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Promoting the uptake of HIV testing among men who have sex with men (MSM): systematic review of effectiveness and cost-effectiveness

Corresponding author:
Dr Theo Lorenc
Department of Social and Environmental Health Research
London School of Hygiene & Tropical Medicine
15-17 Tavistock Place
London WC1H 9SH
U.K.
Tel: +44 (0)20 79272778
Fax: +44 (0)20 79272701
E-mail: theo.lorenc@lshtm.ac.uk

Theo Lorenc
Department of Social and Environmental Health Research, London School of Hygiene & Tropical Medicine, London, UK

Isaac Marrero-Guillamón
Department of Iberian and Latin American Studies, Birkbeck College, London, UK

Peter Aggleton
School of Education and Social Work, University of Sussex, Brighton, UK

Chris Cooper
Centre for Evidence and Policy, King's College London, London, UK

Alexis Llewellyn
Matrix Evidence, London, UK

Angela Lehmann
Matrix Evidence, London, UK

Catriona Lindsay
Matrix Evidence, London, UK

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ABSTRACT

Objectives: What interventions are effective and cost-effective in increasing the uptake of HIV testing among men who have sex with men (MSM)?

Design: Systematic review.

Data sources: AEGIS, ASSIA, BL Direct, BNI, Centre for Reviews and Dissemination, Cochrane Database of Systematic Reviews, CINAHL, Current Contents Connect , EconLit, EMBASE, ERIC, HMIC, Medline, Medline In-Process, NRR, PsychINFO, Scopus, SIGLE, Social Policy and Practice, Web of Science, websites, journal hand-searching, citation chasing and expert recommendations.

Review methods: Prospective studies of the effectiveness or cost-effectiveness of interventions (RCT, controlled trial, one-group or any economic analysis) were included if the intervention aimed to increase the uptake of HIV testing among MSM in a high-income (OECD) country. Quality was assessed, and data extracted, using standardised tools. Results were synthesized narratively.

Results: Twelve effectiveness studies and one cost-effectiveness study were located, covering a range of intervention types. There is evidence that rapid testing and counselling in community settings (one RCT), and intensive peer counselling (one RCT), can increase uptake of HIV testing among MSM. There are promising results regarding the introduction of opt-out testing in STI clinics (two one-group studies). Findings regarding other interventions, including bundling HIV tests with other tests, peer outreach in community settings, and media campaigns, are inconclusive.

Conclusions: Findings indicate several promising approaches to increasing HIV testing among MSM. However, there is limited evidence overall, and evidence for the effectiveness of key intervention types (particularly peer outreach and media campaigns) remains lacking.

Promoting the uptake of HIV testing among men who have sex with men (MSM): systematic review of effectiveness and cost-effectiveness

There are estimated to be 33,300 MSM living with HIV in the UK, of whom 8,950 are undiagnosed (2008 figures).[1] Strategies to prevent HIV in this population include public health education and community-based awareness-raising about the risks of HIV, and the promotion of safer sex through condom distribution, outreach work and other means. Increasing the uptake of voluntary counselling and testing (VCT) also has a potentially important role to play in reducing the incidence of HIV. Of MSM attending genitourinary medicine (GUM) clinics in 2008, 3.1% were found to have a previously undiagnosed HIV infection.[1] Promoting HIV testing has the potential to reduce undiagnosed infections, hence improving individual outcomes and reducing transmission. It may also be of value in raising awareness of HIV more broadly, and engaging MSM with sexual health services.

