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**Evidence Check**

# Evidence review for NSW Sexually Transmissible Infections (STI) Strategy

An **Evidence Check** rapid review brokered by the Sax Institute for the Centre for Population Health, NSW Ministry of Health. October 2015.

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**This report was prepared by:**

Gill Schierhout, Rebecca Guy, Basil Donovan, John Kaldor

October 2015

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# Contents

Abbreviations .....	1
1 Executive summary .....	2
What is the evidence for effectiveness of interventions in sexual health services? .....	3
What is the evidence for effectiveness of interventions in primary health care settings? .....	3
What is the evidence for effectiveness of interventions in Aboriginal Community Controlled Health Services? .....	4
What is the evidence for effectiveness of interventions in antenatal settings? .....	5
What is the evidence for effectiveness of interventions in drug and alcohol services and in services for young people? .....	5
What is the evidence for effectiveness of interventions in emergency department settings? .....	5
What is the evidence for effectiveness of interventions in correctional service settings? .....	6
What is the evidence for effectiveness of interventions in other settings? .....	6
Overall conclusions .....	6
2 Introduction .....	7
2.1 Purpose and objectives of the evidence check .....	7
Overall guiding question .....	8
2.2 Approach .....	8
General process followed in the evidence check .....	8
PubMed search algorithm .....	9
Cochrane Library .....	9
Reasons for exclusion of articles .....	9
2.3 Limitations .....	9
3 Evidence for the effectiveness of STI interventions in different settings .....	11
3.1 Studies, interventions and settings included .....	11
Table 1: Classification of included studies by setting .....	11
Table 2: Broad categories of interventions potentially applicable across the settings .....	12
3.2 Sexual health services .....	12
Summary statement .....	13
Health system strengthening or support strategies in sexual health services .....	13

Strategies that decentralise how STIs are detected and managed in sexual health services.....	14
Box 1: Definition of partner notification approaches and terms – summarised from Althus 2014 <sup>6</sup> .....	15
Demand-side strategies in sexual health services.....	16
Box 2: Patient reminders.....	17
3.3 General practice/primary care.....	18
Summary statement.....	18
Health system strengthening or support strategies in primary care.....	19
Strategies that decentralise how STIs are detected and managed in primary care.....	20
Demand-side strategies in primary care.....	21
3.4 Aboriginal Community Controlled Health Services.....	22
Summary statement.....	22
Health system strengthening or support strategies in Aboriginal Community Controlled Health Services .....	23
Strategies that decentralise how STIs are detected and managed in Aboriginal Community Controlled Health Services.....	24
Demand-side strategies in Aboriginal Community Controlled Health Services.....	25
3.5 Antenatal services.....	26
Summary statement.....	26
Health system strengthening or support strategies in antenatal settings.....	26
Strategies that decentralise how STIs are detected and managed in antenatal settings.....	27
Demand-side interventions.....	28
3.6 Emergency departments.....	28
Summary statement.....	28
Health system strengthening or support strategies in emergency departments.....	28
Strategies that decentralise how STIs are detected and managed in emergency department settings.....	29
Demand-side interventions.....	29
3.7 Drug and alcohol services.....	30
3.8 Mental health services.....	30
3.9 Correctional services.....	30
Summary statement.....	30
3.10 Other settings.....	32
Summary statement.....	32
4 Overall conclusions.....	33
4.1 What is the evidence regarding the effectiveness of interventions conducted in priority settings to reduce transmission of priority STIs in priority populations?.....	33

4.2 What is the evidence regarding the effectiveness of interventions conducted in additional settings to reduce transmission of priority STIs in priority populations? .....	35
5 References .....	36
6 Appendix 1: evidence tables .....	40
Table A1: Summary of studies assessing the effectiveness of interventions in dedicated sexual health services .....	40
Table A2: Summary of studies assessing the effectiveness of interventions in primary health care settings .....	44
Table A3: Summary of studies assessing the effectiveness of interventions in Aboriginal Community Controlled Health Services .....	48
Table A4: Summary of studies assessing the effectiveness of interventions in Antenatal settings .....	50
Table A5: Summary of studies assessing the effectiveness of interventions in emergency departments ..	53
Table A6: Summary of studies assessing the effectiveness of interventions in correctional services .....	54
Table A7: Summary of studies assessing the effectiveness of interventions in other settings .....	56

# Abbreviations

ACCHS	Aboriginal Community Controlled Health Services
ED	Emergency Department
CDC	Centers for Disease Control and Prevention
CQI	Continuous Quality Improvement
GP	General Practitioner
HEADSS	Home, Education, Activities, Drug and alcohol use, Sexuality and Suicide youth assessment framework
HPV	Human Papilloma Virus
MSM	Men who have sex with men
NSW	New South Wales
PID	Pelvic Inflammatory Disease
PDPT	Patient Delivered Partner Therapy
RACGP	Royal Australian College of General Practitioners
SMS	Short messaging services
STI	Sexually Transmissible Infection
STIPU	NSW STI Programs Unit

# 1 Executive summary

This rapid review was commissioned by the Centre for Population Health, New South Wales (NSW) Ministry of Health and the Sax Institute to inform the development of the NSW Sexually Transmissible Infections Strategy 2016–2020. The focus of this review is on the effectiveness of interventions aiming to reduce the transmission of Sexually Transmissible Infections (STIs) in different settings. Consistent with the developing NSW STI strategy, this review focuses on interventions in relation to testing, treatment, partner notification and prevention of re-infection of three priority STIs (chlamydia, gonorrhoea and syphilis), in five priority settings (primary health care; sexual health services; Aboriginal Community Controlled Health Services; antenatal services; and services for young people) for five priority populations (gay and other men who have sex with men (MSM); gay men living with HIV; young people aged 16–29 years; Aboriginal and Torres Strait Islander people and people involved in sex work). The review was also tasked with identifying evidence for the effectiveness of interventions in additional settings (including but not limited to drug and alcohol services, emergency departments, mental health services and correctional services).

Papers that compared different interventions, or an intervention to ‘usual care’ were included in the review. We excluded general descriptive studies; studies specific to clinical efficacy and effectiveness, for example, those comparing one drug with another; and studies focused on assessing interventions that primarily aim to reduce sexual risk behaviour. Further, because the review was already broad in scope we did not include a specific focus on how the interventions that have been shown to be effective in different settings are best operationalised and integrated into core service delivery. Some of these areas may be considered for future reviews.

We searched for literature in two stages. First, a search for previous systematic reviews and overviews was conducted in PubMed, the Cochrane Library and Google Scholar. Second, we searched the Cochrane Library, peer-reviewed literature and grey literature for recent controlled trials and modelling studies, particularly for settings where review evidence was weak.

A total of 25 studies were included for review, including 12 systematic reviews 10 controlled studies and 3 mathematical modelling studies. Some studies were reported in more than one paper, and some included more data from more than one setting.

Papers included in the review reported on the use of more than 40 different interventions, sometimes assessed jointly. We synthesised findings in three broad categories: system strengthening or support interventions; strategies that decentralise how STIs are detected and managed by health care providers; and demand-side strategies that aim to motivate or remind patients to attend for screening or treatment.



## What is the evidence for effectiveness of interventions in sexual health services?

We found four systematic reviews, two modelling studies and two controlled observational studies that included evidence from sexual health services.

- System strengthening and support activities such as effective use of electronic health information systems to prompt clinicians to screen for priority STIs during routine clinic visits, opt-out strategies for syphilis testing and dissemination of guidelines are key strategies for which there is good evidence of effectiveness.
- Proactive evidence-based partner notification approaches (other than simply instructing people with diagnosed STIs to tell their partners) to facilitate testing and treatment of current partners are strongly supported by evidence. Notifying and treating current partners of chlamydia index cases is likely to be effective in reducing population prevalence of chlamydia. For individuals with high rates of partner change, notifying and treating previous partners should also be considered.
- Evidence for cost-effectiveness of point-of-care tests in sexual health clinics is emerging in countries similar to Australia.
- There is some evidence to support mail and telephone reminders and home collection kits for screening and rescreening for priority STIs, with short messaging service (SMS) reminders shown to be as effective as telephone or mail, while being cheaper.

Different strategies may be appropriate for different populations using sexual health services, including MSM.

## What is the evidence for effectiveness of interventions in primary health care settings?

We found two systematic reviews and four controlled studies reporting on intervention effectiveness in primary health care settings.

- System strengthening and support activities such as effective use of electronic health information systems to prompt clinicians to screen for priority STIs during routine clinic visits and multi-faceted quality improvement programs are key strategies for which there is good evidence of effectiveness on screening uptake in primary health care.
- Nurse-led models and greater involvement of practice nurses in STI screening in primary care is supported by available evidence.
- Provision of monetary incentives to primary care centres to increase screening has been shown to be effective only when coupled with other strategies to promote screening.
- There is limited evidence for the effectiveness of theory-based training aiming to change attitudes and behaviour of clinicians in relation to STI detection and management.

There was a general lack of attention to population health approaches to reducing STI transmission in the studies reviewed. Only one study was identified in which the intervention tested had a clearly defined 'cascade' model with increasing intervention intensity targeted to practices and local health systems with highest STI notifications. There was limited evidence to support or discount active reminders for rescreening of patients with a past STI implemented through primary care settings, patient-level incentives and removal of cost barriers to STI screening. There is a lack of evidence to guide what kinds of partner notification approaches are best suited to primary care.

### **What is the evidence for effectiveness of interventions in Aboriginal Community Controlled Health Services?**

We found one systematic review that assessed interventions in Aboriginal Community Controlled Health Services (ACCHSs) in remote Australia, and three controlled studies. We also draw on relevant aspects of evidence from primary health care more generally in forming an assessment of intervention effectiveness in this setting.

- Quality improvement interventions have been found to be effective in ACCHS; these incorporate flexibility to allow services to implement solutions that are suited to context.
- Based on evidence from other primary care settings, strategies that use electronic health information systems to prompt clinicians to screen for priority STIs during routine clinic visits may be effective in ACCHS.
- There is no evidence to support or discount provision of monetary incentives to ACCHS to increase screening rates, but evidence from other primary care settings suggests that provider incentives on their own are unlikely to achieve desired results.
- At the level of how people with STIs are managed, ACCHS may be well placed for playing a lead role in partner notification and treatment, but there is a lack of evidence to guide what these approaches should entail.
- There is emerging evidence that a health-centre level intervention for point-of-care testing for chlamydia can reduce the time between when diagnosis is made and treatment commences in remote Aboriginal and Torres Strait Islander communities. Early initiation of treatment is important to minimise the likelihood of complications, and of the infection being transmitted to others.
- There is little evidence to support or discount active reminders for rescreening of patients with a past STI. Attention also needs to be paid to tracking and minimising possible harms of partner notification and reminder strategies, particularly among vulnerable populations.

### **What is the evidence for effectiveness of interventions in antenatal settings?**

We identified five systematic reviews, one modelling study and one record review assessing intervention effectiveness in antenatal care.

- Based on modelling studies, it is cost-effective for the Australian health system to screen all young pregnant women in Australia for chlamydia.
- There is evidence from other countries that system strengthening and support activities such as use of electronic health information systems to prompt clinicians to screen, improved communication of antenatal screening guidelines and clinical leadership can be effective in improving screening uptake in antenatal settings.
- There is a gap in evidence regarding who should notify partners of pregnant women found to have an STI, and what kinds of partner notification approaches are best suited to women receiving care in antenatal settings.
- Antenatal services are diverse, and different detection and treatment strategies will be appropriate to different settings. Point-of-care testing for STIs in antenatal settings may be warranted in populations where loss to follow-up is a significant risk and where STI prevalence is expected to be high.
- Early (and regular) antenatal care is a necessary condition for optimal detection and treatment of STIs in antenatal settings. It will be important to continue to support efforts that encourage early engagement with antenatal care. In NSW this is likely to be particularly important for Aboriginal and Torres Strait Islander women, and pregnant women from newly immigrant communities.

### **What is the evidence for effectiveness of interventions in drug and alcohol services and in services for young people?**

We did not identify any studies meeting our inclusion criteria that assessed the effectiveness of interventions in these settings. In Australia, the addition of chlamydia screening to the comprehensive youth framework, the HEADSS (Home, Education, Activities, Drug and alcohol use, Sexuality and Suicide youth assessment framework), is currently being evaluated. Findings from this study are not yet available.

### **What is the evidence for effectiveness of interventions in emergency department settings?**

We identified two systematic reviews that included evidence assessing the effectiveness of interventions in emergency departments. The rationale for screening in this setting is that patients attending emergency departments may, for various reasons, be more susceptible to STIs than patients presenting at other parts of the health system, and therefore this contact with the health system may represent a cost-effective screening opportunity.

- Based on case finding from the single study identified in Australia, further development of STI screening models in Australian emergency departments may be warranted.
- Worldwide evidence shows that there are challenges in following up STI cases identified in emergency department settings, but that these can be mitigated through various system support strategies.
- Effective strategies to improve treatment of people diagnosed with STIs in emergency departments may include partnerships between emergency departments and primary health care facilities or STI clinics, and using point-of-care tests in these settings.

### **What is the evidence for effectiveness of interventions in correctional service settings?**

We found two systematic reviews and one modelling study reporting on evidence from correctional service settings.

- STI screening programs implemented in correctional service settings in other countries have shown good potential for high case finding of priority STIs.
- Correctional service interventions to detect and treat STIs can lead to reductions in chlamydia prevalence among women in surrounding areas, depending on characteristics of local communities and the correctional services population. Most intervention studies in this area have been conducted in the US, and further development of implementable models in Australia are warranted.

### **What is the evidence for effectiveness of interventions in other settings?**

We found two systematic reviews assessing intervention effectiveness in pharmacies.

- Pharmacies may have a role in facilitating access to partner treatment, through participation in expedited partner treatment strategies. The single high-quality study assessing a multi-component system-based intervention that include pharmacies in this role showed good evidence for effectiveness of the overall approach. Differences in the structure and model of pharmacies in different countries suggests that the feasibility of this approach for Australia would need to be specifically assessed.
- Pharmacies have been explored as a setting to provide opportunistic screening for young people. Studies describing current practice showed that pharmacists offered testing to select young people – with a range of factors influencing who was and was not offered a test, including fear of causing offence. Among those offered tests, uptake was low and after acceptance, rate of return of tests was also low.

