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Rapid antigen detection test for group A streptococcus in children with pharyngitis (Review)

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[Diagnostic Test Accuracy Review]

Rapid antigen detection test for group A streptococcus in children with pharyngitis

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ABSTRACT

Background

Group A streptococcus (GAS) accounts for 20% to 40% of cases of pharyngitis in children; the remaining cases are caused by viruses. Compared with throat culture, rapid antigen detection tests (RADTs) offer diagnosis at the point of care (within five to 10 minutes).

Objectives

To determine the diagnostic accuracy of RADTs for diagnosing GAS in children with pharyngitis. To assess the relative diagnostic accuracy of the two major types of RADTs (enzyme immunoassays (EIA) and optical immunoassays (OIA)) by indirect and direct comparison.

Search methods

We searched CENTRAL, MEDLINE, EMBASE, Web of Science, CDSR, DARE, MEDION and TRIP (January 1980 to July 2015). We also conducted related citations tracking via PubMed, handsearched reference lists of included studies and relevant review articles, and screened all articles citing included studies via Google Scholar.

Selection criteria

We included studies that compared RADT for GAS pharyngitis with throat culture on a blood agar plate in a microbiology laboratory in children seen in ambulatory care.

Data collection and analysis

Two review authors independently screened titles and abstracts for relevance, assessed full texts for inclusion, and carried out data extraction and quality assessment using the QUADAS-2 tool. We used bivariate meta-analysis to estimate summary sensitivity and specificity, and to investigate heterogeneity across studies. We compared the accuracy of EIA and OIA tests using indirect and direct evidence.

Main results

We included 98 unique studies in the review (116 test evaluations; 101,121 participants). The overall methodological quality of included studies was poor, mainly because many studies were at high risk of bias regarding patient selection and the reference standard used (in 73% and 43% of test evaluations, respectively). In studies in which all participants underwent both RADT and throat culture (105

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test evaluations; 58,244 participants; median prevalence of participants with GAS was 29.5%), RADT had a summary sensitivity of 85.6%; 95% confidence interval (CI) 83.3 to 87.6 and a summary specificity of 95.4%; 95% CI 94.5 to 96.2. There was substantial heterogeneity in sensitivity across studies; specificity was more stable. There was no evidence of a trade-off between sensitivity and specificity. Heterogeneity in accuracy was not explained by study-level characteristics such as whether an enrichment broth was used before plating, mean age and clinical severity of participants, and GAS prevalence. The sensitivity of EIA and OIA tests was comparable (summary sensitivity 85.4% versus 86.2%). Sensitivity analyses showed that summary estimates of sensitivity and specificity were stable in low risk of bias studies.

Authors' conclusions

In a population of 1000 children with a GAS prevalence of 30%, 43 patients with GAS will be missed. Whether or not RADT can be used as a stand-alone test to rule out GAS will depend mainly on the epidemiological context. The sensitivity of EIA and OIA tests seems comparable. RADT specificity is sufficiently high to ensure against unnecessary use of antibiotics. Based on these results, we would expect that amongst 100 children with strep throat, 86 would be correctly detected with the rapid test while 14 would be missed and not receive antibiotic treatment.

PLAIN LANGUAGE SUMMARY

What is the performance of rapid tests for the diagnosis of strep throat in children?

Background and aims

Sore throat is very common in children. It can be caused by viruses or bacteria. The bacterium most frequently identified during sore throat in children is group A streptococcus ('strep throat'). Amongst children with sore throat, antibiotic treatment is only useful in those with strep throat.

Simple, rapid tests for the diagnosis of strep throat have been available since the 1980s. Physicians can do a rapid test at the point of care by swabbing the throat. Based on the result of the rapid test, they can then decide if antibiotics are needed.

We reviewed the evidence about the performance of rapid tests for correctly detecting strep throat in children seen in Outpatient departments with a main complaint of sore throat.

Study characteristics

We searched for studies published in any language from January 1980 to July 2015. We found 98 unique studies, for a total of 116 test evaluations, involving 101,121 children. The number of participants ranged from 42 to 11,644 across test evaluations. The proportion of children with strep throat ranged from 9.5% to 66.6% across test evaluations.

Quality of the evidence

Important study design features were frequently not reported. The overall methodological quality of included studies was poor. For most studies, we had concerns about the ways in which participants were selected.

Key results

On average, rapid tests for strep throat had a sensitivity (ability to correctly detect people with the disease) of 86% and a specificity (ability to correctly identify people who do not have the disease) of 95%. There was substantial variability in rapid test performance across studies, which was not explained by study characteristics, including methodological quality. The two types of rapid tests under evaluation seemed to have comparable sensitivity (85.4% versus 86.2% for enzyme immunoassays and optical immunoassays, respectively). Based on these results, we would expect that amongst 100 children with strep throat, 86 would be correctly detected with the rapid test while 14 would be missed and not receive antibiotic treatment. Of 100 children with non-streptococcal sore throat, 95 would be correctly classified as such with the rapid test while 5 would be misdiagnosed as having strep throat and receive unnecessary antibiotics.

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SUMMARY OF FINDINGS

Summary of findings 1. Summary of findings table

Review questions	**What is the diagnostic accuracy of rapid antigen detection tests (RADT) for detecting group A streptococcus (GAS)? What is the relative diagnostic accuracy of the two major types of RADTs (enzyme immunoassays (EIA) and optical immunoassays (OIA))?**						
Patients/population	Children with acute pharyngitis						
Prior testing	Physical examination establishing the diagnosis of pharyngitis, with or without evaluating the likelihood of a streptococcal origin						
Settings	Ambulatory care settings: mainly private offices, emergency departments and walk-in clinics						
Index tests	EIA and OIA test for GAS						
Reference standard	Throat culture on a blood agar plate						
Importance	Compared with culture, RADTs offer diagnosis at the point of care. Whether negative RADTs should be backed up by throat culture depends mainly on the reported sensitivity of the test						
Studies	Cross-sectional studies						
Quality concerns	Methodological quality was generally poor, but quality appraisal was impeded by suboptimal reporting. Patient selection and reference standard methods were common risk of bias concerns (in 73% and 43% of test evaluations, respectively)						
Heterogeneity	There was substantial heterogeneity in the results of the individual studies, especially for sensitivity, which could not be explained by the investigations						
	Quantity of evidence		Average diagnostic accuracy		Consequences in a cohort of 1000 patients…		
	Studies (n)	Participants (n)	Sensitivity (95% CI)	Specificity (95% CI)	…given 20% prevalence of GAS cases?	…given 30% prevalence of GAS cases?	…given 40% prevalence of GAS cases?
RADT for the diagnosis of GAS pharyngitis in children (EIA and OIA tests)	105	58,244	85.6% (83.3 to 87.6)	95.4% (94.5 to 96.2)	200 children will have a positive culture for GAS. Of these, 171 will be identified (TP); 29 will be missed (FN). Of the 800 children without GAS, 763 will not be treated (TN);	300 children will have a positive culture for GAS. Of these, 257 will be identified (TP); 43 will be missed (FN). Of the 700 children without GAS, 668 will not be treated (TN);	400 children will have a positive culture for GAS. Of these, 342 will be identified (TP); 58 will be missed (FN). Of the 600 children without GAS, 572 will not be treated (TN);

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				37 may receive unnecessary antibiotics (FP)	32 may receive unnecessary antibiotics (FP)	28 may receive unnecessary antibiotics (FP)
Comparison of EIA versus OIA tests						
EIA tests	86	48,808	85.4% (82.7 to 87.8)	95.8% (94.8 to 96.6)	Interpretation: EIA and OIA tests seem to have comparable accuracy (P value = 0.23)	
OIA tests	19	9436	86.2% (82.7 to 89.2)	93.7% (91.5 to 95.4)		

CI: confidence interval
EIA: enzyme immunoassay
FN: false negative
FP: false positive
GAS: group A streptococcus
OIA: optical immunoassay
RADT: rapid antigen detection test
TN: true negative
TP: true positive

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BACKGROUND

Target condition being diagnosed

Pharyngitis is defined as an acute inflammation of the pharynx, tonsils or both. A sore throat is the most common symptom of pharyngitis. The terms 'pharyngitis', 'tonsillitis' and 'sore throat' are often used interchangeably. In this review, the more general term 'pharyngitis' is used. Viruses are the most common cause of pharyngitis but the bacterium most frequently identified during acute pharyngitis is *Streptococcus pyogenes* (*S. pyogenes*), also known as group A β-haemolytic streptococcus (GAS). GAS is estimated to account for 20% to 40% of cases of pharyngitis in children and 5% to 15% in adults (Shaikh 2010; Wessels 2011). The estimated number of cases of GAS pharyngitis in children is 450 million/year worldwide (Carapetis 2005a). Most cases are benign and self limiting within a week but suppurative complications (cervical lymphadenitis, retropharyngeal abscess, peritonsillar cellulitis or abscess (quinsy), sinusitis, acute otitis media and mastoiditis) or non-suppurative post-streptococcal diseases (acute rheumatic fever and rheumatic heart disease, acute glomerulonephritis, Sydenham's chorea, scarlet fever, streptococcal toxic shock syndrome and paediatric autoimmune neuropsychiatric disorder associated with group A streptococci) can occur (Gerber 2005; Shulman 2009).

Acute rheumatic fever is an autoimmune disorder resulting from infection with group A streptococcus, in which heart valves may be severely damaged (rheumatic heart disease). In low-income countries, rheumatic heart disease remains the most commonly acquired heart disease in children, adolescents and young adults: a recent estimate of the number of deaths from rheumatic heart disease is 233,000 per year worldwide (Carapetis 2005a). In high-income countries, acute rheumatic fever and rheumatic heart disease are rare (e.g., ≤ 10 cases/year/100,000 children for acute rheumatic fever) (Carapetis 2005b; Seckeler 2011), because of improvements in living conditions, hygiene, increased antibiotic usage, increased access to primary care providers and changes in GAS epidemiology (Carapetis 2007). In the US, about 50% to 70% of the visits by children with pharyngitis result in antibiotic agents being prescribed (Linder 2005). As a result, the public health goal is shifting from preventing rare GAS complications to minimising inappropriate use of antibiotics.

Index test(s)

Simple rapid antigen detection tests (RADTs) were developed in the 1980s to provide an immediate indication for the clinician about the presence or absence of GAS in children with pharyngitis. RADTs do not require any special equipment and can be performed at the point of care with a throat swab (Gerber 2004). They can provide immediate results and are calibrated to produce binary results (positive or negative).

All available RADTs involve the detection of the Lancefield group A carbohydrate, a GAS-specific cell-wall antigen. Different immunologic techniques are available for carbohydrate detection (Gerber 2004); from older to most recent:

- Latex agglutination (LA) assay: the sample is placed in the presence of latex beads coupled with GAS-specific antibodies; the result is determined by observing the agglutination of the beads if they are related to the specific antigen in the sample. These first-generation tests are no longer used in clinical practice and were not considered in this review.
- Enzyme immunoassay (EIA): the sample is placed at the end of a nitrocellulose strip and then migrates to an area where it forms an antigen-antibody complex. These second-generation tests are also known as immunochromatographic, sandwich or lateral-flow assays. They are the most widespread and most used RADTs in clinical practice.
- Optical immunoassay (OIA): the sample is placed on a silicon membrane in the presence of the reagent. The result is based on the change in optical properties of the inert membrane in the presence of an antigen-antibody complex. These third-generation tests seem to be more sensitive than EIAs but their use is limited because of their high cost.

Clinical pathway

Many experts recommend the prescription of antibiotics for children with GAS-suspected or GAS-proven pharyngitis (Matthys 2007). The goal of antibiotic treatment is to reduce the individual risk of suppurative or non-suppurative complications, the duration of symptoms and the spread of the condition (Spinks 2013). Correct identification of GAS ensures against missing GAS-positive cases that can lead to complications. The correct exclusion of GAS ensures against unnecessary use of antibiotics (thus reducing the incidence of adverse drug reactions, antibiotic resistance and associated costs).

There is a lack of consensus on the most suitable diagnostic method for GAS in children with pharyngitis and the 'standard' diagnostic practice varies greatly amongst countries. The signs and symptoms of GAS and viral pharyngitis overlap broadly (Shaikh 2011), therefore most guidelines that recommend antibiotic treatment of GAS also recommend confirmation of the presence of GAS on the basis of a throat swab (Matthys 2007). However, throat swabs are explicitly not recommended in some countries (e.g., the United Kingdom, Belgium and the Netherlands) (Matthys 2007). International discrepancies might be explained by academic reasons and 'clinical traditions', different targets of sensitivity and specificity because of local epidemiological differences (i.e., rheumatic fever and rheumatic heart disease prevalence), international differences in health systems and policies, and the sparseness of recent data on the incidence of GAS complications and the efficacy of antibiotic treatment for their prevention.

The standard criterion for the diagnosis of GAS in children with pharyngitis is a throat culture on a blood agar plate in a microbiology laboratory (AAP 2012). The major advantage of laboratory throat culture is its detection of GAS from swabs with a very low number of bacteria, but the major limitation is the 48-hour delay in obtaining results. In addition, throat cultures cannot distinguish true GAS infection from GAS carriage with intercurrent viral pharyngitis. Asymptomatic pharyngeal GAS carriage is usually defined as positive throat culture results for GAS without a GAS-specific immune response (anti-streptolysin O and anti-DNase B antibodies) (Tanz 2007). Asymptomatic GAS carriage occurs in 10% to 15% of healthy children (Shaikh 2010), and does not require antibiotic treatment (Tanz 2007). Agreement is lacking on the most suitable culture technique for diagnosing GAS in children with pharyngitis. Several parameters are likely to affect the sensitivity of the test (culture medium, atmosphere of incubation, duration of incubation, group A identification technique and the number

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of plates inoculated) (Kellogg 1990; Tanz 1997). These variables affect the diagnostic accuracy of the throat culture and thus the diagnostic accuracy of RADTs as compared to throat culture.

RADTs are widely used for diagnosing GAS pharyngitis at the point of care. In children, the reported sensitivity of RADTs is about 85% (Gerber 2004), but varies greatly amongst studies (from 66% (Van Limbergen 2006) to 99% (Harbeck 1993)), and the specificity is high and stable, about 95% (Gerber 2004). Due to this high specificity, most experts agree on prescribing antibiotics with positive RADT results, even if RADTs cannot differentiate GAS true infection from GAS carriage. However, the consequences of a negative RADT result depend on national guidelines. North American guidelines recommend backing up negative RADT results with throat culture to avoid not treating RADT false-negative cases (Gerber 2009; Shulman 2012), but most recent European guidelines recommend relying on negative RADT results without culture confirmation (Pelucchi 2012). In low-income countries, the clinical consequences of RADT results might be the same as in high-income countries (treat RADT-positive cases only) but resources for testing might be limited and practices may vary from generalised empiric antibiotic treatment to selective antibiotic treatment or selective rapid testing based on clinical scoring systems (Joachim 2010; Steinhoff 2005; WHO 1995).

Alternative test(s)

Office culture

Another test for the diagnosis of GAS in children with pharyngitis is a throat culture performed in the physician's office (office culture). Office culture has the same disadvantage as a laboratory culture (a 48-hour delay in obtaining results), with the major limitation being insufficient sensitivity (from 50% to 85%) (Battle 1971; Mondzac 1967; Rosenstein 1970; Tanz 2009; Wegner 1992). Office culture is almost completely abandoned and was not considered in this review.

Streptococcal antibody tests

Assessment of GAS-specific antibodies is the traditional reference test to differentiate true GAS infection and GAS carriage. The most commonly used GAS-specific antibody assays tests are for anti-streptolysin O and anti-DNase B antibodies. Increased antibody titre assessment diagnoses true GAS infection better than a single absolute titre assessment (Gerber 1986b; Johnson 2010). Streptococcal antibody tests are not used for the diagnosis of GAS in children with pharyngitis because of the need for repeat blood samples. Moreover, the information about the kinetics of the immune response to GAS in children with pharyngitis is very limited and the most recent data show that the interpretation of streptococcal antibody test results is not straightforward (Johnson 2010). Therefore, their use is usually limited to documenting recent GAS infection in patients suspected of having GAS non-suppurative complications or to epidemiologic studies (Gerber 1986b; Johnson 2010).

Clinical scoring systems

Clinical scoring systems have been developed to diagnose GAS on clinical grounds. The most popular of these scores are the Centor score (Centor 1981) and the McIsaac score (McIsaac 1998). The scores are based on assessing simple clinical criteria (history of fever, cough, tonsillar swelling or exudate, tender cervical adenopathy and age). Their use is recommended in adults but might be inappropriate in children; several authors have reported a lack of diagnostic accuracy in this population (Cohen 2012; Cohen 2015; Fischer Walker 2006; Shaikh 2011). Clinical scoring systems were not considered in this review.

Rapid molecular biology assays

Rapid molecular biology assays for GAS in children with pharyngitis have been recently developed (Group A Streptococcus Direct Test; GenProbe Inc., San Diego, CA; and LightCycler Strep-A assay; Roche Applied Science, Indianapolis, IN) (Chapin 2002; Heelan 1996; Pokorski 1994; Uhl 2003). These techniques, based on DNA-rRNA hybridisation or polymerase chain reaction (PCR), are highly sensitive but are not currently used widely because of their cost, the need for highly specialised equipment and personnel, and the two-hour delay in results (Gerber 2004). Molecular assays are not antigen-detection tests and were not considered in this review.

Rationale

Childhood pharyngitis is a significant public health problem with, on the one hand, suppurative and non-suppurative complications of GAS pharyngitis (especially acute rheumatic fever and rheumatic heart disease) and, on the other, costly diagnostic tests and unnecessary antibiotics. RADTs for GAS are now widely available and their use in children with pharyngitis might increase accurate diagnosis and reduce antibiotic consumption.

According to local clinical guidelines, RADTs may be used as stand-alone diagnostic tests in replacement of throat culture (e.g., in contexts where throat culture is unavailable or not used), or as triage tests, with negative results being supported by a throat culture. These international discrepancies might be explained in part by persistent gaps in knowledge regarding the diagnostic accuracy of RADTs:

- What is the accuracy of RADTs for GAS in children with pharyngitis compared to the most consensual reference test (throat culture on a blood agar plate)?
- Are there significant differences in diagnostic accuracy between EIAs and OIAs?
- Which study-level factors could explain variations in diagnostic accuracy across clinical studies?

We did not address in this review the questions of whether RADTs should be performed in all patients presenting with signs and symptoms of pharyngitis or only in selected patients on the basis of a clinical score (selective testing strategies), and whether clinical protocols that incorporate RADTs are sufficient to reduce antibiotic prescription. We aimed to provide information to help clinicians and public health decision makers better define the precise role of RADTs in the diagnosis of GAS in children with pharyngitis on the basis of unbiased evidence.

OBJECTIVES

To determine the diagnostic accuracy of RADTs for diagnosing GAS in children with pharyngitis. To assess the relative diagnostic accuracy of the two major types of RADTs (enzyme immunoassays (EIA) and optical immunoassays (OIA)) by indirect and direct comparison.

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Secondary objectives

To assess the relative diagnostic accuracy of EIA and OIA tests by indirect and direct comparison.

METHODS

Criteria for considering studies for this review

Types of studies

We included reports of cross-sectional studies reporting the diagnostic accuracy of one or more RADTs for the diagnosis of GAS in children with pharyngitis, with laboratory throat culture as the reference standard. Reports of randomised controlled trials (RCTs) were also eligible if we could extract 2 x 2 tables for children. Reports of studies in which throat culture was selectively performed in participants with a positive or negative RADT result were included in the review but excluded from the meta-analysis of sensitivity and specificity estimates.

Participants

We included reports of studies of children (age ≤ 21 years, according to the upper limit used by the American Academy of Pediatrics) seeking ambulatory medical care because of a sore throat or with a diagnosis of pharyngitis, who provided a throat swab for a RADT and laboratory throat culture. In this review, ambulatory care settings included private physicians' offices (general practitioners and paediatricians), walk-in clinics, hospital outpatient clinics, emergency departments and family medicine centres; we excluded studies performed by specialised physicians (e.g., ear, nose and throat specialists).

We also included reports of studies with only a subgroup of participants eligible for inclusion in the review, provided that we could extract relevant data specific to that subgroup. Reports of studies were not excluded on the basis of whether studies were performed in high-income or low-income countries because no data exist to support variations in the accuracy of RADTs according to this criterion.

Index tests

We included only studies of EIA or OIA RADTs for GAS in children with pharyngitis, including those no longer marketed.

Target conditions

GAS in children with pharyngitis (dichotomous).

Reference standards

Studies were required to diagnose GAS with throat culture on a blood agar plate in a microbiology laboratory used as the reference test. Several parameters may affect the accuracy of throat culture. For studies involving more than one throat culture technique (different medium, duration or atmosphere of incubation), we a priori chose to extract data related to the culture technique recommended by a panel of North American content experts, i.e., simple blood agar plate (versus selective or enriched media), incubation 48 hours total (versus 18 to 24 hours only), aerobic atmosphere (versus other) (Shulman 2000), in order to avoid data-driven approaches.

Search methods for identification of studies

Electronic searches

We searched MEDLINE via Ovid (1980 to May week 5, 2013) using the search strategy described in Appendix 1. The search strategy was developed in consultation with a medical librarian and the Trials Search Co-ordinator for the Acute Respiratory Infections Group and was adapted to search EMBASE via Elsevier (1980 to June 2013) (Appendix 2) and Web of Science (1980 to June 2013) (Appendix 3). We did not use any filter related to age because many RADT studies enrol adults and children and could provide extractable data for children. We did not use methodological filters to identify diagnostic studies because such filters may result in omission of relevant studies (Leeflang 2006; Whiting 2011b). The searches were run from 1980 onwards because RADTs were not available prior to this date. We searched the Cochrane Central Register of Controlled Trials (CENTRAL) for relevant studies.

We searched the following databases to identify potentially relevant studies referenced in reviews and guidelines:

- the Cochrane Database of Systematic Reviews (2013, Issue 5);
- DARE (Database of Abstracts of Reviews of Effects) (2013, Issue 2 of 4);
- the MEDION database (for Systematic Reviews of Diagnostic Studies) (23 May 2013); and
- TRIP (Turning Research Into Practice) (23 May 2013).

We also searched Conference Proceedings Citation Index (CPCI) and SCI-Expanded for conference proceedings and abstracts. The literature search was updated by the Trials Search Co-ordinator for the Acute Respiratory Infections Group on 7 July 2015.

Searching other resources

We handsearched reference lists of included articles and relevant review articles identified through the search and the ‘related articles’ function in PubMed (20 first related articles of each included article) for eligible articles. We used Google Scholar to search for reports that cited included articles. We contacted manufacturers of the most common RADTs to seek additional or unpublished studies. Manufacturers included Abbott, Beckman Coulter, Becton Dickinson, Genzyme, Inverness Medical, Polymedco and Quidel.

Data collection and analysis

Selection of studies

We considered studies published in any language. Two review authors (JFC, NB) independently excluded studies that were not related to pharyngitis or RADT on the basis of the titles and abstracts identified by the search strategy. Two review authors (JFC, NB) retrieved the full text of relevant articles and independently evaluated them for inclusion by using a pro forma as a guide. One review author (MC) acted as arbiter in case of discrepancies between two review authors (JFC, NB) who discussed the inclusion of the studies.

We selected the most recent or most complete report in cases of multiple reports for a given study or when we could not exclude the possibility of overlapping populations. We produced a flowchart to report the search process. We reported reasons for excluding studies but we did not report their references.

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Data extraction and management

We extracted the number of true positives, true negatives, false positives and false negatives for each index test evaluated in each study to construct 2 x 2 tables. If such data were not provided by the trial authors, we calculated the number of true positives, true negatives, false positives and false negatives from the summary estimates of sensitivity and specificity of the index test, if available. For studies for which only a subgroup of patients were included in the review, we extracted, analysed and presented data for this subgroup only. If some data were unclear or missing, we attempted to contact study authors to obtain additional data.

Two authors (JFC, NB) independently extracted the data used for study quality assessment and statistical analysis (data from 2 x 2 tables and covariates used for investigations of heterogeneity) and resolved discrepancies by discussion until a consensus was reached; other descriptive data were extracted by one review author (JFC). See Table 1 for a description of which data were extracted for each study. Non-English language reports were not translated: for reports in French, Italian, Spanish and German, members of our team extracted data; for other languages, the Cochrane Acute Respiratory Infections Group identified collaborators who kindly agreed to extract the data.

Assessment of methodological quality

Methodological quality assessment involved use of a four-domain tool adapted from QUADAS-2 (Whiting 2011a). Two review authors (JFC, NB) independently collected the information needed to assess the methodological quality of each study using signalling questions (yes/no/unclear). We resolved disagreements on the signalling questions by discussion with a third author (MC) until a consensus was reached. One author (JFC) used this information to judge the risk of bias and concerns about applicability using pre-defined rules. We tailored the quality assessment tool to our review question. We developed review-specific guidance on how to assess each signalling question and how to use this information to judge the risk of bias and applicability. We refined the tool until satisfactory inter-rater agreement on signalling questions was achieved. We summarised the methodological quality assessment in tables. See Table 2.

Statistical analysis and data synthesis

We entered data for the 2 x 2 tables into RevMan 2014 and plotted estimates of sensitivity and specificity on forest plots and in the receiver-operating characteristic (ROC) space to represent the variability in diagnostic test accuracy within and between studies.

We fitted the hierarchical bivariate model described by Reitsma 2005 by use of Stata/SE version 13 (using the user written program 'metandi'), which allowed for calculating summary estimates of sensitivity and specificity and the associated 95% confidence intervals (CIs). We also reported the estimate of correlation between sensitivity and specificity (rho). We put the results from the bivariate model into RevMan 2014 to provide plots of the estimated summary points and confidence regions, superimposed on the study-specific estimates of sensitivity and specificity in the ROC space.

We included the same study in the same meta-analysis more than once if needed, i.e., if one study reported different index tests. We presented results in groups according to commercial test name.

Investigations of heterogeneity

We initially visually inspected the forest plots and ROC space to check for heterogeneity between study results. To investigate sources of heterogeneity, we incorporated covariates in the bivariate model, i.e., meta-regression (using the built in program 'xtmelogit' and routines available at http://methods.cochrane.org/sdt/software-meta-analysis-dta-studies). We assessed the significance of the difference in covariate by likelihood ratio test comparing the bivariate model with and without the covariate. We used a P value of less than 0.05 to denote statistical significance. With a significant test result, we assessed effects of covariates on sensitivity and specificity separately by testing the significance of the change in -2 log-likelihood of the model (i.e., change in model deviance) with or without corresponding terms. We addressed the five following sources of heterogeneity by adding variables to the meta-analysis model:

a. Effect of test type

Some authors have suggested that OIA may be more sensitive than EIA tests (Gerber 2004). Therefore, we tried to indirectly compare the RADT tests by using test type as a categorical covariate in the models (EIA versus OIA); in indirect comparisons, data originate from different studies in which participants underwent either the EIA or the OIA test. We also tried to perform direct comparisons of EIA versus OIA by restricting the analysis to studies in which all patients underwent both EIA and OIA tests.

b. Effect of the reference standard

In this review, the reference standard was throat culture on a blood agar plate. However, several parameters may affect the accuracy of throat culture on blood agar, including whether an enrichment broth was used before plating. We added this variable as a categorical covariate (yes/no) in the model.

c. Effect of age

The sensitivity of RADTs is known to be higher in younger children than in older ones (Cohen 2012; Edmonson 2005). This might be explained by higher GAS prevalence in school-age children with pharyngitis than in older children. Therefore, we explored age as a potential source of heterogeneity by using the mean age of patients in the study as a categorised covariate in the model (i.e., below or above median of mean age across studies).

d. Effect of disease severity

Spectrum effect has been demonstrated for RADTs, with increasing sensitivity with increasing disease severity, usually assessed by the McIsaac score (Cohen 2012; Edmonson 2005; Hall 2004; Tanz 2009). Therefore, disease severity might be a relevant source of heterogeneity to explore. We used the proportion of patients with a McIsaac score greater than two as a categorical covariate in the model; we compared studies with less than 70% of patients with a McIsaac score greater than two to studies with more than 70% of patients with a McIsaac score greater than two (arbitrary).

e. Effect of GAS prevalence

Diagnostic accuracy may vary with disease prevalence (Leeflang 2009; Leeflang 2013), usually with better performances in a population with higher disease prevalence. We considered GAS prevalence as a dichotomised covariate to define low-risk versus

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high-risk study populations (i.e., below or above median of GAS prevalence across studies).

Sensitivity analyses

We carried out the following sensitivity analyses to explore the robustness of the results:

- include only studies judged at low risk of bias in each QUADAS-2 domain;
- include only studies judged at low risk of bias in at least 3 of 4 QUADAS-2 domains (arbitrary);
- include only studies judged to have low concerns about applicability in each QUADAS-2 domain.

Additional analyses

We performed univariate logitnormal random-effects meta-analysis of the negative predictive value of RADTs (using the user written command 'metan') combining studies with complete verification and studies in which RADT results were selectively verified by throat culture only in RADT-negative participants.

Assessment of reporting bias

We did not try to assess reporting bias (Macaskill 2010).

RESULTS

Results of the search

The electronic search was performed on 7 July 2015. The search identified 5576 titles, of which we identified 82 as duplicates. We further excluded a total of 5166 titles on the basis of their title, abstract or both (Figure 1). After assessment of the full text of 328 articles, we excluded 235. Using the 'PubMed related articles' function and Google Scholar, and checking the references of included studies or reviews on the same topic (Gerber 2004; Lean 2014; Ruiz-Aragon 2010; Stewart 2014), allowed us to include five additional studies (Nitsch-Osuch 2010; Pauchard 2012; Sedki 2010; Tellechea 2012; Wong 1989). When possible, we contacted by email and postal mail authors of studies that included children and adults or in which the age of participants was unclear; eight trial authors shared or clarified paediatric data (Arribas Blanco 1988; Drulak 1991; Llor 2008; Mezghani Maleej 2010; Mlejnek 2014; Pauchard 2012; Pauchard 2013; Schwabe 1987; Schwabe 1991; Toepfner 2013). All included studies were cross-sectional. Manufacturers of RADTs did not respond. Thus, this review includes a total of 98 unique study reports.

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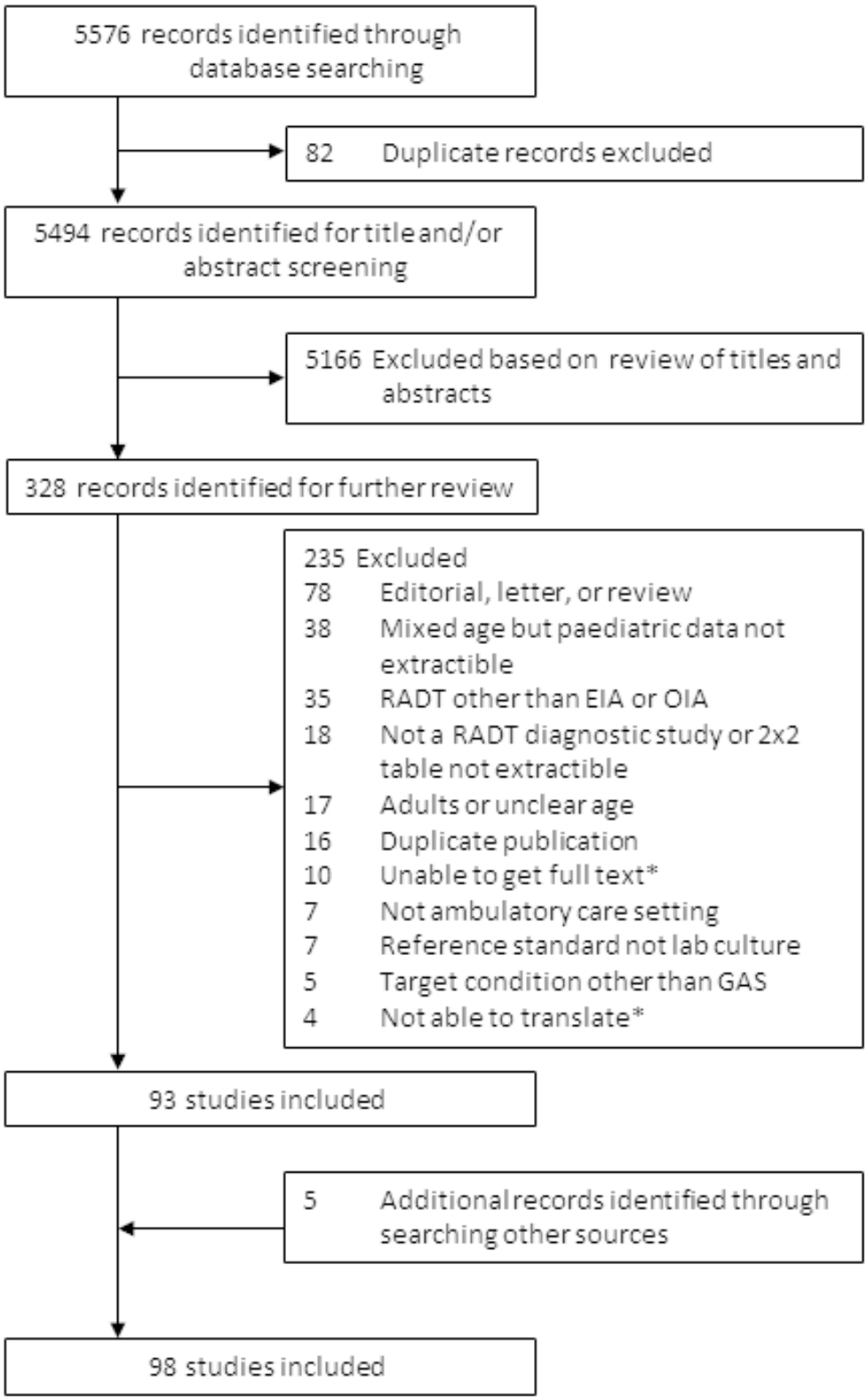
Figure 1. Flow diagram of studies in the review. *Studies awaiting classification (n = 14)



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Included studies

Some studies were subdivided for the purpose of the review. One multi-centre study conducted in four different countries was subdivided into four study cohorts (Rimoin 2010a). Some studies were also subdivided because they evaluated more than one RADT: nine studies compared two tests (Donatelli 1992a; Egger 1990a; Gieseker 2002a; Kaufhold 1991a; Mayes 2001a; Mirza 2007a; Roe 1995a; Schwartz 1997a; Wright 2007a), one compared three tests (Rogo 2010a), and one compared five tests (Chiadmi 2004a). Thus, this review includes a total of 116 test evaluations reporting a total of 101,121 test results. We performed descriptive analysis, methodological quality assessment and meta-analysis at the test evaluation level.

Included studies came from a variety of countries (n = 25); 53 (46%) test evaluations were conducted in the US. Forty-two different commercial RADT kits were evaluated, and three studies mentioned evaluating an EIA test without providing any commercial name (further referred to as "EIA (no name)"). Six commercial kits were evaluated in at least five paediatric cohorts: OSOM Strep A, QuickVue InLine Strep A, Strep A OIA, Strep A OIA Max, TestPack Strep A and TestPack Plus.

Excluded studies

Amongst 328 full-text articles assessed, we excluded 235 trials. Thirty-five assessed RADTs relying on other technologies than EIA or OIA. We excluded 38 studies because they included children and adults but did not report specific data for children, and we could not obtain additional data by contacting the trial authors. The status of 10 studies is uncertain because we were unable to obtain articles in full text. The status of four articles is uncertain as they have not yet been translated (two articles in Turkish, one in Polish and one in Czech).

Methodological quality of included studies

The overall methodological quality of included study cohorts is summarised in Figure 2. The quality assessment results for the individual studies is shown in Figure 3. The median sample size per study cohort was 297 participants (interquartile range (IQR) 196 to 539). The median mean age of participants was 6.6 (IQR 5.8 to 7.7) years, as reported in 32 studies. The majority of study cohorts (82 of 116, 71%) did not clearly report whether participants formed a consecutive, random or convenience series. Fifty-eight study cohorts (50%) avoided clinical selection of participants and therefore included a representative spectrum of patients.

Figure 2. Risk of bias and applicability concerns graph: review authors' judgements about each domain across all included study cohorts (n = 116).

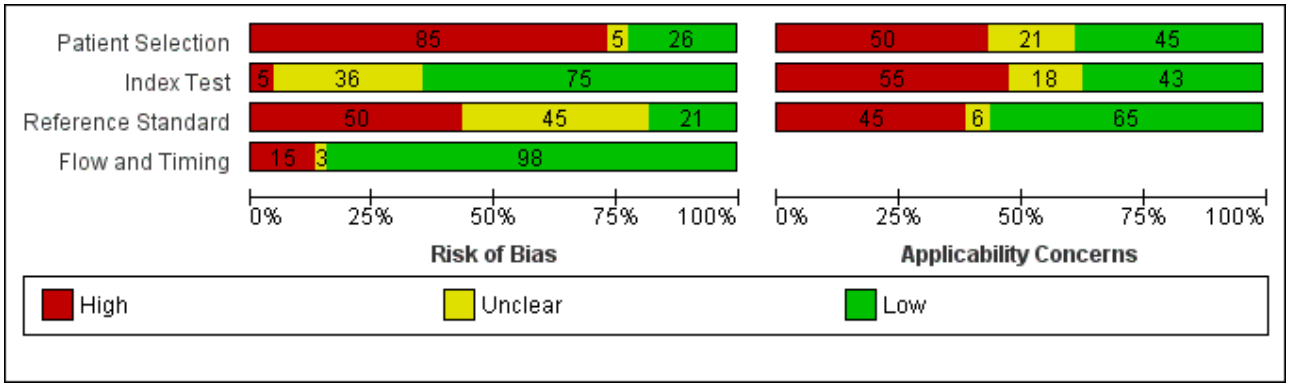

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Figure 3. Risk of bias and applicability concerns summary: review authors' judgements about each domain for each included study cohort (n = 116).

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Figure 3. (Continued)

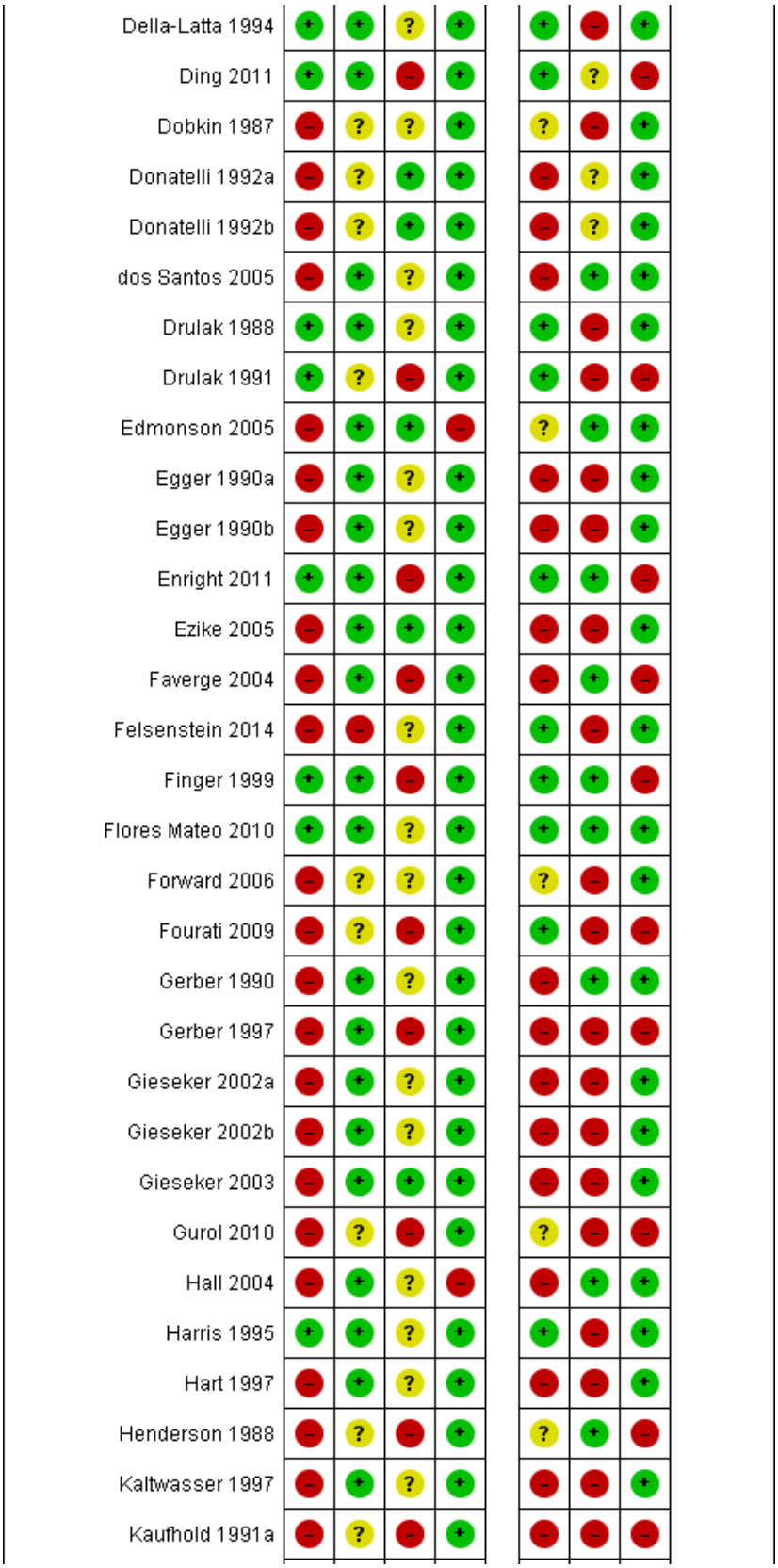

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Figure 3. (Continued)

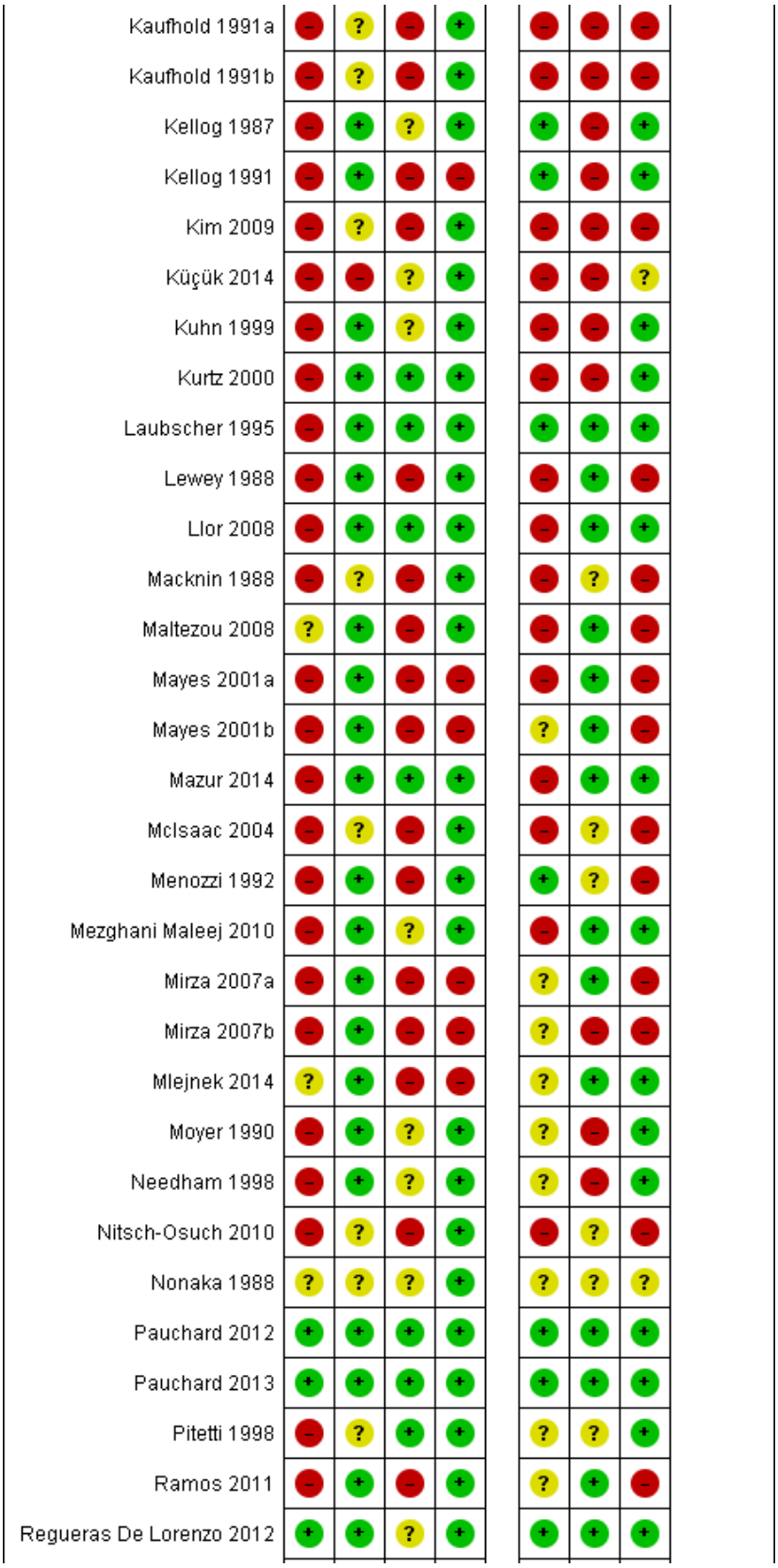

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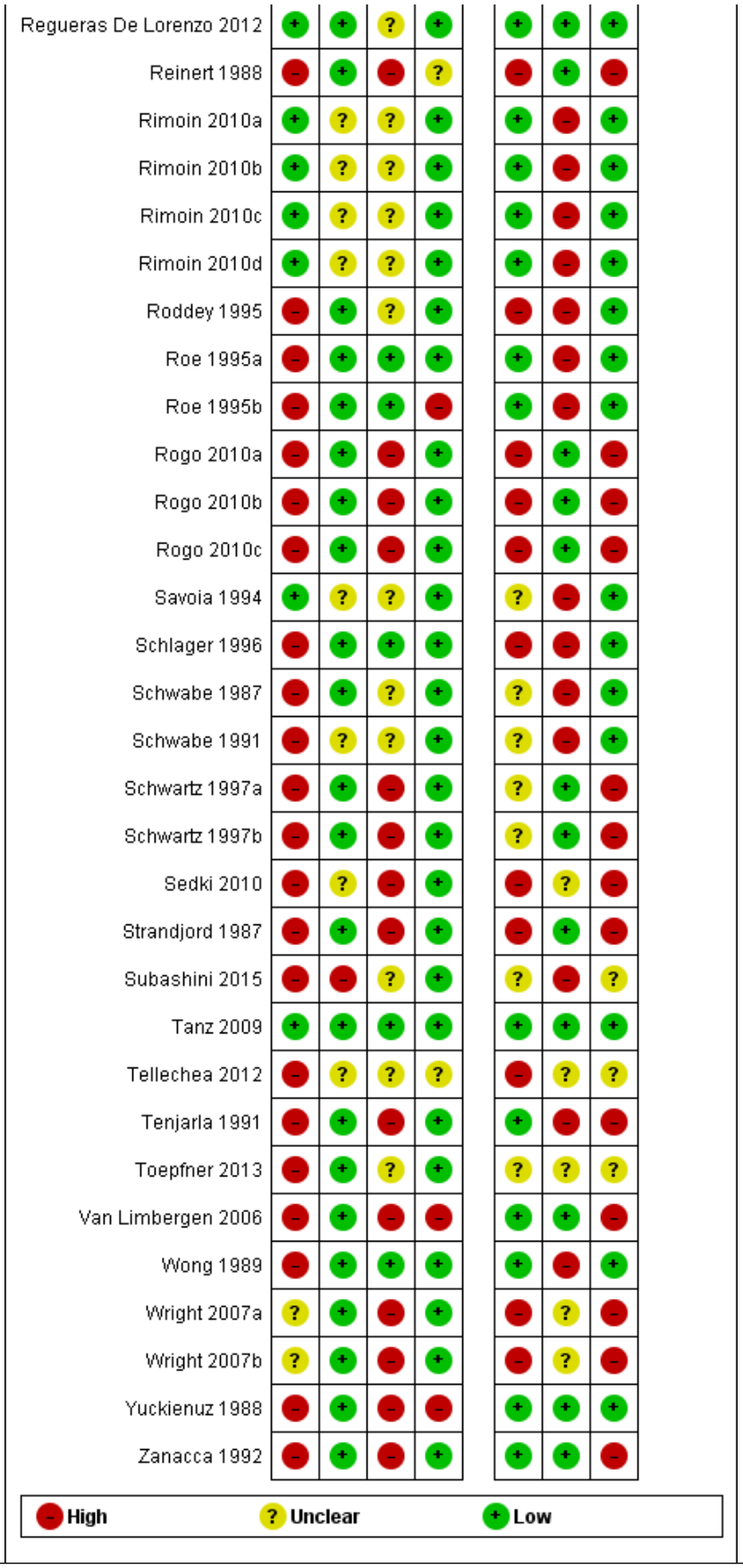
Figure 3. (Continued)



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Interpretation of the results of the RADT was done with blinding of the result of throat culture in 84 of 116 cases (72%). An appropriate reference standard (i.e., laboratory throat culture on a blood agar plate during 48 hours) was used in 72 study cohorts (62%). Interpretation of the results of the reference standard was done with blinding of the result of the RADT in 23 of 116 cases (20%).

Partial verification was avoided in a majority (105 of 116, 91%) of cases. In 10 study cohorts (42,319 participants), RADT results were verified by throat culture only in RADT negative participants (Ayanruoh 2009; Cohen 2004; Edmonson 2005; Hall 2004; Mayes 2001a; Mirza 2007a; Mlejnek 2014; Van Limbergen 2006); in one study (558 participants) RADT results were verified only in RADT positive participants (Cohen 1998).

Findings

Across the 116 study cohorts included in the review, the sensitivity of rapid antigen detection tests (RADTs) ranged from 38.6% to 100% and the specificity from 54.1% to 100% (Figure 4). We excluded 11 study cohorts from the meta-analysis of sensitivity and specificity estimates for a final dataset containing 105 pairs of sensitivity and specificity (58,244 participants), where partial verification was not avoided.

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Figure 4. Forest plots of RADT sensitivity and specificity for GAS detection, ordered by commercial kit. TP = True Positive; FP = False Positive; FN = False Negative; TN = True Negative.

