REVIEW ARTICLE

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Efficacy of antibiotic prophylaxis in cystoscopy to prevent urinary tract infection: a systematic review and meta-analysis

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ABSTRACT

Objective: To estimate the efficacy of antibiotic prophylaxis to prevent urinary tract infection in patients (both gender) who undergo a cystoscopy with sterile urine.
Materials and Methods: Search strategy (January 1980-December 2013) in Medline via PubMed, CENTRAL, and EMBASE. Additionally, we searched databases for registered trials and conference abstracts, as well as reference lists of systematic reviews and included studies. Seven published randomized clinical trials (January 1, 1980 to December 31, 2013) were included in quantitative analyses with no language restrictions. Two independent reviewers collected data. Risk of bias was evaluated with the Cochrane Collaboration tool. We performed a fixed effect analyses due to statistical homogeneity. The primary outcome was urinary tract infection and the secondary was asymptomatic bacteriuria. The effect measure was the risk difference (RD) with 95% confidence interval. The planned interventions were: Antibiotic vs placebo; Antibiotic vs no intervention and Antibiotic vs any other intervention.
Results: 3038 patients were found in seven studies. For the primary outcome, we included 5 studies and we found a RR 0.53 CI95% (0.31, 0.90) and a RD-0.012 CI95% (-0.023,-0.002), favoring antibiotic prophylaxis. For asymptomatic bacteriuria we included 6 studies and we found a RR 0.28 CI95% (0.20, 0.39) and a RD-0.055 CI95% (-0.07,-0.039), was found favoring prophylaxis. According to GRADE evaluation, we considered moderate quality of evidence for both outcomes. The subgroup analysis showed that only two studies were classified as having low risk of bias: Cam 2009 and García-Perdomo 2013. They showed no statistical differences (RD-0.009 CI95% -0.03, 0.011).
Conclusions: Based on studies classified as low risk of bias, we found moderate evidence to not recommend the use of antibiotic prophylaxis to prevent urinary tract infection and asymptomatic bacteriuria in patients who undergo cystoscopy with sterile urine in an ambulatory setting.

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Urinary Tract Infections; Cystoscopy; Antibiotic Prophylaxis; Meta-Analysis [Publication Type]

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INTRODUCTION

Cystoscopy is the most frequently used and accepted diagnostic tool in urology (1). There are multiple indications as: hematuria, lower urinary tract symptoms evaluation, urothelial cancer follow-u p, foreign body retrieval, planning a surgery, etc. (2). Based on these indications, it is important to notice its risks to prevent future complications. Pain, hematuria, lower urinary tract symptoms and urinary tract infection are the main adverse effects present during or after the procedure. These symptoms are associated with higher morbidity in patients and increase the cost for healthcare system (3-5). According to García-Perdomo et al. (6) in Latin America,

hematuria and urinary tract infection (UTI) incidences are 1% and 1.8% respectively, others like Jimenez-Cruz et al. (7) found 10% of UTI incidence in Spain, but it could vary between 1 and 21% according to literature (4, 5, 8, 9).

There are studies on UTI in an ambulatory and hospital settings, identifying it as the most common nosocomial infection nowadays (10).

Experimental studies have demonstrated the prophylaxis antibiotic´s efficacy to prevent surgical site infection and UTI in surgical settings (7, 11, 12). According to urological guidelines, it is not mandatory to use antibiotics in procedures like cystoscopy, urodynamics and cystography in patients with sterile urine. In others, like aged patients, anomalies of the urinary tract, poor nutritional status, cigarette smoking, immunosuppression, external catheters, instrumentation of urinary tract and bacteriuria, the prophylaxis is recommended (13-16).

Currently there is no evidence to suggest antibiotic prophylaxis before cystoscopy due to a large amount of studies, heterogeneous, clinical and methodologically. The aim of this systematic review (SR) and meta-analysis (MA) was to estimate the efficacy of antibiotic prophylaxis to prevent urinary tract infection in patients who undergo a cystoscopy with sterile urine.

MATERIALS AND METHODS

This study was conducted according to the recommendations of the Cochrane Collaboration and following PRISMA Statement. The protocol was registered in the international prospective register of systematic reviews (PROSPERO): CRD42014006976.

