https://doi.org/10.31925/farmacia.2025.6.7 **ORIGINAL ARTICLE**

USE OF NSAIDS AND CORTICOSTEROIDS IN ENT DISORDERS: CORRELATIONS WITH DISEASE SEVERITY AND HOSPITALISATION OUTCOMES

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Abstract

ENT infections and inflammations are among the most common reasons for medical consultation and are often treated with antibiotics and anti-inflammatory drugs, sometimes unevenly or excessively. This retrospective study analysed 167 patients admitted to an ENT clinic, classified into six major diagnostic groups. It evaluated the association between the type of pathology, the treatments administered (NSAIDs, SAIDs, antibiotics) and the duration of hospitalisation. The data revealed a selective therapeutic pattern: NSAIDs were the primary treatment in uncomplicated acute cases, whereas corticosteroids were used predominantly in cases with severe inflammation or obstructive risk. Differential analysis of the most common diagnoses showed that the combined NSAID + SAID regimen was associated with more extended hospital stays than NSAID monotherapy; however, these findings are descriptive and cannot be attributed to differences in disease severity. Drug correlations confirmed clinical trends: associations between anti-inflammatory drugs and gastroprotective drugs or antibiotic combinations specific to acute infections. The results support the need for severity-based, proportionate prescribing in accordance with current ENT guidelines.

Rezumat

Infecțiile și inflamațiile ORL reprezintă una dintre cele mai frecvente cauze de prezentare medicală, fiind adesea tratate cu antibiotice și antiinflamatoare, uneori în mod neuniform sau excesiv. Acest studiu retrospectiv a analizat 167 de pacienți internați într-o clinică ORL, clasificați în șase grupe diagnostice majore, evaluând asocierea dintre tipul patologiei, tratamentul administrat (AINS, SAID, antibiotice) și durata spitalizării. Datele au evidențiat un model terapeutic selectiv: AINS au reprezentat terapia de bază în cazurile acute necomplicate, în timp ce corticosteroizii au fost utilizați preponderent în situațiile cu inflamație severă sau risc obstructiv. Analiza diferențială a celor mai frecvente diagnostice a arătat că regimul combinat NSAID + SAID a fost asociat cu perioade de spitalizare mai lungi în comparație cu monoterapia cu NSAID; cu toate acestea, aceste constatări sunt descriptive și nu pot fi atribuite diferențelor în ceea ce privește gravitatea bolii. Corelațiile medicamentoase au confirmat tendințele clinice: asocieri între antiinflamatoare și gastroprotectoare sau combinații antibiotice specifice infecțiilor acute. Rezultatele susțin nevoia unei prescrieri proporționale, adaptate severității, în concordanță cu ghidurile actuale ORL.

Keywords: ENT pathology, anti-inflammatory drugs, antibiotics, duration of hospital stay

Introduction

Ear, nose and throat (ENT) conditions are common in both children and adults. They are frequently associated with increased morbidity, leading to complications such as hearing loss or a reduced quality of life. In medical practice, acute ear, nose and throat infections are among the leading indications for antibiotic prescribing. However, most of these infections are viral, making antimicrobial therapy frequently unnecessary [6].

At the same time, chronic conditions such as recurrent sinusitis, nasal polyposis and chronic pharyngotonsillitis remain challenging to control. They are often associated with prolonged or frequent antibiotic use. The overuse and inappropriate prescribing of these drugs are facilitated by the difficulty in differentiating between viral and bacterial aetiologies, which contributes to the increasing antimicrobial resistance. In this context, it is essential to reassess prescribing patterns and identify situations in which antibiotics and nonsteroidal anti-inflammatory drugs (NSAIDs) are used correctly or, conversely, excessively [37].

Among ENT pathologies, some disorders present as acute emergencies, whereas others are chronic and affect daily functioning. Epistaxis, for example, is one of the most common acute disorders, involving over 50% of people suffering from at least one episode in their lifetime. Although most cases resolve spontaneously, about 10% need medical interventions, particularly among those with risk factors such as hypertension, coagulation disorders, or use of drugs like NSAIDs and anticoagulants, which emphasises careful medical choices [5, 27, 31, 41, 45]. Acute and postoperative use continued for NSAIDs, while they remain among the most administered anti-inflammatory medications [16]. In postoperative ENT, especially septal deviation surgery, NSAIDs are part of perioperative management as *per* the standard of care [1]. For infectious ENT patients, antibiotics remain the treatment of choice when bacterial involvement is suspected; however, concerns about the prescription of inappropriate antibiotics and the global spread of antimicrobial resistance, as emphasised by the World Health Organisation, underscore the need for appropriate use [34]. Furthermore, the widespread use of NSAIDs, including those available without a prescription, requires caution in their administration to reduce the risk of potential adverse effects and drug interactions in combination with antibiotics [20].

The available data on the prescribing patterns and correlations between diagnosis, treatment and biological parameters in ENT pathology are relatively limited at the local level. This study aimed to analyse these correlations in patients admitted to an ENT clinic, classify cases as acute or chronic, examine how different types of ENT pathologies are associated with prescribed treatments, including antibiotics and NSAIDs and describe patterns in length of hospital stay within these diagnostic groups.

Materials and Methods

Study design and setting

We conducted a single-centre retrospective observational study using routinely recorded inpatient data from the Otorhinolaryngology (ENT) Department of the Timișoara Municipal Emergency Clinical Hospital, Romania, over four months, from 1st January 2025 to 1st May 2025. The study period was selected to ensure uniformity in diagnostic coding and treatment documentation across the electronic and paper medical records used in the department and to capture seasonal variation in acute ENT infections, which constitute a substantial proportion of emergency presentations during the winter and spring months.

The study population comprised all adult patients (over 18 years) admitted with an ENT disorder for which systemic anti-inflammatory therapy (NSAIDs alone or NSAIDs combined with systemic corticosteroids) was initiated during hospitalisation. Diagnostic categories reflected the spectrum of conditions typically managed in an ENT unit, including acute infectious diseases, chronic inflammatory or polypoid disorders, postoperative conditions, traumatic lesions and neoplastic pathologies. All admissions originated from a single urban academic hospital that functions as both a regional referral centre and a provider of continuous emergency ENT care.

The study protocol was reviewed and approved by the Ethics Committee of the Timișoara Municipal Emergency Clinical Hospital, Romania, (Approval No 1264, date 03.12.2025). Because the analysis relied exclusively on anonymised retrospective data extracted from hospital records, and no direct patient contact or intervention was involved, the requirement for informed consent was formally waived in accordance with national regulations governing the secondary use of medical data for research purposes.

Study population

The study population consisted of adult patients (> 18 years) admitted to the ENT department during the study period. Demographic variables (age, sex and, when available, urban/rural residence) and comorbidities were extracted from the medical records. Diagnostic labels assigned by attending physicians were reviewed and standardised, and all cases were allocated into one of six predefined categories: (i) acute infectious pathologies; (ii) chronic inflammatory or polypoid conditions; (iii) postoperative or surgical cases; (iv) neoplastic disease; (v) traumatic or mechanical lesions and (vi) a residual category including acute upper-airway compromise not captured elsewhere.