Acceava Strep A (Biostar)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Hall 2004	117	0	35	409	0.77 [0.69, 0.83]	1.00 [0.99, 1.00]
Rogo 2010a	63	2	1	162	0.98 [0.92, 1.00]	0.99 [0.96, 1.00]

ACON Strep A Rapid Test Strip

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Tellechea 2012	1981	290	210	3024	0.90 [0.89, 0.92]	0.91 [0.90, 0.92]

BioNexia Strep A (BioMerieux)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Pauchard 2013	59	8	9	107	0.87 [0.76, 0.94]	0.93 [0.87, 0.97]

CARDS QS Strep A (Quidel)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Edmonson 2005	384	0	65	735	0.86 [0.82, 0.89]	1.00 [0.99, 1.00]

Clearview Exact Strep A

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Ding 2011	146	9	40	435	0.78 [0.72, 0.84]	0.98 [0.96, 0.99]

Clearview Strep A

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Chiadmi 2004c	24	1	1	49	0.96 [0.80, 1.00]	0.98 [0.89, 1.00]

Diaquick Strep A Test (Dialab)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Al-Najjar 2008	68	3	3	422	0.96 [0.88, 0.99]	0.99 [0.98, 1.00]

Directgen 1-2-3 Group A Strep (Becton Dickinson)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Dagnelie 1998	34	0	12	33	0.74 [0.59, 0.86]	1.00 [0.89, 1.00]
Donatelli 1992a	18	2	23	137	0.44 [0.28, 0.60]	0.99 [0.95, 1.00]
Moyer 1990	78	2	26	218	0.75 [0.66, 0.83]	0.99 [0.97, 1.00]
Zanacca 1992	120	6	79	401	0.60 [0.53, 0.67]	0.99 [0.97, 0.99]

Direct Strep A EIA

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Egger 1990b	38	16	21	218	0.64 [0.51, 0.76]	0.93 [0.89, 0.96]

EIA (no name)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Cohen 2004	268	0	7	329	0.97 [0.95, 0.99]	1.00 [0.99, 1.00]
Henderson 1988	27	3	12	75	0.69 [0.52, 0.83]	0.96 [0.89, 0.99]
Mayes 2001b	1743	0	68	4696	0.96 [0.95, 0.97]	1.00 [1.00, 1.00]

Group A Strep Test (Quidel)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Cohen 1988	26	4	1	61	0.96 [0.81, 1.00]	0.94 [0.85, 0.98]
Reinert 1988	26	4	1	61	0.96 [0.81, 1.00]	0.94 [0.85, 0.98]

IM Strep A (International Microbio)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)

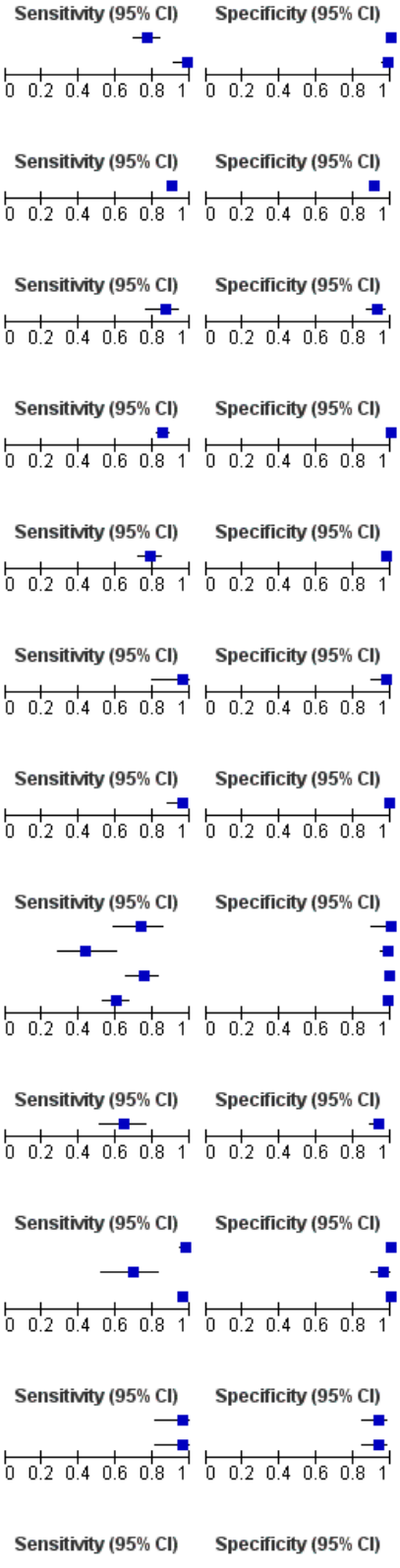

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Figure 4. (Continued)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Buchbinder 2007	44	29	13	130	0.77 [0.64, 0.87]	0.82 [0.75, 0.87]
Chiadmi 2004b	24	2	1	48	0.96 [0.80, 1.00]	0.96 [0.86, 1.00]

Meridian Bioscience

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Alper 2013	19	10	0	85	1.00 [0.82, 1.00]	0.89 [0.81, 0.95]

OSOM Strep A (Genzyme)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Flores Mateo 2010	65	30	7	109	0.90 [0.81, 0.96]	0.78 [0.71, 0.85]
Llor 2008	7	3	1	31	0.88 [0.47, 1.00]	0.91 [0.76, 0.98]
Mezghani Maleej 2010	138	14	10	283	0.93 [0.88, 0.97]	0.95 [0.92, 0.97]
Mlejnek 2014	0	0	0	0	Not estimable	Not estimable
Ramos 2011	50	3	2	110	0.96 [0.87, 1.00]	0.97 [0.92, 0.99]
Rogo 2010b	65	1	1	161	0.98 [0.92, 1.00]	0.99 [0.97, 1.00]
Schwartz 1997a	98	0	5	155	0.95 [0.89, 0.98]	1.00 [0.98, 1.00]

OSOM Ultra Strep A (Genzyme)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Felsenstein 2014	32	3	26	300	0.55 [0.42, 0.68]	0.99 [0.97, 1.00]
Gieseker 2002b	84	18	3	197	0.97 [0.90, 0.99]	0.92 [0.87, 0.95]
Gieseker 2003	181	19	29	658	0.86 [0.81, 0.91]	0.97 [0.96, 0.98]
Wright 2007a	76	7	13	242	0.85 [0.76, 0.92]	0.97 [0.94, 0.99]

QuickVue Dipstick Strep A (Quidel)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Rogo 2010c	60	6	5	157	0.92 [0.83, 0.97]	0.96 [0.92, 0.99]
Tanz 2009	385	29	168	1261	0.70 [0.66, 0.73]	0.98 [0.97, 0.98]

QuickVue Flex Strep A (Quidel)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Contessotto 2000	103	11	10	277	0.91 [0.84, 0.96]	0.96 [0.93, 0.98]
Finger 1999	212	42	27	496	0.89 [0.84, 0.92]	0.92 [0.90, 0.94]

QuickVue In-Line Strep A (Quidel)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Enright 2011	27	2	11	137	0.71 [0.54, 0.85]	0.99 [0.95, 1.00]
Küçük 2014	128	19	87	658	0.60 [0.53, 0.66]	0.97 [0.96, 0.98]
Pauchard 2012	571	153	180	1036	0.76 [0.73, 0.79]	0.87 [0.85, 0.89]
Schwartz 1997b	90	0	13	155	0.87 [0.79, 0.93]	1.00 [0.98, 1.00]
Toepfner 2013	94	20	5	398	0.95 [0.89, 0.98]	0.95 [0.93, 0.97]
Wright 2007b	70	13	18	237	0.80 [0.70, 0.87]	0.95 [0.91, 0.97]

QuickVue+ Strep A (Quidel)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
dos Santos 2005	89	16	3	268	0.97 [0.91, 0.99]	0.94 [0.91, 0.97]
Gurol 2010	28	3	12	135	0.70 [0.53, 0.83]	0.98 [0.94, 1.00]
Mazur 2014	45	2	0	43	1.00 [0.92, 1.00]	0.96 [0.85, 0.99]
Van Limbergen 2006	21	1	11	168	0.66 [0.47, 0.81]	0.99 [0.97, 1.00]

Sacks Biological Farms

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Ayanruoh 2009	1474	0	2	5081	1.00 [1.00, 1.00]	1.00 [1.00, 1.00]

SD Bioline Strep A

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Figure 4. (Continued)

SD Bioline Strep A

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Kim 2009	187	8	8	90	0.96 [0.92, 0.98]	0.92 [0.85, 0.96]
Subashini 2015	15	0	12	84	0.56 [0.35, 0.75]	1.00 [0.96, 1.00]

Signify Strep A (Abbott)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Mirza 2007b	1730	0	280	4855	0.86 [0.84, 0.88]	1.00 [1.00, 1.00]

SMART Group A Strep (New Horizons)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Kellog 1991	302	8	121	604	0.71 [0.67, 0.76]	0.99 [0.97, 0.99]

Strep A Abon kit

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Altun 2015	224	30	83	906	0.73 [0.68, 0.78]	0.97 [0.95, 0.98]

Strep A OIA (Biostar)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Chapin 2002	149	10	24	337	0.86 [0.80, 0.91]	0.97 [0.95, 0.99]
Daly 1994	64	15	12	333	0.84 [0.74, 0.92]	0.96 [0.93, 0.98]
Della-Latta 1994	89	35	3	563	0.97 [0.91, 0.99]	0.94 [0.92, 0.96]
Gerber 1997	844	78	161	1030	0.84 [0.82, 0.86]	0.93 [0.91, 0.94]
Harris 1995	109	24	5	381	0.96 [0.90, 0.99]	0.94 [0.91, 0.96]
Hart 1997	13	23	3	36	0.81 [0.54, 0.96]	0.61 [0.47, 0.73]
Kaltwasser 1997	47	18	10	125	0.82 [0.70, 0.91]	0.87 [0.81, 0.92]
Kuhn 1999	120	9	12	222	0.91 [0.85, 0.95]	0.96 [0.93, 0.98]
Needham 1998	75	7	11	183	0.87 [0.78, 0.93]	0.96 [0.93, 0.99]
Pitetti 1998	58	5	15	155	0.79 [0.68, 0.88]	0.97 [0.93, 0.99]
Roddey 1995	107	8	10	176	0.91 [0.85, 0.96]	0.96 [0.92, 0.98]
Roe 1995a	126	38	25	311	0.83 [0.77, 0.89]	0.89 [0.85, 0.92]
Schlager 1996	48	7	14	193	0.77 [0.65, 0.87]	0.96 [0.93, 0.99]

Strep A OIA Max (Biostar)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Ezike 2005	73	4	6	103	0.92 [0.84, 0.97]	0.96 [0.91, 0.99]
Gieseker 2002a	65	12	17	208	0.79 [0.69, 0.87]	0.95 [0.91, 0.97]
Rimoin 2010a	39	5	6	134	0.87 [0.73, 0.95]	0.96 [0.92, 0.99]
Rimoin 2010b	146	23	13	222	0.92 [0.86, 0.96]	0.91 [0.86, 0.94]
Rimoin 2010c	321	82	109	1114	0.75 [0.70, 0.79]	0.93 [0.92, 0.95]
Rimoin 2010d	55	26	21	156	0.72 [0.61, 0.82]	0.86 [0.80, 0.90]

Strep A Rapid Test Device

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Forward 2006	80	23	38	349	0.68 [0.59, 0.76]	0.94 [0.91, 0.96]

Strep A Sign

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Chiadmi 2004d	22	3	3	47	0.88 [0.69, 0.97]	0.94 [0.83, 0.99]

Strep A test II (INTEX Diagnostica)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Camurdan 2008	426	22	49	751	0.90 [0.87, 0.92]	0.97 [0.96, 0.98]

StreptAtest (Dectrapharm)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)

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Figure 4. (Continued)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Cohen 2012	247	27	38	473	0.87 [0.82, 0.90]	0.95 [0.92, 0.96]
Cohen 2013	259	46	21	350	0.93 [0.89, 0.95]	0.88 [0.85, 0.91]
Faverge 2004	17	4	2	61	0.89 [0.67, 0.99]	0.94 [0.85, 0.98]
Sedki 2010	25	2	6	62	0.81 [0.63, 0.93]	0.97 [0.89, 1.00]

Streptavit

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Chiadmi 2004e	25	3	0	47	1.00 [0.86, 1.00]	0.94 [0.83, 0.99]

Streptop A (ALL-Diag)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Fourati 2009	54	18	5	215	0.92 [0.81, 0.97]	0.92 [0.88, 0.95]

SUDS Group A Strep

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Yuckienuz 1988	93	15	33	200	0.74 [0.65, 0.81]	0.93 [0.89, 0.96]

SureScreen Test Strep A

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Nitsch-Osuch 2010	46	17	6	119	0.88 [0.77, 0.96]	0.88 [0.81, 0.93]

TestPack Strep A (Abbott)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Arribas Blanco 1988	37	18	6	179	0.86 [0.72, 0.95]	0.91 [0.86, 0.94]
Dobkin 1987	65	5	3	148	0.96 [0.88, 0.99]	0.97 [0.93, 0.99]
Egger 1990a	31	4	20	231	0.61 [0.46, 0.74]	0.98 [0.96, 1.00]
Kaufhold 1991a	91	3	14	122	0.87 [0.79, 0.93]	0.98 [0.93, 1.00]
Kellog 1987	80	11	27	240	0.75 [0.65, 0.83]	0.96 [0.92, 0.98]
Menozzi 1992	1007	54	269	2328	0.79 [0.77, 0.81]	0.98 [0.97, 0.98]
Nonaka 1988	16	1	7	76	0.70 [0.47, 0.87]	0.99 [0.93, 1.00]
Schwabe 1987	90	7	10	258	0.90 [0.82, 0.95]	0.97 [0.95, 0.99]
Tenjarla 1991	1389	305	125	7342	0.92 [0.90, 0.93]	0.96 [0.96, 0.96]
Wong 1989	23	1	12	111	0.66 [0.48, 0.81]	0.99 [0.95, 1.00]

TestPack Plus (Abbott)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Attia 2001	187	33	31	336	0.86 [0.80, 0.90]	0.91 [0.88, 0.94]
Chiadmi 2004a	23	1	2	49	0.92 [0.74, 0.99]	0.98 [0.89, 1.00]
Cohen 1998	121	19	0	418	1.00 [0.97, 1.00]	0.96 [0.93, 0.97]
Kurtz 2000	63	18	16	159	0.80 [0.69, 0.88]	0.90 [0.84, 0.94]
Laubscher 1995	106	14	12	322	0.90 [0.83, 0.95]	0.96 [0.93, 0.98]
Regueras De Lorenzo 2012	64	10	10	108	0.86 [0.77, 0.93]	0.92 [0.85, 0.96]
Roe 1995b	124	14	27	335	0.82 [0.75, 0.88]	0.96 [0.93, 0.98]
Schwabe 1991	65	11	6	179	0.92 [0.83, 0.97]	0.94 [0.90, 0.97]

TestPack Plus Strep A with OBC II (Abbott)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
McIsaac 2004	133	3	22	296	0.86 [0.79, 0.91]	0.99 [0.97, 1.00]

Ventrescreen Strep A (Ventrex Lab)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Begovac 1993	70	37	51	231	0.58 [0.49, 0.67]	0.86 [0.81, 0.90]
Clegg 1987	66	1	33	105	0.67 [0.56, 0.76]	0.99 [0.95, 1.00]
Macknin 1988	45	28	14	33	0.76 [0.63, 0.86]	0.54 [0.41, 0.67]

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Figure 4. (Continued)

Macknin 1988	45	28	14	33	0.76 [0.63, 0.86]	0.54 [0.41, 0.67]

Visuwell Strep A (ADI)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Chu 1990	37	23	5	379	0.88 [0.74, 0.96]	0.94 [0.92, 0.96]
Drulak 1988	43	26	14	197	0.75 [0.62, 0.86]	0.88 [0.83, 0.92]
Drulak 1991	43	22	11	126	0.80 [0.66, 0.89]	0.85 [0.78, 0.90]

Icon Strep A

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Donatelli 1992b	17	0	27	158	0.39 [0.24, 0.55]	1.00 [0.98, 1.00]
Kaufhold 1991b	90	12	20	139	0.82 [0.73, 0.89]	0.92 [0.87, 0.96]
Lewey 1988	41	21	6	196	0.87 [0.74, 0.95]	0.90 [0.86, 0.94]
Strandjord 1987	46	6	6	80	0.88 [0.77, 0.96]	0.93 [0.85, 0.97]

Qtest (Becton Dickinson)

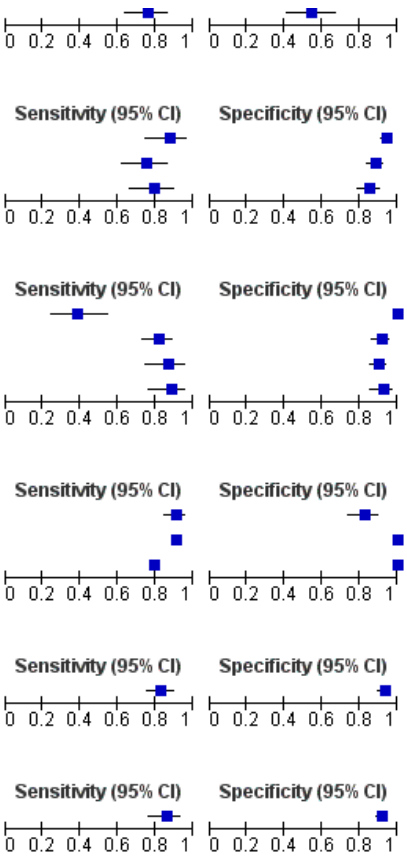
Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Gerber 1990	123	16	12	77	0.91 [0.85, 0.95]	0.83 [0.74, 0.90]
Mayes 2001a	1299	0	132	3342	0.91 [0.89, 0.92]	1.00 [1.00, 1.00]
Mirza 2007a	2612	0	688	8344	0.79 [0.78, 0.81]	1.00 [1.00, 1.00]

Link 2 Strep A Rapid Test (Becton Dickinson)

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Maltezou 2008	98	21	20	293	0.83 [0.75, 0.89]	0.93 [0.90, 0.96]

Event Test Strip Strep A

Study	TP	FP	FN	TN	Sensitivity (95% CI)	Specificity (95% CI)
Savoia 1994	63	36	10	401	0.86 [0.76, 0.93]	0.92 [0.89, 0.94]



Summary estimates of sensitivity and specificity

Amongst 105 test evaluations included in the meta-analysis (58,244 participants), the summary estimates of sensitivity and specificity were 85.6%; 95% confidence interval (CI) 83.3 to 87.6; and 95.4%; 95% CI 94.5 to 96.2, respectively (Figure 5). There was no statistical evidence of a correlation between sensitivity and specificity (correlation coefficient -0.17; 95% CI -0.39 to 0.07).

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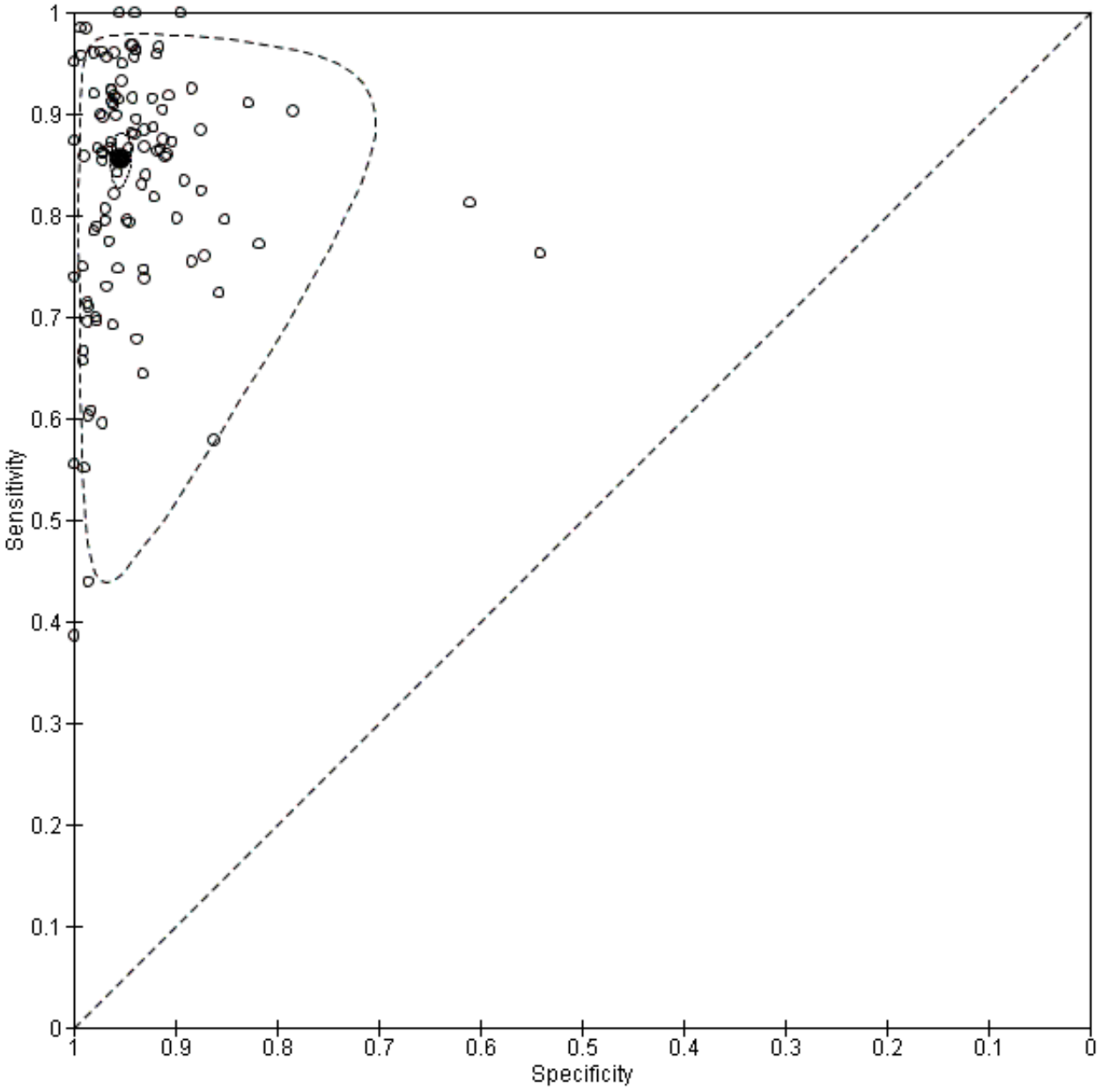
Figure 5. Summary ROC plot of RADT sensitivity and specificity for GAS detection (n = 105). Each individual study cohort is represented by an empty circle. The filled circle is the pooled summary estimate for sensitivity and specificity. The solid curve represents the 95% confidence region around the summary estimate; the dashed curve represents the 95% prediction region.



Enzyme immunoassay (EIA) tests

We included 86 evaluations of EIA RADTs (48,808 participants). The median sample size was 263 (IQR 178 to 454) and the median prevalence of group A streptococcus (GAS) on throat culture was 29.5% (IQR 23.8% to 34.9%). Sensitivity of EIA RADTs ranged from 38.6% to 100%, and specificity from 54.1% to 100%. The summary estimates of sensitivity and specificity for EIA tests were 85.4% (82.7 to 87.8) and 95.8% (94.8 to 96.6), respectively (Figure 6).

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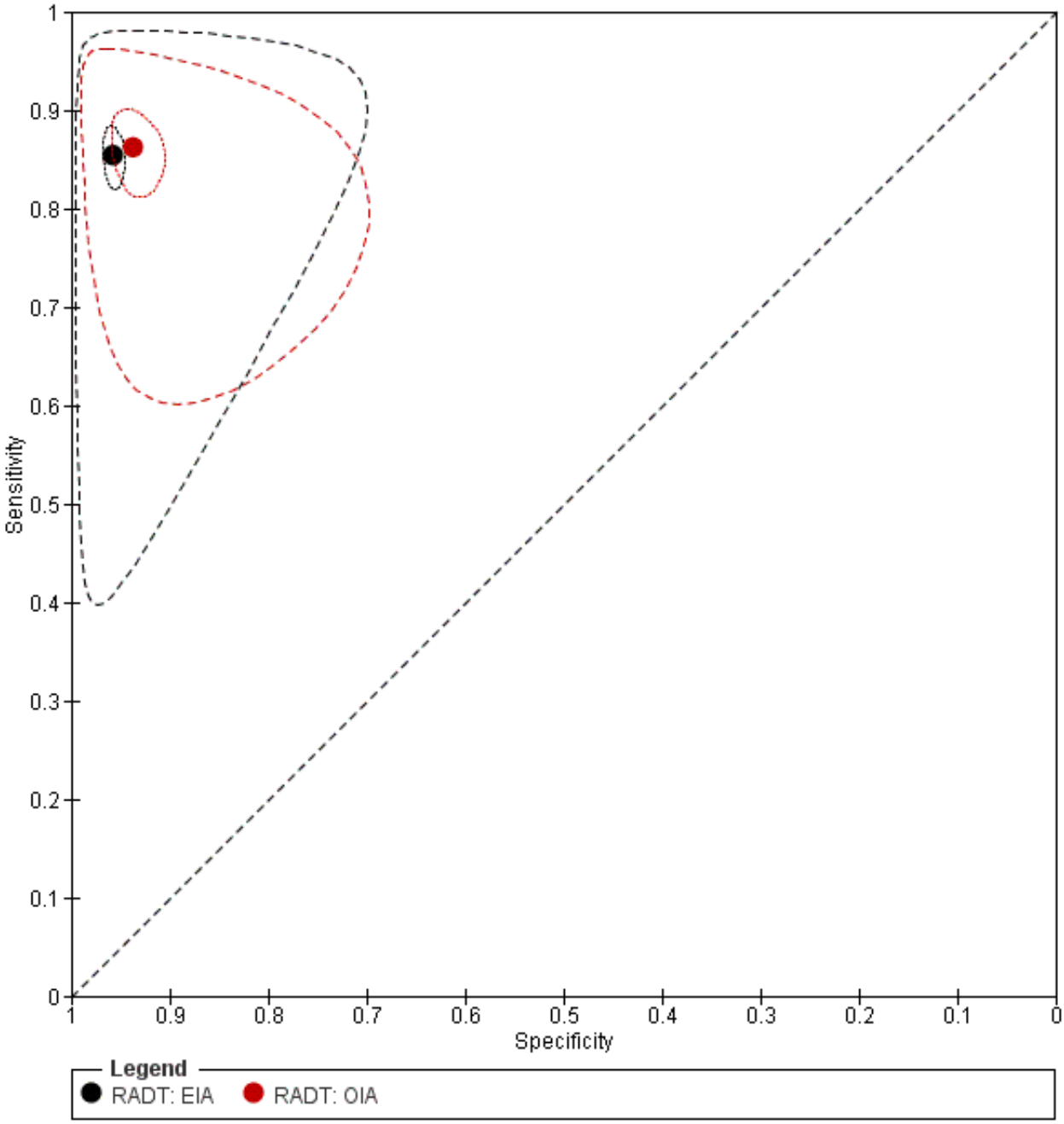
Figure 6. Summary ROC plot of RADT sensitivity and specificity for GAS detection: EIA (n = 86) versus OIA (n = 19). The filled black circle is the pooled summary estimate for sensitivity and specificity of EIA tests; the filled red circle is the pooled summary estimate for sensitivity and specificity of OIA tests The solid curves represent the 95% confidence region around the summary estimate; the dashed curves represent the 95% prediction region.



Optical immunoassay (OIA) tests

We included 19 evaluations of OIA RADTs (9436 participants). The median sample size was 302 (IQR 233 to 519), and the median prevalence of GAS on throat culture was 29.5% (IQR 23.7% to 36.4%). Sensitivity of OIA RADTs ranged from 72.4% to 96.7%, specificity from 61.0% to 97.1%. The summary estimates of sensitivity and specificity for OIA tests were 86.2% (82.7 to 89.2) and 93.7% (91.5 to 95.4), respectively (Figure 6).

Investigations of heterogeneity

Visual inspection of the forests plots and ROC space suggested substantial heterogeneity in accuracy estimates, especially amongst estimates of sensitivity, as reflected by the wide prediction

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areas around summary estimates. The results of investigations of heterogeneity are summarised in Table 3.

a. Effect of test type

There were 86 evaluations of EIA tests (48,808 participants) and 19 evaluations of OIA tests (9436 participants). Based on analysis of all available data, there was no statistical evidence that sensitivity and/or specificity differed between EIA and OIA tests (sensitivity 85.4% versus 86.2%, respectively; specificity 95.8% versus 93.7%, respectively; change in model deviance = 2.90; P value = 0.23) (Figure 6).

Two studies directly compared EIA to OIA tests by applying both tests to each individual (802 participants; Figure 7) (Gieseker 2002a; Roe 1995a); data were too limited to perform additional statistical analysis. In Gieseker 2002a, EIA and OIA tests had comparable specificity (92% (87 to 95) versus 95% (91 to 97), respectively), and the EIA test had the highest sensitivity (97% (90 to 99) versus 79% (69 to 87), respectively). Contrarily, Roe 1995a found that EIA and OIA tests had comparable sensitivity (82% (75 to 88) versus 83% (77 to 89), respectively), with the specificity of EIA being higher than that of the OIA test under evaluation (96% (93 to 98) versus 89% (85 to 92)).

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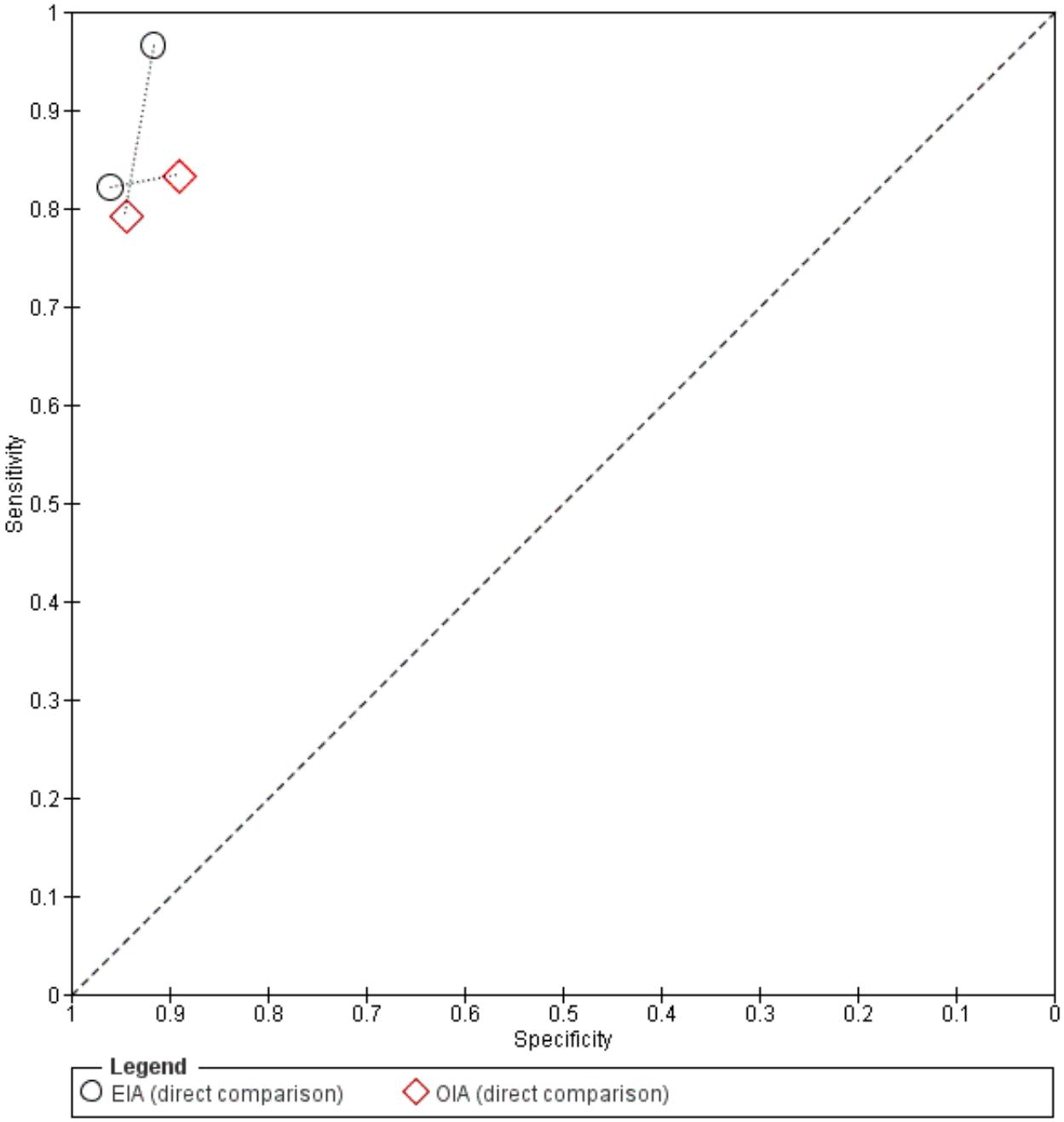
Figure 7. Summary ROC plot of RADT sensitivity and specificity for GAS detection: direct comparison of EIA versus OIA (n = 2). Each individual study cohort is represented by an empty black circle (EIA) and an empty red diamond (OIA), connected by a dotted line.



b. Effect of the reference standard

An enrichment broth was used before plating in 10 test evaluations; this was not done in 88 study cohorts, and the information was unclear for seven. Using an enrichment broth before plating was not associated with significantly different estimates of sensitivity and/or specificity (sensitivity 86.3% versus 85.5%, respectively; specificity 92.7% versus 95.6%, respectively; change in model deviance = 3.79; P value = 0.15).

c. Effect of age

Twenty-nine studies reported the mean age of participants. The median of the mean age of participants was 6.6 years (IQR 5.8 to 7.4). Mean age was not associated with significantly different estimates of sensitivity and/or specificity (sensitivity 87.1% versus 83.7%, respectively; specificity 93.2% versus 95.0%, respectively; change in model deviance = 1.87; P value = 0.39).

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d. Effect of disease severity

Twelve studies assessed clinical severity using the McIsaac score. The median proportion of severe patients (patients with a McIsaac score greater than two) was 85% (IQR 63% to 91%). The proportion of severe patients was below 70% in four study cohorts. Meta-regression did not show evidence of significant associations between clinical severity and sensitivity and/or specificity (change in model deviance = 2.10; P value = 0.35).

e. Effect of GAS prevalence

Based on the proportion of throat culture results positive for GAS, the median prevalence of participants with streptococcal pharyngitis was 29.5% (IQR 23.8% to 34.9%). There was no significant effect of GAS prevalence on sensitivity and/or specificity when GAS prevalence was tested as a covariate in the bivariate model (change in model deviance = 0.71; P value = 0.70).

Sensitivity analysis

Compared with the overall results (summary sensitivity 85.6%), sensitivity was lower in the 20 studies at low risk of bias for the reference standard (81.0%), higher in the 33 studies with low concerns about applicability in the index test domain (89.1%), but stable in the 20 studies at low risk of bias in at least three QUADAS-2 domains (84.0%) (Table 4). Summary estimates of specificity were robust across subgroups, at around 95%.

Additional analysis

We excluded 10 studies from the main meta-analysis of sensitivity and specificity estimates because RADT results were selectively verified by throat culture only in RADT negative participants (partial verification); four were very large studies (more than 3000 participants) (Ayanruoh 2009; Mayes 2001a; Mirza 2007a; Mlejnek 2014). We performed a meta-analysis of the negative predictive value of RADTs, including those 10 additional studies. Across 115 test evaluations, the median prevalence of participants with streptococcal pharyngitis was 29.4%. Negative predictive value ranged from 70.2% to 100%; the summary estimate of negative predictive value was 93.9% (93.1 to 94.6).

DISCUSSION

Summary of main results

In this systematic review, we included 116 cohorts (98 unique studies; 101,121 participants) that evaluated rapid antigen detection tests (RADTs) for the detection of group A streptococcus (GAS) in children with pharyngitis. The overall methodological quality of included studies was poor. Across 105 study cohorts (58,244 participants) in which all participants underwent both RADT and throat culture, the summary estimates of sensitivity and specificity were 85.6% (83.3 to 87.6) and 95.4% (94.5 to 96.2), respectively. There were substantial variations in sensitivity across studies, but specificity was more stable; there was no statistical evidence of a trade-off between sensitivity and specificity. Heterogeneity in accuracy was not explained by study-level characteristics such as test type (enzyme immunoassay (EIA) versus optical immunoassay (OIA)), use of an enrichment broth before plating, mean age and clinical severity of participants, and GAS prevalence. Summary estimates of sensitivity and specificity were stable in low risk of bias studies (84.0% and 95.0%, respectively). Across 115 test evaluations in which all negative RADT results were verified by throat culture, the negative predictive value of RADT was 93.9% (93.1 to 94.6).

Summary of findings

The Summary of findings 1 summarises the findings of the review by applying the results to a hypothetical cohort of 1000 children with pharyngitis, considering three scenarios where GAS prevalence varies from 20% to 40%. The consequence of a false negative result is that the patient may not receive antibiotic treatment, and thus may experience symptoms for a longer period and be at higher risk of developing non-suppurative and suppurative complications of GAS infection (Spinks 2013). The consequence of a false positive result is that the patient may receive unnecessary antibiotics, which could result in adverse reactions and unwilling exposure to antibiotic-resistant bacteria.

Comparison with previous findings

Our findings are in line with those from three published systematic reviews about the accuracy of RADTs for the diagnosis of streptococcal pharyngitis (Table 5) (Lean 2014; Ruiz-Aragon 2010; Stewart 2014). Summary estimates of sensitivity and specificity were comparable across reviews, at around 85% and 95%, respectively.

Strengths and weaknesses of the review

We believe this dataset constitutes a fair representation of diagnostic accuracy studies evaluating RADTs in children with pharyngitis. However, it is known that studies of diagnostic test accuracy tend to be poorly indexed in electronic databases and we may therefore have missed some eligible studies. Moreover, we used an extensive literature search but we did not look systematically in conference abstracts, whereas it has been estimated that at least one-fourth of abstracts of diagnostic accuracy studies presented at conferences are not published (Brazzelli 2009). Thirty-eight studies did not differentiate between adults and children and so whilst they were identified, eligible subsets of data could not be included in the review.

The overall methodological quality of studies included in the review was poor, with less than one-fifth (17%) of studies being judged at low risk of bias for at least three of four QUADAS-2 domains, and half (50%) of estimates of diagnostic accuracy obtained from unselected groups of children presenting with signs and symptoms of pharyngitis. Poor quality mainly arose from high risk of selection bias and high risk of bias in the reference standard used (in 73% and 43% of test evaluations, respectively). Poor study reporting frequently impeded quality appraisal. Whether or not participants formed a consecutive or random series was reported in only 29% of cases, inclusion criteria in 46%, and whether readers of the reference standard were blinded to the result of the rapid test in 28%. We used QUADAS-2 to assess the quality of included studies but did not use GRADE to rate the overall quality of the body of evidence; we will undertake GRADE assessment in future updates of this review.

We included sufficient numbers of studies and participants to obtain precise summary estimates. However, we were not able to identify sources of heterogeneity in accuracy through meta-regression. It is known that sensitivity of RADTs is likely to vary across patient subgroups within a study; several studies, for example, found evidence of increasing sensitivity with increasing

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Centor or McIsaac scores (Cohen 2012; Edmonson 2005; Hall 2004; Tanz 2009). Due to aggregation bias, relationships across studies may not reflect relationships within studies; the relationship between accuracy and patient characteristics such as age and disease severity may be adequately estimated only using individual patient data; we strongly recommend such a future work. We dichotomised variables such as age and clinical severity when investigating heterogeneity, mostly because we lack routines for bivariate meta-regression with continuous variables in Stata, but this may be at the cost of loss of information and statistical power. Study setting could also be a relevant source of heterogeneity to explore in future trials.

Other well described sources of variability in RADT sensitivity could not be explored in this review. For example, several studies reported increasing sensitivity with increasing amount of GAS found on culture (Cohen 2012; Kuhn 1999; Kurtz 2000), but we could not evaluate and compare such effects across studies because of the absence of any standard method to measure bacterial inoculum size. Also the level of expertise of the person performing the throat sample seems to affect the sensitivity of RADTs; several studies have shown improvement in sensitivity following dedicated training sessions (Fox 2006 ; Toepfner 2013).

The analysis was carried out at the test evaluation level, therefore some studies were included more than once in the meta-analysis. This means that the summary estimates are partially based on duplicate use of individuals. This is likely to have introduced bias. However, we anticipate that the implications are rather marginal because such studies represent only a minority when compared to the total number of included studies (11 out of 98).

Applicability of findings to the review question

Included studies came from a variety of countries (n = 25) and ambulatory care settings (private offices, walk-in clinics, emergency departments). However, only half of studies avoided clinical selection of participants; investigators often used clinical criteria, such as McIsaac's, as inclusion criteria. Thus, the included studies may provide a distorted reflection of the diagnostic performance of RADT in unselected children with pharyngitis seen in ambulatory care. From the 41 studies judged at low risk of applicability concerns for patient selection, the summary estimate of sensitivity was slightly lower than the overall estimate (83.1% versus 85.6%, respectively).

We evaluated 42 different commercial kits in this review. All of them are binary tests giving either a positive or negative result, but the different commercial kits may not share a common positivity threshold (Charlier-Bret 2004; Lasseter 2009). The absence of evidence for a significant correlation between sensitivity and specificity suggests that threshold effects may be negligible when evaluating the accuracy of RADTs. Recently, molecular rapid tests relying on DNA probes, polymerase chain reaction (PCR) and fluorescence in situ methods have been commercialised (Chapin 2002; Ding 2011; Slinger 2011). Their accuracy seems promising but they have rarely been evaluated in children and require specialised equipment and personnel.

Amongst 105 test evaluations included in the meta-analysis of sensitivity and specificity estimates, we judged about one-third (31%) to be of low concern regarding applicability in the index test domain because the RADT was processed and interpreted during consultation time. In this subgroup of studies, the summary estimate of sensitivity was higher than that from the overall analysis (89.1% versus 85.6%, respectively).

An appropriate reference standard (laboratory throat culture on a blood agar plate during 48 hours) was used in about two-thirds (62%) of test evaluations. An enrichment broth was used to improve recovery of GAS on culture in 10% of test evaluations; this did not have any effect on RADT sensitivity on meta-regression.

AUTHORS' CONCLUSIONS

Implications for practice

The high specificity of rapid antigen detection tests (RADTs) implies that positive results may not require throat culture confirmation and could be used as a basis to prescribe antibiotics in children with pharyngitis. On average, RADT sensitivity and negative predictive value were 85.6% and 93.9%, respectively. Whether such performances are sufficient to use RADTs without backup culture of RADT negative results depends mainly on the epidemiological context. This includes the prevalence of group A streptococcus (GAS) pharyngitis, the rate of asymptomatic GAS carriage and the incidence of GAS complications such as acute rheumatic fever and quinsy. Clinicians and guideline developers should also take into account other elements that were beyond the scope of this review, such as effectiveness of antibiotics to prevent complications of GAS infection, accessibility of diagnostic tests, cost-effectiveness and patient preferences. Our findings challenge the common view that optical immunoassay (OIA) tests may perform better than enzyme immunoassay (EIA) tests (AAP 2012; Gerber 2004).

Implications for research

Further research should aim to define the minimal sensitivity that RADTs should achieve before such diagnostic tests would be accepted as stand-alone tests in replacement of throat culture. This could be done by inviting a panel of experts or through simulation of patient outcomes. We also need to obtain consensus on which is the most appropriate reference standard to diagnose GAS pharyngitis in children. It remains controversial whether or not throat cultures yielding low GAS colony counts (less than 10 per plate) reflect true GAS infection or GAS carriage. Similarly, weakly positive results on molecular tests such as polymerase chain reaction (PCR) assays may reflect GAS carriage rather than true GAS infection.

Future accuracy studies should include more direct comparisons between different kits and types of RADTs. The best study design might be to randomise participants rather than to compare the accuracy of different tests in the same participants. Indeed, if a unique swab is used to perform two rapid tests, it is likely that the bacterial inoculum available for the second test will be insufficient to give a positive result. Thus, the first rapid test will look more sensitive than the second. Future diagnostic accuracy studies of RADTs should be reported according to the STARD reporting guideline to enhance data extraction and critical appraisal (Bossuyt 2003; Bossuyt 2015).

Beyond accuracy, further research is required to assess the impact of implementing RADTs on antibiotic prescribing and patient outcomes (Llor 2011). We need more test-and-treat randomised trials to evaluate whether rapid testing and/or antibiotics are beneficial to patients. Accuracy is only a proxy for more important

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outcomes such as pharyngitis-related morbidity (e.g., quinsy, acute rheumatic fever, rheumatic heart disease) and mortality.

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REFERENCES

References to studies included in this review

Al-Najjar 2008 *{published data only}*

Al-Najjar FY, Uduman SA. Clinical utility of a new rapid test for the detection of group A Streptococcus and discriminate use of antibiotics for bacterial pharyngitis in an outpatient setting. *International Journal of Infectious Diseases* 2008;**12**(3):308-11.

Alper 2013 *{published data only}*

Alper Z, Uncu Y, Akalin H, Ercan I, Sinirtas M, Bilgel NG. Diagnosis of acute tonsillopharyngitis in primary care: a new approach for low-resource settings. *Journal of Chemotherapy* 2013;**25**(3):148-55.

Altun 2015 *{published data only}*

Altun HU, Meral T, Aribas ET. The specificity and sensitivity results of the rapid antigen test used in the diagnosis of group A beta-hemolytic streptococcal tonsillopharyngitis. *Acta Medica Mediterranea* 2015;**31**:287-90.

Arribas Blanco 1988 *{published and unpublished data}*

Arribas Blanco JM, Frieyro Segui JE, Baos Vicente V, Casarrubios Sagastibelza E, Gonzalez Martinez LA, Morera Montes J, et al. Rapid diagnosis of pharyngotonsillitis using an ELISA method (Test Pack Strep A): comparison with culture and clinical data. Analysis of 306 cases. *Medicina Clinica* 1988;**91**(15):561-4.

Attia 2001 *{published data only}*

Attia MW, Zaoutis T, Klein JD, Meier FA. Performance of a predictive model for streptococcal pharyngitis in children. *Archives of Pediatrics & Adolescent Medicine* 2001;**155**(6):687-91.

Ayanruoh 2009 *{published data only}*

Ayanruoh S, Waseem M, Quee F, Humphrey A, Reynolds T. Impact of rapid streptococcal test on antibiotic use in a pediatric emergency department. *Pediatric Emergency Care* 2009;**25**(11):748-50.

Begovac 1993 *{published data only}*

Begovac J, Bejuk D, Tesovic G, Bobinac E. The Venterscreen Strep A antigen test for rapid diagnosis of streptococcal pharyngitis. *Periodicum Biologorum* 1993;**95**(2):255-7.

Buchbinder 2007 *{published data only}*

Buchbinder N, Benzdira A, Belgaid A, Dufour D, Paon JC, Morel A, et al. Streptococcal pharyngitis in pediatric emergency unit: value and impact of rapid antigen detection test [Angine streptococcique aux urgences pédiatriques : performances et impact d'un test de diagnostic rapide]. *Archives de Pédiatrie* 2007;**14**(9):1057-61.

Camurdan 2008 *{published data only}*

Camurdan AD, Camurdan OM, Ok I, Sahin F, Ilhan MN, Beyazova U. Diagnostic value of rapid antigen detection test for streptococcal pharyngitis in a pediatric population. *International Journal of Pediatric Otorhinolaryngology* 2008;**72**(8):1203-6.

Chapin 2002 *{published data only}*

Chapin KC, Blake P, Wilson CD. Performance characteristics and utilization of rapid antigen test, DNA probe, and culture for detection of group A streptococci in an acute care clinic. *Journal of Clinical Microbiology* 2002;**40**(11):4207-10.

Chiadmi 2004a *{published data only}*

Chiadmi F, Schlatter J, Mounkassa B, Ovetchkine P, Vermerie N. Fast diagnostic tests in the management of group A beta-haemolytic streptococcal pharyngitis [Tests de diagnostic rapide dans la prise en charge des angines à streptocoques béta- hémolytiques du groupe A]. *Annales de Biologie Clinique* 2004;**62**(5):573-7.

Chiadmi 2004b *{published data only}*

Chiadmi F, Schlatter J, Mounkassa B, Ovetchkine P, Vermerie N. Fast diagnostic tests in the management of group A beta-haemolytic streptococcal pharyngitis [Tests de diagnostic rapide dans la prise en charge des angines à streptocoques béta- hémolytiques du groupe A]. *Annales de Biologie Clinique* 2004;**62**(5):573-7.

Chiadmi 2004c *{published data only}*

Chiadmi F, Schlatter J, Mounkassa B, Ovetchkine P, Vermerie N. Fast diagnostic tests in the management of group A beta-haemolytic streptococcal pharyngitis [Tests de diagnostic rapide dans la prise en charge des angines à streptocoques béta- hémolytiques du groupe A]. *Annales de Biologie Clinique* 2004;**62**(5):573-7.

Chiadmi 2004d *{published data only}*

Chiadmi F, Schlatter J, Mounkassa B, Ovetchkine P, Vermerie N. Fast diagnostic tests in the management of group A beta-haemolytic streptococcal pharyngitis [Tests de diagnostic rapide dans la prise en charge des angines à streptocoques béta- hémolytiques du groupe A]. *Annales de Biologie Clinique* 2004;**62**(5):573-7.

Chiadmi 2004e *{published data only}*

Chiadmi F, Schlatter J, Mounkassa B, Ovetchkine P, Vermerie N. Fast diagnostic tests in the management of group A beta-haemolytic streptococcal pharyngitis [Tests de diagnostic rapide dans la prise en charge des angines à streptocoques béta- hémolytiques du groupe A]. *Annales de Biologie Clinique* 2004;**62**(5):573-7.

Chu 1990 *{published data only}*

Chu JM, Chen JM, Wu MH, Hong JY, Wang YM, Hsu HH, et al. Rapid diagnosis of streptococcal pharyngitis with enzyme immunoassay. *Acta Paediatrica Sinica* 1990;**31**(3):151-7.

Clegg 1987 *{published data only}*

Clegg HW, Roddey OF, Mauney CU, Swetenburg RL, Martin ES. Rapid diagnosis of streptococcal pharyngitis using enzyme immunoassay. *Pediatric Infectious Disease Journal* 1987;**6**(7):696-7.

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Cohen 1988 *{published data only}*

Cohen R, Bouhanna A, Geslin P, Reinert P. Interest of a rapid diagnosis test for streptococcus A in management of pharyngitis (Quidel Group A Strep Test) [Intérêt d'un test de diagnostic rapide du streptocoque du groupe A (Quidel Group A Strep Test) pour le traitement des angines]. *Médecine et Maladies Infectieuses* 1988;**18**(10b):518-20.

