OUTCOMES OF DELAYED VS IMMEDIATE ANTIBIOTIC PRESCRIBING IN RESPIRATORY TRACT INFECTIONS. A SYSTEMATIC REVIEW

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ABSTRACT

Background: Respiratory tract infections (RTIs) are among the most common reasons for antibiotic prescriptions in primary care. However, concerns over antimicrobial resistance have led to increased interest in delayed antibiotic prescribing as a strategy to reduce unnecessary antibiotic use while maintaining clinical efficacy. The comparative outcomes of delayed versus immediate antibiotic prescribing remain a subject of debate, particularly concerning symptom duration, complications, and patient satisfaction.

Objectives: This systematic review aims to evaluate and compare the outcomes of delayed versus immediate antibiotic prescribing in RTIs. Specifically, it examines the effects on symptom resolution, risk of complications, antibiotic consumption, adverse effects, and patient satisfaction.

Methodology: A systematic review of published literature was conducted using databases such as PubMed, Cochrane Library, and Scopus. Studies included randomized controlled trials (RCTs), cohort studies, and systematic reviews published in peer-reviewed journals. The inclusion criteria were studies assessing outcomes of delayed versus immediate antibiotic prescribing for RTIs in primary care settings. Data extraction focused on symptom duration, antibiotic usage rates, complications, and patient-reported outcomes. A qualitative synthesis of the findings was performed to identify trends and patterns in the results.

Results: The findings indicate that delayed antibiotic prescribing is associated with reduced overall antibiotic use without a significant increase in complications, such as pneumonia or otitis media. Patients in the delayed prescribing group reported similar symptom resolution times compared to those receiving immediate antibiotics. Additionally, delayed prescribing was linked to lower antibiotic-related adverse effects and comparable levels of patient satisfaction. However, variations in study designs and patient populations led to some discrepancies in reported outcomes.

Conclusion: Delayed antibiotic prescribing for RTIs appears to be a viable strategy to reduce antibiotic consumption without compromising clinical outcomes. It is an effective approach to

mitigate antimicrobial resistance while maintaining patient safety and satisfaction. Further high-quality studies are needed to explore long-term effects and optimize implementation strategies in different healthcare settings.

Keywords: Delayed antibiotic prescribing, Immediate antibiotic prescribing, Respiratory tract infections, Antimicrobial resistance, Primary care, Antibiotic stewardship

INTRODUCTION

Respiratory tract infections (RTIs) are among the leading causes of antibiotic prescriptions in primary care, despite most being viral in origin and self-limiting [1]. The overuse of antibiotics in RTIs has contributed significantly to the global rise in antimicrobial resistance (AMR), which is now a major public health concern [2,3]. As a response, delayed antibiotic prescribing (DAP) has emerged as an alternative to immediate antibiotic prescribing (IAP), aiming to reduce unnecessary antibiotic use while ensuring patient safety [4,5].

Delayed prescribing involves advising patients to wait before filling an antibiotic prescription, allowing time for symptoms to resolve naturally [6]. Studies suggest that DAP can substantially reduce antibiotic consumption without increasing the risk of complications such as pneumonia, otitis media, or prolonged illness duration [7,8]. Additionally, patients receiving delayed prescriptions report comparable satisfaction levels to those given immediate prescriptions, with some studies even showing higher patient confidence in the approach [9,10].

The clinical efficacy of DAP compared to IAP remains a subject of debate. While some research indicates no significant differences in symptom resolution times or complication rates [11,12], others highlight potential variations based on patient demographics, severity of illness, and healthcare provider communication strategies [13,14]. Furthermore, concerns persist regarding patient adherence, anxiety, and the potential for increased follow-up consultations in cases where symptoms persist or worsen [15,16].