### **Overall conclusions**

Overall, the evidence check identified substantial evidence for a broad range of interventions that have been shown to be effective in four of the five priority settings included in the review, and two of the four additional settings. Interventions identified in the evidence check varied widely in the level of resources required, with the more expensive interventions not always the most effective.

# 2 Introduction

## 2.1 Purpose and objectives of the evidence check

This project comprises a desk-based analysis of existing research across countries similar to Australia in the broad area of interventions for the detection and treatment of Sexually Transmissible Infections (STIs). The research was tailored to the needs of the New South Wales (NSW) Centre for Population Health and Ministry of Health (the Agency).

The evidence check was commissioned in order to inform the development of the NSW Sexually Transmissible Infections Strategy 2016–2020. A strong focus of the strategy is to be on the settings of interventions to effectively identify, prevent and treat three STIs (chlamydia, gonorrhoea and syphilis) in priority populations. An important focus of this review is to identify, for each priority setting, the scope of possible interventions, with a focus on those interventions that have been shown to be effective. Effectiveness was considered in relation to a broad range of intended outcomes of STI strategies, including decreasing STI prevalence, as well as increasing screening, testing, treatment and partner notification. There is considerable existing research that has been done both in Australia and internationally that could inform a 'settings-based' approach to STIs in NSW, but these data need to be identified and made accessible.

The overall purpose of the evidence check is to contribute to the development of an NSW STI strategy 2016–2020. The primary audience of the report is the NSW STI Strategy Working Group.

The evidence check was tasked with answering three research questions:

1. What is the evidence regarding the effectiveness of interventions conducted in priority settings with the ultimate aim of reducing transmission of priority STIs in priority populations?
2. What is the evidence regarding the effectiveness of interventions conducted in additional settings to reduce transmission of priority STIs in priority populations?
3. What is the evidence regarding the effectiveness of missed opportunities interventions to reduce the transmission of priority STIs in priority populations?

The priority settings to be included in the review were defined as: sexual health services, general practice/primary care; Aboriginal Community Controlled Health Services (ACCHSs); antenatal services; and services for young people. The additional settings to be included were: emergency departments, drug and alcohol services, mental health services and correctional services, particularly those for younger people.

Priority STIs were defined as: *Chlamydia trachomatis* infection (hereafter referred to as chlamydia), *Neisseria gonorrhoea* infection (hereafter referred to as gonorrhoea) and syphilis.

Priority populations were defined as: men who have sex with men (MSM), MSM living with HIV, young people aged 16–29 years, Aboriginal and Torres Strait Islander people and sex workers.

### Overall guiding question

What interventions that can be applied in different settings are likely to make the greatest difference to the sexual health of priority populations in NSW?

Focus on testing, treatment, partner notification and prevention of re-infection in the identified settings.

## 2.2 Approach

The approach to the review was guided by the Proposal provided by the Sax Institute. In the briefing discussion with the Agency, it was confirmed that that focus of the review should be on interventions in the areas of testing, treatment, partner notification and prevention of re-infection in the identified settings. This means that the large body of literature seeking to establish 'what works' in relation to reducing high-risk sexual behaviour, health promotion and broad public health prevention initiatives was not included. It was also confirmed that the findings of the evidence check may be presented by setting.

The main focus of evidence included in the review was on intervention effectiveness. General descriptive studies were not included except where these provided contextual information necessary to interpret the findings of studies that addressed questions of intervention effectiveness.

We developed a search strategy for identifying evidence for the review and provided this to the Ministry prior to finalisation. The strategy was developed considering the timeframe of the review, the large body of literature available, and the required focus on considering interventions by setting. We followed a systematic stepwise approach as outlined below.

### General process followed in the evidence check

1. Developed brief inclusion criteria that determine which studies were to be included
2. Searched relevant databases and websites (further details below) and contacted researchers in the field for possible studies. A stepwise search strategy was used
3. Screened all identified studies against inclusion criteria to create a 'master list'
4. Entered studies into an electronic database, developed data extraction templates, then extracted data
5. Described range of interventions documented in the different settings and synthesised evidence of effectiveness of the various interventions by setting.

The stepwise approach proceeded in the following way. We first searched for systematic reviews and overviews reporting on intervention effects in broad areas of interventions aiming to increase uptake of testing, treatment, partner notification and prevention of re-infection. Reviews were included if they: were published post 2010; included data from Australia or a similar country; included intervention effects disaggregated by one or more of the settings identified in the proposal; and met quality standards. For each of the reviews identified, we extracted data relevant to each of the priority settings and additional settings.

For any setting with major gaps in review evidence, or where updated evidence (for example, in relation to new technologies) was likely to be of interest to the Agency, we conducted a targeted search for evidence from other studies with a focus on randomised controlled trials, controlled trials and modelling studies.

For all settings, we sought to identify relevant contextual evidence from Australia to help to identify implications of the evidence for the NSW STI strategy.

We searched PubMed and the Cochrane Library and scanned websites of The King's Fund, Health Foundation, Nuffield Trust, WHO, NHS and The European Observatory on Health Systems. We supplemented this with a scanned table of contents for recent (not yet indexed) major journals in the field and searched the Aboriginal and Torres Strait Islander Health Bibliography (ATSI health). Search terms are provided below.

#### PubMed search algorithm

```
("gonorrhoea"[All Fields] OR "gonorrhea"[MeSH Terms] OR "gonorrhea"[All Fields]) OR ("syphilis"[MeSH Terms] OR "syphilis"[All Fields]) OR ("chlamydia"[MeSH Terms] OR "chlamydia"[All Fields]) AND (Review[ptyp] AND "2010/01/01"[PDat] : "2015/09/07"[PDat] AND English[lang] AND systematic[sb])
```

#### Cochrane Library

```
("gonorrhoea" or "gonorrhea" or "gonorrhea" or "syphilis" or "chlamydia") and ("primary care" or "clinic*" or "antenatal" or "young people" or "prisons" or "correctional service*" or "emergency department*" or "drug" or "alcohol" or "aboriginal*" or "antenatal" or "general practice") not ("behaviour*" or "behavior*" or "school*")
```

#### Reasons for exclusion of articles

Articles were excluded if they were out of scope, used the wrong design, had the wrong intervention or measured the wrong outcomes. We made these judgements on the basis of the scope agreed with the Ministry, and usefulness to the developing NSW STI strategy. For example this review did not set out to inform best practice clinical guidelines, therefore studies that compared different treatment options e.g. penicillin single-dose vs multi-dose or different types of drugs were excluded. We also excluded studies that did not test interventions. For example, reviews reporting on adverse outcomes of untreated STIs were excluded on this basis. We also excluded reviews that focused solely on improving treatment for clinical conditions that may result from untreated STIs, for example pelvic inflammatory disease and ectopic pregnancy.

### 2.3 Limitations

The evidence check is limited to those interventions that have been studied in a controlled situation and findings of the studies published. This may exclude identification of higher-level system reform interventions that are broader in scope or more complex, as these are often harder to assess in controlled studies.

This review is rather broad in scope. The large volume of literature available meant that it was not feasible to conduct a full systematic review of all available studies. We focused on synthesising available reviews and where there were clear gaps in systematic review evidence, we included primary research articles addressing key questions. Due to the heterogeneity of the interventions and outcomes we were unable to pool the outcomes to determine a summary effect.

While our review was able to determine the types of interventions potentially useful in each of the identified settings (evidence for 'what to do'), there was fairly limited information available on the features of these interventions that may have contributed to their effectiveness. For example, whether interventions are theory-based, tailored to local context and so on, and on implementation strategies (evidence for 'how to do it').

Findings of this review need to be interpreted along with evidence from a broader body of research including implementation science and systems strengthening that provide evidence not only on 'what' needs to be done, but 'how' these things can be done at scale and under what circumstances they are most likely to be successful. The size of effects observed when interventions are taken to scale are often disappointingly lower than those observed in controlled study situations.

In interpreting the findings of this review, it is important to bear in mind that not all interventions in health care require the same level of evidence for implementation. An intervention which is already known to be highly feasible, has low risk of adverse outcomes, is generally acceptable, has a large potential effect size and brings with it other health and social benefits, should be considered for wide-scale implementation. In these situations, policy makers do not need strong systematic review evidence or large-scale randomised controlled studies to tell them that such an intervention is useful. On the other hand, when feasibility, risk of adverse outcomes, acceptability, and small effect sizes are more predominant, it is more critical that there is a strong evidence for effectiveness of such interventions prior to wider-scale implementation.

Finally, this review was limited in terms of time, being a one-month desk based project. Although we used systematic approaches to search the literature and made efforts to obtain relevant evidence from a range of different sources, some papers describing innovative interventions relevant to the different settings may have been missed.



# 3 Evidence for the effectiveness of STI interventions in different settings

## 3.1 Studies, interventions and settings included

A total of 25 studies were found suitable for inclusion in the evidence check. There were 12 systematic reviews, 10 controlled studies and 3 mathematical modelling studies. Some of the studies included data from more than one setting. Where possible we extracted data relevant to each of the settings and presented data separately by setting. There were no studies meeting our inclusion criteria that assessed intervention effectiveness in drug and alcohol services, mental health services or services for young people.

Within each of the settings we considered missed opportunities – that is, those interventions that take advantage of existing interactions between a priority population and the health service.

**Table 1: Classification of included studies by setting**

		<b>Systematic reviews</b>	<b>Controlled studies</b>	<b>Modelling studies</b>
<b>Priority settings</b>	Sexual health services	4	2	2
	Primary health care settings	2	4	-
	Aboriginal and Torres Strait Islander Community Controlled Health Services	1	3	-
	Antenatal services	5	1	1
	Services for young people	0	0	0
<b>Additional settings</b>	Emergency departments	2	-	-
	Drug and alcohol services	0	0	0
	Mental health services	0	0	0
	Correctional services	2	-	1
	Community pharmacies	2	-	-

Multiple STI interventions and combinations of interventions were assessed in the papers included. Studies included in this evidence check covered 1–42 discrete interventions. To make it easier to synthesise findings across the studies, and to identify gaps, we categorised the interventions using a systems approach ([Table 2](#)).

**Table 2: Broad categories of interventions potentially applicable across the settings**

<b>System strengthening or support strategies</b>	Strategies implemented at facility or broader system-level that can be described as system strengthening or support interventions. Examples include dissemination of clinical guidelines, quality improvement programs, decision support and reminders integrated into electronic medical records, incentives provided to clinics, and education of health care providers. The distinguishing feature of these interventions is that they seek to change the conditions under which STI screening, rescreening or treatment is provided, in order to improve its coverage or effectiveness
<b>Strategies that decentralise how STIs are detected or managed</b>	Strategies that decentralise how STIs are detected and managed by health care providers. Examples include point-of-care testing, with same-day diagnosis and treatment, strategies to detect and treat STIs in partners of clients with STIs, and single dose compared to multiple-dose treatment. These include interventions that have developed over time in response to changes in the epidemiology of STIs, changes in the organisation of – and resources available for – sexual health services and advances in technologies for testing, treating and communicating with patients
<b>Demand-side strategies</b>	Demand-side strategies that are intended to motivate and remind patients to attend for screening or treatment. Examples include monetary or non-monetary incentives provided to patients or community members, counselling and motivational interviewing and postal, text/short messaging service (SMS) or telephonic reminders to patients to test. These also include strategies that remove cost barriers to accessing screening, rescreening and treatment

The following sections present findings disaggregated for each setting. A summary table of evidence for each of the studies is provided ([Appendix 1](#), Tables A1–A7).

### 3.2 Sexual health services

Sexual health services in NSW provide care to people with symptoms of STIs and to asymptomatic people from priority populations. As defined in the 2010–2013 National STI Strategy, these populations include young people, Aboriginal and Torres Strait Islander people, MSM and sex workers.<sup>1</sup> Many people prefer sexual health services as they provide specialist expertise, confidential systems and targeted services.<sup>2</sup>

The evidence presented below in relation to intervention effectiveness in sexual health service settings is derived from four systematic reviews contained in seven study reports, two modelling studies and two controlled observational studies ([Appendix 1, Table A1](#)).

### Summary statement

Sexual health services have a range of strategies available to them to enhance their role in reducing the transmission of STIs in NSW. At the system level, system strengthening and support activities such as effective use of electronic health information systems to prompt clinicians to screen for priority STIs during routine clinic visits and dissemination of guidelines are key strategies for which there is good evidence of effectiveness. At the level of how sexual health services manage people with STIs, proactive evidence-based partner notification approaches to facilitate testing and treatment of current partners are strongly supported by evidence. For individuals with high rates of partner change, notifying and treating previous partners should also be considered. Evidence for cost-effectiveness of point-of-care tests in sexual health clinics is emerging in countries similar to Australia. At the patient level, there is some evidence to support mail and telephone reminders for screening and rescreening for priority STIs, with SMS reminders shown to be as effective as telephone or mail, while being cheaper.

Different strategies may be appropriate for different populations using sexual health services, including MSM.

Our review did not identify studies that measured the range of possible adverse effects of strategies. For example incentives that may inadvertently introduce inequities or negatively impact other services that are offered, or difficulties for patients as a result of partner notification. It is not possible therefore to discount that negative effects may ensue from some strategies, nor to state that they will. This comment applies across all of the settings and is not repeated again at length.

### Health system strengthening or support strategies in sexual health services

- There is evidence for the effectiveness of prompts and algorithms included in electronic health information systems for priority STIs in sexual health service settings. Electronic medical record reminder alerts showed strong recent evidence for effectiveness in increasing screening/rescreening rates among MSM attending sexual health clinics.<sup>3</sup> Examples included a computer alert on the electronic medical record that reminded doctors to screen MSM for gonorrhoea and chlamydia during routine consultations, and electronically alerting clinicians to the recommended three-monthly screening for syphilis among high-risk MSM in routine consultations. There is more limited evidence that these prompts reduce time to treat a diagnosed STI in sexual health clinics.<sup>4</sup>
- There is some evidence that introduction of guidelines at the clinic level (where these do not exist), can increase screening rates of MSM in sexual health clinics. Introduction of clinic guidelines recommending at least annual screening of MSM increased screening for the three priority STIs from 43% to 61% in one study. No studies were identified in relation to introduction of guidelines for other priority populations in sexual health clinics.
- There is some evidence that the policies adopted by clinics in relation to how tests are offered can influence the implementation of recommended clinical guidelines in relation to STI testing. Guy et al.<sup>5</sup> reports on a study to compare an opt-out, opt-in and risk-based approach to syphilis testing among HIV positive MSM. In this study, opt-out refers to syphilis testing done automatically on all HIV-positive MSM unless a patient declines to have the test; opt-in means offering syphilis testing

to HIV-positive MSM and conducting the test in those that agree; and risk-based involves assessing risk and then offering a syphilis test accordingly. Over five years the proportion of HIV-positive men undergoing syphilis testing at recommended frequencies more than doubled, and was 5–6 times higher in clinics with opt-out and opt-in strategies compared with risk-based policies.

