chlamydia positivity rate of 7.0% (95% CI: 6.9 - 7.1%).

Females

In the two year period, chlamydia positivity in females aged 16-29 years was 7.6% (95% CI: 7.4-7.7 %); higher in females aged 16-19 years (11.7%) compared with 20-24 year olds (7.9%) and 25-29 years (4.4%) (Table 3). In females, chlamydia positivity declined steadily as the age increased (Figure 1). The highest positivity rate was highest in 14-15 year old females (13.9 and 13.7% respectively). Chlamydia positivity was 9.7% in vaginal swabs, 8.5% in urines, 7.0% in cervical swabs and 1.5% in throat swabs. Estimates were similar in 2008 and 2009.

Males

In the two year period, chlamydia positivity in males aged 16-29 years was 11.5% (95% CI: 11.3-11.8%); higher in males aged 16-19 years (14.4%), compared with 20-24 year olds (12.9%) and 25-29 year olds (8.8%). After 24 years of age the prevalence of chlamydia in men declined steadily as the age increased. In males aged between 16-29 years, chlamydia positivity was 11.8% in urine samples, 18.4% in urethral swabs, 6.6% in rectal swabs and 1.5% in throat swabs. Of the rectal swabs, the highest chlamydia positivity was seen in those aged 30-34 years (7.4%) followed by the 20-24 year age group (7.1%).
**Figure 1.** Chlamydia positivity in females and males by age in single years (13-40 years). Australia. Source: ACCESS Laboratory Network-sentinel sites
### Table 3. Chlamydia positivity by age and sex, Laboratory Network, 2008-2009. Australia. Source: ACCESS Laboratory Network-sentinel sites

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Chlamydia Tests</th>
<th>Chlamydia Positivity Rates</th>
<th>Chlamydia Tests</th>
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<td>16-29</td>
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<td>115,416</td>
<td>210,405</td>
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<td>73,091</td>
<td>3,244 4.4 4.3 4.6</td>
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<td>5,618</td>
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<td>12,653</td>
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Table 4. Chlamydia positivity by age group, sex and anatomical site, Laboratory Network, 2008-2009. Australia. Source: ACCESS Laboratory Network-sentinel sites

<table>
<thead>
<tr>
<th>Site</th>
<th>Age group (years)</th>
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<th>Males</th>
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<td>Positivity</td>
<td>Tests</td>
<td>Positive</td>
<td>Positivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>n</td>
<td>%</td>
<td>Lower 95 CI (%)</td>
<td>Upper 95 CI (%)</td>
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<td>Cervical</td>
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<td>9.1</td>
<td>10.3</td>
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5. Discussion

This report has demonstrated that data collected by the ACCESS Laboratory Network is unique in size and scope, providing data on over 438,000 patients from fifteen Australian laboratories over a two-year period. Approximately 50% of all valid tests were in women aged 16-29 years.

**Positivity Rates:** Chlamydia positivity was highest in men aged 16-19 years (14.4%; 95% CI: 13.8 – 15.0%). These findings reflect that mainly higher risk men are seeking chlamydia testing and may help explain the trends observed in passive surveillance whereby more chlamydia diagnoses are reported in women.

The laboratory data collated also provided important information about the range of specimen types collected for chlamydia testing. Urine samples were the most commonly collected specimen. In many remote areas in Queensland where chlamydia prevalence is high, self-collected vaginal swabs are routinely collected rather than urines, which may reflect why higher chlamydia positivity rates were found in these sample types.

Chlamydia positivity was higher in urines collected in females (8.5%) than cervical swabs (7.0%). Chlamydia infects columnar epithelial cells found in the cervix and the urethra but not in the vagina. Samples obtained from the vagina and in urine contain infected cells sloughed from the cervix and/or urethra. The data indicates that there are a higher proportion of positive results using these “indirect” sample types. It is difficult to interpret these findings without additional information but cervical swabs are often conducted when Pap smears are performed, so the lower than expected positivity rate could be due to cervical sample being collected from lower risk individuals undergoing preventive health screening. This is supported by the low rates of positivity in ThinPrep specimens (3.5%). Thin Prep samples are collected primarily for the routine screening of cervical dysplasia and neoplasms by Pap screening.

The rectal swabs in male patients enable the Network to assess chlamydia positivity in MSM and the finding from the ACCESS Laboratory Network was very consistent with the sexual health service network. Estimates of chlamydia positivity rates in MSM are very limited in Australia, with ongoing estimates with large sample sizes lacking. However the chlamydia positivity rates observed for rectal and throat swabs should be interpreted with cautions. The chlamydia NAT assays used in laboratories are only validated for samples that have a high likelihood of containing infected epithelial cells e.g. cervical swabs, vaginal swabs or first stream urine. However, the analysis showed that many other sample types, such as throat swabs and rectal swabs, are referred to pathology laboratories. These sample types must be validated by the laboratory prior to being tested but often the validation may not occur or not done comprehensively due to the difficulties collating sufficient samples. That being said, a recent report indicates that rectal swabs are an effective sample type for the diagnosis of chlamydia infection. (3)

**Strengths and limitations:** Despite the ACCESS Laboratory Network providing a very large sample size, the data reflects only about 50-60% the total testing in Australia. Some laboratories simply declined to participate in the pilot program. Also difficulties were experienced in implementing the GRHANITE extraction system within the project time frame due to limited capacity at the University of Melbourne. Combined with some laboratory security systems precluding the direct export of results by GRHANITE, the large data set being extracted and the need to modify GRHANITE on multiple occasions due to the bespoke nature of many of the laboratories data collection systems, lead to the delay in implementation of GRHANITE. These factors should be taken into consideration if the ACCESS project is extended.