Cohen 1998 *{published data only}*

Cohen R, de Gouvello A, Levy C, de La Rocque F, Boucherat M, Portier H. Utilization of rapid diagnostic tests for group A streptococcus and bacteriologic and clinical correlations with acute angina in general medicine. *Presse Médicale* 1998;**27**(23):1131-4.

Cohen 2004 *{published data only}*

Cohen R, Levy C, Ovetchkine P, Boucherat M, Weil-Olivier C, Gaudelus J, et al. Evaluation of streptococcal clinical scores, rapid antigen detection tests and cultures for childhood pharyngitis. *European Journal of Pediatrics* 2004;**163**(4-5):281-2.

Cohen 2012 *{published data only}*

Cohen JF, Chalumeau M, Levy C, Bidet P, Thollot F, Wollner A, et al. Spectrum and inoculum size effect of a rapid antigen detection test for group A streptococcus in children with pharyngitis. *PLoS One* 2012;**7**(6):e39085.

Cohen 2013 *{published data only}*

Cohen JF, Cohen R, Bidet P, Levy C, Deberdt P, d'Humières C, et al. Rapid-antigen detection tests for group A streptococcal pharyngitis: revisiting false-positive results using polymerase chain reaction testing. *Journal of Pediatrics* 2013;**162**(6):1282-4.

Contessotto 2000 *{published data only}*

Contessotto Spadetto C, Camara Simon M, Aviles Ingles MJ, Ojeda Escuriet JM, Cascales Barcelo I, Rodriguez Sanchez F. Rational use of antibiotics in pediatrics: impact of a rapid test for detection of beta-haemolytic group A streptococci in acute pharyngotonsillitis [Empleo racional de los antibioticos en pediatria: impacto de la aplicacion de un test rapido de deteccion de estreptococo beta-hemolitico del grupo A en la faringoamigdalitis aguda]. *Anales Espanoles de Pediatria* 2000;**52**(3):212-9.

Dagnelie 1998 *{published data only}*

Dagnelie CF, Bartelink ML, van der Graaf Y, Goessens W, de Melker RA. Towards a better diagnosis of throat infections (with group A beta-haemolytic streptococcus) in general practice. *British Journal of General Practice* 1998;**48**(427):959-62.

Daly 1994 *{published data only}*

Daly JA, Korgenski EK, Munson AC, Llausas-Magana E. Optical immunoassay for streptococcal pharyngitis: evaluation of accuracy with routine and mucoid strains associated with acute rheumatic fever outbreak in the intermountain area of the United States. *Journal of Clinical Microbiology* 1994;**32**(2):531-2.

Della-Latta 1994 *{published data only}*

Della-Latta P, Whittier S, Hosmer M, Agre F. Rapid detection of group A streptococcal pharyngitis in a pediatric population with optical immunoassay. *Pediatric Infectious Disease Journal* 1994;**13**(8):742-3.

Ding 2011 *{published data only}*

Ding JY, Wang P. Methods for the rapid screening of group A streptococci: fluorescent in situ hybridization versus immunochromatography. *Medical Principles and Practice* 2011;**20**(6):504-8.

Dobkin 1987 *{published data only}*

Dobkin D, Shulman ST. Evaluation of an ELISA for group A streptococcal antigen for diagnosis of pharyngitis. *Journal of Pediatrics* 1987;**110**(4):566-9.

Donatelli 1992a *{published data only}*

Donatelli J, Macone A, Goldmann DA, Poon R, Hinberg I, Nanji A, et al. Rapid detection of group A streptococci: comparative performance by nurses and laboratory technologists in pediatric satellite laboratories using three test kits. *Journal of Clinical Microbiology* 1992;**30**(1):138-42.

Donatelli 1992b *{published data only}*

Donatelli J, Macone A, Goldmann DA, Poon R, Hinberg I, Nanji A, et al. Rapid detection of group A streptococci: comparative performance by nurses and laboratory technologists in pediatric satellite laboratories using three test kits. *Journal of Clinical Microbiology* 1992;**30**(1):138-42.

dos Santos 2005 *{published data only}*

dos Santos AGP, Berezin EN. Comparative analysis of clinical and laboratory methods for diagnosing streptococcal sore throat. *Jornal de Pediatria* 2005;**81**(1):23-8.

Drulak 1988 *{published data only}*

Drulak M, Raybould TJ, Yong J, Hsiung D, Smith H, Winston S. Comparison of Visuwell enzyme immunoassay to culture for detection of group A Streptococcus in throat swab specimens. *Diagnostic Microbiology & Infectious Disease* 1988;**11**(4):181-7.

Drulak 1991 *{published and unpublished data}*

Drulak M, Bartholomew W, LaScolea L, Amsterdam D, Gunnersen N, Yong J, et al. Evaluation of the modified Visuwell Strep-A enzyme immunoassay for detection of group-A Streptococcus from throat swabs. *Diagnostic Microbiology & Infectious Disease* 1991;**14**(4):281-5.

Edmonson 2005 *{published data only}*

Edmonson MB, Farwell KR. Relationship between the clinical likelihood of group A streptococcal pharyngitis and the sensitivity of a rapid antigen-detection test in a pediatric practice. *Pediatrics* 2005;**115**(2):280-5.

Egger 1990a *{published data only}*

Egger P, Siegrist CA, Strautmann G, Belli D, Auckenthaler R. Evaluation of two ELISA tests for the rapid detection of group A streptococci. *European Journal of Pediatrics* 1990;**149**(4):256-8.

Egger 1990b *{published data only}*

Egger P, Siegrist CA, Strautmann G, Belli D, Auckenthaler R. Evaluation of two ELISA tests for the rapid detection of group A streptococci. *European Journal of Pediatrics* 1990;**149**(4):256-8.

Copyright © 2016 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

Enright 2011 *{published data only}*

Enright K, Kalima P, Taheri S. Should a near-patient test be part of the management of pharyngitis in the pediatric emergency department?. *Pediatric Emergency Care* 2011;**27**(12):1148-50.

Ezike 2005 *{published data only}*

Ezike EN, Rongkavilit C, Fairfax MR, Thomas RL, Asmar BI. Effect of using 2 throat swabs vs 1 throat swab on detection of group A streptococcus by a rapid antigen detection test. *Archives of Pediatrics & Adolescent Medicine* 2005;**159**(5):486-90.

Faverge 2004 *{published data only}*

Faverge B, Marie-Cosenza S, Bietrix M, Attou D, Bensekhria S, Dookna P. Use in hospital of a rapid diagnosis test of group A streptococcal pharyngotonsillitis in children [Utilisation à l'hôpital d'un test de diagnostic rapide des angines à streptocoque du groupe A de l'enfant]. *Archives de Pédiatrie* 2004;**11**(7):862-3.

Felsenstein 2014 *{published data only}*

Felsenstein S, Faddoul D, Sposto R, Batoon K, Polanco CM, Dien Bard J. Molecular and clinical diagnosis of group A streptococcal pharyngitis in children. *Journal of Clinical Microbiology* 2014;**52**(11):3884-9.

Finger 1999 *{published data only}*

Finger R, Ho SH, Ngo TT, Ritchie CD, Nguyen TN. Rapid streptococcal testing in Vietnamese children with pharyngitis. *Asia-Pacific Journal of Public Health* 1999;**11**(1):26-9.

Flores Mateo 2010 *{published data only}*

Flores Mateo G, Conejero J, Grenzner Martinel E, Baba Z, Dicono S, Echasabal M, et al. Early diagnosis of streptococcal pharyngitis in paediatric practice: validity of a rapid antigen detection test [Diagnostico precoz de faringitis estreptococica en pediatria: validacion deuna tecnica antigenica rapida]. *Atencion Primaria* 2010;**42**(7):356-61.

Forward 2006 *{published data only}*

Forward KR, Haldane D, Webster D, Mills C, Brine C, Aylward D. A comparison between the Strep A Rapid Test Device and conventional culture for the diagnosis of streptococcal pharyngitis. *Canadian Journal of Infectious Diseases and Medical Microbiology* 2006;**17**(4):221-3.

Fourati 2009 *{published data only}*

Fourati S, Smaoui H, Jegiurim H, Berriche I, Taghorti R, Ben Bader M, et al. Use of the rapid antigen detection test in group A streptococci pharyngitis diagnosis in Tunis, Tunisia [Utilisation d'un test de diagnostic rapide des angines à streptocoque béta-hémolytique du groupe A, auprès d'un échantillon d'enfants à Tunis, Tunisie]. *Bulletin de la Société de Pathologie Exotique* 2009;**102**(3):175-6.

Gerber 1990 *{published data only}*

Gerber MA, Randolph MF, DeMeo KK. Liposome immunoassay for rapid identification of group A streptococci directly from throat swabs. *Journal of Clinical Microbiology* 1990;**28**(6):1463-4.

Gerber 1997 *{published data only}*

Gerber MA, Tanz RR, Kabat W, Dennis E, Bell GL, Kaplan EL, et al. Optical immunoassay test for group A beta-hemolytic streptococcal pharyngitis. An office-based, multicenter investigation. *JAMA* 1997;**277**(11):899-903.

Gieseker 2002a *{published data only}*

Gieseker KE, Mackenzie T, Roe MH, Todd JK. Comparison of two rapid Streptococcus pyogenes diagnostic tests with a rigorous culture standard. *Pediatric Infectious Disease Journal* 2002;**21**(10):922-7.

Gieseker 2002b *{published data only}*

Gieseker KE, Mackenzie T, Roe MH, Todd JK. Comparison of two rapid Streptococcus pyogenes diagnostic tests with a rigorous culture standard. *Pediatric Infectious Disease Journal* 2002;**21**(10):922-7.

Gieseker 2003 *{published data only}*

Gieseker KE, Roe MH, MacKenzie T, Todd JK. Evaluating the American Academy of Pediatrics diagnostic standard for Streptococcus pyogenes pharyngitis: backup culture versus repeat rapid antigen testing. *Pediatrics* 2003;**111**(6):e666-70.

Gurol 2010 *{published data only}*

Gurol Y, Akan H, Izbirak G, Tekkanat ZT, Gunduz TS, Hayran O, et al. The sensitivity and the specifity of rapid antigen test in streptococcal upper respiratory tract infections. *International Journal of Pediatric Otorhinolaryngology* 2010;**74**(6):591-3.

Hall 2004 *{published data only}*

Hall MC, Kieke B, Gonzales R, Belongia EA. Spectrum bias of a rapid antigen detection test for group A beta-hemolytic streptococcal pharyngitis in a pediatric population. *Pediatrics* 2004;**114**(1):182-6.

Harris 1995 *{published data only}*

Harris R, Paine D, Wittler R, Bruhn F. Impact on empiric treatment of group A streptococcal pharyngitis using an optical immunoassay. *Clinical Pediatrics* 1995;**34**(3):122-7.

Hart 1997 *{published data only}*

Hart AP, Buck LL, Morgan S, Saverio S, McLaughlin JC. A comparison of the BioStar Strep A OIA rapid antigen assay, group A Selective Strep Agar (ssA), and Todd-Hewitt broth cultures for the detection of group A Streptococcus in an outpatient family practice setting. *Diagnostic Microbiology & Infectious Disease* 1997;**29**(3):139-45.

Henderson 1988 *{published data only}*

Henderson EL, Meier FA, Fortner CA, Dalton HP, Zanga JR. Physician bias and the interpretation of rapid tests for group-A streptococcal pharyngitis. *American Journal of Diseases of Children* 1988;**142**(4):405-6.

Kaltwasser 1997 *{published data only}*

Kaltwasser G, Diego J, Welby-Sellenriek PL, Ferrett R, Caparon M, Storch GA. Polymerase chain reaction for Streptococcus pyogenes used to evaluate an optical immunoassay for the detection of group A streptococci in

Copyright © 2016 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

children with pharyngitis. *Pediatric Infectious Disease Journal* 1997;**16**(8):748-53.

Kaufhold 1991a *{published data only}*

Kaufhold A, Krug E, Lutticken R, Knoop U, Blaker F. Evaluation of a rapid test for direct detection of group A streptococcal antigen in throat swabs. Study of 4 commercial test systems. *Monatsschrift Kinderheilkunde* 1991;**139**(4):208-13.

Kaufhold 1991b *{published data only}*

Kaufhold A, Krug E, Lutticken R, Knoop U, Blaker F. Evaluation of a rapid test for direct detection of group A streptococcal antigen in throat swabs. Study of 4 commercial test systems. *Monatsschrift Kinderheilkunde* 1991;**139**(4):208-13.

Kellog 1987 *{published data only}*

Kellogg JA, Landis RC, Nussbaum AS, Bankert DA. Performance of an enzyme immunoassay test and anaerobic culture for detection of group A streptococci in a pediatric practice versus a hospital laboratory. *Journal of Pediatrics* 1987;**111**(1):18-21.

Kellog 1991 *{published data only}*

Kellogg JA, Bankert DA, Schonauer TD, Landis RC, Nussbaum AS, Levisky JS. Detection of group A streptococci by aerobic culture and a new simplified immunoassay in three pediatric practices and a hospital laboratory. *Journal of Clinical Laboratory Analysis* 1991;**5**(5):367-71.

Kim 2009 *{published data only}*

Kim S. The evaluation of SD Bioline Strep A rapid antigen test in acute pharyngitis in pediatric clinics. *Korean Journal Of Laboratory Medicine* 2009;**29**(4):320-3.

Küçük 2014 *{published data only}*

Küçük O, Biçer S, Giray T, Cöl D, Erdag GC, Gürol Y, et al. Validity of rapid antigen detection testing in group A beta-hemolytic streptococcal tonsillopharyngitis. *Indian Journal of Pediatrics* 2014;**81**(2):138-42.

Kuhn 1999 *{published data only}*

Kuhn S, Davies HD, Katzko G, Jadavji T, Church DL. Evaluation of the Strep A OIA assay versus culture methods: ability to detect different quantities of group A Streptococcus. *Diagnostic Microbiology & Infectious Disease* 1999;**34**(4):275-80.

Kurtz 2000 *{published data only}*

Kurtz B, Kurtz M, Roe M, Todd J. Importance of inoculum size and sampling effect in rapid antigen detection for diagnosis of Streptococcus pyogenes pharyngitis. *Journal of Clinical Microbiology* 2000;**38**(1):279-81.

Laubscher 1995 *{published data only}*

Laubscher B, van Melle G, Dreyfuss N, de Crousaz H. Evaluation of a new immunologic test kit for rapid detection of group A streptococci, the Abbott Testpack Strep A plus. *Journal of Clinical Microbiology* 1995;**33**(1):260-1.

Lewey 1988 *{published data only}*

Lewey S, White CB, Lieberman MM, Morales E. Evaluation of the throat culture as a follow-up for an initially negative enzyme immunosorbent assay rapid streptococcal antigen detection test. *Pediatric Infectious Disease Journal* 1988;**7**(11):765-9.

Llor 2008 *{published data only}*

Llor C, Hernandez Anadon S, Gomez Bertomeu FF, Santamaria Puig JM, Calvino Dominguez O, Fernandez Pages Y. Validation of a rapid antigenic test in the diagnosis of pharyngitis caused by group A beta-haemolytic Streptococcus. *Atencion Primaria* 2008;**40**(10):489-96.

Macknin 1988 *{published data only}*

Macknin ML, Indich N, Easley KA, Imrie R, Shapiro DJ. Comparison of two rapid diagnostic tests for group A streptococcus. *Pediatric Infectious Disease Journal* 1988;**7**(10):735-6.

Maltezou 2008 *{published data only}*

Maltezou HC, Tsagris V, Antoniadou A, Galani L, Douros C, Katsarolis I, et al. Evaluation of a rapid antigen detection test in the diagnosis of streptococcal pharyngitis in children and its impact on antibiotic prescription. *Journal of Antimicrobial Chemotherapy* 2008;**62**(6):1407-12.

Mayes 2001a *{published data only}*

Mayes T, Pichichero ME. Are follow-up throat cultures necessary when rapid antigen detection tests are negative for group A streptococci?. *Clinical Pediatrics* 2001;**40**(4):191-5.

Mayes 2001b *{published data only}*

Mayes T, Pichichero ME. Are follow-up throat cultures necessary when rapid antigen detection tests are negative for group A streptococci?. *Clinical Pediatrics* 2001;**40**(4):191-5.

Mazur 2014 *{published data only}*

Mazur E, Bochynska E, Juda M, Koziol-Montewka M. Empirical validation of Polish guidelines for the management of acute streptococcal pharyngitis in children. *International Journal of Pediatric Otorhinolaryngology* 2014;**78**(1):102-6.

McIsaac 2004 *{published data only}*

McIsaac WJ, Kellner JD, Aufricht P, Vanjaka A, Low DE. Empirical validation of guidelines for the management of pharyngitis in children and adults. *JAMA* 2004;**291**(13):1587-95.

Menozzi 1992 *{published data only}*

Menozzi MC, Zanacca C, Boschi G, Carmeli G, Capatti C, Morini C. Evaluation of a kit for rapid detection of S. pyogenes in throat swabs. New perspectives on streptococci and streptococcal infections: proceedings of the XI Lancefield International Symposium on Streptococci and Streptococcal Diseases (Orefici G, ed). 1992:106-7.

Mezghani Maleej 2010 *{published data only}*

Mezghani Maalej S, Rekik M, Boudaouara M, Jardak N, Turki S, Arous R, et al. Childhood pharyngitis in Sfax (Tunisia): epidemiology and utility of a rapid streptococcal test. *Médecine et Maladies Infectieuses* 2010;**40**(4):226-31.

Copyright © 2016 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

Mirza 2007a *{published data only}*

Mirza A, Wludyka P, Chiu TT, Rathore MH. Throat culture is necessary after negative rapid antigen detection tests. *Clinical Pediatrics* 2007;**46**(3):241-6.

Mirza 2007b *{published data only}*

Mirza A, Wludyka P, Chiu TT, Rathore MH. Throat culture is necessary after negative rapid antigen detection tests. *Clinical Pediatrics* 2007;**46**(3):241-6.

Mlejnek 2014 *{published and unpublished data}*

Mlejnek JR, Almulhem K, Spadafore S. Utility and cost effectiveness of throat culture in the treatment of patients with negative rapid strep screens. *Academic Emergency Medicine* 2014;**21**(Suppl 1):51.

Moyer 1990 *{published data only}*

Moyer NP, Quinn PJ, Showalter CA. Evaluation of the Directigen 1,2,3 Group A Strep Test for diagnosis of streptococcal pharyngitis. *Journal of Clinical Microbiology* 1990;**28**(7):1661-3.

Needham 1998 *{published data only}*

Needham CA, McPherson KA, Webb KH. Streptococcal pharyngitis: impact of a high-sensitivity antigen test on physician outcome. *Journal of Clinical Microbiology* 1998;**36**(12):3468-73.

Nitsch-Osuch 2010 *{published data only}*

Nitsch-Osuch A, Dyk S, Gyrczuk E, Wardyn K, Zycinska K. Validity of a rapid streptococcal test (Test Strep A) in children with acute pharyngitis treated in an outpatient setting. Abstract book of the Annual meeting of the European Society for Paediatric Infectious Diseases. 2010:207.

Nonaka 1988 *{published data only}*

Nonaka C, Togasaki K, Ushijima H, Kon Y, Kawaoi T. Rapid diagnosis of the group A streptococcal infection--comparison with culture method, latex agglutination and enzyme immunoassay. *Kansenshogaku Zasshi* 1988;**62**(1):32-8.

Pauchard 2012 *{published and unpublished data}*

Pauchard JY, Verga ME, Bersier J, Prod'Hom G, Gehri M, Vaudaux B. Performance of rapid antigen diagnostic test for group A β-haemolytic streptococcal pharyngitis in a tertiary paediatric emergency department. *Swiss Medical Weekly* 2012;**142**(Suppl 192):35S.

Pauchard 2013 *{published and unpublished data}*

* Pauchard JY, Verga ME, Bersier J, Durusell C, Gehri M, Vaudaux B. Performance of rapid antigen detection test in group A β-haemolytic streptococcal pharyngitis in comparison with three clinical decision rule in a tertiary paediatric emergency department. *Swiss Medical Weekly* 2013;**143**(Suppl 197):6S.

Pitetti 1998 *{published data only}*

Pitetti RD, Drenning SD, Wald ER. Evaluation of a new rapid antigen detection kit for group A beta-hemolytic streptococci. *Pediatric Emergency Care* 1998;**14**(6):396-8.

Ramos 2011 *{published data only}*

Ramos JL, Fraile MT, Chanza M, Tormo N, Lurbe A, Gimeno C. Rapid detection of Streptococcus pyogenes in peripheral medical centres. A pilot custody assay. *Clinical Microbiology and Infection* 2011;**17**:S250.

Regueras De Lorenzo 2012 *{published data only}*

Regueras De Lorenzo G, Santos Rodriguez PM, Villa Bajo L, Perez Guirado A, Arbesu Fernandez E, Barreiro Hurle L, et al. Use of the rapid antigen technique in the diagnosis of Streptococcus pyogenes pharyngotonsillitis [Utilidad de una técnica antigénica rápida en el diagnósticode faringoamigdalitis por Streptococcus pyogenes]. *Anales de Pediatria* 2012;**77**(3):193-9.

Reinert 1988 *{published data only}*

Reinert P, Cohen R, de La Rocque F, Bouhanna A, Geslin P. Value of rapid tests for the detection of streptococcal infections. *Rhinology* 1988;**5**(Suppl):75-9.

Rimoin 2010a *{published data only}*

Rimoin AW, Walker CLF, Hamza HS, Elminawi N, Ghafar HA, Vince A, et al. The utility of rapid antigen detection testing for the diagnosis of streptococcal pharyngitis in low-resource settings. *International Journal of Infectious Diseases* 2010;**14**:e1048-53.

Rimoin 2010b *{published data only}*

Rimoin AW, Walker CLF, Hamza HS, Elminawi N, Ghafar HA, Vince A, et al. The utility of rapid antigen detection testing for the diagnosis of streptococcal pharyngitis in low-resource settings. *International Journal of Infectious Diseases* 2010;**14**:e1048-53.

Rimoin 2010c *{published data only}*

Rimoin AW, Walker CLF, Hamza HS, Elminawi N, Ghafar HA, Vince A, et al. The utility of rapid antigen detection testing for the diagnosis of streptococcal pharyngitis in low-resource settings. *International Journal of Infectious Diseases* 2010;**14**:e1048-53.

Rimoin 2010d *{published data only}*

Rimoin AW, Walker CLF, Hamza HS, Elminawi N, Ghafar HA, Vince A, et al. The utility of rapid antigen detection testing for the diagnosis of streptococcal pharyngitis in low-resource settings. *International Journal of Infectious Diseases* 2010;**14**:e1048-53.

Roddey 1995 *{published data only}*

Roddey OF, Clegg HW, Martin ES, Swetenburg RL, Koonce EW. Comparison of an optical immunoassay technique with two culture methods for the detection of group A streptococci in a pediatric office. *Journal of Pediatrics* 1995;**126**(6):931-3.

Roe 1995a *{published data only}*

Roe M, Kishiyama C, Davidson K, Schaefer L, Todd J. Comparison of BioStar Strep A OIA optical immune assay, Abbott TestPack Plus Strep A, and culture with selective media for diagnosis of group A streptococcal pharyngitis. *Journal of Clinical Microbiology* 1995;**33**(6):1551-3.

Copyright © 2016 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

Roe 1995b *{published data only}*

Roe M, Kishiyama C, Davidson K, Schaefer L, Todd J. Comparison of BioStar Strep A OIA optical immune assay, Abbott TestPack Plus Strep A, and culture with selective media for diagnosis of group A streptococcal pharyngitis. *Journal of Clinical Microbiology* 1995;**33**(6):1551-3.

Rogo 2010a *{published data only}*

Rogo T, Schwartz RH, Ascher DP. Comparison of the Inverness Medical Acceava Strep A Test with the Genzyme OSOM and Quidel QuickVue Strep A Tests. *Clinical Pediatrics* 2010;**49**(11):1050-2.

Rogo 2010b *{published data only}*

Rogo T, Schwartz RH, Ascher DP. Comparison of the Inverness Medical Acceava Strep A Test with the Genzyme OSOM and Quidel QuickVue Strep A Tests. *Clinical Pediatrics* 2010;**49**(11):1050-2.

Rogo 2010c *{published data only}*

Rogo T, Schwartz RH, Ascher DP. Comparison of the Inverness Medical Acceava Strep A Test with the Genzyme OSOM and Quidel QuickVue Strep A Tests. *Clinical Pediatrics* 2010;**49**(11):1050-2.

Savoia 1994 *{published data only}*

Savoia D, Francesetti C, Millesima M, Dotti G, Gatti G, Rurali C. Evaluation of the diagnostic accuracy of a kit for the rapid detection of group A streptococci. *Microbios* 1994;**77**(313):253-9.

Schlager 1996 *{published data only}*

Schlager TA, Hayden GA, Woods WA, Dudley SM, Hendley JO. Optical immunoassay for rapid detection of group A beta-hemolytic streptococci. Should culture be replaced?. *Archives of Pediatrics and Adolescent Medicine* 1996;**150**(3):245-8.

Schwabe 1987 *{published data only}*

Schwabe LD, Small MT, Randall EL. Comparison of TestPack Strep A test kit with culture technique for detection of group A streptococci. *Journal of Clinical Microbiology* 1987;**25**(2):309-11.

Schwabe 1991 *{published data only}*

Schwabe LD, Gobbo AF, Gottschall RL, Randall EL. Comparison of TestPack Plus Strep A with selective and nonselective culture media for detection of group-A streptococci. *Diagnostic Microbiology and Infectious Disease* 1991;**14**(5):367-72.

Schwartz 1997a *{published data only}*

Schwartz RH. Evaluation of rapid streptococcal detection tests. *Pediatric Infectious Disease Journal* 1997;**16**(11):1099-100.

Schwartz 1997b *{published data only}*

Schwartz RH. Evaluation of rapid streptococcal detection tests. *Pediatric Infectious Disease Journal* 1997;**16**(11):1099-100.

Sedki 2010 *{published data only}*

Sedki M, Salama H, Salama E, Abdalla N, Ezz H. Rapid diagnostic test for streptococcal throat infection in Egyptian children. *Medical Journal of Cairo University* 2010;**78**(2):177-82.

Strandjord 1987 *{published data only}*

Strandjord TP, Rich EJ, Quan L. Comparison of two antigen detection techniques for group A streptococcal pharyngitis in a pediatric emergency department. *Pediatric Infectious Disease Journal* 1987;**6**(11):1071-2.

Subashini 2015 *{published data only}*

Subashini B, Anandan S, Balaji V. Evaluation of a rapid antigen detection test for the diagnosis of group-A beta-hemolytic Streptococcus in pharyngotonsillitis. *Journal of Global Infectious Diseases* 2015;**7**(2):91-2.

Tanz 2009 *{published data only}*

Tanz RR, Gerber MA, Kabat W, Rippe J, Seshadri R, Shulman ST. Performance of a rapid antigen-detection test and throat culture in community pediatric offices: implications for management of pharyngitis. *Pediatrics* 2009;**123**(2):437-44.

Tellechea 2012 *{published data only}*

Tellechea AL, Salvo MG, Mendez JH, Cavagnari BM. Group A beta-hemolytic Streptococcus frequency in the throat of symptomatic patients younger than 15 years, by age group. *Archivos Argentinos de Pediatria* 2012;**110**(6):516-9.

Tenjarla 1991 *{published data only}*

Tenjarla G, Kumar A, Dyke JW. TestPack Strep A kit for the rapid detection of group A streptococci on 11,088 throat swabs in a clinical pathology laboratory. *American Journal of Clinical Pathology* 1991;**96**(6):759-61.

Toepfner 2013 *{published data only}*

Toepfner N, Henneke P, Berner R, Hufnagel M. Impact of technical training on rapid antigen detection tests (RADT) in group A streptococcal tonsillopharyngitis. *European Journal of Clinical Microbiology and Infectious Diseases* 2013;**32**(5):609-11.

Van Limbergen 2006 *{published data only}*

Van Limbergen J, Kalima P, Taheri S, Beattie TF. Streptococcus A in paediatric accident and emergency: are rapid streptococcal tests and clinical examination of any help?. *Emergency Medicine Journal* 2006;**23**(1):32-4.

Wong 1989 *{published data only}*

Wong T, Tiessen E. Evaluation of TestPack Strep A for rapid identification of group A streptococci. *Canadian Family Physician* 1989;**35**(Sep):1767-70.

Wright 2007a *{published data only}*

Wright M, Williams G, Ludeman L. Comparison of two rapid tests for detecting group A streptococcal pharyngitis in the pediatric population at Wright-Patterson air force base. *Military Medicine* 2007;**172**(6):644-6.

Wright 2007b *{published data only}*

Wright M, Williams G, Ludeman L. Comparison of two rapid tests for detecting group A streptococcal pharyngitis in the pediatric population at Wright-Patterson air force base. *Military Medicine* 2007;**172**(6):644-6.

Copyright © 2016 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

Yuckienuz 1988 *{published data only}*

Yuckienuz SA, Thorne GM, Macone AB, Goldmann DA, St Pierre J, Marcus EP. Performance of a solid phase enzyme immunoassay for detection of group A streptococci in a pediatric office laboratory as refereed by a hospital laboratory. *Pediatric Infectious Disease Journal* 1988;**7**(6):393-8.

Zanacca 1992 *{published data only}*

Zanacca C, Boschi G, Capatti C, Carmeli G, Corsini M, Morini C. Liposome technology for a rapid diagnosis of streptococcal pharyngitis. New perspectives on streptococci and streptococcal infections: proceedings of the XI Lancefield International Symposium on Streptococci and Streptococcal Diseases (Orefici G, ed). 1992:104-5.

References to studies excluded from this review

Abu-Sabaah 2006 *{published data only}*

Abu-Sabaah AH, Ghazi HO. Better diagnosis and treatment of throat infections caused by group A beta-haemolytic streptococci. *British Journal of Biomedical Science* 2006;**63**:155-8.

Andersen 1994 *{published data only}*

Andersen JS, Borrild NJ, Hoffmann S. Diagnosis of sore throat. A multipractice study of 3 different ways of antigenic determination for detection of group A streptococci in throat swabs. *Ugeskrift for Laeger* 1994;**156**:6869-73.

Andersen 2003a *{published data only}*

Andersen JB, Dahm TL, Nielsen CT, Frimodt-Moller N. Diagnosis of streptococcal tonsillitis in the pediatric department with the help of antigen detection test. *Ugeskrift for Laeger* 2003;**165**:2291-5.

Andersen 2003b *{published data only}*

Andersen JB, Dahm TL, Nielsen CT, Frimodt-Moller N. Antigen detection test for the diagnosis of streptococcal tonsillitis in the paediatric hospital department. *Ugeskrift for Laeger* 2003;**165**:2291-5.

Anhalt 1992 *{published data only}*

Anhalt JP, Heiter BJ, Naumovitz DW, Bourbeau PP. Comparison of three methods for detection of group A streptococci in throat swabs. *Journal of Clinical Microbiology* 1992;**30**:2135-8.

Anonymous 1985a *{published data only}*

Anonymous. Rapid office diagnostic tests for streptococcal pharyngitis. *Medical Letter on Drugs & Therapeutics* 1985;**27**:49-51.

Anonymous 1985b *{published data only}*

Anonymous. Rapid diagnosis of streptococcal pharyngitis. *Journal of Pediatrics* 1985;**107**:154-6.

Anonymous 1985c *{published data only}*

Anonymous. Rapid diagnostic assay for strep throat. *Analytical Chemistry* 1985;**57**:1372A-4A.

Anonymous 1986 *{published data only}*

Anonymous. Rapid detection of beta haemolytic streptococci. *Lancet* 1986;**1**:247-8.

Anonymous 1991 *{published data only}*

Anonymous. Rapid diagnostic tests for group A streptococcal pharyngitis. *Medical Letter on Drugs & Therapeutics* 1991;**33**:40-1.

Anonymous 1992 *{published data only}*

Anonymous. Rapid antigen test vs. culture in streptococcal pharyngitis. *American Family Physician* 1992;**46**:552.

Araj 1986 *{published data only}*

Araj GF, Majeed HA. Evaluation of a two-minute strep A direct swab test (SADST) on patients with pharyngitis at a primary care clinic. *Journal of Hygiene* 1986;**97**:133-8.

Araujo 2005 *{published data only}*

Araujo Filho BC, Imamura R, Sennes LU, Sakae FA. Role of rapid antigen detection test for the diagnosis of group A beta-hemolytic streptococcus in patients with pharyngotonsillitis. *Revista Brasileira de Otorrinolaringologia* 2005;**71**:168-71.

Armengol 2004a *{published data only}*

Armengol CE, Hendley JO, Schlager TA. Could repetition of the rapid antigen detection test for group a streptococci on a second swab replace the backup throat culture?. *Pediatric Research* 2004;**55**:341A.

Armengol 2004b *{published data only}*

Armengol CE, Schlager TA, Hendley JO. Sensitivity of a rapid antigen detection test for group A streptococci in a private pediatric office setting: answering the Red Book's request for validation. *Pediatrics* 2004;**113**:924-6.

Arya 1993 *{published data only}*

Arya SC. Treatment of streptococcal sore throat. Immunoassays for rapid diagnosis. *BMJ* 1993;**306**:1612.

Atlas 2005 *{published data only}*

Atlas SJ, McDermott SM, Mannone C, Barry MJ. The role of point of care testing for patients with acute pharyngitis. *Journal of General Internal Medicine* 2005;**20**:759-61.

Ausina 1987 *{published data only}*

Ausina V, Coll P. Rapid technics for antigen detection in acute streptococcal pharyngitis. *Medicina Clinica* 1987;**89**:413-4.

Badgett 1996 *{published data only}*

Badgett JT, Hesterberg LK. Management of group A streptococcus pharyngitis with a second-generation rapid strep screen: Strep A OIA. *Microbial Drug Resistance* 1996;**2**:371-6.

Baker 1995 *{published data only}*

Baker DM, Cooper RM, Rhodes C, Weymouth LA, Dalton HP. Superiority of conventional culture technique over rapid detection of group A Streptococcus by optical immunoassay. *Diagnostic Microbiology & Infectious Disease* 1995;**21**:61-4.

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Ba-Saddik 2014 *{published data only}*

Ba-Saddik IA, Munibari AA, Alhilali AM, Ismail SM, Murshed FM, Coulter JB. Prevalence of Group A beta-haemolytic Streptococcus isolated from children with acute pharyngotonsillitis in Aden, Yemen. *Tropical Medicine & International Health* 2014;**19**:431-9.

Baselski 1988 *{published data only}*

Baselski VS, Hansen VR, Ikner SB, Osborne PT. Concurrent evaluation of 4 rapid group A streptococcus tests. *American Journal of Clinical Pathology* 1988;**89**:447.

Berger-Jekic 1987 *{published data only}*

Berger-Jekic O. A direct, rapid method for the identification of Streptococcus pyogenes from throat smears. *Srpski Arhiv Za Celokupno Lekarstvo* 1987;**115**:927-34.

Berke 1989 *{published data only}*

Berke CM. Development of rapid strep test technology. *Pediatric Infectious Disease Journal* 1989;**8**:825-8.

Betriu 1988 *{published data only}*

Betriu C, de la Torre F, Munoz P, Fernandez A, Picazo JJ. Evaluation of four methods for the detection of streptococcal group A antigen directly from throat swabs. *Microbiologia* 1988;**4**:177-9.

Betriu 1989 *{published data only}*

Betriu Cabeceran C, Igea Benito A, Picazo de la Garza JJ, Valor Perea R. Comparative study of 2 rapid antigenic technics for diagnosing streptococcal pharyngitis. *Revista Clinica Espanola* 1989;**184**:389.

Bischoff 2007 *{published data only}*

Bischoff A. Diagnosis of streptococcal tonsillitis. Rapid test prevents treatment error. *MMW Fortschritte der Medizin* 2007;**149**:17.

Bjerrum 2013 *{published data only}*

Bjerrum L, Cordoba Currea GC, Llor C, Lindbaek M. Lower threshold for rapid antigen detection testing in patients with sore throats would reduce antibiotic use. *BMJ* 2013;**347**:f7055.

Blade 1991 *{published data only}*

Blade J, Alaman E, Cartana A, Guinea I, Liberal A, Herreros M. Evaluation of clinical data and a technique of rapid detection (TestPack Strep A) in the diagnosis of acute streptococcal pharyngo-tonsillitis. *Atencion Primaria* 1991;**8**:92, 94, 96-8.

Blanco 1988 *{published data only}*

Blanco JMA, Segui JEF, Vicente VB, Sagastibelza EC, Martinez LAG, Montes JM. Rapid diagnosis of pharyngoamigdalitis by ELISA (Test Pack Strep-A) - comparison with culture and clinical-data - analysis of 306 cases. *Medicina Clinica* 1988;**91**:561-4.

Boccazzi 2011 *{published data only}*

Boccazzi A, Garotta M, Pontari S, Agostoni CV. Streptococcal tonsillopharyngitis: clinical vs. microbiological diagnosis. *Infezioni in Medicina* 2011;**19**:100-5.

Bodino 1987 *{published data only}*

Bodino JA, Lopez EL, Rubeglio E, de Giavedoni CG. Evaluation of a rapid test for group A Streptococcus at a physician's office and hospital laboratory in Buenos Aires, Argentina. *Pediatric Infectious Disease Journal* 1987;**6**:762-4.

Boss 1992 *{published data only}*

Boss DJ. Culture and antigen detection tests for streptococcal tonsillopharyngitis. *American Family Physician* 1992;**46**:1658; author reply 1658-9, 1662.

Bourbeau 1993 *{published data only}*

Bourbeau PP, Heiter BJ, Anhalt JP, Naumovitz DW. Comparison of direct specimen testing utilizing TestPack strep A with testing of specimens following a two-hour broth enrichment. *Diagnostic Microbiology & Infectious Disease* 1993;**17**:93-6.

Brahmadathan 1986 *{published data only}*

Brahmadathan KN, Pandian R, Joseph A, Koshi G. Use of plastic kits for rapid recovery of streptococci in epidemiological studies. *Indian Journal of Medical Research* 1986;**84**:331-3.

Burke 1988 *{published data only}*

Burke P, Bain J, Lowes A, Athersuch R. Rational decisions in managing sore throat: evaluation of a rapid test. *BMJ* 1988;**296**:1646-9.

Calvino 2015 *{published data only}*

Calvino DO, Hernandez AS, Teresa MBM, Hernandez AM. Validation Analyz-Strep A Rapid Test in the diagnosis of acute pharyngitis. *Atencion Primaria* 2015;**47**:69-70.

Cardoso 2013 *{published data only}*

Cardoso DM, Gilio AE, Hsin SH, Machado BM, Paulis M, Lotufo JPB. Impact of the rapid antigen detection test in diagnosis and treatment of acute pharyngotonsillitis in a pediatric emergency room. *Revista Paulista de Pediatria* 2013;**31**:4-9.

Carey 1991 *{published data only}*

Carey RD, Tilyard MW, Morris RW. Evaluation of a rapid diagnostic test for group A beta-haemolytic streptococcus in general practice. *New Zealand Medical Journal* 1991;**104**:401-3.

Centor 1984 *{published data only}*

Centor RM, Dalton HP, Campbell MS, Lynch MR. Rapid diagnosis of group A beta streptococcal throat infection. *Clinical Research* 1984;**32**:A841.

Centor 1985 *{published data only}*

Centor RM, Garner BK, Campbell MS, Lynch MR, Dalton HP. Rapid diagnosis of group-A beta-streptococcal throat infection - could the gold standard be fools gold. *Clinical Research* 1985;**33**:A245.

Chen 2000 *{published data only}*

Chen FM. Culture confirmation of negative rapid strep test results. *Journal of Family Practice* 2000;**49**:371-2.

Copyright © 2016 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

Chessman 1998 *{published data only}*

Chessman A. A streptococcal antigen detection test had low sensitivity and high specificity for detecting group A (beta)-haemolytic streptococcus. *Evidence-Based Medicine* 1998;**3**:190.

Choi 1995 *{published data only}*

Choi YH, Lee C, Jung JA, Kang J. A rapid immunochromatographic assay for detection of group-A streptococci. *Clinical Chemistry* 1995;**41**(Suppl):72-3.

Coban 2013 *{published data only}*

Coban B, Kaplan H, Topal B, Ulku N. The sensitivity and the specifity of rapid antigen test in group A streptococcal tonsillopharyngitis. *Cocuk Enfeksiyon Dergisi* 2013;**7**:143-6.

Cohen 1993 *{published data only}*

Cohen R, Geslin P. Rapid diagnostic tests of Streptococcus group A in pharyngitis. Value and limitations. *Revue du Praticien* 1993;**43**:2233-5.

Cohen 2000 *{published data only}*

Cohen R. Rapid diagnostic tests of community-acquired infection. *Archives de Pédiatrie* 2000;**7**(Suppl 2):325-7.

Cohen 2012a *{published data only}*

Cohen JF, Levy C, Bidet P, Benani M, Thollot F, Koskas M. Sensitivity of rapid diagnostic test for group A streptococcus in healthy carriers and children with pharyngitis. *Archives de Pédiatrie* 2012;**19**:H143-4.

Cohen 2013a *{published data only}*

Cohen JF, Chalumeau M, Levy C, Bidet P, Benani M, Koskas M. Effect of clinical spectrum, inoculum size and physician characteristics on sensitivity of a rapid antigen detection test for group A streptococcal pharyngitis. *European Journal of Clinical Microbiology and Infectious Diseases* 2013;**32**:787-93.

Corneli 2001 *{published data only}*

Corneli HM. Rapid strep tests in the emergency department: an evidence-based approach. *Pediatric Emergency Care* 2001;**17**:272-8.

Dale 1994 *{published data only}*

Dale JC, Vetter EA, Contezac JM, Iverson LK, Wollan PC, Cockerill FR 3rd. Evaluation of two rapid antigen assays, BioStar Strep A OIA and Pacific Biotech CARDS O.S., and culture for detection of group A streptococci in throat swabs. *Journal of Clinical Microbiology* 1994;**32**:2698-701.

Dale 1997 *{published data only}*

Dale JC, Wollan P, Cockerill FR 3rd. Use of optical immunoassay to diagnose streptococcal pharyngitis. *JAMA* 1997;**278**:23-4.

De Lorenzo 2012 *{published data only}*

De Lorenzo GR, Rodriguez PMS, Bajo LV, Guirado AP, Fernandez EA, Hurle LB. Use of the rapid antigen technique in the diagnosis of Streptococcus pyogenes pharyngotonsillitis. *Anales De Pediatria* 2012;**77**:193-9.

Demeyere 1992 *{published data only}*

Demeyere M, Blondeel L, Bellon J, Verschraegen G. Directigen 1-2-3 group-A Streptest (DGAST) - new liposome immunoassay for rapid identification of group-A streptococci directly from throat swabs. In: Orefici G editor(s). New Perspectives on Streptococci and Streptococcal Infections. 22. Stuttgart: Gustav Fischer, 1992:101-3.

Diaz-Berenguer 1992 *{published data only}*

Diaz-Berenguer JA, Ibrahim F. Evaluation of a rapid technique for detecting the type A Streptococcus antigen (Test Pack Strep A). *Atencion Primaria* 1992;**9**:245-9.

Dimatteo 2001 *{published data only}*

Dimatteo LA, Lowenstein SR, Brimhall B, Reiquam W, Gonzales R. The relationship between the clinical features of pharyngitis and the sensitivity of a rapid antigen test: evidence of spectrum bias. *Annals of Emergency Medicine* 2001;**38**:648-52.

Dingle 2014 *{published data only}*

Dingle TC, Abbott AN, Fang FC. Reflexive culture in adolescents and adults with group A streptococcal pharyngitis. *Clinical Infectious Diseases* 2014;**59**:643-50.

DiNicola 1986 *{published data only}*

DiNicola AF. Putting rapid group A strep throat screening tests into perspective. *American Journal of Diseases of Children* 1986;**140**:852.

DuBois 1986 *{published data only}*

DuBois D, Ray VG, Nelson B, Peacock JB. Rapid diagnosis of group A strep pharyngitis in the emergency department. *Annals of Emergency Medicine* 1986;**15**:157-9.

DuBose 1996 *{published data only}*

DuBose Ravenel S, Ellis GC, Michal WN. Rapid streptococcal tests. *Pediatrics* 1996;**97**:288.

Eaton 1987 *{published data only}*

Eaton CB. Rapid diagnostic test and throat cultures for streptococcal pharyngitis. *Journal of Family Practice* 1987;**24**:342-3.

Edmonson 2003 *{published data only}*

Edmonson MB, Weix KR. Relationship of pre-test likelihood of group A streptococcal (GAS) pharyngitis and sensitivity of a rapid antigen detection test (RADT) in pediatric practice. *Pediatric Research* 2003;**53**:180A.

Edouard 2014 *{published data only}*

Edouard S, Michel-Lepage A, Raoult D. Does it make sense to detect Streptococcus pyogenes during tonsillitis in Europe to prevent acute rheumatic fever?. *Clinical Microbiology and Infection* 2014;**20**(12):O981-2.

Ehrlich 1993 *{published data only}*

Ehrlich TP, Schwartz RH, Wientzen R, Thorne MM. Comparison of an immunochromatographic method for rapid identification of group A streptococcal antigen with culture method. *Archives of Family Medicine* 1993;**2**:866-9.

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Enright 2009 *{published data only}*

Enright K, Taheri S, Beattie T. Emergency department testing for Streptococcus in children with sore throats. *Emergency Medicine Journal* 2009;**26**:310.

Esteban 2004 *{published data only}*

Esteban M, Pertierra A, Garcia-Tornel S, Gaspa J. Rapid detection tests for pharyngotonsillitis. *Pediatria Catalana* 2004;**64**:141-2.

Fellah 1988 *{published data only}*

Fellah H, Benslimane A, el Jai J, Veysseyre C, Carraz M. Evaluation of a fast test for direct research on streptococcal group A from pharyngeal samples. *Pathologie Biologie* 1988;**36**:885-7.

Figura 1981 *{published data only}*

Figura N, Partini N, Rossolini A. New methods for the group identification of beta-hemolytic Streptococci. *Quaderni Sclavo di Diagnostica Clinica e di Laboratorio* 1981;**17**:438-49.

Fischer 1992 *{published data only}*

Fischer PM. Culture and antigen detection tests for streptococcal tonsillopharyngitis. *American Family Physician* 1992;**46**:1658; author reply 1658-9, 1662.

Foong 1992 *{published data only}*

Foong HB, Yassim M, Chia YC, Kang BH. Streptococcal pharyngitis in a primary care clinic. *Singapore Medical Journal* 1992;**33**:597-9.

Fox 2006a *{published data only}*

Fox JW, Cohen DM, Marcon MJ, Cotton WiH, Bonsu BK. Performance of rapid streptococcal antigen testing varies by personnel. *Journal of Clinical Microbiology* 2006;**44**:3918-22.

Fox 2006b *{published data only}*

Fox JW, Marcon MJ, Bonsu BK. Diagnosis of streptococcal pharyngitis by detection of Streptococcus pyogenes in posterior pharyngeal versus oral cavity specimens. *Journal of Clinical Microbiology* 2006;**44**:2593-4.

Frei 1991 *{published data only}*

Frei R. Diagnosis of streptococcal pharyngitis. *Schweizerische Rundschau fur Medizin Praxis* 1991;**80**:1471-3.

Fries 1995 *{published data only}*

Fries SM. Diagnosis of group A streptococcal pharyngitis in a private clinic: comparative evaluation of an optical immunoassay method and culture. *Journal of Pediatrics* 1995;**126**:933-6.

Gaustad 1991 *{published data only}*

Gaustad P, Hjortdahl P. Use of streptococcal antigen tests in acute tonsillitis. *Tidsskrift for Den Norske Laegeforening* 1991;**111**:1130-1.

Gerber 1986a *{published data only}*

Gerber MA, Randolph MF, Tilton RC. Enzyme fluorescence procedure for rapid diagnosis of streptococcal pharyngitis. *Journal of Pediatrics* 1986;**108**:421-3.

Gerber 1989 *{published data only}*

Gerber MA. Comparison of throat cultures and rapid strep tests for diagnosis of streptococcal pharyngitis. *Pediatric Infectious Disease Journal* 1989;**8**:820-4.

Gerber 1990a *{published data only}*

Gerber MA, Facklam RR, Randolph MF, DeMeo KK. New colorimetric test for rapid diagnosis of streptococcal pharyngitis: a warning. *Pediatrics* 1990;**86**:457-9.

Gerber 1997a *{published data only}*

Gerber MA. Use of antigen detection tests in the diagnosis and management of patients with group A streptococcal pharyngitis. *Pediatric Infectious Disease Journal* 1997;**16**:1187.

Gerber 1997b *{published data only}*

Gerber MA, Tanz RR, Kaplan EL. Use of optical immunoassay to diagnose streptococcal pharyngitis - reply. *JAMA* 1997;**278**:23-4.

Gerber 1998 *{published data only}*

Gerber MA. Diagnosis of group A streptococcal pharyngitis. *Pediatric Annals* 1998;**27**:269-73.

Ghanassia 1996 *{published data only}*

Ghanassia JP, Reinert P, Berche P, Bianchi M, Bingen E, Cohen R. How to diagnose streptococcal pharyngitis?. *Archives de Pédiatrie* 1996;**3**:749-51.

Gnehm 1987 *{published data only}*

Gnehm HE, Salfinger M. Rapid antigen tests for the diagnosis of group A streptococci in practice. *Schweizerische Rundschau fur Medizin Praxis* 1987;**76**:188-91.

Gonsu 2015 *{published data only}*

Gonsu HK, Bomki CM, Djomou F, Toukam M, Ndze VN, Lyonga EE. A comparative study of the diagnostic methods for group a streptococcal sore throat in two reference hospitals in Yaounde, Cameroon. *Pan African Medical Journal* 2015;**20**:1-7.

Greiver 1999 *{published data only}*

Greiver M. Practice tips. Incorporating a rapid group A streptococcus assay with the sore throat score. *Canadian Family Physician* 1999;**45**:1181-2.

Gupta 1992 *{published data only}*

Gupta R, Talwar GP, Gupta SK. Rapid antibody capture assay for detection of group-A streptococci using monoclonal antibody and colloidal gold-monospecific polyvalent antibody conjugate. *Journal of Immunoassay* 1992;**13**:441-55.

Gupta 1997 *{published data only}*

Gupta R, Kalia A, Rattan A, Kumar R, Gupta SK. Comparative evaluation of two indigenously developed tests for rapid detection of group-A streptococci directly from throat swabs. *Indian Journal of Medical Research* 1997;**105**:200-5.

Gutman 1996 *{published data only}*

Gutman S. Rapid streptococcal tests. *Pediatrics* 1996;**97**:783-4.

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Hadfield 1987 *{published data only}*

Hadfield SG, Petts DN, Kennedy P, Lane A, McIllmurray MB. Novel color test for rapid detection of group A streptococci. *Journal of Clinical Microbiology* 1987;**25**:1151-4.