Eligibility Criteria

Studies: We included parallel, randomized clinical trials (RCT) conducted between January 1, 1980 and December 31, 2013. Open label, cross-over trials and studies with simultaneous interventions were excluded. No language restrictions were imposed.

Participants: Female and male people older than 18 years old who underwent cystoscopy with sterile urine (negative urine culture). There were no preferences in any other demographic characteristic of participants.

Interventions: The planned interventions were: Antibiotic vs placebo; Antibiotic vs no intervention and Antibiotic vs any other intervention.

The antibiotic prophylaxis was unique administration, 30 to 60 minutes before the urological procedure. There was no restriction of dosage or type of antibiotic during the selection of the studies.

Outcomes: The primary outcome was the incidence of urinary tract infection (UTI) in placebo and treatment groups, defined as positive urine culture ($>10^5$ CFU/mL) plus storage bladder symptoms. The secondary outcome was asymptomatic bacteriuria (AB) defined as positive urine culture ($>10^5$CFU/mL) without storage bladder symptoms. These outcomes were assessed up to 30 days after the procedure.

Exclusions: No assessment of efficacy and antibiotic as a treatment.

Information sources and search strategy

We designed a search strategy for RCTs published in Medline via PubMed, CENTRAL and EMBASE. The search strategy was specific for each database and included a combination of the medical subject headings and free text terms for urinary tract infection and cystoscopy. No language or publication status restrictions were considered. We included articles from January 1, 1980 to December 31, 2013. The full search strategies are listed in Appendix 1.

Other electronic sources were used to find additional studies, such as Clinicaltrials.gov, conference abstracts, DARE and PROSPERO. We looked for additional studies in reference lists of selected articles, contacted with authors about knowledge of published or unpublished articles.

The results of searches were crosschecked in order to eliminate duplicates.

Study selection

Two investigators independently and blindly screened the titles and abstracts to determine the potential usefulness of the articles. Eligibility criteria were applied to the full text articles during the final selection. When discrepancies occurred, an agreement was made to take

a final decision. In case of no agreement, a third reviewer made the final decision.

Data collection process

Relevant data were collected by duplicate, using a standardized data extraction sheet, which contained: study design, participants, interventions and comparators and final outcomes details. Reviewers confirmed all data entries and checked at least twice for completeness and accuracy. If some information was missing, we contacted authors in order to get data completed.

Risk of bias in individual studies and across them

The risk of bias was assessed independently by two researches using the Cochrane Collaboration risk of bias tool. We solved disagreements by consensus. The "Risk of bias table" was edited using Review Manager Software Version 5.2® (RevMan) to illustrate the judgments for each study. A risk of bias summary was made to show the judgments in a cross-tabulation of study by entry. After all, we assessed the general quality by each outcome with the GRADE tool and we produced a summary of findings table.

Summary measures

Analyses were performed in Revman®5.2 and Stata®13 were needed. The Risk Ratio (RR) and the risk difference (RD) were the effect measured of the primary and secondary outcome, with 95% confidence intervals (95%CI). We performed fixed--effects Meta-analysis due to homogeneity (clinical and statistical) found in clinical trials included.

Heterogeneity between trials was assessed through the I^2 statistic. An I^2 value greater or equal to 50% could represent heterogeneity according to Higgins et al. (17). Results were reported as forest plots showing the effect size of all the included studies with 95%CI.

Additional Analyses

Subgroup Analysis

Risk of bias (low, unclear and high risk of bias)

They were performed on Stata 13. No meta--regression was performed because of the number of included studies.

Sensitivity Analysis

We undertook the sensitivity analysis based on the exclusion of each one of the trials, as well as the unpublished and the smallest trials (18).

Publication Bias

This was not performed due to the number of studies found (less than 10 studies) according to Higgins (17).

RESULTS

Study Selection: 94 articles were found with the search strategies designed; after exclusions, 7 studies were included in qualitative and quantitative analyses (6-8, 19-22) (Figure-1).