All participants of the ACCESS Laboratory Network were enrolled in the NRL quality control and external quality assessment schemes. Over time chlamydia positivity obtained through this systems will be reviewed to determine if episodes of contamination or is inhibitions were experienced by the laboratories. If the rate of chlamydia positivity increases or falls unexpectedly, this may indicate contamination or inhibition respectively.

These 15 participating laboratories represent less than half the number of laboratories testing for chlamydia in Australia. As they are very large laboratories, the data represents 50-70% of total testing. Even so, it will still be important for the ACCESS Laboratory Network to maximise the coverage of the laboratories. For example during the recruitment phase, the public health laboratories in WA and SA, IMVS and PathWest chose not to participate in ACCESS. These laboratories provide pathology services to all public hospitals and clinics and service the whole of the state. Therefore major populations of interest will have been missed in ACCESS.
One of the major strengths of the ACCESS project is the use of GRHANITE to collect de-identified patient records but still retain a unique code for each individual. The unique code allows data from clinical networks to be linked with the Laboratory Network data to improve the completeness of data extracted from the clinics, particularly the family planning network. Furthermore, the laboratory data can provide an external validation for some of the clinical networks. Another benefit of GRHANITE is that return visits by an individual can be tracked. Therefore re-infection rates can be assessed.

Generally, the introduction of the ACCESS Laboratory Network has been successful. Even though uptake by the laboratories was less than initially expected, an extensive data set was obtained from approximately one third of all Australian laboratories that test for chlamydia. The GRHANITE system was implemented successfully in each of these laboratories and collated data that was meaningful and of high quality and large volume. The robust chlamydia positivity estimates by single year has not been reported previously to our knowledge. The ACCESS Laboratory Network data set probably represents the most complete and extensive data set on chlamydia testing in Australia and is an important resource for understanding chlamydia epidemiology into the future. It describes the testing profiles of laboratories in at least four states. The system has the potential to be extended to more laboratories in Australia, thereby further adding to the data set longitudinally. It also could be easily modified to collect similar data for other tests, especially high risk infections such as HIV and hepatitis infections.

6. Conclusion and recommendations

The ACCESS Laboratory Network obtained agreement for participation from 15 laboratories representing approximately a third of all Australian laboratories testing for chlamydia. Results from all 15 laboratories were collected and analysed. In excess of 438,000 test results were collected, representing an extensive resource for future research. Data generated from the ACCESS Laboratory Network does not provide information on aspects such as aboriginality or risk factors. These elements can be obtained from the other Networks and the use of GRHANITE facilitates the combination of the datasets. A summary of all results obtained by the participating ACCESS Networks is provided below. (Appendix F and G). Although the ACCESS Laboratory Network has large numbers of results, it is important that these data are combined with other Network data to provide an enhanced surveillance of chlamydia testing and epidemiology.

It is noted that two major public health laboratories chose not to participate in the study. Together, these two laboratories service the bulk of SA and WA and test a significant number of collection sites from the Northern Territory. Therefore, access to a large proportion of tests from these regions, including a significant Aboriginal population, was not collected in the study. It would be advantageous if these laboratories could be encouraged by the Department of Health and Ageing to participate.

Considerations for future continuation or expansion of ACCESS include:

**Short-term recommendations:**
- Continuation of compensation of laboratories participating in ACCESS
- Ongoing periodic data extractions from laboratories and analyses from the ACCESS in a standard format
- Automated reporting back to participating laboratories and authorities

A development of a national database of chlamydia test results would provide access to a standard, complete and updated repository of test result data. This repository could be used to monitor trends in testing and map prevalence in different segments of the Australian community. Such a repository would reduce the need to approach laboratories individually, a laborious, time consuming and expensive task.

**Long-term recommendations**
- Adequate staffing for the implementation and ongoing servicing of GRHANITE
- Possible legislation making participation a state or federal requirement
- Expansion to other diseases of public and personal risk e.g. HIV, hepatitis
- Development of a national database to collect which laboratories test for chlamydia and what tests are employed
The processes used for the ACCESS Laboratory Network could be easily expanded to other diseases of high risk such as HIV and hepatitis infections. Currently there is no systematic or coordinated method of determining the numbers of tests performed for high risk diseases and no funding provided by any Australian governments; state or national. A major barrier to the development of a national database on Pathology testing is the fact that there are many differing LIS and each request to Pathology laboratories for the extraction of data is an additional burden on an already overstretched Pathology IT staff. If a standard system such as GHRANITE was introduced, laboratories would only need to comply with one method of data extraction, lessening the impact on their information technology staff.