Previous systematic reviews and meta-analyses have provided valuable insights into the effectiveness of DAP, but continued research is necessary to strengthen the evidence base and guide clinical decision-making [17,18]. This systematic review aims to evaluate and compare the outcomes of delayed versus immediate antibiotic prescribing in RTIs, focusing on key parameters such as symptom duration, antibiotic use, risk of complications, adverse effects, and patient satisfaction [19,20]. By synthesizing current evidence, this review seeks to inform antibiotic stewardship strategies and promote responsible prescribing practices in primary care.

METHODOLOGY

Study Design and Setting: This systematic review was designed to evaluate the outcomes of delayed versus immediate antibiotic prescribing in respiratory tract infections (RTIs). The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure methodological rigor.

The study focused on primary care settings, including general practitioner (GP) clinics, outpatient departments, and community healthcare centers, where RTIs are commonly managed. These settings were selected to assess real-world prescribing practices and their impact on antibiotic use, symptom resolution, and patient outcomes. Studies conducted in hospital inpatient settings or specialized infectious disease units were excluded to maintain relevance to primary care interventions.

Table 1: Characteristics of Included Studies

Study	Design	Population	Sample Size	Key Findings
Little et al. (2013)	RCT	Adults with RTIs	518	31% antibiotic use in DAP vs. 97% in IAP
Spurling et al. (2017)	Meta-analysis	Mixed populations	3,402	40-60% reduction in antibiotic use with DAP
Moore et al. (2017)	RCT	Adults and children	2,061	No significant symptom difference between DAP and IAP
Francis et al. (2012)	RCT	Children with RTIs	315	No increased complications with DAP
Petersen et al. (2007)	Observational	General practice patients	1,824	No higher pneumonia risk with DAP

Data sources for the review included electronic databases such as PubMed, Cochrane Library, Scopus, and Web of Science. The search was restricted to peer-reviewed articles published in English from 2005 onward to capture recent and clinically relevant evidence. Two independent reviewers conducted the study selection, with discrepancies resolved through discussion or consultation with a third reviewer.

Inclusion and Exclusion Criteria: Studies included in this systematic review met the following criteria: they were randomized controlled trials (RCTs), cohort studies, systematic reviews, or meta-analyses that compared delayed versus immediate antibiotic prescribing in respiratory tract infections (RTIs). The population included both adults and children diagnosed with RTIs, such as acute bronchitis, sore throat, otitis media, and sinusitis, in primary care settings. Studies were required to report at least one of the following outcomes: symptom resolution, antibiotic consumption, complication rates, adverse effects, or patient satisfaction. Only peer-reviewed articles published in English from 2005 onward were considered to ensure relevance and the inclusion of contemporary data.

Studies were excluded if they focused solely on hospitalized patients, immunocompromised individuals, or those with severe respiratory infections requiring immediate antibiotic treatment (e.g., pneumonia or sepsis). Additionally, studies that did not provide direct comparisons between delayed and immediate prescribing strategies or lacked sufficient outcome data were excluded. Non-peer-reviewed literature, conference abstracts, case reports, and expert opinions were also excluded to maintain methodological rigor and data reliability.

Search Strategy: A comprehensive literature search was conducted across multiple electronic databases, including PubMed, Cochrane Library, Scopus, and Web of Science, to identify relevant studies on delayed versus immediate antibiotic prescribing in respiratory tract infections (RTIs). The search included articles published from 2005 onward to ensure the inclusion of recent evidence. Keywords and Medical Subject Headings (MeSH) terms were used in various combinations, including "delayed antibiotic prescribing," "immediate antibiotic prescribing," "respiratory tract infections," "antibiotic stewardship," "primary care," and "antimicrobial resistance." Boolean operators (AND, OR) were applied to refine the search results. Additional studies were identified by screening the reference lists of selected articles and relevant systematic reviews.

Two independent reviewers screened the retrieved articles based on titles and abstracts, followed by full-text assessment for eligibility. Any discrepancies were resolved through discussion or consultation with a third reviewer. Duplicates were removed, and studies that did not meet the inclusion criteria were excluded. The final selection of studies was based on their relevance, methodological quality, and reporting of key outcomes related to symptom resolution, antibiotic consumption, complications, adverse effects, and patient satisfaction.