Hallander 1988 *{published data only}*

Hallander HO. Rapid diagnosis of group A streptococci in the throat cannot yet substitute for conventional culture technics. *Lakartidningen* 1988;**85**:2316-8.

Handrick 2006 *{published data only}*

Handrick W. What is the value of rapid tests for streptococci?. *Krankenhauspharmazie* 2006;**27**:542-3.

Hansen 1992a *{published data only}*

Hansen FH. "When throats are visiting...." A profitable business for a rapid test?. *Lakartidningen* 1992;**89**:3155; discussion 3155-6.

Hansen 1992b *{published data only}*

Hansen FH. When "throats are visiting". Increased demands should be put on the rapid test. *Lakartidningen* 1992;**89**:3573.

Harbeck 1993 *{published data only}*

Harbeck RJ, Teague J, Crossen GR, Maul DM, Childers PL. Novel, rapid optical immunoassay technique for detection of group A streptococci from pharyngeal specimens: comparison with standard culture methods. *Journal of Clinical Microbiology* 1993;**31**:839-44.

Harbeck 1995 *{published data only}*

Harbeck RJ. Evaluation of two rapid antigen assays, BioStar Strep A OIA and Pacific Biotech CARDS O.S., and culture for detection of group A streptococci in throat swabs. *Journal of Clinical Microbiology* 1995;**33**:3365-7.

Hasin 1989 *{published data only}*

Hasin M, Furst A. Sore throat in family practice: comparison of blood agar throat culture with a rapid enzyme immunoassay test for diagnostic purposes. *Journal of the Royal College of General Practitioners* 1989;**39**:332-4.

Haym 1986 *{published data only}*

Haym JL, DiTomasso RA, Colameco S. Use of selective vs standard sheep blood agar for the diagnosis of hemolytic streptococcus group A pharyngitis. *Journal of Family Practice* 1986;**23**:580-1.

Hedges 1991 *{published data only}*

Hedges JR, Singal BM, Estep JL. The impact of a rapid screen for streptococcal pharyngitis on clinical decision making in the emergency department. *Medical Decision Making* 1991;**11**:119-24.

Heiter 1993 *{published data only}*

Heiter BJ, Bourbeau PP. Comparison of the Gen-Probe Group A streptococcus Direct Test with culture and a rapid streptococcal antigen detection assay for diagnosis of streptococcal pharyngitis. *Journal of Clinical Microbiology* 1993;**31**:2070-3.

Heiter 1995 *{published data only}*

Heiter BJ, Bourbeau PP. Comparison of two rapid streptococcal antigen detection assays with culture for diagnosis of streptococcal pharyngitis. *Journal of Clinical Microbiology* 1995;**33**:1408-10.

Hinfey 2010 *{published data only}*

Hinfey P, Nicholls BH, Garcia F, Ripper J, Cameron Y, Joshi S. Sensitivity of a rapid antigen detection test for the diagnosis of group A streptococcal pharyngitis in the emergency department. *Annals of Emergency Medicine* 2010;**56**(Suppl):132.

Hodgins 1988 *{published data only}*

Hodgins GW, Raybould TJ. Comparison of the sensitivity and specificity of eight commercially-available reagents for clinical detection of group A streptococcus to different extracts of streptococci. *Medical Laboratory Sciences* 1988;**45**:34-9.

Hoffmann 1987 *{published data only}*

Hoffmann S. Rapid office methods for the diagnosis of streptococcal tonsillitis--reliability and impact on patient management. *Scandinavian Journal of Primary Health Care* 1987;**5**:129-30.

Hoffmann 1990 *{published data only}*

Hoffmann S. Detection of group A streptococcal antigen from throat swabs with five diagnostic kits in general practice. *Diagnostic Microbiology & Infectious Disease* 1990;**13**:209-15.

Holbrook 1998 *{published data only}*

Holbrook T. Rapid strep tests in the pediatric clinical setting. *Journal of Pediatric Nursing* 1998;**13**:131-3.

Hufnagel 2010 *{published data only}*

Hufnagel M, Blessing K, Brell K, Fukala S, Schmidt U, Henneke P. Comparison of two Group A Streptococcal Rapid test (Latex agglutination vs. "Lateral-Flow-Immunoassay") consequences for clinical practice. *Klinische Padiatrie* 2010;**222**:S8.

Humair 2006 *{published data only}*

Humair JP, Revaz SA, Bovier P, Stalder H. Acute pharyngitis: No reliability of rapid streptococcal tests and clinical findings - in reply. *Archives of Internal Medicine* 2006;**166**:2285-6.

Issa 2014 *{published data only}*

Issa N, Demant X, Bonnet G, Camou F. Negative rapid antigen detection test do not exclude streptococcal pharyngitis. *Annales Françaises de Médecine d'Urgence* 2014;**5**:54-5.

Johansson 2003 *{published data only}*

Johansson L, Mansson NO. Rapid test, throat culture and clinical assessment in the diagnosis of tonsillitis. *Family Practice* 2003;**20**:108-11.

Johnson 1995 *{published data only}*

Johnson SL, Shulman ST. Value of new rapid tests for the diagnosis of group A streptococcal pharyngitis. *Pediatric Infectious Disease Journal* 1995;**14**:923-4.

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Joslyn 1995 *{published data only}*

Joslyn SA, Hoekstra GL, Sutherland JE. Rapid antigen detection testing in diagnosing group A beta-hemolytic streptococcal pharyngitis. *Journal of the American Board of Family Practice* 1995;**8**:177-82.

Joubaud 2003 *{published data only}*

Joubaud P. About a rapid technique for detection of group a streptococci from pharyngeal specimens. *Immuno-Analyse et Biologie Spécialisée* 2003;**18**:302-6.

Kawakami 2003 *{published data only}*

Kawakami S, Ono Y, Yanagawa Y, Miyazawa Y. Basic and clinical evaluation of the new rapid diagnostic kit for detecting group A streptococci with the immunochromatographical method. *Rinsho Biseibutsu Jinsoku Shindan Kenkyukai Shi* 2003;**14**:9-16.

Kayaba 1996 *{published data only}*

Kayaba H, Tamura H, Fujiwara Y. Evaluation of the therapy for streptococcal pharyngitis using Abbott Test Pack strep A. *Acta Paediatrica Japonica* 1996;**38**:8-11.

Keahey 2002 *{published data only}*

Keahey L, Bulloch B, Jacobson R, Tenenbein M, Kabani A. Diagnostic accuracy of a rapid antigen test for GABHS performed by nurses in a pediatric ED. *American Journal of Emergency Medicine* 2002;**20**:128-30.

Kechrid 1988 *{published data only}*

Kechrid A, Ben M'rad N, Ben Salah N, Maherzi H, Boujnah A. Rapid diagnosis of Streptococcus A angina. *Tunisie Médicale* 1988;**66**:31-5.

Kellogg 1986a *{published data only}*

Kellogg JA, Bankert DA, Levisky JS. Suitability of a throat culture method for evaluation of group A streptococcal antigen detection kits. *American Journal of Clinical Pathology* 1986;**86**:624-8.

Kellogg 1986b *{published data only}*

Kellogg JA, Manzella JP. Detection of group A streptococci in the laboratory or physician's office. Culture vs antibody methods. *JAMA* 1986;**255**:2638-42.

Kellogg 1987 *{published data only}*

Kellogg JA, Bankert DA, Levisky JS. Comparison of the TestPack Strep A enzyme immunoassay system with anaerobically incubated cultures for detection of group A streptococci from oropharyngeal swabs. *American Journal of Clinical Pathology* 1987;**88**:631-4.

Kellogg 1988 *{published data only}*

Kellogg JA, Bankert DA, Levisky JS. Performance of the Tandem ICON Strep A enzyme immunoassay system for detection of group A streptococci from oropharyngeal swabs. *Journal of Clinical Laboratory Analysis* 1988;**2**:205-8.

Kellogg 1990 *{published data only}*

Kellogg JA. Suitability of throat culture procedures for detection of group A streptococci and as reference standards for evaluation of streptococcal antigen detection kits. *Journal of Clinical Microbiology* 1990;**28**:165-9.

Klein 1986 *{published data only}*

Klein G, Ziering R. Dipstick enzyme-immunoassay (EIA) for rapid detection of group A streptococcal antigen (GAS). *Annals of Allergy* 1986;**56**:524.

Kljakovic 2009 *{published data only}*

Kljakovic M. The office-based blood agar plate culture was more sensitive than the rapid antigen detection test for detecting pharyngitis. *Evidence-Based Medicine* 2009;**14**:183.

Kojima 2002 *{published data only}*

Kojima T, Arai M, Sadamoto S, Ikedo M, Yui I. Evaluation of the diagnostic reagents which detect group A Streptococcus with the immunochromatographical method. *Rinsho Biseibutsu Jinsoku Shindan Kenkyukai Shi* 2002;**12**:91-5.

Kramer 1980 *{published data only}*

Kramer II, Goldstein EO. Rapid diagnosis of streptococcal infection. *Journal of Pediatrics* 1980;**97**:1039-40.

Kurtz 1999 *{published data only}*

Kurtz B, Kurtz M, Roe M, Todd J. Importance of inoculum size and sampling effect in rapid antigen detection of S-pyogenes pharyngitis. *Pediatric Research* 1999;**45**:166A.

Larkin 2001 *{published data only}*

Larkin M. A single, rapid test suffices for pharyngitis diagnosis in high-risk patients. *Lancet* 2001;**358**:1969.

Laubscher 1994 *{published data only}*

Laubscher B. Streptococcal sore throat: the role of rapid diagnostic tests in the doctor's office. *Revue Médicale de la Suisse Romande* 1994;**114**:873-7.

Lind 1988 *{published data only}*

Lind L, Roos K. A rapid test for tonsillitis/pharyngitis as an aid in the diagnostic arsenal. *Lakartidningen* 1988;**85**:4209-10.

Lindbaek 2004 *{published data only}*

Lindbaek M, Hoiby EA, Lermark G, Steinsholt IM, Hjortdahl P. Which is the best method to trace group A streptococci in sore throat patients: culture or GAS antigen test?. *Scandinavian Journal of Primary Health Care* 2004;**22**:233-8.

Lindsay 1985 *{published data only}*

Lindsay AN, Swensen PH. Rapid diagnosis of streptococcal pharyngitis. *Journal of Pediatrics* 1985;**107**:154.

Llor 2009a *{published data only}*

Llor C, Madurell J. Rapid diagnostic test for streptococcal pharyngitis. *Formacion Medica Continuada en Atencion Primaria* 2009;**16**:219-21.

Llor 2009b *{published data only}*

Llor C, Calvino O, Hernandez S, Crispi S, Perez-Bauer M, Fernandez Y. Repetition of the rapid antigen test in initially negative supposed streptococcal pharyngitis is not necessary in adults. *International Journal of Clinical Practice* 2009;**63**:1340-4.

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Llor 2010 *{published data only}*

Llor C. Does a pharyngeal culture have to be requested when using rapid antigen techniques?. *Atencion Primaria* 2010;**42**:362-3.

Luebbert 1989 *{published data only}*

Luebbert PP. Group A streptococci rapid testing. *Laboratory Medicine* 1989;**20**:863-4.

Lutticken 1991 *{published data only}*

Lutticken R. Rapid diagnosis of streptococci. *Laboratoriums Medizin* 1991;**15**:409-19.

Manasse 1989 *{published data only}*

Manasse RJ. Evaluation of the pacific biotech CARDS STREP A test for detecting group A streptococci from cases of pharyngitis. *Journal of Clinical Microbiology* 1989;**27**:1657-8.

Mateo 2010 *{published data only}*

Mateo GF, Conejero J, Martinel EG, Baba Z, Dicono S, Echasabal M. Early diagnosis of streptococcal pharyngitis in paediatric practice: validity of a rapid antigen detection test. *Atencion Primaria* 2010;**42**:356-61.

Mathur 1992 *{published data only}*

Mathur NB. Bacteriological examination of pharyngeal secretions. *Indian Pediatrics* 1992;**29**:1071-5.

Matthys 2006 *{published data only}*

Matthys J, De Meyere M. Acute pharyngitis: no reliability of rapid streptococcal tests and clinical findings. *Archives of Internal Medicine* 2006;**166**:2285; author reply 2285-6.

Mayefsky 1985 *{published data only}*

Mayefsky JH. Rapid diagnosis of streptococcal pharyngitis. *Journal of Pediatrics* 1985;**107**:156.

McCusker 1984 *{published data only}*

McCusker JJ, McCoy EL, Young CL, Alamares R, Hirsch LS. Comparison of Directigen Group A Strep Test with a traditional culture technique for detection of group A beta-hemolytic streptococci. *Journal of Clinical Microbiology* 1984;**20**:824-5.

Meier 1990 *{published data only}*

Meier FA, Howland J, Johnson J, Poisson R. Effects of a rapid antigen test for group A streptococcal pharyngitis on physician prescribing and antibiotic costs. *Archives of Internal Medicine* 1990;**150**:1696-700.

Messina 2010 *{published data only}*

Messina A, Bottaro G, Morselli I. Utility of rapid antigen detection test for group a streptococci in a family paediatrician office setting. *Acta Medica Mediterranea* 2010;**26**:101-5.

Morandi 2003 *{published data only}*

Morandi PA, Deom A, Mauris A, Rohner P. External quality control of direct antigen tests to detect group A streptococcal antigen. *European Journal of Clinical Microbiology & Infectious Diseases* 2003;**22**:670-4.

Morandi 2010 *{published data only}*

Morandi PA, Kesseler D, Deom A. Performances of rapid antigen detection kits for group A Streptococcus. *Revue Médicale Suisse* 2010;**6**:358-60.

Morlan 1988 *{published data only}*

Morlan SA, Gonzalez SFJ, Pedreira CF, Rada MR, Castell YL. Rapid diagnosis of streptococcal pharyngo-tonsillitis in a primary care unit. *Anales Espanoles de Pediatria* 1988;**28**:23-6.

Nahata 1986 *{published data only}*

Nahata MC. Rapid diagnostic tests for streptococcal pharyngitis. *Clinical Pharmacy* 1986;**5**:160-1.

Nerbrand 2002 *{published data only}*

Nerbrand C, Jasir A, Schalen C. Are current rapid detection tests for Group A Streptococci sensitive enough? Evaluation of 2 commercial kits. *Scandinavian Journal of Infectious Diseases* 2002;**34**:797-9.

Nissinen 2009 *{published data only}*

Nissinen A, Stranden P, Myllys R, Takkinen J, Bjorkman Y, Leinikki P. Point-of-care testing of group A streptococcal antigen: performance evaluated by external quality assessment. *European Journal of Clinical Microbiology & Infectious Diseases* 2009;**28**:17-20.

Noorbakhsh 2011 *{published data only}*

Noorbakhsh S, Tabatabaei A, Farhadi M, Ebrahimi T F. Immunoasssay chromatographic antigen test for rapid diagnosis of group a beta hemolytic streptococcus pharyngitis in children: a cross-sectional study. *Iranian Journal of Microbiology* 2011;**3**:99-103.

Norris 1993 *{published data only}*

Norris RJ. The diagnosis of streptococcal pharyngitis by optical immunoassay. *American Clinical Laboratory* 1993;**12**:24-5.

Omurzakova 2008 *{published data only}*

Omurzakova NA, Yamano Y, Sato T, Izumi T, Azakami K, Hasegawa D. Increased prevalence of group A (beta)-hemolytic streptococcus among an ethnic population in Kyrgyzstan detected by the rapid antigen detection test. *Molecular Medicine Reports* 2008;**1**:869-74.

Omurzakova 2009 *{published data only}*

Omurzakova NA, Yamano Y, Nishioka K, Nakajima T. Prevalence of group a Streptococcus among children with tonsillopharyngitis in Kyrgyzstan. *Internal Medicine Journal* 2009;**39**:A63.

Omurzakova 2010 *{published data only}*

Omurzakova NA, Yoshihisa Y, Guli S, Toshihiro N, Mayramkan A. Prevalence of group A b-hemolytic Streptococcus among children with tonsillopharyngitis in Kyrgyzstan: the difficulty of diagnostics and therapy. *International Journal of Rheumatic Diseases* 2010;**13**:212-3.

Copyright © 2016 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

Patel 1987 *{published data only}*

Patel K, Chittom AL, Toshniwal R, Kocka FE. Rapid commercial test for direct detection of group A streptococci in throat swabs. *European Journal of Clinical Microbiology* 1987;**6**:193-4.

Penalba Citores 2007 *{published data only}*

Penalba Citores AC, Riano Mendez B, Maranon Pardillo R, Miguez Navarro C, Vazquez Lopez P, Guerrero Soler Maria M. Incidence of streptococcal pharyngitis. *Anales de Pediatria* 2007;**67**:220-4.

Petts 1985 *{published data only}*

Petts DN, Mantell GA. Rapid detection of group A streptococci on throat swabs. *Medical Laboratory Sciences* 1985;**42**:291-2.

Petts 1988 *{published data only}*

Petts DN, Lane A, Kennedy P, Hadfield SG, McIllmurray MB. Direct detection of groups A, C and G streptococci in clinical specimens by a trivalent colour test. *European Journal of Clinical Microbiology & Infectious Diseases* 1988;**7**:34-9.

Pichichero 1992 *{published data only}*

Pichichero ME, Disney FA, Green JL, Francis AB, Marsocci SM, Lynd AM. Comparative reliability of clinical, culture, and antigen detection methods for the diagnosis of group A beta-hemolytic streptococcal tonsillopharyngitis. *Pediatric Annals* 1992;**21**:798-805.

Portier 2003 *{published data only}*

Portier H. Rapid diagnosis of streptococcal pharyngitis: what's new?. *Revue de Médecine Interne* 2003;**24**:347-9.

Prakash 1985 *{published data only}*

Prakash K. Rapid diagnosis of streptococcal infections. *Indian Journal of Pediatrics* 1985;**52**:391-3.

Preston 1987 *{published data only}*

Preston EN. Use of rapid group A strep throat screening tests. *American Journal of Diseases of Children* 1987;**141**:397.

Putto 1987 *{published data only}*

Putto A. Febrile exudative tonsillitis: viral or streptococcal?. *Pediatrics* 1987;**80**:6-12.

Radetsky 1985 *{published data only}*

Radetsky M, Wheeler RC, Roe MH, Todd JK. Comparative evaluation of kits for rapid diagnosis of group A streptococcal disease. *Pediatric Infectious Disease* 1985;**4**:274-81.

Radetsky 1987 *{published data only}*

Radetsky M, Solomon JA, Todd JK. Identification of streptococcal pharyngitis in the office laboratory: reassessment of new technology. *Pediatric Infectious Disease Journal* 1987;**6**:556-63.

Raich 1990 *{published data only}*

Raich T, Allerberger F, Sandholzer C, Kofler J, Arnold G, Moser G. Acute tonsillitis: clinical symptoms; bacteriologic culture and rapid test as deciding criteria for the use of antibiotics. *Wiener Klinische Wochenschrift* 1990;**102**:111-4.

Rasaiah 1986 *{published data only}*

Rasaiah B. Rapid diagnosis of streptococcal pharyngitis from throat swabs. *CMAJ* 1986;**135**:10-1.

Raz 1987 *{published data only}*

Raz R, Bitnun S. Dilemmas of streptococcal pharyngitis. *American Family Physician* 1987;**35**:187-92.

Razongles 1993 *{published data only}*

Razongles P, Bastien P. Use of rapid beta-hemolytic strept testing in the office-based treatment of pharyngitis. *Médecine et Maladies Infectieuses* 1993;**23**:348-53.

Redd 1988 *{published data only}*

Redd SC, Facklam RR, Collin S, Cohen ML. Rapid group A streptococcal antigen detection kit: effect on antimicrobial therapy for acute pharyngitis. *Pediatrics* 1988;**82**:576-81.

Reed 1990 *{published data only}*

Reed BD, Huck W, French T. Diagnosis of group A beta-hemolytic Streptococcus using clinical scoring criteria, Directigen 1-2-3 group A streptococcal test, and culture. *Archives of Internal Medicine* 1990;**150**:1727-32.

Reichardt 2009 *{published data only}*

Reichardt B, Pichlhofer O, Zehetmayer S, Maier M. Current diagnosis of acute pharyngitis. *Wiener Medizinische Wochenschrift* 2009;**159**:202-6.

Rimoin 2004 *{published data only}*

Rimoin AW, Vince A, Hamza H, da Cunha ALA, Chitale R, Oazi S. Evaluation of a rapid test for streptococcal pharyngitis in children in 3 countries. *Pediatric Research* 2004;**55**:279A.

Roosevelt 2001 *{published data only}*

Roosevelt GE, Kulkarni MS, Shulman ST. Critical evaluation of a CLIA-waived streptococcal antigen detection test in the emergency department. *Annals of Emergency Medicine* 2001;**37**:377-81.

Santos 2003 *{published data only}*

Santos O, Weckx LLM, Pignatari ACC, Pignatari SSN. Detection of Group A beta-hemolytic Streptococcus employing three different detection methods: culture, rapid antigen detecting test, and molecular assay. *Brazilian Journal of Infectious Diseases* 2003;**7**:297-300.

Sarikaya 2010 *{published data only}*

Sarikaya S, Aktas C, Ay D, Cetin A, Celikmen F. Sensitivity and specificity of rapid antigen detection testing for diagnosing pharyngitis in the emergency department. *Ear, Nose, & Throat Journal* 2010;**89**:180-2.

Savoia 1992 *{published data only}*

Savoia D, Biglino S, Cestaro A, Scarsi G, Dotti G, Fiorucci GC. Group A streptococci - evaluation of a rapid direct kit and T-serotypes isolated in children. In: Orefici G editor(s). New Perspectives on Streptococci and Streptococcal Infections. 22. Cambridge: The Faculty Press, 1992:108-9.

Copyright © 2016 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

Schafer 1995 *{published data only}*

Schafer S. Rapid antigen detection testing. *Journal of the American Board of Family Practice* 1995;**8**:428-30.

Schmuziger 1996 *{published data only}*

Schmuziger N, Frei R, Hauser R, Wengen D, Probst R. Reliability of the rapid Streptococcus A test. *HNO* 1996;**44**:365-9.

Schmuziger 2003 *{published data only}*

Schmuziger N, Schneider S, Frei R. Reliability and general practice value of 2 rapid Streptococcus A tests. *HNO* 2003;**51**:806-12.

Schwartz 1985 *{published data only}*

Schwartz RH. Rapid diagnosis of streptococcal pharyngitis. *Journal of Pediatrics* 1985;**107**:154-5.

Seaberg 1997 *{published data only}*

Seaberg DC, Gettings G, Rosenthal B, Geiger T. Rapid, optical immunoassay for streptococcal pharyngitis. *Academic Emergency Medicine* 1997;**4**:81-3.

Seecamp 1993 *{published data only}*

Seecamp CH. Rapid strep assessment. *Minnesota Medicine* 1993;**76**:8.

Seguido 1987 *{published data only}*

Seguido P, Hidalgo MA, Lobos JM, Lahoz F, Garcia-Perea A, Conthe P. Predictive value of rapid antigenic technics in the diagnosis of acute streptococcal pharyngitis. *Medicina Clinica* 1987;**89**:405-6.

Seki 1986 *{published data only}*

Seki I, Yabana T, Sakuta R, Ohkuni M. The rapid diagnosis of group A streptococcal infection. *Japanese Circulation Journal* 1986;**50**:1249-50.

Serra 1989 *{published data only}*

Serra A, Grillo C, Saita V, Allegra E, La Mantia I. Group A streptococcal tonsillitis: comparative evaluation of kits for rapid diagnosis. *Journal of Chemotherapy* 1989;**1**:20.

Shaughnessy 2015 *{published data only}*

Shaughnessy AF. Back-up culture not needed for negative rapid strep test results. *American Family Physician* 2015;**91**:643-8.

Sheeler 2002 *{published data only}*

Sheeler RD, Houston MS, Radke S, Dale JC, Adamson SC. Accuracy of rapid strep testing in patients who have had recent streptococcal pharyngitis. *Journal of the American Board of Family Practice* 2002;**15**:261-5.

Shekelle 1992 *{published data only}*

Shekelle PG. Rapid antigen and culture detection of streptococcal pharyngitis. *Annals of Internal Medicine* 1992;**117**:22.

Shriner 1985 *{published data only}*

Shriner HC Jr, Spodaccini LJ, Wright LL, Deutsch L. A quick strep test. *Pediatric Infectious Disease* 1985;**4**:301.

Shulman 1994 *{published data only}*

Shulman ST. Streptococcal pharyngitis: diagnostic considerations. *Pediatric Infectious Disease Journal* 1994;**13**:567-71.

Shulman 1995 *{published data only}*

Shulman ST. Value of new rapid tests for the diagnosis of group A streptococcal pharyngitis. *Pediatric Infectious Disease Journal* 1995;**14**:923-4.

Skellern 1993 *{published data only}*

Skellern P, Mitchell J, MacCulloch D, Lang S. Direct antigen test for group A streptococcal pharyngitis. *New Zealand Medical Journal* 1993;**106**:111.

Smith 1989 *{published data only}*

Smith TD, Wilkinson V, Kaplan EL. Group A streptococcus-associated upper respiratory tract infections in a day-care center. *Pediatrics* 1989;**83**:380-4.

Smith 1995 *{published data only}*

Smith JM, Bauman MC, Fuchs PC. An optical immunoassay for the direct detection of group A strep antigen. *Laboratory Medicine* 1995;**26**:408-10.

Solé 2009 *{published data only}*

Solé JD, Rodríguez LH, Donaire MTB, Macias MD. Rapid antigen tests for beta-haemolytic streptococcus in primary care. *Atencion Primaria* 2009;**41**:468; author reply 469-70.

Stillstrom 1991 *{published data only}*

Stillstrom J, Schwan A, Bjorklind A. Streptococcal throat infection: calculation of test standards and a comparison between an antigen detection test and culture. *Scandinavian Journal of Primary Health Care* 1991;**9**:149-54.

Stingu 2009 *{published data only}*

Stingu CS, Turcu T, Dimitriu S. A comparison between a rapid antigen test and culture in diagnosis of group A streptococcal pharyngitis. *Infectious Diseases in Clinical Practice* 2009;**17**:354-5.

Supon 1998 *{published data only}*

Supon PA, Tunnell S, Greene M, Ostroff RM. Rapid detection of group A streptococcal antigen with a new optical immunoassay. *Pediatric Infectious Disease Journal* 1998;**17**:349-51.

Syriopoulou 2011 *{published data only}*

Syriopoulou T, Konstantelos D, Papoula M, Karachanidi E, Maggana I, Straka K. Laboratory methods for diagnosing streptococcal pharyngitis: predictive value, usefulness. *Clinical Biochemistry* 2011;**44**:534-5.

Taeron 2006 *{published data only}*

Taeron C. The diagnostic rapid test for angina. *Actualités Pharmaceutiques* 2006;**45**:32-3.

Tagami 1997 *{published data only}*

Tagami H. Triggering factors. *Clinics in Dermatology* 1997;**15**:677-85.

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Tenjarla 1990 *{published data only}*

Tenjarla G, Kumar A, Dyke JW. Evaluation of TestPack Strep A kit for rapid detection of group-A streptococci in a laboratory setting. *Clinical Research* 1990;**38**:A823.

Tocks 1992 *{published data only}*

Tocks JB. Culture and antigen detection tests for streptococcal tonsillopharyngitis. *American Family Physician* 1992;**46**:1657-8; author reply 1658-9, 1662.

Todd 1987 *{published data only}*

Todd JK. Defining the limits of office (and home) laboratory testing: rapid streptococcal antigen tests. *Bulletin of the New York Academy of Medicine* 1987;**63**:467-74.

True 1986 *{published data only}*

True BL, Carter BL, Driscoll CE, House JD. Effect of a rapid diagnostic method on prescribing patterns and ordering of throat cultures for streptococcal pharyngitis. *Journal of Family Practice* 1986;**23**:215-9.

Uhl 2003 *{published data only}*

Uhl JR, Adamson SC, Vetter EA, Schleck CD, Harmsen WS, Iverson LK. Comparison of LightCycler PCR, rapid antigen immunoassay, and culture for detection of group A streptococci from throat swabs. *Journal of Clinical Microbiology* 2003;**41**:242-9.

Vakkila 2015 *{published data only}*

Vakkila J, Koskinen JO, Brandt A, Muotiala A, Liukko V, Soittu S. Detection of group A Streptococcus from pharyngeal swab samples by bacterial culture is challenged by a Novel mariPOC point-of-care test. *Journal of Clinical Microbiology* 2015;**53**:2079-83.

Waagepetersen 2009 *{published data only}*

Waagepetersen R. Strep A test and ear irrigation. *Ugeskrift for Laeger* 2009;**171**:156; author reply 157.

Wagener 1985 *{published data only}*

Wagener S, Remington JS. Rapid diagnosis of streptococcal pharyngitis. *Journal of Pediatrics* 1985;**107**:155-6.

Warner 1985 *{published data only}*

Warner MD. Rapid diagnostic assay for strep throat. *Analytical Chemistry* 1985;**57**:1372.

Waseem 2009 *{published data only}*

Waseem M, Ayanruoh S, Humphrey A, Reynolds T. Impact of rapid streptococcal test on antibiotic use in a pediatric emergency department. *Annals of Emergency Medicine* 2009;**54**:S41.

Wegner 1992 *{published data only}*

Wegner DL, Witte DL, Schrantz RD. Insensitivity of rapid antigen detection methods and single blood agar plate culture for diagnosing streptococcal pharyngitis. *JAMA* 1992;**267**:695-7.

Wegner 1996 *{published data only}*

Wegner DL. Proper evaluation of rapid antigen detection methods for diagnosing streptococcal pharyngitis. *Archives of Pediatrics & Adolescent Medicine* 1996;**150**:241, 245-8.

White 1986 *{published data only}*

White CB, Bass JW. Rapid enzyme fluorescence test for diagnosis of streptococcal pharyngitis. *Journal of Pediatrics* 1986;**109**:564.

Wolinsky 1986 *{published data only}*

Wolinsky E, Adams W. Diagnosis of streptococcal pharyngitis by rapid antigen detection from the throat swab. *Journal of Family Practice* 1986;**22**:277-8, 280.

Wong 2002 *{published data only}*

Wong MCK, Chung CH. Group A streptococcal infection in patients presenting with a sore throat at an accident and emergency department: prospective observational study. *Hong Kong Medical Journal* 2002;**8**:92-8.

Woodburn 2007 *{published data only}*

Woodburn JD, Smith KL, Nelson GD. Quality of care in the retail health care setting using national clinical guidelines for acute pharyngitis. *American Journal of Medical Quality* 2007;**22**:457-62.

Wright 1987 *{published data only}*

Wright A, Crabtree B, O'Connor P. Evaluation of a rapid method for diagnosing streptococcal pharyngitis in an office laboratory. *Journal of Family Practice* 1987;**25**:505-6, 508.

Yu 1988 *{published data only}*

Yu PK, Germer JJ, Torgerson CA, Anhalt JP. Evaluation of TestPack Strep A for the detection of group A streptococci in throat swabs. *Mayo Clinic Proceedings* 1988;**63**:33-6.

References to studies awaiting assessment

Briko 1997 *{published data only}*

Briko NI, Bovin NV, Shevelev BI, Dynga LO, Blinnikova EI, Kuksiuk PP. Immunoenzyme test system for detecting antibodies to group-specific antigens of group A Streptococcus on the base of conjugated N-acetylglucosamine and its use in medical practice. *Klinicheskaia Laboratornaia Diagnostika* 1997;**9**:43-6.

Gajos 1997 *{published data only}*

Gajos A, Janeczek T, Wilczynski K, Bogdan P, Winiewicz A, Szychowska Z, et al. Diagnostic value of rapid streptococcal antigen test provided by Abbott "test pack strep A": current report. *Otolaryngologia Polska* 1997;**51**:168-70.

Gnehm 1986 *{published data only}*

Gnehm HE. Rapid diagnosis for group-A streptococci in practice. *Helvetica Paediatrica Acta* 1986;**41**:250.

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Grevnina 1992 *{published data only}*

Grevnina GS, Pavlova EB, Iontova IM, Bystriakova LV. The rapid diagnosis of acute streptococcal infection in children. *Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii* 1992;**9-10**:31-4.

Herranz 2007 *{published data only}*

Herranz B, Rodriguez-Salinas E, Orden B. From laboratory to clinic: usefulness of rapid diagnostic techniques for the diagnostic techniques of Streptococcus pyogenes. *Anales de Pediatria Continuada* 2007;**5**:92-5.

Mirjat 2012a *{published data only}*

Mirjat KA, Valiram P, Fatima I. Role of rapid antigen detection test (RADT) and throat culture in the diagnosis of streptococcal pharyngotonsillitis. *Medical Forum Monthly* 2012;**23**:60-3.

Mirjat 2012b *{published data only}*

Mirjat KA, Fatima I, Mustafa F. Prevalence of pharyngitis and tonsilitis among children. *Medical Forum Monthly* 2012;**23**:64-7.

Nestorovic 2004 *{published data only}*

Nestorovic B, Laban-Nestorovic S, Paripovic V, Milosevic K. Value of a rapid test for identification of beta-hemolytic streptococcus antigens in children with streptococcal pharyngitis. *Srpski Arhiv Za Celokupno Lekarstvo* 2004;**132**(Suppl 1):39-41.

Sanz Moreno 2010 *{published data only}*

Sanz Moreno J. Differential diagnostic protocol of pharyngoamygdalitis. *Medicine* 2010;**10**:4015-8.

Shikhman 1988 *{published data only}*

Shikhman AR, Shmakova ZF, Briko NI. Enzyme-immunoassay of Streptococcus Pyogenes group-specific A polysaccharide - relationship between the results and the bacterial-cell biodegradation. *Laboratornoe Delo* 1988;**4**:18-22.

Soyletir 1988 *{published data only}*

Soyletir G, Ener B, Basaran M, Cakan N, Pamukcu A, Goral M. Direct antigen detection for group A streptococcal pharyngitis: comparison of throat cultures and the direct antigen test. *Mikrobiyoloji Bulteni* 1988;**22**:322-6.

Sramek 1992 *{published data only}*

Sramek J, Havlicek J, Benes O. The importance of a rapid, direct method of detection of group A streptococci in the treatment of pharyngitis. *Ceskoslovenska Pediatrie* 1992;**47**:733-6.

Vylegzhanina 1994 *{published data only}*

Vylegzhanina ES, Dmitrieva NF, Shevelev BI, Kondrakova OA. Use of enzyme immunoassay in the study of Group A Streptococcus adhesion. *Klinicheskaia Laboratornaia Diagnostika* 1994;**4**:40-1.

Yilmaz 2008 *{published data only}*

Yilmaz F, Karabay O, Ince NK, Ekerbicer H, Kocoglu E. Effectiveness of rapid antigen test with throat gargle in detecting group A beta-hemolytic streptococci. *Kulak Burun Bogaz Ihtisas Dergisi* 2008;**18**:280-3.

Additional references

AAP 2012

American Academy of Pediatrics. Group A streptococcal infections. In: Pickering L, Baker C, Long S, McMillan J editor(s). Red Book: 2012 Report of the Committee on Infectious Disease. 29th Edition. Elk Grove Village, IL: American Academy of Pediatrics, 2012.

Battle 1971

Battle CU, Glasgow LA. Reliability of bacteriologic identification of beta-hemolytic streptococci in private offices. *American Journal of Diseases of Children* 1971;**122**(2):134-6.

Bossuyt 2003

Bossuyt PM, Reitsma JB, Bruns DE, Gatsonis CA, Glasziou PP, Irwig LM, et al. Towards complete and accurate reporting of studies of diagnostic accuracy: the STARD initiative. Standards for Reporting of Diagnostic Accuracy. *Clinical Chemistry* 2003;**49**(1):1-6.

Bossuyt 2015

Bossuyt PM, Reitsma JB, Bruns DE, Gatsonis CA, Glasziou PP, Irwig L, et al. STARD 2015: an updated list of essential items for reporting diagnostic accuracy studies. *BMJ* 2015;**351**:h5527.

Brazzelli 2009

Brazzelli M, Lewis SC, Deeks JJ, Sandercock PA. No evidence of bias in the process of publication of diagnostic accuracy studies in stroke submitted as abstracts. *Journal of Clinical Epidemiology* 2009;**62**(4):425-30.

Carapetis 2005a

Carapetis JR, Steer AC, Mulholland EK, Weber M. The global burden of group A streptococcal diseases. *Lancet* 2005;**5**(11):685-94.

Carapetis 2005b

Carapetis JR, McDonald M, Wilson NJ. Acute rheumatic fever. *Lancet* 2005;**366**(9480):155-68.

Carapetis 2007

Carapetis JR. Rheumatic heart disease in developing countries. *New England Journal of Medicine* 2007;**357**(5):439-41.

Centor 1981

Centor RM, Witherspoon JM, Dalton HP, Brody CE, Link K. The diagnosis of strep throat in adults in the emergency room. *Medical Decision Making* 1981;**1**(3):239-46.

Charlier-Bret 2004

Charlier-Bret N, Boucher B, Poyart C, Quesne G, Bingen E, Doit C, et al. Rapid antigen detection tests for diagnosis of group A streptococcal pharyngitis: comparative evaluation of sensitivity and practicability of 16 in vitro diagnostics medical devices performed in July 2002 by the French health products safety agency (Afssaps) as part of its market control mission. *Pathologie Biologie (Paris)* 2004;**52**(8):438-43.

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Cohen 2015

Cohen JF, Cohen R, Levy C, Thollot F, Benani M, Bidet P, et al. Selective testing strategies for diagnosing group A streptococcal infection in children with pharyngitis: a systematic review and prospective multicentre external validation study. *CMAJ* 2015;**187**(1):23-32.

Fischer Walker 2006

Fischer Walker CL, Rimoin AW, Hamza HS, Steinhoff MC. Comparison of clinical prediction rules for management of pharyngitis in settings with limited resources. *Journal of Pediatrics* 2006;**149**(1):64-71.

Fox 2006

Fox JW, Cohen DM, Marcon MJ, Cotton WiH, Bonsu BK. Performance of rapid streptococcal antigen testing varies by personnel. *Journal of Clinical Microbiology* 2006;**44**:3918-22.

Gerber 1986b

Gerber MA, Randolph MF, Chanatry J, Wright LL, DeMeo KK, Anderson LR. Antigen detection test for streptococcal pharyngitis: evaluation of sensitivity with respect to true infections. *Journal of Pediatrics* 1986;**108**(5 Pt 1):654-8.

Gerber 2004

Gerber MA, Shulman ST. Rapid diagnosis of pharyngitis caused by group A streptococci. *Clinical Microbiology Reviews* 2004;**17**(3):571-80.

Gerber 2005

Gerber MA. Diagnosis and treatment of pharyngitis in children. *Pediatric Clinics of North America* 2005;**52**(3):729-47, vi.

Gerber 2009

Gerber MA, Baltimore RS, Eaton CB, Gewitz M, Rowley AH, Shulman ST, et al. Prevention of rheumatic fever and diagnosis and treatment of acute streptococcal pharyngitis: a scientific statement from the American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee of the Council on Cardiovascular Disease in the Young, the Interdisciplinary Council on Functional Genomics and Translational Biology, and the Interdisciplinary Council on Quality of Care and Outcomes Research: endorsed by the American Academy of Pediatrics. *Circulation* 2009;**119**(11):1541-51.

Heelan 1996

Heelan JS, Wilbur S, Depetris G, Letourneau C. Rapid antigen testing for group A Streptococcus by DNA probe. *Diagnostic Microbiology and Infectious Disease* 1996;**24**(2):65-9.

Joachim 2010

Joachim L, Campos D Jr, Smeesters PR. Pragmatic scoring system for pharyngitis in low-resource settings. *Pediatrics* 2010;**126**(3):e608-14.

Johnson 2010

Johnson DR, Kurlan R, Leckman J, Kaplan EL. The human immune response to streptococcal extracellular antigens: clinical, diagnostic, and potential pathogenetic implications. *Clinical Infectious Diseases* 2010;**50**(4):481-90.

Lasseter 2009

Lasseter GM, McNulty CA, Hobbs RFD, Mant D, Little P, PRISM investigators. In vitro evaluation of five rapid antigen detection tests for group A beta-haemolytic streptococcal sore throat infections. *Family Practice* 2009;**26**(6):437-44.

Lean 2014

Lean WL, Arnup S, Danchin M, Steer AC. Rapid diagnostic tests for group A streptococcal pharyngitis: a meta-analysis. *Pediatrics* 2014;**134**(4):771-81.

Leeflang 2006

Leeflang MM, Scholten RJ, Rutjes AW, Reitsma JB, Bossuyt PM. Use of methodological search filters to identify diagnostic accuracy studies can lead to the omission of relevant studies. *Journal of Clinical Epidemiology* 2006;**59**(3):234-40.

Leeflang 2009

Leeflang MM, Bossuyt PM, Irwig L. Diagnostic test accuracy may vary with prevalence: implications for evidence-based diagnosis. *Journal of Clinical Epidemiology* 2009;**62**(1):5-12.

Leeflang 2013

Leeflang MM, Rutjes AW, Reitsma JB, Hooft L, Bossuyt PM. Variation of a test's sensitivity and specificity with disease prevalence. *CMAJ* 2013;**185**(11):E537-44.

Linder 2005

Linder JA, Bates DW, Lee GM, Finkelstein JA. Antibiotic treatment of children with sore throat. *JAMA* 2005;**294**(18):2315-22.

Llor 2011

Llor C, Madurell J, Balagué-Corbella M, Gómez M, Cots JM. Impact on antibiotic prescription of rapid antigen detection testing in acute pharyngitis in adults: a randomised clinical trial. *British Journal of General Practice* 2011;**61**(586):e244-51.

Macaskill 2010

Macaskill P, Gatsonis C, Deeks JJ, Harbord RM, Takwoingi Y. Chapter 10: analysing and presenting results. In: Deeks JJ, Bossuyt PM, Gatsonis C editor(s). Cochrane Handbook for Systematic Reviews of Diagnostic Test Accuracy. Chichester, UK: The Cochrane Collaboration, 2010.

Matthys 2007

Matthys J, De Meyere M, van Driel ML, De Sutter A. Differences among international pharyngitis guidelines: not just academic. *Annals of Family Medicine* 2007;**5**(5):436-43.

McIsaac 1998

McIsaac WJ, White D, Tannenbaum D, Low DE. A clinical score to reduce unnecessary antibiotic use in patients with sore throat. *Canadian Medical Association Journal* 1998;**158**(1):75-83.

Mondzac 1967

Mondzac AM. Throat culture processing in the office - a warning. *JAMA* 1967;**200**(12):1132-3.

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Pelucchi 2012

Pelucchi C, Grigoryan L, Galeone C, Esposito S, Huovinen P, Little P, et al. ESCMID Guideline for the management of acute sore throat. *Clinical Microbiology and Infection* 2012;**18**(Suppl 1):1-28.

Pokorski 1994

Pokorski SJ, Vetter EA, Wollan PC, Cockerill FR, 3rd. Comparison of Gen-Probe Group A streptococcus Direct Test with culture for diagnosing streptococcal pharyngitis. *Journal of Clinical Microbiology* 1994;**32**(6):1440-3.

Reitsma 2005

Reitsma JB, Glas AS, Rutjes AW, Scholten RJ, Bossuyt PM, Zwinderman AH. Bivariate analysis of sensitivity and specificity produces informative summary measures in diagnostic reviews. *Journal of Clinical Epidemiology* 2005;**58**(10):982-90.

RevMan 2014 [Computer program]

The Nordic Cochrane Centre, The Cochrane Collaboration. Review Manager (RevMan). Version 5.3. Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2014.

Rosenstein 1970

Rosenstein BJ, Markowitz M, Gordis L. Accuracy of throat cultures processed in physicians' offices. *Journal of Pediatrics* 1970;**76**(4):606-9.

Ruiz-Aragon 2010

Ruiz-Aragon J, Rodriguez Lopez R, Molina Linde JM. Evaluation of rapid methods for detecting Streptococcus pyogenes. systematic review and meta-analysis. *Anales de Pediatría (Barcelona, Spain)* 2010;**72**(6):391-402.

Seckeler 2011

Seckeler MD, Hoke TR. The worldwide epidemiology of acute rheumatic fever and rheumatic heart disease. *Clinical Epidemiology* 2011;**3**:67-84.

Shaikh 2010

Shaikh N, Leonard E, Martin JM. Prevalence of streptococcal pharyngitis and streptococcal carriage in children: a meta-analysis. *Pediatrics* 2010;**126**(3):e557-64.

Shaikh 2011

Shaikh N, Swaminathan N, Hooper EG. Accuracy and precision of the signs and symptoms of streptococcal pharyngitis in children: a systematic review. Journal of Pediatrics 2011 Nov 1 [Epub ahead of print].

Shulman 2000

Shulman ST, Tanz RR, Gerber MA. Streptococcal pharyngitis. In: Stevens DL, Kaplan EL editor(s). Streptococcal Infections: Clinical Aspects, Microbiology, and Molecular Pathogenesis. New York: Oxford University Press, 2000:76-101.

Shulman 2009

Shuman ST. Pediatric autoimmune neuropsychiatric disorders associated with streptococci (PANDAS): update. *Current Opinion in Pediatrics* 2009;**21**(1):127-30.

Shulman 2012

Shulman ST, Bisno AL, Clegg HW, Gerber MA, Kaplan EL, Lee G, et al. Clinical practice guideline for the diagnosis and management of group A streptococcal pharyngitis: 2012 update by the Infectious Diseases Society of America. *Clinical Infectious Diseases* 2012;**55**(10):1279-82.

Slinger 2011

Slinger R, Goldfarb D, Rajakumar D, Moldovan I, Barrowman N, Tam R, et al. Rapid PCR detection of group A Streptococcus from flocked throat swabs: a retrospective clinical study. *Annals of Clinical Microbiology and Antimicrobials* 2011;**10**:33. [DOI: 10.1186/1476-0711-10-33]

Spinks 2013

Spinks A, Glasziou PP, Del Mar CB. Antibiotics for sore throat. *Cochrane Database of Systematic Reviews* 2013, Issue 11. [DOI: 10.1002/14651858.CD000023.pub4]

Steinhoff 2005

Steinhoff MC, Walker CF, Rimoin AW, Hamza HS. A clinical decision rule for management of streptococcal pharyngitis in low-resource settings. *Acta Paediatrica* 2005;**94**(8):1038-42.

Stewart 2014

Stewart EH, Davis B, Clemans-Taylor BL, Littenberg B, Estrada CA, Centor RM. Rapid antigen group A streptococcus test to diagnose pharyngitis: a systematic review and meta-analysis. *PLoS One* 2014;**9**(11):e111727.

Tanz 1997

Tanz RR, Gerber MA, Shulman ST. What is a throat culture?. *Advances in Experimental Medicine and Biology* 1997;**418**:29-33.

Tanz 2007

Tanz RR, Shulman ST. Chronic pharyngeal carriage of group A streptococci. *Pediatric Infectious Disease Journal* 2007;**26**(2):175-6.

Wessels 2011

Wessels MR. Clinical practice. Streptococcal pharyngitis. *New England Journal of Medicine* 2011;**364**(7):648-55.

Whiting 2011a

Whiting PF, Rutjes AW, Westwood ME, Mallett S, Deeks JJ, Reitsma JB, et al. QUADAS-2: a revised tool for the quality assessment of diagnostic accuracy studies. *Annals of Internal Medicine* 2011;**155**(8):529-36.

Whiting 2011b

Whiting P, Westwood M, Beynon R, Burke M, Sterne JA, Glanville J. Inclusion of methodological filters in searches for diagnostic test accuracy studies misses relevant studies. *Journal of Clinical Epidemiology* 2011;**64**(6):602-7.

WHO 1995

World Health Organization. The Management of Acute Respiratory Infectious in Children: Practical Guidelines for Outpatient Care. Geneva: World Health Organization, 1995.

