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Effectiveness of Incentives on Sexually Transmitted Infection Testing Uptake: A Trial Among Aboriginal and Torres Strait Islander Young People in Remote Central Australia (2015–2020)

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Background: Bacterial sexually transmitted infections (STIs) cause a substantial disease burden worldwide and disproportionately impact young people. In Australia, Aboriginal and Torres Strait Islander people are a priority population in STI testing guidelines.

Methods: The More Options for STI Testing trial evaluated whether providing an incentive impacted STI testing rates in select Central Australian communities. Aboriginal and Torres Strait Islander people aged 16 to 29 years were eligible for a A$30 phone voucher if they had an STI test at a participating Aboriginal community-controlled primary health care clinic. An interrupted time series analysis examined monthly STI test counts for chlamydia, gonorrhea, or syphilis from 2015 to 2020, to determine whether testing increased during the incentives phase (2018–2020)

Results: There were a total of 10,457 visits to the clinic in which an STI test was conducted, 5110 of which were during the incentives period. A total of 1526 incentives were provided to eligible clients. The baseline and incentives periods were each divided into 2 phases to account for new clinic openings and the COVID-19 pandemic. Among men, average monthly visits for an STI test were 32.6 (baseline phase 1), 44.1 (baseline phase 2), 50.8 (incentives phase), and 35.4 (incentives/COVID-19 phase). Women had 93.5, 111.3, 118.8, and 113.4 visits, respectively. No significant change in STI testing was observed during the incentives phase. The proportion of visits for an STI test where an incentive was paid (coverage) varied by month, from 36% to 76% of consultations.

Conclusions: The limited impact of incentives could be explained by low coverage or that the incentive was not motivating enough to overcome STI testing barriers. Future studies should investigate alternative methods of increasing STI testing in remote Central Australia, including through primary care clinics.

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Acknowledgments: The authors would like to thank all communities, health boards and health services for participating in this study. They would like to specifically acknowledge the efforts of the partner organizations and health service staff in implementing this project. They express their gratitude to Abdolvahab (Vahab) Baghbanian, Sam Moore, Walbira Murray, and David Whiley for their contributions to the study.

Conflict of Interest and Sources of Funding: The More Options for STI Testing Trial was funded by the National Health and Medical Research Council (Reference No. APP1060478). No pharmaceutical grants were received in the development of this study.

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Received for publication June 2, 2025, and accepted September 22, 2025.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text, and links to the digital files are provided in the HTML text of this article on the journal's Web site (http://www.stdjournal.com).

DOI: 10.1097/OLQ.0000000000002254

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Bacterial sexually transmitted infections (STIs) cause substantial disease burden around the world, with an estimated 1 million new infections occurring per day.[1] These STIs disproportionately affect young people and can cause a range of potentially serious health issues, such as pelvic inflammatory disease,[2] infertility,[3] and poor pregnancy or birth outcomes such as preterm birth and low birth weight.[4] Common STIs, including *Chlamydia trachomatis* (chlamydia), *Neisseria gonorrhoeae* (gonorrhea), and *Treponema pallidum* (syphilis), are often asymptomatic,[5] so STI testing is a key strategy for early detection aimed at delivering effective treatment to prevent adverse consequences and onward transmission. In Australia, primary health services are the main source of care for STI testing and treatment.[6,7] The challenges in engaging young people in testing are well documented,[8,9] and testing rates in many settings remain low.[10]

First Nations populations in high-income countries with a history of colonization bear a disproportionate burden of adverse sexual and reproductive health outcomes compared with non-Indigenous populations in these countries.[11–14] linked to socially driven inequities, a continuing impact of colonization.[11,14] In Australia, Aboriginal and Torres Strait Islander is a broad term used to describe the 2 distinct cultural groups of First Nations peoples encompassing a broad diversity of language and culture.[15] Aboriginal and Torres Strait Islander young people younger than 35 years bear a high burden of STIs,[6,7] despite evidence that a high proportion of this population (particularly women) engages regularly with health services,[16] and therefore are noted as a priority population under national STI testing guidelines.[17] National surveillance data document rates of chlamydia, gonorrhea, and infectious syphilis diagnosis 2, 4, and 5 times higher, respectively, among Aboriginal and Torres Strait Islander people compared with their non-Indigenous counterparts,[18] with an even greater