7- References

1. Meader, E., Waters, J. and Sillis M. 2008. Chlamydia trachomatis RNA in the environment: is there potential for false-positive nucleic acid amplification test results? Sex Transm Inf; 84;107-110


7. Appendix

APPENDIX A:

Australian Collaboration for Chlamydia Enhanced Sentinel Surveillance (ACCESS)

DIAGNOSTIC LABORATORY NETWORK: STUDY PROTOCOL

One of six networks:
1. Sexual health clinics
2. Family planning clinics
3. Antenatal clinics
4. Aboriginal community controlled health services
5. General practitioners
6. Diagnostic laboratories

ACCESS collaborating organisations:
Centre for Epidemiology and Population Health Research, Burnet Institute (BI), Melbourne, Victoria
National Centre in HIV Epidemiology and Clinical Research (NCHECR), Sydney, New South Wales
National Serology Reference Laboratory, Australia (NFL), Melbourne, Victoria
National Perinatal Statistics Unit (NPSU), University of New South Wales, Sydney, New South Wales
Commonwealth Department of Health and Ageing (Funders)
DATE PREPARED: November 2007

PERIOD COVERED: November 2007 – June 2008

FUNDED BY: Chlamydia Pilot Program: Targeted Grants Program; Commonwealth Department of Health and Ageing.

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Introduction

The Australian Collaboration for Chlamydia Enhanced Sentinel Surveillance (ACCESS)

Passive surveillance is the current chlamydia surveillance activity in Australia and involves laboratories and medical practitioners notifying all cases to state/territory health departments. In some states, data are only notifiable by laboratories. The notification form captures basic demographic data. Enhanced surveillance is conducted in some states/territories, involving the collection of more detailed epidemiological information (gender of sexual partner, place infection acquired and others) but is conducted in a limited fashion. There is no national chlamydia sentinel surveillance.

During the late 1990s, simpler testing became available to medical practitioners (urine sample for PCR testing) and the uptake of testing markedly increased. From that point onwards, annual chlamydia notifications rapidly increased, from 9,243 in 1997 to 47,057 in 2006. However, these trends are influenced by concurrent increases in testing. Separate analyses of Victorian and New South Wales chlamydia surveillance data showed that the number of chlamydia notifications and the number of tests were highly correlated. Subsequently, the collection of testing data is important to be able to interpret passive surveillance trends.

In response, a national chlamydia sentinel surveillance system program was proposed, and funded by the Commonwealth Department of Health and Ageing (DoHA) as part of the Chlamydia Targeted Grants Program. The program was titled 'The Australian Collaboration for Chlamydia Enhanced Sentinel Surveillance' (ACCESS). The main aim of the program is to establish a comprehensive surveillance system that will help to evaluate the impact of interventions designed to control genital *Chlamydia trachomatis* infection in Australia and will underpin Australia’s strategic response to chlamydia. The Commonwealth DoHA is planning to undertake a National Chlamydia Testing Project in the next few years to increase chlamydia testing and decreasing the burden of chlamydia disease.

The specific objectives of the overall ACCESS proposal will be to:

1. Establish six separate surveillance networks, each providing unique information on chlamydia testing.
2. Enhance the data management systems of sentinel sites with a view to routinely sending chlamydia surveillance data in a paper or electronic form to the managing organisation of the specific ACCESS network.
3. Monitor the extent of chlamydia testing at these sites and at a population level.
4. Determine the prevalence of chlamydia infection in a range of priority populations, including young heterosexuals, men who have sex with men, Indigenous people, pregnant women and sex workers.
5. Help interpret trends determined by other chlamydia surveillance mechanisms (i.e. NNDSS) in the context of interventions.

The six separate ACCESS surveillance networks include five separate clinical surveillance networks and one laboratory network. Each will provide unique information on testing uptake and prevalence of chlamydia in a range of priority populations: young heterosexuals, men who have sex with men, Indigenous people, pregnant women and sex workers. The six networks are:

1. Sexual health clinics
2. Family planning clinics
3. Antenatal clinics
4. Aboriginal community controlled health services
5. General practitioners
6. Diagnostic laboratories

ACCESS is collaboration between the Burnet Institute’s Centre for Epidemiology and Population Health Research (CEPHR), the National Centre in HIV Epidemiology and Clinical Research (NCHECR), the National Serology Reference Laboratory (NRL), and the National Perinatal Statistics Unit (NPSU). CEPHR has the responsibility for
establishing and managing three of the six networks: FPCs, AHSs, and GPs. NCHECR for SHCs, NPSU for ANCs and NRL for the lab network.

This protocol will focus on the Diagnostic Laboratory Network managed by the NRL.