Operational definitions were used to ensure consistency among the cases. “Complete medical data” needed demographics (age, sex, birth) and classification of the diagnosis (diagnostic classification), laboratory investigations, documentation of anti-inflammatory and antibiotic treatments being administered and definitive admission and discharge dates, which allowed for calculation of hospital stay. Clinical severity was defined according to criteria commonly applied in ENT emergency practice. Severe presentations included airway compromise (dyspnoea, stridor or inability to handle secretions), trismus or marked odynophagia suggesting deep pharyngeal infection, high-grade fever (> 38.5°C) with substantial inflammatory marker elevation, radiological evidence of abscess or extensive

soft-tissue oedema, or the requirement for urgent interventions (incision and drainage, airway stabilisation). Cases that did not meet these criteria were classified as uncomplicated.

Inclusion criteria encompassed all adult patients with a clearly documented ENT diagnosis, complete medical data and documented exposure to systemic anti-inflammatory treatment (NSAIDs with or without systemic corticosteroids).

Exclusion criteria were: absence of documentation regarding anti-inflammatory therapy; discharge on request or transfer before treatment completion; severe comorbidities requiring management outside the ENT unit (*e.g.,* decompensated cardiac failure, advanced renal insufficiency, uncontrolled haematological malignancy, severe immunosuppression); age below 18 years; and pregnancy, owing to specific concerns regarding the NSAID and corticosteroid exposure.

Diagnostic classification

All diagnoses were taken from the medical records as recorded by the attending ENT specialists and subsequently standardised to ensure consistency across cases. Each patient was assigned to one of six pre-defined diagnostic groups already used in routine clinical practice: (i) acute infectious pathologies (such as acute tonsillitis, peritonsillar abscess, acute sinusitis, mastoiditis, phlegmonous angina, acute otitis media or externa and acute laryngitis); (ii) chronic inflammatory or polypoid conditions (including chronic sinusitis, chronic rhinosinusitis with or without nasal polyposis and hypertrophic rhinitis); (iii) postoperative or surgical cases *(e.g.,* septoplasty, endoscopic sinus surgery, postoperative inflammatory oedema); (iv) neoplastic diseases of the sinonasal tract, cavum or larynx; (v) traumatic or mechanical lesions (such as nasal fractures, septal haematoma or auricular lacerations) and (vi) a residual "other" category capturing presentations that did not clearly fit into the previous groups.

The allocation into diagnostic categories followed standard ENT clinical practice and the definitions routinely applied in the department. When a case presented with overlapping features (*e.g.*, coexistence of an acute infection and an underlying chronic condition), the diagnosis judged most clinically relevant at admission was selected. If ambiguity persisted, the classification was resolved by consensus after re-examination of the whole medical record. This approach ensured uniformity while remaining faithful to the available clinical documentation.

Data collection procedures

Data was collected through a structured review of each patient's complete medical record. Information was extracted from admission notes, daily progress entries, operative or procedural reports (when applicable), laboratory panels, medication charts and discharge summaries. Demographic variables (age, sex and, when available, urban or rural residence), the primary ENT diagnosis, associated diagnoses and all documented therapeutic interventions were recorded using a predefined extraction grid.

Data extraction was performed by two reviewers, each trained in ENT, who independently confirmed the accuracy and internal consistency of the collected information. Where discrepancies or ambiguous diagnostic or treatment entries were noted, the original medical file was reread, and a consensus decision was reached. Missing laboratory values were documented as missing and were not imputed.

Anti-inflammatory treatment exposure

The primary exposure variable was anti-inflammatory treatment and was divided into four groups: (i) the NSAIDs alone, (ii) NSAIDs combined with systemic corticosteroids (SAIDs), (iii) SAIDs alone and (iv) no anti-inflammatory therapy. The drug name, route of administration and therapeutic indication were documented for each patient.

NSAIDs commonly administered in the cohort included ibuprofen, ketoprofen, diclofenac, metamizole and naproxen. They were given orally or intravenously in accordance with clinical presentation and the treating physician's judgment. Systemic corticosteroids, mainly dexamethasone or methylprednisolone, were prescribed in the cases with marked mucosal oedema, intense inflammatory response, or clinical suspicion of impending airway obstruction. Anti-inflammatory therapy was usually started at admission and continued throughout the hospital stay, with duration reflecting the evolution of the clinical condition.

Due to the high proportion of patients with ENT infections requiring antimicrobial treatment, antibiotic exposures were also reported. The antibiotics were categorised by pharmacological class: intravenous cephalosporins, intravenous penicillin-β-lactamase inhibitor combinations, oral β-lactams, aminoglycosides and nitroimidazoles. In acute infectious presentations, antibiotics and NSAIDs were commonly co-administered, as is standard clinical practice.

Laboratory and clinical measurements

Laboratory investigations recorded at admission included leukocyte count, C-reactive protein (CRP), fibrinogen and erythrocyte sedimentation rate (ESR), all obtained from the routine clinical laboratory within 24 hours of hospital presentation. These parameters were collected as documented in the medical record and were used descriptively to characterise the inflammatory status of the cohort.

For descriptive purposes, elevated inflammatory markers were defined according to commonly applied clinical thresholds: CRP > 5 mg/L, ESR > 20 mm/h, fibrinogen > 400 mg/dL and leukocyte count > 10×10^9/L. No imputation of missing laboratory values was performed; absent results were recorded as missing.

Clinical measurements, such as temperature, airway compromise, localised oedema, or evidence of deep neck infection, were extracted from admission and

progress notes when relevant to the diagnostic classification or clinical course.

Outcome measures

The primary outcome of the study was the length of hospital stay (LOS), defined as the number of calendar days between the documented date of admission and the date of discharge. LOS was selected as the primary measure of clinical course because it is routinely recorded, consistently available in retrospective datasets and widely used in observational studies assessing treatment patterns in acute ENT conditions. However, LOS reflects not only clinical evolution but also organisational and contextual factors; therefore, it was interpreted descriptively rather than as a direct indicator of disease severity.

Secondary outcomes included the distribution of anti-inflammatory treatment regimens across diagnostic groups and the descriptive evaluation of inflammatory markers at admission (leukocyte count, CRP, ESR and fibrinogen) while these laboratory parameters were not used to establish formal severity strata, they are indicative of the inflammatory profile of the cohort.

Because of the retrospective design, potential confounding variables that may impact LOS, including admission time (weekday *versus* weekend), availability of beds, policies regarding discharge, social considerations, surgical scheduling and comorbidities, were not sufficiently accounted for. As such, associations between treatment groups and LOS should not be interpreted causally. No systematic data on adverse drug reactions were available, and safety outcomes could not be evaluated.

Statistical analysis (software versions, statistical tests applied, rationale for each test, treatment of non-normal data, adjustments for multiple comparisons)

Statistical analyses were performed using GraphPad Prism version 10.5.0, Matplotlib 3.9.0 and Microsoft Excel, both of which support grouped clinical datasets. Descriptive statistics were used to summarise demographic characteristics, diagnostic categories, treatment regimens and laboratory parameters. Categorical variables (diagnostic group, treatment classification, antibiotic class) were presented as counts and percentages and compared using chi-square or Fisher's exact tests, depending on the expected cell counts.