disparity in regional and remote areas of Australia.[18,19] Factors that impact on failure to reduce prevalence of common STIs in remote Australian Aboriginal and Torres Strait Islander communities include availability of and access to culturally appropriate health care, inadequate responses to STI control, high turnover of staff, a reliance on locum staff, and multiple competing priorities for health personnel.[20–23] Factors impacting the uptake of sexual health care by Aboriginal and Torres Strait Islander young people are linked more broadly to the social determinants of health[11,20,24] and may include low levels of educational attainment,[25] knowledge, and awareness[26–28]; shame and stigma related to STIs or unplanned pregnancy[26,27,29,30]; intergenerational trauma[11]; systemic racism[27,28]; and socioeconomic disadvantage.[20,29]

Various interventions have been conducted in remote Aboriginal Community Controlled Health Service (ACCHS) settings within Australia with the goal of enhancing uptake of STI testing and treatment among Aboriginal and Torres Strait Islander people younger than 35 years. The STRIVE trial found that a continuous quality improvement program led to an increase in STI testing[31s] in remote Aboriginal and Torres Strait Islander communities, but not sufficient to reduce community prevalence, consistent with analyses of data from other regional areas in Australia.[32s] The TTANGO trial[33s] showed that point-of-care testing for chlamydia, gonorrhea, and trichomonas reduced time to treatment and number of infectious days,[34s] and increased uptake of STI testing.[35s] However, these strategies focus generally on testing uptake among those already attending a service, so they need to be complemented by other approaches to enhance clinic attendance.

Incentives aim to capitalize on individuals' interest in immediate benefits,[36s] and have been used to encourage behavior change in health care settings, including blood donation,[37s] disease prevention,[38s] treatment adherence,[39s] and smoking cessation.[40s] Applied to STI testing,[41s] incentives can increase uptake in high-income country settings.[41s, 42s] In Australia, incentives have led to increased STI testing within a hepatitis C treatment program, improved sexual health service delivery by clinics, and greater uptake of retesting after a positive STI diagnosis.[31s, 43s, 44s, 45s] The More Options for STI Testing (MOST) study was conducted in Central Australia, with the goal of assessing whether provision of an incentive (A$30 phone voucher) increased the number of young Aboriginal and Torres Strait Islander people having an STI test.

METHODS

Design of the Intervention

In Central Australia, primary health care is provided by government-run clinics, or ACCHSs. The MOST trial took place at 7 clinical sites that are managed by ACCHSs, with the majority of sites located in Alice Springs, Northern Territory.[46s] The design of the MOST trial was informed by a formative qualitative study[47s] in Central Australia that investigated the acceptability of novel strategies aimed at increasing STI testing. Participatory, peer-led research methods were used in which peer researchers collected, analyzed, and interpreted qualitative data. The findings of the qualitative study were used to rule out one proposed strategy, anonymous specimen drop-off, due to confidentiality concerns, and to design the delivery of an incentives program for STI testing. A key part of the design process was close consultation with clinicians and managers at the participating ACCHSs to determine the operational logistics on the delivery of the program.