Characteristics of included studies: 3038 patients were found in seven studies with a median of 162 patients (45-2172). Five studies assessed UTI as primary outcome (6, 7, 19, 21, 22) and 6 studies assessed asymptomatic bacteriuria as primary outcome (6-8, 19, 20, 22). Some of them measured both outcomes (6, 7, 19, 22) (Table-1).

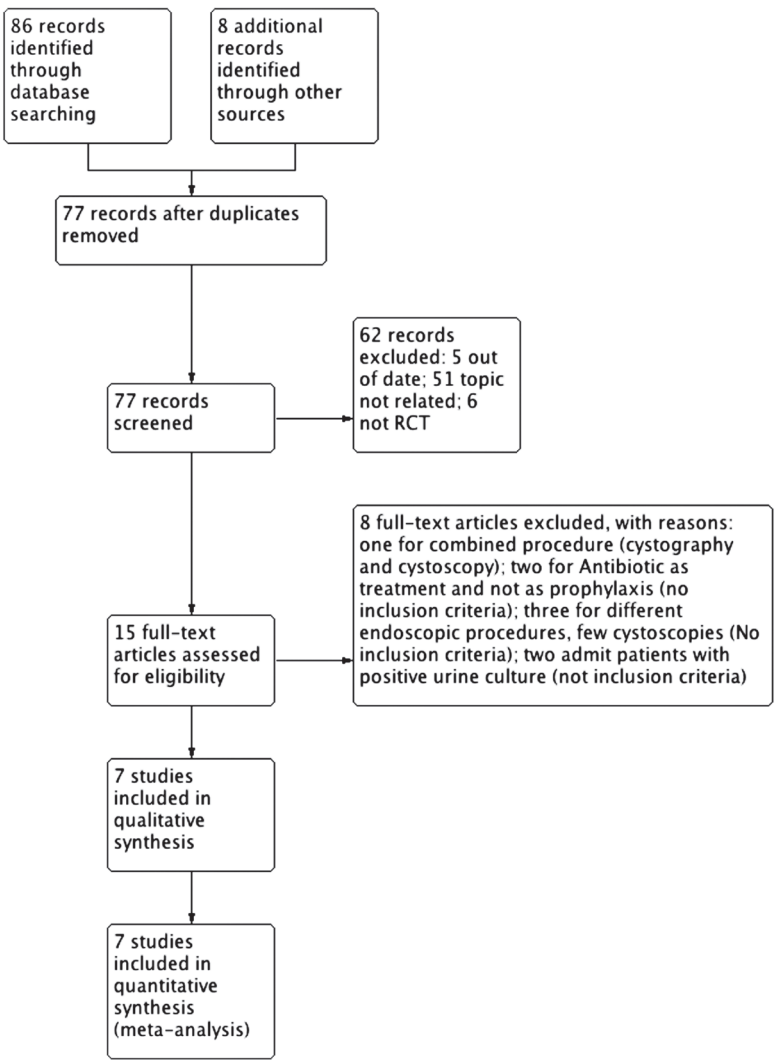
The studies of Jimenez-Cruz et al., 1993 and Rané et al., 2001 used flexible urethrocystoscope while the rest of them used rigid cystoscope. The type of antibiotic administered was parenteral for the studies of Jimenez-Cruz et al., 1993 and Rané et al., 2001 while the other five used oral administration (Table-1).

Characteristics of excluded studies: The reasons for exclusion were: different endoscopic procedures, combined procedures, not clinical trials, duplicates, inclusion of patients with positive urine culture, another research topic and antibiotic as a treatment.

Risk of bias within studies: We performed the risk of bias assessment for UTI and bacteriuria at the same time due to the close relationship between the assessment of the two outcomes:

Jimenez-Cruz et al., 1993; Kamouni et al., 2001; René et al., 2001 and Tsugawa et al., 1998 showed no clear risk in most of their items, while Cam et al., 2009 and Cam et al., 2009 and García-Perdomo et al., 2013 had low risk mostly. High risk was found for attrition bias in the study of Jimenez-Cruz et al., 1993; for allocation concealment in the study of Jimenez-Pacheco et

Figure 1 - Study selection.



al., 2012 and Rané et al., 2001 presented on sequence generation, blinding and attrition biases (Figure-1).