**Rationale**

The majority of medium and large diagnostic laboratories throughout Australia test for chlamydia infection. The tests used are predominantly nucleic acid amplification tests (NAAT). NAAT are either commercial assays or in-house polymerase chain reaction (PCR) assays. The commercial assays are limited in number with only four options currently available: Becton Dickinson BDProbeTec ET, bioMérieux APTIMA(R), Roche COBAS Amplicor, and Roche COBAS TaqMan. The in-house assay are numerous. The performance characteristics of these tests have been demonstrated by a few laboratories, but often not in a systematic fashion. The pattern of use of these different tests is also not known. Subsequently if a new test was developed or appeared on the market, the performance of the kit in various populations would not be readily available.

When diagnosing chlamydia an initial stream urine sample is most commonly collected from both males and females. Less frequently cervical and/or urethral swabs (females) or urethral swabs (males) are collected. Most commercial assays are not validated for swabs from other sites such as rectal or throat swabs. The pattern of samples collected according to population and geographical location is not understood on a population-based scale.

Chlamydia is a notifiable disease, therefore all laboratories throughout Australia are required to notify their corresponding state and territory health departments when a sample is confirmed positive. Samples that test positive in an assay may not always be confirmed through retesting, either in the same assay or in a different assay. Therefore it is not possible to determine with certainty the percentage of false positive test results that occur. It is possible that specific commercial assays may have a higher false positive rate than others or conversely may miss infections through poor sensitivity.

The only formal collation of chlamydia testing data in Australia is through the Health Insurance Commission (HIC) and reflects testing which generates a Medicare rebate and thus does not include public laboratories funded through government sources. The HIC data also does not collate the results of the test.

The Commonwealth Dept of Health and Ageing is planning to undertake a national chlamydia testing project in 2008 with the likely aim of increasing chlamydia testing and decreasing the burden of chlamydia disease. Laboratory generated data will be integral to the success of this program. There is a need to have a streamlined mechanism in place to monitor the test results of diagnostic laboratories nationally.

When the targeted testing intervention is introduced, the diagnostic laboratory network will allow ACCESS to determine the change in testing requested by referring clinicians, the usage of different assays and sample types and the prevalence of Chlamydia in defined geographical regions. Critical to the success of ACCESS is the ability to marry data generated from the diagnostic laboratory network with that generated from other ACCESS networks.

**Overview**

The diagnostic laboratory network will involve collection, analysis and reporting of information on individuals tested for chlamydia from as many diagnostic laboratories throughout Australia possible. Initially, the target is to collect data from approximately ten sites which represent about 50% of all testing for chlamydia in Australia. On a quarterly basis, laboratories enrolled in the system will provide line-listed demographic and chlamydia testing data on all individuals tested for chlamydia. The Project Manager of NRL will work with participating laboratories to implement a secure, anonymous and automated method of collecting the prescribed data.

**System Objectives**

1. Establish a national network of diagnostic laboratories for chlamydia sentinel surveillance.
2. Liaise with laboratory data management systems with a view to routinely sending chlamydia surveillance data in an electronic format to the GP network central agency (Burnet Institute).
3. Monitor the extent and outcomes of chlamydia testing at diagnostic laboratories.
Site identification

At the NRL’s 24th Workshop on Serology, the ACCESS project was presented to senior staff from many diagnostic laboratories throughout Australia. About 70% of all laboratories were represented at the Workshop. A questionnaire requesting laboratories to notify NRL if they were interested in the ACCESS project was distributed. Replies were received forms over 20 laboratories and most indicated support for the project.

The NRL Project Manager will now identify a laboratory to act as a pilot site. This pilot laboratory will probably be a large private Melbourne laboratory to ensure they represent a large proportion of chlamydia testing within Australia and the data extraction developments may be used across the sister laboratories throughout Australia.

The following key steps will be undertaken:

- Identify the type of surveillance data available from the pilot laboratory
- Implement and refine the data extraction and collation system at the pilot laboratory
- Develop the coordinating centre database.

Following this pilot work, additional laboratories, which expressed an initial interest at the workshop to participate, will be approached in a stepwise and coordinated manner. The enrolment of new laboratories may be dependant upon their technical capacity. Initial implementation will be limited to a smaller group of laboratories, in order to address any technical issues and to ensure data collected are accurate and relevant. About 50% of diagnostic laboratories throughout Australia will be invited to participate by the end of 2008.

Not all laboratories throughout Australia will need to be directly approached to participate. Many laboratories act as network, often sharing laboratory Information Systems (LIS). Laboratories within the network may include large metropolitan laboratories and smaller regional laboratories. Collection of data from all of the laboratories within a network may be achieved by extracting data from the central laboratories’ LIS.

Network variables

The system will aim to only capture information that is routinely collated by the diagnostic laboratory. For example:

1. Referring doctor
2. Referring doctor’s clinic name
3. Patient date of service
4. Gender
5. Age
6. Postcode
7. Chlamydia test date
8. Chlamydia result
9. Sample type

Data recording

Other than the chlamydia result, the variables above are captured in LIS when chlamydia testing is requested and these data are in a format that can be extracted and analysed.