The Intervention

The intervention phase of the trial took place from April 2018 to September 2020. The intervention was the offer of an incentive to any Aboriginal and Torres Strait Islander person aged 16 to 29 years who underwent a test for bacterial STIs as per recommended sexual health guidelines.[48s] Specifically, those in this target population who attended a participating clinic in Central Australia during the intervention phase were eligible to receive a A$30 phone voucher if they had an STI urine test (for chlamydia and gonorrhea) or blood test (for syphilis). The type and value of the incentive were chosen based on the formative qualitative research conducted with young Aboriginal and Torres Strait Islander people in the local area.[47s] In consultation with the ACCHSs, the availability of the incentive was advertised through posters in clinic consulting rooms, waiting rooms, and bathrooms; promotional cards at clinic reception; radio advertisements, advertised on the ACCHSs organizational Facebook page; and text messages to phone numbers obtained from the health service patient information management system (PIMS) of individuals within the target population. Health promotion staff also advertised the incentive through community events, and clinical staff were reminded to offer the incentive at their regular staff meetings. Study investigators met with clinic staff quarterly to assess progress and identify any issues. To protect confidentiality, people in the target population attending the service for any reason were to be offered the opportunity to receive the incentive by the clinician during their consultation. During each consultation, consent was obtained for testing as per normal clinical protocols, and participants provided a urine specimen (for chlamydia and gonorrhea) and blood sample (for syphilis) as per STI guidelines, which recommend opportunistic STI testing for those aged 15 to 34 years.[48s] As part of the design, the clinics decided to opportunistically offer a standard adult health check[49s] in conjunction with the STI test, which also had the goal of normalizing and providing education around STI testing and sexual health. People in the target population attending a participating clinic were eligible to receive a further incentive for having a test after 6 months had elapsed since their previous test, or after 2 to 4 months in the case of a positive result. Delivery of the incentive was given by the clinician during the consultation and was recorded in the clinic PIMS in each clinic. To reconcile the vouchers purchased with those that were distributed, a paper-based system was used to track physical voucher distribution according to date and recipient.

Data Analysis

Data were extracted from the PIMS of participating clinics. A report was generated, aggregating the monthly number of STI tests conducted between January 1, 2015, and September 30, 2020. For the analysis, tests eligible for an incentive were defined as those who were aged 16 to 29 years, were tested for chlamydia/gonorrhea (CTNG; a combination test based on urine samples) or for syphilis (based on blood samples), and had not had an STI test in the previous 6 months. To account for the addition of new participating clinical sites opening during the study period, 2 in August 2016 and 1 in August 2017, we split the baseline phase into 2 periods (baseline phase 1: January 2015 to July 2016, baseline phase 2: August 2016 to March 2018). In addition, the incentive phase was split into periods before and after the onset of the COVID-19 pandemic, allowing for a separate regression line to be estimated for each phase (incentives phase: April 2018 to February 2020, incentives/COVID-19 phase: March 2020 to September 2020; Fig. S1, http://links.lww.com/OLQ/B269). Analyses were stratified by gender. We used interrupted time series analysis to compare the uptake of STI testing in each phase. We used Poisson regression analysis, with time as the independent variable and the outcome being the number of STI tests per month, either for CTNG or for syphilis. As a control measure, to assess the impact of new clinic openings before the intervention period on numbers of STI tests and visits to the health service, we separately examined STI testing trends outside the target age group and also

TABLE 1. Number of STI Tests Among Male and Female Participants by Age and Study Phase

	Male			Female			Total		
	No. Visits	%	Average No. Visits Per Month	No. Visits	%	Average No. Visits Per Month		%	No. Visits Per Month
Unique visits that contained a CTNG* and/or syphilis test	2922		42.3	7535		109.2	10,457		151.6
CTNG and syphilis	2261	77.4	32.8	3934	52.2	57.0	6196	59.3	89.8
CTNG	469	16.1	6.8	2681	35.6	38.9	3150	30.1	45.7
Syphilis	192	6.6	2.8	920	12.2	13.3	1112	10.6	16.1
16–19 y	811	27.8	11.8	1881	25	27.3	2692	25.7	39.0
20–24 y	1086	37.2	15.7	3030	40.2	43.9	4116	39.4	59.7
25–29 y	1025	35.1	14.9	2624	34.8	38.0	3649	34.9	52.9
Baseline phase 1 (19 mo)	619	21.2	32.6	1777	23.6	93.5	2396	22.9	126.1
Baseline phase 2† (19 mo)	837	28.6	44.1	2114	28.1	111.3	2951	28.2	155.3
Incentives phase (24 mo)	1218	41.7	50.8	2850	37.8	118.8	4068	38.9	169.5
Incentives/COVID-19 pandemic phase (7 mo)	248	8.49	35.4	794	10.5	113.4	1042	10.0	148.9

*Combined chlamydia and gonorrhea test.