Results of individual studies by outcome

Urinary Tract Infection

For antibiotic versus any other intervention, we included five studies (6, 7, 19, 21, 22); they showed a RR 0.52 IC95% (0.31, 0.89) (and a Risk difference of -0.012 CI95% (-0.023, -0.002)); the analysis of antibiotic compared to no intervention showed a similar effect (RR 0.55 IC95% 0.32, 0.96) (and a Risk difference of –0.012 (-0.023, -0.002)); however, different from the result of antibiotic against placebo only one study was included here (6) (Table-2 and Figure-2). Antibiotic vs antibiotic analysis was not performed since we did not find any article.

Asymptomatic Bacteriuria

In the analysis antibiotic vs any other intervention we included six studies (6-8, 19, 20, 22) that showed a RR 0.28 IC95% (0.20, 0.39) and a risk difference (RD) -0.012 CI95% (-0.023, -0.002));

the analysis of antibiotic compared to no intervention and against placebo resulted in a similar effect (RR 0.26 IC95% 0.18, 0.38) and a Risk difference of –0.012 (-0.023, -0.002)); however, the last one had only one study included (6) (Table-2 and Figure-2). We did not performed Antibiotic vs antibiotic analysis since we did not find any article.

Risk of bias across the studies

Most of the items assessed as "Low risk" were: attrition, selective reporting and other bias, the performance (blinding personnel and participants) and detection (blinding outcome assessment); biases showed a "No clear" assessment mostly and allocation concealment along with attrition bias showed mostly a "High risk" evaluation (Figure-2).

Subgroup Analysis

We only performed the subgroup analysis related to the risk of bias assessment, based on the Cochrane tool.

Urinary Tract Infection

Regarding this outcome, we found only two studies classified as having mostly low risk of bias: Cam 2009 and García-Perdomo 2013. They showed no statistical differences (RD -0.009 CI95% -0.03, 0.011). Three studies had unclear risk of bias: Jimenez 1993, Karmouni 2001 and Tsugawa 1998. They showed RD -0.013 CI95% (-0.025, -0.001) (p=0.02).

Asymptomatic Bacteriuria

Regarding this outcome, we found two studies classified as having mostly low risk of bias: Cam 2009 and García-Perdomo 2013. They showed a RD -0.02 CI95% (-0.045, 0.005).

Two studies had unclear risk of bias: Jimenez 1993 and Tsugawa 1998. They showed RD -0.073 CI95% (-0.093, -0.053) and two studies showed a high risk of bias: Jimenez-Pacheco 2012 and Rane 2001. These two showed RD -0.014 CI95%(-0.199, -0.028) (p=0.000).

Sensitivity Analysis

The sensitivity analysis found that the inclusion of Jimenez-Cruz et al., 1993 study influenced notoriously the results. When this article is included, the meta-analysis favors prevention of UTI using antibiotic prophylaxis; however when this one is excluded, there are no differences; besides, this study carries an unclear risk of bias.

GRADE Assessment

The quality of evidence assessment was performed by the GRADE methodology and a summary of findings table was generated for both outcomes (Table-1). We found five studies assessing the UTI outcome as the clinically important one. These five studies had serious considerations in the risk of bias, according to the Cochrane tool but there were no other important considerations. According to this evaluation, we considered moderate quality of evidence for this outcome. There were six studies where we found similar findings for the asymptomatic bacteriuria and we graded as moderate quality of evidence according to the evaluation.

DISCUSSION

Main Findings Summary

In summary, we found 3038 patients in 7 studies included; 5 assessed UTI as primary outcome (6, 7, 19, 21, 22) and 6 studies assessed asymptomatic bacteriuria (6-8, 19, 20, 22). For the primary outcome, a RR 0.52 IC95% (0.31, 0.89) was found; to asymptomatic bacteriuria a RR 0.28 IC95% (0.20, 0.39) was supported.