Promoting HIV testing may be of particular value in reducing late diagnoses. Of new HIV diagnoses among MSM in 2008, 43% had CD4 cell counts below the threshold at which treatment should normally be commenced (<350 per mm^3 within three months of diagnosis), and 20% had CD4 counts less than 200 per mm^3.[1] Late HIV diagnosis is an important predictor of morbidity and mortality. Those who start treatment at a more advanced stage of disease respond less well to treatment, and remain at increased risk of death for many years following treatment initiation.[2]

Rates of HIV testing among MSM vary widely between countries,[3] and between subgroups of MSM within the UK.[4] Rates have varied over time; survey data show

a steady upward trend in numbers ever tested for HIV in samples of MSM in the UK since 2000.[5] Testing policies also vary internationally, although there is a general trend towards recommending more routine testing.[6] Current UK guidelines recommend that HIV testing should be offered to MSM annually, and more frequently if symptoms indicative of seroconversion or high risk exposure are present;[7] US guidelines recommend annual screening for MSM who themselves or whose sex partners have had more than one sex partner since their most recent HIV test.[8] 'Opt-out' testing policies in STI clinics are now widely implemented, having been recommended by WHO and UNAIDS in 2004,[9] and by UK guidelines in 2006.[10] Current UK guidelines also recommend opt-out testing in a much wider range of healthcare settings.[7]

We aimed to systematically review the evidence on the effectiveness and cost-effectiveness of interventions to increase uptake of HIV testing among MSM. The study presented here is part of a larger review, which also included relevant qualitative evidence, commissioned by NICE (the review protocol has not been published). The full methods and results are available at http://www.nice.org.uk/guidance/index.jsp?action=download&o=50931. This review includes only interventions which aimed to promote HIV testing, although it is clear that the promotion of HIV testing should form part of an integrated risk-reduction strategy aiming to change a range of sexual behaviours.[11-12]

To our knowledge, no systematic review with this scope has previously been conducted. Two high-quality systematic reviews whose scope partially overlaps with that of the present review were located by our searches. One of these focused on mass

media interventions to promote HIV testing, but included all populations, not only MSM.[13] The other included HIV health promotion interventions for MSM in general, but did not have a primary focus on HIV testing, and did not include a separate synthesis of evidence relating to interventions promoting HIV testing.[14]

METHODS

Identification of studies

We searched the following databases from 1996 to December 2009: AEGIS (AIDSLine and International AIDS Society abstract archives); ASSIA; BL Direct; British Nursing Index; Centre for Reviews and Dissemination databases (including DARE and NHS EED); Cochrane Library (including the Health Technology Assessment database and CENTRAL); CINAHL; Current Contents Connect ; EconLit; EMBASE; ERIC (Education Resources Information Centre); HMIC; Medline; Medline In-Process; National Research Register; PsycINFO; Scopus; SIGLE; Social Policy and Practice; Web of Science (including Social Science Citation Index, Science Citation Index, and Conference Proceedings Citation Index).

Where possible, searches were limited to studies of humans published in English. The Medline search strategy is presented in web-only supplement 1. Full search strategies are available in the complete review report.[15] Searching was conducted simultaneously for this review and the review of qualitative evidence (the strategy was designed to locate both types of evidence, and all references were screened for inclusion in both reviews).

In addition, we hand-searched nine key journals from January 2005 to December 2009; scanned the citation lists of included studies and those of systematic reviews which met all other criteria for inclusion; and conducted 'forward' citation chasing on included studies using ISI Web of Knowledge. Finally, a call for evidence to experts and stakeholders was issued; all references arising from the call were screened for inclusion.

Inclusion criteria

The inclusion criteria were as follows:

1) Does the study include men who have sex with men (MSM), or focus on services aimed at MSM?
2) Does the study relate to HIV testing?
3) Was the study conducted in a country which is a current member of the OECD?
4) Was the study published in 1996 or later?
5) Does the study include MSM who are HIV-negative or do not know their HIV status, and are competent to consent to an HIV test?
6) Does the study relate to an intervention that aims to increase the uptake of HIV testing?
7) Is the study a prospective outcome evaluation (randomised or non-randomised controlled trial, or one-group before-and-after study), or a cost-benefit or cost-effectiveness analysis, or any other type of economic evaluation?

For criterion (1), studies which either had a sample more than 50% of whom were MSM, or presented disaggregated outcome data on the MSM within the sample, or focused on services aimed at MSM, were included. Studies of the general population which did not present outcome data on MSM were excluded. Studies published prior to 1996 were excluded (criterion 4) due to the lesser relevance of data collected before the introduction of effective anti-retroviral treatment for HIV.