Continuous variables, including length of hospital stay and inflammatory markers, were evaluated for distributional symmetry. When approximately normally distributed, results were summarised as means with standard deviations, and comparisons between treatment groups (NSAIDs only *versus* NSAIDs + SAIDs) were made using independent-sample Student's t-tests. Medians and interquartile ranges were used for skewed data, and non-parametric methods were examined in sensitivity analyses.

Descriptive correlation analyses were utilised to investigate the associations between medication classes and adjuvant therapies. No formal multivariable modelling was undertaken, as the study was not designed to adjust for the wide range of potential confounders that could influence hospital stay. Similarly, no adjustments for multiple comparisons were applied, given the exploratory nature of the analyses and the retrospective design. A two-sided p-value below 0.05 was regarded as statistically significant.

Results and Discussion

A total of 167 consecutive patients, irrespective of age or sex, admitted to the ENT department with acute or chronic presentations were included in the study. For consistency in clinical interpretation and statistical analysis, all diagnoses were grouped into six broader categories. Acute infectious disorders comprised conditions such as tonsillitis, peritonsillar abscess, acute otitis media, acute sinusitis, phlegmon, mastoiditis, acute otitis externa, nasopharyngitis, acute laryngitis, suppurative adenitis/lymphadenitis and nasal vestibule furuncle. Chronic inflammatory or polypoid diseases included chronic rhinitis, chronic sinusitis, chronic rhinosinusitis, nasal polyposis, hypertrophic rhinitis, adenoid hypertrophy and tonsillar hypertrophy. Postoperative or surgically related conditions encompassed septal deviation, septal deviation associated with hypertrophic rhinitis, septoplasty and polyp surgery. Neoplastic diseases included recurrent polyps, adenomas, papillomas, cavum tumours and carcinomas. The traumatic or mechanical lesions comprised nasal pyramid fractures, sinus fractures, septal haematoma, auricular lacerations, facial contusions and other forms of nasal trauma. A small number of admissions presented with conditions not primarily classified as ENT pathology, such as acute respiratory failure or unspecified sinusitis; these were recorded as associated presentations and were not included in the comparative diagnostic analysis.

Demographic characterisation

The study group comprised 167 adult patients (≥ 18 years) admitted to the Otorhinolaryngology (ENT) department. Patient ages ranged from 18 to 90 years, with most cases occurring between 36 and 75 years (Figure 1). The age distribution was dominated by middle-aged adults, with a gradual decline in older age groups. The male-to-female ratio in hospital admissions was approximately 1.5:1, which indicates a slight gender imbalance. Most patients in the group were middle-aged, consistent with the overall trend reported in routine ENT treatment.

The age and gender distribution seen in the study group broadly matches the overall trends reported in the literature for the adult population with ENT conditions. The preponderance of middle-aged patients can be attributed to the raised incidence of chronic inflammatory conditions (sinusitis, hypertrophic rhinitis, nasal polyposis) in this age group [29, 30], as well as the environmental and occupational factors (exposure to pollutants, smoking, stress) [22]. The higher frequency of cases in men has

also been related in other relevant epidemiological studies, which have highlighted an increased incidence of ENT diseases and head and neck cancers among the male population, mainly associated with smoking, alcohol consumption and exposure to occupational risk factors [18, 49].

On the other hand, the lower proportion of elderly patients can be explained by demographic changes and the particularities of this age group. Earlier studies have shown that geriatric patients tend to have more frequent otological pathologies and multiple comorbidities, which often lead to referrals to other medical specialities [9, 19]. This aspect could represent an epidemiological limitation of the study, but also a potential starting point for future evaluation of ENT service needs in the elderly. The observed demographic structure indicates that ENT disorders are common in adults, and the literature suggests that gender differences may affect the manifestation, pathophysiology and progression of these conditions, particularly through sex hormones' effects on immune responses and inflammation of the upper respiratory tract [24].

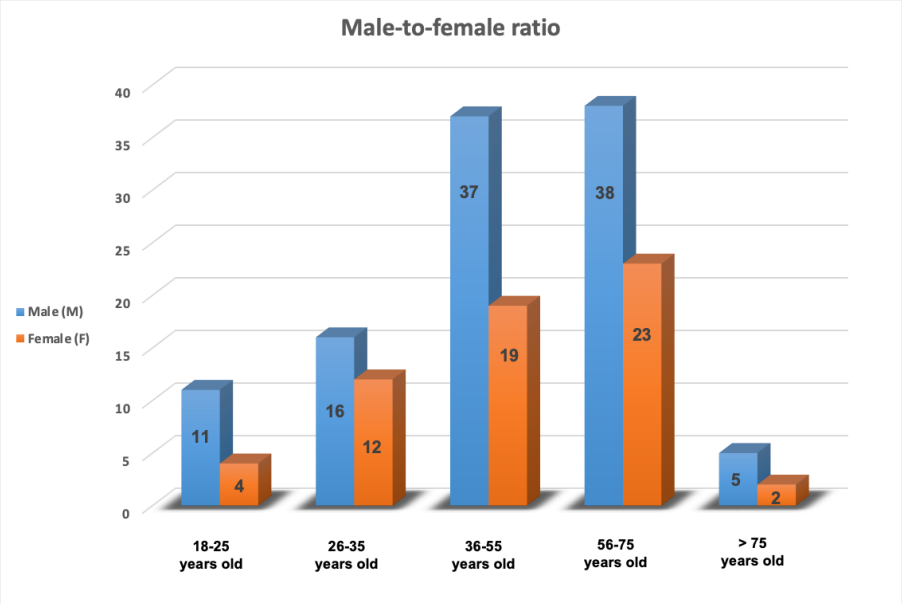

Figure 1.
Demographic structure of the study population by age group and sex (n = 167)

Distribution by diagnostic category

Based on the clinical diagnosis, the patients were classified into six major pathological groups, which are illustrated in Figure 2.

As shown in Figure 2, the acute infectious group accounted for the largest share, representing 46% of all cases. The group with chronic inflammation and polyps accounted for 13.17%, followed by neoplastic conditions (11.38%) and postoperative or surgical cases (10.78%). Traumatic and mechanical pathologies, including epistaxis and nasal fractures, represented a smaller proportion (4%), whereas the other conditions group accounted for 14% of cases. This distribution indicates that infectious and inflammatory pathologies are prevalent among adults with ENT conditions, reflecting the clinical spectrum typically encountered in clinical practice.

The distribution of cases highlights that infectious and inflammatory pathologies are the principal reasons for admission to ENT departments, confirming their predominant role in current clinical practice. This prevalence can be attributed to well-documented pathophysiological mechanisms that underscore the roles of complex ostio-meatal obstruction and inflammation of the respiratory mucosa in initiating and maintaining infectious processes in the upper respiratory tract. Moreover, bacterial biofilm formation and local microbial flora imbalance prolong inflammation and diminish the efficacy of antimicrobial treatment, thereby limiting treatment success and leading to recurrent infections and bacterial resistance. Such problems can be exacerbated by allergic inflammation and mucociliary clearance disorders, which are important contributors to the inflammation-disease association [29, 44]. At the same time, the 13% proportion of chronic inflammatory pathologies, such as chronic rhinosinusitis and nasal polyposis, confirms the persistence of these slow-progressing conditions, which significantly affect patients' quality of life. These diseases, characterised by a complex inflammatory process of the sinus mucosa, involve numerous immunologic and molecular mechanisms [25].