Interventions To Prevent Urinary Tract Infection

Physicians often think it is not necessary to incorporate antibiotics before cystoscopy because there is low incidence of UTI, however this intervention turned out to be really important when looking at the risk difference and risk of bias found in this meta-analysis. This agrees to different clinical trials that demonstrated lowering surgical site infection and UTI risk previously (7, 11, 12). Cam et al., 2009; García-Perdomo et al., 2013; Karmouni et al.; 2001 did not showed this result but it was probably because they had a small sample size, but it is clear the consistence and homogeneity (I^2=0%) of these results to

Table 1 - Characteristics of included studies.

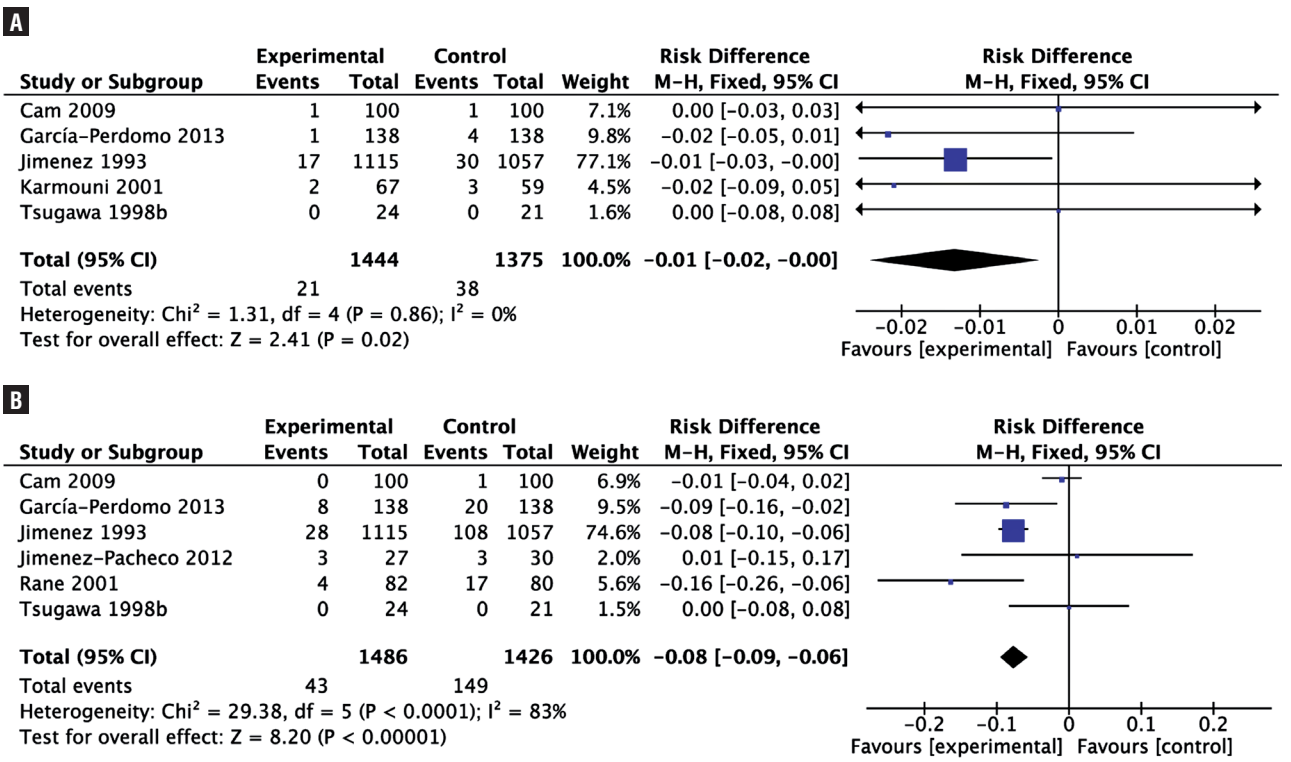
Source	Setting	No of patients	Mean age	Inclusion criteria	Intervention	Control	Outcome	Follow- up
Cam et al. 2009	Turkey	200	58	Patients who underwent rigid cystoscopy for bladder tumor follow-up or hematuria and bladder biopsy and tumor resection. Exclusion: antibiotics 30 days before procedure or positive urine culture.	Cephoperazone 1 gr	No intervention	UTI and Bacteriuria	Up to 10 days
García-Perdomo et al. 2013	Colombia	276	58	Any non urgent indication of cystoscopy. Exclusion: no follow-up, allergy, interaction with antibiotic, permanent urethral catheter, immunossupression, intermitent catheterization.	Levofloxacin 500 mg	Placebo	UTI and Bacteriuria	Up to 10 days
Jimenez-Cruz et al. 1993	Spain	2284	NA	Older than 16 years old, negative urine culture, diagnostic cystoscopy. Exclusion: indwelling urethral catheter, antibiotics, uti,	Ceftriaxone 1 gr	No intervention	UTI and Bacteriuria	Up to 30 days
Jimenez-Pacheco et al. 2012	Spain	60	65	Any indication for flexible cystoscopy . Exclusion: indwelling urethral catheter, instrumentation of urinary tract 1 month before, uti, positive urine culture, vesicoureteral reflux, intermitent catheterization, risk of endocarditis, hypersensitivity.	Phosphomicine Trometamol 3 gr	No intervention	Bacteriuria	Up to 10 days
Karmouni et al. 2001	France	126	66	Diagnostic cystoscopy for bladder tumor follow-up, hematuria, luts, incontinence. Exclusion: antibiotics, risk of endocarditis, indwelling urethral catheter, double pig tail.	Norfloxacin 400 mg	No intervention	UTI	Up to 10 days
Rane et al. 2001	United Kingdom	162	NA	Diagnostic cystoscopy for bladder tumor follow-up, Exclusion: antibiotics, risk of endocarditis, indwelling urethral catheter, bladder biopsy	Gentamicine 120 mg	No intervention	Bacteriuria	Up to 10 days
Tsugawa et al. 1998	Japan	47	63	Diagnostic cystoscopy based on symptoms	Sparfloxacine	No intervention	UTI and Bacteriuria	Up to 30 days