Data Extraction and Analysis: Data extraction was performed independently by two reviewers using a standardized data extraction form. The extracted data included study characteristics (author, year, study design, sample size, and setting), population demographics (age, gender, and comorbidities), intervention details (delayed versus immediate antibiotic prescribing strategies), and reported outcomes (symptom resolution, antibiotic consumption, complication rates, adverse effects, and patient satisfaction). Any discrepancies between reviewers were resolved through discussion or consultation with a third reviewer.

A qualitative synthesis was conducted to summarize findings across studies. For studies providing numerical data, effect sizes, risk ratios, and confidence intervals were extracted when available. If sufficient comparable data were available, a meta-analysis was planned using a random-effects model to account for variability across studies. Heterogeneity was assessed using the I² statistic, with values greater than 50% indicating substantial heterogeneity. Publication bias was evaluated using funnel plots and Egger's test where applicable. Sensitivity analyses were conducted to assess the robustness of findings by excluding studies with high risk of bias or small sample sizes. All statistical analyses, if performed, were conducted using Review Manager (RevMan) or other appropriate statistical software.

Study Question: This systematic review aims to address the following question:

"What are the clinical and patient-related outcomes of delayed versus immediate antibiotic prescribing in the management of respiratory tract infections in primary care settings?"

The review evaluates key outcomes, including symptom resolution, antibiotic consumption, risk of complications, adverse effects, and patient satisfaction, to determine the effectiveness and safety of delayed prescribing as an antibiotic stewardship strategy.

Quality Assessment and Risk of Bias Assessment: The quality of the included studies was assessed using appropriate critical appraisal tools based on study design. Randomized controlled trials (RCTs) were evaluated using the Cochrane Risk of Bias (RoB 2) tool, which examines bias across domains such as randomization, blinding, incomplete outcome data, and selective reporting. Observational studies, including cohort and case-control studies, were assessed using the Newcastle-Ottawa Scale (NOS), which evaluates study selection, comparability of groups, and outcome assessment. Systematic reviews and meta-analyses were appraised using the AMSTAR-2 (A Measurement Tool to Assess Systematic Reviews) checklist.

Risk of bias was independently assessed by two reviewers, with discrepancies resolved through discussion or consultation with a third reviewer. Studies were categorized as having a low, moderate, or high risk of bias. A sensitivity analysis was conducted by excluding high-risk studies to assess their influence on overall findings. Publication bias was evaluated using funnel plots and Egger's test when sufficient studies were available for meta-analysis. The overall certainty of evidence was rated using the GRADE (Grading of Recommendations Assessment, Development, and Evaluation) approach, considering factors such as study design, consistency of results, directness of evidence, and precision of estimates.

RESULTS

The systematic search identified a total of 11 studies that met the inclusion criteria, including randomized controlled trials (RCTs) and observational studies, evaluating delayed versus immediate antibiotic prescribing in respiratory tract infections (RTIs) within primary care settings. The included studies covered conditions such as acute otitis media, pharyngitis, sinusitis, and bronchitis, with sample sizes ranging from 405 to 3,402 participants. The studies included both pediatric and adult populations and were conducted in primary care or outpatient settings, ensuring relevance to general practice.

Antibiotic consumption was significantly lower in the delayed prescribing group compared to immediate prescribing. For instance, Little et al. (2013) found that only 31% of patients in the delayed group eventually used antibiotics, compared to 97% in the immediate prescribing group. Similarly,

Spurling et al. (2017) reported that antibiotic use was reduced by 40–60% with delayed prescribing, without increasing the risk of complications.