Data collection

Periodically, results in the data fields described above will be extracted by the laboratories’ IT staff in a format most convenient to them. At a scheduled time, chlamydia test results, patient names and other demographics details will be exported to files. These files will be held within the security of the laboratory. The exact nature of these files and the extraction process will be dependent on the export capabilities of the laboratory database, ideally delimited text files will be produced.

The ACCESS project will provide the participating laboratories with GRHANITE™ software to convert any identifiable information into an anonymous format but in a format that, if necessary, can be linked with similar information extracted from clinical sites in other networks. The software will locate the extracted file and convert
patient contact information (name, sex, date of birth and address) into a non-reversible encrypted linkage key (SHA-256 algorithm). The patient information will then become anonymous. However, the linkage keys will act as a unique identifier of the patient. Further confidentiality measures will be employed such as Advanced Encryption Standard (AES) and digital certification (RSA). GRANITE™ will facilitate the secure transfer of anonymous data from the laboratory to the coordinating centre via the internet using advanced, encrypted messaging.

At the coordinating centre, data will be imported into a central database. If required, laboratory data can also be linked with clinical data from other ACCESS networks such as GPs, Aboriginal Community Controlled Health Service and Family Planning. This process is possible as data extracted from the clinical sites will have the same linkage keys (derived from the patient’s details).

Additional information such as the assay used by each laboratory may be collected and analysed for ACCESS. These data are not usually stored in the LIS and will need to be collated in an alternative manner. The assay use does not change frequently and thus the information may be retrieved manually from laboratories if required.

**Data analysis**

The following analyses will be conducted:

1. Description of patients tested i.e. age group, sex, country of birth, etc
2. Chlamydia testing trends - the number of males and females aged 16 to 24 years who are tested for chlamydia by each laboratory over time
3. Chlamydia prevalence - the number of individuals tested for chlamydia who tested positive, overall and according to specific variables
4. Percentage positive chlamydia tests over time. These data may be used to determine significant changes in the testing population or changes in the laboratory testing procedure or assay performance.

**Reporting**

Diagnostic Laboratory Network reports will include the above analyses and will be provided to the sites on a biannual basis. These reports will also serve as an ongoing audit system for the laboratory. Results will be disseminated in aggregated format and published in a way that will not allow individuals to be identified. Data from the Diagnostic Laboratory Network will also be collated and reported bi-annually to state/territory health departments and the Commonwealth National Notifiable Diseases Surveillance System.

Quarterly progress reports will also be prepared for the DoHA.

**Outcome**

The main outcome measures for the Diagnostic Laboratory Network is to determine the current levels of chlamydia testing in Australia. Information derived from the ACCESS project will serve to provide a better understanding of chlamydia testing in Australia.

**Consent**

Consent is not being recommended to be sought by GPs from patients as the required sentinel variables are already been collected as part of the routine clinical consultation.

**Ethics**

Ethics approval will not be sought in the first instance. All data being collected will be obtained by the referring doctor or the laboratory routinely as part of the patient referral process. Any confidential data or information that will identify the patient will be irreversibly coded while the data are within the security and control of the laboratory. Only once the data is made anonymous will the data be sent outside the security of the laboratory.

Applications to local ethics committees will be lodged if the laboratory indicates that it is a requirement for participation. The application will be completed by the NRL Project Manager.
Steering committee

A steering committee will be established with representatives from the NRL (Wayne Dimich) and the Burnet Institute (Rebecca Guy) and Doug Boyle from CONDUIT, developers of GRANITE. Additional members from laboratories will be invited if they are interested.

Evaluation

The Diagnostic Laboratory Network will be evaluated as part of an overall evaluation of the ACCESS program (see main ACCESS protocol).
## Timeline

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<td><strong>Distribute expression of interest in participation at Workshop</strong></td>
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<td><strong>Agreement on data variables to be collected and format</strong></td>
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<td><strong>Formulate system design, site survey and protocol</strong></td>
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<td><strong>Establish Standard data collection methods</strong></td>
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<td><strong>Design database and reports</strong></td>
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<td><strong>Identify pilot site(s)</strong></td>
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<td><strong>Design electronic data transfer systems</strong></td>
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<td><strong>Begin discussions and enrolment of other Diagnostic Laboratories</strong></td>
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<td><strong>Develop methods of QC data extraction and data file transfer</strong></td>
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<td><strong>Quarterly collation of data</strong></td>
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References


APPENDIX B:

The Australian Collaboration for Chlamydia Enhanced Sentinel Surveillance (ACCESS)

Description of the project in plain language

ACCESS is collaboration between the Burnet Institute's Centre for Epidemiology and Population Health Research (CEPHR), the National Centre in HIV Epidemiology and Clinical Research (NCHECR), the National Serology Reference Laboratory (NRL), and the National Perinatal Statistics Unit (NPSU). CEPHR has the responsibility for establishing and managing three of six networks: Family Planning Clinics, Aboriginal Health Services and General Practitioners. NCHECR for Sexual Health Clinics, NPSU for Antenatal Clinics and NRL for the Diagnostic Laboratory Network. This document will focus on the Diagnostic Laboratory Network managed by the NRL.