†Baseline phase split into 2 parts to account for 2 new clinics opening in August 2016 and 1 in August 2017.

measured overall consultations at the health service (not just those for STI testing).

MOST was overseen by executive and operations committees, made up of senior study investigators and representatives from partner organizations, including participating health services and the Northern Territory Department of Health. The study was granted ethical approval by the Central Australian Human Research Ethics Committee (CA-17-2949).

RESULTS

Over the 5-year study period, 10,457 visits were recorded in which a member of the target population received a CTNG test, a syphilis test, or both at a participating clinical site (Table 1). Of these 5110 (48.9%) such visits occurred during the incentives and incentives/COVID-19 pandemic phase, with a total of 1526 incentives provided to eligible clients. Across all 4 study phases (Fig. S1, http://links.lww.com/OLQ/B269), the average number of CTNG tests per month was substantially higher among women compared with men (109.2 vs. 42.3 CTNG tests per month, respectively; Table 1). During the incentives phase, among women, there were an average of 118.8 tests per month compared with 50.8 in men (Table 1).

There was a small increase in the number of visits where an STI test was conducted (Fig. S2, http://links.lww.com/OLQ/B269) following the introduction of new clinical sites. The number of clinic visits for an STI test remained stable during the incentives phase and declined during the COVID-19 pandemic phase. Similarly, the number of consultations (visits for any reason) among the target population (Fig. S3, http://links.lww.com/OLQ/B269) similarly increased after new clinics opened and remained stable during the incentives phase.

To determine the impact of new clinics opening in the region, we examined consultation data for individuals aged 30 to 35 years (Fig. S4, http://links.lww.com/OLQ/B269), an age group not targeted in the incentives program. The analysis showed an increase in STI screening consultations during the second baseline phase, likely due to the opening of new clinics, and fluctuated but remained stable over the incentives phase.

Figure S5, http://links.lww.com/OLQ/B269, shows the number of unique STI testing visits that were eligible for an incentive under the intervention protocol and the number of incentives recorded as having been given. The proportion of eligible tests that resulted in provision of an incentive per full month of the incentives program (from March 2018 onward) ranged from 36% to 76% and from 10% to 59% over the incentives/COVID-19 pandemic phase.

As shown in Figure 1, the majority of STI testing visits involved both CTNG and syphilis tests. There was a slight increase

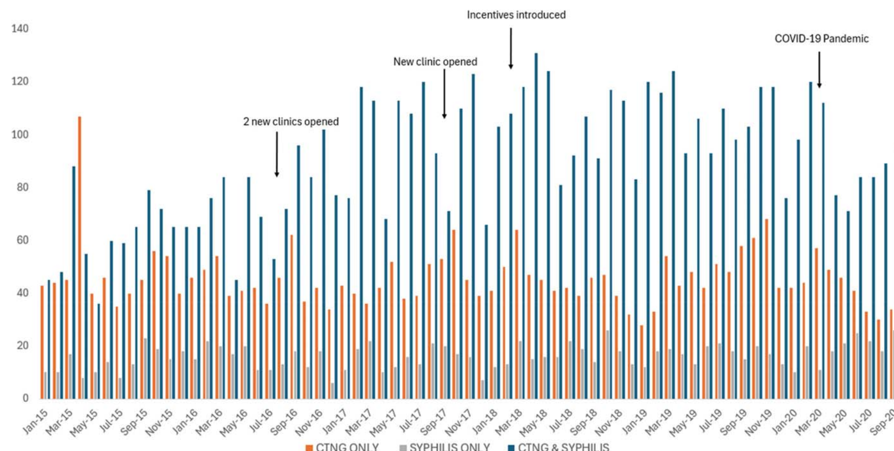

Figure 1. Number of unique visits for a combined chlamydia and gonorrhoea (CTNG) test and/or a syphilis test per month, during the study period January 2015 to September 2020.