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References to other published versions of this review

Cohen 2013

Cohen JF, Cohen R, Chalumeau M. Rapid antigen detection test for group A streptococcus in children with pharyngitis. *Cochrane Database of Systematic Reviews* 2013, Issue 4. [DOI: 10.1002/14651858.CD010502]

* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Al-Najjar 2008

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: yes (exclusion if antibiotics during the preceding week) Clinical selection of patients: explicit criteria but not a score Presenting signs and symptoms: fever, acute catarrh and acutely inflamed throat/tonsils with or without exudates Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 505 (but the contingency table includes 496 participants) Age (distribution): 81% under 5 years of age (mean or median not reported) GAS prevalence according to culture (with 95% confidence interval): 14.1% (95% CI not reported) Country of study: United Arab Emirates Sex (% of girls): 45% Clinical severity assessment: none Clinical setting: walk-in clinics Multi-centre study
Index tests	Throat swab: 1 double swab Commercial name of the RADT: Diaquick Strep A Test (Dialab) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: not reported Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: throat culture technique not described
Flow and timing	No follow-up
Comparative	
Type of study	Journal article

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Al-Najjar 2008 *(Continued)*

Notes	-

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		
		Unclear	**Unclear**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		Unclear	**Unclear**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Unclear		

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Al-Najjar 2008 *(Continued)*

Were undetermined/uninterpretable results reported?	No
Were withdrawals from the study explained?	No
	Unclear

Alper 2013

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: yes (within 3 days before inclusion) Clinical selection of patients: none Presenting signs and symptoms: patients with a chief complaint of sore throat Age range for inclusion: 7 to 15 years
Patient characteristics and setting	Sample size: 114 Age (distribution): mean (SD) = 10.0 (0.24) years GAS prevalence according to culture (with 95% confidence interval): 16.7% (95% CI not reported) Country of study: Turkey Sex (% of girls): not reported Clinical severity assessment: Centor score Clinical setting: walk-in clinic (family practice centre) Single-centre study
Index tests	Throat swab: unclear Commercial name of the RADT: only the name of the manufacturer was reported (Meridian Bioscience) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: not reported Duration of incubation: 48 hours GAS confirmation: bacitracin disk Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article

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Alper 2013 *(Continued)*

Notes	Supported by academic funding (Uludag University Scientific Research Projects)

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		

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Alper 2013 *(Continued)*

Were undetermined/uninterpretable results reported?	No
Were withdrawals from the study explained?	Yes
	Low

Altun 2015

Study characteristics	
Patient sampling	Cross-sectional study Retrospective design Sample: non-consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: explicit criteria but not a score Presenting signs and symptoms: clinical exudative tonsillopharyngitis Age range for inclusion: 0 to 18 years
Patient characteristics and setting	Sample size: 1243 Age (distribution): mean (SD) = 5.5 (3.1) years GAS prevalence according to culture (with 95% confidence interval): 24.7% (95% CI not reported) Country of study: Turkey Sex (% of girls): 48.5% Clinical severity assessment: none Clinical setting: paediatric outpatient clinic Single-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: Strep A Abon kit Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: not reported Duration of incubation: < 24 hours GAS confirmation: bacitracin disk Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	—

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Altun 2015 *(Continued)*

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		High	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		

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Altun 2015 *(Continued)*

	Low

Arribas Blanco 1988

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physician (most of the time) or nurse (sometimes) Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: acute pharyngo-tonsillitis Age range for inclusion: < 21 years
Patient characteristics and setting	Sample size: 240 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 18.9% (95% CI not reported) Country of study: Spain Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: walk-in clinic Single-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: TestPack Strep A (Abbott) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: bacitracin disk Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article (in Spanish)
Notes	We thank Dr JM Arribas Blanco for sharing unpublished paediatric data
Methodological quality	

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Arribas Blanco 1988 *(Continued)*

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

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Attia 2001

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physicians Exclusion if recent antibiotics use before inclusion: yes (within 5 days of enrollment) Clinical selection of patients: none Presenting signs and symptoms: patients with signs and symptoms of acute pharyngitis Age range for inclusion: 1 to 18 years
Patient characteristics and setting	Sample size: 587 Age (distribution): mean (SD) = 6.7 (3.9) years GAS prevalence according to culture (with 95% confidence interval): 37.1% (95% CI not reported) Country of study: USA Sex (% of girls): 51% Clinical severity assessment: other (Attia score) Clinical setting: mixed (paediatric emergency department and 2 paediatric outpatient clinics) Multi-centre study
Index tests	Throat swab: 2 different swabs (1 swab for culture, 1 swab for the RADT) Commercial name of the RADT: TestPack Plus (Abbott) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: inhibitory Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 2 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Funded by a grant from the Nemours Research Programmes

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**

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Attia 2001 *(Continued)*

DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

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Ayanruoh 2009

Study characteristics	
Patient sampling	Cross-sectional study Retrospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physicians Exclusion if recent antibiotics use before inclusion: yes (within 14 days of presentation) Clinical selection of patients: none Presenting signs and symptoms: patients with clinical signs of pharyngitis Age range for inclusion: 3 to 18 years
Patient characteristics and setting	Sample size: 6557 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 22.5% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: emergency department Single-centre study
Index tests	Throat swab: not reported Commercial name of the RADT: only the name of the manufacturer was reported (Sacks Biological Farms) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Throat culture performed only for children with negative RADT results (partial verification)

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**

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Ayanruoh 2009 *(Continued)*

DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	No		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	No		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		High	

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Begovac 1993

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: symptoms and signs of pharyngitis Age range for inclusion: not reported
Patient characteristics and setting	Sample size: 389 (age < 15 years = 389, age > 15 years = 115) Age (distribution): mean or median not reported GAS prevalence according to culture (with 95% confidence interval): 31.1% (95% CI not reported) Country of study: Croatia Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: walk-in clinic (outpatient clinic of a University Hospital) Single-centre study
Index tests	Throat swab: 1 double swab Commercial name of the RADT: Venterscreen Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard and inhibitory (2 plates) Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 2 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	—

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		

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Begovac 1993 *(Continued)*

Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Buchbinder 2007

Study characteristics	
Patient sampling	Cross-sectional study

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Buchbinder 2007 *(Continued)*

	Prospective design Sample: random Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physicians Exclusion if recent antibiotics use before inclusion: yes (time frame not reported) Clinical selection of patients: explicit criteria but not a score (see below) Presenting signs and symptoms: sore throat associated with pharyngeal erythema or exudate and fever Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 216 Age (distribution): mean (SD) = 4.8 (3.6) years GAS prevalence according to culture (with 95% confidence interval): 26.4% (95% CI not reported) Country of study: France Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: emergency department Single-centre study
Index tests	Throat swab: 2 different swabs (1 swab for culture, 1 swab for the RADT) Commercial name of the RADT: IM Strep A (International Microbio) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard (no details) Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated (n): not reported Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article (in French)
Notes	—

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		

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Buchbinder 2007 *(Continued)*

Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	No		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

Camurdan 2008

Study characteristics	
Patient sampling	Cross-sectional study Prospective design

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Camurdan 2008 *(Continued)*

	Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physician Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: signs and symptoms of acute upper respiratory tract infections Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 1248 Age (distribution): mean (SD) = 6.3 (3.6) years GAS prevalence according to culture (with 95% confidence interval): 38.1% (95% CI not reported) Country of study: Turkey Sex (% of girls): 48% Clinical severity assessment: none Clinical setting: walk-in clinic Single-centre study
Index tests	Throat swab (1 single, 1 double, 2 different): unclear Commercial name of the RADT: Strep A Test II (Intex Diagnostica) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 24 hours GAS confirmation: latex test Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	—

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		

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Camurdan 2008 *(Continued)*

Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		
		Unclear	**Unclear**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Chapin 2002

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no (comparison of a RADT with a DNA probe test) Direct comparison of several throat culture techniques: no

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Chapin 2002 *(Continued)*

	Person performing the throat sample: physicians Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: symptoms of pharyngitis Age range for inclusion: not reported ("paediatric outpatient clinics")
Patient characteristics and setting	Sample size: 520 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 33.1% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: walk-in clinic ("paediatric outpatient clinics") Multi-centre study
Index tests	Throat swab: 1 double swab (1 swab was used for the RADT, 1 swab for the DNA probe technique, and the pledget was used for culture) Commercial name of the RADT: Strep A OIA (Thermo Biostar) Type of RADT: OIA
Target condition and reference standard(s)	Throat culture medium: enrichment Atmosphere of incubation: anaerobic Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The RADT was compared to a DNA probe technique; such molecular tests are not in the scope of this review. Travel grant support provided by Gen-Probe, manufacturer of the DNA probe assay under evaluation

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		

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Chapin 2002 *(Continued)*

Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Chiadmi 2004a

Study characteristics

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Chiadmi 2004a *(Continued)*

Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: yes Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: yes (within 7 days before inclusion) Clinical selection of patients: explicit criteria but not a score (see below) Presenting signs and symptoms: signs and symptoms of pharyngitis or pharyngo-tonsillitis (fever, sore throat, inflammation of pharynx) Age range for inclusion: 8 to 14 years
Patient characteristics and setting	Sample size: 75 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 33.3% (95% CI not reported) Country of study: France Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: other ("paediatric consultation") Single-centre study
Index tests	Throat swab (1 single, 1 double, 2 different): unclear Commercial name of the RADT: Test Pack Plus (Abbott) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: inhibitory Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article (in French)
Notes	A total of 7 RADTs were performed in the same sample of children (5 EIAs and 2 LAs). We only extracted data regarding the evaluation of EIA tests

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		

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Chiadmi 2004a *(Continued)*

Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

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Chiadmi 2004b

Study characteristics			
Patient sampling	See Chiadmi 2004a		
Patient characteristics and setting	See Chiadmi 2004a		
Index tests	Throat swab (1 single, 1 double, 2 different): unclear Commercial name of the RADT: IM Strep A (International Microbio) Type of RADT: EIA		
Target condition and reference standard(s)	See Chiadmi 2004a		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article (in French)		
Notes	A total of 7 RADTs were performed in the same sample of children (5 EIAs and 2 LAs). We only extracted data regarding the evaluation of EIA tests		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			

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Chiadmi 2004b *(Continued)*

Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Chiadmi 2004c

Study characteristics			
Patient sampling	See Chiadmi 2004a		
Patient characteristics and setting	See Chiadmi-a		
Index tests	Throat swab (1 single, 1 double, 2 different): unclear Commercial name of the RADT: Clearview Strep A Type of RADT: EIA		
Target condition and reference standard(s)	See Chiadmi 2004a		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article (in French)		
Notes	A total of 7 RADTs were performed in the same sample of children (5 EIAs and 2 LAs). We only extracted data regarding the evaluation of EIA tests		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**

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Chiadmi 2004c *(Continued)*

DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

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Chiadmi 2004d

Study characteristics			
Patient sampling	See Chiadmi 2004a		
Patient characteristics and setting	See Chiadmi 2004a		
Index tests	Throat swab (1 single, 1 double, 2 different): unclear Commercial name of the RADT: Strep A Sign Type of RADT: EIA		
Target condition and reference standard(s)	See Chiadmi 2004a		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article (in French)		
Notes	A total of 7 RADTs were performed in the same sample of children (5 EIAs and 2 LAs). We only extracted data regarding the evaluation of EIA tests		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			

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Chiadmi 2004d *(Continued)*

Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Chiadmi 2004e

Study characteristics			
Patient sampling	See Chiadmi 2004a		
Patient characteristics and setting	See Chiadmi 2004a		
Index tests	Throat swab (1 single, 1 double, 2 different): unclear Commercial name of the RADT: Streptavit Type of RADT: EIA		
Target condition and reference standard(s)	See Chiadmi 2004a		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article (in French)		
Notes	A total of 7 RADTs were performed in the same sample of children (5 EIAs and 2 LAs). We only extracted data regarding the evaluation of EIA tests		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**

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Chiadmi 2004e *(Continued)*

DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

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Chu 1990

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: explicit criteria but not a score (see below) Presenting signs and symptoms: one or more of the following: sore throat, tonsil exudate, pharyngeal erythema, enlarged anterior cervical lymph node, fever or skin rash suggestive of scarlet fever Age range for inclusion: 3 to 18 years
Patient characteristics and setting	Sample size: 444 Age (distribution): mean = 9.8 years GAS prevalence according to culture (with 95% confidence interval): 9.5% (95% CI not reported) Country of study: Taiwan Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: mixed (hospital outpatient clinics, emergency department and a private office clinic) Multi-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: Visuwell Strep A (ADI) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic Duration of incubation: 24 hours GAS confirmation: bacitracin disk Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	—

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			

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Chu 1990 *(Continued)*

Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

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Clegg 1987

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: acute pharyngitis Age range for inclusion: not reported ("paediatric patients")
Patient characteristics and setting	Sample size: 205 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 48.3% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based Single-centre study
Index tests	Throat swab: 1 single swab (used for culture and then for the RADT) Commercial name of the RADT: Ventrescreen (Ventrex Laboratories) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: not reported GAS confirmation: bacitracin disk Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	—

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			

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Clegg 1987 *(Continued)*

Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		
		Low	**Unclear**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

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Cohen 1988

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: explicit criteria but not a score (see below) Presenting signs and symptoms: pharyngitis with fever Age range for inclusion: 2 to 14 years
Patient characteristics and setting	Sample size: 92 Age (distribution): mean age = 6.3 years GAS prevalence according to culture (with 95% confidence interval): 29.3% (95% CI not reported) Country of study: France Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: mixed (office-based and hospital) Multi-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: Group A Strep Test (Quidel) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: enrichment and inhibitory Atmosphere of incubation: aerobic Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article (in French)
Notes	—

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		

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Cohen 1988 *(Continued)*

Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	No		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		High	

Cohen 1998

Study characteristics	
Patient sampling	Cross-sectional study

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Cohen 1998 *(Continued)*

	Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physician Exclusion if recent antibiotics use before inclusion: yes (within 7 days before inclusion) Clinical selection of patients: implicit criteria (see below) Presenting signs and symptoms: acute pharyngitis or tonsillitis with dysphagia or fever Age range for inclusion: 4 to 15 years
Patient characteristics and setting	Sample size: 563 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 21.5% (95% CI not reported) Country of study: France Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based Multi-centre study
Index tests	Throat swab: 2 different (first one for the RADT, second one only if RADT+) Commercial name of the RADT: TestPack Plus Strep A (Abbott) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: inhibitory Atmosphere of incubation: anaerobic Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article (in French)
Notes	The study was supported by ASTRA laboratories

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		

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Cohen 1998 *(Continued)*

Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	No		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	No		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		
		High	

Cohen 2004

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear

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Cohen 2004 *(Continued)*

	Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: signs and symptoms of pharyngitis Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 604 Age (distribution): median age = 5.5 years GAS prevalence according to culture (with 95% confidence interval): 45.5% (95% CI not reported) Country of study: France Sex (% of girls): not reported Clinical severity assessment: McIsaac score and Wald score Clinical setting: mixed (office-based and emergency department) Multi-centre study
Index tests	Throat swab: 2 different swabs (1 swab for the RADT, 1 swab for culture) Commercial name of the RADT: not reported ("EIA no name") Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: not reported Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Throat culture performed only for children with negative RADT results (partial verification)

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		

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Cohen 2004 *(Continued)*

Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	No		
Were RADTs conducted during consultation time?	Yes		
		High	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	No		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	No		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		High	

Cohen 2012

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no

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Cohen 2012 *(Continued)*

	Person performing the throat sample: physician Exclusion if recent antibiotics use before inclusion: yes (within 7 days before inclusion) Clinical selection of patients: none Presenting signs and symptoms: pharyngitis (inflammation of the pharynx and/or tonsils) Age range for inclusion: 3 to 15 years
Patient characteristics and setting	Sample size: 785 Age (distribution): mean (SD) = 6.1 (2.5) years GAS prevalence according to culture (with 95% confidence interval): 36.3% (95% CI 32.9 to 39.8) Country of study: France Sex (% of girls): 44.7% Clinical severity assessment: McIsaac score Clinical setting: office-based Multi-centre study
Index tests	Throat swab: 1 double swab (1 swab for the RADT, 1 swab for culture) Commercial name of the RADT: StreptAtest (Dectrapharm) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic Duration of incubation: 48 hours GAS confirmation: latex agglutination (Prolex) Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Funded by Dectrapharm (manufacturer of the RADT) and educational grants

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		

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Cohen 2012 *(Continued)*

Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	No		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		
		Low	

Cohen 2013

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physician

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Cohen 2013 *(Continued)*

	Exclusion if recent antibiotics use before inclusion: yes (within 7 days before inclusion) Clinical selection of patients: none Presenting signs and symptoms: children with a diagnosis of pharyngitis Age range for inclusion: 3 to 14 years
Patient characteristics and setting	Sample size: 676 Age (distribution): mean (SD) = 6.1 (2.5) years GAS prevalence according to culture (with 95% confidence interval): 41.4% (95% CI 37.7 to 45.2) Country of study: France Sex (% of girls): 46.3% Clinical severity assessment: none Clinical setting: office-based Multi-centre study
Index tests	Throat swab: 1 double swab (1 swab for the RADT, 1 swab for culture) Commercial name of the RADT: StreptAtest (Dectrapharm) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: inhibitory and enrichment Atmosphere of incubation: anaerobic Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 2 (the second plate was inoculated if the first one was negative after 48 hours of incubation) Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Funded by Dectrapharm (manufacturer of the RADT)

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		

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Cohen 2013 *(Continued)*

Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	No		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		
		Low	

Contessotto 2000

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported

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Contessotto 2000 *(Continued)*

	Exclusion if recent antibiotics use before inclusion: yes (within 3 days before inclusion) Clinical selection of patients: none Presenting signs and symptoms: acute pharyngitis and/or tonsillitis Age range for inclusion: 6 months to 14 years
Patient characteristics and setting	Sample size: 401 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 28.2% (95% CI +/- 4.4%) Country of study: Spain Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: mixed (office-based and emergency department) Multi-centre study
Index tests	Throat swab: 1 double swab (1 swab for the RADT, 1 swab for culture) Commercial name of the RADT: QuickVue Flex Strep A (Quidel) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation (aerobic, aerobic with CO_2 enrichment, anaerobic): not reported Duration of incubation: 48 hours GAS confirmation: bacitracin disk and latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article (Spanish)
Notes	—

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		

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Contessotto 2000 *(Continued)*

		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Dagnelie 1998

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physicians Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none

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Dagnelie 1998 *(Continued)*

	Presenting signs and symptoms: sore throat for less than 15 days Age range for inclusion: 4 to 14 years
Patient characteristics and setting	Sample size: 79 (total of 558 patients but only 79 children) Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 58.2% (95% CI not reported) Country of study: the Netherlands Sex (% of girls): not reported Clinical severity assessment: Centor score Clinical setting: office-based Multi-centre study
Index tests	Throat swab: 2 different swabs (1 swab for the RADT, 1 swab for culture) Commercial name of the RADT: Directgen 1-2-3 (Becton Dickinson) Type of RADT: EIA (liposomal test)
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic and anaerobic Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: unclear Assessment of GAS antibody response: yes Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The study included children and adults; we extracted data only for children

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			

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Dagnelie 1998 *(Continued)*

Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		
		Unclear	**Unclear**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Daly 1994

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: pharyngitis Age range for inclusion: not reported ("children")

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Daly 1994 *(Continued)*

Patient characteristics and setting	Sample size: 424 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 17.9% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: child medical centre Single-centre study
Index tests	Throat swab: 1 single swab (used for culture and then for the RADT) Commercial name of the RADT: Strep A OIA (Biostar) Type of RADT: OIA
Target condition and reference standard(s)	Throat culture medium: enrichment in a Todd-Hewitt broth followed by culture on a selective medium Atmosphere of incubation: 35°C, aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: bacitracin disk and latex test (and PYR test) Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Supported by a grant from Biostar (manufacturer of the RADT)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Unclear		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		

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Daly 1994 *(Continued)*

Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Della-Latta 1994

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: acute pharyngitis Age range for inclusion: 2 to 19 years
Patient characteristics and setting	Sample size: 690 Age (distribution): not reported

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Della-Latta 1994 *(Continued)*

	GAS prevalence according to culture (with 95% confidence interval): 13.3% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: emergency department Single-centre study
Index tests	Throat swab: 1 single swab (used for culture and then for the RADT) Commercial name of the RADT: Strep A OIA (BioStar) Type of RADT: OIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: latex agglutination Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: pledgets were also incubated in a Todd-Hewitt broth to improve GAS recovery (data not extracted)
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	—

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		

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Della-Latta 1994 *(Continued)*

		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

Ding 2011

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physicians Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: signs and symptoms of acute upper respiratory infection Age range for inclusion: 6 months to 14 years
Patient characteristics and setting	Sample size: 630 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 29.5% (95% CI not reported) Country of study: China Sex (% of girls): 39.5%

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Ding 2011 *(Continued)*

	Clinical severity assessment: none Clinical setting: walk-in clinic Multi-centre study		
Index tests	Throat swab: 1 double swab (1 swab was used for the RADT, 1 swab for a FISH technique, and the pledget for culture) Commercial name of the RADT: Clearview Exact Strep A Type of RADT: EIA		
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 24 hours GAS confirmation: bacitracin disk and latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article		
Notes	The RADT was compared to a FISH technique; such techniques were out of the scope of this review		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		
		Low	**Unclear**

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Ding 2011 *(Continued)*

DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Dobkin 1987

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: patients with acute pharyngitis Age range for inclusion: not reported
Patient characteristics and setting	Sample size: 221 Age (distribution): not reported ("Almost all swabs were obtained from children younger than 16 years of age") GAS prevalence according to culture (with 95% confidence interval): 30.8% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: unclear

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Dobkin 1987 *(Continued)*

	Single-centre study		
Index tests	Throat swab: not reported Commercial name of the RADT: Test Pack Strep A (Abbott) Type of RADT: EIA		
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: bacitracin disk and latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article		
Notes	Supported by a grant from Abbott (manufacturer of the RADT)		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Unclear		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			

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Dobkin 1987 *(Continued)*

Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	No		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Donatelli 1992a

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: yes Direct comparison of several throat culture techniques: no Person performing the throat sample: laboratory personnel (data from nurses not extracted) Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: patients presenting with and symptoms of acute pharyngitis Age range for inclusion: not reported (performed in a children's hospital)
Patient characteristics and setting	Sample size: 180 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 22.8% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: mixed (general paediatric clinic and emergency department)

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Donatelli 1992a *(Continued)*

	Single-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: Directgen 1-2-3 Type of RADT: EIA (liposome assay)
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic Duration of incubation: 48 hours GAS confirmation: other (PYR test during first third of the study, then latex test) Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The study compared results obtained by nurses and by laboratory technologists; we extracted data only for laboratory technologists. This study was funded in part by Health and Welfare Canada

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		
		Unclear	**Unclear**

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Donatelli 1992a *(Continued)*

DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Donatelli 1992b

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: yes Direct comparison of several throat culture techniques: no Person performing the throat sample: laboratory personnel (data from nurses not extracted) Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: patients presenting with and symptoms of acute pharyngitis Age range for inclusion: not reported
Patient characteristics and setting	Sample size: 203 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 21.7% (95% CI not reported) Country of study: USA Sex (% of girls): not reported

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Donatelli 1992b *(Continued)*

	Clinical severity assessment: none Clinical setting: mixed (general paediatric clinic and emergency department) Single-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: ICON Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic Duration of incubation: 48 hours GAS confirmation: other (PYR test during first third of the study, then latex test) Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The study compared results obtained by nurses and by laboratory technologists; we extracted data only for laboratory technologists. This study was funded in part by Health and Welfare Canada

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		

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Donatelli 1992b *(Continued)*

Were RADTs conducted during consultation time?	Unclear		
		Unclear	**Unclear**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

dos Santos 2005

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: the "researcher" Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: explicit criteria but not a score (see below) Presenting signs and symptoms: children with a painful throat and evidence of inflammation of throat or tonsils and no sign of viral respiratory infection (rhinorrhoea, coryza, conjunctivitis, coughing and/or sneezing) Age range for inclusion: 2 to 13 years
Patient characteristics and setting	Sample size: 376 Age (distribution): not reported

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dos Santos 2005 *(Continued)*

	GAS prevalence according to culture (with 95% confidence interval): 24.5% (95% CI not reported) Country of study: Brazil Sex (% of girls): 54% Clinical severity assessment: none Clinical setting: emergency department Single-centre study
Index tests	Throat swab: 1 double swab (1 swab for the RADT, 1 swab for culture) Commercial name of the RADT: QuickVue Plus Strep A (Quidel) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: bacitracin disk (and PYR test) Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The first author received public funding (Coordination for the Improvement of Higher Education Personnel, Brazilian Ministry of Higher Education)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		

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dos Santos 2005 *(Continued)*

Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		
		Low	

Drulak 1988

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: other ("staff") Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: pharyngitis Age range for inclusion: < 18 years
Patient characteristics and setting	Sample size: 280 Age (distribution): not reported

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Drulak 1988 *(Continued)*

	GAS prevalence according to culture (with 95% confidence interval): 20.4% (95% CI not reported) Country of study: Canada Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: outpatient clinic ("outpatient department of a large paediatric institution") Single-centre study
Index tests	Throat swab: 1 double swab (1 swab for the RADT, 1 swab for culture) Commercial name of the RADT: Visuwell Strep A (ADI) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic during 24 hours then aerobic with CO_2 enrichment during 24 hours Duration of incubation: 48 hours GAS confirmation: other (capillary tube precipitation) Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The study had 2 parts: 1 with adults and children (n = 585), the second with children only (n = 280). The data used for this systematic review were restricted to the second part because paediatric data were not extractable from the first part of the study Study conducted by the manufacturer of the RADT under investigation (Visuwell, ADI)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**

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Drulak 1988 *(Continued)*

DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Drulak 1991

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no

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Drulak 1991 *(Continued)*

	Clinical selection of patients: none Presenting signs and symptoms: pharyngitis Age range for inclusion: < 18 years
Patient characteristics and setting	Sample size: 202 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 26.7% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: outpatient clinic Single-centre study
Index tests	Throat swab: 1 swab (used for culture and then for the RADT) Commercial name of the RADT: Visuwell Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 24 hours GAS confirmation: bacitracin disk followed by latex test Number of plates inoculated: unclear Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	First and last author affiliated with the manufacturer. We thank Dr M Drulak for sharing unpublished paediatric data

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**

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Drulak 1991 *(Continued)*

DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Edmonson 2005

Study characteristics	
Patient sampling	Cross-sectional study Retrospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: no (exclusion only if current antimicrobial therapy) Clinical selection of patients: patients enrolled retrospectively if they had a diagnotic test to detect GAS

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Edmonson 2005 *(Continued)*

	Presenting signs and symptoms: n/a (see above) Age range for inclusion: < 24 years
Patient characteristics and setting	Sample size: 1184 Age (distribution): 63% between 5 and 15 years of age GAS prevalence according to culture (with 95% confidence interval): 38% (95% CI 35 to 41) Country of study: USA Sex (% of girls): 53% Clinical severity assessment: McIsaac score Clinical setting: walk-in clinic Single-centre study
Index tests	Throat swab: 1 single swab for culture and then for the RADT during first 11 months then 1 double swab (1 swab for the RADT, 1 swab for culture) Commercial name of the RADT: CARDS QS Strep A (Quidel) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Throat culture performed only for children with negative RADT results (partial verification)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**

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Edmonson 2005 *(Continued)*

DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	No		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		
		High	

Egger 1990a

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: yes Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: clinical pharyngitis

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Egger 1990a *(Continued)*

	Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 579 Age (distribution): range 9 months to 14 years 1 month GAS prevalence according to culture (with 95% confidence interval): 19.0% (95% CI not reported) Country of study: Switzerland Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: walk-in clinic Single-centre study
Index tests	Throat swab: 2 different swabs (1 swab for the RADT, 1 swab for culture) Commercial name of the RADTs: Test Pack Strep A Type of RADTs: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic during 24 hours and if negative reincubated during 24 hours in CO_2 enriched atmosphere Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Supported by grants from the manufacturers of the RADTs (Abbott and Hoffmann-La Roche)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			

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Egger 1990a *(Continued)*

Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	No		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		
		Low	

Egger 1990b

Study characteristics	
Patient sampling	See Egger 1990a
Patient characteristics and setting	See Egger 1990a
Index tests	Throat swab: 2 different swabs (1 swab for the RADT, 1 swab for culture) Commercial name of the RADTs: Direct Strep A Type of RADTs: EIA
Target condition and reference standard(s)	See Egger 1990a
Flow and timing	No follow-up

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Egger 1990b *(Continued)*

Comparative			
Type of study	Journal article		
Notes	Supported by grants from the manufacturers of the RADTs (Abbott and Hoffmann-La Roche)		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	No		

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Egger 1990b *(Continued)*

Did all patients receive a throat culture?	Yes
Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	Yes
Were withdrawals from the study explained?	Yes
	Low

Enright 2011

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: nurse Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: presentation consistent with symptomatic pharyngitis Age range for inclusion: 0 to 13 years
Patient characteristics and setting	Sample size: 177 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 21.5% (95% CI not reported) Country of study: Scotland Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: emergency department Single-centre study
Index tests	Throat swab: 2 different swabs (1 swab for the RADT, 1 swab for culture) Commercial name of the RADT: QuickVue In-Line Strep A (Quidel) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: not reported Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: throat culture technique not described
Flow and timing	No follow-up

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Enright 2011 *(Continued)*

Comparative			
Type of study	Journal article		
Notes	No specific funding reported but the RADTs were made available by the manufacturer (Quidel)		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		

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Enright 2011 *(Continued)*

Did all patients receive a throat culture?	Yes
Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	Yes
Were withdrawals from the study explained?	Yes
	Low

Ezike 2005

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: convenience Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physician Exclusion if recent antibiotics use before inclusion: yes Clinical selection of patients: explicit criteria but not a score (see below) Presenting signs and symptoms: acute pharyngitis without rhinorrhoea or conjunctivitis (considered suggestive of viral infection) Age range for inclusion: 5 to 18 years
Patient characteristics and setting	Sample size: 186 (group 2) Age (distribution): mean (SD) = 9.9 (3.7) years GAS prevalence according to culture (with 95% confidence interval): 42.5% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: McIsaac score Clinical setting: emergency department Single-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: Strep A OIA MAX Type of RADT: OIA
Target condition and reference standard(s)	Throat culture medium: enrichment Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	

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Ezike 2005 *(Continued)*

Type of study	Journal article
Notes	This study was supported by the Sarnaik Endowment Resident and Fellow Research Fund, Children's Hospital of Michigan, Detroit. Some rapid test kits were provided by Thermo Electron Corporation

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		

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Ezike 2005 *(Continued)*

Did all patients receive a throat culture?	Yes
Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	Yes
Were withdrawals from the study explained?	Yes
	Low

Faverge 2004

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: unclear Presenting signs and symptoms: not reported Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 84 Age (distribution): range 7 months to 14 years GAS prevalence according to culture (with 95% confidence interval): 22.6% (95% CI not reported) Country of study: France Sex (% of girls): 42% Clinical severity assessment: none Clinical setting: mixed (paediatric ward, outpatient clinic, emergency department from a general hospital) Single-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: StreptAtest Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: not reported Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: throat culture technique not described
Flow and timing	No follow-up
Comparative	

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Faverge 2004 *(Continued)*

Type of study	Journal article (in French)
Notes	—

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Unclear		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		

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Faverge 2004 *(Continued)*

Were undetermined/uninterpretable results reported?	No	
Were withdrawals from the study explained?	No	
		Low

Felsenstein 2014

Study characteristics	
Patient sampling	Cross-sectional study Retrospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: nurse Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: pharyngitis, fever of unknown origin, upper respiratory tract symptoms, or subjective complaints of throat pain or discomfort on swallowing Age range for inclusion: not reported ("paediatric patients")
Patient characteristics and setting	Sample size: 361 Age (distribution): mean (SD) = 7.4 (4.2) years GAS prevalence according to culture (with 95% confidence interval): 16.1% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: Centor and McIsaac scores (only in those with positive throat culture or RADT result Clinical setting: emergency department Single-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: OSOM Ultra Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article

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Felsenstein 2014 *(Continued)*

Notes	No specific funding reported but the manufacturer of a rapid molecular test also evaluated in the study (illumigene, Meridian Biosciences) supplied assay kits, incubator and reader for the study

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		High	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		

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Felsenstein 2014 *(Continued)*

Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	No
Were withdrawals from the study explained?	Yes
	Low

Finger 1999

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: complaint of sore throat with at least one sign of pharyngitis (redness of throat, purulent exudate in throat, or anterior cervical lymphadenopathy) Age range for inclusion: 3 to 16 years
Patient characteristics and setting	Sample size: 777 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 30.8% (95% CI not reported) Country of study: Vietnam Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: mixed (emergency department and outpatient clinics) Multi-centre study
Index tests	Throat swab: 2 different swabs (1 swab for the RADT, 1 swab for culture) Commercial name of the RADT: QuickVue Flex Strep A (Quidel) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: not reported Duration of incubation: 48 hours GAS confirmation: bacitracin disk Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: during the first half of the study, the laboratory investigators read cultures with knowledge of the result of the RADT
Flow and timing	No follow-up

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Finger 1999 *(Continued)*

Comparative	
Type of study	Journal article
Notes	No specific funding reported but the manufacturer of the RADT (Quidel) provided the RADTs

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			

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Finger 1999 *(Continued)*

Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes	
Did all patients receive a throat culture?	Yes	
Did patients receive the same throat culture method?	Yes	
Were undetermined/uninterpretable results reported?	No	
Were withdrawals from the study explained?	No	
		Low

Flores Mateo 2010

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physicians Exclusion if recent antibiotics use before inclusion: yes (within 15 days before enrollment) Clinical selection of patients: none Presenting signs and symptoms: sore throat for less than 5 days Age range for inclusion: 1 to 14 years
Patient characteristics and setting	Sample size: 211 Age (distribution): mean (SD) = 6.6 (3.8) years GAS prevalence according to culture (with 95% confidence interval): 34.1% (95% CI not reported) Country of study: Spain Sex (% of girls): 55.8% Clinical severity assessment: McIsaac score Clinical setting: walk-in clinic Multi-centre study
Index tests	Throat swab: 2 different swabs (1 swab for the RADT, 1 swab for culture) Commercial name of the RADT: OSOM Strep A (Gemzyme) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: bacitracin disk and latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no

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Flores Mateo 2010 *(Continued)*

	Relevant details: -		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article (in Spanish)		
Notes	—		

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			

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Flores Mateo 2010 *(Continued)*

Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear
Did all patients receive a throat culture?	Yes
Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	No
Were withdrawals from the study explained?	Yes
	Low

Forward 2006

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: not reported ("pharyngeal swabs received from children") Age range for inclusion: < 16 years
Patient characteristics and setting	Sample size: 490 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 24.1% (95% CI not reported) Country of study: Canada Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: unclear (laboratory study) Single-centre study
Index tests	Throat swab: 1 single swab (used for culture and then for the RADT) Commercial name of the RADT: Strep A Rapid test Device Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic Duration of incubation: 48 hours GAS confirmation: PYR test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -

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Forward 2006 *(Continued)*

Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	—

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Unclear		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		

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Forward 2006 *(Continued)*

Did all patients receive a throat culture?	Yes
Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	No
Were withdrawals from the study explained?	Yes
	Low

Fourati 2009

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: pharyngotonsillitis Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 292 Age (distribution): mean (SD) = 6.7 (3.5) years GAS prevalence according to culture (with 95% confidence interval): 20.2% (95% CI not reported) Country of study: Tunisia Sex (% of girls): 39% Clinical severity assessment: none Clinical setting: mixed (emergency department and walk-in clinics) Multi-centre study
Index tests	Throat swab: 2 different swabs (1 swab for the RADT, 1 swab for culture) Commercial name of the RADT: Streptop A (ALL-Diag) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 24 hours GAS confirmation: not reported Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	

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Fourati 2009 *(Continued)*

Type of study	Journal article (in French)
Notes	—

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		

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Fourati 2009 *(Continued)*

Were undetermined/uninterpretable results reported?	No	
Were withdrawals from the study explained?	Yes	
		Low

Gerber 1990

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: implicit criteria (see below) Presenting signs and symptoms: "clinical findings suggestive of GA(BH)S pharyngitis" Age range for inclusion: not reported ("private pediatric practice")
Patient characteristics and setting	Sample size: 228 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 59.2% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based Single-centre study
Index tests	Throat swab: 2 different swabs (1 swab for the RADT, 1 swab for culture) Commercial name of the RADT: QTest Strep (Becton Dickinson) Type of RADT: EIA (liposomal assay)
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: bacitracin disk and latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article

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Gerber 1990 *(Continued)*

Notes	—

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		

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Gerber 1990 *(Continued)*

Were withdrawals from the study explained?	No
	Low

Gerber 1997

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: acute pharyngitis Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 2113 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 47.6% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based Multi-centre study
Index tests	Throat swab: 1 single swab (used for culture and then for the RADT) Commercial name of the RADT: Strep A OIA (Biostar) Type of RADT: OIA
Target condition and reference standard(s)	Throat culture medium: standard culture and culture following incubation in a Todd-Hewitt enrichment broth Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: bacitracin disk +/- latex test Number of plates inoculated: 2 Assessment of GAS antibody response: no Relevant details: composite reference standard (office standard culture + laboratory enriched culture). Office tests (culture and RADT) were reviewed in the laboratory. The same swab was used for multiple purposes (office culture, RADT and lab culture).
Flow and timing	No follow-up
Comparative	
Type of study	Journal article

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Gerber 1997 *(Continued)*

Notes	Supported by a grant from Biostar (manufacturer of the RADT)

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		

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Gerber 1997 *(Continued)*

Were undetermined/uninterpretable results reported?	No	
Were withdrawals from the study explained?	Yes	
		Low

Gieseker 2002a

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: yes Direct comparison of several throat culture techniques: yes Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: implicit criteria ("children suspected of having S. pyogenes pharyngitis") Presenting signs and symptoms: not reported Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 302 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 28.8% (plate 1) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: mixed (child health clinic and emergency department) Multi-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADTs: Strep A OIA Max (Biostar) Type of RADTs: OIA
Target condition and reference standard(s)	Throat culture medium: inhibitory Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 4 Assessment of GAS antibody response: no Relevant details: the study used a composite reference standard relying on 4 media plated for each culture but we only extracted the data corresponding to the "same swab single plate standard", i.e., single inhibitory plate using the same swab first for culture and then for performing the RADT. This standard may resemble what is used in practice in most settings.
Flow and timing	No follow-up

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Gieseker 2002a *(Continued)*

Comparative			
Type of study	Journal article		
Notes	Supported by a grant from one of the manufacturers of the RADTs under evaluation (Genzyme)		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			

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Gieseker 2002a *(Continued)*

Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	No		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Gieseker 2002b

Study characteristics	
Patient sampling	See Gieseker 2002a
Patient characteristics and setting	See Gieseker 2002a
Index tests	Throat swab: 2 different swabs Commercial name of the RADTs: OSOM Ultra Strep A (Genzyme) Type of RADTs: EIA
Target condition and reference standard(s)	See Gieseker 2002a
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Supported by a grant from one of the manufacturers of the RADTs under evaluation (Genzyme)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	No		

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Gieseker 2002b *(Continued)*

Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	No		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Gieseker 2003

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: no

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Gieseker 2003 *(Continued)*

	Clinical selection of patients: implicit criteria (see below) Presenting signs and symptoms: patients suspected of having *S. pyogenes* pharyngitis Age range for inclusion: not reported
Patient characteristics and setting	Sample size: 887 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 23.7% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based Single-centre study
Index tests	Throat swab: 1 single swab (used for culture and then for the RADT) Commercial name of the RADT: OSOM Ultra Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: inhibitory Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 2 Assessment of GAS antibody response: no Relevant details: 2 swabs were taken for each participant. We extracted the data corresponding to Swab #2 because it was fully processed in the microbiology laboratory whereas Swab #1 was processed in the paediatrician's office.
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The study was funded by Genzyme (manufacturer of the RADT)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	No		

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Gieseker 2003 *(Continued)*

Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Gurol 2010

Study characteristics	
Patient sampling	Cross-sectional study Retrospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear

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Gurol 2010 *(Continued)*

	Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: patients for whom RADT and culture were requested Presenting signs and symptoms: not reported Age range for inclusion: not reported ("all patients", i.e., adults and children; data extractable for children 0 to 9 years of age)
Patient characteristics and setting	Sample size: 178 (total sample 453, paediatric sample 0 to 9 years 178) Age (distribution): not reported in this age group (0 to 9 years) GAS prevalence according to culture (with 95% confidence interval): 22.5% (95% CI not reported) Country of study: Turkey Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: outpatient clinic of a university hospital Single-centre study
Index tests	Throat swab: unclear Commercial name of the RADT: QuickVue Plus Strep A (Quidel) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: bacitracin disk Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The RADT is referred to as "QuickVue Strep A cassette test" from Quidel. Quidel manufactures 2 cassette 2: QuickVue In-Line and QuickVue Plus. The accuracy mentioned by the authors as being reported in the package insert corresponds to those from the QuickVue Plus test.

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		

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Gurol 2010 *(Continued)*

Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

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Hall 2004

Study characteristics	
Patient sampling	Cross-sectional study Retrospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: nurse or medical assistant Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: implicit criteria ("all children with suspected GAS pharyngitis") Presenting signs and symptoms: unclear (see above) Age range for inclusion: 2 to 17 years
Patient characteristics and setting	Sample size: 561 Age (distribution): median age = 9 years GAS prevalence according to culture (with 95% confidence interval): 27.1% (95% CI not reported) Country of study: USA Sex (% of girls): 53% Clinical severity assessment: Centor score (modified) Clinical setting: mixed ("departments of pediatrics, family medicine, urgent care, and emergency medicine and primary care satellite centers") Multi-centre study
Index tests	Throat swab: 2 different swabs (1 swab for culture, 1 swab for the RADT) Commercial name of the RADT: Acceava Strep A (Biostar) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard (plate 1) and inhibitory (plate 2) Atmosphere of incubation: aerobic (plate 1) and aerobic with CO_2 enrichment (plate 2) Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Throat culture performed only for children with negative RADT results (partial verification). Funded by the US Centers for Disease Control and Prevention.

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**

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Hall 2004 *(Continued)*

DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	No		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		High	

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Harris 1995

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physician Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: signs of pharyngitis Age range for inclusion: 2 to 18 years
Patient characteristics and setting	Sample size: 519 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 22.0% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: other (in-house score) Clinical setting: walk-in clinic Single-centre study
Index tests	Throat swab: 1 single swab (used for culture and then for the RADT) Commercial name of the RADT: Strep A OIA (Biostar) Type of RADT: OIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	RADT kits were provided by the manufacturer (Biostar)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		

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Harris 1995 *(Continued)*

Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Hart 1997

Study characteristics	
Patient sampling	Cross-sectional study

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Hart 1997 *(Continued)*

	Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes Person performing the throat sample: nurses Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: patients presenting with pharyngitis Age range for inclusion: not reported ("adults" and "children"; data extractable for patients ≤ 18 years)
Patient characteristics and setting	Sample size: total sample 263, paediatric sample 75 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 21% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: walk-in clinic ("family practice clinic") Single-centre study
Index tests	Throat swab: 1 double swab (each swab was used first for culture and then for performing the RADT; paired swabs were collected to study swab-to-swab variability but only the result from one randomly selected swab was used for estimating diagnostic accuracy) Commercial name of the RADT: Strep A OIA (Biostar) Type of RADT: OIA
Target condition and reference standard(s)	Throat culture medium: inhibitory and enrichment (using the pledget) Atmosphere of incubation: anaerobic Duration of incubation: 48 hours GAS confirmation: bacitracin disk Number of plates inoculated: 2 plates per swab (1 selective plate and 1 selective plate following Todd-Hewitt enrichment) Assessment of GAS antibody response: no Relevant details: 2 swabs were collected to study swab-to-swab variability but only the result from one randomly selected swab was used for estimating accuracy measurements
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Technical and partial financial assistance was provided by Biostar (manufacturer of the RADT)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			

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Hart 1997 *(Continued)*

Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		

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Hart 1997 *(Continued)*

Were withdrawals from the study explained?	No
	Low

Henderson 1988

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: yes (EIA versus LA) Direct comparison of several throat culture techniques: no Person performing the throat sample: physician Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: unclear Presenting signs and symptoms: unclear Age range for inclusion: birth to 17 years
Patient characteristics and setting	Sample size: 117 (total sample 218; 117 were tested by EIA) Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 33.3% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: emergency department Single-centre study
Index tests	Throat swab: unclear Commercial name of the RADT: not reported ("EIA no name") Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: not reported Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: unclear Assessment of GAS antibody response: no Relevant details: throat culture technique not described
Flow and timing	No follow-up
Comparative	
Type of study	Conference abstract (published in the American Journal of Diseases in Children)
Notes	The study compared an EIA rapid test to a LA test and compared the accuracy of both tests performed in the emergency room or in the microbiology

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Henderson 1988 *(Continued)*

	laboratory. We extracted data only for the EIA test performed in the emergency room.

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Unclear	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		

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Henderson 1988 *(Continued)*

Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	No
Were withdrawals from the study explained?	No
	Low

Kaltwasser 1997

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes (and culture versus PCR) Person performing the throat sample: other ("emergency department personnel") Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: implicit criteria (enrollment if "the medical staff evaluating the patient determined that detection of GAS was needed") Presenting signs and symptoms: pharyngitis Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 200 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 28.5% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: emergency department Single-centre study
Index tests	Throat swab: 1 double swab (1 swab used first for culture and then for the RADT, 1 swab used for broth-enhanced culture and PCR) Commercial name of the RADT: Strep A OIA (Biostar) Type of RADT: OIA
Target condition and reference standard(s)	Throat culture medium: inhibitory and enrichment Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: bacitracin disk +/- latex test Number of plates inoculated: 2 Assessment of GAS antibody response: no Relevant details: only data for the simple selective plate were extracted (no enrichment)
Flow and timing	No follow-up

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Kaltwasser 1997 *(Continued)*

Comparative	
Type of study	Journal article
Notes	The study compared the RADT to 2 types of culture and to PCR. We extracted data regarding OIA versus simple agar plating. Study supported in part by an unrestricted grant from Biostar (manufacturer of the RADT).

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**

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Kaltwasser 1997 *(Continued)*

DOMAIN 4: Flow and Timing	
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear
Did all patients receive a throat culture?	Yes
Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	Yes
Were withdrawals from the study explained?	No
	Low

Kaufhold 1991a

Study characteristics	
Patient sampling	Cross-sectional study Retrospective or prospective design: unclear Sample: unclear Direct comparison of different RADTs: yes Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: data not extracted Clinical selection of patients: none Presenting signs and symptoms: suspicion of streptococcal pharyngitis Age range for inclusion: 0 to 16 years
Patient characteristics and setting	Sample size: 230 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 45.6% (95% CI not reported) Country of study: Germany Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: mixed (paediatric hospital and private offices) Multi-centre study
Index tests	Throat swab: 1 double swab Commercial name of the RADT: TestPack Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 24 to 48 hours GAS confirmation: latex test Number of plates inoculated (n): data not extracted Assessment of GAS antibody response: data not extracted

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Kaufhold 1991a *(Continued)*

	Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article (in German)
Notes	The manufacturers provided the rapid test kits. We thank Dr A Leis for translating this study report.

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**High**

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Kaufhold 1991a *(Continued)*

DOMAIN 4: Flow and Timing	
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear
Did all patients receive a throat culture?	Yes
Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	No
Were withdrawals from the study explained?	No
	Low

Kaufhold 1991b

Study characteristics	
Patient sampling	Cross-sectional study Retrospective or prospective design: unclear Sample: unclear Direct comparison of different RADTs: yes Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: data not extracted Clinical selection of patients: none Presenting signs and symptoms: suspicion of streptococcal pharyngitis Age range for inclusion: 0 to 16 years
Patient characteristics and setting	Sample size: 261 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 42.1% (95% CI not reported) Country of study: Germany Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: mixed (paediatric hospital and private offices) Multi-centre study
Index tests	Throat swab: 1 double swab Commercial name of the RADT: Tandem Icon Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 24 to 48 hours GAS confirmation: latex test Number of plates inoculated (n): data not extracted Assessment of GAS antibody response: data not extracted Relevant details: -

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Kaufhold 1991b *(Continued)*

Flow and timing	No follow-up
Comparative	
Type of study	Journal article (in German)
Notes	The manufacturers provided the rapid test kits. We thank Dr A Leis for translating this study report.

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**High**
DOMAIN 4: Flow and Timing			

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Kaufhold 1991b *(Continued)*

Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear
Did all patients receive a throat culture?	Yes
Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	No
Were withdrawals from the study explained?	No
	Low

Kellog 1987

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes (office versus laboratory culture) Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: patients with symptoms of pharyngitis Age range for inclusion: not reported (only age range of included patients)
Patient characteristics and setting	Sample size: 358 Age (distribution): mean 7.2 years (range 7 months to 19 years) GAS prevalence according to culture (with 95% confidence interval): 29.9% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based Single-centre study
Index tests	Throat swab: 1 single swab (used for culture and then for the RADT) Commercial name of the RADT: TestPack Strep A (Abbott) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic Duration of incubation: 48 hours GAS confirmation: latex test or direct fluorescent antibody procedure Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: 2 swabs were taken from each patient. Swab #1 was used in the office for culture (office culture) and then for performing the RADT. Swab #2 was

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Kellog 1987 *(Continued)*

	sent to the laboratory for culture and then for performing the RADT. We only extracted data related to analyses performed in the microbiology laboratory.
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	2 swabs were taken from each patient. Swab #1 was used in the office for culture (office culture) and then for performing the RADT. Swab #2 was sent to the laboratory for culture and then for performing the RADT. We only extracted data related to analyses performed in the microbiology laboratory.

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		

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Kellog 1987 *(Continued)*

Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes

		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

Kellog 1991

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes (office culture versus laboratory culture) Person performing the throat sample: physician Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: symptoms of pharyngitis Age range for inclusion: not reported ("pediatric offices")
Patient characteristics and setting	Sample size: 1035 Age (distribution): mean = 8.0 years (1030 children and 5 parents included) GAS prevalence according to culture (with 95% confidence interval): 40.9% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based Multi-centre study

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Kellog 1991 *(Continued)*

Index tests	Throat swab: 1 duplicate swab (swab #1 used first for culture and then for performing the RADT in the office; swab #2 used first for culture and then for performing the RADT in the microbiology laboratory) Commercial name of the RADT: SMART Group A test (New Horizons) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: when the SMART result was positive but the culture was negative, the primary inoculum zone was subcultured to both an aerobically incubated standard blood agar plate and aerobically (with CO_2 enrichment) selective blood agar plate.
Flow and timing	No follow-up.
Comparative	
Type of study	Journal article
Notes	Swab #1 was used first for culture and then for performing the RADT in the office and swab #2 was used first for culture and then for performing the RADT in the microbiology laboratory. In the laboratory, RADTs were read after 5 minutes of incubation and tests with negative results were reincubated overnight and reread. We extracted data only for the RADT performed in the laboratory and read after 5 minutes of incubation. RADT kits were provided by the manufacturer (New Horizons).

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		

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Kellog 1991 *(Continued)*

Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	No		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	No		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		
		High	

Kim 2009

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: implicit criteria (see below)

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Kim 2009 *(Continued)*

	Presenting signs and symptoms: patients with "suspected bacterial pharyngitis on the basis of the symptoms or signs" Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 293 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 66.6% (95% CI not reported) Country of study: Korea Sex (% of girls): 44.7% Clinical severity assessment: none Clinical setting: mixed (office-based and walk-in clinics) Multi-centre study
Index tests	Throat swab: 2 different swabs (unclear how they were used) Commercial name of the RADT: SD Bioline Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 24 hours GAS confirmation: bacitracin disk and latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The manufacturer of the RADT (SD) provided the kits for this study

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			

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Kim 2009 *(Continued)*

Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	No		
		Low	

Kuhn 1999

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: yes (within the previous 72 hours) Clinical selection of patients: explicit criteria but not a score (see below) Presenting signs and symptoms: sore throat and one of the following signs: pharyngeal injection or exudate, fever > 38.4°C, or cervical lymphadenopathy

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Kuhn 1999 *(Continued)*

	Age range for inclusion: 2 to 18 years
Patient characteristics and setting	Sample size: 363 throat swabs from 248 children (multiple visits allowed) Age (distribution): median 6.6 years (range 2.2 to 15.9 years) GAS prevalence according to culture (with 95% confidence interval): 36.4% (95% CI not reported) Country of study: Canada Sex (% of girls): 49.2% Clinical severity assessment: none Clinical setting: mixed (emergency department and office-based) Multi-centre study
Index tests	Throat swab: 1 single swab (used for culture and then for the RADT) Commercial name of the RADT: Strep A OIA (Biostar) Type of RADT: OIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic Duration of incubation: 48 hours GAS confirmation: bacitracin disk and latex test Number of plates inoculated: 1 standard (+1 after broth enrichment, data not extracted) Assessment of GAS antibody response: no Relevant details: the throat swab was used for standard culture and the pledget was used for a broth-enriched culture. We only extracted data relevant to the standard agar culture technique.
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The throat swab was used for standard culture and the pledget was used for a broth-enriched culture. We only extracted data relevant to the standard agar culture technique. The first author was supported by the Canadian Infectious Diseases Society Glaxo Wellcome Research Fellowship Award. The study was supported by a grant from the Alberta Children's Hospital Foundation.