Table 2 - Search strategies.

Quality assessment							No of patients		Effect		Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Antibiotic prophylaxis	Control	Relative (95% CI)	Absolute		
Urinary Tract Infection (follow-up 2-30 days; assessed with: Urine culture plus symptoms)												
5	randomized trials	Serious [1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	21/1444 -1.50%	38/1375 -2.80% 2.80%	RR 0.52 (0.31 to 0.89)	1 fewer per 100 (from 0 fewer to 2 fewer) 1 fewer per 100 (from 0 fewer to 2 fewer)	⊕⊕⊕⊖ MODERATE1	CRITICAL
Asymptomatic Bacteriuria (follow-up 2-30 days; assessed with: Urine culture)												
6	randomized trials	Serious [1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	43/1486 -2.90%	149/1426 -10.40% 10.10%	RR 0.28 (0.2 to 0.39)	8 fewer per 100 (from 6 fewer to 8 fewer) 7 fewer per 100 (from 6 fewer to 8 fewer)	⊕⊕⊕⊖ MODERATE1	IMPORTANT [2]

1 Many studies did not describe their methods correctly. A pair of them had no clear and high risk; 2 This outcome is not clinically relevant

Figure 2 - Forrest plot for antibiotic versus any other intervention, outcome: A. urinary tract infection B. asymptomatic bacteriuria.



recommend and prevent UTI using prophylaxis. The sensitivity analysis showed Jimenez-Cruz et al., 1993 as the most weighted study and changes results and conclusion of this research if we put it in or out of the Meta-analysis. According to the subgroup analysis, the low risk bias studies showed no differences between using or not antibiotic prophylaxis, in contrast to the unclear risk of bias studies.

Clinical guidelines suggest not using prophylaxis antibiotic in patients with sterile urine who undergo cystoscopy or urodynamic studies (based on descriptive studies); on the other side, they suggest to use prophylaxis in high-risk patients (13-15); however it is important to remember that these recommendations are based on an expert panel and also, UTI as any other disease, has an interaction between the microorganism and the inflammatory response from the host, which will determine the symptoms according to the immunity response (23). In Colombia, it is advised to use a first generation cephalosporine in high-risk patients due to the higher antibiotic resistance to ciprofloxacin and TMP/SMX. Indications for antibiotic in high risk patients were not measured in this MA because data were not enough based on the studies and this was not its aim.