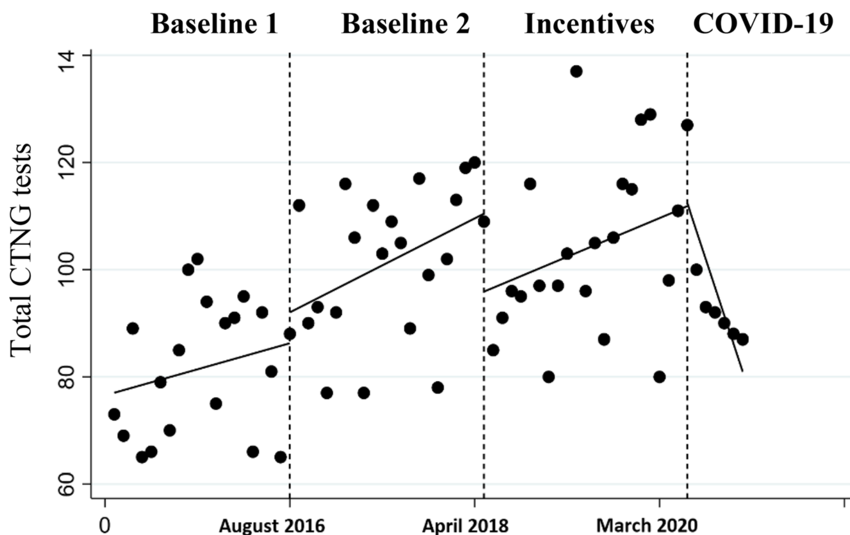

Figure 2. Interrupted time series analysis of number of combined chlamydia and gonorrhea (CTNG) tests conducted among women per month, from January 2015 to September 2020, by study phase.

in these visits during the second baseline phase, but they remained stable for the remainder of the study period. Visits where either a CTNG or syphilis test only was performed were less common (30% and 11% of all tests, respectively) and remained stable across the whole study period.

During the incentives phase, among women, there was a small increase of 0.72 CTNG tests per month (95% confidence interval [CI], −0.30 to 1.83), and this was not statistically significant (Fig. 2, Table 2). This was followed by a statistically significant and sharp decline of 5.25 (95% CI, −8.72 to −1.77) tests per month after the commencement of the COVID-19 pandemic (Fig. 2, Table 2). Among men, there was a small increase of 0.90 CTNG tests during the second baseline phase (95% CI, 0.19–1.61), which was marginally significant, but no change in testing rates during the incentives phase (Fig. 3, Table 2).

DISCUSSION

The MOST study assessed whether the provision of an incentive ($30 phone voucher) incentivized young Aboriginal and Torres Strait Islander people in Central Australia to test for STIs in Aboriginal primary health care services. This trial aimed to increase engagement with STI testing among this group in remote areas of Central Australia to address inequities in STI disease burden and access to health services.

Results from this study show that this incentives trial had no significant impact on STI testing uptake among the target population. These data also highlight a continuing and substantial difference in STI testing patterns between men and women, and the impact of the COVID-19 pandemic on STI testing in our study setting. Although it was not our hypothesis, we observed an increase in uptake of testing as new clinics opened, suggesting that provision of additional service sites is an effective way to enhance uptake.

The number of STI tests among women was almost 3-fold higher than that of men across all study phases. This finding is consistent with a number of other studies that found a higher level of engagement with health services among women than men.[32-s,50s] Possible explanations include greater capacity and agency of women to engage in health care,[51s] structural issues such as greater availability of female staff,[52s] a preference among women for obtaining contraception that requires a visit to the clinic,[53s] less health-seeking behavior among young men,[50s] or that STI testing guidelines recommend routine STI testing during pregnancy.[17]

The sharp decrease in testing among women after the commencement of the COVID-19 pandemic may be at least partly attributable to restrictions placed on communities,[54s] reductions in both sexual risk behaviors, and visits to the health service.[55s] In addition to people not wanting to attend clinics due to risk of COVID-19 exposure, from 2020, there was an increasing decline in available workforce due to border closures.[56s] That this decrease during the COVID-19 pandemic was observed among women and not men is likely related to the much higher testing rates among women across the whole study period. One possible explanation could be that a higher proportion STI tests among women in our study are opportunistic or associated with other medical visits such as antenatal testing, which are likely to decrease as in-person visits to the clinic decreased during COVID-19 lockdown restriction periods.