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		

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Kuhn 1999 *(Continued)*

Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

Kurtz 2000

Study characteristics

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Kurtz 2000 *(Continued)*

Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no (but comparison of single-swab versus double-swab antigen extraction) Direct comparison of several throat culture techniques: yes (standard blood agar versus selective medium) Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: yes (previous 7 days) Clinical selection of patients: explicit criteria but not a score (see below) Presenting signs and symptoms: children with clinical signs of *S. pyogenes* pharyngitis ("fever, sore throat, and/or cervical adenitis and the absence of cough, rhinorrhea, lower respiratory infection, and otitis media") Age range for inclusion: 4 to 15 years
Patient characteristics and setting	Sample size: 256 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 30.9% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based Single-centre study
Index tests	Throat swab: 2 different swabs (each used first for culture and then for performing the RADT; we randomly chose to extract data for swab B) Commercial name of the RADT: Test Pack Plus (Abbott) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard and inhibitory (composite 2-plate reference standard) Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: bacitracin disk and latex test Number of plates inoculated: 2 Assessment of GAS antibody response: no Relevant details: 2 swabs were taken (A and B). Each swab was first inoculated onto a culture plate (standard or selective) and then used for performing the RADT. Culture positivity was defined as growth from either of the 2 plates. For the results of the RADT, we only extracted data for 1 swab, which was randomly chosen to be swab B.
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	2 swabs were taken (A and B). Each swab was inoculated onto a culture plate (standard or selective) and then used for antigen detection. Culture positivity was defined as growth from either of the 2 plates. For the results of the RADT, we only extracted data for 1 swab, which was randomly chosen to be swab B. Funded in part by Abbott (manufacturer of the RADT).
Methodological quality	

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Kurtz 2000 *(Continued)*

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		

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Kurtz 2000 *(Continued)*

Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	Yes
Were withdrawals from the study explained?	Yes
	Low

Küçük 2014

Study characteristics	
Patient sampling	Cross-sectional study Retrospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: yes (without precision) Clinical selection of patients: explicit criteria but not a score Presenting signs and symptoms: acute sore throat, fever and acutely inflamed throat/tonsils with or without exudates Age range for inclusion: 0 to 17 years
Patient characteristics and setting	Sample size: 892 Age (distribution): mean = 5.3 years GAS prevalence according to culture (with 95% confidence interval): 24.1% (95% CI not reported) Country of study: Turkey Sex (% of girls): 42% Clinical severity assessment: none Clinical setting: mixed (paediatric emergency department and outpatient clinics) Multi-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: QuickVue In-Line Strep A (Quidel) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: bacitracin disk Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up

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Küçük 2014 *(Continued)*

Comparative	
Type of study	Journal article
Notes	The authors reported using the "QuickVue Strep A (Quidel) cassette". Quidel manufactures several RADTs that use a cassette; we assumed the study evaluated the most simple one, QuickVue In-Line Strep A kit.

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		High	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		Unclear	**Unclear**
DOMAIN 4: Flow and Timing			

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Küçük 2014 *(Continued)*

Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes
Did all patients receive a throat culture?	Yes
Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	No
Were withdrawals from the study explained?	Yes
	Low

Laubscher 1995

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: yes (within the last 5 days) Clinical selection of patients: none Presenting signs and symptoms: all patients with a clinical diagnosis of pharyngitis Age range for inclusion: not reported ("pediatric patients")
Patient characteristics and setting	Sample size: 454 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 26.0% (95% CI not reported) Country of study: Switzerland Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: walk-in clinic Single-centre study
Index tests	Throat swab: 2 different swabs (1 swab for culture, 1 swab for performing the RADT) Commercial name of the RADT: Test Pack Strep A Plus (Abbott) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: bacitracin disk and latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no

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Laubscher 1995 *(Continued)*

	Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Supported by the manufacturer of the RADT (Abbott), which provided the kits

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**

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Laubscher 1995 *(Continued)*

DOMAIN 4: Flow and Timing	
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear
Did all patients receive a throat culture?	Yes
Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	Yes
Were withdrawals from the study explained?	Yes
	Low

Lewey 1988

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physician Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: explicit criteria but not a score (see below) Presenting signs and symptoms: sore throat and fever Age range for inclusion: 1 to 21 years
Patient characteristics and setting	Sample size: 264 Age (distribution): mean = 10.4 years GAS prevalence according to culture (with 95% confidence interval): 17.8% (95% CI not reported) Country of study: USA Sex (% of girls): 59% Clinical severity assessment: none Clinical setting: walk-in clinic Single-centre study
Index tests	Throat swab: 1 double swab (2 double swabs were taken, for a total of 4 swabs, but we extracted data only for swab #1) Commercial name of the RADT: Icon Strep A (Hybritech) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 24 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no

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Lewey 1988 *(Continued)*

	Relevant details: 2 double swabs (swab #1 and #2) were taken for each patient, for a total of 4 swabs per participant. For each double swab, swab A was used for the RADT and swab B was used for culture. We randomly chose 1 double swab for which we extracted data (swab #1).
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	2 double swabs (swab #1 and #2) were taken for each patient, for a total of 4 swabs per participant. For each double swab, swab A was used for the RADT and swab B was used for culture. We randomly chose 1 double swab for which we extracted data (swab #1).

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		

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Lewey 1988 *(Continued)*

Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		
		Low	

Llor 2008

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physician Exclusion if recent antibiotics use before inclusion: yes Clinical selection of patients: clinical score (Centor score) Presenting signs and symptoms: clinical symptoms of odynophagia and 2 or more of Centor criteria Age range for inclusion: 14 to 21 years
Patient characteristics and setting	Sample size: 42 Age (distribution): not reported, in patients 14 to 21 years GAS prevalence according to culture (with 95% confidence interval): 19.0% (95% CI not reported) Country of study: Spain Sex (% of girls): not reported, in patients 14 to 21 years Clinical severity assessment: Centor score Clinical setting: walk-in clinic Single-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: OSOM Strep A

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Llor 2008 *(Continued)*

	Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The manufacturer provided the rapid test kits. We thank Dr C Llor for sharing unpublished paediatric data.

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		

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Llor 2008 *(Continued)*

Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Macknin 1988

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: yes (EIA versus LA, data extracted only for EIA) Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: explicit criteria but not a score (see below) Presenting signs and symptoms: patients with fever and sore throat Age range for inclusion: 2 to 18 years
Patient characteristics and setting	Sample size: 120 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 49.2% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: walk-in clinic Single-centre study
Index tests	Throat swab: 3 different swabs (1 for each RADT and 1 for culture) Commercial name of the RADT: Ventrescreen Strep A Type of RADT: EIA

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Macknin 1988 *(Continued)*

Target condition and reference standard(s)	Throat culture medium: not reported Atmosphere of incubation: anaerobic Duration of incubation: not reported GAS confirmation: bacitracin disk and latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article		
Notes	—		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		
		Unclear	**Unclear**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		

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Macknin 1988 *(Continued)*

		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Maltezou 2008

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: yes (within the previous week) Clinical selection of patients: clinical score (Centor) Presenting signs and symptoms: clinical evidence of pharyngitis including one of the 4 Centor criteria (fever, tonsillar exudate, tender enlarged anterior cervical lymph nodes and absence of cough) Age range for inclusion: 2 to 14 years
Patient characteristics and setting	Sample size: 432 Age (distribution): mean = 6.8 years (calculated from data in table 1) GAS prevalence according to culture (with 95% confidence interval): 27.3% (95% CI not reported) Country of study: Greece Sex (% of girls): 53.9% Clinical severity assessment: Centor score Clinical setting: mixed (office-based and hospital outpatient clinic) Multi-centre study
Index tests	Throat swab: 2 different swabs (1 swab for culture, 1 swab for performing the RADT) Commercial name of the RADT: Link 2 Strep A Rapid Test (Becton Dickinson) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: not reported

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Maltezou 2008 *(Continued)*

	Duration of incubation: 48 hours GAS confirmation: bacitracin disk and latex test Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Funded by the Hellenic Center for Disease Control and Prevention

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		Unclear	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		

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Maltezou 2008 *(Continued)*

Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Mayes 2001a

Study characteristics	
Patient sampling	Cross-sectional study Retrospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: implicit criteria (RADTs were not used for all patients presenting with pharyngitis; different physicians used varying individual criteria to determine whether or not to use the RADT or throat culture as the primary diagnostic test) Presenting signs and symptoms: unclear Age range for inclusion: not reported
Patient characteristics and setting	Sample size: total 4847 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 28.8% (assuming all RADT positive results are true positives; 95CI not reported) Country of study: USA Sex (% of girls): 45% Clinical severity assessment: none Clinical setting: office-based (laboratory records of the Elmwood Pediatric Group) Single-centre study
Index tests	Throat swab: 2 different swabs (1 swab for performing the RADT, 1 swab for culture) Commercial name of the RADT: Qtest (Becton Dickinson)

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Mayes 2001a *(Continued)*

	Type of RADT: EIA (liposomal test)
Target condition and reference standard(s)	Throat culture medium: not reported Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: throat culture technique not described
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	We sub-divided the study into 2 time periods (Mayes 2001a and Mayes 2001b) to take into account the fact that different criteria were used to determine whether or not a RADT should be performed, and because different RADTs were used during those 2 time periods. Funded in part by an academic grant (Strong Children's Research Center, Summer Student Scholar Program, University of Rochester). Throat culture performed only for children with negative RADT results (partial verification).

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**

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Mayes 2001a *(Continued)*

DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	No		
Did patients receive the same throat culture method?	Unclear		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		High	

Mayes 2001b

Study characteristics	
Patient sampling	Cross-sectional study Retrospective design Sample: unclear Direct comparison of different RADTs: no (different RADTs used but not compared) Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: unclear Presenting signs and symptoms: unclear Age range for inclusion: not reported
Patient characteristics and setting	Sample size: total 6580 Age (distribution): not reported

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Mayes 2001b *(Continued)*

	GAS prevalence according to culture (with 95% confidence interval): 27.8% (assuming all RADT positive results are true positives: 95% CI not reported) Country of study: USA Sex (% of girls): 45% Clinical severity assessment: none Clinical setting: office-based Single-centre study
Index tests	Throat swab: 2 different swabs (1 swab for performing the RADT, 1 swab for culture) Commercial name of the RADT: Signify (Abbott) and Acceava (Biostar), data aggregated and test further referred to as "EIA (no name)" Type of RADT: EIA
Target condition and reference standard(s)	See Mayes 2001a
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	See Mayes 2001a

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**

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Mayes 2001b *(Continued)*

DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	No		
Did patients receive the same throat culture method?	Unclear		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		High	

Mazur 2014

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physician Exclusion if recent antibiotics use before inclusion: yes (within the previous 2 weeks) Clinical selection of patients: clinical score (McIsaac) Presenting signs and symptoms: clinical and epidemiological signs of acute pharyngitis suggesting GAS aetiology and McIsaac score ≥ 2 Age range for inclusion: 2 to 15 years
Patient characteristics and setting	Sample size: 90 Age (distribution): mean (SD) = 6.6 (3.4) years GAS prevalence according to culture (with 95% confidence interval): 50.0% (95% CI not reported) Country of study: Poland Sex (% of girls): 42.2% Clinical severity assessment: McIsaac score

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Mazur 2014 *(Continued)*

	Clinical setting: paediatric outpatient clinic Single-centre study		
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: QuickVue+ Strep A Test (Quidel) Type of RADT: EIA		
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: not reported Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article		
Notes	Academic funding (Medical University of Lublin, Poland)		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			

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Mazur 2014 *(Continued)*

Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

McIsaac 2004

Study characteristics	
Patient sampling	RCT (comparing 2 different antibacterial therapies for pharyngitis) Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: implicit criteria ("a throat swab was collected when the physician believed it was warranted") Presenting signs and symptoms: patients with acute sore throat Age range for inclusion: 3 to 17 years (adults also included in the study but data extracted only for children)
Patient characteristics and setting	Sample size: total 787; children 454 Age (distribution): not reported among children GAS prevalence according to culture (with 95% confidence interval): 34.1% (95% CI not reported) Country of study: Canada Sex (% of girls): not reported Clinical severity assessment: McIsaac score Clinical setting: walk-in clinic Single-centre study

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McIsaac 2004 *(Continued)*

Index tests	Throat swab: 2 different swabs (1 swab for culture, 1 swab for performing the RADT) Commercial name of the RADT: TestPack Plus Strep A with OBC II (Abbott) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic Duration of incubation: not reported GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The study was funded by Abbott (manufacturer of the RADT)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		
		Unclear	**Unclear**
DOMAIN 3: Reference Standard			

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McIsaac 2004 *(Continued)*

Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Menozzi 1992

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physicians and nurses Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: patients with symptoms of pharyngitis Age range for inclusion: unclear
Patient characteristics and setting	Sample size: 3658 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 34.9% (95% CI not reported) Country of study: Italy Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: paediatric outpatient clinic Single- or multi-centre study: unclear

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Menozzi 1992 *(Continued)*

Index tests	Throat swab: 2 different swabs (1 swab for culture, 1 swab for performing the RADT) Commercial name of the RADT: TestPack Strep A (Abbott) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: inhibitory Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Conference abstract
Notes	—

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		
		Low	**Unclear**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		

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Menozzi 1992 *(Continued)*

Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

Mezghani Maleej 2010

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physician Exclusion if recent antibiotics use before inclusion: yes Clinical selection of patients: implicit criteria (see below) Presenting signs and symptoms: acute pharyngitis, excluding those with signs suggesting viral aetiology Age range for inclusion: 2 to 10 years
Patient characteristics and setting	Sample size: 504 (445 participants in the contingency table) Age (distribution): mean = 5.7 years (range 2 years and 2 months to 10 years) GAS prevalence according to culture (with 95% confidence interval): 32.9% (95% CI not reported) Country of study: Tunisia Sex (% of girls): 46% Clinical severity assessment: McIsaac score Clinical setting: walk-in clinic Single-centre study
Index tests	Throat swab: 2 different swabs

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Mezghani Maleej 2010 *(Continued)*

	Commercial name of the RADT: OSOM Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard and inhibitory (2 plates) Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 2 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article (in French)
Notes	We thank Prof. A Hammami for providing data from the contingency table (not extractable in the original publication)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		

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Mezghani Maleej 2010 *(Continued)*

Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		
		Low	

Mirza 2007a

Study characteristics	
Patient sampling	Cross-sectional study Retrospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: nurses and medical assistants Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: unclear Presenting signs and symptoms: unclear Age range for inclusion: < 18 years
Patient characteristics and setting	Sample size: total 11,644 (only 9032 included in the meta-analysis, i.e., those with RADT negative results also cultured) Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 28.3% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based Multi-centre study
Index tests	Throat swab: 2 different swabs (1 swab for culture, 1 swab for performing the RADT)

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Mirza 2007a *(Continued)*

	Commercial name of the RADT: QTest (Becton Dickinson) Type of RADT: EIA (liposomal test)
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The study was sub-divided into 2 study cohorts (Mirza 2007a and Mirza 2007b). In Mirza 2007a, the data came from 3 paediatric practices and the RADT used was the QTest (Abbott). In Mirza 2007b, the data came from a children's hospital and the RADT used was the Signify (Abbott). Throat culture performed only for children with negative RADT results (partial verification).

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			

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Mirza 2007a *(Continued)*

Were culture results interpreted with blinding of the results of the RADT?	No		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	No		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		High	

Mirza 2007b

Study characteristics	
Patient sampling	Cross-sectional study Retrospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: nurses Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: unclear Presenting signs and symptoms: unclear Age range for inclusion: < 18 years
Patient characteristics and setting	Sample size: total 6865 (only 5135 included in the meta-analysis, i.e., those with RADT negative results also cultured) Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 29.3% (95% CI not reported) Country of study: USA Sex (% of girls): not reported

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Mirza 2007b *(Continued)*

	Clinical severity assessment: none Clinical setting: unclear ("children's hospital") Single-centre study		
Index tests	Throat swab: 2 different swabs (1 swab for performing the RADT, 1 swab for culture) Commercial name of the RADT: Signify Strep A (Abbott) Type of RADT: EIA		
Target condition and reference standard(s)	Throat culture medium: inhibitory Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article		
Notes	See Mirza 2007a		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Unclear		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			

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Mirza 2007b *(Continued)*

Were culture results interpreted with blinding of the results of the RADT?	No		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	No		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		High	

Mlejnek 2014

Study characteristics	
Patient sampling	Cross-sectional study Retrospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: unclear Presenting signs and symptoms: not reported ("all patients who had rapid strep screens") Age range for inclusion: < 21 years
Patient characteristics and setting	Sample size: 3423 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 16.8% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: emergency department Single-centre study

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Mlejnek 2014 *(Continued)*

Index tests	Throat swab (1 single, 1 double, 2 different): not reported Commercial name of the RADT: OSOM Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: not reported Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Conference abstract (Annual Meeting of the Society for Academic Emergency Medicine, Dallas, Texas, USA, May 2014)
Notes	We thank Dr. JR Mlejnek for sharing additional information that was not part of the original conference abstract

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		Unclear	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			

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Mlejnek 2014 *(Continued)*

Were culture results interpreted with blinding of the results of the RADT?	No		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	No		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		High	

Moyer 1990

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes (24 versus 48 hour reading) Person performing the throat sample: physician or nurse Exclusion if recent antibiotics use before inclusion: yes (within 2 weeks prior to the onset of pharyngitis) Clinical selection of patients: not reported Presenting signs and symptoms: not reported Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: total 649, children 324 Age (distribution): range 7 months to 16 years GAS prevalence according to culture (with 95% confidence interval): 32.1% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based

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Moyer 1990 *(Continued)*

	Single-centre study
Index tests	Throat swab: 1 single swab (used for culture and then for the RADT) Commercial name of the RADT: Directgen 1-2-3 Group A Strep Test Type of RADT: EIA (liposomal test)
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: plates were examined at 24 and 48 hours and variations in the accuracy of the RADT by incubation time were evaluated. We only extracted data related to the 48 hour reference standard.
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The study included children and adults. We extracted data for paediatric participants. RADT kits were provided by the manufacturer (BBL).

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**

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Moyer 1990 *(Continued)*

DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		
		Low	

Needham 1998

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes (standard versus enriched) Person performing the throat sample: physician Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: unclear Presenting signs and symptoms: unclear Age range for inclusion: not reported
Patient characteristics and setting	Sample size: 276 Age (distribution): mean = 6.4 years GAS prevalence according to culture (with 95% confidence interval): 31.2% (95% CI not reported)

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Needham 1998 *(Continued)*

	Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based Single-centre study (regarding paediatric participants)
Index tests	Throat swab: 1 single swab (used for culture and then for the RADT) Commercial name of the RADT: Strep A OIA (Biostar) Type of RADT: OIA
Target condition and reference standard(s)	Throat culture medium: standard and enrichment Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: swabs were inoculated on a standard blood agar plate and the pledget from the transport tube was used for culture following incubation in a Todd-Hewitt enrichment broth. Enriched culture did not identify additional positive specimens as compared to standard culture. The results of the 2 culture techniques were considered equivalent.
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The study was funded in part by Biostar (manufacturer of the RADT)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		

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Needham 1998 *(Continued)*

Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

Nitsch-Osuch 2010

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: yes Clinical selection of patients: explicit criteria but not a score (see below) Presenting signs and symptoms: fever > 38°C and sore throat, no cough and sneezing Age range for inclusion: 2 to 15 years

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Nitsch-Osuch 2010 *(Continued)*

Patient characteristics and setting	Sample size: 188 Age (distribution): mean (SD) = 5.5 (2.6) years GAS prevalence according to culture (with 95% confidence interval): 33.5% (95% CI not reported) Country of study: Poland Sex (% of girls): 48% Clinical severity assessment: none Clinical setting: unclear Single- or multi-centre study: unclear
Index tests	Throat swab (1 single, 1 double, 2 different): not reported Commercial name of the RADT: Test Strep A (SureScreen) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: not reported Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: throat culture technique not described
Flow and timing	No follow-up
Comparative	
Type of study	Conference abstract
Notes	—

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		

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Nitsch-Osuch 2010 *(Continued)*

Were RADTs conducted during consultation time?	Unclear		
		Unclear	**Unclear**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

Nonaka 1988

Study characteristics	
Patient sampling	Cross-sectional study Retrospective or prospective design: unclear Sample: unclear Direct comparison of different RADTs: yes Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: unclear Clinical selection of patients: unclear Presenting signs and symptoms: pharyngitis or tonsillitis Age range for inclusion: 0 to 16 years
Patient characteristics and setting	Sample size: 100 Age (distribution): unclear GAS prevalence according to culture (with 95% confidence interval): 23% (95% CI not reported) Country of study: Japan

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Nonaka 1988 *(Continued)*

	Sex (% of girls): 42% Clinical severity assessment: none Clinical setting: hospital paediatric outpatient clinic Single-centre study
Index tests	Throat swab: unclear Commercial name of the RADT: TestPack Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: unclear Atmosphere of incubation: unclear Duration of incubation: unclear GAS confirmation: bacitracin disk Number of plates inoculated: not extracted Assessment of GAS antibody response: not extracted Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article (in Japanese)
Notes	The study was funded by Tokyo Kosei-Nenkin Hospital. We thank Prof. Ryuki Kassai for translating this article.

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Unclear		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		Unclear	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		
		Unclear	**Unclear**

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Nonaka 1988 *(Continued)*

DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Unclear		
		Unclear	**Unclear**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Unclear		
		Low	

Pauchard 2012

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: yes (within the previous week) Clinical selection of patients: none Presenting signs and symptoms: sore throat Age range for inclusion: 3 to 18 years
Patient characteristics and setting	Sample size: 1940 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 38.7% (95% CI not reported for this group) Country of study: Switzerland Sex (% of girls): not reported Clinical severity assessment: McIsaac score Clinical setting: emergency department

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Pauchard 2012 *(Continued)*

	Single-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: QuickVue In-Line Strep A (Quidel) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Conference abstract (Annual Meeting of the Swiss Society of Paediatrics, Lucerne, Switzerland, June 2012)
Notes	We thank Dr. JY Pauchard for sharing additional information that was not part of the original conference abstract

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**

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Pauchard 2012 *(Continued)*

DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		
		Low	

Pauchard 2013

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: yes (within the previous week) Clinical selection of patients: none Presenting signs and symptoms: sore throat Age range for inclusion: 3 to 18 years
Patient characteristics and setting	Sample size: 183 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 37.2% (95% CI not reported for this group) Country of study: Switzerland Sex (% of girls): not reported Clinical severity assessment: McIsaac

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Pauchard 2013 *(Continued)*

	Clinical setting: emergency department Single-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: BioNexia Strep A (BioMerieux) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Conference abstract (Annual Meeting of the Swiss Society of Paediatrics, Geneva, Switzerland, June 2012).
Notes	We thank Dr. JY Pauchard for sharing additional information that was not part of the original conference abstract.

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**

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Pauchard 2013 *(Continued)*

DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		
		Low	

Pitetti 1998

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: yes (within one week before presentation) Clinical selection of patients: explicit criteria but not a score (see below) Presenting signs and symptoms: patients with a sore throat with erythematous posterior pharynx, tonsillar exudate or scarlatiniform rash; or patients without a complaint of sore throat but with either an erythematous posterior pharynx, with or without exudate, or a scarlatiniform rash Age range for inclusion: 1 to 18 years
Patient characteristics and setting	Sample size: 233 Age (distribution): mean = 8.6 years (range 1.5 to 18.9 years) GAS prevalence according to culture (with 95% confidence interval): 31.3% (95% CI not reported)

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Pitetti 1998 *(Continued)*

	Country of study: USA Sex (% of girls): 44.6% Clinical severity assessment: none Clinical setting: mixed (emergency department, walk-in clinic and acute concern clinic of a children hospital) Single-centre study		
Index tests	Throat swab: 1 single swab (used for culture and then for the RADT) Commercial name of the RADT: Strep A OIA (Biostar) Type of RADT: OIA		
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article		
Notes	Funded in part by a grant from Biostar (manufacturer of the RADT)		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		

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Pitetti 1998 *(Continued)*

		Unclear	**Unclear**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Ramos 2011

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: unclear Presenting signs and symptoms: unclear Age range for inclusion: not reported ("pediatric services")
Patient characteristics and setting	Sample size: 165 Age (distribution): not reported

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Ramos 2011 *(Continued)*

	GAS prevalence according to culture (with 95% confidence interval): 31.5% (95% CI not reported) Country of study: Spain Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: other ("pediatric services") Multi-centre study
Index tests	Throat swab: unclear Commercial name of the RADT: OSOM Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: not reported Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: throat culture technique not described
Flow and timing	No follow-up
Comparative	
Type of study	Conference abstract
Notes	Funding not reported

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		

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Ramos 2011 *(Continued)*

		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

Regueras De Lorenzo 2012

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physicians Exclusion if recent antibiotics use before inclusion: yes (within a week before enrollment) Clinical selection of patients: none Presenting signs and symptoms: acute tonsillitis and/or pharyngitis Age range for inclusion: 2 to 14 years
Patient characteristics and setting	Sample size: 192 Age (distribution): mean (SD) = 7.2 (2.8) years GAS prevalence according to culture (with 95% confidence interval): 38.5% (95% CI not reported) Country of study: Spain

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Regueras De Lorenzo 2012 *(Continued)*

	Sex (% of girls): 48.4% Clinical severity assessment: Centor score Clinical setting: office-based Multi-centre study
Index tests	Throat swab: 2 different swabs (1 for culture, 1 for performing the RADT) Commercial name of the RADT: TestPack Plus (Inverness) Type of RAD: EIA
Target condition and reference standard(s)	Throat culture medium: inhibitory Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article (in Spanish)
Notes	Supported by a public research grant (Institute of Health Carlos III) and EU funding (FEDER)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**

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Regueras De Lorenzo 2012 *(Continued)*

DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

Reinert 1988

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: febrile sore throat Age range for inclusion: 2 to 14 years
Patient characteristics and setting	Sample size: 92 Age (distribution): mean age = 6 years and 4 months GAS prevalence according to culture (with 95% confidence interval): 29.4% (95% CI not reported) Country of study: France Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based

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Reinert 1988 *(Continued)*

	Multi-centre study		
Index tests	Throat swab: 2 different swabs (1 swab for performing the RADT, 1 swab for culture) Commercial name of the RADT: Group A Strep Test (Quidel) Type of RADT: EIA		
Target condition and reference standard(s)	Throat culture medium: enrichment and inhibitory Atmosphere of incubation: aerobic Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article		
Notes	—		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			

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Reinert 1988 *(Continued)*

Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Unclear		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Unclear	

Rimoin 2010a

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: yes (oral use in the 3 days prior to screening or parenteral use in the 28 days before screening) Clinical selection of patients: none Presenting signs and symptoms: sore throat Age range for inclusion: 2 to 12 years
Patient characteristics and setting	Sample size: 184 Age (distribution): mean (SD) = 5.8 (0.21) years GAS prevalence according to culture (with 95% confidence interval): 24.5% (95% CI not reported) Country of study: Brazil Sex (% of girls): 43.3% Clinical severity assessment: Centor score Clinical setting: walk-in clinic Multi-centre study (see Rimoin 2010b-d)

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Rimoin 2010a *(Continued)*

Index tests	Throat swab: 2 different swabs (1 swab for performing the RADT, 1 swab for culture) Commercial name of the RADT: Strep A OIA Max (Biostar) Type of RADT: OIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic Duration of incubation: 48 hours GAS confirmation: bacitracin disk Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Multi-centre study conducted in Brazil, Croatia, Egypt and Latvia (see Rimoin 2010b-d). This study was supported by USAID and WHO. The rapid test kits were provided by Biostar (manufacturer of the RADT).

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**

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Rimoin 2010a *(Continued)*

DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Rimoin 2010b

Study characteristics	
Patient sampling	See Rimoin 2010a
Patient characteristics and setting	Sample size: 404 Age (distribution): mean (SD) = 5.8 (0.14) years GAS prevalence according to culture (with 95% confidence interval): 39.4% (95% CI not reported) Country of study: Croatia Sex (% of girls): 51.6% Clinical severity assessment: Centor score Clinical setting: walk-in clinic Multi-centre study (see Rimoin 2010a)
Index tests	See Rimoin 2010a
Target condition and reference standard(s)	See Rimoin 2010a
Flow and timing	No follow-up
Comparative	
Type of study	Journal article

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Rimoin 2010b *(Continued)*

Notes	See Rimoin 2010a		

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		

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Rimoin 2010b *(Continued)*

Were withdrawals from the study explained?	Yes		
		Low	

Rimoin 2010c

Study characteristics			
Patient sampling	See Rimoin 2010a		
Patient characteristics and setting	Sample size: 1626 Age (distribution): mean (SD) = 4.8 (0.06) years GAS prevalence according to culture (with 95% confidence interval): 26.4% (95% CI not reported) Country of study: Egypt Sex (% of girls): 42.3% Clinical severity assessment: Centor score Clinical setting: walk-in clinic Multi-centre study (see Rimoin 2010a)		
Index tests	See Rimoin 2010a		
Target condition and reference standard(s)	See Rimoin 2010a		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article		
Notes	See Rimoin 2010a		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			

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Rimoin 2010c *(Continued)*

Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Rimoin 2010d

Study characteristics	
Patient sampling	See Rimoin 2010a
Patient characteristics and setting	Sample size: 258 Age (distribution): mean (SD) = 6.6 (1.9) years GAS prevalence according to culture (with 95% confidence interval): 29.5% (95% CI not reported) Country of study: Latvia Sex (% of girls): 46.1% Clinical severity assessment: Centor score Clinical setting: walk-in clinic Multi-centre study (see Rimoin 2010a)
Index tests	See Rimoin 2010a

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Rimoin 2010d *(Continued)*

Target condition and reference standard(s)	See Rimoin 2010a		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article		
Notes	See Rimoin 2010a		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			

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Rimoin 2010d *(Continued)*

Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear
Did all patients receive a throat culture?	Yes
Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	No
Were withdrawals from the study explained?	Yes
	Low

Roddey 1995

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes (standard versus enriched culture) Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: yes (during the precedent week) Clinical selection of patients: none Presenting signs and symptoms: acute pharyngitis Age range for inclusion: not reported
Patient characteristics and setting	Sample size: 301 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 38.9% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: paediatric office Single-centre study
Index tests	Throat swab: 2 throat swabs were taken for each patient. Swab #1 was used for standard culture and then for performing the RADT. Swab #2 was incubated in a Todd-Hewitt enrichment broth and subsequently inoculated on a blood agar plate. We extracted data only for swab #1. Commercial name of the RADT: Strep A OIA (Biostar) Type of RADT: OIA
Target condition and reference standard(s)	Throat culture medium: standard and enrichment (data extracted only for standard culture) Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: bacitracin disk

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Roddey 1995 *(Continued)*

	Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The study was funded by a research grant from the American Academy of Pediatrics and the manufacturer of the RADT (Biostar) provided the test kits

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		

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Roddey 1995 *(Continued)*

		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

Roe 1995a

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: yes Direct comparison of several throat culture techniques: yes (1 plate versus 2 plates versus enrichment broth) Person performing the throat sample: other ("clinical personnel") Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: symptomatic pharyngitis Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 500 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 30.2% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: mixed (children's hospital clinic and emergency department) Single-centre study
Index tests	Throat swab: 2 different swabs (each swab used for culture and then for the RADT) Commercial name of the RADT: Strep A OIA (Biostar) Type of RADT: OIA
Target condition and reference standard(s)	Throat culture medium: inhibitory and enrichment Atmosphere of incubation: aerobic Duration of incubation: 48 hours

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Roe 1995a *(Continued)*

	GAS confirmation: latex test Number of plates inoculated: 2 or 3 Assessment of GAS antibody response: no Relevant details: 2 swabs were taken for each patient. Each swab was used for culture on a selective medium and then for antigen detection by one or the other RADTs. If both selective plates were negative for GAS, the pledgets were incubated in a Todd-Hewitt enrichment broth with subsequent culture. The reference standard was the isolation of GAS by any one (or more than one) of the plates.
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	A co-author was affiliated with the manufacturer of one of the RADTs under evaluation (Abbott)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		

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Roe 1995a *(Continued)*

Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	No		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Roe 1995b

Study characteristics	
Patient sampling	See Roe 1995a
Patient characteristics and setting	See Roe 1995a
Index tests	Throat swab: 2 different swabs (each swab used for culture and then for the RADT) Commercial name of the RADT: Test Pack Plus Strep A (Abbott) Type of RADT: EIA
Target condition and reference standard(s)	See Roe 1995a
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	See Roe 1995a
Methodological quality	

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Roe 1995b *(Continued)*

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	No		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		High	

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Rogo 2010a

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: yes Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: signs and symptoms of pharyngitis Age range for inclusion: not reported ("pediatric office setting")
Patient characteristics and setting	Sample size: 228 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 28.1% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based Multi-centre study
Index tests	Throat swab: 3 different swabs (each swab used for culture and then for the RADT) Commercial name of the RADT: Acceava Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: not reported Duration of incubation: 24 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The study was funded by the manufacturer of one of the 3 RADTs under evaluation (Acceava)

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			

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Rogo 2010a *(Continued)*

Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

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Rogo 2010b

Study characteristics			
Patient sampling	See Rogo 2010a		
Patient characteristics and setting	See Rogo 2010a		
Index tests	Throat swab: 3 different swabs (each swab used for culture and then for the RADT) Commercial name of the RADT: OSOM Strep A (Genzyme) Type of RADT: EIA		
Target condition and reference standard(s)	See Rogo 2010a		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article		
Notes	The study was funded by the manufacturer of one of the 3 RADTs under evaluation (Acceava)		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			

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Rogo 2010b *(Continued)*

Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Rogo 2010c

Study characteristics			
Patient sampling	See Rogo 2010a		
Patient characteristics and setting	See Rogo 2010a		
Index tests	Throat swab: 3 different swabs (each swab used for culture and then for the RADT) Commercial name of the RADT: QuickVue Dipstick (Quidel) Type of RADT: EIA		
Target condition and reference standard(s)	See Rogo 2010a		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article		
Notes	The study was funded by the manufacturer of one of the 3 RADTs under evaluation (Acceava)		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**

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Rogo 2010c *(Continued)*

DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

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Savoia 1994

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: patients with pharyngotonsillitis Age range for inclusion: 1 to 14 years
Patient characteristics and setting	Sample size: 510 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 14.3% (95% CI not reported) Country of study: Italy Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: not reported Single- or multi-centre study: not reported
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: Event test strip Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: inhibitory Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 2 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	—

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		

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Savoia 1994 *(Continued)*

Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Unclear		
		Low	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

Schlager 1996

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear

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Schlager 1996 *(Continued)*

	Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: unclear Presenting signs and symptoms: pharyngitis Age range for inclusion: not reported
Patient characteristics and setting	Sample size: 262 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 24% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: mixed (paediatric and family practice clinics in a primary care centre) Single-centre study
Index tests	Throat swab: 1 double Commercial name of the RADT: Strep A OIA Type of RADT: OIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: the study compared the accuracy of different throat culture techniques. We extracted data used by the authors to calculate accuracy estimates for the rapid test ("standard culture").
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	—

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		

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Schlager 1996 *(Continued)*

Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Schwabe 1987

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear

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Schwabe 1987 *(Continued)*

	Exclusion if recent antibiotics use before inclusion: yes (2 weeks before throat swab collection) Clinical selection of patients: none Presenting signs and symptoms: current respiratory tract infection Age range for inclusion: unclear (but Dr. LD Schwabe confirmed that study specimens were primarily from children ≤ 21 years seen in paediatric offices)
Patient characteristics and setting	Sample size: 365 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 27.4% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: paediatric offices Single-centre study
Index tests	Throat swab: 1 single swab (used for culture and then for the RADT) Commercial name of the RADT: TestPack Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic for the first 24 hours and then aerobic with CO_2 enrichment for the second 24 hours Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	We thank Dr. LD Schwabe for confirming that study specimens were primarily from children ≤ 21 years seen in paediatric offices

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		

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Schwabe 1987 *(Continued)*

Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Schwabe 1991

Study characteristics	
Patient sampling	Cross-sectional study

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Schwabe 1991 *(Continued)*

	Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes Person performing the throat sample: mixed (physicians, nurses, technologists, other) Exclusion if recent antibiotics use before inclusion: yes (2 weeks prior to throat swab collection) Clinical selection of patients: unclear Presenting signs and symptoms: unclear Age range for inclusion: unclear from the study report (but Dr. LD Schwabe confirmed 98.6% of participants were paediatric patients)
Patient characteristics and setting	Sample size: 261 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 27.1% (95 CI% not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: mixed (paediatric offices, a university student health centre and a general community hospital outpatient laboratory) Multi-centre study
Index tests	Throat swab: 1 single swab (culture then RADT) Commercial name of the RADT: Test Pack Plus Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic for the first 24 hours and aerobic with CO_2 enrichment for the second 24 hours Duration of incubation: 48 hours GAS confirmation: bacitracin disk and latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: only data for culture on the nonselective medium were extracted
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	We thank Dr. LD Schwabe for confirming that numbers in the published contingency table are from paediatric patients (99%)

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			

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Schwabe 1991 *(Continued)*

Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Unclear	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

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Schwartz 1997a

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: yes (2 different EIAs) Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: not reported Presenting signs and symptoms: unclear Age range for inclusion: unclear
Patient characteristics and setting	Sample size: 258 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 40.0% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based (paediatric clinic) Single-centre study
Index tests	Throat swab: not reported Commercial name of the RADT: OSOM Strep A (Wyntek) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 24 hours GAS confirmation: not reported Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	—

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		

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Schwartz 1997a *(Continued)*

Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Schwartz 1997b

Study characteristics

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Schwartz 1997b *(Continued)*

Patient sampling	See Schwartz 1997a
Patient characteristics and setting	See Schwartz 1997a
Index tests	Throat swab: not reported Commercial name of the RADT: QuickVue In-Line Strep A (Quidel) Type of RADT: EIA
Target condition and reference standard(s)	See Schwartz 1997a
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	—

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		

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Schwartz 1997b *(Continued)*

Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Sedki 2010

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physician Exclusion if recent antibiotics use before inclusion: yes Clinical selection of patients: clinical score (Centor) Presenting signs and symptoms: pharyngitis with at least 2 Centor criteria Age range for inclusion: 3 to 15 years
Patient characteristics and setting	Sample size: 95 Age (distribution): median = 8.98 years (range 3.3 to 13.8) GAS prevalence according to culture (with 95% confidence interval): 32.6% (95% CI not reported) Country of study: Egypt Sex (% of girls): 58% Clinical severity assessment: none Clinical setting: mixed (outpatient clinic of health centre or the school dispensary room) Multi-centre study
Index tests	Throat swab: 2 different swabs Commercial name of the RADT: StreptAtest Type of RADT: EIA

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Sedki 2010 *(Continued)*

Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 24 hours GAS confirmation: other (penicillin susceptibility and gram stain microscopy) Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The rapid test kits were supplied by the manufacturer

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Unclear		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		
		Unclear	**Unclear**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		

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Sedki 2010 *(Continued)*

Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		
		Low	

Strandjord 1987

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: yes (LA versus EIA; data extracted only for EIA) Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: implicit criteria (see below) Presenting signs and symptoms: "patients who were suspect of having GAS pharyngitis" Age range for inclusion: 2 to 18 years
Patient characteristics and setting	Sample size: 138 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 37.7% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: mixed (emergency department and acute care clinic) Single-centre study
Index tests	Throat swab: 1 double swab (1 swab for culture, 1 swab for performing the RADT) Commercial name of the RADT: Icon Strep A (Hybritech) Type of RADT: EIA

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Strandjord 1987 *(Continued)*

Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 24 hours GAS confirmation: fluorescent antibody technique Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	—

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		

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Strandjord 1987 *(Continued)*

		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Subashini 2015

Study characteristics	
Patient sampling	Cross-sectional study Retrospective or prospective design: unclear Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: not reported Presenting signs and symptoms: pharyngitis Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 111 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 24.3% (95% CI not reported) Country of study: India Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: outpatient clinic Single-centre study
Index tests	Throat swab (1 single, 1 double, 2 different): not reported Commercial name of the RADT: SD Bioline Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: not reported GAS confirmation: latex test Number of plates inoculated (n): not reported

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Subashini 2015 *(Continued)*

	Assessment of GAS antibody response: no Relevant details: -		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article		
Notes	—		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		High	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		Unclear	**Unclear**
DOMAIN 4: Flow and Timing			

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Subashini 2015 *(Continued)*

Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear
Did all patients receive a throat culture?	Yes
Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	No
Were withdrawals from the study explained?	Yes
	Low

Tanz 2009

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes (office culture versus laboratory culture) Person performing the throat sample: physician Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: pharyngitis Age range for inclusion: 3 to 18 years
Patient characteristics and setting	Sample size: 1848 Age (distribution): 13% under 5 years of age (mean or median not reported) GAS prevalence according to culture (with 95% confidence interval): 30% (95% CI not reported) Country of study: USA Sex (% of girls): 53% Clinical severity assessment: McIsaac score Clinical setting: office-based Multi-centre study
Index tests	Throat swab: 2 different swabs (swab A used first for office culture and then for performing the RADT; swab B used for laboratory culture) Commercial name of the RADT: QuickVue dipstick (Quidel) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: latex agglutination Number of plates inoculated: 1 Assessment of GAS antibody response: no

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Tanz 2009 *(Continued)*

	Relevant details: swab A was streaked on a blood agar plate for office culture and then used for the RADT; data for office culture not extracted
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	Last author (Dr Shulman) is on the medical advisory board of Quidel (manufacturer of the RADT)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		Low	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		

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Tanz 2009 *(Continued)*

		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	No		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

Tellechea 2012

Study characteristics	
Patient sampling	Cross-sectional study Retrospective design Sample: non-consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: laboratory personnel Exclusion if recent antibiotics use before inclusion: yes (within the previous week) Clinical selection of patients: implicit criteria (see below) Presenting signs and symptoms: symptoms compatible with GAS Age range for inclusion: 3 to 15 years
Patient characteristics and setting	Sample size: 5505 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 39.8% (95% CI not reported) Country of study: Argentina Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: paediatric emergency department Single-centre study
Index tests	Throat swab: not reported Commercial name of the RADT: ACON Strep A Rapid Test Strip (ACON Lab) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported

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Tellechea 2012 *(Continued)*

	Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: -		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article (in Spanish)		
Notes	—		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	No		
Were patients seen in an ambulatory care setting?	Yes		
		High	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Unclear	**Unclear**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		Unclear	**Unclear**
DOMAIN 4: Flow and Timing			

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Tellechea 2012 *(Continued)*

Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear
Did all patients receive a throat culture?	Yes
Did patients receive the same throat culture method?	Unclear
Were undetermined/uninterpretable results reported?	No
Were withdrawals from the study explained?	Yes
	Unclear

Tenjarla 1991

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: physicians and office staff Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: clinical tonsillopharyngitis Age range for inclusion: "pediatric patients"
Patient characteristics and setting	Sample size: 9161 children (among a total of 11,088) Age (distribution): 3 months to 18 years ("pediatric population") GAS prevalence according to culture (with 95% confidence interval): 16.5% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based Single- or multi-centre study: unclear
Index tests	Throat swab: 1 double swab (1 swab for culture, 1 swab for performing the RADT) Commercial name of the RADT: TestPack Strep A (Abbott) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: anaerobic Duration of incubation: 16 to 42 hours GAS confirmation: TestPack Strep A used on beta-haemolytic colonies Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: in this study the RADT was also used as a confirmation technique to identify beta-haemolytic colonies as *S. pyogenes*

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Tenjarla 1991 *(Continued)*

Flow and timing	No follow-up		
Comparative			
Type of study	Journal article		
Notes	Included adults and children; data extracted only for children		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	No		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**High**
DOMAIN 4: Flow and Timing			

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Tenjarla 1991 *(Continued)*

Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes
Did all patients receive a throat culture?	Yes
Did patients receive the same throat culture method?	Yes
Were undetermined/uninterpretable results reported?	No
Were withdrawals from the study explained?	Yes
	Low

Toepfner 2013

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: yes Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: tonsillopharyngitis Age range for inclusion: not reported
Patient characteristics and setting	Sample size: 517 (324 in 2009 and 193 in 2010) Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 17.6% (95% CI not reported) Country of study: Germany Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: unclear Single- or multi-centre study: unclear
Index tests	Throat swab: 1 single swab (used for culture and then for the RADT) Commercial name of the RADT: QuickVue In-Line Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up

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Toepfner 2013 *(Continued)*

Comparative

Type of study	Journal article
Notes	In this study, the accuracy of the rapid test was compared between physicians and laboratory technicians. Our review focused on the accuracy of RADT with laboratory culture as the reference standard, therefore we extracted data only for laboratory technicians. The study also comprised 2 phases: before (2009) and after (2010) training of physicians by laboratory technicians. We extracted data only for laboratory technicians, therefore we pooled the data from 2009 and 2010. We thank Dr. M Hufnagel for confirming that numbers in the published contingency table are from paediatric patients.