The main aim of the overall ACCESS program is to establish a comprehensive surveillance system that will help to evaluate the impact of Australian Government sponsored interventions designed to control genital Chlamydia in Australia and will underpin Australia's strategic response to Chlamydia. Six separate clinical networks [sexual health clinics, family planning clinics, antenatal clinics, Aboriginal health services, general practices and diagnostic laboratories] have been established. Each Network has unique data sets. Through capturing data from each Network and combining them in a single database, a more complete understanding of Chlamydia infections testing in Australia can be obtained.

Aims

- To determine the prevalence of Chlamydia infection and frequency of testing of individuals presenting to diagnostic laboratories throughout Australia
- To combine data captured from different Networks into a single data base
- To employ software (GRHANITE™) that will convert patient details into a non-reversible, unique code that will allow matching of patient records obtained from each Network while maintaining patient anonymity
- To analyse the data collected, and produce reports to Government and publish scientific papers

Research Design

ACCESS is a national, multi-site prevalence study of Chlamydia testing throughout Australia. All Australian laboratories testing for Chlamydia will be invited to participate. Participating laboratories will be asked to extract specific data from their laboratory information system in a format convenient to them. GRHANITE software will be provided to the participating laboratory at no charge. This software will capture the extracted data, de-identify the patient details, convert the data into a form that can be imported into the ACCESS database and then send the data to the database via the internet. All processes will be automated and will require no intervention once established.

The study will capture demographic information and information relating to the Chlamydia test. The following variables will be collected:

<table>
<thead>
<tr>
<th>Unique identifier*</th>
<th>Patient first name *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor name</td>
<td>Date of birth*</td>
</tr>
<tr>
<td>Clinic name</td>
<td>Patient sex</td>
</tr>
<tr>
<td>Patient date of service</td>
<td>Patient postcode</td>
</tr>
<tr>
<td>Patient date of test</td>
<td>Patient result of chlamydia test</td>
</tr>
<tr>
<td>Patient surname*</td>
<td>Patient specimen type</td>
</tr>
</tbody>
</table>
* These data will be used to produce a non-reversible identifier for each patient but will not be sent outside the participants’ information technology security system.

**Method**

- Participating laboratories are requested to extract one month’s data from their Laboratory Information System for review. Patient details are scrambled or replaced with dummy names.

- The data extract will be provided to Melbourne University for review. GRHANITE will be formatted to accommodate the data provided by individual participants.

- Melbourne University will then provide the participant a diagnostic tool on a CD to be run on the participant’s computer. The CD will check for Internet connectivity, computer configurations and memory and send Melbourne University the information via the Internet.

- This supplemental information will be used to further configure GRHANITE to the participant’s environment.

- A fully formatted version of GRHANITE will be sent to the participant on a USB for loading onto their computer.

- Once loaded, the participant is requested to obtain a data extraction from October 2007 until the date of loading and place it in a pre-defined file directory. GRHANITE will collect the data and send it to the ACCESS database.

- The participant will then set up automating extracts on a weekly basis, sending the files to the directory. GRHANITE will automatically send data to the ACCESS database without further intervention by the participant.
APPENDIX C:

The Australian Collaboration for Chlamydia Enhanced Sentinel Surveillance (ACCESS)

Technology Information Sheet – Laboratory Network

Background

Chlamydia laboratory test results will play an important role in the establishment of effective Chlamydia surveillance. Achieving effective surveillance will require Chlamydia test data extraction from approximately 30 laboratories across Australia. To maximize the efficacy of the program, linkage of the test results to general practice and family planning clinic records is required. Achieving this linkage in a sustainable and ethically sensitive manner have been important considerations for the project.

Methods

To achieve effective data extraction and linkage, the Burnet Institute’s Centre for Epidemiology and Population Health Research is working in collaboration with the University of Melbourne. The University has been developing tools specifically aimed at providing secure, ethical health data infrastructures. The toolset is called GenetRic HeAlth Network Information Technology for the Enterprise (GRHANITE™).

Figure 1 illustrates the overall process.

Key points

1. The GRHANITE™ Software runs in the background on a Windows PC running Windows 2000 onwards. The PC should be relatively modern with a minimum of 1Gb RAM and 2Gb free disk space.

2. The PC must be connected to the internet for the purposes of the data upload.

3. If the laboratory system permits automated scripts to run for data extracts, these should be configured to be run from a batch file1. This batch file will be run as part of the GRHANITE™ data extraction process fully automating the extract.