For criterion (7), effectiveness studies were included if they either contained a comparison group receiving different interventions (randomised or non-randomised) and/or presented outcome data for both before and after the intervention, or both. Any economic evaluation was included regardless of study design. Systematic reviews were not included; however, systematic reviews meeting criteria (1)-(6) were retained and their lists of included primary studies scanned for inclusion.

A random sample of 10% of abstracts was screened by two reviewers independently. Inter-rater reliability (Cohen's kappa) was $\kappa=0.627$. Subsequently all abstracts were screened by one reviewer alone. For all references included on abstract, the full text was retrieved and re-screened independently by two reviewers, with disagreements resolved by discussion and reference to a third reviewer if necessary.

Study quality

Study quality was assessed using a standardised tool.[16] The full quality assessment tool is presented in web-only supplement 2. Both quality assessment and data extraction were conducted for a sample of 10% of studies (N=2) by two reviewers

independently; subsequently all references were quality-assessed by one reviewer and then checked in detail by a second reviewer. On the basis of this quality assessment, each study was assigned a rating: high (++), medium (+) or low (–). Quality ratings are presented for each study below; studies were not formally weighted by quality in the synthesis.

Data extraction and synthesis

Data were extracted from the studies using a standardised tool.[16] The list of variables for which data were extracted is presented in web-only supplement 2. Outcome data were only extracted regarding the uptake of HIV testing and the number of new diagnoses; data on other outcomes (e.g. condom use) were not extracted. Due to the heterogeneity of intervention types, quantitative meta-analysis was not carried out, and studies were synthesized narratively.

RESULTS

A total of 4,342 unique references were located by our searches (this figure includes studies for the qualitative review as well as those for this review). After screening, a total of 14 study reports on effectiveness and one on cost-effectiveness were retained in the review. Two of these were linked reports presenting data from the same study. Hence, a total of 12 effectiveness studies and one cost-effectiveness study were included. The flow of literature through the review is presented in Figure 1.

Basic characteristics of the study settings and populations are set out in Table 1. Table 1 also shows the results of the quality assessment process (full details are given in the full report).[15] Table 2 sets out the interventions evaluated and the findings of the studies. We have divided the interventions into four categories:

1) offering different types of test or testing protocols in outreach settings;[17-19]

2) peer education or recruitment programmes, including intensive residential programmes[20] and community-based programmes;[21-23]

3) community-based media campaigns[24-25] and web-based educational interventions;[26] and

4) changes to the way in which services are delivered in STI clinics, including the introduction of opting-out schemes[27-28] and the implementation of guidelines recommending regular screening.[29]

Broadly, these four categories can be grouped as service delivery interventions (1 and 4) and community-level interventions (2 and 3).

Table 1. Summary of included studies: population characteristics

Study reference	Study type	Quality score	Population targeted	Country	Sampling and recruitment	Sample size	Baseline demographics	Baseline HIV testing experience
Type of test / testing protocol								
Spielberg et al. 2005[18]	RCT	++	MSM and injecting drug users (only MSM findings reported here)	USA	All men using bathhouse approached to participate	3,140 (partici pated) 561 (agreed to test)	Age: 22% <30 Ethnicity: 80% white (estimated, for eligible population)	6% never (of eligible population; those tested <3 months ago were excluded)
Galvan et al. 2006[17]	nRCT	+	Latino MSM	USA	Randomly sampled from men entering bars popular with Latino MSM	394	Ethnicity: All Latino. Other details NR for eligible population (only for those men agreeing to test)	NR
Spielberg et al. 2000[19]	RCT	++	MSM, injecting drug users and women at heterosexual risk (only MSM findings reported here)	USA	From the HIV Network for Prevention Trials Vaccine Preparedness Study (VPS) Cohort	140	NR for MSM group	NR
Peer education and recruitment								
Flowers et al. 2002[21, 30]	nRCT	+	MSM	Scotland	All men entering one of 10 gay bars in given time	4,774 (total)	Age: mean 31.7 years. SES: 87% social class I-III.	49.3% never