- There is no evidence to support or discount quality improvement approaches in sexual health clinics although there is evidence of multi-component quality-improvement interventions having modest effects in other settings, including primary health care.
- There is no evidence to support or discount providing incentives or performance-linked payments to sexual health clinics or clinicians working in these clinics to increase screening.

### Strategies that decentralise how STIs are detected and managed in sexual health services

- Notifying and treating partners of clients with diagnosed STIs is effective in reducing the transmission of priority STIs. Based on results of modelling studies, partner notification is also considered to be an efficient method for case finding. For example, in relation to chlamydia, partners of infected cases have rates 5–10 times higher than the general population.<sup>6</sup>
- Who to notify? Notifying and effectively treating current partners of all clients with priority STIs is essential. Notifying and treating current partners of chlamydia index cases is likely to be sufficiently effective in reducing population prevalence of chlamydia (compared to a longer 'look back' period including historical partners). In populations with high rates of partner change, it is estimated that notification of previous partners is also likely to have an effect on transmission.<sup>6</sup> A recent modelling study<sup>6</sup> building on review evidence found that at an individual level, as far back as 18 months, a substantial proportion of partners (> 10%) were likely to be infected with chlamydia. If partner notifications extend to historical partners (beyond one year), more new index cases for individual case management will be identified than through a general population screening intervention. The strongest effect of partner notification at the population level stems from notifying only the current partner. If screening is targeted at high-risk individuals, notifying previous partners (not only current partners) will likely have a stronger effect on limiting onward transmission because of their higher partner change rates.
- How to notify? There is no one-partner notification approach that is more effective than others for any particular STI. However, simply instructing people with diagnosed STIs to tell their partners to come for testing is not an effective method of ensuring that STIs are detected and treated, and re-infection does not occur. Recent review evidence shows that more intensive and up-to-date partner notification methods are effective in increasing screening and treatment of partners and in decreasing re-infection rates.<sup>6, 7</sup>
- Brief definitions of partner notification approaches and key terms are provided in Box 1 on the following page.

### Box 1: Definition of partner notification approaches and terms – summarised from Althus 2014<sup>6</sup>

Partner notification: process by which a sexual partner is informed that they have been in contact with an STI and is offered treatment. Synonym: contact tracing.

Patient referral: patient takes responsibility for informing their partner(s) and telling them they need to be tested/treated.

- Simple patient referral: advice to the patient by the health provider to inform their partners
- Enhanced patient referral: patient referral with additional resources for patient to pass on to partner: e.g. written or verbal information; website; sampling kits.

Accelerated partner therapy: facilitated access to antibiotic treatment for sexual partners; involves consultation by telephone or with a pharmacist for assessment, but no requirement for face-to-face consultation with a doctor. Sometimes a pharmacist is involved.

Expedited partner therapy: facilitated access to antibiotic treatment for sexual partners. No consultation with health professional is required. There are different variants of accelerated and expedited partner therapy.

Studies assessing partner notification approaches compare different types of approaches to one another, or to usual care. One variant of expedited partner therapy is patient-delivered partner therapy, in which the patient is provided with the drugs and/or additional information to pass on to his/her partners.

- For heterosexual people, expedited partner therapy results in a lower risk of reinfection in the index case and results in more partners being treated, when compared with simple patient referral, but not when compared with enhanced patient referral methods. There is insufficient evidence to support or discount expedited partner therapy for MSM.<sup>7</sup> A key concern is that without contact with the health care provider, partners of MSM may not test for other STIs that they may be at risk for, such as HIV.
- Implementation of expedited partner therapy is constrained by legal issues in many settings. Even in those jurisdictions where expedited partner therapy is legal, clinicians are often unsure of its legality, constraining implementation. A recent study showed that a public health intervention model can be effective in increasing uptake of expedited partner therapy and may have had population level effects on chlamydia prevalence.<sup>8</sup> This area-based intervention model that included general practices as providers of sexual health care is discussed further in the section on primary health care settings.
- A further strategy that has been developed to support partner notification is the development of websites that patients can use to send their partners information and referrals about testing. There are three such sites in Australia: Let Them Know, Better to Know (for Aboriginal and Torres Strait Islander people) and Drama Down Under (MSM). These types of sites provide a means for people to send anonymous partner notification messages by SMS or email. Our search strategy did not identify any completed studies assessing the effectiveness of the intervention on partner screening or treatment. One trial was identified assessing a similar strategy InSPOT, targeting MSM with chlamydia, but the trial was not completed due to low enrolment.<sup>9</sup>

- There is insufficient evidence to support or discount the possibility of adverse effects of various partner notification approaches – this may be particularly important to consider for vulnerable populations where consequences such as violence against people who reveal that they have an STI, or relationship breakdown may be particular concerns.<sup>7</sup>
- Point-of-care tests for chlamydia and gonorrhoea have the potential to provide more timely diagnosis, to increase treatment and contact tracing – and thereby reduce infection and re-infection. A service evaluation of a pilot of point-of-care testing in a sexual health clinic reports reduced time to treat using this approach.<sup>10</sup> An early evaluation of costs and benefits estimated that replacing standard laboratory tests for chlamydia and gonorrhoea with a point of care test in UK STI clinics could be cost saving and patients would benefit from more accurate diagnosis and less unnecessary treatment.<sup>11</sup>

### Demand-side strategies in sexual health services

- There is evidence for the effectiveness of patient reminders in increasing screening and rescreening for priority STIs in STI clinic settings.<sup>3, 12</sup> Mailed screening kits were effective in increasing rescreening in two of the three studies assessing this intervention in STI clinics in a recent review.<sup>12</sup> Phone reminders showed inconclusive evidence for effectiveness.<sup>12</sup> The addition of mail screening kits to routine SMS reminders resulted in substantial improvements in chlamydia retesting rates and detection of more repeat positive tests, compared with SMS alone in a recent trial.<sup>13</sup> A review assessing interventions to promote screening for bacterial STIs among MSM men<sup>3</sup> included one study in a sexual health clinic that assessed SMS reminders for repeat STI screening after an STI consultation among MSM. In this study, rescreening increased from 31% in the pre-intervention group and 30% in the concurrent comparison group to 64 per cent. In relation to MSM and testing for syphilis, a fully automated reminder system was associated with increased detection of bacterial STIs among MSM in an observational study in a major Melbourne sexual health clinic.<sup>14</sup>
- There is conflicting evidence from studies in sexual health clinics regarding effectiveness of patient reminders on reducing the time between testing and commencement of treatment.<sup>4</sup>
- There is some evidence that monetary incentives offered to patients in sexual health clinics are of limited effectiveness in increasing screening or rescreening. Monetary incentives to patients as a strategy to encourage rescreening for chlamydia among patients with a previous chlamydia diagnosis, with evidence from STI clinics was included in two systematic reviews.<sup>15, 16</sup> A monetary incentive (of \$20) had no effect on rescreening rates. Lee et al. 2014<sup>15</sup> identified two studies in STI clinics with very modest differences in uptake rates for rescreening, between incentivised and non-incentivised patients. This review found larger effect sizes for monetary incentives in non-clinical settings and concluded that patients already attending STI clinics, are less likely to need the additional encouragement to screen from an incentive, whereas people identified through outreach or non-clinical settings are more likely to be responsive to incentives to test.<sup>15</sup>
- There is some evidence that motivational interviewing in STI clinic settings is of limited effectiveness in increasing screening.<sup>12</sup>
- There is no evidence to support or discount strategies to remove cost barriers to screening and rescreening.

**Box 2: Patient reminders**

Patient reminders can be delivered to encourage patients to test for STIs, including reminders to retest within recommended periods after treatment for an STI. Reminders can be delivered via postal, sms or telephone. Studies to assess patient reminders compare different channels of delivery to one another, or to no reminder, and those that compare different combinations of reminders.

### 3.3 General practice/primary care

General practitioners provide the bulk of sexual health care in Australia.<sup>17</sup> The Royal Australian College of General Practitioners – “Red Book” recommends annual screening for chlamydia for sexually active patients under 30 years old, and for MSM, and testing for re-infection three months post-treatment. It is estimated that 86% of women and 64% of men aged 16 to 29 years attend a GP each year, providing opportunity for testing. Estimates calculated from 2007/8 Medicare reimbursement data suggested that only 10% of men and women under 30 were tested for chlamydia through primary care consultations each year.<sup>18</sup>

The evidence for the effectiveness of interventions implemented in primary care settings included in this section is derived from two systematic reviews and four controlled studies ([Appendix 1, Table A2](#)).

#### Summary statement

Primary health care in NSW is a key partner in reducing the transmission of priority STIs in priority populations. At the system level, system strengthening and support activities such as effective use of electronic health information systems to prompt clinicians to screen for priority STIs during routine clinic visits and multi-faceted quality improvement programs are key strategies for which there is good evidence of effectiveness for increasing screening uptake – and more limited evidence for effectiveness on biological endpoints such as reducing STI prevalence. Key features of support activities are that they are designed to make it easier for clinicians to incorporate recommended screening into busy routines with competing demands. This implies some local flexibility in what is done, as while there may be some common constraints to screening, solutions may differ depending on context and available resources. Nurse-led models and greater involvement of practice nurses in STI screening in primary care is supported by available evidence, but will not be available to all practices. Provision of monetary incentives to primary care centres to increase screening has been shown to be effective only where the incentives were coupled with other investment to promote screening.

At the level of how people with STIs are managed, primary health care providers can play an active role in partner notification and treatment, but there is a lack of evidence to guide what kinds of partner notification approaches are best suited to primary care. At the patient level, there is little evidence to support or discount active reminders for rescreening of patients with a past STI implemented through primary care settings. There is limited evidence for patient-incentives and removal of cost barriers to STI screening. These strategies on their own are unlikely to achieve population health impact. There was a general lack of attention to population health approaches to reducing STI transmission in the studies reviewed. Only one study was identified in which the intervention tested had a clearly defined ‘cascade’ model with increasing intervention intensity targeted to practices and local health systems with highest STI notifications.

Different strategies of reminders and partner notification may be appropriate for different populations attending primary care services, and for different types of services. There is a general lack of evidence to support or discount possible adverse effects of several strategies. For example, in a busy practice, incentivising one area of care could plausibly have detrimental effects on another. Our review did not identify studies that systematically addressed possible adverse effects of the strategies being assessed.



## Health system strengthening or support strategies in primary care

- *There is good evidence for the effectiveness of prompts and algorithms included in electronic health information systems for priority STIs in primary health care settings.* Taylor et al. 2015<sup>19</sup> identified four studies of electronic health record interventions in primary care settings and found absolute difference in screening rates between intervention and comparison groups greater than 20 per cent. Possible explanations for the greater effectiveness apparent for computer alerts in this recent review compared to an earlier review<sup>16</sup> may be the greater functionality and use of electronic medical records in more recent years, coupled with more recent trials of this intervention.
- *Technical challenges in use of electronic health information systems can hinder effectiveness and acceptability of interventions in primary care – modifications of existing systems to support prompts is preferable to use of new or stand-alone information systems and software.* A before-after study testing an intervention to increase STI testing among MSM by 66 Australian General Practitioners<sup>20</sup> experienced considerable technical challenges in implementing these reminders. The study authors highlighted the need to ensure technical robustness and workability of electronic medical record interventions with modification of existing systems, rather than implementing new systems wherever possible.
- *There is strong evidence for the effectiveness of multi-faceted interventions that make it easier for generalist primary care clinicians to implement and routinise STI testing.* For example, strategic placement of specimen collection materials and automatic collection of STD specimens in routine visits, nurse-led models of care, and quality improvement programs that encourage services to reflect on evidence-practice gaps and develop locally appropriate strategies to redress them, may be included in these approaches.<sup>16,19</sup> An example is an intervention in which clinicians agreed to routinely offer urine-based testing for chlamydia to all young men attending intervention primary care practices, regardless of their reason for visiting. Screening increased from 3.8% in control clinics to 29.4% in intervention clinics, with more than double the number of chlamydia infections detected. A nurse-led model of STI screening in general practice resulted in a screening increase from 28% of eligible clinic attenders to 76% post intervention, and a quality improvement intervention from 53% to 76.1 per cent. The important feature of these approaches is that they are systematic, and normalised.
- Preliminary results<sup>21</sup> from the large-scale trial of a multi-faceted intervention in Australian General Practice, the 'ACCEPT' trial – interventions including GP and nurse incentives, education, computer reminder alerts, and an education package - indicate that STI screening increased from 8% at baseline to 20% in the intervention group. Results describing the impact on STI prevalence and reproductive morbidity will be available at a later date.
- *There is good evidence that dedicated personnel to encourage screening may be effective in increasing screening uptake in primary care, but this strategy may be considerably more expensive (and not necessarily more effective) than some of the other interventions considered above.*<sup>19</sup>
- *There is some evidence that provision of incentives to clinics along with a co-ordinator and doctor to support screening uptake in primary care can be effective in increasing screening. There is no evidence that incentives on their own will increase screening.* A UK study that assessed an intervention comprising monetary incentives provided to clinics based on their achievement of

coverage targets for chlamydia screening, along with a co-ordinator and part-time doctor to promote screening, found that testing increased from 23 to 4813 tests between 2003–2004 and 2011 in one practice, and from 5 to 4321 in the other.<sup>19</sup> The total cost of incentives was GBP £54,566. An earlier study in primary care settings included in two reviews<sup>16, 19</sup> assessed an incentive of AUD \$5 per test with no other promotion of testing and found no significant intervention effect, however the authors noted that way in which the incentives were delivered was not ideal. It can be concluded (and is consistent with other evidence in different areas of health reform) that incentives on their own are insufficient to achieve behaviour change at scale.