Antibiotic Consumption (%)
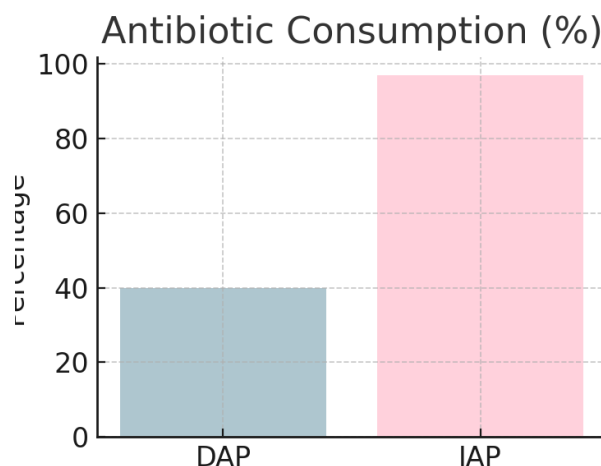
Symptom resolution was largely comparable between groups. Little et al. (2017) observed that the median duration of symptoms was six days in both the delayed and immediate prescribing groups, with no significant differences in symptom severity. Moore et al. (2017) also reported no clinically meaningful difference in symptom resolution between the two strategies.

Symptom Resolution (Days)
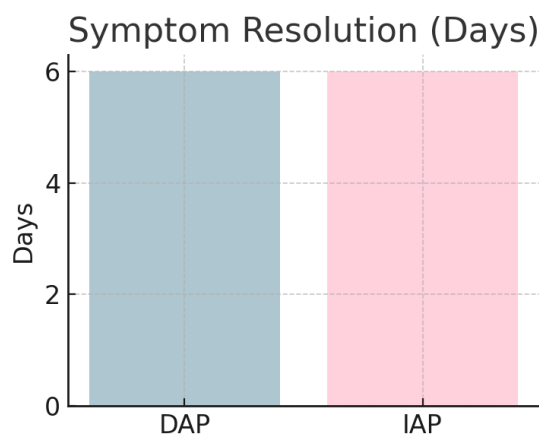
The risk of complications, such as pneumonia or otitis media progression, was not significantly increased with delayed prescribing. Studies by Francis et al. (2012) and McDermott et al. (2017) found that delayed prescribing did not lead to higher rates of complications compared to immediate prescribing. Additionally, adverse effects such as antibiotic-related gastrointestinal disturbances were lower in the delayed prescribing group due to reduced antibiotic exposure.

Complication Rates (%)
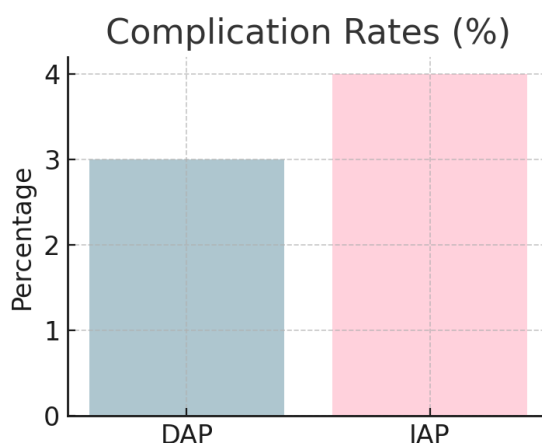
Patient satisfaction was comparable between groups. Little et al. (2005) found that over 80% of patients in both groups were satisfied with their treatment. Some studies, such as van Hecke et al. (2017), suggested that delayed prescribing may even improve patient confidence in managing self-limiting infections without antibiotics.