					period were approached		Education: 40% at least degree level.	
Elford et al. 2000[22, 31]	nRCT	–	MSM	England	Peer educators recruited from gyms with predominantly gay clientele by gym managers	5,656 (total)	Age: median 33 years. Ethnicity: 89% white. Employment: 88% employed.	27% never, 10% <3 months ago, 18% 4-12 months ago, 45% >1 year ago
Wilton et al. 2009[20]	RCT	++	Black MSM	USA	Outreach, referrals from service users and gatekeepers, advertising	338	Age: mean 29.6 years. Ethnicity: all self-identified as Black. SES: 46.4% income <$20,000 p.a. Education: 29.9% college degree. Sexual orientation: 78.1% gay / homosexual; 18.3% bisexual.	96.1% ever, 41.4% <3 months ago
Golden et al. 2006[23]	Economic analysis (non-comparative data)	–	MSM	USA	Through health services, advertising, outreach	283 (recruiters) + 498 (peers)	Unclear	Unclear
Media and web-based campaigns								
Guy et al. 2009[24]	Before-and-after	–	MSM	Australia	Participants in Melbourne Gay Community Periodic Survey	4,988 (total)	NR for this sample	60.3% < 12 months ago

McOwan et al. 2002[25]	Before-and-after	–	MSM, particularly black and southern European	England	Record review	357 (total)	Age: 9% under 25. Ethnicity: 5% 'south European' origin; 3% Black origin. (of those seeking HIV test at targeted clinic)	NR
Chiasson et al. 2009[26]	Before-and-after	+	MSM	USA	Recruited through a banner advert on a gay sexual meeting site	3,052 (consented); 1,463 (received intervention)	Age: 22% 18-29, 36% 30-39, 42% ≥40. Ethnicity: 72% White. Education: 51% college degree. Sexual orientation: 91% homosexual, 9% bisexual.	6% never
STI clinic service delivery								
Dukers-Muijrers et al. 2009[27]	Before-and-after	–	General population (only MSM findings reported here)	Nether-lands	Record review	1,127 (total)	NR for MSM	NR
Heijman et al. 2009[28]	Before-and-after	+	General population (only MSM findings reported here)	Nether-lands	Record review	8,047 (total)	Age: 29% ≤29, 34% 30-39, 25% 40-49, 12% ≥50. Nationality: 72% Dutch	16% never
Ryder et al. 2005[29]	Before-and-after	–	MSM	Australia	Record review (random sample)	569	Age: median 33 years	NR

Table 2. Summary of included studies: interventions and outcomes

Study reference	Intervention and comparison	Follow-up (measured from start of intervention delivery)	HIV testing outcome	HIV testing findings	New diagnoses: N (% of completed tests)
Type of test / testing protocol					
Spielberg et al. 2005[18]	Four testing protocols offered in gay bathhouses. (1) Traditional serum testing and a return visit to receive results, with standard face-to-face counselling before testing; (2) rapid serum testing with same-day test results and single-session counselling; (3) oral fluid testing with standard counselling; (4) traditional serum testing with the choice of pre-test written materials or standard counselling.	Immediate	Acceptance of testing; completion of testing; receipt of test results	Acceptance. (1): 15.8%; (2): 21.2% *; (3): 22.8% *; (4): 13.6% Completion. (1): 12.4%; (2): 16.2% *; (3): 17.3% *; (4): 11.2% Receipt. (1): 9.1%; (2): 16.0% *; (3): 12.5% *; (4): 8.4% [significance tests by comparison with group (1)]	(1 and 4): 13 (6.1%) (2 and 3): 2 (0.9%)
Galvan et al. 2006[17]	HIV tests bundled with other tests (for other STIs, alcohol and drug dependence and depression) offered in bars. Comparison: HIV tests alone.	Immediate	Acceptance of testing	I (bundled): 10.2% C (HIV alone): 8.9%	I (bundled): 5 (3.4%) C (HIV alone): 10 (5.1%)
Spielberg et al. 2000[19]	Two types of HIV tests for home testing: (1) dried blood spot home collection, 3 cycles, bimonthly. (2) oral fluid home collection, 3 cycles, bimonthly.	20 weeks	Adherence to home specimen collection schedule	(1) 92%; (2) 99% [not tested for significance by study authors]	NR
Peer education and recruitment					
Flowers et	Risk-reduction education in bars delivered by	15 months	Self-reported ever	I: 47.0% baseline, 47.9% at 15	NR