- *There is limited evidence that well designed clinician training can be effective in increasing STI screening.* Continuing medical education for primary care clinicians has been tested in several studies, with very modest results. More recently, a multifaceted program based on the theory of planned behaviour to change health staff's beliefs and behaviours in relation to STI screening has been tested in a randomised controlled trial reported in Hengel 2015.<sup>4</sup> The intervention included education, posters, invitation cards, screening targets and regular feedback. There was a 76% increase in testing in intervention sites compared with control, which was sustained for nine months post intervention.
- *There is good evidence that linking chlamydia testing to pap smears can be effective in increasing overall screening rates, but not among the target age group of young women*<sup>16</sup> Currently pap smears are not recommended in those aged < 18 years, and as Human Papilloma Virus (HPV) screening replaces pap smears and age of HPV screening is 25+ years, the opportunities for linking chlamydia testing to pap smears will be reduced.
- There is some evidence to suggest that introduction of passive prompts, such as attaching a reminder sticker to medical records, and including chlamydia information on laboratory result forms, and paper chart reminders are ineffective.
- *Overall there is a lack of evidence on the relative costs and cost-effectiveness of strategies to expand screening coverage and partner notification services through primary care settings.* Previous reviews of the effectiveness of screening programs on Pelvic Inflammatory Disease (PID) have been inconclusive<sup>22</sup>, with review evidence suggesting that the magnitude of benefit to be expected from screening may have been overestimated based on the earliest trials. It is likely that chlamydia screening programs have contributed to declines in PID incidence through shortening prevalent infections, although the magnitude of their contribution remains unclear. To reduce transmission and repeat infections, implementation of efficient strategies to treat partners of infected women is also essential, as is a whole-of-population approach that includes improving uptake of STI screening, partner notification and effective timely treatment everywhere that priority populations receive primary health care.

### Strategies that decentralise how STIs are detected and managed in primary care

- *Much of the evidence assessing different ways of managing how STIs are detected and treated in clinical settings has been conducted in sexual health clinics, with very limited data available on effective interventions for primary care and general practices.* The practice populations of sexual health clinics differ from practice populations in primary health care settings, and service delivery environments also differ. This suggests that evidence from sexual health clinics about how to most

effectively detect and treat STIs is unlikely to be generalisable to primary health care settings. A recent systematic review included 21 studies, only two of which were in general practice settings. Both of these studies tested enhanced vs simple patient referral in relation to chlamydia infections with no evidence of a difference between the two approaches in re-infection rates, or intermediate outcomes.<sup>6</sup> A recent UK trial aiming to assess the effectiveness of different partner notification strategies for chlamydia in primary care settings was unable to be completed because of the challenges of recruiting young people to the trial.<sup>23</sup>

- *There is evidence to suggest that a multi-component place-based model of expedited partner therapy aimed at cases where partner notification would otherwise fail, can have a population level effect on STIs.* A large cluster-randomised controlled trial in the US<sup>8</sup>, assessed a public health model of expedited partner therapy compared to usual care. Although not implemented exclusively in general practice settings, general practitioners were a key partner in the intervention model. Clinicians were contacted for participation based on their levels of reporting of bacterial STIs in the previous year. Participating general practices (and obstetricians and gynaecologists), were provided with support and guidance to identify situations in which standard partner notification was likely to fail, and to provide alternatives. Antibiotics provided were free. Declines in chlamydia positivity among young women from 8.2% to 6.5% in the study area, and in annualised incidence of gonorrhoea from 59.6 to 26.4 per 100,000 in the study area, suggested a population health impact of the model.
- There is insufficient evidence to support or discount the possibility of adverse effects of various partner notification approaches in primary care settings, as mentioned earlier in relation to the sexual health clinic setting.
- Overall there is a lack of evidence on the relative costs and cost-effectiveness of strategies to expand screening coverage and partner notification services through primary care settings. This is currently being assessed as part of the ACCEPt trial in Australia.
- Point-of-care tests for chlamydia and gonorrhoea have the potential to provide more timely diagnosis, to increase treatment and contact tracing – and thereby reduce infection and re-infection. Our search strategy did not identify any published reviews or trials of point-of-care testing for these priority STIs in general practice settings. Point-of-care testing is currently being trialled in remote Australian health services which predominantly provide clinical services to Aboriginal and Torres Strait Islander people, but these results are not yet available. We did not identify any studies reporting on the cost-effectiveness of point-of-care tests for priority STIs in primary care settings specifically.

#### Demand-side strategies in primary care

- There is some evidence that patient reminder strategies such as SMS reminders may be ineffective in primary care settings. There is stronger evidence for their effectiveness in sexual health clinic settings.
- There is evidence that patient incentives to test, for example through prize draws, and tokens and vouchers can increase screening from low baseline levels, but these interventions on their own may not achieve screening rates that would impact on STI prevalence. A cluster controlled trial involving

84 primary care trusts in the UK tested this intervention. Chlamydia screening among young people attending primary care in intervention areas increased from 0.41% to 1.08% and there was no effect on chlamydia positivity.<sup>19</sup>

- There is some evidence that patient education strategies, for example referring patients to internet-based resources are ineffective in increasing screening or rescreening in primary care. A study assessing this intervention among young people in three Australian general practice clinics found no increase in testing using this strategy for either young men or young women.<sup>19</sup>
- There is evidence that strategies to remove cost barriers to STI screening for young people in primary care settings can be modestly effective in increasing screening uptake. A strategy to reduce cost barriers to STI screening was tested in New Zealand in a controlled trial including 49 clinics. Testing coverage increased from 13.9% to 16.8% among young women. No change in testing coverage was observed among males, with coverage of 13% and 13.2 per cent.<sup>19</sup>

### 3.4 Aboriginal Community Controlled Health Services

The evidence presented in relation to the effectiveness of interventions in Aboriginal Community Controlled Health Services (ACCHS) is derived from one systematic review that assessed interventions in ACCHS in remote Australia<sup>24</sup>, and three controlled studies<sup>25,26,27</sup> ([Appendix 1, Table A3](#)). We also draw on relevant aspects of evidence from primary health care more generally in forming an assessment of the effectiveness of STI interventions in ACCHS.

#### Summary statement

ACCHS in NSW are key partners in reducing the transmission of priority STIs among Aboriginal and Torres Strait Islander people, and a preferred provider for sexual health care for the majority of young Aboriginal and Torres Strait Islander people in the state. At the system level, system strengthening and support activities such as effective use of electronic health information systems to prompt clinicians to screen for priority STIs during routine clinic visits and multifaceted interventions that make it easier for clinicians to incorporate recommended screening into busy routines, are likely to be key strategies for which there is good evidence of effectiveness in other primary care settings. There is good evidence for the effectiveness of quality improvement interventions in increasing STI screening among young people. There is no evidence to support or discount provision of monetary incentives to ACCHS to increase screening rates – evidence from other primary care settings that suggests that provider incentives on their own are unlikely to achieve desired results. At the level of how people with STIs are managed, ACCHS may be well placed for playing a lead role in partner notification and treatment, but there is a lack of evidence to guide what these approaches should entail, and what the adverse effects may be. There is emerging evidence that a health centre level intervention for point-of-care testing for chlamydia can reduce time to treat in remote Aboriginal and Torres Strait Islander communities.

At the patient level, there is little evidence to support or discount active reminders for rescreening of patients with a past STI. Attention also needs to be paid to tracking and minimising possible harms of partner notification and reminder strategies, particularly among vulnerable populations.

## Health system strengthening or support strategies in Aboriginal Community Controlled Health Services

- *There is good evidence that multifaceted local level system change and quality improvement programs increase rates of screening for STIs in Aboriginal communities.*<sup>24</sup> This is consistent with evidence from other primary care settings, which indicates that multifaceted interventions that make it easier for clinicians to implement screening are effective in primary care settings.
- *Levels of screening coverage achieved in the two quality improvement programs evaluated are still fairly low after two years of intervention, suggesting that a longer intervention period, or refinement of the intervention/s and their implementation are still needed.* Overall testing coverage post-intervention of 22% was reported in the NSW study<sup>25</sup> and post-intervention coverage of 27% and 43% for men and women respectively was achieved for 68 remote health centres participating in the STRIVE trial. Although the coverage levels were still fairly low, these represented substantial increases over baseline screening levels ([Appendix 1, Table A3](#)). The STRIVE trial found no reduction in prevalence of priority STIs, suggesting the coverage of testing and possibly the frequency of testing needs to be greater to achieve a population level effect.<sup>26</sup>
- There is some evidence to suggest that prompts and algorithms included in electronic health information systems for priority STIs may be effective in ACCHS. Evidence for the effectiveness of these strategies in other primary health care settings and in sexual health clinics, provided in the sections above, suggests that development of these types of interventions suitable for ACCHS are worth supporting. In addition, a study in an Indian Health Service in the US included in Taylor et al. 2015<sup>19</sup> assessed a prompt in electronic health records for chlamydia screening of women under 25 years. The number of women screened increased from 56 to 200, and coverage increased from 13% to 48% of eligible patients.
- There is a lack of evidence for the effectiveness of dedicated personnel to encourage screening. Dedicated personnel have been found to be somewhat effective in increasing STI screening uptake in primary care, but less cost-effective than other strategies. Evidence from other continuous quality improvement (CQI) programs in Aboriginal and Torres Strait Islander primary health care settings suggests that dedicated personnel in the form of regional level support, such as offered through a visiting CQI co-ordinator with responsibility for a number of services, is critical for implementation of CQI and sustainability of gains achieved through clinic-level quality improvement programs.<sup>28</sup> In relation to sexual health specifically, evidence shows the importance of a comprehensive approach to sexual health, rather than focusing on only one component.<sup>24</sup>
- There is insufficient evidence to support or discount provision of incentives for ACCHS, or other primary care services to increase screening or improve management of STIs – incentives that have been assessed are on a fairly limited scale. The Adult Health Check, which is already incentivised with a payment of AUD \$300 per completed check, includes a requirement to offer STI screening. The recommendation is fairly non-specific, and for a range of reasons, uptake of the adult health assessment by ACCHS has been historically variable.
- There is insufficient evidence about possible adverse effects of screening, and of incentivising screening in ACCHS, or for Aboriginal people in general.

- There is a lack of evidence for the effectiveness of clinician training in STIs in ACCHS as a sole strategy to increase testing. Evidence from other primary care settings suggesting that provision of clinician training (without wider system support for behaviour change) is of very limited effectiveness or ineffective. A recent study conducted as part of the ACCEPt trial has shown that an education program for practice nurses can improve knowledge and attitudes in relation to chlamydia screening and treatment. Impact on testing and retesting will be assessed in the ACCEPt trial at a later stage.
- There is some evidence that introduction of passive prompts – such as attaching a reminder sticker to medical records, and including chlamydia information on laboratory result forms and paper chart reminders – are ineffective in general primary health care, and this may also be the case in ACCHS.

### Strategies that decentralise how STIs are detected and managed in Aboriginal Community Controlled Health Services

There was limited review evidence available to identify strategies that decentralise how STIs are detected and managed in ACCHS or in primary care more generally.

- Different ways of ensuring testing and treating partners are available and have been assessed internationally. The most effective approach to ensure testing and treating partners of people with priority STIs in ACCHS is not known.
- There is a lack of evidence for public health scalability and sustainability of programs that have been/are trialled. Evidence from a large stepped wedge trial in the US<sup>8</sup>, suggests that a multi-component place-based model can be effective in achieving population health outcomes. The model tested used a layered targeting strategy that identified clinics, and then areas with high infection rates for greater intensity of intervention. At the individual patient level, interventions were focused on improving access to partner treatment in cases where partner referral would otherwise fail. An area-based model along these lines would appear to be worth further exploration and testing in areas of disproportionately high STI prevalence in NSW.
- There is insufficient evidence to support or discount the possibility of adverse effects of partner notification in ACCHS or other services that may be accessed by Aboriginal and Torres Strait Islander people. This may be particularly important to consider in Aboriginal Communities where consequences such as loss of trust in health services due to breach of cultural norms or confidentiality concerns and violence against women who reveal that they have an STI, may be particular concerns.
- Point-of-care tests for chlamydia and gonorrhoea have the potential to provide more timely diagnosis, to increase treatment and contact tracing, and thereby reduce infection and re-infection. Early results from three sites shows a reduction in median number of days to treatment for people diagnosed with chlamydia in remote health centres.

### Demand-side strategies in Aboriginal Community Controlled Health Services

- There is insufficient evidence to discount or support patient reminder strategies such as text reminders in ACCHS. Our review did not identify any studies in this area that met inclusion criteria.
- There is no evidence to discount or support patient education strategies, for example referring patients to internet-based resources in ACCHS. Based on evidence from other primary health care settings we can conclude that these are unlikely to be effective in the ACCHS setting.

### 3.5 Antenatal services

Antenatal testing for specified STIs is recommended by the Royal Australian and New Zealand College of Obstetricians and Gynaecologists.

The evidence for effectiveness of interventions in antenatal services is derived from five systematic reviews, one modelling study and one record review ([Appendix 1, Table A4](#)).

#### Summary statement

Antenatal services are an important setting in which to screen and treat STIs both to protect mothers and their babies from preventable complications of infection, and because they provide a cost-effective way to reach young sexually active women with STI screening. At a population or policy level, there is a strong rationale for screening for chlamydia in all young pregnant women in antenatal settings. Evidence from a modelling study in Australia suggests that this approach is cost-effective in the Australian health system. There appears to be room to improve chlamydia screening coverage in Australian antenatal settings. At the system level, system strengthening and support activities such as effective use of electronic health information systems to prompt clinicians to screen may be useful. Evidence from other countries has shown marked improvements in screening using this approach. Better communication of antenatal screening guidelines and clinical leadership in relation to emphasising the importance of following recommended clinical guidelines may be particularly effective in the antenatal setting.

At the level of how people with STIs are managed, there is a gap in evidence regarding what kinds of partner notification approaches are best suited to antenatal settings. Antenatal care providers are unused to dealing with these types of issues, and may lack the required skills and competencies. As is the case for other settings, attention needs to be paid to the design, monitoring and evaluation of partner notification strategies – noting that pregnancy is a particularly vulnerable time for all women. Collaboration with other services, such as dedicated sexual health services and ACCHS are likely to be relevant. Antenatal services are diverse and different strategies will be appropriate to different settings. Point of care testing for STIs in antenatal settings may be warranted in populations where loss to follow-up is a significant risk and where STI prevalence is expected to be high.

Early (and regular) antenatal care is a necessary condition for optimal detection and treatment of STIs in antenatal settings. It will be important to continue to support efforts that encourage early engagement with antenatal care. In NSW this is likely to be particularly important for Aboriginal and Torres Strait Islander women, and pregnant women from newly immigrant communities.