Interventions To Prevent Asymptomatic Bacteriuria

AB is not a clinically relevant outcome because it does not imply any significant disease for the patient (24). In the current study we found a significant reduction favoring the use of prophylaxis, however when looking at subgroup analysis based on the risk of bias assessment we found that only those studies with unclear and high risk of bias showed statistical differences, but those classified as low risk of bias showed no differences. Clinical guidelines recommended antibiotic prophylaxis to prevent urinary tract

infection, however there is not an statement for preventing asymptomatic bacteriuria since this is not a major outcome in clinical practice (13-15, 25).

All these results are according to published literature and stated hypothesis due to instrumentation of lower urinary tract. Despite of many studies evaluating AB incidence, it is just relevant for pregnant and immunosuppressed people; however, these patients are frequently excluded from clinical trials.

Limitations

Similar to other MA´s, clinical trials included were not adequately written (it does not mean bad or low quality), so the assessment could have incurred on overestimations. Currently, the Cochrane risk of bias tool is the best and more consistent tool to evaluate clinical trials because they focus on the way to conduct a clinical trial. This was helpful for the development and assessment of the articles included (17).

Two articles had low risk of bias in most items (6, 19). One of them showed high risk of bias in three items (sequence generation, allocation concealment and attrition bias) (8), but the rest of them showed mostly no clear risk of bias. In general, across studies we had low risk of bias for sequence generation and attrition bias.

To notice, the most weighted study (7) had no clear risk of bias in four items (sequence generation, allocation concealment, blinding of participants, investigator and assessors); high risk in attrition bias and low risk in reporting and other biases. This is important for analyzing and interpreting results; however it had the bigger sample size, which is also relevant. When performing the subgroup analysis we found that those studies classified as low risk of bias showed no differences when using or not antibiotic prophylaxis to prevent urinary tract infections and asymptomatic bacteriuria. We believe that this is the most important issue to consider making a decision about using or not antibiotic prophylaxis before a cystoscopy.

Another important topic that limits our work is the lack of data found to perform a subgroup analysis or a meta-regression.

Despite there was no evidence of neither statistical (I^2=0%) nor clinical heterogeneity, it is important to observe that studies used different type of antibiotics: Cefoperazone (19), Levofloxacin (6), Ceftriaxone (7), Phosphomicine trometamol (20), Norfloxacin (21), Gentamicine (8) and Sparfloxacin (22). This might contribute to the results and clinical application according to antibiotic resistance in each hospital or ambulatory setting.

Finally, our Meta-analysis was done for a frequent urological procedure, according to Cochrane and PRISMA methodology so we could recommend this intervention for institutions around the world.

As a conclusion, based on studies classified as low risk of bias, we found moderate evidence to not recommend the use of antibiotic prophylaxis to prevent urinary tract infection and asymptomatic bacteriuria in patients who undergo cystoscopy with sterile urine in an ambulatory setting. Nevertheless, we believe we need more well-designed, adequately powered clinical trials to assess benefits and harms of using antibiotic prophylaxis in these settings. We also suggest conducting clinical trials on patients who are likely to develop UTI to determine the most effective antibiotic/s to prevent it. These factors are: advanced age, urinary tract anomalies, poor nutritional status, cigarette smoking, immunosuppression, as well as external catheters, recurrent UTI and bacteriuria.

CONFLICT OF INTEREST

None declared.