Study reference	Intervention and comparison	Follow-up (measured from start of intervention delivery)	HIV testing outcome	HIV testing findings	New diagnoses: N (% of completed tests)
al. 2002[21, 30]	peer educators over 9 months. Peer educators received 2 days of training and support throughout the intervention. Training involved communication skills, role play and message delivery. Comparison: no intervention.		testing	months. C: 55.1% baseline, 52.8% at 15 months.	
Elford et al. 2000[22, 31]	Peer educators were identified on the basis of social connections and communication skills. They received training and were asked to talk to at least 20 gay men over the next 5 months about risk reduction. Comparison: no intervention.	18 months	Self-reported ever testing	I: 72% baseline, 78% at 18 months. C: 78% baseline, 87% at 18 months.	NR
Wilton et al. 2009[20]	Intensive 3-day residential risk-reduction intervention led by trained Black MSM peers. The intervention was conducted in a small group and focused on relationships, HIV risk, behaviour change, racism and homophobia. Comparison: waiting list.	6 months	Self-reported HIV testing in last 3 months	I: 38.4% baseline, 52.0% at 3 months, 54.8% at 6 months C: 44.3% baseline, 46.3% at 3 months, 43.3% at 6 months *	I: 4 (5.8%) C: 4 (6.9%)
Golden et al. 2006[23]	Peer recruitment programme. Recruiters were identified from service users and through advertisements and outreach. They received 40 minutes of training and were offered US$20 for each peer recruited (peers also received $20 if tested). Peers were tested for HIV, hepatitis A, B and C, and syphilis.	29 months	Cost per newly-identified HIV-infected person; cost per newly-identified person who received test results	Per new case: US$4929. Per new case who received test results: US$5377	22 (5.0%)

Study reference	Intervention and comparison	Follow-up (measured from start of intervention delivery)	HIV testing outcome	HIV testing findings	New diagnoses: N (% of completed tests)
Media and web-based campaigns					
Guy et al. 2009[24]	Multi-component social marketing campaign, including display advertising, print and radio advertisements, and a website. Targeted messages were aimed at young MSM, non-gay-community-attached MSM, and culturally and linguistically diverse MSM.	2 years	Self-reported testing in last 12 months	60.3% baseline, 61.4% at 1 year, 61.9% at 2 years	NR
McOwan et al. 2002[25]	Print media promoting testing at a specific venue, distributed regularly to gay venues by community outreach teams.	12 weeks	Number of tests carried out at targeted clinic	N=65 over 12 weeks prior to intervention, N=292 over 12-week intervention period *	NR
Chiasson et al. 2009[26]	Educational video (viewed online) designed to promote critical thinking about HIV risk	3 months	Self-reported testing in last 3 months	26% baseline, 44% at 3 months *	17 (14.2%)
STI clinic service delivery					
Dukers-Muijrers et al. 2009[27]	Opt-out HIV testing policy in STI clinic	3 years	Refusal of HIV test	16% at baseline; 10% immediately after intervention; 6% in years 1-2; 2.1% by end of year 3 *	(2.8%) across study period: N NR
Heijman et al. 2009[28]	Opt-out HIV testing policy in STI clinic	11 months	Uptake of HIV test	62% at baseline, 88% immediately after intervention, 93% at 11 months [not tested for significance by study authors]	95 (3.7%) baseline; 117 (3.4%) after intervention
Ryder et al.	Implementation of guidelines in STI clinic	1 year	Proportion of MSM	73% baseline, 88% at follow up	NR