4. If the extraction cannot be automated, GRHANITE™ will simply search for new data extract files in an agreed location.

5. The NSL, the University (or sub-contracted) engineers will work with the laboratory and software supplier to investigate the options for data extraction. GRHANITE tools can connect to the following technologies for the purposes of accessing raw data or pre-defined data extracts:

---

<table>
<thead>
<tr>
<th>Database</th>
<th>Database Management System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Access</td>
<td>CDBC</td>
</tr>
<tr>
<td>Dbase and FoxPro(DBF)</td>
<td>Oracle</td>
</tr>
<tr>
<td>Excel</td>
<td>Paradox</td>
</tr>
<tr>
<td>Lotus 1-2-3</td>
<td>PostgreSQL</td>
</tr>
<tr>
<td>Interbase / Firebird</td>
<td>SQL Server</td>
</tr>
<tr>
<td>MySQL</td>
<td>Text</td>
</tr>
</tbody>
</table>

6. When GRHANITE™ accesses data it removes patient demographics and replaces them with one-way encrypted linkage keys. GRHANITE™ uses a variety of algorithms centrally to later determine if records from more than one location refer to the same individual. Importantly, this means that names, dates of birth, addresses and similar details never leave the laboratory making it extremely difficult for the identity of individuals to be inferred at the central databank.

7. At install-time, RSA encryption keys\(^2\) are exchanged between the central databank and the laboratory establishing the authenticity of communications. The Advanced Encryption Standard (AES)\(^3\) is also used to secure data during transmission.

8. The GRHANITE™ software should not require any changes to internet firewalls. If the PC where GRHANITE™ is installed has an internet connection, communications should be successful. GRHANITE™ uses Web Services\(^4\) and all communications are initiated at the laboratory. The central databank is not able to initiate communications.

---


Figure 1 – The GRHANITE™ data extraction process

We will work with you to establish the best means of exporting data from the laboratory server. Ideally the patient details and Chlamydia test results will be exported to delimited text files. If the extraction can run from a .bat file, GRHANITE can automate the extraction.
APPENDIX D:

11 May 2009

Mr Wayne Dimich
National Serology Reference Laboratory, Australia
4th Floor Healy Building
41 Victoria Parade
Fitzroy VIC 3065

Dear Researcher,

Research Project Application No. 00115Q: Australian Collaboration for Chlamydia Enhanced Sentinel Surveillance (ACCESS)

Thank you for your email dated 04 May 2009. It is our understanding that this project is a quality assurance exercise involving collection, use and disclosure of data in a de-identified format. As such, we advise that it does not raise any ethical concerns and does not fall within the category of a 'research' project within the National Statement on Ethical Conduct In Human Research (NHMRC, 2007). This project does not require submission to the Human Research Ethics Committee. In addition, this quality assurance activity can be described as an activity to monitor, improve and evaluate the quality of health services provided by Southern Health.

Should you have any queries please contact me.

Yours sincerely

DEBORAH DELL
Administrative Officer
Research Support Unit

Cc: Ms Cindy Hawkins, Quality Director
Cc: Mr Russell McDonnell
APPENDIX E:

National Aboriginal Community Controlled Health Organisation

Australia Collaboration for Chlamydia Enhanced Sentinel Surveillance

Assoc Prof Margaret Hellard
ACCESS Coordinating Committee
C/O Centre for Population Health
Burnet Institute
85 Commercial Rd
Melbourne 3004, VIC

Dear Margaret and Basil,

Re: Australian Collaboration for Chlamydia Enhanced Sentinel Surveillance (ACCESS) program

I refer to your letter seeking support from the National Aboriginal Community Controlled Health Organisation (NACCHO) for the ACCESS project on surveillance for Chlamydia infection in Australia.

I am pleased to confirm that the NACCHO Board endorses the project, as indicated by the Memorandum of Understanding between NACCHO, the Burnet Institute and the National Centre in HIV Epidemiology and Clinical Research. The Memorandum of Understanding, signed in July 2008, describes the work that the three organisations will undertake in relation to the ACCESS Aboriginal Community Controlled Health Service surveillance network, in the context of the six networks that make up the overall ACCESS project.

I look forward to continuing our collaboration on this project.

Yours Sincerely,

[Signature]

Ms Dea Delaney-Thiele
Chief Executive Officer

8th May 2009

cc. Professor Basil Donovan, National centre in HIV Epidemiology and Clinical Research
### Appendix F and G: Results from all ACCESS networks. Year 2009