#### Health system strengthening or support strategies in antenatal settings

- *There is evidence for the effectiveness of prompts and algorithms included in electronic health information systems to increase screening for priority STIs among pregnant women.* A study in the US aiming to improve chlamydia and gonorrhoea repeat testing during the third trimester of pregnancy in accordance with guidelines found that automated testing reminders in electronic health records were effective in increasing compliance with guidelines, from 33% to 97%. Screening rates returned to baseline levels when the reminders were turned off.<sup>19</sup> The electronic health record reminder strategy was implemented in family medicine teaching clinics where women attended for antenatal care.



- *There is some evidence to suggest that disseminating guidelines may increase STI screening rates in antenatal settings.* A recent survey of 1600 antenatal care providers (predominantly obstetricians and gynaecologists) in Australia reported that around one in five followed the recommendation to screen all young pregnant women for chlamydia.<sup>29</sup> The authors raised the possibility that the wording of the screening recommendation may be unclear, and suggested that there is a need for greater clinical leadership and clarity of communication in this area. A recent study in Australia<sup>30</sup> analysed the cost-effectiveness of chlamydia screening for all pregnant women between 16 and 25, no screening at all, and selective screening for those at higher risk of contracting the infection. Results showed that when chlamydia prevalence is 3%, screening pregnant women between 16 and 25 is cost-effective and if chlamydia prevalence was higher than 11%, screening could result in cost savings to the Australian healthcare system. Limited evidence from a study in Western Australia<sup>31</sup> suggests that guideline dissemination may assist in increasing antenatal screening for STIs. This study reported that screening increased after the state department of health issued an operational directive for this screening. However this was a before and after study with no control group – the increase in screening may be resulted from other factors.
- *There is insufficient evidence to support or discount clinician education to increase STI screening rates in antenatal settings.* Our rapid evidence check did not identify any studies on this topic that met inclusion criteria.
- *There is no evidence to support or discount providing incentives or performance-linked payments to antenatal care providers to increase screening rates.* As concluded in relation to the other settings, incentives on their own are unlikely to be effective in changing behaviour.

### Strategies that decentralise how STIs are detected and managed in antenatal settings

- *There is evidence for the effectiveness of strategies that make it easier for pregnant women to receive testing for STIs, and same-day diagnosis and treatment but there is very little data on the effectiveness of these interventions from countries similar to Australia.* A systematic review of interventions to improve screening for syphilis in pregnancy<sup>32</sup> identified 10 studies, one of which was from the US, although this study was conducted some years ago. The intervention tested in this study was a public-private partnership that included education of doctors and identification of high-risk patients to ensure serological tests at booking, 28 weeks' gestation, and delivery. A reduction in congenital syphilis was reported in the intervention communities. Screening uptake data were not reported.
- A recent systematic review of strategies to improve syphilis screening uptake worldwide<sup>33</sup> found that differences in results between trials could be explained by differences in implementation. Of the two trials included in the review, one showed marked effectiveness of point-of-care testing on reducing adverse maternal outcomes, and the other showed no effect. The reviewers highlighted the importance of ensuring adequate health worker training, quality assurance, and continuity of supply chains of materials and staff, when introducing and sustaining implementation of new technologies such as point-of-care tests.<sup>33</sup>

- No studies were identified that assessed partner notification approaches in antenatal settings. A key rationale for incorporating chlamydia screening into antenatal care is that chlamydia can be detected and treated promptly and there are no additional costs of attending another screening program. Gains may be lost if women are simply reinfected due to a failure of detecting and treating chlamydia in partners.

### Demand-side interventions

- *In the context of antenatal care, interventions on the demand-side, focus on ensuring that pregnant women attend antenatal care in the first trimester.* This is recognised as important for several maternal and child health outcomes, and is also important in ensuring STI tests are offered in a timely way with the best chance of preventing negative sequelae of STIs. Hawkes et al. 2013<sup>34</sup> showed that the timing of antenatal care interventions makes a significant difference in the risk of having an adverse outcome due to syphilis. The authors concluded that encouraging all pregnant women to seek care in the first two trimesters of their pregnancy should be a priority for health programs.

### 3.6 Emergency departments

There is limited evidence for effectiveness of STI interventions in emergency departments (ED). Evidence is derived from two systematic reviews ([Appendix 1, Table A5](#)).

#### Summary statement

The rationale for STI screening in this setting is that patients attending emergency departments (ED) may, for various reasons, be more susceptible to STIs than patients presenting at other parts of the health system, and therefore this contact with the health system may represent a cost-effective screening opportunity. High case finding from the single study identified in Australia supports this rationale and suggests that further development of STI screening models in Australian EDs may be warranted. Evidence worldwide shows that there are challenges in following up STI cases identified in emergency department settings, but that these can be mitigated through various system support strategies. Greater use of point-of-care tests may also help to mitigate the challenges of ensuring adequate and timely follow-up of people identified as having STIs through emergency department screening. Effective strategies to improve treatment of people diagnosed with STIs in emergency departments may include partnerships between emergency departments and primary health care facilities and/or sexual health clinics.

#### Health system strengthening or support strategies in emergency departments

- A review of screening for STIs in EDs<sup>35</sup> estimated that positivity rates for ED patients (in the US) are comparable with other high-risk populations, and sufficient for selected screening to be cost-effective.
- Patients diagnosed with STIs in EDs are very difficult to follow-up. Studies included in this review reported under-treatment rates of between 2% and 84% (highest for asymptomatic infections) and overtreatment of 7.9% to 87 per cent.<sup>35</sup>

- Strategies to address the issue of under-treatment that have been assessed include the use of unspecified follow-up; treatment at a local public STD clinic or local health department; return to the ED or hospital clinic, or follow-up by a hospital disease-intervention specialist; direct study investigator contact; and treatment at a primary care setting. One study explored the effectiveness of collaboration between the ED and local health department for follow-up. Using these strategies, under-treatment dropped from an average of 66.7% to 15.9% (unadjusted averages).
- Several studies included in the review examined the utility of various screening strategies and algorithms. One study found that simple mass treatment was more cost-effective than any screening strategy with regard to reducing costs associated with immediate and potential disease sequelae. Of the screening strategies considered, screening all sexually active females aged 18–31 years was the most cost-effective. For males, standard ED practice, or simple mass treatment, were more cost-effective than any screening program.
- Barriers to routine screening in EDs include limited space, competing demands of acute illness and injury, appropriate staffing. It is not appropriate or cost-effective for ED doctors to conduct this screening – nurse-led models may be more appropriate, but nurses are not always available for this task.
- A nurse-led model of encouraging screening of clients in EDs has been described in a Western Australian study. This study did not meet inclusion criteria as it does not include a control group.<sup>36</sup> In this study, 178 eligible patients were offered screening, 65% consented for testing and 14 patients (12%) returned positive results. The authors concluded that emergency departments are an underutilised interface between difficult-to-reach at-risk youth populations and public health services.

### Strategies that decentralise how STIs are detected and managed in emergency department settings

- No studies were identified that address this topic. However in view of the challenges to following up positive cases from EDs, and the consequent under- or over-treatment in EDs reported in previous studies, it is worth considering judicious application of point-of-care tests for STIs in EDs, coupled with same-day diagnosis and treatment. Any screening and treatment strategy in this setting would also need to consider how to incorporate notification of partners of people diagnosed with STIs – the facility best suited to this task may not be the emergency department, in which case strong partnerships with other services, such as primary health care and Aboriginal Community Controlled Health Services will be imperative.

### Demand-side interventions

- No studies identified that address this topic. The study in a Western Australian ED reported a 65% acceptance rate of opportunistic screening offered to young people in that setting. If interventions are to be developed for emergency department settings in Australia, further research on acceptability and adverse effects of screening in the Australian ED context will be needed.

### 3.7 Drug and alcohol services

There were no studies identified that assessed the effectiveness of interventions in this setting. In relation to young people, it has been suggested that a comprehensive youth framework – such as the HEADSS (Home, Education, Activities, Drug and alcohol use, Sexuality and Suicide youth assessment framework) – explores risk and protective factors, as well as risk-taking behaviours, can provide an entry point for opportunistic screening for STIs among young people.<sup>37</sup> An audit of a nurse-led primary healthcare service in Melbourne that works with young people aged 12–24 years who are at risk of or currently experiencing homelessness reported some chlamydia screening in young people as an outcome of the HEADSS assessment, but this was not a formal evaluation of this strategy and there was no comparator group. We are aware of an evaluation (before and after design) being conducted by Hunter New England Local Health District, NSW where chlamydia screening was added to the HEADSS assessment but findings of this evaluation were not available during the timeframes of this review.

### 3.8 Mental health services

There were no studies identified in this evidence check that assessed the effectiveness of interventions in mental health services settings.

### 3.9 Correctional services

The evidence presented in relation to correctional services is derived from two systematic reviews and one modelling study ([Appendix 1, Table A6](#)).

#### Summary statement

Responding to the burden of disease in correctional populations, which have a disproportionate representation of Aboriginal and Torres Strait Islander people, is a potentially important strategy for closing the gap in STI rates between Aboriginal and Torres Strait Islander people and other people in Australia. STI screening programs implemented in correctional service settings in other countries have shown good potential for high case finding of priority STIs. Correctional service interventions to detect and treat STIs can lead to reductions in chlamydia prevalence among women in surrounding areas. Most intervention studies in this area have been conducted in the US, and further development of implementable models in Australia are warranted.

- *There is some evidence that screening for chlamydia and gonorrhoea in prison populations may be cost-effective, although applicability to the New South Wales context has not been established. The US's Centers for Disease Control and Prevention (CDC) added STD screening guidelines specific to correctional settings to the 2010 STD Treatment Guidelines. The evidence review supporting the CDC recommendations<sup>38</sup> concluded that available evidence supports routine screening of adolescents and young women in correctional service settings for chlamydia and gonorrhoea because of high prevalence and the subsequent risk of adverse reproductive outcomes. The recommendations suggest that screening men (to reduce sequelae among women) should be considered based on local epidemiology and resource availability. Syphilis screening was not strongly supported in this review because of low prevalence. The review did not yield any randomised controlled trials of interventions in correctional services, highlighting the lack of*

research in this area. The most recent available Australian data identified in a review of prevalence of STIs in prison populations worldwide<sup>39</sup> was conducted in Western Australia in 2008. Around one-half of the prisoners in this study had a record of chlamydia and/or gonorrhoea testing, and around one in four had a record of syphilis testing. Of the 946 prisoners' records analysed for the study, 57.5% were Aboriginal. Positive chlamydia test results were recorded for 7.3% (95% CI: 4.9–9.7%) of the 466 prisoners tested and positive gonorrhoea tests for 3.4% (95% CI: 1.8–5.0%). Positive treponemal test results indicating present or past syphilis infection were recorded for 11.8% (95% CI: 7.6–16.0%) of the 229 prisoners tested. The authors note that screening was not universal, health care providers may have selectively screened higher-risk individuals and therefore the figures should not be considered true prevalence. These results were broadly similar or higher than the estimates of prevalence of chlamydia, gonorrhoea and syphilis in people who are incarcerated worldwide.<sup>40</sup> Estimates are also fairly similar to a case finding reported from an Aboriginal Health Worker-led STI screening program among male detainees of a rural juvenile detention centre in Australia (to November 2004). The screening program found urethral chlamydia prevalence 16.3% and prevalence of newly diagnosed syphilis over 5 per cent.<sup>37</sup>

- There is some evidence that correctional service programs that screen and treat chlamydia in men and women in prison populations can result in reduced chlamydia prevalence in women in surrounding communities.<sup>38</sup> There is limited evidence from the same review<sup>38</sup> that screening for syphilis in jail has impacted community syphilis rates. These studies were conducted in urban areas with large correctional populations – population health impact may be more or less pronounced in other types of communities.
- STI screening and treatment services may be incorporated into the medical intake process during booking – authors of the included review considered that this is likely to have a high yield in settings with rapid turnover, and also can result in high rates of treatment as long as rapid processing of results is available. STI screening tests may also be included during comprehensive medical examinations.<sup>38</sup>

### 3.10 Other settings

Our search strategy identified evidence for effectiveness of interventions in the additional setting of pharmacies. The evidence presented in relation to intervention effectiveness in relation to pharmacies is derived from two systematic reviews ([Appendix 1, Table A7](#)).

#### Summary statement

In many communities, pharmacies play an important role in public health care, in addition to their role in dispensing medications. Factors such as ease of access, long opening hours, and anonymity, make them attractive settings for delivery of sexual health services, including STI testing and treatment. Pharmacies may have a role in facilitating access to partner treatment, through participation in expedited partner treatment strategies. They may also play a role in providing opportunistic screening for young people. Current practice suggests that young people are offered tests selectively by pharmacists based on a range of criteria. Pharmacists may not offer some young people testing for fear of causing offence. Among those offered tests, uptake is low and after acceptance, rates of return of tests are also low. Greater clarity around the role of pharmacies in screening and treatment is required, as is a public health approach to targeting pharmacy-based interventions to areas and activities of greatest need.

Two of the studies already mentioned in this report described interventions or models of expedited partner therapy or accelerated partner therapy in which pharmacies were a key partner. The model tested in Escourt et al. 2015<sup>41</sup> compared routine partner notification with two innovative approaches: a hotline approach; and an approach in which a community pharmacist conducted an assessment of the need for partner treatment. While the pharmacy model was considered feasible, uptake of both strategies was low. In the area-based model of expedited partner therapy reported in Golden 2015<sup>8</sup>, a component of the model included making free antibiotics available through select commercial pharmacies for clinicians to prescribe for their patients' partners. In this model, the goal of pharmacy participation was to facilitate widespread easy access to antibiotic treatment.

Two additional systematic reviews identified through our search strategy provided evidence for effectiveness of interventions implemented through pharmacies – both of these addressed the potential role of pharmacies in providing chlamydia screening.<sup>42</sup>

The reviews identified different strategies of implementing chlamydia screening in pharmacies, including opportunistic and population-based models. For example in the Kaputia review<sup>42</sup> six of the 11 studies included interventions that targeted women by offering chlamydia testing during a consultation for emergency contraception. There was wide variation in the coverage of the STI testing kits across the studies – 25% to 78% of women who requested emergency contraception were offered kits. Another strategy was for pharmacies to display self-test kits, for example, in labelled buckets, with the intent that these were to be picked up by young people, offered to clients when presenting for any sex-related product or consultation, or given on request. In the studies included in the two reviews, acceptance of the offer for a test in the pharmacy setting was low. Between 10% and 47% of those approached by the pharmacists agreed to be screened for STIs.<sup>42</sup> Once successfully recruited by a pharmacy, and provided with home testing kits, the proportion of people who returned home testing kits (so that they could receive their test results) varied widely between 12% and 64 per cent.<sup>42</sup>

# 4 Overall conclusions

This evidence check identified a broad range of interventions applicable across the priority settings and additional settings. The overall conclusions are provided below, organised by the research questions that the review set out to address. Conclusions in relation to possible 'missed opportunities' for intervention are included in the first two questions.