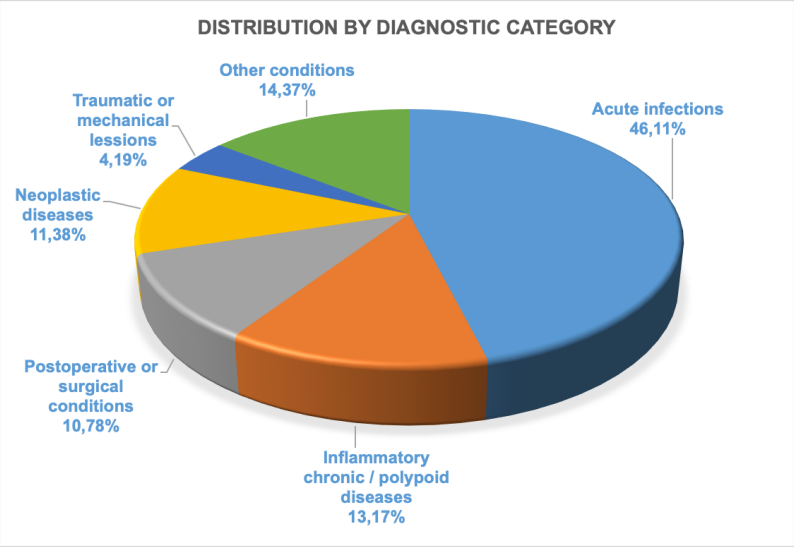

Figure 2.
Distribution of the 167 cases across the diagnostic categories used in the study

Recent literature has highlighted that chronic rhinosinusitis, particularly with nasal polyps, is a heterogeneous entity driven by distinct inflammatory responses (types 1, 2, or 3), which may account for variations in clinical response and in responses to traditional therapies. In these conditions, the corticosteroids are the primary treatment, playing a central role in reducing matrix metalloproteinase (MMP-2 and MMP-9) expression and increasing their inhibitors (TIMP-1 and TIMP-2), processes that limit tissue remodelling and the formation of nasal polyps. At the same time, new therapeutic directions are emerging, such as the use of SIRT1 activators (*e.g.,* resveratrol), which can modulate the inflammatory response and prevent recurrences of nasal polyposis. Thus, the need for effective and safe anti-inflammatory treatments, along with careful monitoring of these patients, justifies increased interest in evaluating prescribing patterns for NSAIDs and corticosteroids in chronic ENT diseases [26].

Medication patterns and clinical outcomes

Regarding anti-inflammatory therapy (Table I), the NSAIDs (non-steroidal anti-inflammatory drugs) were administered to most patients (159; 95.2%), whereas SAIDs (steroidal anti-inflammatory agents) were used in 53 patients (31.7%). A combined therapy including both NSAIDS and SAIDS was prescribed in 50 cases (29.9%), whereas only 5 patients (3.0%) did not receive any anti-inflammatory medication.

Table I

Distribution of patients according to anti-inflammatory treatment (n = 167)

Treatment category	No. patients	%
NSAIDs	151	**90.42**
SAIDs	53	**31.74**
NSAIDs + SAIDs	50	**29.94**
No NSAIDs + SAIDs	5	**2.99**

The fact that nearly all patients (95%) received non-steroidal anti-inflammatory drugs (NSAIDs) underscores the central role of inflammation and pain management in the treatment of ENT conditions. These findings reflect a common trend in international clinical practice, in which NSAIDs are considered first-line treatments for most acute and postoperative conditions in oto-rhinolaryngology, such as sinusitis, tonsillitis, otitis media and postoperative inflammation [8]. Their frequent use in ENT practice is linked to their predictable effect on inflammation and pain and to their accessibility [3]. As NSAIDs reduce prostaglandin synthesis through cyclo-oxygenase inhibition, they may cause gastric irritation, which often leads to the co-prescription of gastroprotective agents. The frequent use of proton pump inhibitors (PPIs) in clinical practice supports the application of preventive strategies for digestive complications, particularly in the patients receiving combination anti-inflammatory treatments [10].

The NSAIDs play an important role in reducing inflammatory symptoms but are not without risks. The risk of gastrointestinal, renal, cardiovascular and haematological reactions associated with prolonged administration or in the geriatric population is consistently reported in the literature. In this context, it is essential to carefully select the active substance, dose and duration of therapy. Selective COX-2 inhibitors can minimise the risk of digestive complications, but they should be used with caution in patients with cardiovascular disease [39, 47].

On the other hand, the association observed between the use of NSAIDs and steroidal anti-inflammatory drugs (SAIDs) in nearly one-third of cases reflects a combination therapy approach aimed at effectively controlling severe or refractory inflammation [28]. This combination is frequently used in ENT pathology when inflammatory processes involve marked mucosal

oedema or extensive involvement of the upper respiratory structures, for example, in complicated acute rhinosinusitis, extensive postoperative inflammation, recurrent serous otitis, or chronic forms of hyperplastic rhinitis [33]. Using complementary mechanisms, NSAIDs and SAIDs reduce the synthesis of inflammatory mediators: NSAIDs by inhibiting cyclooxygenases (COX-1 and COX-2) and, thereby, prostaglandins; and SAIDs by inhibiting phospholipase A_2 and the expression of proinflammatory genes (cytokines, leukotrienes). Thus, the combination exhibits synergistic effects in reducing pain, fever and local oedema [32].

In addition to anti-inflammatory synergies, the complex pharmacological treatment of ENT pathology will also include adjuvant strategies to reduce potential side effects and complications, such as bleeding or gastric irritation [39]. The analysis thus also examined prescribing trends for haemostatic and gastroprotective agents.

Haemostatic therapy was prescribed in 46 cases (27.5%), primarily for epistaxis or postoperative bleeding. In contrast, the proton pump inhibitors (PPIs) were administered in 73 cases (43.7%), often as a gastroprotective co-treatment in patients receiving combined anti-inflammatory therapy.

Also, analysis of medication associations revealed consistent co-administration patterns between anti-inflammatory drugs and adjuvant therapies. Proton pump inhibitors were prescribed significantly more frequently in patients receiving anti-inflammatory treatment, both for NSAIDs and for SAIDs ($p < 0.001$, chi-square test and Fisher's exact test, respectively). The frequent pairing of gastroprotective agents with anti-inflammatory therapy reflects everyday ENT ward practice. A mild trend toward the use of haemostatic agents in SAID-treated patients was also observed, but the numbers were small, and the association was not statistically significant ($p > 0.05$).

The results regarding the use of adjuvant therapeutics reflect an integrative management approach to ENT pathology, focused not only on controlling inflammation but also on preventing iatrogenic or postoperative complications. The administration of proton pump inhibitors (PPIs) in almost half of cases (43.7%) underscores a continued focus on gastrointestinal safety in patients treated with anti-inflammatory drugs, particularly in combination therapy (NSAIDs + SAIDs). The efficacy of PPI administration adjunct to NSAIDs is well-established, as reported by a large meta-analysis of more than 12,000 patients [48], which showed a significant decrease in peptic ulcer and other gastrointestinal complications.