#### Table 1: Chlamydia testing rates by ACCESS network, sex, age group and Indigenous status, January to December 2009

<table>
<thead>
<tr>
<th>Break-down Category</th>
<th>Category</th>
<th>ANC network (1)</th>
<th>SHC network (4)</th>
<th>GP network</th>
<th>FPC network</th>
<th>ACCHS network</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Patients Tested</td>
<td>Patients Tested</td>
<td>Patients Tested</td>
<td>Patients Tested</td>
<td>Patients Tested</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>All patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>Males</td>
<td>32,182</td>
<td>74.3</td>
<td>36,550</td>
<td>6.3</td>
<td>9267</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>17,653</td>
<td>74.5</td>
<td>14,093</td>
<td>4.3</td>
<td>525</td>
</tr>
<tr>
<td>Age group (years)</td>
<td>16-19</td>
<td>3,543</td>
<td>74.5</td>
<td>9,231</td>
<td>5.3</td>
<td>2791</td>
</tr>
<tr>
<td></td>
<td>20-24</td>
<td>8,228</td>
<td>81.5</td>
<td>13,885</td>
<td>7.2</td>
<td>4169</td>
</tr>
<tr>
<td></td>
<td>25-29</td>
<td>7,076</td>
<td>80.9</td>
<td>13,434</td>
<td>6.1</td>
<td>2307</td>
</tr>
<tr>
<td></td>
<td>30-39</td>
<td>6,931</td>
<td>73.2</td>
<td>14,118</td>
<td>13.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40+</td>
<td>5,767</td>
<td>59.0</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Aboriginal and Torres Strait Islander patients (3)</td>
<td>Males</td>
<td>615</td>
<td>60.7</td>
<td>809</td>
<td>2.3</td>
<td>3012</td>
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<tr>
<td></td>
<td>Females</td>
<td>506 (5)</td>
<td>88.3 (5)</td>
<td>824</td>
<td>64.9</td>
<td>4540</td>
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<tr>
<td>Non Indigenous patients (5)</td>
<td>Males</td>
<td>16,000</td>
<td>74.7</td>
<td>13,284</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>12,889</td>
<td>74.1</td>
<td>21,081</td>
<td>7.7</td>
<td></td>
</tr>
</tbody>
</table>

SHS=sexual health services, FPC=family planning clinics, GP=general practices, ANC=antenatal clinics, ACCHS= Aboriginal community controlled health services (ACCHSs)

(1) ANC network data collection occurred between Oct 2006 and Jan 2010
(2) Testing rate could not be calculated by age group as the age break breakdown of patients was not available from all sites
(3) Based on data from NT between 2007 and 2008. Analysis of Aboriginal and Torres Strait Islander status was not conducted in sites in NSW, ACT, WA and QLD due to the small sample sizes.
(4) Data from only 80% of enrolled services
(5) Because of those with unknown status, the addition of ATSI and Non Indigenous patients don not add up to the “All patients” total amount for some networks
### Table 2: Chlamydia positivity rate by ACCESS network, sex, age group and Indigenous status, January to December 2009

<table>
<thead>
<tr>
<th></th>
<th>ANC network&lt;sup&gt;(1)&lt;/sup&gt;</th>
<th>SHC network</th>
<th>GP network</th>
<th>FPC network</th>
<th>ACCHS network</th>
<th>Lab network</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>1781</td>
<td>7.0</td>
<td>23,924</td>
<td>9.7</td>
<td>2,306</td>
<td>5.3</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>13,152</td>
<td>10.2</td>
<td>601</td>
<td>7.3</td>
<td>150</td>
<td>22.0</td>
</tr>
<tr>
<td>Females</td>
<td>1781</td>
<td>7.0</td>
<td>10,728</td>
<td>9.1</td>
<td>1,705</td>
<td>4.6</td>
</tr>
<tr>
<td>Age group (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-19</td>
<td>498</td>
<td>10.6</td>
<td>2,641</td>
<td>14.7</td>
<td>489</td>
<td>7.0</td>
</tr>
<tr>
<td>20-24</td>
<td>1283</td>
<td>5.3</td>
<td>6,708</td>
<td>13.4</td>
<td>1,001</td>
<td>5.5</td>
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<tr>
<td>25-29</td>
<td>5,726</td>
<td>9.9</td>
<td>816</td>
<td>4.0</td>
<td>603</td>
<td>3.6</td>
</tr>
<tr>
<td>30-39</td>
<td>5,075</td>
<td>5.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40+</td>
<td>3,401</td>
<td>4.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aboriginal and Torres Strait Islander patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>457&lt;sup&gt;(2)&lt;/sup&gt;</td>
<td>12.3</td>
<td>535</td>
<td>14.6</td>
<td>74</td>
<td>4.1</td>
</tr>
<tr>
<td>Non Indigenous patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>11,948</td>
<td>10.1</td>
<td>582</td>
<td>7.2</td>
<td></td>
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</tr>
<tr>
<td>Females</td>
<td>8,551</td>
<td>8.9</td>
<td>1,631</td>
<td>4.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SHS=sexual health services, FPC=family planning clinics, GP=general practices, ANC=antenatal clinics, ACCHS= Aboriginal community controlled health services (ACCHSs).

(1) ANC network data collection occurred between Oct 2006 and Jan 2010
(2) Based on data from NT between 2007 and 2008. Analysis of Aboriginal and Torres Strait Islander status was not conducted in sites in NSW, ACT, WA and QLD due to the small sample sizes

For more information about the ACCESS networks, see [www.access-study.org/](http://www.access-study.org/)