## 4.1 What is the evidence regarding the effectiveness of interventions conducted in priority settings to reduce transmission of priority STIs in priority populations?

1. The evidence check has identified substantial evidence for a broad range of interventions that have been shown to be effective in the four of the five priority settings included in the review. We did not find much evidence of effective interventions implemented within services for young people. We note however that youth-specific STI screening and treatment interventions can be implemented within each of the other settings included in this review – and most of the interventions implemented through primary care and to some extent Aboriginal and Torres Strait Islander Community Controlled Health Services, include a focus on youth. The structure of youth health services in NSW will also determine the kinds of models appropriate in the youth health setting; the utility of the HEADS assessment tool in increasing chlamydia screening among young people within a broader youth health framework is encouraging.
2. Interventions identified in the evidence check varied widely in the level of resources required, with the more expensive interventions not always the most effective. Reminders to clinicians to screen for STIs implemented through electronic health information systems showed effectiveness across almost all the settings in which they had been tested, with particularly strong effectiveness noted in antenatal settings. Antenatal care, which is reasonably 'guideline-driven' (for example, other types of screening are a standard recognised part of quality antenatal care), may be particularly amenable to interventions that remind clinicians of the recommended guidelines, and provide prompts at the point of care to follow them. However, particularly in relation to care provided by specialist clinicians, including obstetricians and gynaecologists, some work may be required in ensuring clinical leadership to drive change. A key challenge for antenatal care, along with wider implementation of recommended STI screening, will be to ensure adequate partner notification and treatment of women with diagnosed STIs. There was little evidence and few models described of successful partner notification approaches in antenatal settings.
3. There are a large number of studies assessing various interventions in sexual health clinics. These include system strengthening and support strategies, strategies that change the way that STIs are detected and managed in the clinic setting, and demand-side strategies. However there are still a number of gaps in the evidence regarding effective interventions in sexual health clinics. Greater use of point-of-care tests for chlamydia and gonorrhoea in sexual health clinics may be warranted as these types of tests may lead to less unnecessary treatment – effectively eliminating the need for presumptive treatment. Challenges in sexual health clinics include uncertainty about the most effective approaches for notification and treatment of partners, with particular gaps in the evidence around how to notify partners of MSM diagnosed with STIs. Strategies in which high-risk patients in

sexual health clinics are reminded to come for screening have shown evidence for effectiveness when these strategies are taken up, but in general uptake of reminder strategies by patients outside of the context of trials has been fairly low. Clinic policies specifying that tests are offered as opt-out, rather than opt-in or risk-based, shows promise, and an opt out policy has now been adopted in at least one large NSW sexual health service. In NSW, sexual health clinics fulfil a niche role providing specialist care and management, with a focus on populations most at risk of STIs. However these services need to be seen as part of the broader system and reductions in STI prevalence in NSW will require a response from the whole system, both public and private, not just sexual health clinics.

4. A common theme across all of the settings, is that interventions to increase screening for priority STIs have shown success in increasing screening rates but little or no impact on chlamydia (or other STI) prevalence. This could be because population coverage of screening and treatment was not at a level sufficiently high to make an impact on onwards transmission. It may also be that other strategies such as partner notification and retesting were not strengthened sufficiently. A key goal of screening is to reduce reproductive morbidity. One large study (ACCEPt) will be assessing the impact of screening on this outcome in the near future.
5. In primary health care settings, and to some extent in EDs, we found little evidence for interventions that addressed models focusing on population health approaches that are necessary to impact on population level prevalence. For example, strategies to increase screening and rescreening that achieve high levels of coverage and are implementable at scale. Interventions that show evidence of effectiveness on a small scale may not necessarily be scalable.
6. There is increasing evidence for the effectiveness of quality improvement approaches in increasing STI screening and rescreening in primary care and in ACCHS. With increasing attention being given to Continuous Quality Improvement (CQI) in Australian primary health care settings more generally, it may be timely to consider how the STI CQI approaches fit with CQI that is directed at other of the many evidence-practice gaps in primary care. Primary health care services, including ACCHS have other competing demands on resources and time, with STI screening and management being part of a larger picture. Wherever possible it will be important to support STI interventions that strengthen systems, to allow for more effective detection and management of the range of priority health concerns facing priority populations, rather than taking a disease-centric approach. The roles of meso-level support structures such as the Primary Health Care networks (and previously Medicare Locals and Divisions of General Practice), and the Aboriginal Community Controlled Peak bodies in supporting STI screening and management may need to be more clearly articulated and communicated.



#### 4.2 What is the evidence regarding the effectiveness of interventions conducted in additional settings to reduce transmission of priority STIs in priority populations?

1. The evidence check identified some evidence for intervention effectiveness in ED and correctional services. We were unable to identify evidence for effectiveness of interventions in mental health services, and drug and alcohol services.
2. The evidence identified in relation to ED confirmed this as a potentially useful setting for STI detection and treatment, as case finding is likely to be higher than in the general population. New technologies, particularly point-of-care tests, may be useful in mitigating the challenges of follow-up of patients with STIs detected through ED screening, and ensuring prompt treatment. Service delivery models in ED settings still need to be developed and trialled. These should include specification of linkages with other parts of the health care system to help support management and partner notification.
3. Most evidence for intervention effectiveness in correctional service populations is from the US, and may not be applicable to NSW. Models of STI screening and management in NSW prison facilities need to take into account the disproportionate representation of Aboriginal and Torres Strait Islander people in prison populations. STI screening programs implemented in correctional service settings in other countries have shown good potential for high case finding of priority STIs. Further development of implementable models in Australia may be warranted.
4. Greater clarity around the role of pharmacies in STI screening and treatment is required, as is a public health approach to targeting pharmacy-based interventions to areas and activities of greatest need.

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## 6 Appendix 1: evidence tables

**Table A1: Summary of studies assessing the effectiveness of interventions in dedicated sexual health services**

Study ID	Interventions	Methods, populations and settings	Main findings
Ferrara 2014 <sup>7</sup> (also summarised in Althus 2014 and Hogben 2015) <sup>43</sup>	Comparison of partner notification approaches	<p>Systematic review of randomised controlled trials (RCTs) comparing partner notification approaches. Twenty-one RCTs reported on eight comparisons of a method of Enhanced Patient Referral (EPT) compared with an alternative technology in patients with curable STIs. Included RCTs from the USA (12), the UK (3), Denmark (2), Australia (1), South Africa (1), Uganda (1), and Zimbabwe (1)</p> <p>Settings include STI clinics (11/21); public health clinics – for example those serving disadvantaged non-insured populations in the US (7/21), GP settings (2) and other (1)</p>	<p>When data for all curable STIs are pooled (across all settings), EPT results in a lower risk of reinfection in the index case when compared with simple patient referral, but not when compared with enhanced patient referral methods</p> <p><b>EPT vs patient referral:</b> Index patients in the EPT group had a 29% lower risk of being reinfected compared with index patients in patient referral group (RR: 0.71; 95% CI: 0.56–0.89). Stratified data do not point to a clear advantage for any one infection. Inconsistent results for number of partners notified; more partners treated with EPT (varying estimates)</p> <p><b>EPT vs enhanced counselling:</b> No difference in reinfection (RR: 0.96; 95% CI: 0.6–1.53) or number of partners elicited (MD, 0.07; 95% CI: –0.18 to 0.32) or evaluated (MD, 0.01; 95% CI: –0.02 to 0.03). Small increase in number of partners treated in the EPT group (MD, 0.22; 95% CI: 0.21–0.23)</p> <p><b>Counselling:</b> Mixed effects, with some RCTs showing efficacy and others none</p> <p><b>Patient referral via Internet:</b> With EPT and internet notification together, more partners identified (MD, 1.15; 95% CI: 0.22–2.08; 1 study). No differences in the number of partners treated or notified</p>

Althus 2014 <sup>6</sup>	Comparison of partner notification approaches	Mathematical modelling study. Compares impact on chlamydia prevalence of two strategies to notification: notifying partners in order of the most recent date of sexual intercourse before the end of a partnership, or notifying all partners during a specified look-back period	<p>At an individual level, as far back as 18 months, a substantial proportion of partners (&gt; 10%) were infected with chlamydia. This suggests that extending partner notification beyond one year yields more new index cases for individual case management than would be found through random screening</p> <p>The strongest effect of partner notification at the population level stems from notifying only the current partner. If screening is targeted at high-risk individuals, notifying previous partners (not only current partners) will likely have a stronger effect on limiting onward transmission because of their higher partner change rates</p>
Lee et al. 2014 <sup>15</sup>	Monetary incentives for STI testing	Systematic review of controlled studies. Seven studies included. Settings include STI clinics (2/7); ED (1/7) and non-clinical settings, such as university settings, general population and mobile/temporary structures (4/7)	<p>Of the three studies that performed testing only at non-clinical settings, differences between incentivised and non-incentivised uptake were 43, 19.5, and 18.1%</p> <p>Three studies that only performed testing in clinical settings demonstrated differences in uptake rates of 15, 2, and 1.8%</p>
Zhou et al. 2012 <sup>44</sup>	Computer alert; clinical guidelines; SMS reminders; regular screening incorporated into HIV care; retesting after syphilis treatment	Systematic review of controlled studies. Eight studies included. Compared screening of MSM for or detection of gonorrhoea, chlamydia and syphilis in the presence and the absence of an intervention. Settings included STI clinics (4/8 studies). Three reported screening outcomes for all three priority STIs, and one reported screening outcomes for syphilis only. Each of these studies tested a slightly different intervention	All studies in STI clinic settings reported increased screening rates relative to comparison groups. A computer alert on an electronic medical record that reminded doctors to screen MSM for gonorrhoea and chlamydia during consultations significantly increased screening from 78% to 83% (P 0.023). A computer alert on an electronic medical record that reminded clinicians during consultations to undertake 3-monthly syphilis testing of higher-risk MSM increased the proportion of high-risk MSM screened for syphilis from 77% to detect that was asymptomatic from 16% to 53%. The introduction of clinic guidelines recommending at least annual screening of MSM increased screening for the three priority STIs from 43% to 61% (p < 0.001). An SMS reminder for repeat STI screening after an STI consultation increased rescreening from 31% (P 0.001) in the pre-intervention group and 30% (P 0.001) in the concurrent comparison group to 64% in the intervention group

Guy et al. 2012a <sup>45</sup> updated in Hengel 2015 <sup>4</sup>	Clinician reminders; mailed kits; motivational interviewing; patient incentives	<p>Systematic review of controlled studies assessing interventions to increase rescreening. Twelve studies included</p> <p>Outcomes: Rescreening for repeat chlamydial infection rates; Repeat infection rates</p> <p>Most studies (8/12) in STI clinics. Most studies in the US</p>	<p>Two studies assessed motivational interviewing reminders with a summary effect of 2.15 (95% CI: 0.92–3.37); one study assessed monetary incentives to patients with OR of 1.19 (95% CI: 0.6–2.4), two studies assessed phone reminders (OR: 1.01 [95% CI: 0.66–1.55] and 9.67 [95% CI: 1.31–71.31]). Three studies assessed mailed screening kits reminders, with effects of OR: 1.7 (0.8–3.8), RR: 1.26 (1.01–1.56) and RR: 1.88 (1.58–2.24) (for updates see <a href="#">Table 2</a>)</p>
Zou et al. 2013 <sup>14</sup>	Automated text message and email reminders generated by computer assisted self-interview to remind MSM to retest for syphilis	<p>Controlled observational study. Compared clinic visits, STI testing and detection rates over 12 months between men receiving reminders (reminder group) and men not offered the reminders (concurrent control group)</p> <p>MSM in Melbourne’s major STI clinic</p>	<p>After the reminders were implemented, 4514 MSM attended the clinic of whom 3132 (69.4%) were offered the reminder service and 1382 (30.6%) were not offered it. Men in the latter group made up the concurrent control group. Among those offered reminders, 997 (31.8%) accepted the reminders, 139 (4.4%) had already registered with another reminder service elsewhere, and 1996 (63.7%) declined the service</p> <p>Men who chose three-monthly reminders had more clinic visits (median 3 vs 1) and higher testing rates for pharyngeal gonorrhoea (67.0% vs 33.6%), rectal gonorrhoea (62.7% vs 31.1%), urethral chlamydia (67.3% vs 39.3%), rectal chlamydia (62.9% vs 31.3%), syphilis (67.0% vs 39.3%), and HIV (64.9% vs 36.7%) (all <math>p &lt; 0.001</math>) than concurrent controls, within 12 months after their first visit. Also, men receiving reminders had a higher combined testing rate for all the aforementioned STIs at a same visit (55.7% vs 25.5%, <math>p &lt; 0.001</math>) compared with concurrent controls. This association remained after adjusting for differences in characteristics between the two groups (adjusted odds ratio: 1.77, 95% confidence interval: 1.51–2.08). Men receiving reminders also had a higher detection rate of: rectal gonorrhoea (3.7% vs 1.2%, <math>p = 0.001</math>), urethral chlamydia (3.1% vs 1.4%, <math>p = 0.027</math>), rectal chlamydia (6.6% vs 2.8%, <math>p &lt; 0.001</math>), and early, latent syphilis (1.7% vs 0.4%, <math>p = 0.008</math>) compared with concurrent controls</p>