Study reference	Intervention and comparison	Follow-up (measured from start of intervention delivery)	HIV testing outcome	HIV testing findings	New diagnoses: N (% of completed tests)
2005[29]	recommending at least annual screening of MSM for HIV and other STIs	(approx.)	attendees testing for HIV	[not tested for significance by study authors]	

*Significant at p=0.05 according to study authors' analyses

Type of test and testing protocol

One study from the USA, published in 2006, compared the uptake of HIV tests included with a package of other tests (for other STIs, alcohol and drug dependence, and depression) offered in outreach settings (bars) with that of HIV tests alone.[17] This study found no significant difference in uptake between the two groups. However, there were some promising but non-significant trends among high-risk subgroups towards greater acceptance of the packaged tests compared to the HIV test alone.

One study, also from the USA and conducted in 1999-2000, compared traditional serum testing and counselling with rapid serum testing and oral fluid testing offered in a gay bathhouse.[18] This study found that both rapid serum testing and oral fluid testing were significantly more likely to be accepted than traditional testing. This study provides evidence that rapid testing modalities can increase uptake in an outreach setting compared to traditional testing.

A further US study, conducted in 1996-97, compared oral fluid and blood spot home testing kits, finding high levels of adherence to both types of test.[19]

Peer education and recruitment

Two studies from the UK, both from the late 1990s (1996-99), used non-randomised designs to investigate the effectiveness of peer-led community-based risk-reduction campaigns.[21-22] Both of these studies found such campaigns not to be effective in

increasing HIV testing among a community sample of MSM. However, there are limitations in the design and reporting of both these studies (see Discussion), so they arguably do not provide conclusive evidence for the ineffectiveness of peer-led strategies.

One RCT conducted in 2005-07 evaluated an intensive weekend residential programme for Black MSM in the USA led by trained MSM peers.[20] This study found a small but significant improvement in HIV testing rates among participants at six-month follow-up.

One economic analysis, conducted in 2002-05, looked at a peer recruitment programme to increase rates of HIV testing, finding a cost per new case of HIV identified of US$4,929.[23] According to the study authors, this compares favourably with costs per case for other interventions, although the analysis presented falls considerably short of a full cost-effectiveness analysis.

Media and web-based campaigns

Two non-comparative studies in Australia and England investigated community-based media campaigns to promote HIV testing among MSM, including components such as display advertising and websites and print media distributed to gay venues and organisations.[24-25] One of these studies, conducted in 2004-06, found no increase in the numbers of MSM in the targeted location reporting an HIV test in the previous year.[24] The other, conducted in 1999-2000, found a substantial increase in HIV tests conducted in the targeted clinic.[25] However, there are flaws in the design

of both these studies (see Discussion). Overall, the evidence for media campaigns must be regarded as inconclusive.

One further non-comparative study in the USA, conducted in 2005-06, evaluated an educational video which was accessed through a banner advert on a gay sexual meeting website.[26] This study found a significant increase in HIV testing at 3-month follow-up (and a substantial number of new diagnoses were made as a result). This finding is promising, although since the study is non-comparative, it does not permit strong conclusions to be drawn.

STI clinic service delivery

Two studies from the mid-2000s (2003-07), both non-comparative, investigated the introduction of 'opt-out' policies in STI clinics in the Netherlands, such that all clients attending the clinic received an HIV test unless they requested not to have one.[27-28] Both these studies found substantial increases in HIV tests among MSM after the introduction of the opt-out policy. A finding of concern in both these studies was that certain groups, particularly older MSM and MSM with potentially STI-related symptoms, were more likely to opt out of testing after the introduction of the policy.

One study from 2000-02, also non-comparative, found that the implementation of guidelines promoting regular HIV testing in an STI clinic resulted in an increase in the proportion of MSM being tested, although it is unclear if the increase reached significance.[29]

DISCUSSION

This review indicates that several promising strategies are available to increase the uptake of HIV testing among MSM. Opt-out policies in STI clinics can increase testing rates, although there remain concerns about high rates of refusal among certain high-risk subgroups (as well as about those MSM who do not attend STI clinics). Offering rapid testing in outreach settings can also increase the uptake of testing relative to traditional testing methods.