In ENT inpatient care, where anti-inflammatory treatment may be administered for several days, and many patients have cardiovascular or metabolic comorbidities, PPIs are routinely added to reduce gastric side effects and improve treatment tolerance [36].

International research supports this treatment approach, showing that combining a proton pump inhibitor (such as omeprazole, pantoprazole, or esomeprazole) with NSAIDs reduces the risk of severe gastric damage or ulcer complications in hospitalised patients by more than 50% [46]. The findings of our study, which demonstrated a significant positive association between anti-inflammatory treatments and PPI use ($p < 0.001$), confirm that this practice is not only common but also systematically followed in line with pharmacovigilance principles and international safety guidelines for anti-inflammatory therapy.

Haemostatic agents are indicated primarily in patients with epistaxis or postoperative bleeding, situations in which haemorrhage control is essential for a favourable outcome [23].

Although the association between systemic glucocorticoid therapy and the use of haemostatic agents did not reach statistical significance ($p > 0.05$), the observed trend toward coadministration may reflect a cautious clinical approach aimed at preventing haemorrhagic complications in patients with extensive inflammation or a predisposition to bleeding. Evidence from recent literature indicates that perioperative corticosteroid administration can significantly reduce postoperative oedema and discomfort, particularly in rhinoplasty, endoscopic sinus surgery and thyroidectomy, without substantially increasing the risk of intraoperative bleeding. However, in cases involving highly vascularised mucosa, the use of systemic glucocorticoids requires careful assessment of bleeding risk; therefore, adjuvant haemostatic therapy may be appropriate in specific clinical situations [7, 14].

This approach aligns with contemporary trends in the international literature on inflammatory pain management, which emphasises the importance of personalising treatment based on the underlying pathophysiological mechanisms and the individual patient's profile. Recent consensus documents highlight the importance of reevaluating traditional therapeutic guidelines, particularly regarding the role of NSAIDs and adjuvant analgesics, to increase the safety and efficacy of treatment [43].

In this cohort, treatment decisions reflected common ENT prescribing patterns, balancing the need for pain and inflammation control with the avoidance of gastrointestinal, haemorrhagic and metabolic adverse effects. Antibiotics were given to most patients, and their selection varied according to the underlying diagnosis (Table II).

Intravenous β-lactam/β-lactamase inhibitor combinations were the most frequently used antibiotics (69 cases; 41.3%), followed closely by intravenous cephalosporins (67 cases; 40.1%). Aminoglycosides were prescribed in 53 patients (31.7%), mainly as an additional agent in mixed or more severe infections. Oral regimens were less frequently used, including oral β-lactam/β-lactamase inhibitor combinations (29 patients; 17.4%)

and oral cephalosporins (5 patients; 3.0%). Nitroimidazoles were administered in 5 patients (3.0%) for suspected anaerobic involvement. In total, most intravenous β-lactams and cephalosporins are used to treat acute infectious presentations commonly encountered in an inpatient ENT setting. The inflammatory profile was evaluated through clinical laboratory tests, with moderate increases in systemic inflammatory markers (average values of C-reactive protein at 29.34 mg/L, ESR at 29.69 mm/h and fibrinogen at 377.54 mg/dL). According to the leukocyte formula, the number of leukocytes in the cohort was moderately increased (mean 10.27 x 10^5/μL), consistent with the infectious and inflammatory background. Statistical analysis using the Student's t-test revealed no significant differences in baseline inflammatory markers between patients treated with and untreated with NSAIDs ($p > 0.05$ for all markers). Patients who received SAIDs showed a trend for greater CRP and fibrinogen levels, consistent with the use of corticosteroids in more challenging or highly inflamed circumstances. The Chi-square test did not identify a significant association between diagnostic category and the administration of NSAIDs or SAIDs ($p > 0.05$), indicating a relatively homogeneous treatment approach across diagnostic groups.

Table II

Distribution of patients according to antibiotic class (n = 167)

Antibiotic class	No. patients	%
Cephalosporins i.v.	67	**40.12**
Cephalosporins p.o.	5	**2.99**
Penicillins + β-lactamase inhibitors p.o.	29	**17.37**
Penicillins + β-lactamase inhibitors i.v.	69	**41.32**
Aminoglycosides	53	**31.74**
Nitroimidazoles	5	**2.99**

A descriptive review of laboratory data found that patients with combination NSAID + SAID treatment tended to have higher CRP and leukocyte values at admission compared with those treated with NSAIDs alone; however, these differences were not used to construct formal severity classifications.

Regarding antibiotic co-prescriptions, no significant associations were identified between NSAIDs or SAIDs use and specific antibiotic classes (including β-lactam/β-lactamase inhibitor combinations, cephalosporins, or aminoglycosides), indicating that anti-inflammatory and antimicrobial treatments were prescribed independently, based on clinical indication.

The pattern of drug use in our cohort mirrors that of most ENT prescriptions, where anti-inflammatory agents are frequently used with gastroprotective or haemostatic drugs when it is clinically indicated.

The predominance of β-lactam/β-lactamase inhibitor combinations in our cohort reflects the current trend in antimicrobial therapy toward broad-spectrum agents with enhanced stability against β-lactamases. Broad-spectrum β-lactam/β-lactamase inhibitor regimens, such as amoxicillin–clavulanate and piperacillin-tazobactam, remain the most commonly prescribed for acute inpatient ENT infections. And the novel combinations, such as cefepime/enmetazobactam, reflect that, against the backdrop of this growing antimicrobial resistance [35], this antibiotic class remains of ongoing relevance.

Cephalosporins were prescribed at a similar rate in our cohort. Their use is consistent with routine ENT practice, as they are typically well tolerated and remain effective against many β-lactamase-producing bacterial strains. This trait makes them effective in moderate to severe infections, such as complicated otitis and sinusitis, where β-lactamase-producing bacteria (BLPB) can hinder the response to classic penicillins. Some cephalosporins remain active in the presence of β-lactamase-producing bacteria and can therefore be effective without substantially disturbing the normal respiratory flora [2].

Aminoglycosides were used in approximately one-third of cases, typically as an additional agent in mixed or clinically severe infections requiring enhanced Gram-negative coverage. Their use reflects established practice, as they act rapidly and may work synergistically with β-lactams. At the same time, the risk of nephrotoxicity and ototoxicity necessitates that treatment courses be kept short and that renal function be monitored, in accordance with current recommendations [15, 42].

Nitroimidazoles, mainly metronidazole, were prescribed only when anaerobic involvement was suspected. This limited use corresponds with guideline-based practice, as these agents are reserved for situations in which anaerobic coverage is clearly indicated [11].