The small increase in CTNG tests in the second baseline phase among men following the opening of new clinical sites could have also been contributed to by other health promotion or continuous quality improvement initiatives coinciding with this event.[31s,57s]

TABLE 2. Coefficient (95% CI) Interrupted Time Series Analysis of Chlamydia and Gonorrhea Tests Among Women and Men, Per Month, From January 2015 to September 2020, by Study Phase

	Coefficient (95% CI)	
	Women (Fig. 2)	Men (Fig. 3)
Overall change in baseline 1 phase	0.49 (0.51 to 1.48)	−0.34 (−2.04 to 1.37)
Overall change in baseline 2 phase	0.88 (−0.07 to 1.83)	0.90 (0.19 to 1.61)
Overall change in incentive phase	0.72 (−0.30 to 1.74)	−0.01 (−0.49 to 0.51)
Overall change in incentive/COVID-19 phase	−5.25 (−8.72 to −1.77)	0.64 (−2.32 to 3.61)

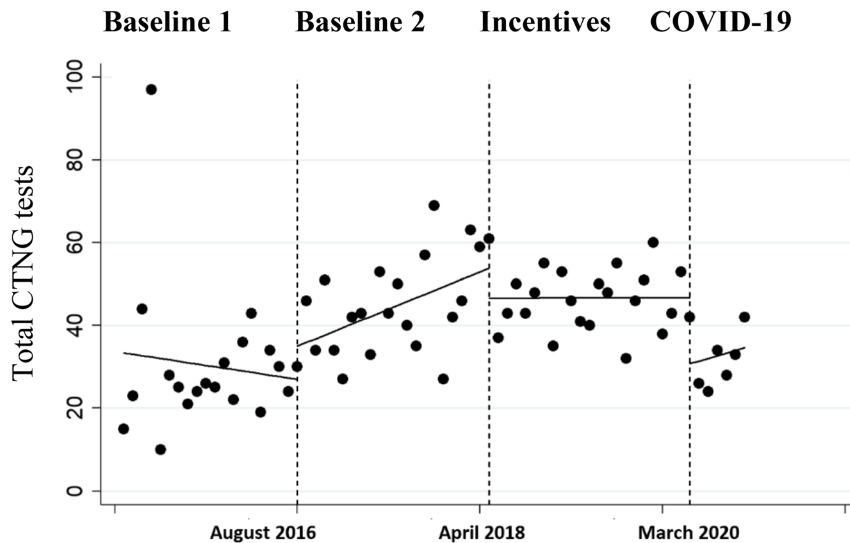

Figure 3. Interrupted time series analysis of combined chlamydia and gonorrhea (CTNG) tests among men per month, from January 2015 to September 2020, by study phase.

This study was a simple before- and after-study design, and thus, there was no comparison control group to further explore the impact of these other initiatives; however, the increase was also apparent in baseline phase 2 in the overall consultation data for 16- to 29-year-olds and for STI screening data for 30- to 35-year-olds.

In considering why the incentives program lacked impact, it is important to first note that the proportion of eligible tests that received an incentive was inconsistent, ranging from 36% to 76% per month, and declined steadily after reaching a peak early in the incentives phase. That the proportion of incentives given rose to almost 80% of visits then slowly decreased to about 50% before the COVID-19 pandemic points to challenges in implementing this program in a remote ACCHS setting. The capacity of clinical staff to add the delivery of incentives to an already heavy workload in the context of a declining workforce[58s] may have been limited in the dynamic setting of new clinics opening and other health promotion programs running concurrently.[57s] It is also possible that an individual may have been motivated by the incentive to attend the clinic but reluctant to proactively ask for it if it was not offered during the consultation. The relative low coverage of providing incentives even to people who had an STI test is only likely to influence people coming back for retesting or impact people who had the incentive spreading information about it by word of mouth, rather attracting new clients for STI testing. The analyses were time series only and did not examine differences in incentive distribution by clinic and provider. The number of tests per month at the clinic level was too small to allow meaningful analysis of the impact of the intervention or opening of specific clinics on STI testing.