Turner et al. 2014 <sup>11</sup>	Clinical pathways incorporating a point-of-care (POC) test for chlamydia and gonorrhoea in UK STI clinics compared with standard laboratory testing	Mathematical modelling study. Simulated 1.2 million GUM clinic attendees in England. A simulation was developed to compare existing standard pathways of management for chlamydia and gonorrhoea with a POC NAAT. Conducted scenario analyses to evaluate the robustness of the model findings. The primary outcome was the incremental cost-effectiveness ratio. Secondary outcomes included the number of inappropriate treatments, complications and transmissions averted	<p>The baseline cost of using the point of POC NAAT was £103.9 million compared with £115.6 million for standard care. The POC NAAT was also associated with a small increase of 46 quality adjusted life years, making the new test both more effective and cheaper. Over 95,000 inappropriate treatments might be avoided by using a POC NAAT. Patients receive diagnosis and treatment on the same day as testing, which may also prevent 189 cases of pelvic inflammatory disease and 17,561 onward transmissions annually</p> <p>The authors concluded that replacing standard laboratory tests for chlamydia and gonorrhoea with a POC test in UK STI clinics could be cost saving and patients would benefit from more accurate diagnosis and less unnecessary treatment. Overtreatment currently accounts for about a tenth of the reported treatments for chlamydia and gonorrhoea and POC NAATs would effectively eliminate the need for presumptive treatment</p>
Guy et al. 2013 <sup>5</sup>	Compared opt-out, opt-in and risk-based policies for syphilis testing among MSM with HIV	Observational study. Three general practices, two sexual health clinics and two hospital HIV outpatient clinics provided data on HIV viral load and syphilis testing from 2006–2010. Men having $\geq 1$ viral load test per year were included; > 95% were MSM. Study assessed changes in syphilis testing frequency over time, and differences by clinic testing policy (opt-out, opt-in and risk-based)	<p>The proportion of men having HIV viral loads with same-day syphilis tests increased from 37% in 2006 to 63% in 2007 (<math>p &lt; 0.01</math>) and 68–69% thereafter. In 2010, same-day syphilis testing was highest in four clinics with opt-out strategies (87%, range: 84–91%) compared with one clinic with opt-in (74%, <math>p = 0.121</math>) and two clinics with risk-based strategies (22%, range: 20–24%, <math>p &lt; 0.01</math>). The proportion of men having <math>\geq 3</math> syphilis tests per year increased from 15% in 2006 to 36% in 2007 (<math>p &lt; 0.01</math>) and 36–38% thereafter. In 2010, the proportion of men having <math>\geq 3</math> syphilis tests in a year was highest in clinics with opt-out strategies (48%, range: 35–59%), compared with opt-in (39%, <math>p = 0.121</math>) and risk-based strategies (8.4%, range: 5.4–12%, <math>p &lt; 0.01</math>)</p> <p>Provides some evidence that the policies adopted by clinics can influence the implementation of recommended clinical guidelines in relation to STI screening</p>

Table A2: Summary of studies assessing the effectiveness of interventions in primary health care settings

Study ID	Interventions	Methods and study populations	Main findings
Taylor et al. 2015 <sup>46</sup>	Forty-two Interventions categorised to increase STI screening in clinical settings classified into four intervention types: (1) structural interventions and incentives, (2) testing reminders incorporated into electronic health records, (3) provider education, and (4) patient education and reminders	Systematic review of controlled studies to increase screening rates. Twenty-two studies were included that reported on interventions in primary care	<p><b>Evidence that the following interventions are highly effective</b> for increasing screening rates in primary care facilities (absolute difference of &lt;20% between intervention and comparison groups): changing local level service delivery systems e.g. strategic placement of specimen collection materials; automatic collection of STD specimens in routine visits; use of health electronic records; provision of dedicated STI screening personnel</p> <p><b>Evidence that the following interventions have no or very limited effectiveness</b> (&lt; 5% absolute difference between intervention and comparison groups) on screening rates: patient incentives; clinic incentives; motivational counselling; paper chart reminders; referring patients to educational internet resources and providing training to general practitioners (without additional system change). In addition, patient reminder strategies showed limited effectiveness in primary care settings (but showed high or moderate effectiveness in those studies conducted in sexual health clinics)</p> <p>All interventions with strong or moderate effectiveness in increasing screening rates were considered low cost, except for provision of dedicated STI screening personnel</p>
Guy et al. 2011 <sup>47</sup> with update from Hengel 2015 <sup>4</sup>	Sixteen strategies to increase chlamydia screening in primary care: e.g. prompts, incentives, clinician education, quality improvement program	Systematic review of controlled studies to increase chlamydia screening in primary care  Fifteen reports describing 16 interventions included – 10 RCTs and 5 observational studies	<p>7/16 interventions were associated with increased screening rates</p> <p>Interventions that involved system changes to enable all patients to be offered a chlamydia test had the greatest impact; they included a multifaceted quality improvement program that included provision of a urine jar to patients at registration (65% in intervention clinics vs 21% in the control clinics among female adolescents and 49% vs 5% among male adolescents); and doctors</p>

			<p>offering a test to all presenting young male clients, prior to consultation (29% in the intervention clinics vs 4% in the control clinics)</p> <p>Other strategies showed more modest increases including linking screening to routine Pap smears (6.9% vs 4.5%), computer alerts for doctors (12.2% vs 10.6% in young females), education workshops for clinic staff (p&lt;0.001, in young females) and internet-based continuing medical education (15.5% vs 12.4%, in young females)</p> <p>Linking chlamydia screening with Pap smears resulted in increased testing, but often outside the recommended target age groups for chlamydia screening</p> <p>Update included six studies. An RCT assessing the impact of a multifaceted program targeting clinic staff and including education, posters, invitation cards, screening targets and regular feedback led to a 76% increase in testing in intervention sites compared with control. The remaining five studies reported on GP incentives, education and feedback sessions, the introduction of clinical guidelines, nurse initiated testing and quality improvement programs. Of these interventions, nurse initiated testing (28% screened pre-intervention vs 76% post intervention) and quality improvement (53% screened pre-intervention vs 76.1% post intervention) reported improvements in the proportion of health centre attendees screened</p>
Cassel et al. 2014 <sup>23</sup> and Escourt 2015 <sup>48</sup>	Two models of accelerated partner therapy (APT) offered to partners of women with chlamydia diagnosed in general practices	<p>Pilot randomised controlled trial</p> <p>Partner referral was compared to two adjunct APT interventions: APTHotline (telephone assessment of partner(s) plus standard PN) and APTPharmacy (community pharmacist assessment of partner(s) plus routine PN). Index patients were women diagnosed with genital chlamydia in 12 general practices and</p>	<p>199 women described 339 male partners, of whom 313 were reported by the index as contactable. The proportions of contactable partners considered treated within 6 weeks of index diagnosis were: APTHotline 39/111 (35%), APTPharmacy 46/100 (46%), standard patient referral 46/102 (45%). Among treated partners, 8/39 (21%) in APTHotline arm were treated via hotline and 14/46 (30%) in APTPharmacy arm were treated via pharmacy</p> <p>The authors conclude that the two novel primary care APT models were acceptable, feasible, compliant with regulations and capable of achieving</p>

		three community contraception and sexual health (CASH) services in London and south coast of England, randomised between 1 September 2011 and 31 July 2013	acceptable outcomes within a pilot RCT but intervention uptake was low. Although addition of these interventions to standard PN did not result in a difference between arms, overall PN uptake was higher than previously reported in similar settings. Recruitment to an individually randomised trial proved challenging and authors recommend service-level randomisation
Golden 2015 <sup>8</sup>	Health area-based model to increase the use of expedited partner therapy	<p>Community trial using a stepped wedge design; intervention targeted at practices and to populations at increased risk of chlamydia and gonorrhoea, and for individual situations in which partner referral was likely to fail</p> <p>The trial randomly assigned local health jurisdictions (LHJs) in Washington State, US, into four study waves. Waves instituted the intervention in randomly assigned order at intervals of 6–8 months. Of the state's 25 LHJs, 24 were eligible and 23 participated. Heterosexual individuals with gonorrhoea or chlamydial infection were eligible for the intervention</p>	chlamydia positivity among women ages 14–25 years tested in IPP clinics in LHJs participating in the trial decreased over the study period from 8.2% to 6.5% ( $p < 0.001$ ), while the annualised incidence of gonorrhoea in women declined from 59.6 to 26.4 per 100,000 ( $p < 0.001$ ). After adjusting for temporal trends, the intervention was associated with an approximately 10% reduction in both chlamydia positivity and gonorrhoea incidence, though the confidence bounds on these outcomes both included one. A post hoc analysis that combined the study's two primary outcomes resulted in narrower confidence bounds, suggesting that the intervention was associated with at least a small population-level effect
Hocking et al. 2015 <sup>21</sup>	<p>Multifactorial intervention tailored to each clinic</p> <p>Includes: quarterly updates on testing rates; incentives to GPs of \$5–\$8 per test depending on coverage; nurse incentives (\$10</p>	<p>Cluster randomised controlled trial</p> <p>Unit of randomisation = geographical area (town/rural area)</p> <p>All general practice clinics and Aboriginal Medical Services in each area invited to participate in the trial</p> <p>Up to 2.5–3.5 year intervention period.</p> <p>Primary outcome: Estimated chlamydia prevalence 16–30 year olds</p>	<p>&gt; 90% participation among clinics + 70% participation show that opportunistic chlamydia testing in Australian general practice is feasible and acceptable</p> <p>The intervention increased annual chlamydia testing to about 20% – that was an increase of about 80% of baseline levels</p> <p>Preliminary results suggest that screening up to about 20% of 16- to 29-year-old men and women attending general practice each year for an average of three years, did not reduce chlamydia prevalence in the population when compared with control population</p>

	per test); accredited educational package for GPs and nurses; computer alerts; recall register for follow-up; partner notification support	<p>Study aims to assess the feasibility, acceptability, efficacy and cost-effectiveness of chlamydia testing in the general practice setting</p> <p>Other outcomes: Pelvic inflammatory disease (PID)/epididymitis; chlamydia testing and retesting rates; chlamydia positivity (proportion of those tested who test CT positive); chlamydia re-infection rates</p>	
Callander et al. 2015 <sup>20</sup>	Multifaceted 2-year intervention to increase STI testing among MSM. Integrative software generated computer prompts; patient testing recall system; annual payment incentives to GPs; promotional and educational resources and monthly and biannual feedback reports to clinic staff	<p>Before-after study</p> <p>6/7 participating GPs located in Sydney and 1/7 in Melbourne. GPs had to see 50 or more MSM per year to be eligible</p>	<p>MSM who had a full HIV/STI screen increased from 23% to 31% (p &lt; 0.001)</p> <p>14–29 year old men tested for chlamydia increased from 38% to 52% (p &lt; 0.001), similar for gonorrhoea</p> <p>Proportion of male patients diagnosed with chlamydia and/or gonorrhoea who were retested within 3 months (+/- 1 month) increased from 27% to 33% (p &lt; 0.001)</p> <p>The ongoing technical issues faced by participants hampered the interventions usefulness and acceptability significantly. The limits of both existing patient management systems and the eTEST-specific software challenged how useful GPs saw the intervention overall and highlighted major issues with introducing this type of intervention</p>

Table A3: Summary of studies assessing the effectiveness of interventions in Aboriginal Community Controlled Health Services

Study ID	Interventions	Methods, populations and settings	Main findings
Guy et al. <sup>24</sup>	STI programs in remote Aboriginal communities	<p>Systematic review of evaluations of the impact of STI programs delivered by primary health care services in remote Aboriginal communities</p> <p>Primary outcome was the change in bacterial STI infection prevalence in the target age group over a 5-year period or more</p> <p>Remote Aboriginal communities</p>	<p>Twelve reports described four distinct STI programs in remote communities and their impact on STI prevalence. In the Anangu Pitjantjatjara Yankunytjatjara (APY) lands of northern South Australia, there was a reduction in the age-adjusted chlamydia and gonorrhoea prevalence by 58% and 67%, respectively (1996–2003). In the Tiwi Islands of Northern Territory (NT) chlamydia and gonorrhoea positivity decreased by 94% and 34%, respectively (2002–2005)</p> <p>In the Ngaanyatjarra Lands of Western Australia, crude chlamydia and gonorrhoea prevalence decreased by 36% and 48%, respectively (2001–2005), and in the central Australian region of NT, there was no sustained decline in crude prevalence (2001–2005)</p> <p>Conclusion: In three of the four programs, there was some evidence that clinical best practice and well-coordinated sexual health programs can reduce STI prevalence in remote Aboriginal communities</p>
Graham et al. 2015 <sup>49</sup>	Quality improvement program in 4 ACCHOs in NSW	<p>Before-after study</p> <p>Aimed to assess the impact of a sexual health quality improvement intervention on chlamydia and gonorrhoea testing rates among 15–29 year olds attending 4 ACCHS in NSW</p> <p>Primary outcome was the proportion of 15–29 year olds tested for chlamydia and gonorrhoea</p>	<p>In the before period, 9% of the 1881 individuals were tested for chlamydia, compared to 22% of the 2259 individuals in the QIP period (odds ratio [OR]: 1.43, 95% CI: 1.22–1.67)</p> <p>From the before to the QIP periods, increases were observed in females (13% to 25%, OR: 1.32, 95% CI: 1.10–1.59) and males (3% to 17%, OR: 1.85, 95% CI: 1.36–2.52). The highest testing rate in the QIP period was in 15–19 year old females (16% to 29%, OR: 1.02, 95% CI: 0.75–1.37), yet the greatest increase was in 20–24 year olds males (3% to 19%, OR: 1.65, 95% CI: 1.01–2.69). Similar increases were seen in gonorrhoea testing. There were 73 (11%) chlamydia diagnoses, with 22 (12%) in the before and 51 (10%) in the intervention period. Overall, there were 4 (0.7%) gonorrhoea diagnoses</p> <p>Case finding was 11% for chlamydia and 0.3% for gonorrhoea</p>

Ward et al. 2013 <sup>26</sup> and unpublished powerpoint presentation	Quality improvement program in remote communities in Australia	Stepped wedge cluster randomised controlled trial in 68 remote Aboriginal communities. Data are extracted from patient management systems and from laboratories	<p>In the first year of the trial, testing rates improved overall by 27% at 21 sites and by 50% or more at 11 sites (testing coverage in year 3 sites increased from 30% to 43% in females and 16% to 27% in males)</p> <p>In 2011, baseline prevalence for CT and NG (n = 2483) and TV (n = 1848) among 16–34 year olds were 9%, 7% and 13% respectively. Highest prevalence were reported among 16–19 year olds for CT 13% (95% CI: 10.8–16.4), NG, 12% (95% CI: 9.7–15.1) and TV, 17%(95% CI: 13.7–21.1). There were 17,848 STI tests conducted in 2010 and among females aged 16–34; 33.3% had &gt; 1 STI (highest in 16–19 year olds: 48.9%) and 21.3% of males had &gt; 1 STI (highest in 16–19 year olds: 33.4%). The most frequent co-infection was CT and NG, which was found in 3.4% of females (highest in 16–19 year olds: 8.6%) and 3.9% of males (highest in 16–19 year olds: 10.1%)</p>
Guy et al. 2015 <sup>27</sup>	POC testing for chlamydia and gonorrhoea	Cross-cover health centre randomised controlled trial – includes nine remote sites around Australia. Assess impact of molecular point-of-care tests to detect and treat sexually transmissible infections in young Aboriginal people in remote communities. Intervention, which included a formal training package, competency-based POC training, wall charts, other resources	<p>Preliminary results available from 3 sites indicates a reduction in median number of days to treatment</p> <p>Importance of nurse and Aboriginal Health Worker involvement to promote uptake and for follow-up</p>