Methodological quality

Item	Authors' judgement	Risk of bias	Applicability concerns
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Unclear**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		
		Low	**Unclear**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		

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Toepfner 2013 *(Continued)*

Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		Unclear	**Unclear**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Van Limbergen 2006

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: consecutive Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: nursing staff Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: clinical diagnosis of pharyngitis Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 201 Age (distribution): mean (SD) = 3.85 (3.15) years GAS prevalence according to culture (with 95% confidence interval): 15.9% (95% CI not reported) Country of study: Scotland Sex (% of girls): 48.4% Clinical severity assessment: none Clinical setting: emergency department Single-centre study
Index tests	Throat swab: unclear Commercial name of the RADT: QuickVue Plus Strep A (Quidel)

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Van Limbergen 2006 *(Continued)*

	Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: not reported Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: throat culture technique not described
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The test kits were provided by Quidel (manufacturer of the RADT) Throat culture performed only for children with negative RADT results (partial verification)

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Yes		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	No		

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Van Limbergen 2006 *(Continued)*

Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	No		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	Yes		
Were withdrawals from the study explained?	Yes		
		High	

Wong 1989

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: convenience Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: unclear Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: symptoms of viral or streptococcal pharyngitis Age range for inclusion: < 18 years (data for adults not extracted)
Patient characteristics and setting	Sample size: 147 children (data for 151 adults not extracted) Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 23.8% (95% CI not reported) Country of study: Canada Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: walk-in clinic Single-centre study
Index tests	Throat swab: 2 different swabs

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Wong 1989 *(Continued)*

	Commercial name of the RADT: TestPack Strep A Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic with CO_2 enrichment Duration of incubation: 48 hours GAS confirmation: latex test Number of plates inoculated: 1 Assessment of GAS antibody response: no Relevant details: -
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	—

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	No		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	No		
		Low	**High**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		

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Wong 1989 *(Continued)*

Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		Low	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Wright 2007a

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: yes (2 EIAs) Direct comparison of several throat culture techniques: no Person performing the throat sample: other ("medical technician") Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: explicit criteria but not a score (see below) Presenting signs and symptoms: "Criteria for throat swab included sore throat, erythematous tonsils or pharynx, cervical lymphadenopathy, and exudates" Age range for inclusion: 0 to 18 years
Patient characteristics and setting	Sample size: 338 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 26.0% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: military air force base Single-centre study
Index tests	Throat swab: 1 double swab (each swab used for antigen detection and culture) Commercial name of the RADT: OSOM Ultra Strep A Type of RADT: EIA

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Wright 2007a *(Continued)*

Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic Duration of incubation: 48 hours GAS confirmation: not reported Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details: unclear if the reference standard was a single-plate culture or a composite of both plates.
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	—

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	No		
		Unclear	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		
		Low	**Unclear**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		

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Wright 2007a *(Continued)*

Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Wright 2007b

Study characteristics			
Patient sampling	See Wright 2007a		
Patient characteristics and setting	See Wright 2007a		
Index tests	Throat swab: 1 double swab Commercial name of the RADT: QuickVue In-Line Strep A (Quidel) Type of RADT: EIA		
Target condition and reference standard(s)	See Wright 2007a		
Flow and timing	No follow-up		
Comparative			
Type of study	Journal article		
Notes	—		
Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		

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Wright 2007b *(Continued)*

Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes		
Was clinical selection of patients avoided?	Unclear		
Were patients seen in an ambulatory care setting?	No		
		Unclear	**High**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Unclear		
		Low	**Unclear**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Yes		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		Low	

Yuckienuz 1988

Study characteristics	
Patient sampling	Cross-sectional study

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Yuckienuz 1988 *(Continued)*

	Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: yes (office culture versus laboratory culture) Person performing the throat sample: physicians Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: pharyngitis Age range for inclusion: not reported ("children")
Patient characteristics and setting	Sample size: 341 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 37.0% (95% CI not reported) Country of study: USA Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: office-based Single-centre study
Index tests	Throat swab: 1 double swab (1 swab for culture, 1 swab for performing the RADT) Commercial name of the RADT: SUDS Group A Strep (Murex) Type of RADT: EIA
Target condition and reference standard(s)	Throat culture medium: standard Atmosphere of incubation: aerobic during 24 hours (office culture) and then anaerobic during 24 hours (laboratory) Duration of incubation: 48 hours GAS confirmation: bacitracin disk and latex test Number of plates inoculated: 1 plate initially inoculated in the office but several subcultures performed in the laboratory Assessment of GAS antibody response: no Relevant details: 1 swab was used for office culture (aerobic 24-hour incubation) and the plates were then transferred to the laboratory for further exploration (anaerobic 24-hour reincubation +/- subcultures of suspect colonies)
Flow and timing	No follow-up
Comparative	
Type of study	Journal article
Notes	The manufacturer of the RADT (Murex) financially supported the study and provided the test kits

Methodological quality

Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**
DOMAIN 1: Patient Selection			

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Yuckienuz 1988 *(Continued)*

Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	No		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Yes		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes		
		High	**Low**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Yes		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	No		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	Yes		
		High	

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Zanacca 1992

Study characteristics	
Patient sampling	Cross-sectional study Prospective design Sample: unclear Direct comparison of different RADTs: no Direct comparison of several throat culture techniques: no Person performing the throat sample: not reported Exclusion if recent antibiotics use before inclusion: no Clinical selection of patients: none Presenting signs and symptoms: symptoms of pharyngitis Age range for inclusion: not reported ("patients from the pediatric outpatients departments")
Patient characteristics and setting	Sample size: 606 Age (distribution): not reported GAS prevalence according to culture (with 95% confidence interval): 32.8% (95% CI not reported) Country of study: Italy Sex (% of girls): not reported Clinical severity assessment: none Clinical setting: walk-in clinic Multi-centre study
Index tests	Throat swab: 2 different swabs (1 swab for culture, 1 swab for performing the RADT) Commercial name of the RADT: Directgen 1-2-3 Group A Strep (Becton Dickinson) Type of RADT: EIA (liposomal test)
Target condition and reference standard(s)	Throat culture medium: inhibitory Atmosphere of incubation: not reported Duration of incubation: not reported GAS confirmation: not reported Number of plates inoculated: not reported Assessment of GAS antibody response: no Relevant details:-
Flow and timing	No follow-up
Comparative	
Type of study	Conference abstract
Notes	—

Methodological quality			
Item	**Authors' judgement**	**Risk of bias**	**Applicability concerns**

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Zanacca 1992 *(Continued)*

DOMAIN 1: Patient Selection			
Was a consecutive or random sample of patients enrolled?	Unclear		
Was it a cross-sectional study or a RCT?	Yes		
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	No		
Was clinical selection of patients avoided?	Yes		
Were patients seen in an ambulatory care setting?	Yes		
		High	**Low**
DOMAIN 2: Index Test All tests			
Were the RADT results interpreted with blinding of the results of culture?	Yes		
Was the type of the RADT mentioned (EIA or OIA)?	Yes		
Were RADTs conducted during consultation time?	Yes		
		Low	**Low**
DOMAIN 3: Reference Standard			
Were culture results interpreted with blinding of the results of the RADT?	Unclear		
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during 48 hr)?	Unclear		
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	No		
		High	**High**
DOMAIN 4: Flow and Timing			
Was the delay between the performance of the RADT and throat culture plating less than 48 hours?	Unclear		
Did all patients receive a throat culture?	Yes		
Did patients receive the same throat culture method?	Yes		
Were undetermined/uninterpretable results reported?	No		
Were withdrawals from the study explained?	No		
		Low	

CI: confidence interval
EIA: enzyme immunoassay

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FISH: fluorescence in situ hybridisation
GAS: group A streptococcus
LA: latex agglutination
n/a: not applicable
OIA: optical immunoassay
PCR: polymerase chain reaction
PYR: pyrrolidonyl peptidase
RADT: rapid antigen detection test
SD: standard deviation
USAID: United States Agency for International Development
WHO: World Health Organization

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Abu-Sabaah 2006	Not ambulatory care setting
Andersen 1994	Mixed age but no paediatric data
Andersen 2003a	Duplicate publication
Andersen 2003b	Not ambulatory care setting
Anhalt 1992	Mixed age but no paediatric data
Anonymous 1985a	Editorial, letter or review
Anonymous 1985b	Duplicate publication
Anonymous 1985c	Duplicate publication
Anonymous 1986	Editorial, letter or review
Anonymous 1991	Editorial, letter or review
Anonymous 1992	Editorial, letter or review
Araj 1986	RADT other than EIA or OIA
Araujo 2005	Adults or unclear age
Armengol 2004a	Reference standard not laboratory culture
Armengol 2004b	Reference standard not laboratory culture
Arya 1993	Editorial, letter or review
Atlas 2005	Adults or unclear age
Ausina 1987	Editorial, letter or review
Ba-Saddik 2014	RADT other than EIA or OIA
Badgett 1996	Editorial, letter or review
Baker 1995	Mixed age but no paediatric data

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Study	Reason for exclusion
Baselski 1988	Adults or unclear age
Berger-Jekic 1987	RADT other than EIA or OIA
Berke 1989	Editorial, letter or review
Betriu 1988	Not a RADT diagnostic study or 2 x 2 table not extractable
Betriu 1989	Adults or unclear age
Bischoff 2007	Editorial, letter or review
Bjerrum 2013	Editorial, letter or review
Blade 1991	Mixed age but no paediatric data
Blanco 1988	Duplicate publication
Boccazzi 2011	Not a RADT diagnostic study or 2 x 2 table not extractable
Bodino 1987	RADT other than EIA or OIA
Boss 1992	Editorial, letter or review
Bourbeau 1993	Mixed age but no paediatric data
Brahmadathan 1986	Not a RADT diagnostic study or 2 x 2 table not extractable
Burke 1988	Mixed age but no paediatric data
Calvino 2015	Adults or unclear age
Cardoso 2013	Not a RADT diagnostic study or 2 x 2 table not extractable
Carey 1991	Mixed age but no paediatric data
Centor 1984	RADT other than EIA or OIA
Centor 1985	RADT other than EIA or OIA
Chen 2000	Editorial, letter or review
Chessman 1998	Editorial, letter or review
Choi 1995	Adults or unclear age
Coban 2013	Not ambulatory care setting
Cohen 1993	Editorial, letter or review
Cohen 2000	Editorial, letter or review
Cohen 2012a	Duplicate publication
Cohen 2013a	Duplicate publication

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Study	Reason for exclusion
Corneli 2001	Editorial, letter or review
Dale 1994	Adults or unclear age
Dale 1997	Editorial, letter or review
De Lorenzo 2012	Duplicate publication
Demeyere 1992	Mixed age but no paediatric data
Diaz-Berenguer 1992	Mixed age but no paediatric data
Dimatteo 2001	Adults or unclear age
Dingle 2014	Mixed age but paediatric data not extractable
DiNicola 1986	RADT other than EIA or OIA
DuBois 1986	RADT other than EIA or OIA
DuBose 1996	Editorial, letter or review
Eaton 1987	Editorial, letter or review
Edmonson 2003	Duplicate publication
Edouard 2014	Editorial, letter or review
Ehrlich 1993	Reference standard not laboratory culture
Enright 2009	Duplicate publication
Esteban 2004	Editorial, letter or review
Fellah 1988	RADT other than EIA or OIA
Figura 1981	Not a RADT diagnostic study or 2 x 2 table not extractable
Fischer 1992	Editorial, letter or review
Foong 1992	Mixed age but no paediatric data
Fox 2006a	Reference standard not laboratory culture
Fox 2006b	Reference standard not laboratory culture
Frei 1991	Editorial, letter or review
Fries 1995	Reference standard not laboratory culture
Gaustad 1991	Editorial, letter or review
Gerber 1986a	RADT other than EIA or OIA
Gerber 1989	Editorial, letter or review

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Study	Reason for exclusion
Gerber 1990a	RADT other than EIA or OIA
Gerber 1997a	Editorial, letter or review
Gerber 1997b	Editorial, letter or review
Gerber 1998	Editorial, letter or review
Ghanassia 1996	Editorial, letter or review
Gnehm 1987	RADT other than EIA or OIA
Gonsu 2015	Not ambulatory care setting
Greiver 1999	Editorial, letter or review
Gupta 1992	Target condition other than GAS
Gupta 1997	Adults or unclear age
Gutman 1996	Editorial, letter or review
Hadfield 1987	RADT other than EIA or OIA
Hallander 1988	Editorial, letter or review
Handrick 2006	Editorial, letter or review
Hansen 1992a	RADT other than EIA or OIA
Hansen 1992b	Editorial, letter or review
Harbeck 1993	Mixed age but no paediatric data
Harbeck 1995	Editorial, letter or review
Hasin 1989	Mixed age but no paediatric data
Haym 1986	Not a RADT diagnostic study or 2 x 2 table not extractable
Hedges 1991	Adults or unclear age
Heiter 1993	Mixed age but no paediatric data
Heiter 1995	Mixed age but no paediatric data
Hinfey 2010	Mixed age but no paediatric data
Hodgins 1988	Not a RADT diagnostic study or 2 x 2 table not extractable
Hoffmann 1987	Editorial, letter or review
Hoffmann 1990	Mixed age but no paediatric data
Holbrook 1998	Editorial, letter or review

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Study	Reason for exclusion
Hufnagel 2010	Duplicate publication
Humair 2006	Editorial, letter or review
Issa 2014	Editorial, letter or review
Johansson 2003	Mixed age but no paediatric data
Johnson 1995	Editorial, letter or review
Joslyn 1995	Mixed age but no paediatric data
Joubaud 2003	Mixed age but no paediatric data
Kawakami 2003	Mixed age but no paediatric data
Kayaba 1996	Not a RADT diagnostic study or 2 x 2 table not extractable
Keahey 2002	RADT other than EIA or OIA
Kechrid 1988	RADT other than EIA or OIA
Kellogg 1986a	Not a RADT diagnostic study or 2 x 2 table not extractable
Kellogg 1986b	Editorial, letter or review
Kellogg 1987	Mixed age but no paediatric data
Kellogg 1988	Mixed age but no paediatric data
Kellogg 1990	Editorial, letter or review
Klein 1986	Adults or unclear age
Kljakovic 2009	Editorial, letter or review
Kojima 2002	Not a RADT diagnostic study or 2 x 2 table not extractable
Kramer 1980	Editorial, letter or review
Kurtz 1999	Duplicate publication
Larkin 2001	Editorial, letter or review
Laubscher 1994	Editorial, letter or review
Lind 1988	Editorial, letter or review
Lindbaek 2004	Mixed age but no paediatric data
Lindsay 1985	Editorial, letter or review
Llor 2009a	Editorial, letter or review
Llor 2009b	Mixed age but no paediatric data

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Study	Reason for exclusion
Llor 2010	Editorial, letter or review
Luebbert 1989	Editorial, letter or review
Lutticken 1991	Editorial, letter or review
Manasse 1989	Adults or unclear age
Mateo 2010	Duplicate publication
Mathur 1992	Editorial, letter or review
Matthys 2006	Editorial, letter or review
Mayefsky 1985	Editorial, letter or review
McCusker 1984	RADT other than EIA or OIA
Meier 1990	RADT other than EIA or OIA
Messina 2010	Not a RADT diagnostic study or 2 x 2 table not extractable
Morandi 2003	Not a RADT diagnostic study or 2 x 2 table not extractable
Morandi 2010	Not a RADT diagnostic study or 2 x 2 table not extractable
Morlan 1988	RADT other than EIA or OIA
Nahata 1986	Editorial, letter or review
Nerbrand 2002	Mixed age but no paediatric data
Nissinen 2009	Not a RADT diagnostic study or 2 x 2 table not extractable
Noorbakhsh 2011	Not a RADT diagnostic study or 2 x 2 table not extractable
Norris 1993	Editorial, letter or review
Omurzakova 2008	Target condition other than GAS
Omurzakova 2009	Target condition other than GAS
Omurzakova 2010	Target condition other than GAS
Patel 1987	Mixed age but no paediatric data
Penalba Citores 2007	Not a RADT diagnostic study or 2 x 2 table not extractable
Petts 1985	RADT other than EIA or OIA
Petts 1988	RADT other than EIA or OIA
Pichichero 1992	Editorial, letter or review
Portier 2003	Editorial, letter or review

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Study	Reason for exclusion
Prakash 1985	Editorial, letter or review
Preston 1987	Editorial, letter or review
Putto 1987	RADT other than EIA or OIA
Radetsky 1985	Editorial, letter or review
Radetsky 1987	Editorial, letter or review
Raich 1990	Mixed age but no paediatric data
Rasaiah 1986	Editorial, letter or review
Raz 1987	Editorial, letter or review
Razongles 1993	RADT other than EIA or OIA
Redd 1988	RADT other than EIA or OIA
Reed 1990	Mixed age but no paediatric data
Reichardt 2009	Not a RADT diagnostic study or 2 x 2 table not extractable
Rimoin 2004	Duplicate publication
Roosevelt 2001	Reference standard not laboratory culture
Santos 2003	Not ambulatory care setting
Sarikaya 2010	Adults or unclear age
Savoia 1992	Not a RADT diagnostic study or 2 x 2 table not extractable
Schafer 1995	Editorial, letter or review
Schmuziger 1996	Mixed age but no paediatric data
Schmuziger 2003	Mixed age but no paediatric data
Schwartz 1985	RADT other than EIA or OIA
Seaberg 1997	Mixed age but no paediatric data
Seecamp 1993	Adults or unclear age
Seguido 1987	RADT other than EIA or OIA
Seki 1986	RADT other than EIA or OIA
Serra 1989	Not ambulatory care setting
Shaughnessy 2015	Editorial, letter or review
Sheeler 2002	Adults or unclear age

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Study	Reason for exclusion
Shekelle 1992	Editorial, letter or review
Shriner 1985	Editorial, letter or review
Shulman 1994	Editorial, letter or review
Shulman 1995	Editorial, letter or review
Skellern 1993	Adults or unclear age
Smith 1989	RADT other than EIA or OIA
Smith 1995	Mixed age but no paediatric data
Solé 2009	Editorial, letter or review
Stillstrom 1991	Mixed age but no paediatric data
Stingu 2009	Not ambulatory care setting
Supon 1998	Mixed age but no paediatric data
Syriopoulou 2011	RADT other than EIA or OIA
Taeron 2006	Editorial, letter or review
Tagami 1997	Target condition other than GAS
Tenjarla 1990	Duplicate publication
Tocks 1992	Editorial, letter or review
Todd 1987	Editorial, letter or review
True 1986	RADT other than EIA or OIA
Uhl 2003	Mixed age but no paediatric data
Vakkila 2015	RADT other than EIA or OIA
Waagepetersen 2009	Editorial, letter or review
Wagener 1985	RADT other than EIA or OIA
Warner 1985	Editorial, letter or review
Waseem 2009	Duplicate publication
Wegner 1992	Mixed age but no paediatric data
Wegner 1996	Editorial, letter or review
White 1986	RADT other than EIA or OIA
Wolinsky 1986	RADT other than EIA or OIA

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Study	Reason for exclusion
Wong 2002	Mixed age but no paediatric data
Woodburn 2007	Mixed age but no paediatric data
Wright 1987	RADT other than EIA or OIA
Yu 1988	Adults or unclear age

EIA: enzyme immunoassay
GAS: group A streptococcus
OIA: optical immunoassay
RADT: rapid antigen detection test

Characteristics of studies awaiting classification *[ordered by study ID]*

Briko 1997

Study characteristics	
Patient sampling	—
Patient characteristics and setting	—
Index tests	—
Target condition and reference standard(s)	—
Flow and timing	—
Comparative	—
Notes	Unable to obtain full text

Gajos 1997

Study characteristics	
Patient sampling	—
Patient characteristics and setting	—
Index tests	—
Target condition and reference standard(s)	—
Flow and timing	—
Comparative	—
Notes	In Polish

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Gnehm 1986

Study characteristics	
Patient sampling	—
Patient characteristics and setting	—
Index tests	—
Target condition and reference standard(s)	—
Flow and timing	—
Comparative	—
Notes	Unable to obtain full text

Grevnina 1992

Study characteristics	
Patient sampling	—
Patient characteristics and setting	—
Index tests	—
Target condition and reference standard(s)	—
Flow and timing	—
Comparative	—
Notes	Unable to obtain full text

Herranz 2007

Study characteristics	
Patient sampling	—
Patient characteristics and setting	—
Index tests	—
Target condition and reference standard(s)	—
Flow and timing	—
Comparative	—
Notes	Unable to obtain full text

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Mirjat 2012a

Study characteristics	
Patient sampling	—
Patient characteristics and setting	—
Index tests	—
Target condition and reference standard(s)	—
Flow and timing	—
Comparative	—
Notes	Unable to obtain full text

Mirjat 2012b

Study characteristics	
Patient sampling	—
Patient characteristics and setting	—
Index tests	—
Target condition and reference standard(s)	—
Flow and timing	—
Comparative	—
Notes	Unable to obtain full text

Nestorovic 2004

Study characteristics	
Patient sampling	—
Patient characteristics and setting	—
Index tests	—
Target condition and reference standard(s)	—
Flow and timing	—
Comparative	—

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Nestorovic 2004 *(Continued)*

Notes	Unable to obtain full text

Sanz Moreno 2010

Study characteristics	
Patient sampling	—
Patient characteristics and setting	—
Index tests	—
Target condition and reference standard(s)	—
Flow and timing	—
Comparative	—
Notes	Unable to obtain full text

Shikhman 1988

Study characteristics	
Patient sampling	—
Patient characteristics and setting	—
Index tests	—
Target condition and reference standard(s)	—
Flow and timing	—
Comparative	—
Notes	Unable to obtain full text

Soyletir 1988

Study characteristics	
Patient sampling	—
Patient characteristics and setting	—
Index tests	—
Target condition and reference standard(s)	—

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Soyletir 1988 *(Continued)*

Flow and timing	—
Comparative	—
Notes	In Turkish

Sramek 1992

Study characteristics	
Patient sampling	—
Patient characteristics and setting	—
Index tests	—
Target condition and reference standard(s)	—
Flow and timing	—
Comparative	—
Notes	In Czech

Vylegzhanina 1994

Study characteristics	
Patient sampling	—
Patient characteristics and setting	—
Index tests	—
Target condition and reference standard(s)	—
Flow and timing	—
Comparative	—
Notes	Unable to obtain full text

Yilmaz 2008

Study characteristics	
Patient sampling	—
Patient characteristics and setting	—

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Yilmaz 2008 *(Continued)*

Index tests	—
Target condition and reference standard(s)	—
Flow and timing	—
Comparative	—
Notes	In Turkish

D A T A

Presented below are all the data for all of the tests entered into the review.

Table Tests. Data tables by test

Test	No. of studies	No. of participants
1 All studies (n = 116)	116	101121
2 Complete verification (n = 105)	105	58244
3 EIA (direct comparison)	2	802
4 OIA (direct comparison)	2	802
5 Acceava Strep A (Biostar)	2	789
6 ACON Strep A Rapid Test Strip	1	5505
7 BioNexia Strep A (BioMerieux)	1	183
8 CARDS QS Strep A (Quidel)	1	1184
9 Clearview Exact Strep A	1	630
10 Clearview Strep A	1	75
11 Diaquick Strep A Test (Dialab)	1	496
12 Directgen 1-2-3 Group A Strep (Becton Dickinson)	4	1189
13 Direct Strep A EIA	1	293
14 EIA (no name)	3	7228
15 Group A Strep Test (Quidel)	2	184
16 IM Strep A (International Microbio)	2	291
17 Meridian Bioscience	1	114

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Test	No. of studies	No. of participants
18 OSOM Strep A (Genzyme)	7	1349
19 OSOM Ultra Strep A (Genzyme)	4	1888
20 QuickVue Dipstick Strep A (Quidel)	2	2071
21 QuickVue Flex Strep A (Quidel)	2	1178
22 QuickVue In-Line Strep A (Quidel)	6	4122
23 QuickVue+ Strep A (Quidel)	4	845
24 Sacks Biological Farms	1	6557
25 SD Bioline Strep A	2	404
26 Signify Strep A (Abbott)	1	6865
27 SMART Group A Strep (New Horizons)	1	1035
28 Strep A Abon kit	1	1243
29 Strep A OIA (Biostar)	13	6476
30 Strep A OIA Max (Biostar)	6	2960
31 Strep A Rapid Test Device	1	490
32 Strep A Sign	1	75
33 Strep A test II (INTEX Diagnostica)	1	1248
34 StreptAtest (Dectrapharm)	4	1640
35 Streptavit	1	75
36 Streptop A (ALL-Diag)	1	292
37 SUDS Group A Strep	1	341
38 SureScreen Test Strep A	1	188
39 TestPack Strep A (Abbott)	10	14766
40 TestPack Plus (Abbott)	8	2883
41 TestPack Plus Strep A with OBC II (Abbott)	1	454
42 Ventrescreen Strep A (Ventrex Lab)	3	714
43 Visuwell Strep A (ADI)	3	926
44 Icon Strep A	4	865
45 Qtest (Becton Dickinson)	3	16645

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Test	No. of studies	No. of participants
46 Link 2 Strep A Rapid Test (Becton Dickinson)	1	432
47 Event Test Strip Strep A	1	510

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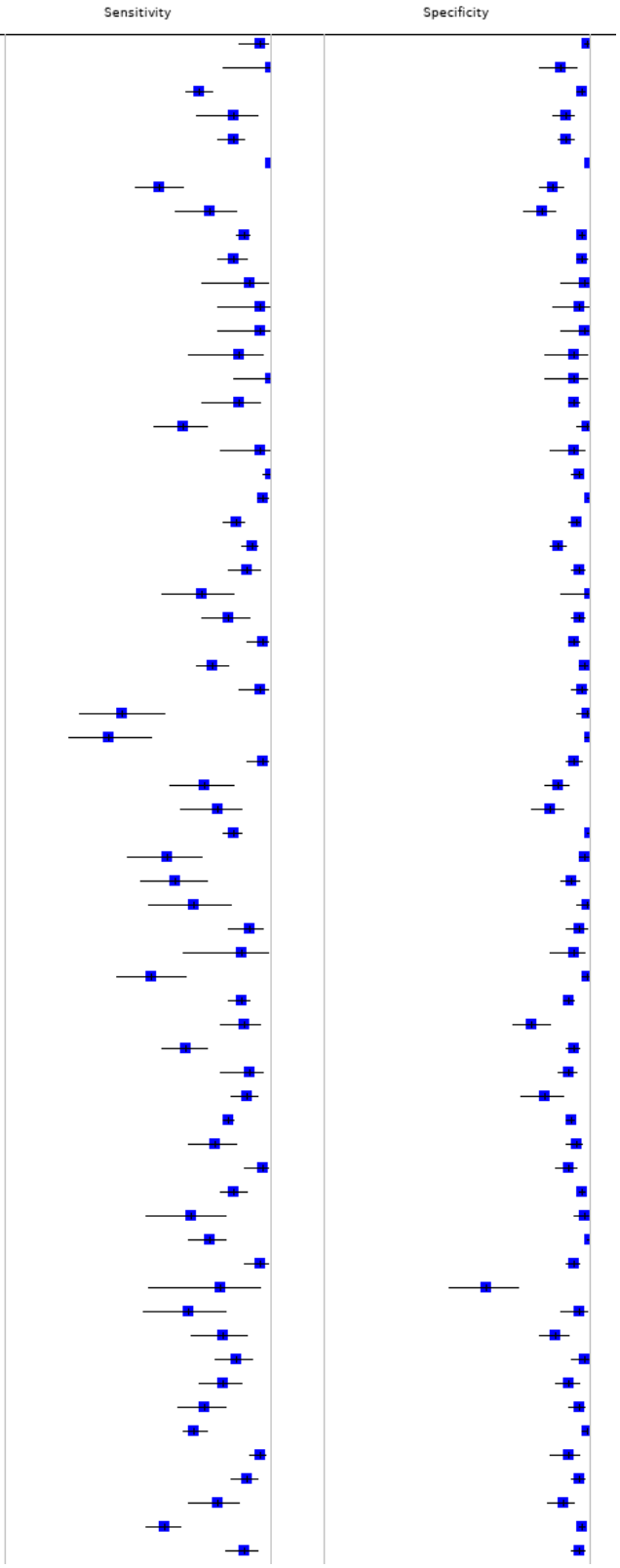
Test 1. All studies (n = 116).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 1 All studies (n = 116)

Study	TP	FP	FN	TN	Sensitivity	Specificity
Al-Najjar 2008	68	3	3	422	0.96 [0.88, 0.99]	0.99 [0.98, 1.00]
Alper 2013	19	10	0	85	1.00 [0.82, 1.00]	0.89 [0.81, 0.95]
Altun 2015	224	30	83	906	0.73 [0.68, 0.78]	0.97 [0.95, 0.98]
Arribas Blanco 1988	87	18	6	179	0.86 [0.72, 0.95]	0.91 [0.86, 0.94]
Attia 2001	187	33	31	336	0.86 [0.80, 0.90]	0.91 [0.88, 0.94]
Ayanruoh 2009	1474	0	2	5081	1.00 [1.00, 1.00]	1.00 [1.00, 1.00]
Begovac 1993	70	37	51	231	0.58 [0.49, 0.67]	0.86 [0.81, 0.90]
Buchbinder 2007	44	29	13	130	0.77 [0.64, 0.87]	0.82 [0.75, 0.87]
Camurdan 2008	426	22	49	751	0.90 [0.87, 0.92]	0.97 [0.96, 0.98]
Chapin 2002	149	10	24	337	0.86 [0.80, 0.91]	0.97 [0.95, 0.99]
Chiadmi 2004a	23	1	2	49	0.92 [0.74, 0.99]	0.98 [0.89, 1.00]
Chiadmi 2004b	24	2	1	48	0.96 [0.80, 1.00]	0.96 [0.86, 1.00]
Chiadmi 2004c	24	1	1	49	0.96 [0.80, 1.00]	0.98 [0.89, 1.00]
Chiadmi 2004d	22	3	3	47	0.88 [0.69, 0.97]	0.94 [0.83, 0.99]
Chiadmi 2004e	25	3	0	47	1.00 [0.86, 1.00]	0.94 [0.83, 0.99]
Chu 1990	37	23	5	379	0.88 [0.74, 0.96]	0.94 [0.92, 0.96]
Clegg 1987	66	1	33	105	0.67 [0.56, 0.76]	0.99 [0.95, 1.00]
Cohen 1988	26	4	1	61	0.96 [0.81, 1.00]	0.94 [0.85, 0.98]
Cohen 1998	121	19	0	418	1.00 [0.97, 1.00]	0.96 [0.93, 0.97]
Cohen 2004	268	0	7	329	0.97 [0.95, 0.99]	1.00 [0.99, 1.00]
Cohen 2012	247	27	38	473	0.87 [0.82, 0.90]	0.95 [0.92, 0.96]
Cohen 2013	259	46	21	350	0.93 [0.89, 0.95]	0.88 [0.85, 0.91]
Contessotto 2000	103	11	10	277	0.91 [0.84, 0.96]	0.96 [0.93, 0.98]
Dagnelie 1998	34	0	12	33	0.74 [0.59, 0.86]	1.00 [0.89, 1.00]
Daly 1994	64	15	12	333	0.84 [0.74, 0.92]	0.96 [0.93, 0.98]
Della-Latta 1994	89	35	3	563	0.97 [0.91, 0.99]	0.94 [0.92, 0.96]
Ding 2011	146	9	40	435	0.78 [0.72, 0.84]	0.98 [0.96, 0.99]
Dobkin 1987	65	5	3	148	0.96 [0.88, 0.99]	0.97 [0.93, 0.99]
Donatelli 1992a	18	2	23	137	0.44 [0.28, 0.60]	0.99 [0.95, 1.00]
Donatelli 1992b	17	0	27	158	0.39 [0.24, 0.55]	1.00 [0.98, 1.00]
dos Santos 2005	89	16	3	268	0.97 [0.91, 0.99]	0.94 [0.91, 0.97]
Drulak 1988	43	26	14	197	0.75 [0.62, 0.86]	0.88 [0.83, 0.92]
Drulak 1991	43	22	11	126	0.80 [0.66, 0.89]	0.85 [0.78, 0.90]
Edmonson 2005	384	0	65	735	0.86 [0.82, 0.89]	1.00 [0.99, 1.00]
Egger 1990a	31	4	20	231	0.61 [0.46, 0.74]	0.98 [0.96, 1.00]
Egger 1990b	38	16	21	218	0.64 [0.51, 0.76]	0.93 [0.89, 0.96]
Enright 2011	27	2	11	137	0.71 [0.54, 0.85]	0.99 [0.95, 1.00]
Ezike 2005	73	4	6	103	0.92 [0.84, 0.97]	0.96 [0.91, 0.99]
Faverge 2004	17	4	2	61	0.89 [0.67, 0.99]	0.94 [0.85, 0.98]
Felsenstein 2014	32	3	26	300	0.55 [0.42, 0.68]	0.99 [0.97, 1.00]
Finger 1999	212	42	27	496	0.89 [0.84, 0.92]	0.92 [0.90, 0.94]
Flores Mateo 2010	65	30	7	109	0.90 [0.81, 0.96]	0.78 [0.71, 0.85]
Forward 2006	80	23	38	349	0.68 [0.59, 0.76]	0.94 [0.91, 0.96]
Fourati 2009	54	18	5	215	0.92 [0.81, 0.97]	0.92 [0.88, 0.95]
Gerber 1990	123	16	12	77	0.91 [0.85, 0.95]	0.83 [0.74, 0.90]
Gerber 1997	844	78	161	1030	0.84 [0.82, 0.86]	0.93 [0.91, 0.94]
Gieseker 2002a	65	12	17	208	0.79 [0.69, 0.87]	0.95 [0.91, 0.97]
Gieseker 2002b	84	18	3	197	0.97 [0.90, 0.99]	0.92 [0.87, 0.95]
Gieseker 2003	181	19	29	658	0.86 [0.81, 0.91]	0.97 [0.96, 0.98]
Gurol 2010	28	3	12	135	0.70 [0.53, 0.83]	0.98 [0.94, 1.00]
Hall 2004	117	0	35	409	0.77 [0.69, 0.83]	1.00 [0.99, 1.00]
Harris 1995	109	24	5	381	0.96 [0.90, 0.99]	0.94 [0.91, 0.96]
Hart 1997	13	23	3	36	0.81 [0.54, 0.96]	0.61 [0.47, 0.73]
Henderson 1988	27	3	12	75	0.69 [0.52, 0.83]	0.96 [0.89, 0.99]
Kaltwasser 1997	47	18	10	125	0.82 [0.70, 0.91]	0.87 [0.81, 0.92]
Kaufhold 1991a	91	3	14	122	0.87 [0.79, 0.93]	0.98 [0.93, 1.00]
Kaufhold 1991b	90	12	20	139	0.82 [0.73, 0.89]	0.92 [0.87, 0.96]
Kellog 1987	80	11	27	240	0.75 [0.65, 0.83]	0.96 [0.92, 0.98]
Kellog 1991	302	8	121	604	0.71 [0.67, 0.76]	0.99 [0.97, 0.99]
Kim 2009	187	8	8	90	0.96 [0.92, 0.98]	0.92 [0.85, 0.96]
Kuhn 1999	120	9	12	222	0.91 [0.85, 0.95]	0.96 [0.93, 0.98]
Kurtz 2000	63	18	16	159	0.80 [0.69, 0.88]	0.90 [0.84, 0.94]
Küçük 2014	128	19	87	658	0.60 [0.53, 0.66]	0.97 [0.96, 0.98]
Laubscher 1995	106	14	12	322	0.90 [0.83, 0.95]	0.96 [0.93, 0.98]



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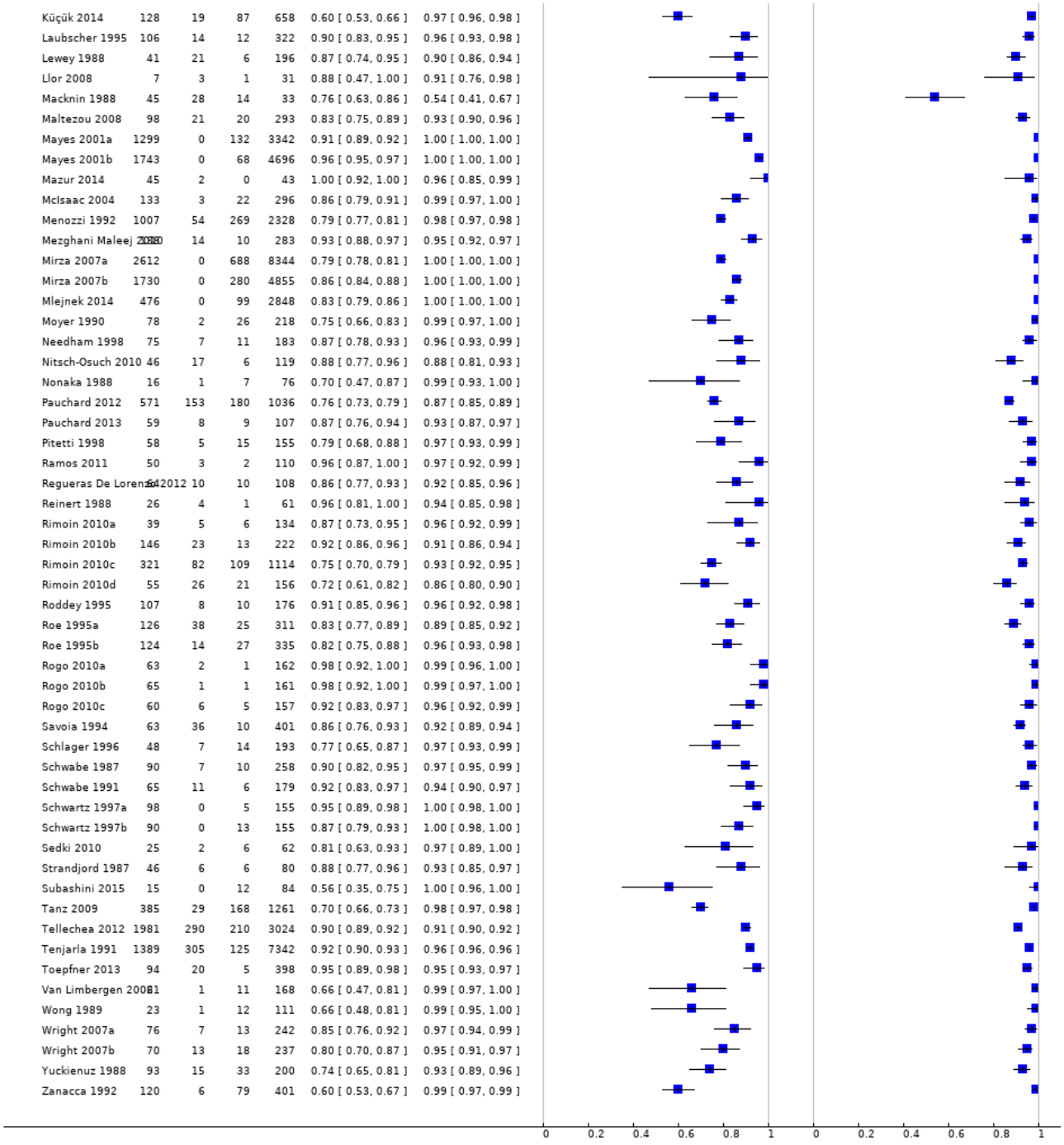
Test 1. (Continued)



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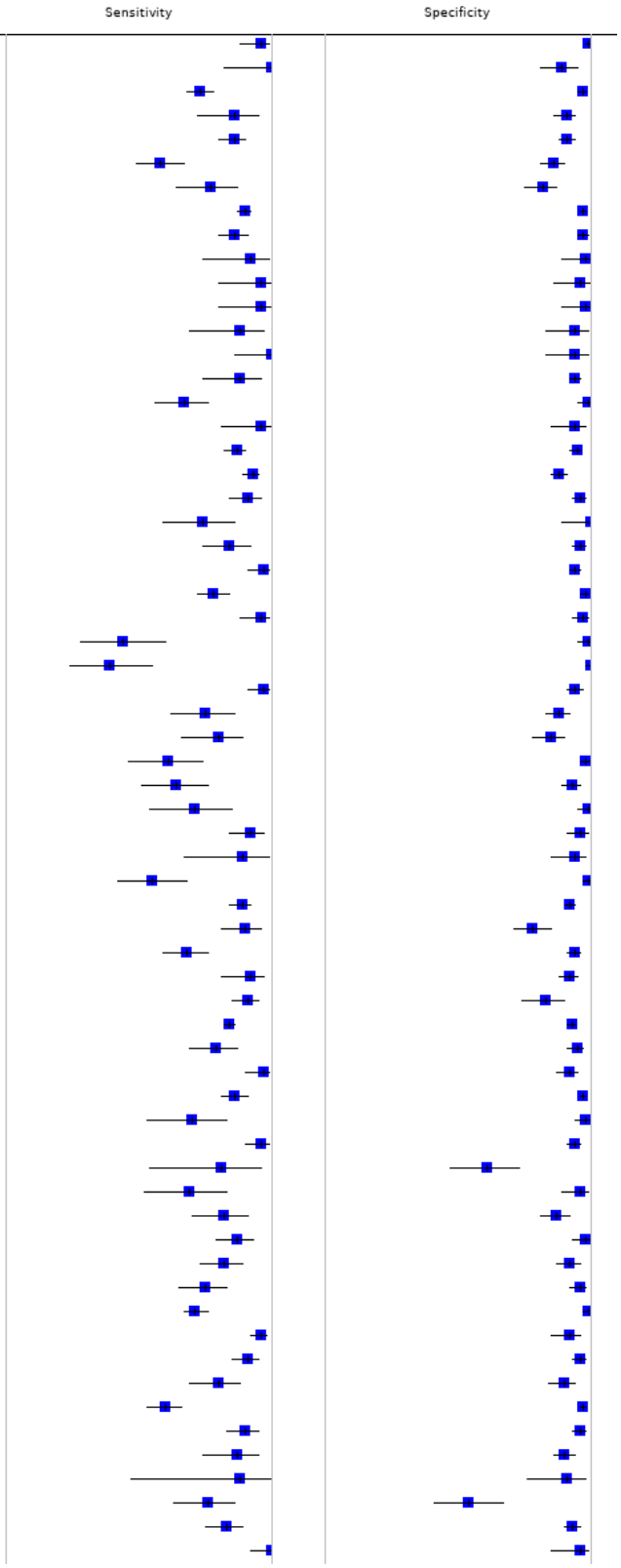
Test 2. Complete verification (n = 105).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 2 Complete verification (n = 105)

Study	TP	FP	FN	TN	Sensitivity	Specificity
Al-Najjar 2008	68	3	3	422	0.96 [0.88, 0.99]	0.99 [0.98, 1.00]
Alper 2013	19	10	0	85	1.00 [0.82, 1.00]	0.89 [0.81, 0.95]
Altun 2015	224	30	83	906	0.73 [0.68, 0.78]	0.97 [0.95, 0.98]
Arribas Blanco 1988	87	18	6	179	0.86 [0.72, 0.95]	0.91 [0.86, 0.94]
Attia 2001	187	33	31	336	0.86 [0.80, 0.90]	0.91 [0.88, 0.94]
Begovac 1993	70	37	51	231	0.58 [0.49, 0.67]	0.86 [0.81, 0.90]
Buchbinder 2007	44	29	13	130	0.77 [0.64, 0.87]	0.82 [0.75, 0.87]
Camurdan 2008	426	22	49	751	0.90 [0.87, 0.92]	0.97 [0.96, 0.98]
Chapin 2002	149	10	24	337	0.86 [0.80, 0.91]	0.97 [0.95, 0.99]
Chiadmi 2004a	23	1	2	49	0.92 [0.74, 0.99]	0.98 [0.89, 1.00]
Chiadmi 2004b	24	2	1	48	0.96 [0.80, 1.00]	0.96 [0.86, 1.00]
Chiadmi 2004c	24	1	1	49	0.96 [0.80, 1.00]	0.98 [0.89, 1.00]
Chiadmi 2004d	22	3	3	47	0.88 [0.69, 0.97]	0.94 [0.83, 0.99]
Chiadmi 2004e	25	3	0	47	1.00 [0.86, 1.00]	0.94 [0.83, 0.99]
Chu 1990	37	23	5	379	0.88 [0.74, 0.96]	0.94 [0.92, 0.96]
Clegg 1987	66	1	33	105	0.67 [0.56, 0.76]	0.99 [0.95, 1.00]
Cohen 1988	26	4	1	61	0.96 [0.81, 1.00]	0.94 [0.85, 0.98]
Cohen 2012	247	27	38	473	0.87 [0.82, 0.90]	0.95 [0.92, 0.96]
Cohen 2013	259	46	21	350	0.93 [0.89, 0.95]	0.88 [0.85, 0.91]
Contessotto 2000	103	11	10	277	0.91 [0.84, 0.96]	0.96 [0.93, 0.98]
Dagnelie 1998	34	0	12	33	0.74 [0.59, 0.86]	1.00 [0.89, 1.00]
Daly 1994	64	15	12	333	0.84 [0.74, 0.92]	0.96 [0.93, 0.98]
Della-Latta 1994	89	35	3	563	0.97 [0.91, 0.99]	0.94 [0.92, 0.96]
Ding 2011	146	9	40	435	0.78 [0.72, 0.84]	0.98 [0.96, 0.99]
Dobkin 1987	65	5	3	148	0.96 [0.88, 0.99]	0.97 [0.93, 0.99]
Donatelli 1992a	18	2	23	137	0.44 [0.28, 0.60]	0.99 [0.95, 1.00]
Donatelli 1992b	17	0	27	158	0.39 [0.24, 0.55]	1.00 [0.98, 1.00]
dos Santos 2005	89	16	3	268	0.97 [0.91, 0.99]	0.94 [0.91, 0.97]
Drulak 1988	43	26	14	197	0.75 [0.62, 0.86]	0.88 [0.83, 0.92]
Drulak 1991	43	22	11	126	0.80 [0.66, 0.89]	0.85 [0.78, 0.90]
Egger 1990a	31	4	20	231	0.61 [0.46, 0.74]	0.98 [0.96, 1.00]
Egger 1990b	38	16	21	218	0.64 [0.51, 0.76]	0.93 [0.89, 0.96]
Enright 2011	27	2	11	137	0.71 [0.54, 0.85]	0.99 [0.95, 1.00]
Ezike 2005	73	4	6	103	0.92 [0.84, 0.97]	0.96 [0.91, 0.99]
Faverge 2004	17	4	2	61	0.89 [0.67, 0.99]	0.94 [0.85, 0.98]
Felsenstein 2014	32	3	26	300	0.55 [0.42, 0.68]	0.99 [0.97, 1.00]
Finger 1999	212	42	27	496	0.89 [0.84, 0.92]	0.92 [0.90, 0.94]
Flores Mateo 2010	65	30	7	109	0.90 [0.81, 0.96]	0.78 [0.71, 0.85]
Forward 2006	80	23	38	349	0.68 [0.59, 0.76]	0.94 [0.91, 0.96]
Fourati 2009	54	18	5	215	0.92 [0.81, 0.97]	0.92 [0.88, 0.95]
Gerber 1990	123	16	12	77	0.91 [0.85, 0.95]	0.83 [0.74, 0.90]
Gerber 1997	844	78	161	1030	0.84 [0.82, 0.86]	0.93 [0.91, 0.94]
Gieseker 2002a	65	12	17	208	0.79 [0.69, 0.87]	0.95 [0.91, 0.97]
Gieseker 2002b	84	18	3	197	0.97 [0.90, 0.99]	0.92 [0.87, 0.95]
Gieseker 2003	181	19	29	658	0.86 [0.81, 0.91]	0.97 [0.96, 0.98]
Gurol 2010	28	3	12	135	0.70 [0.53, 0.83]	0.98 [0.94, 1.00]
Harris 1995	109	24	5	381	0.96 [0.90, 0.99]	0.94 [0.91, 0.96]
Hart 1997	13	23	3	36	0.81 [0.54, 0.96]	0.61 [0.47, 0.73]
Henderson 1988	27	3	12	75	0.69 [0.52, 0.83]	0.96 [0.89, 0.99]
Kaltwasser 1997	47	18	10	125	0.82 [0.70, 0.91]	0.87 [0.81, 0.92]
Kaufhold 1991a	91	3	14	122	0.87 [0.79, 0.93]	0.98 [0.93, 1.00]
Kaufhold 1991b	90	12	20	139	0.82 [0.73, 0.89]	0.92 [0.87, 0.96]
Kellog 1987	80	11	27	240	0.75 [0.65, 0.83]	0.96 [0.92, 0.98]
Kellog 1991	302	8	121	604	0.71 [0.67, 0.76]	0.99 [0.97, 0.99]
Kim 2009	187	8	8	90	0.96 [0.92, 0.98]	0.92 [0.85, 0.96]
Kuhn 1999	120	9	12	222	0.91 [0.85, 0.95]	0.96 [0.93, 0.98]
Kurtz 2000	63	18	16	159	0.80 [0.69, 0.88]	0.90 [0.84, 0.94]
Küçük 2014	128	19	87	658	0.60 [0.53, 0.66]	0.97 [0.96, 0.98]
Laubscher 1995	106	14	12	322	0.90 [0.83, 0.95]	0.96 [0.93, 0.98]
Lewey 1988	41	21	6	196	0.87 [0.74, 0.95]	0.90 [0.86, 0.94]
Llor 2008	7	3	1	31	0.88 [0.47, 1.00]	0.91 [0.76, 0.98]
Macknin 1988	45	28	14	33	0.76 [0.63, 0.86]	0.54 [0.41, 0.67]
Maltezou 2008	98	21	20	293	0.83 [0.75, 0.89]	0.93 [0.90, 0.96]
Mazur 2014	45	2	0	43	1.00 [0.92, 1.00]	0.96 [0.85, 0.99]



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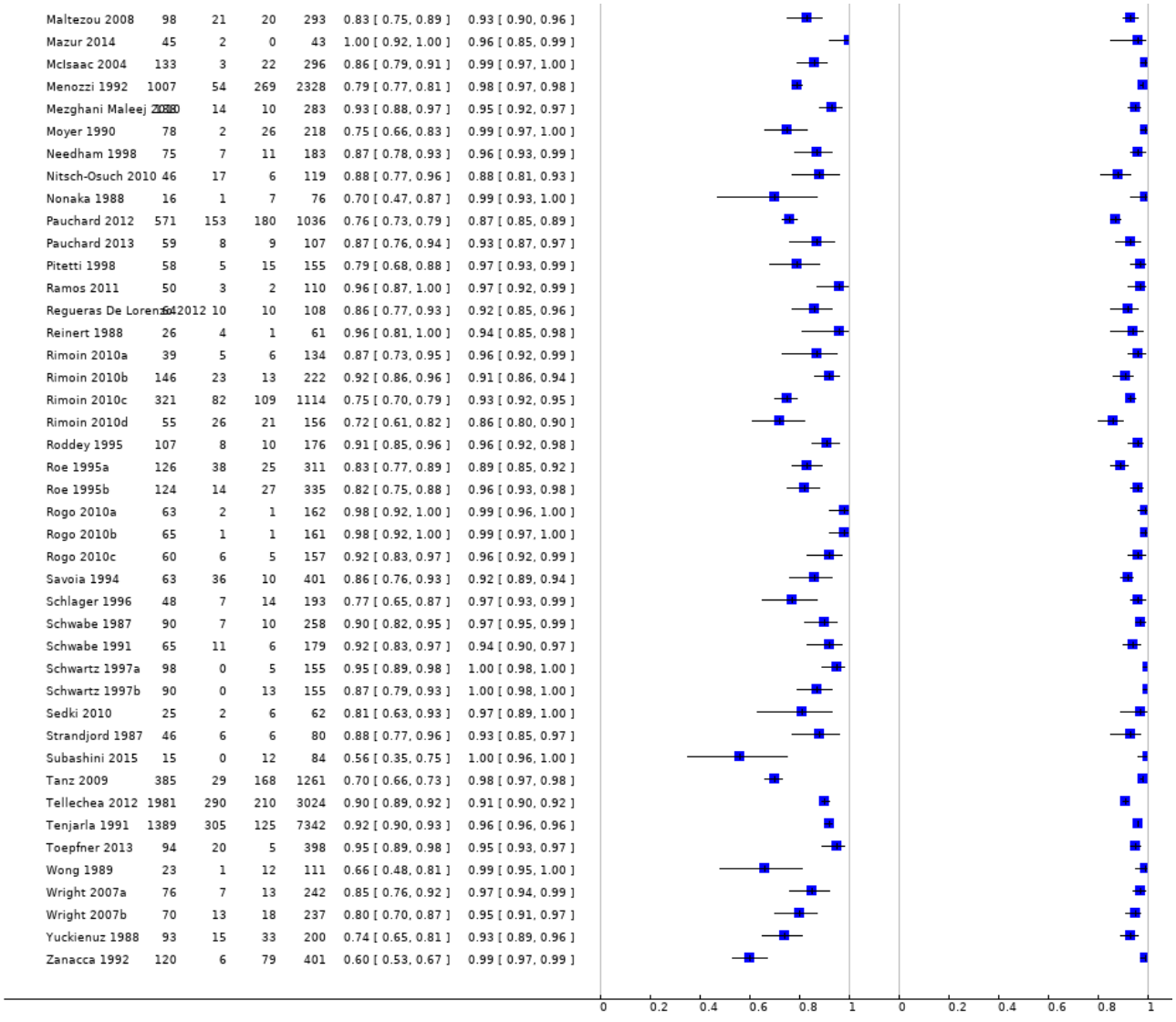
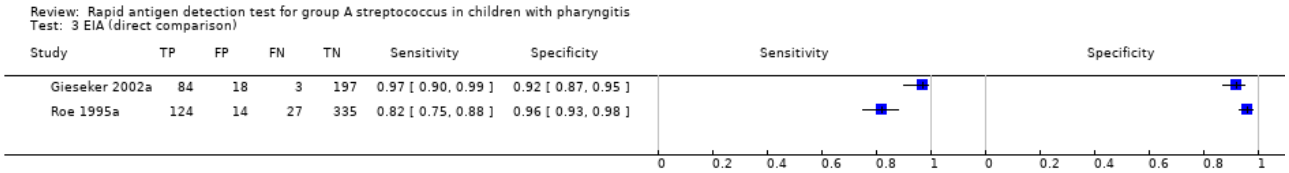
Test 2. (Continued)



Test 3. EIA (direct comparison).



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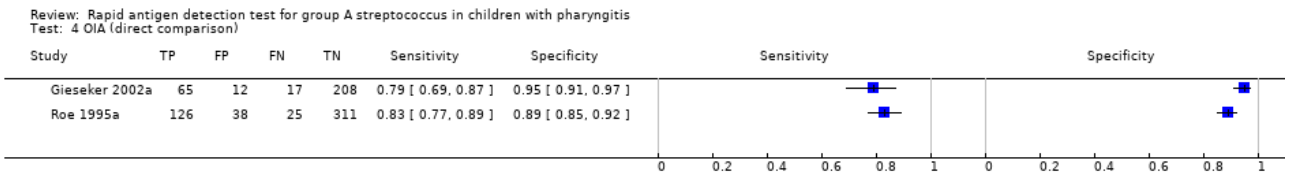
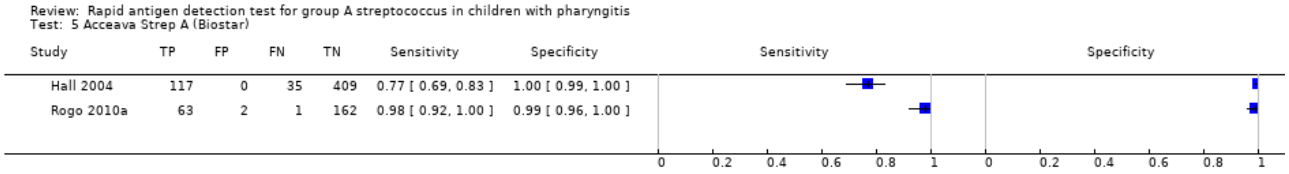
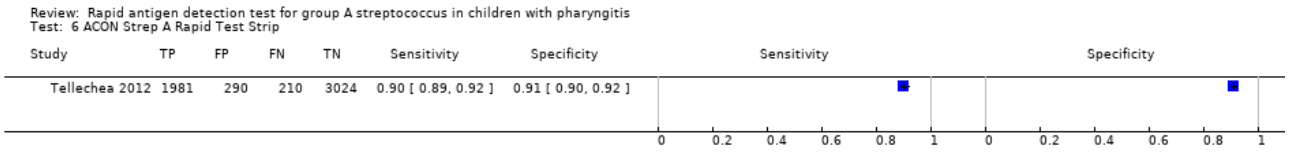
Test 4. OIA (direct comparison).



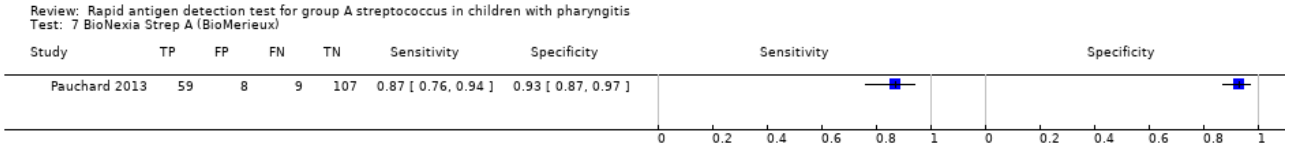
Test 5. Acceava Strep A (Biostar).