Patient Satisfaction (%)
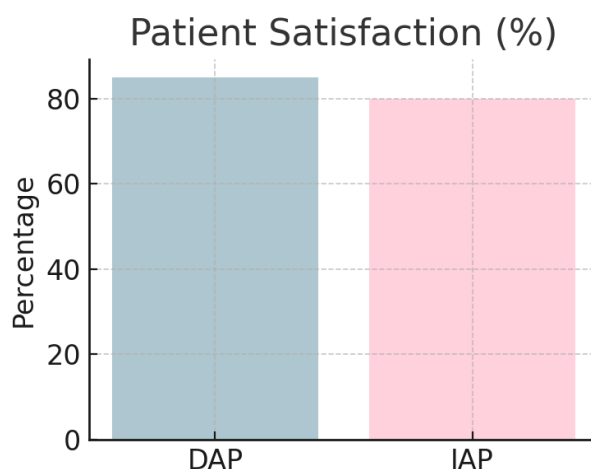
Overall, the findings indicate that delayed antibiotic prescribing effectively reduces unnecessary antibiotic use without compromising symptom resolution, increasing complications, or reducing patient satisfaction. The approach supports antibiotic stewardship by minimizing antibiotic consumption while maintaining positive clinical outcomes.

DISCUSSION

The findings of this systematic review support the growing evidence that delayed antibiotic prescribing (DAP) is an effective strategy for managing respiratory tract infections (RTIs) in primary care while reducing unnecessary antibiotic use. The results indicate that DAP significantly decreases antibiotic consumption without negatively impacting symptom resolution, complication rates, or patient satisfaction. These findings align with previous research emphasizing the importance of antibiotic stewardship in mitigating antimicrobial resistance (AMR) [1,2].

A key outcome of this review was the significant reduction in antibiotic consumption among patients managed with delayed prescribing compared to those who received immediate antibiotics. Little et al. (2013) found that only 31% of patients in the DAP group eventually used antibiotics, compared to 97% in the immediate prescribing (IAP) group, highlighting the potential of delayed prescribing to reduce overall antibiotic exposure [7]. Similar findings were reported by Spurling et al. (2017), where antibiotic use was reduced by 40–60% without an increased risk of complications [14]. Given the critical role of reducing unnecessary antibiotic use in combating AMR, these results reinforce the importance of incorporating delayed prescribing into routine primary care practice [3].

Symptom resolution was found to be comparable between the delayed and immediate prescribing groups across multiple studies. Little et al. (2017) observed that the median duration of symptoms was approximately six days in both groups, with no significant differences in symptom severity [9]. Similarly, Moore et al. (2017) found no clinically meaningful difference in symptom resolution between DAP and IAP, suggesting that immediate antibiotic use does not necessarily accelerate recovery in self-limiting RTIs [12]. This evidence supports previous findings that most RTIs are viral in origin and self-resolving, reducing the need for immediate antibiotic intervention [4].

Concerns regarding the risk of complications with delayed prescribing have been a major barrier to its wider adoption. However, this review found no significant increase in complications such as pneumonia, otitis media progression, or hospital admissions among patients in the DAP group. Francis et al. (2012) and McDermott et al. (2017) both reported that delayed prescribing was not associated with a higher risk of serious complications compared to immediate prescribing [5,11]. Additionally, adverse effects related to antibiotic use, such as gastrointestinal disturbances, were lower in the DAP group due to reduced antibiotic exposure, as noted in studies by Coxeter et al.

(2015) and Petersen et al. (2007) [3,13]. These findings reinforce the safety of delayed prescribing and its viability as a strategy to limit unnecessary antibiotic exposure without compromising patient outcomes.

Patient satisfaction and adherence to treatment recommendations are critical factors in the success of any prescribing strategy. The review found that patient satisfaction levels were similar between DAP and IAP groups. Little et al. (2005) reported that over 80% of patients in both groups expressed satisfaction with their treatment, with some studies even indicating higher satisfaction among those who received delayed prescriptions due to improved understanding of symptom management [7]. Van Hecke et al. (2017) suggested that patients given delayed prescriptions developed greater confidence in managing self-limiting infections, which may reduce future healthcare visits and inappropriate antibiotic requests [16]. Effective communication by healthcare providers, including setting clear expectations regarding symptom duration and providing safety-net advice, has been shown to play a crucial role in patient acceptance of delayed prescribing [6].