Matters correlation and co-occurrence analysis of treatments

An analysis of the correlation (Figure 3) and the co-occurrence (Figure 4) matrices improves the interpretation of the cohort's therapeutic use and sheds light on drug use in these approaches. Trends in the simultaneous or independent combination of therapeutic classes are displayed using the correlation matrix. Correlations are positive (red), indicating relatively frequent treatment pairs, *e.g.,* anti-inflammatory groups with gastroprotective agents or β-lactams with aminoglycosides in acute and polymicrobial infections. On the other hand, the more negative correlation (in blue) refers to the infrequent combination of therapies, facilitating targeted

prescribing according to their indications and, in so doing, limiting the minimal use of metronidazole when anaerobes are suspected. The co-occurrence matrix shows the actual rates of these drug combinations and corroborates the patterns observed in the correlation matrix. Frequent combinations like β-lactam/β-lactamase inhibitors with aminoglycosides or β-lactam with gastro-protectors indicate that many severe cases of acute infections might require a combination of medicines (usually treatment options). The very few nitroimidazole combinations in question indicate careful selection based on applicability and rational antimicrobial principles. Overall, these tools demonstrate that treatment within the cohort was deliberate and systematic, aligning with modern antibiotic stewardship and integrated ENT management strategies, rather than being random.

Comparative analysis of therapeutic efficacy: NSAID treatment versus NSAID + SAID combination

An analysis of hospital stay lengths by treatment category revealed significant differences between groups. Patients who received NSAIDs alone had a mean hospital stay of 6.0 ± 4.3 days (n = 114), whereas those treated with both NSAIDs and systemic corticosteroids had a mean hospital stay of 8.1 ± 5.9 days (n = 50; p = 0.011). The few patients who received corticosteroids alone had a mean length of stay of 9.7 ± 4.0 days (n = 3), and the small subgroup without any anti-inflammatory treatment had a mean length of stay of 4.0 ± 2.0 days (n = 5). Since these latter groups are small, these figures should be interpreted as descriptive rather than comparative.

Hospital stays fluctuated much more in the NSAID + SAID group, which also contained a few extreme cases. In contrast, values in the NSAID-only group were more tightly clustered.

Analysis of the age distribution (Figure 5) showed a similar spread across groups, with no significant differences, suggesting no age-related confounding in treatment choice or length of hospital stay.