However, there is limited evidence for the effectiveness of community-level strategies. One study shows that a holistic group intervention, led by trained peers, can increase testing among a minority ethnic, socio-economically disadvantaged group of MSM. While this is a promising result, such interventions are resource-intensive and may be challenging to implement. Nonetheless, further research on such strategies would be valuable. There are also promising findings, warranting further research, regarding a Web-based intervention.

Evidence regarding media campaigns and peer-led outreach strategies is inconclusive. Methodologically, evaluations of existing programmes would benefit from measuring individual-level outcomes among men exposed to the intervention, as well as population-level outcomes, and from indexing outcome measures to the timeframe of the intervention (i.e. recent testing rather than lifetime testing). With regard to intervention content, more intensive programmes, sustained over longer timeframes and reaching a larger proportion of the population, are likely to have more impact, as studies of media campaigns in other fields have found.[32] Using formative research,

or the published qualitative literature, could also be of value in targeting the content of such interventions.

Several limitations in the evidence should be noted. The findings show that, even where interventions succeeded in increasing uptake, numbers of new diagnoses were generally modest. Baseline rates of recent HIV testing in the targeted populations were often high: for example, Spielberg and colleagues' study excluded 35% of potential participants because they had already had an HIV test within the last three months.[18] In addition, most studies recruited primarily from gay venues and/or MSM-oriented services or organisations, and were unlikely to include less gay-identified MSM. These points raise the question as to whether evaluated interventions reach those MSM who are most at risk of having undiagnosed HIV.

Other limitations relate to the methods of the primary studies, particularly those evaluating community-level interventions. First, several studies used non-comparative designs and were conducted over several years. This makes it difficult to distinguish the effects of the intervention from longer-term upward trends in testing behaviour. Second, several studies measured outcomes at a population level (i.e. different individuals were sampled at pre- and post-test), meaning that any measurement of effectiveness may be diluted by changes in the population. This is particularly an issue when the reach of interventions is limited: two studies found that relatively few of the targeted populations could recall direct contact with the intervention at post-test (29%[21] and 3%[22]). A third limitation relates to the measurement of outcomes: the use of lifetime HIV testing rather than recent testing,[21-22] or the total number of

HIV tests conducted by specific services,[25] may not provide an accurate picture of changes in testing behaviour.

There are also some limitations in the review itself, primarily because of its intentionally restricted scope. This review did not consider evidence relating to HIV testing in populations other than MSM, although this evidence is potentially relevant; for example, there is evidence that mass media interventions are effective in the general population.[13] It also did not consider the considerable evidence on other risk-reduction strategies among MSM. This evidence would be valuable in providing the context needed to understand the longer-term impacts of successful interventions to promote HIV testing among MSM. For example, the role of testing in serosorting strategies, which remain prevalent among some groups of MSM and may involve substantial risk of infection,[33-34] suggests that the relation between the uptake of testing, infection rates, and health status, is complex and unpredictable. Hence, interventions to promote testing, in isolation, may not have a substantial impact on rates of infection. Such interventions are more likely to be effective as part of an integrated programme for reducing HIV infections and promoting access to anti-retroviral treatment among MSM.

Key messages:

* Interventions to promote the uptake of HIV testing among men who have sex with men have the potential to reduce HIV risk and late diagnoses
* Opt-out testing policies, and offering rapid testing, can increase the uptake of HIV testing among MSM

* Evidence concerning the effectiveness of community-level strategies, such as media campaigns or peer education and recruitment, is inconclusive

* Strategies to promote testing should be seen in the broader context of a comprehensive approach to HIV prevention

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Contributions:

TL led the design and conduct of the review. Literature searches were conceived and executed by CC. Screening was carried out by TL, IMG, AL (Alexis Llewellyn), AAL (Angela Lehmann), and CL. Quality assessment and data extraction was carried out by TL and IMG. Data analysis and interpretation were carried out by TL, IMG and PA. TL wrote the first draft of the paper with input from IMG and PA.