Table A4: Summary of studies assessing the effectiveness of interventions in Antenatal settings

Study ID	Interventions	Methods and study populations	Main findings
Shahrook 2014 <sup>33</sup>	POC testing for syphilis with treatment offered the same day compared to laboratory testing	<p>Systematic review. Two cluster RCTs, which together involved 8493 pregnant women. Both trials were conducted in LMICs. Trial results were not pooled due to heterogeneity</p> <p>Trial 1: included 14 antenatal clinics (including 7700 pregnant women): Mongolia</p> <p>Trial 2: included seven matched pairs of clinics (including 7618 pregnant women, although results were only presented for the 792 women who tested positive): South Africa</p>	<p>Trial 1: Incidence of congenital syphilis was lower in the clusters receiving on-site screening (adjusted odds ratio (AOR): 0.09, 95% CI: 0.01–0.71); proportion of women tested for syphilis was higher at both the first antenatal visit and at the third trimester visit (OR: 989.80, 95% CI: 16.27–60233.05; OR: 617.88, 95% CI: 13.44–28399.01); adequate treatment and partner treatment was higher (AOR: 10.44, 95% CI: 1.00–108.99; AOR: 18.17, 95% CI: 3.23–101.20) and more syphilis cases were detected at first and third trimester visits (AOR: 2.45, 95% CI: 1.44–4.18; AOR: 6.27, 95% CI: 1.47–26.69)</p> <p>Trial 2: No clear evidence of an effect on perinatal mortality reduction (odds ratio [OR] 0.63; 95% CI: 0.27–1.48; 18/549 [3.3%] versus 8/157 [5.1%]). Report noted technical and logistical difficulties in implementation, which may have contributed to the lack of effect</p>
Hawkes et al. 2011 <sup>32</sup>	Interventions to increase uptake of syphilis screening	Systematic review including 10 studies; strategies included interventions that aimed to encourage women to seek care earlier in pregnancy (two studies), and decentralisation of screening and treatment (nine studies)	The 10 studies included are very heterogeneous. Important common features of the interventions were decentralized testing and same-day treatment. The outcomes are varied and include, in various combinations: i. proportion of women receiving antenatal screening (5 studies); ii. proportion of women receiving at least one dose of penicillin (6); iii. infants born with congenital syphilis (4); iv. peri-natal deaths (3); v. stillbirths (3). Evidence of increased uptake of testing and treatment (i. and ii.) was inconclusive. Evidence of adverse pregnancy outcomes (especially iv. and v.) is stronger, with reduced peri-natal death (RR) of 0.46, and for still birth of 0.42



Hawkes et al. 2013 <sup>34</sup>	Early antenatal care as a means to reduce adverse outcomes from syphilis (some overlap with below)	Systematic review. Assessed associations between gestational age of first screen and maternal and neonatal outcomes related to syphilis	Women who sought care in the first two trimesters of their pregnancy, and received the appropriate intervention, were more likely to have a healthy infant, compared to women screened and treated in the third trimester
Nelson 2014 <sup>50</sup> and Zakher 2014 <sup>51</sup>	Screening for chlamydia and gonorrhoea in pregnancy	Systematic review. Assessed impact of screening programs on maternal complications, adverse pregnancy and infant outcomes and transmission or acquisition of disease	No evidence was identified for the effectiveness of screening asymptomatic young pregnant women for chlamydia and gonorrhoea – no studies met the inclusion criteria
Taylor 2015 <sup>19</sup>	Screening reminders/alerts in electronic health records	Systematic review including two studies in antenatal setting – see <a href="#">Table A2</a> and opposite for study details <sup>19</sup>	<p>Two studies included in the review in antenatal settings</p> <p>One study tested an intervention that placed CT swabs next to Pap collection materials for collection at the same time. Proportion of patients screened for CT increased from 57% (2939/5127) to 81% (4067/5014) (P &lt; 0.001). The number of newly diagnosed patients increased 10% overall</p> <p>One study tested automated electronic reminders in electronic health records. Compared with the pre-intervention period either completion of the test or documentation of the lack of need for repeat GC/CT testing increased from 33% at baseline to 97% when prompts were active (P &lt; 0.001)</p> <p>Screening rates went back to 34% in the post intervention period</p>

Ong et al. 2015 <sup>30</sup>	Comparison of cost effectiveness of different screening approaches – screening all young pregnant women compared to selective screening	Modelling study	Implementing a screening program where all pregnant women aged 16–25 years received a chlamydia test as part of their routine antenatal care would cost £767 (\$1641) for every additional chlamydia case detected and treated, but could avoid much larger costs of complications of undetected chlamydia, such as managing a low birth weight baby, which may cost over £2800 (\$6000), managing neonatal pneumonia which may cost up to £1727 (\$3695) and managing pelvic inflammatory disease, which may cost up to £1699 (\$3636). Additionally, results showed that when chlamydia prevalence is 3%, screening pregnant women between 16 and 25 is cost-effective and if chlamydia prevalence was higher than 11%, screening could result in cost savings to the Australian healthcare system
Kwan et al. 2012 <sup>31</sup>	Operational directive (OD) issued by the state health department recommending universal testing for chlamydia and additional testing for women in the STI endemic regions of Western Australia	Record review of records from seven hospitals in WA. Demographic details and testing information of the last 200 women who gave birth immediately before 30 June 2007 (baseline audit) and 30 June 2010 (follow-up audit) were obtained from each hospital's antenatal records	Data from 2718 women who delivered at ≥ 36 weeks' gestation were analysed (baseline = 1353; follow-up = 1365). Testing at the first antenatal visit in accordance with the guidelines improved over time (RANZCOG: 68–74%; $\chi(2)$ -test = 13.96, d.f. = 1, P < 0.001; DoHWA OD: 12–40%; $\chi(2)$ -test = 279.71, d.f.=1, P < 0.001). Retesting at 28–36 weeks' gestation in the STI endemic regions improved for chlamydia (3–10%; $\chi(2)$ -test = 17.40, d.f. = 1, P < 0.001) and gonorrhoea (3–7%; $\chi(2)$ -test = 6.62, d.f. = 1, P < 0.05), but not for syphilis or HIV. Chlamydia prevalence was 3% and 8% among non-Aboriginal and Aboriginal women, respectively  The proportion of women delivering in WA public hospitals who had antenatal STI and BBV tests improved after publication and promotion of the OD

**Table A5: Summary of studies assessing the effectiveness of interventions in emergency departments**

Study ID	Interventions	Methods and study populations	Main findings
Jenkins et al. 2013 <sup>35</sup>	None	<p>Systematic review 1995–2010</p> <p>Aimed to evaluate the burden of CT/GC infection in ED patients in the US, assess the extent of associated under-treatment and overtreatment, and investigate mechanisms whereby ED screening can be feasible</p>	<p>Positivity rates for ED patients are comparable with other high-risk populations but follow-up is challenging</p> <p>Under-treatment rates of between 2% and 84% (highest for asymptomatic infections) and overtreatment of 7.9% to 87%</p> <p>Strategies to decrease under-treatment included use of unspecified follow-up; treatment at a local public STD clinic or local health department; return to the ED or hospital clinic, or follow-up by a hospital disease-intervention specialist; direct study investigator contact; and treatment at a primary care setting. One study explored the effectiveness of collaboration between the ED and local health department for follow-up. Using these strategies, under treatment dropped from an average of 66.7% to 15.9% (unadjusted averages)</p> <p>Several studies examined the utility of various screening strategies and algorithms. One study found that simple mass treatment was more cost-effective than any screening strategy. Of the screening strategies considered, screening all sexually active females aged 18-31 years was the most cost-effective. For males, standard ED practice, or simple mass treatment, were cost-effective</p> <p>Barriers to routine screening in the ED include limited space, competing demands of acute illness and injury, appropriate staffing, particularly appropriate level of staffing</p>
Lee et al. 2014 <sup>15</sup>	Monetary incentives for STI testing	<p>Systematic review of monetary incentives to increase STI testing – see <a href="#">Table A1</a> for study details</p>	<p>Review included one study in ED department. However on further review this study was found to be focused on HIV testing – no further data were extracted</p>

Table A6: Summary of studies assessing the effectiveness of interventions in correctional services

Study ID	Interventions	Methods and study populations	Main findings
Kouyoumdjian et al. 2015 <sup>52</sup>	Various interventions (to improve the health of persons during imprisonment and in the year after release)	Systematic review of RCTs of interventions to improve the health of people during imprisonment or in the year after release	Ninety-five RCTs were identified. Most studies were conducted in the US (n = 57)  STI interventions in the included studies that were tested were interventions to reduce sexual risk behaviours after release, Hepatitis B vaccination during imprisonment and interventions for HCV testing during imprisonment. The review did not identify any studies that cover the priority STIs of interest for this evidence check. No further data were extracted
Spaulding et al. 2013 <sup>38</sup>	Screening for STIs in prison populations	Evidence review undertaken to inform US guideline development  Studies reviewed to end 2009  Only studies from US included	There were no RCTs assessing the effectiveness of STI screening interventions in prison settings identified in this review  <b>Non-randomised evidence suggests that STD screening and treatment in detention facilities may also impact community prevalence rates.</b> In San Francisco, jail entrants between 1997 and 2004 were screened for chlamydia; 75% of those testing positive were treated before release, and 17% were treated after release. This intervention was ecologically associated with declines in chlamydia positivity among female patients tested in the health clinic located in a neighbourhood where many of the persons tested in detention facilities resided. However, an evaluation of the Philadelphia jail-based screening did not demonstrate an ecologic link between screening and treating men in the Philadelphia city jail for chlamydia and neighbourhood-specific changes in positivity among women. Chlamydia positivity among women decreased citywide  <b>There is limited evidence that screening for syphilis in jail has impacted community P&amp;S syphilis rates.</b> For example, data from New York City suggest that screening and treating women for syphilis at jail intake may result in a reduction of syphilis morbidity in the general community. <sup>39</sup> In Nashville, a decline in community rates followed implementation of screening in the jail <sup>31</sup>

			<p>The review cites data from a mathematical model of jail screening where a rapid plasma reagin test with point-of-care rapid results was used. This model estimated that universal screening was cost saving if the prevalence of early syphilis was more than 1%. This estimate was based on cost savings associated with treating cardiovascular syphilis and neurosyphilis and did not consider cost savings resulting from transmission during pregnancy, transmission to sex partners, and increased risk of HIV transmission, so it is possible that the cost-savings prevalence threshold could be even lower, particularly given the high lifetime risk of unplanned pregnancy and lack of prenatal care among incarcerated individual</p>
Tuli and Kerndt 2009 <sup>53</sup>	Package of screening, treatment, and condom provision	<p>Modelling study</p> <p>Chlamydia, gonorrhoea, and syphilis infections, net cost and cost effectiveness</p> <p>STD/HIV screening in gay and bisexual incarcerated populations in Los Angeles</p>	<p>Suggests significant cost-savings in this population in the US. Applicability to NSW context highly uncertain and therefore no further data were extracted</p>

Table A7: Summary of studies assessing the effectiveness of interventions in other settings

Study ID	Interventions	Methods and study populations	Main findings
<b>Pharmacies</b>			
Gudka et al. 2013 <sup>54</sup>	Chlamydia screening interventions in pharmacies: population-based screening (consumer-led) and opportunistic (pharmacist offered pre-select group)	<p>Systematic review to determine the different types of pharmacy-based chlamydia screening interventions, describe their uptake rates and understand issues around the acceptability of and barriers to testing</p> <p>Search strategy up to 30 October 2011 for studies that reported chlamydia screening interventions from community pharmacies, or had qualitative evidence on acceptability or barriers linked with interventions.</p> <p>Main outcomes were screening uptake and rate of return</p>	<p>Twelve studies included. Nine reported chlamydia screening interventions in a pharmacy setting, whereas three focussed on perspectives on chlamydia screening. Pharmacists could offer a chlamydia test to consumers attending the pharmacy for a sexual health-related consultation, or consumers could request a chlamydia test as part of a population-based intervention. Participating consumers said pharmacies were accessible and convenient, and pharmacists were competent when offering a chlamydia test. Pharmacists reported selectively offering tests to women they thought would be most at risk, undermining the principles of opportunistic interventions</p> <p>The authors concluded that chlamydia screening from community pharmacies is feasible, and can provide an accessible, convenient venue to get a test. Professional implementation support, alongside resources, education and training programs, and incentives may overcome the issue of pharmacists selectively offering the test</p>
Kapadia et al. 2013 <sup>42</sup>	Chlamydia screening from community pharmacies	<p>Systematic review to assess the uptake of screening in community pharmacies and the prevalence of chlamydia among those screened. Search strategy from 1 January 1995 to 30 June 2011</p> <p>Young people under 24 years of age, women receiving EC or high-risk gay men reached through pharmacies (worldwide)</p>	<p>Eleven studies included in the review. Six of the 11 studies targeted only women by offering chlamydia testing during an EC consultation Kits were offered to 25% to 78% of women coming for EC</p> <p>The proportional meta-analysis showed a chlamydia positivity of 8.1% (95% CI: 7.3%–8.9%). Chlamydia screening programs in community pharmacies tended to be targeted at certain client groups such as those seeking emergency contraception in pharmacies. The pharmacists were reluctant to offer chlamydia screening to potential clients. The uptake of the service was low, and tended not to include men and ethnic minorities</p>

			<p>Between 10% and 47% of those approached by the pharmacists agreed to be screened</p> <p>Once successfully recruited by a community pharmacy, the proportion who returned home testing kits varied widely between 12% and 64%</p> <p>Among those screened, pooled positivity rate was of 8.1% (95% CI: 7.3%–8.9%) among those tested in a community pharmacy setting</p>
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There were no studies meeting our inclusion criteria that assessed the effectiveness of interventions in services specifically for young people, mental health services or drug and alcohol services.