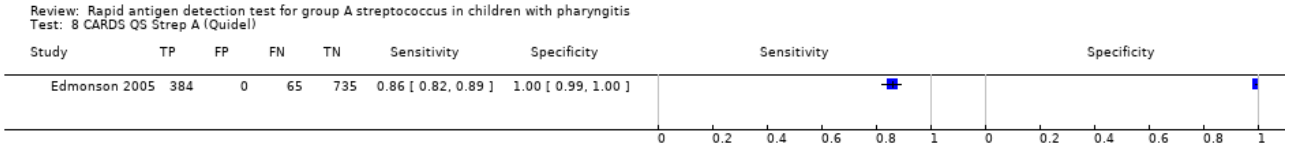
Test 6. ACON Strep A Rapid Test Strip.



Test 7. BioNexia Strep A (BioMerieux).



Test 8. CARDS QS Strep A (Quidel).



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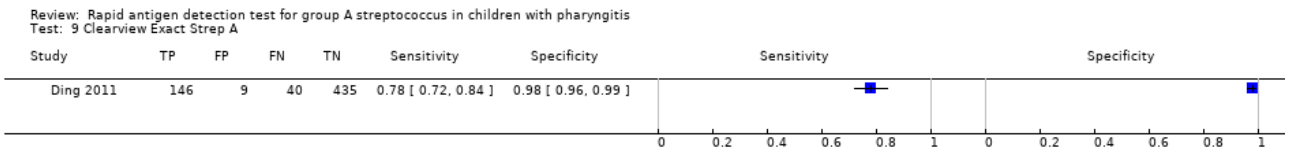
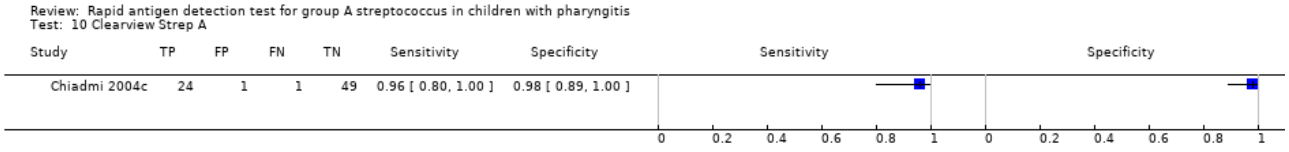
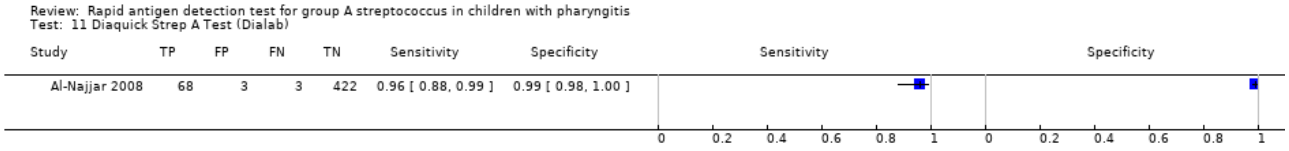
Test 9. Clearview Exact Strep A.



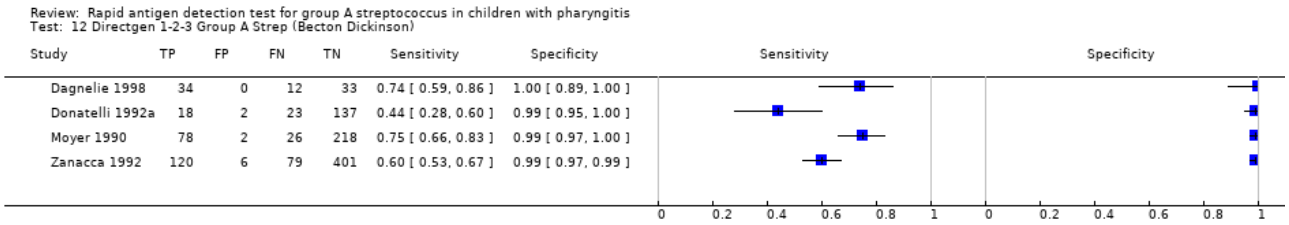
Test 10. Clearview Strep A.



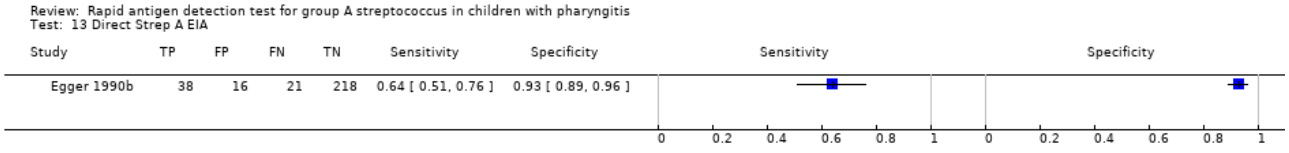
Test 11. Diaquick Strep A Test (Dialab).



Test 12. Directgen 1-2-3 Group A Strep (Becton Dickinson).



Test 13. Direct Strep A EIA.



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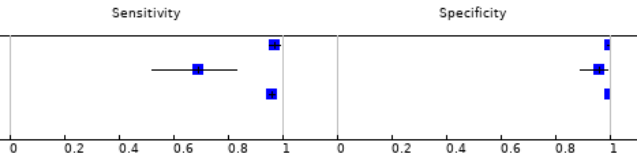
Test 14. EIA (no name).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 14 EIA (no name)

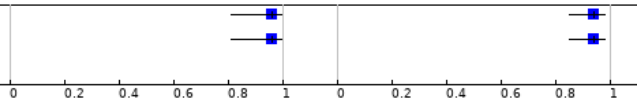
Study	TP	FP	FN	TN	Sensitivity	Specificity
Cohen 2004	268	0	7	329	0.97 [0.95, 0.99]	1.00 [0.99, 1.00]
Henderson 1988	27	3	12	75	0.69 [0.52, 0.83]	0.96 [0.89, 0.99]
Mayes 2001b	1743	0	68	4696	0.96 [0.95, 0.97]	1.00 [1.00, 1.00]



Test 15. Group A Strep Test (Quidel).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 15 Group A Strep Test (Quidel)

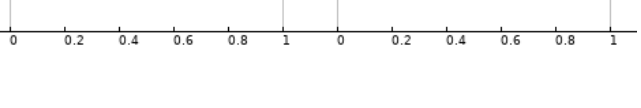
Study	TP	FP	FN	TN	Sensitivity	Specificity
Cohen 1988	26	4	1	61	0.96 [0.81, 1.00]	0.94 [0.85, 0.98]
Reinert 1988	26	4	1	61	0.96 [0.81, 1.00]	0.94 [0.85, 0.98]



Test 16. IM Strep A (International Microbio).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 16 IM Strep A (International Microbio)

Study	TP	FP	FN	TN	Sensitivity	Specificity
Buchbinder 2007	44	29	13	130	0.77 [0.64, 0.87]	0.82 [0.75, 0.87]
Chiadmi 2004b	24	2	1	48	0.96 [0.80, 1.00]	0.96 [0.86, 1.00]



Test 17. Meridian Bioscience.

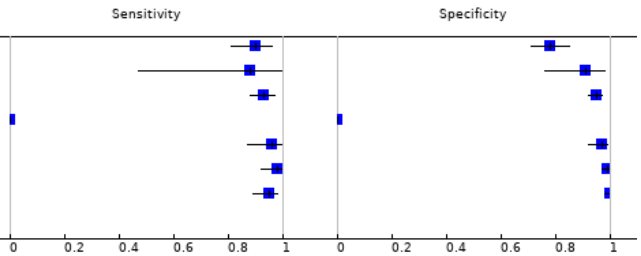
Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 17 Meridian Bioscience

Study	TP	FP	FN	TN	Sensitivity	Specificity
Alper 2013	19	10	0	85	1.00 [0.82, 1.00]	0.89 [0.81, 0.95]

Test 18. OSOM Strep A (Genzyme).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 18 OSOM Strep A (Genzyme)

Study	TP	FP	FN	TN	Sensitivity	Specificity
Flores Mateo 2010	65	30	7	109	0.90 [0.81, 0.96]	0.78 [0.71, 0.85]
Llor 2008	7	3	1	31	0.88 [0.47, 1.00]	0.91 [0.76, 0.98]
Mezghani Maleej 2010	80	14	10	283	0.93 [0.88, 0.97]	0.95 [0.92, 0.97]
Mlejnek 2014	0	0	0	0	0.0 [0.0, 0.0]	0.0 [0.0, 0.0]
Ramos 2011	50	3	2	110	0.96 [0.87, 1.00]	0.97 [0.92, 0.99]
Rogo 2010b	65	1	1	161	0.98 [0.92, 1.00]	0.99 [0.97, 1.00]
Schwartz 1997a	98	0	5	155	0.95 [0.89, 0.98]	1.00 [0.98, 1.00]



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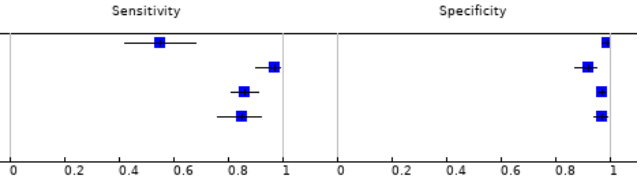
Test 19. OSOM Ultra Strep A (Genzyme).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 19 OSOM Ultra Strep A (Genzyme)

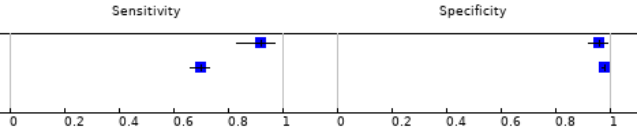
Study	TP	FP	FN	TN	Sensitivity	Specificity
Felsenstein 2014	32	3	26	300	0.55 [0.42, 0.68]	0.99 [0.97, 1.00]
Gieseker 2002b	84	18	3	197	0.97 [0.90, 0.99]	0.92 [0.87, 0.95]
Gieseker 2003	181	19	29	658	0.86 [0.81, 0.91]	0.97 [0.96, 0.98]
Wright 2007a	76	7	13	242	0.85 [0.76, 0.92]	0.97 [0.94, 0.99]



Test 20. QuickVue Dipstick Strep A (Quidel).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 20 QuickVue Dipstick Strep A (Quidel)

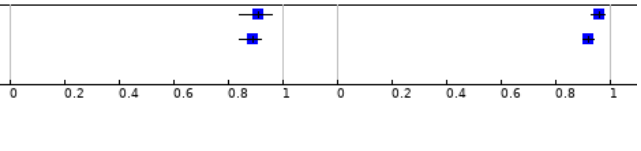
Study	TP	FP	FN	TN	Sensitivity	Specificity
Rogo 2010c	60	6	5	157	0.92 [0.83, 0.97]	0.96 [0.92, 0.99]
Tanz 2009	385	29	168	1261	0.70 [0.66, 0.73]	0.98 [0.97, 0.98]



Test 21. QuickVue Flex Strep A (Quidel).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 21 QuickVue Flex Strep A (Quidel)

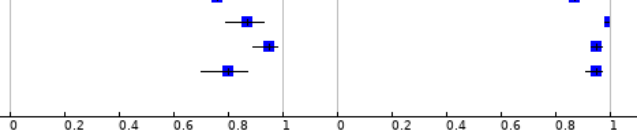
Study	TP	FP	FN	TN	Sensitivity	Specificity
Contessotto 2000	103	11	10	277	0.91 [0.84, 0.96]	0.96 [0.93, 0.98]
Finger 1999	212	42	27	496	0.89 [0.84, 0.92]	0.92 [0.90, 0.94]



Test 22. QuickVue In-Line Strep A (Quidel).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 22 QuickVue In-Line Strep A (Quidel)

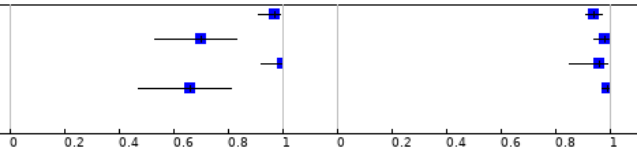
Study	TP	FP	FN	TN	Sensitivity	Specificity
Enright 2011	27	2	11	137	0.71 [0.54, 0.85]	0.99 [0.95, 1.00]
Küçük 2014	128	19	87	658	0.60 [0.53, 0.66]	0.97 [0.96, 0.98]
Pauchard 2012	571	153	180	1036	0.76 [0.73, 0.79]	0.87 [0.85, 0.89]
Schwartz 1997b	90	0	13	155	0.87 [0.79, 0.93]	1.00 [0.98, 1.00]
Toepfner 2013	94	20	5	398	0.95 [0.89, 0.98]	0.95 [0.93, 0.97]
Wright 2007b	70	13	18	237	0.80 [0.70, 0.87]	0.95 [0.91, 0.97]



Test 23. QuickVue+ Strep A (Quidel).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 23 QuickVue+ Strep A (Quidel)

Study	TP	FP	FN	TN	Sensitivity	Specificity
dos Santos 2005	89	16	3	268	0.97 [0.91, 0.99]	0.94 [0.91, 0.97]
Gurol 2010	28	3	12	135	0.70 [0.53, 0.83]	0.98 [0.94, 1.00]
Mazur 2014	45	2	0	43	1.00 [0.92, 1.00]	0.96 [0.85, 0.99]
Van Limbergen 2008	81	1	11	168	0.66 [0.47, 0.81]	0.99 [0.97, 1.00]



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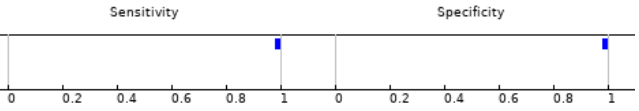
Test 24. Sacks Biological Farms.

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 24 Sacks Biological Farms

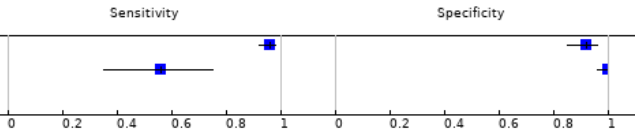
Study	TP	FP	FN	TN	Sensitivity	Specificity
Ayanruoh 2009	1474	0	2	5081	1.00 [1.00, 1.00]	1.00 [1.00, 1.00]



Test 25. SD Bioline Strep A.

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 25 SD Bioline Strep A

Study	TP	FP	FN	TN	Sensitivity	Specificity
Kim 2009	187	8	8	90	0.96 [0.92, 0.98]	0.92 [0.85, 0.96]
Subashini 2015	15	0	12	84	0.56 [0.35, 0.75]	1.00 [0.96, 1.00]



Test 26. Signify Strep A (Abbott).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 26 Signify Strep A (Abbott)

Study	TP	FP	FN	TN	Sensitivity	Specificity
Mirza 2007b	1730	0	280	4855	0.86 [0.84, 0.88]	1.00 [1.00, 1.00]

Test 27. SMART Group A Strep (New Horizons).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 27 SMART Group A Strep (New Horizons)

Study	TP	FP	FN	TN	Sensitivity	Specificity
Kellog 1991	302	8	121	604	0.71 [0.67, 0.76]	0.99 [0.97, 0.99]

Test 28. Strep A Abon kit.

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 28 Strep A Abon kit

Study	TP	FP	FN	TN	Sensitivity	Specificity
Altun 2015	224	30	83	906	0.73 [0.68, 0.78]	0.97 [0.95, 0.98]

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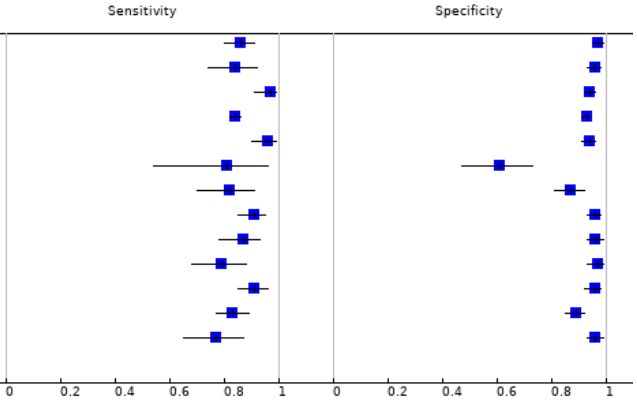
Test 29. Strep A OIA (Biostar).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 29 Strep A OIA (Biostar)

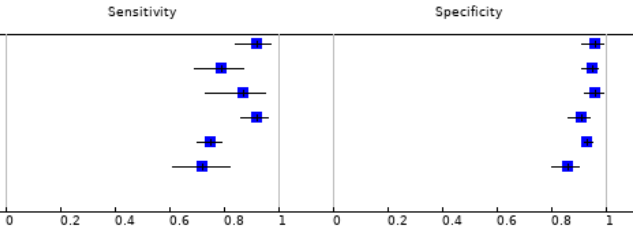
Study	TP	FP	FN	TN	Sensitivity	Specificity
Chapin 2002	149	10	24	337	0.86 [0.80, 0.91]	0.97 [0.95, 0.99]
Daly 1994	64	15	12	333	0.84 [0.74, 0.92]	0.96 [0.93, 0.98]
Della-Latta 1994	89	35	3	563	0.97 [0.91, 0.99]	0.94 [0.92, 0.96]
Gerber 1997	844	78	161	1030	0.84 [0.82, 0.86]	0.93 [0.91, 0.94]
Harris 1995	109	24	5	381	0.96 [0.90, 0.99]	0.94 [0.91, 0.96]
Hart 1997	13	23	3	36	0.81 [0.54, 0.96]	0.61 [0.47, 0.73]
Kaltwasser 1997	47	18	10	125	0.82 [0.70, 0.91]	0.87 [0.81, 0.92]
Kuhn 1999	120	9	12	222	0.91 [0.85, 0.95]	0.96 [0.93, 0.98]
Needham 1998	75	7	11	183	0.87 [0.78, 0.93]	0.96 [0.93, 0.99]
Pitetti 1998	58	5	15	155	0.79 [0.68, 0.88]	0.97 [0.93, 0.99]
Roddey 1995	107	8	10	176	0.91 [0.85, 0.96]	0.96 [0.92, 0.98]
Roe 1995a	126	38	25	311	0.83 [0.77, 0.89]	0.89 [0.85, 0.92]
Schlager 1996	48	7	14	193	0.77 [0.65, 0.87]	0.97 [0.93, 0.99]



Test 30. Strep A OIA Max (Biostar).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 30 Strep A OIA Max (Biostar)

Study	TP	FP	FN	TN	Sensitivity	Specificity
Ezike 2005	73	4	6	103	0.92 [0.84, 0.97]	0.96 [0.91, 0.99]
Gieseker 2002a	65	12	17	208	0.79 [0.69, 0.87]	0.95 [0.91, 0.97]
Rimoin 2010a	39	5	6	134	0.87 [0.73, 0.95]	0.96 [0.92, 0.99]
Rimoin 2010b	146	23	13	222	0.92 [0.86, 0.96]	0.91 [0.86, 0.94]
Rimoin 2010c	321	82	109	1114	0.75 [0.70, 0.79]	0.93 [0.92, 0.95]
Rimoin 2010d	55	26	21	156	0.72 [0.61, 0.82]	0.86 [0.80, 0.90]



Test 31. Strep A Rapid Test Device.

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 31 Strep A Rapid Test Device

Study	TP	FP	FN	TN	Sensitivity	Specificity
Forward 2006	80	23	38	349	0.68 [0.59, 0.76]	0.94 [0.91, 0.96]

Test 32. Strep A Sign.

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 32 Strep A Sign

Study	TP	FP	FN	TN	Sensitivity	Specificity
Chiadmi 2004d	22	3	3	47	0.88 [0.69, 0.97]	0.94 [0.83, 0.99]

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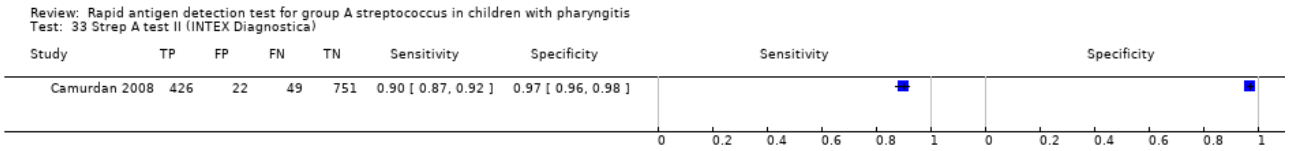
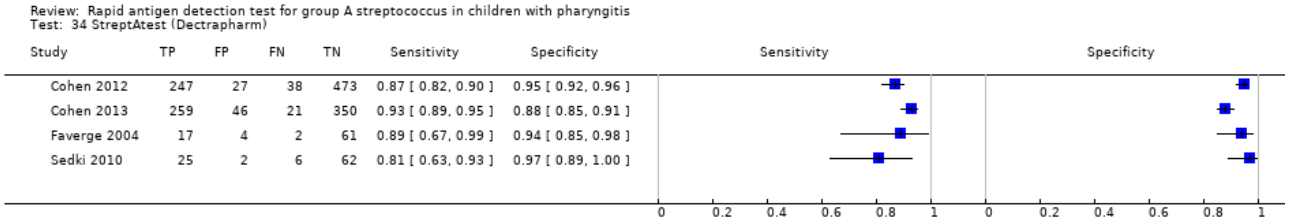
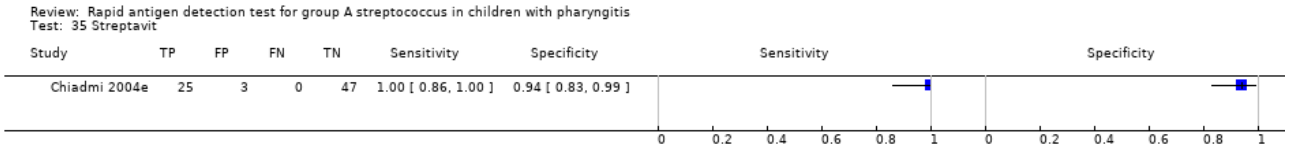
Test 33. Strep A test II (INTEX Diagnostica).



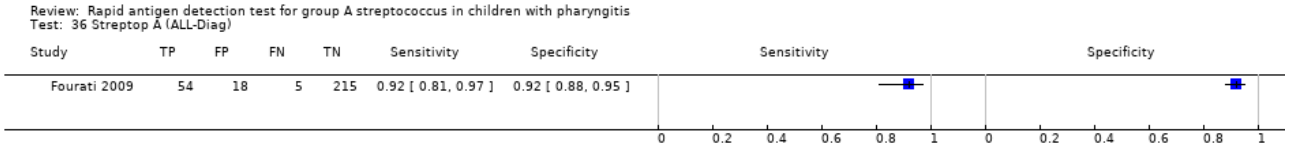
Test 34. StreptAtest (Dectrapharm).



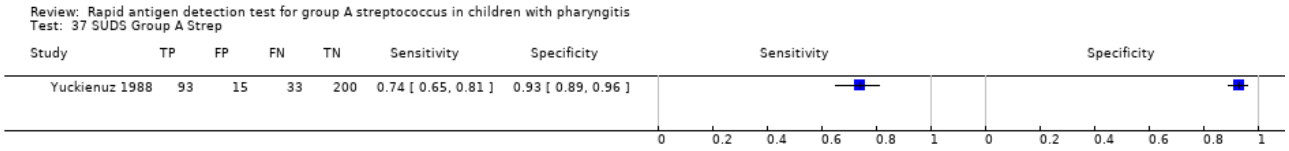
Test 35. Streptavit.



Test 36. Streptop A (ALL-Diag).



Test 37. SUDS Group A Strep.



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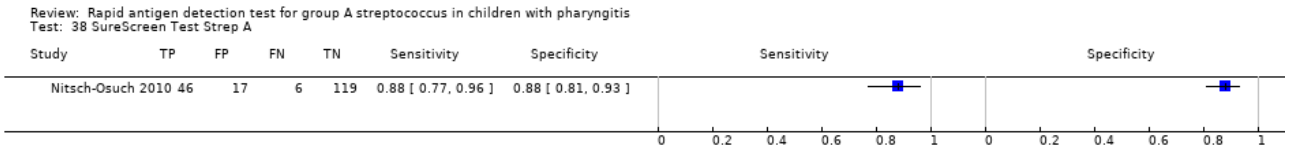
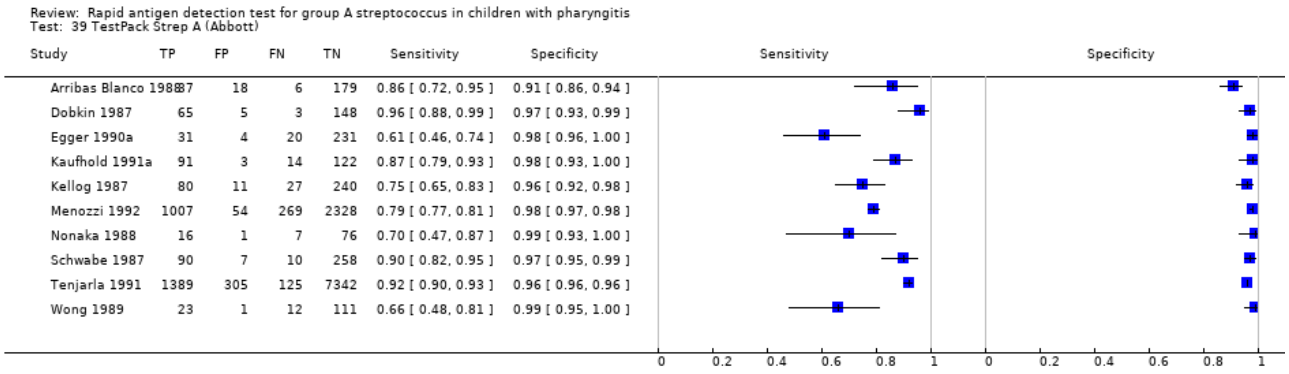
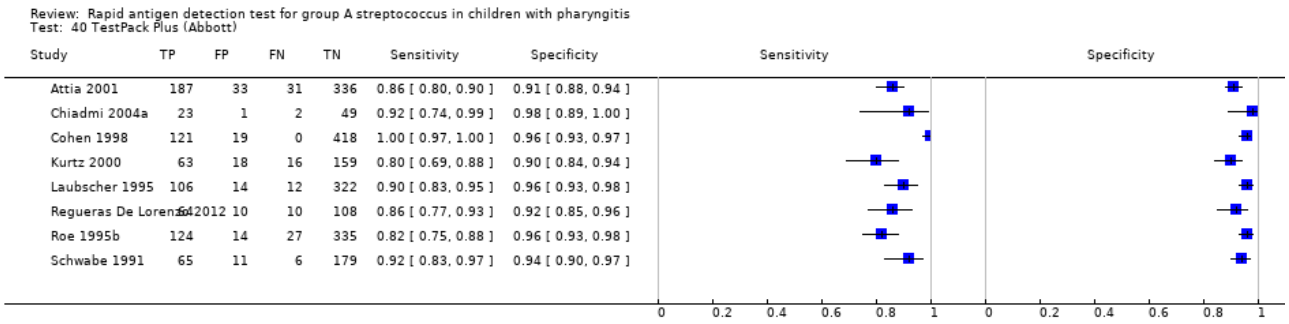
Test 38. SureScreen Test Strep A.



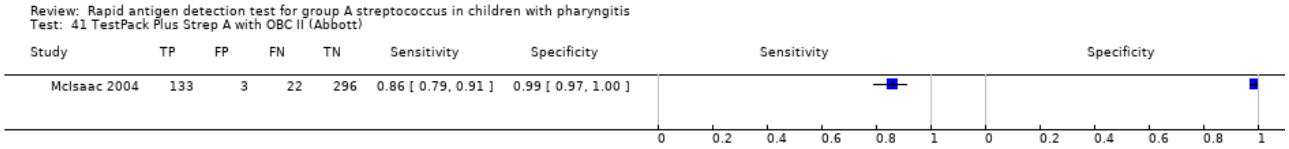
Test 39. TestPack Strep A (Abbott).



Test 40. TestPack Plus (Abbott).



Test 41. TestPack Plus Strep A with OBC II (Abbott).



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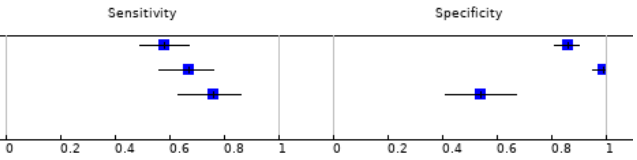
Test 42. Ventrescreen Strep A (Ventrex Lab).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 42 Ventrescreen Strep A (Ventrex Lab)

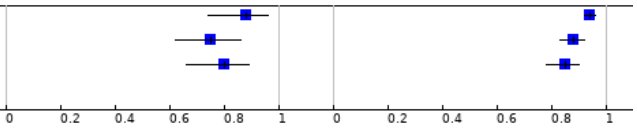
Study	TP	FP	FN	TN	Sensitivity	Specificity
Begovac 1993	70	37	51	231	0.58 [0.49, 0.67]	0.86 [0.81, 0.90]
Clegg 1987	66	1	33	105	0.67 [0.56, 0.76]	0.99 [0.95, 1.00]
Macknin 1988	45	28	14	33	0.76 [0.63, 0.86]	0.54 [0.41, 0.67]



Test 43. Visuwell Strep A (ADI).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 43 Visuwell Strep A (ADI)

Study	TP	FP	FN	TN	Sensitivity	Specificity
Chu 1990	37	23	5	379	0.88 [0.74, 0.96]	0.94 [0.92, 0.96]
Drulak 1988	43	26	14	197	0.75 [0.62, 0.86]	0.88 [0.83, 0.92]
Drulak 1991	43	22	11	126	0.80 [0.66, 0.89]	0.85 [0.78, 0.90]



Test 44. Icon Strep A.

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 44 Icon Strep A

Study	TP	FP	FN	TN	Sensitivity	Specificity
Donatelli 1992b	17	0	27	158	0.39 [0.24, 0.55]	1.00 [0.98, 1.00]
Kaufhold 1991b	90	12	20	139	0.82 [0.73, 0.89]	0.92 [0.87, 0.96]
Lewey 1988	41	21	6	196	0.87 [0.74, 0.95]	0.90 [0.86, 0.94]
Strandjord 1987	46	6	6	80	0.88 [0.77, 0.96]	0.93 [0.85, 0.97]

Test 45. Qtest (Becton Dickinson).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 45 Qtest (Becton Dickinson)

Study	TP	FP	FN	TN	Sensitivity	Specificity
Gerber 1990	123	16	12	77	0.91 [0.85, 0.95]	0.83 [0.74, 0.90]
Mayes 2001a	1299	0	132	3342	0.91 [0.89, 0.92]	1.00 [1.00, 1.00]
Mirza 2007a	2612	0	688	8344	0.79 [0.78, 0.81]	1.00 [1.00, 1.00]

Test 46. Link 2 Strep A Rapid Test (Becton Dickinson).

Review: Rapid antigen detection test for group A streptococcus in children with pharyngitis
Test: 46 Link 2 Strep A Rapid Test (Becton Dickinson)

Study	TP	FP	FN	TN	Sensitivity	Specificity
Maltezou 2008	98	21	20	293	0.83 [0.75, 0.89]	0.93 [0.90, 0.96]

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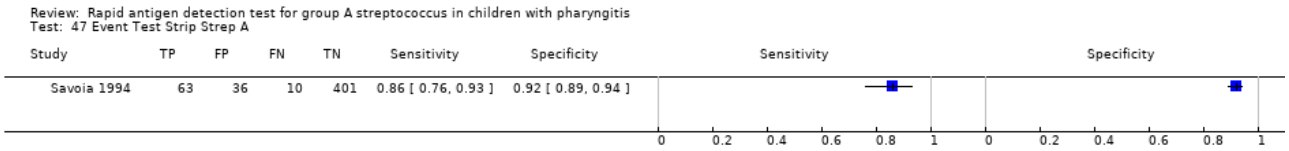
Test 47. Event Test Strip Strep A.



ADDITIONAL TABLES

Table 1. Data extracted from each study

Study ID	First author, year of publication
Type of study	Journal article or conference abstract
Clinical features and settings	Presenting signs and symptoms
	Clinical selection of patients (none, clinical score, explicit criteria but not a score, implicit criteria)
	Exclusion if antibiotics use before inclusion (yes/no)
	Clinical setting (office-based, emergency department, walk-in clinic, mixed, other)
	Single- or multi-centre study
	Age range for inclusion
Participants	Sample size (n)
	Age (distribution)
	GAS prevalence according to culture (with 95% confidence interval)
	Country of study
	Sex (% of girls)
	Clinical severity assessment (Centor score, McIsaac score, other, none)
Study design	Cross-sectional study or RCT
	Retrospective or prospective design
	Sample (consecutive, random or unclear)
	Direct comparison of different RADTs (yes/no)
	Direct comparison of several throat culture techniques (yes/no)
	Throat swab (1 single, 1 double, 2 different)
	Person performing the throat sample (physician, nurse, laboratory personnel, other)
Reference standard(s)	Throat culture medium (standard, enrichment, inhibitory)

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Table 1. Data extracted from each study *(Continued)*

	Atmosphere of incubation (aerobic, aerobic with CO_2 enrichment, anaerobic)
	Duration of incubation (≤ 24, 24 to 48, ≥ 48 hours)
	GAS confirmation (bacitracin disk, latex test, other, none)
	Number of plates inoculated (n)
	Assessment of GAS antibody response (yes/no)
	Relevant details
Index tests	Commercial name of the RADT
	Type of RADT (EIA, OIA)
Data	Number of true positives, false positives, true negatives, false negatives and undetermined/uninterpretable results
Notes	Source of funding (whether any of the authors is affiliated with the manufacturer of the RADT, the study was directly funded by the manufacturer, authors reported conflicts of interests related to the manufacturer or other funding sources)
	Anything else of relevance

RADT: rapid antigen detection test
EIA: enzyme immunoassay
OIA: optical immunoassay
CO_2: carbon dioxide

Table 2. Methodological quality assessment table for each study

Domain 1: Patient selection	
Was a consecutive or random sample of patients enrolled?	Yes, No or Unclear
Was it a cross-sectional study or a RCT?	Yes, No or Unclear
Were selection criteria clearly described (at least presenting signs and symptoms and age limits for inclusion)?	Yes, No or Unclear
Were patients seen in an ambulatory care setting?	Yes, No or Unclear
Was clinical selection of patients avoided?	Yes, No or Unclear
Could the selection of patients have introduced bias?	**Risk: Low, High or Unclear**
Is there concern that the included patients do not match the review question?	**Concern: Low, High or Unclear**
Domain 2: RADT (index test)	
Were RADTs conducted during consultation time?	Yes, No or Unclear
Were the RADT results interpreted with blinding of the results of culture?	Yes, No or Unclear

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Table 2. Methodological quality assessment table for each study *(Continued)*

Was the type of the RADT mentioned (EIA or OIA)?	Yes, No or Unclear
Could the conduct or interpretation of the RADT have introduced bias?	**Risk: Low, High or Unclear**
Is there concern that the RADT, its conduct or interpretation differ from the review question?	**Concern: Low, High or Unclear**
Domain 3: Throat culture (reference standard)	
Were culture results interpreted with blinding of the results of the RADT?	Yes, No or Unclear
Is the throat culture method likely to correctly identify GAS (laboratory culture on a blood agar plate during ≥ 48 hr)?	Yes, No or Unclear
Were the culture medium, atmosphere, duration of incubation and GAS-confirmation technique described?	Yes, No or Unclear
Could the throat culture, its conduct or its interpretation have introduced bias?	**Risk: Low, High or Unclear**
Is there concern that the target condition as defined by the reference standard does not match the review question?	**Concern: Low, High or Unclear**
Domain 4: Flow and timing	
Was the delay between the performance of the RADT and throat culture plating ≤ 48 hours?	Yes, No or Unclear
Did all patients receive a throat culture?	Yes, No or Unclear
Did patients receive the same throat culture method?	Yes, No or Unclear
Were undetermined/uninterpretable results reported?	Yes, No or Unclear
Were withdrawals from the study explained?	Yes, No or Unclear
Could the patient flow have introduced bias?	**Risk: Low, High or Unclear**

Table 3. Results of investigations of heterogeneity

Study-level covariate		Studies (n)	Sensitivity (95% CI)	Specificity (95% CI)	Interpretation
Test type[a]					
	Enzyme immuno-assay	86	85.4 (82.7 to 87.8)	95.8 (94.8 to 96.6)	Accuracy does not seem influenced by test type (P value = 0.23)
	Optical immuno-assay	19	86.2 (82.7 to 89.2)	93.7 (91.5 to 95.4)	
Throat culture					
	Without enrichment broth	88	85.5 (82.8 to 87.8)	95.6 (94.8 to 96.3)	Accuracy does not seem influenced by whether an enrichment broth was used (P value = 0.15)

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Table 3. Results of investigations of heterogeneity *(Continued)*

	With enrichment broth	10	86.3 (83.3 to 88.7)	92.7 (87.9 to 95.7)	
Mean age of participants[b]					
	Below the median	16	87.1 (81.7 to 91.1)	93.2 (90.5 to 95.2)	No evidence of association with age (P value = 0.39)
	Above the median	13	83.7 (78.5 to 87.9)	95.0 (92.7 to 96.6)	
% of patients with McIsaac score > 2					
	≤ 70%	4	81.3 (69.8 to 89.1)	94.9 (91.1 to 97.2)	No evidence of association with clinical severity (P value = 0.35)
	> 70%	8	88.8 (82.9 to 92.9)	94.2 (89.4 to 96.9)	
Prevalence of group A streptococcus[c]					
	Below the median	54	84.9 (81.1 to 88.1)	95.5 (94.2 to 96.4)	Accuracy does not seem influenced by the prevalence of group A streptococcus (P value = 0.70)
	Above the median	51	86.2 (83.5 to 88.5)	95.4 (94.0 to 96.5)	

[a]Results based on indirect comparisons; [b]the median of mean age was 6.6 years; [c]the median of group A streptococcus prevalence using throat culture as the reference standard was 29.5%.
CI: confidence interval

Table 4. Results of sensitivity analyses

Concerns	Domain	Studies at low risk (n)	Sensitivity (95% CI)	Specificity (95% CI)
Risk of bias	Patient selection	25	85.7 (82.1 to 88.6)	93.0 (91.1 to 94.5)
	Index test	65	86.6 (84.0 to 88.8)	95.2 (94.1 to 96.1)
	Reference standard	20	81.0 (74.1 to 86.5)	95.5 (93.4 to 96.9)
	Flow and timing	98	85.4 (83.0 to 87.5)	95.3 (94.4 to 96.1)
	≥ 3 domains with low risk of bias	20	84.0 (79.4 to 87.8)	95.0 (93.1 to 96.4)
Applicability				
	Patient selection	41	83.1 (79.7 to 86.0)	94.9 (93.4 to 96.0)
	Index test	33	89.1 (85.7 to 91.8)	95.0 (93.2 to 96.4)
	Reference standard	60	84.9 (81.6 to 87.6)	94.7 (93.5 to 95.7)

CI: confidence interval

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Table 5. Comparison between previous systematic reviews on the diagnostic accuracy of RADTs for streptococcal pharyngitis and the present one

	Ruiz-Aragon 2010 [a]	Lean 2014	Stewart 2014	**Present review**
Study participants	Adults and children	Adults and children	Adults and children	Children
Timeframe for searches	2000 to 2009	1996 to 2013	2000 to 2012	1980 to 2015
Number of studies included	24	60[b]	58[c]	105[b]
Number of participants included	14,936	29,934	55,766	58,244
Summary estimate of sensitivity (95% CI)	85% (84 to 87)	86% (83 to 88)	84% (83 to 85)[d]	86% (83 to 88)
Summary estimate of specificity (95% CI)	96% (96 to 97)	96% (94 to 97)	95% (94 to 95)[d]	95% (95 to 96)
Investigations of heterogeneity	None performed	No evidence of significant variation in accuracy by test type (EIA versus OIA), and by age (children versus adults)	Did not identify sources of variability[d]	Did not identify sources of variability

[a]In Spanish; [b]pairs of sensitivity and specificity; [c]59 study cohorts; [d]amongst high-quality studies.
CI: confidence interval

APPENDICES

Appendix 1. MEDLINE (Ovid) search strategy

1 Pharyngitis/ (6583)
2 pharyngitis.tw. (3961)
3 Tonsillitis/ (6246)
4 tonsillitis.tw. (3954)
5 (tonsillopharyngitis or pharyngotonsillitis).tw. (515)
6 sore throat*.tw. (3152)
7 ((throat* or pharyn* or tonsil*) adj5 (infect* or inflam*)).tw. (3411)
8 Pharynx/mi [Microbiology] (3411)
9 Streptococcal Infections/ (27643)
10 (strep* adj5 (throat* or pharyn* or tonsil*)).tw. (2750)
11 ("group a" adj5 streptococc*).tw. (7943)
12 gabhs.tw. (333)
13 (beta-hemoly* or beta-haemoly*).tw. (4341)
14 lancefield group a.tw. (110)
15 Streptococcus pyogenes/ (11396)
16 (streptococcus pyogenes or "s. pyogenes" or "s.pyogenes").tw. (6096)
17 or/1-16 (54426)
18 Immunoassay/ (22034)
19 exp Immunoenzyme Techniques/ (183964)
20 (enzyme adj2 (immunoassay* or immuno-assay* or immunosorbent)).tw. (80381)
21 Immunochromatography/ (203)
22 immunochromatograph*.tw. (1623)
23 Immunosorbent Techniques/ (6331)
24 exp Enzyme-Linked Immunosorbent Assay/ (123418)
25 (elisa or elisas or eia or eias).tw. (112952)
26 (sandwich* adj2 assay*).tw. (1053)

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27 (lateral flow adj2 assay).tw. (126)
28 (optical adj2 (immunoassay* or immuno-assay*)).tw. (93)
29 (oia or oias).tw. (127)
30 Antigens, Bacterial/ (39874)
31 Reagent Kits, Diagnostic/ (14838)
32 Point-of-Care Systems/ (6609)
33 ((rapid or "point of care" or "near patient" or poc or poct or bedside) adj5 (test or tests or testing or detect* or diagnos* or screen* or kit or kits or assay*)).tw. (57892)
34 (radt or radts or rdt or rdts).tw. (803)
35 (antigen* adj3 detect*).tw. (22067)
36 test pack strep a.tw. (5)
37 icon strep a.tw. (4)
38 link 2 strep a rapid test.tw. (1)
39 acceava strep a.tw. (2)
40 osom strep a.tw. (3)
41 poly stat strep a.tw. (0)
42 quickvue strep a.tw. (5)
43 or/18-42 (395969)
44 17 and 43 (4273)
45 limit 44 to yr="1980 -Current" (3809)
46 exp animals/ not humans/ (3903550)
47 45 not 46 (3194)

Appendix 2. Embase (Elsevier) search strategy

#39 #35 NOT #382310
#38 #37 NOT #365030292
#37 [animals]/lim5557209
#36 'human'/exp AND [embase]/lim9108195
#35 #34 AND [embase]/lim AND [1-1-1980]/sd NOT [23-5-2013]/sd2579
#34 #17 AND #332757
#33 #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR
#28 OR #29 OR #30 OR #31 OR #32321374
#32 'test pack strep a':ab,ti OR 'icon strep a':ab,ti OR 'link 2 strep a rapid test':ab,ti OR 'acceava strep a':ab,ti OR 'poly stat strep a':ab,ti OR 'quickvue strep a':ab,ti OR 'osom strep a':ab,ti AND [embase]/lim11
#31 (antigen* NEAR/3 detect*):ab,ti AND [embase]/lim19264
#30 radt:ab,ti OR radts:ab,ti OR rdt:ab,ti OR rdts:ab,ti AND [embase]/lim972
#29 ((rapid OR 'point of care' OR 'near patient' OR poc OR poct OR bedside) NEAR/5 (test OR tests OR testing OR detect* OR diagnos* OR screen* OR kit OR kits OR assay*)):ab,ti AND [embase]/lim56547
#28 'point of care testing'/de AND [embase]/lim3626
#27 'streptococcus group a rapid test'/de OR 'rapid test'/de OR 'elisa kit'/de AND [embase]/lim446
#26 'bacterial antigen'/de OR 'streptococcus antigen'/de AND [embase]/lim12962
#25 oia:ab,ti OR oias:ab,ti AND [embase]/lim112
#24 (optical NEAR/2 (immunoassay OR 'immuno-assay')):ab,ti AND [embase]/lim76
#23 ((sandwich* OR 'lateral flow') NEAR/2 assay*):ab,ti AND [embase]/lim1180
#22 elisa:ab,ti OR elisas:ab,ti OR eia:ab,ti OR eias:ab,ti AND [embase]/lim124297
#21 immunochromatograph*:ab,ti AND [embase]/lim1576
#20 'immunoaffinity chromatography'/de AND [embase]/lim2788
#19 (enzyme NEAR/2 (immunoassay OR 'immuno-assay' OR immunosorben*)):ab,ti AND [embase]/lim70295
#18 'immunoassay'/de OR 'enzyme linked immunosorbent assay'/de OR 'enzyme immunoassay'/de AND [embase]/lim212276
#17 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR
#12 OR #13 OR #14 OR #15 OR #1655997
#16 'streptococcus pyogenes':ab,ti OR 's. pyogenes':ab,ti OR 's.pyogenes':ab,ti AND [embase]/lim5883
#15 'streptococcus pyogenes'/de AND [embase]/lim8434
#14 'streptococcal pharyngitis'/de AND [embase]/lim442
#13 'lancefield group a':ab,ti AND [embase]/lim100
#12 (beta NEXT/1 hemoly*):ab,ti OR (beta NEXT/1 haemoly*):ab,ti AND [embase]/lim1830
#11 gabhs:ab,ti AND [embase]/lim372
#10 ('group a' NEAR/5 streptococc*):ab,ti AND [embase]/lim6931
#9 (strep* NEAR/5 (throat* OR pharyn* OR tonsil*)):ab,ti AND [embase]/lim2573
#8 'streptococcus infection'/de OR 'group a streptococcal infection'/exp AND [embase]/lim16432
#7 ((throat* OR pharyn* OR tonsil*) NEAR/5 (infect* OR inflam*)):ab,ti AND [embase]/lim3363

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#6 'sore throat'/de AND [embase]/lim8235
#5 tonsillopharyngitis:ab,ti OR pharyngotonsillitis:ab,ti AND [embase]/lim633
#4 tonsillit*:ab,ti AND [embase]/lim3362
#3 'tonsillitis'/exp AND [embase]/lim7295
#2 pharyngit*:ab,ti AND [embase]/lim4095
#1 'pharyngitis'/exp AND [embase]/lim16213

Appendix 3. Web of Science (Thomson ISI) search strategy

# 3	1,235
# 2	253,763
# 1	26,550

Appendix 4. Trip database search strategy

(gabhs or group a streptococ* or strep throat) and (rapid test or immunoassay or radt or rapid antigen)

Appendix 5. Medion search strategy

Each term searched individually in the abstract field.

(pharyngitis, sore throat, gabhs, beta-haemolytic, beta-hemolytic, lancefield, streptococcal, streptococcus)

CONTRIBUTIONS OF AUTHORS

MC and JFC had the original idea for the review and wrote the first draft of the protocol. RC edited the protocol. JFC and NB selected studies and extracted data. JFC performed the statistical analysis. JFC and MC interpreted the results and drafted the manuscript. All authors provided critical revisions to the manuscript. The study was supervised by MC.

DECLARATIONS OF INTEREST

Jérémie F Cohen: None known.
Robert Cohen: My relevant financial activities are only in the field of vaccines.
Martin Chalumeau: No financial competing interest. Potential academic competing interest (as any expert in the field).
Nathalie Bertille: I am supported by educational grants from Laboratoires Guigoz - Société Française de Pédiatrie - Groupe de Pédiatrie Générale - Groupe de Recherches Epidémiologiques en Pédiatrie and Ecole Doctorale 393 (Sorbonne Universités, UPMC Univ Paris 06) and I have no patents, products in development or marketed products to declare.
JFC, RC and MC have been involved in studies that were included in the review.

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DIFFERENCES BETWEEN PROTOCOL AND REVIEW

Authors: One author (NB) contributed to the review but not to the protocol.

Search methods for identification of studies: We intended to search the Cochrane Register of Diagnostic Test Accuracy Studies but did not do so. We searched the Cochrane Central Register of Controlled Trials (CENTRAL) but this was not initially planned. In the protocol, we stated that we would search Science Citation Index for reports that cited included articles, and OpenSIGLE and OAISTER databases for grey literature; due to the number of citations returned by our search (more than 5000) and the number of included studies (n = 98), we judged that these searches were not required.

Data collection and analysis: Two review authors independently excluded studies that were not related to pharyngitis or RADT on the basis of the titles and abstracts, instead of one. We did not use ReSyWeb, an online tool, for study selection. We initially planned to extract all study-level data in duplicate; due to the number of included studies (n = 98), independent double data extraction was restricted to signalling questions used for study quality assessment and data used for statistical analysis (data from 2 x 2 tables and covariates used for investigating heterogeneity); other descriptive data were extracted by one review author (JFC). In the protocol we stated that we would not present results in groups according to commercial test name but we finally did so because we found this grouping informative for readers.

Investigation of heterogeneity and sensitivity analyses: We intended to assess the effect of the following characteristics of the reference standard: culture medium, atmosphere of incubation, duration of incubation, use of an enrichment broth before plating, group A identification technique and number of plates inoculated; to contain the risk of false positive findings we finally decided to assess the effect of only one of such parameters (i.e. whether an enrichment broth was used before plating); we took this decision before analysing the data. We intended to investigate the effect of age of participants as a 4-class categorical covariate; in almost all studies in which mean age was reported, mean age was in one of our pre-specified age categories; we finally used a median split. We intended to investigate the effect of disease severity by using the proportion of participants with a McIsaac score greater than two as a continuous covariate; because we lack routines to investigate the effect of continuous covariates in the bivariate model in Stata, we dichotomised this variable using an arbitrary cut-off of 70%.

Sensitivity analyses: In the protocol, we intended to carry out sensitivity analyses on the following groups: studies for which patient selection was avoided, studies for which patients were excluded on the basis of antibiotics use within seven days before inclusion, studies for which GAS antibody response was used as the reference test, and studies of high quality according to QUADAS-2; we finally decided to explore only groups based on QUADAS-2, as such criteria are explicitly meant to identify studies at low risk of bias and concerns about applicability; this decision was taken before analysing the data. We had the intention to study the effect of partial verification in a sensitivity analysis, but after discussion within the review team, we decided to exclude studies with partial verification from the meta-analysis of sensitivity and specificity estimates but to include them in a separate additional meta-analysis of the negative predictive value of RADTs.

INDEX TERMS

Medical Subject Headings (MeSH)

Antigens, Bacterial [*analysis]; Immunoenzyme Techniques [*standards] [statistics & numerical data]; Pharyngitis [*microbiology]; Reference Standards; Sensitivity and Specificity; Streptococcal Infections [*diagnosis]; Streptococcus pyogenes [*immunology]

MeSH check words

Adolescent; Child; Humans

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