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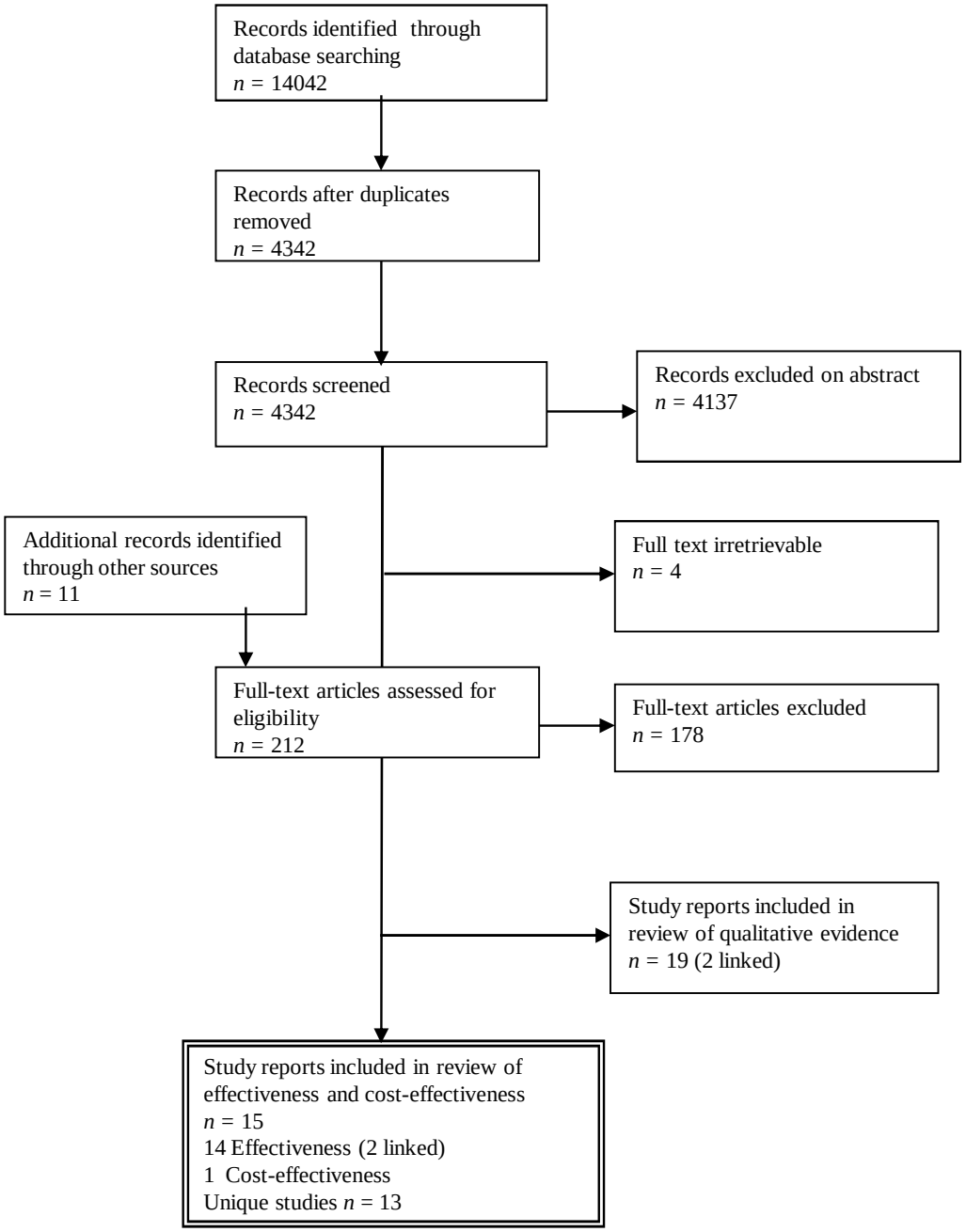
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Study reports included in review of effectiveness and cost-effectiveness
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1 Cost-effectiveness
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