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APPENDIX 1

Search strategy for medline via pubmed:

(Cystoscopy [mh] OR Urethroscopy [tw] OR Urethrocystoscopy [tw] OR "flexible cystoscopy" [tw] OR "transurethral cystoscopy" [tw]) AND ("anti-infective agents, urinary" [mh] OR "antibiotic prophylaxis" [mh] OR "antibiotic" [tw] OR "antimicrobial prophylaxis" [tw]) AND (urinary tract infection [mh] OR bacteriuria [mh] OR pyuria [mh]) AND (randomized controlled trial [pt] OR controlled clinical trial [pt] OR randomized controlled trials [mh] OR clinical trial [pt] OR "clinical trial" [tw])

Search strategy for EMBASE:

('cystoscopy'/exp OR 'urethroscopy'/exp OR urethrocystoscopy OR 'flexible cystoscopy' OR 'transurethral cystoscopy') AND ('urinary tract antiinfective agent'/exp OR 'antibiotic prophylaxis'/exp OR 'antibiotic agent'/exp OR 'antimicrobial prophylaxis') AND ('urinary tract infection'/exp OR 'pyuria'/exp) AND ('randomized controlled trial'/exp OR 'controlled clinical trial'/exp OR 'clinical trial'/exp OR 'clinical trial')

Search strategy for CENTRAL:

(cystoscopy OR "urethroscopy" OR "urethrocystoscopy":ti,ab,kw OR ¨flexible cystoscopy¨:ti,ab,kw OR "transurethral cystoscopy":ti,ab,kw) AND ("anti-infective agents, urinary" OR "antibiotic prophylaxis" OR "antibiotic":ti,ab,kw OR "antimicrobial prophylaxis":ti,ab,kw) AND (¨urinary tract infection¨ OR bacteriuria OR pyuria) AND (¨randomized controlled trial¨:pt OR ¨controlled clinical trial¨:pt OR ¨randomized controlled trials¨ OR ¨clinical trial¨:pt OR "clinical trial")

EDITORIAL COMMENT

Rather the use of validated methodological tools, the author of a systematic review has in his or her hands, a lot of decisions to make, not always controlled by those instruments, which can determine different conclusions, or even diametrically opposed one. A Systematic Review titled "Efficacy of antibiotic prophylaxis in urinary tract cystoscopy to prevent infection" is a good example of the variation of options, in their development, producing results influenced by this variation.

There is a strong school of systematic reviews, that recommends, on behalf of the reader information, to include and aggregate (meta-analysis) works with different populations, different interventions, different comparisons and different outcomes; with distinct strength of evidence (number and importance of bias); and improper comparisons to define efficacy.

This review includes studies with the use of various antibiotics (Cefoperazone, Levofloxacin, Ceftriaxone, Phosphomicine trometamol, Norfloxacin, Gentamicin and Sparfloxacin), which were never compared, in these patients, allowing them to be aggregated with the unique status of antibiotics.

Some are flexible cystoscopy, other rigid; indications in some cases are for bladder tumors, other diagnostic only. Certainly the risk of infection varies, from uncorrected way, from work to work.

Studies Jimenez in 1993, Jimenez-Pacheco 2012, Karmouni 2001 Rane 2001 and Tsugawa 1998 have important bias relative to randomization and blinding, and must not be included in the review, and mainly in the meta-analysis. The sensitivity analysis, addressing only one study (Jimenez 1993) confirms this fact.

Only two studies have a low level of bias, and only one study comparing intervention with placebo (García-Perdomo 2013), being the one who should be included to support the concept of efficacy.

The quality assessment of the studies varied: according to the outcome analyzed by grouping (eg UTI or asymptomatic bacteriuria); according to the topics of bias tool used; and requires clinical interpretation of what is moderate, which will vary from doctor to doctor. This fact makes the need for a critic academic exercise, that is the duty of the author, and should not be passed on to the reader, who only wishes to know: whether or not to prescribe antibiotic? and which antibiotic?

We know that one of the major limitations of the systematic review with meta-analysis, is the true heterogeneity, which depends on the inherent differences of each included study. There is no instrument, step by step methodology, which replace the judgment of the author. But there are schools of systematic review that make strong push for the inclusion to be as flexible as possible, to enable the meta-analysis. After all, "systematic review without meta-analysis, is not a systematic review".

However, in this review to answer the questions: We must use antibiotics for prophylaxis of urinary tract infection in cystoscopy? What antibiotics? How effective is the antibiotic? only one study should be included: García Perdomo 2013. And the answer is "yes", we should use Levofloxacin 500 mg, which reduces the risk of urinary infection in 25% (Number Need to Treat – NNT = 4) and asymptomatic bacteriuria in 40% (NNT: 2).

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