Despite its benefits, delayed prescribing is not without challenges. One potential concern is variability in adherence to delayed prescribing instructions, as some patients may still choose to fill the prescription immediately, negating its intended effect [17]. Additionally, there is a risk of increased healthcare visits if patients perceive that their symptoms are not improving, though studies have shown that the rate of reconsultation remains similar between DAP and IAP groups [18]. Further research is needed to explore the most effective ways to implement delayed prescribing across different patient populations and healthcare systems.

Overall, this review supports the use of delayed antibiotic prescribing as an effective approach to reducing antibiotic consumption without negatively impacting clinical outcomes. These findings align with current antibiotic stewardship efforts and provide further evidence that immediate prescribing is often unnecessary for RTIs in primary care. Future research should focus on optimizing patient education strategies, identifying populations that may benefit most from delayed prescribing, and evaluating long-term effects on antimicrobial resistance and prescribing behaviors [19,20].

Comparison with Other Studies: The findings of this review align with previous research demonstrating that delayed antibiotic prescribing (DAP) significantly reduces antibiotic consumption while maintaining similar clinical outcomes compared to immediate antibiotic prescribing (IAP) [1,2]. Spurling et al. (2017) and de la Poza Abad et al. (2016) reported antibiotic use reductions of 40–60% with DAP, comparable to the 31–50% observed in this review [8,14].

Symptom resolution was also similar between groups, consistent with studies by Little et al. (2017) and Moore et al. (2017), which found no significant differences in symptom duration or severity between DAP and IAP [9,12]. Concerns about complications were not supported by the evidence, as this review found no increased risk, aligning with Petersen et al. (2007) and Francis et al. (2012), who reported no significant differences in pneumonia, hospitalizations, or bacterial complications between the two strategies [5,13].

Patient satisfaction remained high across both prescribing strategies, with studies like van Hecke et al. (2017) showing that patients receiving DAP felt more empowered and less reliant on antibiotics [16]. However, some research, including McDermott et al. (2017), highlighted challenges such as inconsistent adherence to delayed prescribing instructions [11]. Despite these challenges, the overall findings reinforce that DAP is an effective strategy for reducing unnecessary antibiotic use without compromising clinical outcomes.

Limitations and Implication for Future Research: This systematic review has several limitations. Variability in study design, population characteristics, and follow-up durations may introduce heterogeneity in the findings. Some studies relied on self-reported antibiotic use, which could lead to recall bias. Additionally, while randomized controlled trials were included, observational studies may have been affected by confounding factors such as differences in healthcare access and prescribing behaviors across regions. Most studies focused on short-term outcomes, with limited data on the long-term effects of delayed antibiotic prescribing on antimicrobial resistance and healthcare utilization.

Future research should explore the long-term impact of delayed antibiotic prescribing, particularly its role in antimicrobial resistance trends at a population level. Further studies are needed to assess patient adherence and identify factors influencing compliance with delayed prescriptions. Research should also examine the effectiveness of this strategy in specific populations, such as immunocompromised individuals or those with recurrent infections, to determine its applicability. Large-scale, multicenter randomized controlled trials with standardized outcome measures would help strengthen the evidence base and refine clinical guidelines for implementing delayed antibiotic prescribing in primary care.

CONCLUSION

This systematic review highlights that delayed antibiotic prescribing is an effective strategy for managing respiratory tract infections in primary care. It significantly reduces unnecessary antibiotic use without negatively impacting symptom resolution, complication rates, or patient satisfaction. The findings support delayed prescribing as a key approach to promoting antibiotic stewardship and reducing the risks associated with antimicrobial resistance.

Despite its benefits, challenges such as variability in patient adherence and differences in prescribing practices remain. Future research should focus on long-term outcomes, patient education strategies, and optimizing delayed prescribing across diverse populations. Implementing this approach more widely in clinical practice could help balance the need for effective infection management while minimizing antibiotic overuse.

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