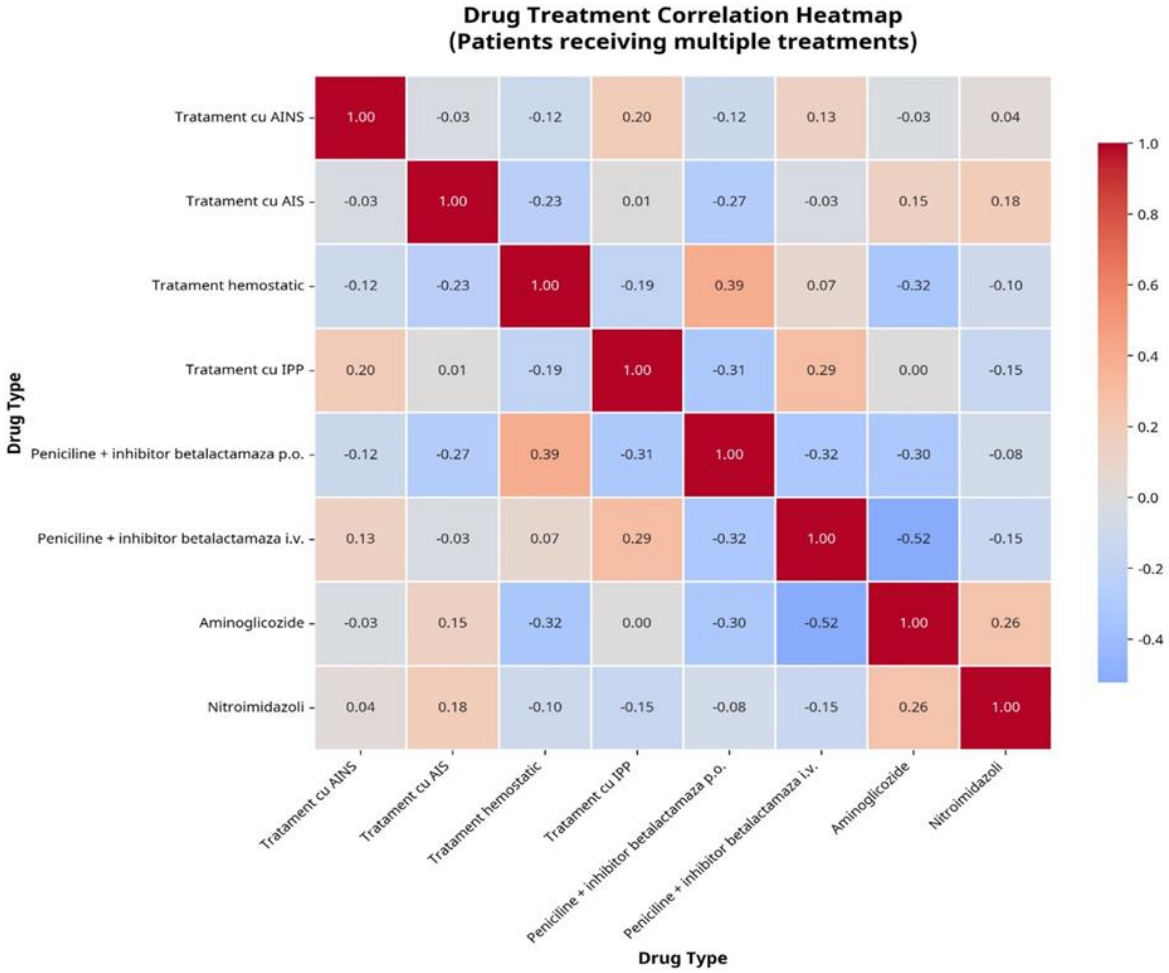

Figure 3.
Treatment correlation matrix

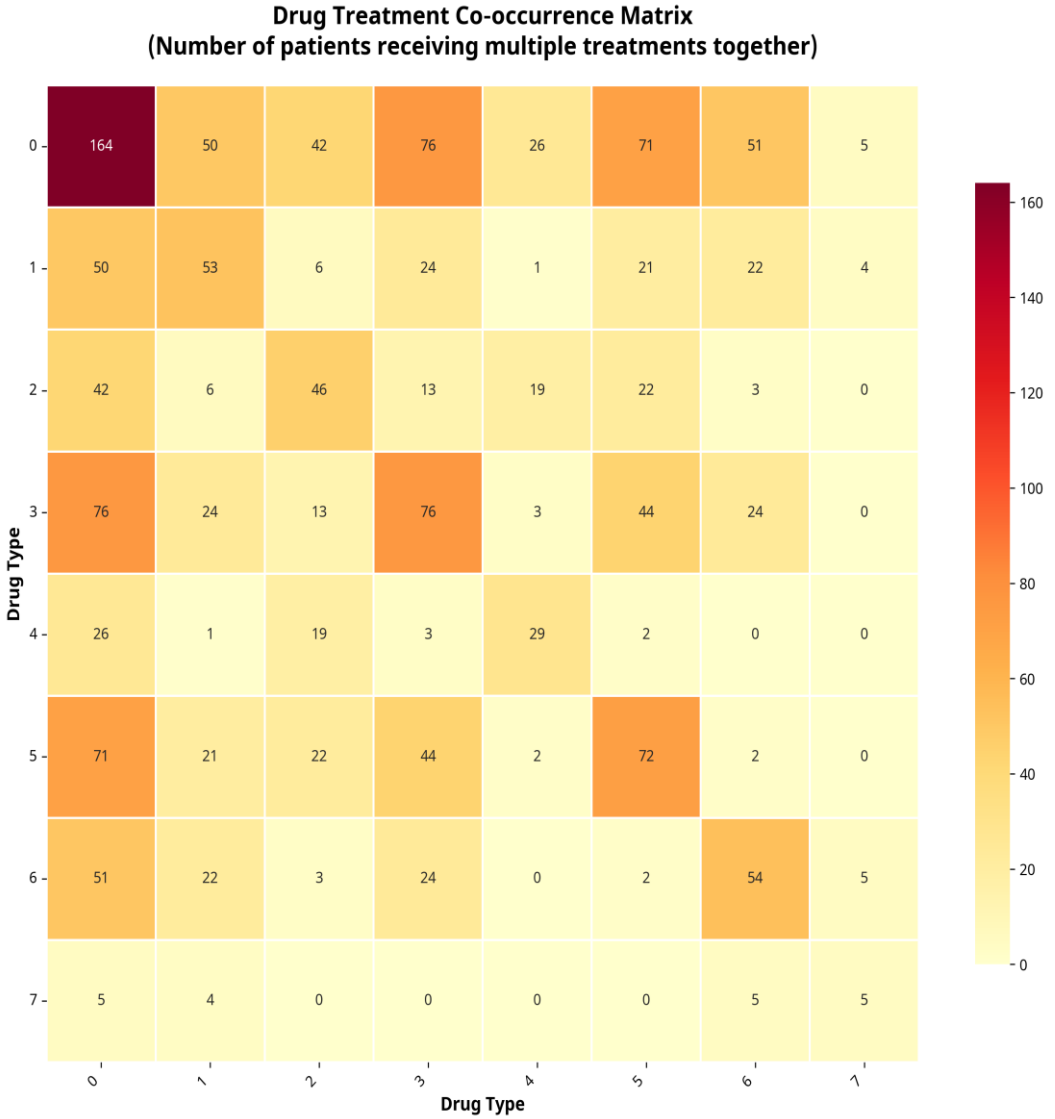

Figure 4.
Treatment co-occurrence matrix

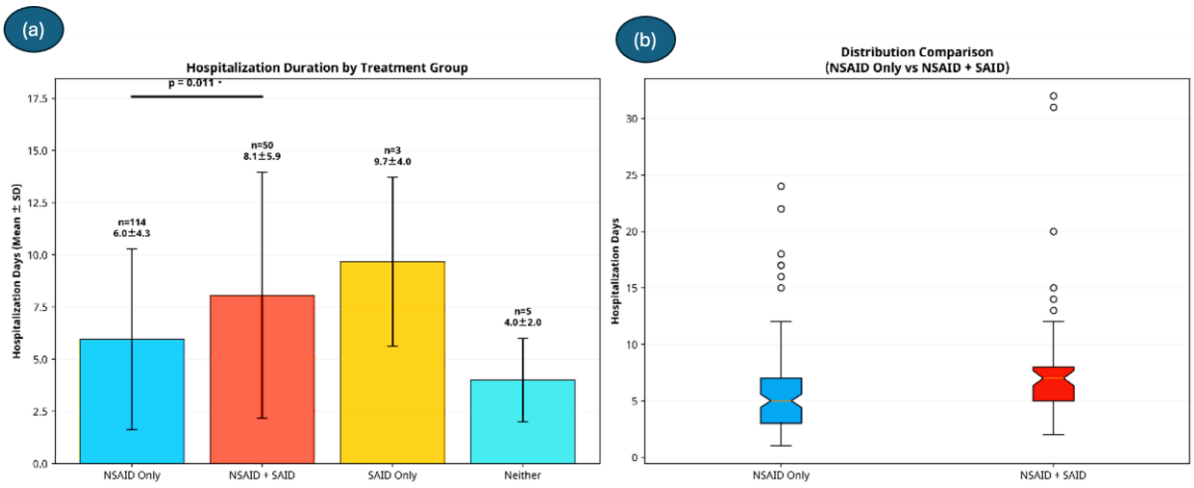

Figure 5.
(a) Comparative analysis of hospital stay duration and (b) distribution comparison according to anti-inflammatory regimen (NSAIDs *vs*. NSAIDs + SAIDs)
The plots were generated using Matplotlib 3.9.0

Our observations are consistent with the existing literature, suggesting that the intensity and duration of anti-inflammatory treatment are correlated with disease severity and clinical outcome. For example, a prospective observational study of patients with pleuropulmonary infections showed that prolonged use of NSAIDs before hospitalisation is associated with more extended hospital stays and more severe pleural complications, suggesting that the use of anti-inflammatory drugs may reflect or influence the severity of the infectious process [21]. Similarly, in our cohort, the combination of NSAIDs + SAIDs was used predominantly in patients with more complex clinical progression, and this group had a significantly longer hospital stay compared to those treated with NSAIDs alone. This parallel implies that combinations of anti-inflammatory regimens are likely to be used in practice for complex clinical contexts. However, in the absence of formal severity criteria, differences in length of stay should be interpreted descriptively and cannot establish a causal link.

The more frequent use of haemostatics in the group treated with NSAIDs alone can be interpreted as reflecting the clinical presentation of these patients, who were more often hospitalised for epistaxis or ENT procedures with haemorrhagic potential, without requiring systemic corticosteroid therapy. Despite traditional concerns about bleeding risk, NSAIDs should not be automatically excluded from the perioperative period, and bleeding risk should be assessed individually, depending on the patient and the type of intervention. Recent multidisciplinary assessments show that, although caution is necessary, routine avoidance of NSAIDs is not justified, as they remain essential components of multimodal analgesia, with an acceptable safety profile when used in a controlled manner. Thus, the need for haemostatics in the NSAID-only group appears to be determined predominantly by the nature of the pathology, not by an intrinsic adverse effect of anti-inflammatory treatment [38].

The similar frequency of proton pump inhibitor use in both groups suggests a mature therapeutic practice aligned with current guidelines, which recommend systematic gastroprotection in patients treated with NSAIDs or combined anti-inflammatory therapies. The literature confirms the importance of this approach: an extensive population-based study has shown that the efficacy of PPIs depends decisively on treatment adherence, with patients with < 20% adherence having an almost twofold higher risk of ulcer or gastro-intestinal bleeding compared with compliant patients. The uniform application of PPIs in the cohort indicates the frequent use of gastroprotective strategies during anti-inflammatory therapy. It is congruent with current guidance on risk of NSAID-induced gastrointestinal toxicity [17].

The absence of significant age differences between groups shows that demographic factors did not influence the choice between NSAIDs and SAIDs, but by disease severity. The literature confirms that the use of cortico-steroids is primarily guided by the severity of the inflammation and clinical risk, given their complex adverse-effect profile and the need for selective administration. In our setting, corticosteroids were used primarily in patients with the most pronounced inflammatory features, whereas NSAIDs were the recommended treatment category for uncomplicated acute diseases. Thus, the distribution in our study reflects personalised medical practice and alignment with current guidelines, in which the severity of manifestations, not the patient's age, determines the therapeutic strategy [13].