A second possible explanation for the limited impact of the intervention is that individuals in the target population may have been unaware of the incentive program, despite the various forms of advertising that were used. Some communication elements that relied on people already attending a clinic site, such as posters and text messages, would have limited ability to attract new clients. As the client base of ACCHSs comprises Aboriginal and Torres Strait Islander people who are priority populations for testing under national guidelines,[17] these services have a higher STI testing rate of clinic attendees than in a mainstream primary care setting. As such, ACCHS's capacity to increase STI testing to a higher level among existing patients would be limited. It is unclear how many new clients attended ACCHSs based on hearing about the incentives through wider advertising such as radio and health promotion activities. Data were not collected on whether people attended the clinic to receive the incentive or for other reasons; therefore, it is difficult to determine whether any effect of the incentive could have been counteracted by a drop in attendance rates due to a cause outside of our study. An individual-based randomized controlled trial of this intervention was considered to be impractical as it would not be possible to allocate an incentive to one portion of a community. Randomization of communities would have required a large number of locations in a remote setting with varied health service coverage.

A third possibility is that the incentive may not have been a big enough motivator to test or return for repeat testing. Although the A $30 phone voucher was deemed suitable as an incentive by peer researchers during the formative qualitative research in 2015,[47s] the subsequent advances in phone Internet technology such as a shift to Internet-based message services accessible via Wi-Fi, rather than phone calls, which require credit, and vouchers being limited to one phone provider, may have diminished its attractiveness to young people. Other potential reasons for this could be a concern that the phone voucher might be perceived as identifying them as having had an STI test rather than acting to normalize the test. Other studies using incentives have found that cash was more effective than vouchers.[41s] From a more general perspective, the incentive may not have been sufficient to overcome recognized barriers to STI testing, including lack of transport, shame or embarrassment around accessing testing,[8] appointment procedures,[30] waiting times,[30] fear about confidentiality,[30] or lack of culturally appropriate services or gender-appropriate care.[8] Methods such as peer education[59s] or outreach models of care[42s] may be enhanced when complemented with an incentive, rather than relying on a financial incentive alone.

It may be that busy ACCHSs in remote settings may not be appropriate settings for incentive-based programs, and that other strategies for increasing STI testing should be explored. Research from an urban setting has highlighted the strong engagement of young Aboriginal and Torres Strait Islander people in community-controlled health services and utilization of existing social networks to access sexual health support.[60s] Evaluation of the "Deadly Choices" program[61s] that aims to encourage uptake of health checks in ACCHSs showed that combining social media campaigns with incentives such as T-shirts was effective.[62s] The

success of this particular program may be due to the limited edition nature of the T-shirts, and that they are only able to be obtained from ACCHSs, as opposed to phone vouchers, which are widely accessible. Furthermore, these T-shirts are linked to an overall health check rather than specifically for STIs, which may be perceived as less stigmatizing. Future trials of incentives could assess whether the context of the screening site (including staff capacity) is appropriate for such programs.

CONCLUSIONS

The improved uptake of testing and treatment has long been a goal of public health programs to reduce the prevalence and impact of bacterial STIs in remote Aboriginal and Torres Strait Islander communities. Our study found that the addition of a small financial incentive for having an STI test did not enhance uptake. Future research should assess the suitability of incentives for the target population and consider alternatives or methods to complement the use of incentives to increase STI testing. Research aimed at increasing STI testing in remote settings should explore strategies that engage with young Aboriginal and Torres Strait Islander people and build upon their existing health care practices.

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For further references, please see "Supplemental References," http://links.lww.com/OLQ/B270.