Overall, the analysis supports the existence of a controlled and rational therapeutic practice in which treatments are differentiated according to the severity of the clinical presentation and adjuvant therapies are coherently integrated to maximise the safety and effectiveness of care.

Analysis of therapeutic efficacy by diagnostic category

The analysis of therapeutic efficacy compared the average hospital stay duration between patients treated solely with NSAIDs and those receiving a combination of NSAIDs and SAIDs for the four most common diagnoses identified in the cohort (with at least two cases *per* group). For phlegmonous angina, the hospital stay was similar across groups, with 6.1 days for NSAID-only treatment and 6.5 days for the combined treatment. For acute respiratory failure, the hospitalisation period was typically longer in the administration of NSAIDs and systemic corticosteroids (11 days *versus* about 8.5 days with NSAIDs alone). This pattern was similar in acute epiglottitis, with mean overnight stays of 7.5 and 5.5 days, respectively. In acute sinusitis, however, the mean duration of admission was identical among the two populations, at approximately 6.5 days for NSAIDs alone and 5.5 days with the combined regimen. Differential analysis of hospitalisation time by diagnosis showed positive values (longer duration in the combination group) for three of the four diagnoses analysed, except for acute sinusitis, where the duration was shorter in the NSAID group.

When considering only diagnoses with at least 2 cases *per* treatment group, we observed that in approximately a quarter of these comparisons, hospital stay was shorter in patients receiving NSAIDs alone. In contrast, in the remaining 3 quarters, it was longer in patients treated with both NSAIDs and systemic corticosteroids. These patterns simply reflect how hospital stays varied within the available data and should not be interpreted as showing a treatment effect (Table III).

This detailed analysis (Figure 6) by diagnosis provides additional insight into how disease severity influences the selection of anti-inflammatory regimens. The graphs compare the average length of hospital stay between patients treated exclusively with NSAIDs and those

treated with the combination of NSAIDs + corticosteroids for the most common diagnoses in our cohort. The results are consistent with data from the ENT literature, in which corticosteroids are used selectively, primarily in cases characterised by severe inflammation or refractory disease progression. For example, in uncomplicated acute sinusitis, treatment is mainly symptomatic, and systemic corticosteroids are not recommended. In contrast, chronic forms, such as nasal polyposis or orbital and intracranial complications, call for far more aggressive therapeutic strategies, justifying the use of corticosteroids. This "intense inflammation-selective corticosteroid therapy" paradigm is also reflected in our study, in which more extended hospital stays in the NSAID + SAID group are attributed to initial case severity rather than to the direct effect of corticosteroids [4, 12].

Table III

Overall efficacy summary (diagnoses with ≥ 2 cases *per* group)

Diagnosis	NSAID Better	Combo Better	Total cases
Count	1	3	4
Percentage	25%	75%	100%

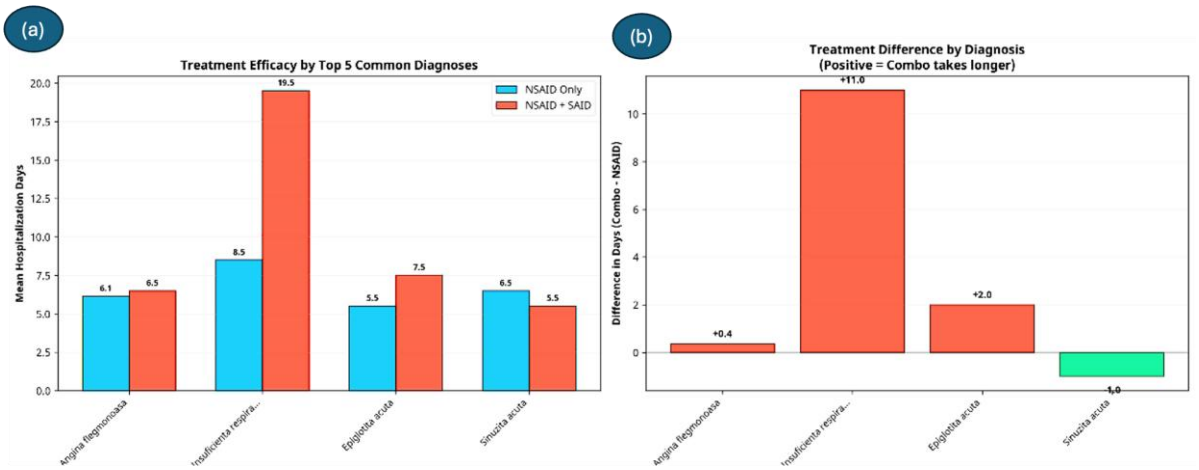

Figure 6.

(a) Comparative treatment efficacy and (b) treatment differences by hospitalisation outcomes (NSAID *vs.* NSAID + SAID) across common ENT diagnoses

The plots were generated using Matplotlib 3.9.0

Furthermore, the absence of significant age differences between groups indicates that therapeutic selection was not influenced by this factor, but rather by the severity of clinical manifestations. This trend is consistent with modern recommendations in otolaryngology, which consider NSAIDs first-line treatment for uncomplicated acute inflammation. In contrast, corticosteroids are used only in carefully selected situations when inflammation is intense or there is a risk of obstruction. Recent guidelines from the American Academy of Otolaryngology emphasise the same approach: NSAIDs offer an excellent efficacy and safety profile for most patients, and systemic corticosteroid therapy should be reserved for severe cases, integrated into a personalised therapeutic strategy, and proportional to the severity of the disease [8].

There are certain limitations to the retrospective approach used in this study. At admission, disease severity was not assessed using formal or standardised criteria, potentially limiting the accuracy of comparisons of treatment characteristics and length of hospital stay. Laboratory markers (CRP, ESR, fibrinogen and leukocyte count) were also utilised descriptively, rather than as indicators of severity. Adverse events typical of NSAIDs or systemic corticosteroids, such as gastrointestinal bleeding, renal impairment, hyperglycaemia, or immunosuppression, were not routinely documented in medical records and so could not be assessed. Length of hospital stay (LOS) is influenced by organisational and contextual factors (*e.g.*, weekend admissions, bed availability, discharge procedures, surgical scheduling and social considerations). It therefore cannot be used as a reliable surrogate for disease severity in this retrospective cohort.

Conclusions

We present the trends in treatment in the ENT practice cohort we have studied. NSAIDs and antibiotics were used the most in uncomplicated acute presentations, whereas systemic corticosteroids were used more frequently in cases deemed clinically more complicated. Patients treated with corticosteroids were hospitalised for longer durations; however, because the current study did not include a formal severity assessment, this difference should be interpreted descriptively and is not directly related to treatment efficacy or disease

severity. In fact, the results reflect a pragmatic therapeutic approach consistent with clinical practice. These findings should be balanced against the study's limitations: its retrospective design, the small number of cases for specific diagnoses, and its single-centre setting, indicating that prospective work may be required.

Conflict of interest

The authors declare no conflict of interest.

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