Prospective-Drug Utilization Evaluation Analysis in Ear, Nose, and Throat Outpatient Department: Incorporating Benchmarks and World Health Organization Indicators

Mugada et al. Post-Drug Utilization Evaluation, Benchmarking, WHO Indicators

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ABSTRACT

Background: A drug utilization study is a tool for determining the effectiveness of drug use. Our research aims to evaluate the drug usage patterns in Ear, Nose, and Throat (ENT) outpatient settings by incorporating established benchmarks and World Health Organization (WHO) indicators.

Methods: We conducted a drug utilization evaluation (DUE) study on 800 patients from the ENT outpatient department (OPD). Initially, we gathered data on the currently prescribed medications and, through careful analysis, identified discrepancies. To rectify any irrational prescribing patterns identified among physicians, we utilized continuing educational activities like 'Dear Doctor' letters and personal consultations. We applied the WHO's core indicators, specifically prescribing and patient care indicators, and established benchmarks to encourage rational prescribing.

Results: The three most common diagnoses identified were pharyngitis (51.49%), allergic rhinitis (25.11%), and Acute Suppurative Otitis Media (21.17%). Montelukast, in combination with levocetirizine (13.77%) and amoxicillin paired with clavulanic acid (8.81%), were the most frequently prescribed medications. The study revealed prescribing indicators such as an excessive number of drugs per prescription (4.2), low usage of generic names (33.0%), and suboptimal reliance on the Essential Drugs List (76.7%). Furthermore, patient care indicators demonstrated room for improvement, particularly concerning consultation times (6mins), dispensing times (30secs), and drug labelling practices (0% labelled). The DUE positively impacted WHO patient care indicators and the prescription of first-line drugs for various diseases, suggesting a shift toward adherence to recommended treatment guidelines.

Conclusion: The study results showed an overuse of prescribed drugs, a lack of utilization of generic names, and less than optimal use of the Essential Drugs List (EDL). Additionally, shortcomings in patient care were observed, including issues in consultation, drug dispensing times, and labelling. However, it was found that the DUE effectively improved WHO patient care metrics and the prescription of first-line drugs.

UNCORRECTED PROOF

INTRODUCTION

The purpose of Drug Utilization Evaluation (DUE) is to promote appropriate drug utilization through continuous, authorized, and systematic quality improvement processes, including reviewing prescriptions, providing feedback to clinicians, developing optimal drug use standards, and educating patients, with the goal of optimizing therapeutic benefits and reducing adverse effects.[1]

Doctor of Pharmacy (PharmD) students experiences offer the invaluable opportunity to observe and understand the complex aspects of healthcare within real-world settings. A noticeable lack of first-line drug prescriptions was observed during a visit to the Ear, Nose, and Throat (ENT) outpatient department (OPD). Intrigued by this, a review of the literature concerning DUE within ENT outpatient departments was conducted.[1-12]

Unexpectedly, a significant research gap was discovered. No studies included a post-DUE analysis, an essential part of the DUE process, within an ENT outpatient environment. The WHO's patient care indicators had yet to be employed. These indicators provide a comprehensive framework for assessing rational drug use, ensuring medication safety, monitoring the performance of health systems, and facilitating comparative analyses.

Given these shortcomings in the current literature, we decided to investigate DUE within the ENT OPD. Our research aims to contribute to a more thorough understanding of drug utilization in this setting by using WHO indicators and established benchmarks, thus promoting the rational use of drugs and enhancing the overall healthcare system performance.

METHOD

Study Setting and Duration

The study was conducted at the ENT outpatient department in a tertiary care hospital. The study took place for a duration of 6 months, from November 2022 to April 2023.

Study design

This study used a cross-sectional study to collect and analyse data from patients in the ENT outpatient department

Study participants

The inclusion criteria consisted of individuals under 65 years who were treated as outpatients in the ENT department. These criteria focused on a specific age group and outpatient setting relevant to the study objectives.

Conversely, certain exclusion criteria were applied to refine the participant pool. Subjects with severe ailments were excluded to minimize potential confounding factors that could impact the study outcomes. Additionally, pregnant or lactating patients were excluded due to the potential influence of these conditions on the results. Furthermore, individuals already undergoing medication for co-morbid diseases such as diabetes, hypertension, thyroid disease, and other similar conditions were also excluded. This decision aimed to isolate the effects of the specific ENT-related factors under investigation and reduce potential interactions with pre-existing medical treatments.

Sampling technique

A combination of convenience and purposive sampling methods was utilized to select participants in this study.

Sample size

The sample size was calculated using the Roasoft sample size calculator with a 5% margin of error and 95% confidence level. The recommended sample size is 377 for a population size of 20000 members. However, we obtained a sample size of 800 individuals who met the inclusion criteria.

Study Procedure

Data Collection: Demographic data, encompassing age, sex, weight, area of residence, occupation, and marital status, was collated from the patients. Additionally, their past medication history, current medication, history of the present illness, and diagnosis were compiled and subsequently tabulated for analysis.

Prescription Analysis: Utilizing the WHO's core indicators, we conducted a thorough prescription analysis to verify whether rational prescribing occurred. Concurrently, a meticulous examination of the prescribed drugs was maintained.

Evidence Review: We reviewed the scientific evidence supporting using first-line drugs for various ENT diseases. This was then juxtaposed with the drugs prescribed by the physicians at the study site.

Development and Distribution of 'Dear Doctor' Letters: We identified a discrepancy in the prevailing prescribing pattern as a consequence of this comparison.

Personal Consultations: Beyond the circulation of 'Dear Doctor' letters, we took the initiative to consult with the doctors, expounding on the contents delineated in the letters.

Establish a Benchmark and Follow-up: Aiming to foster an increase in the prescription rate of first-line drugs, we established a benchmark of 90% and conducted a one-month follow-up to monitor the progress.

Data Analysis

Descriptive statistics were calculated for quantitative data, and frequencies and percentages were calculated for qualitative data.

Ethical Approval

The study was approved by the Institutional Human Ethics Committee (VIPT/IEC/159/2022). The Institutional Review Board reviewed the study protocol. Both literate and illiterate patients were informed about the aim and objectives of the research work, and informed consent was obtained from them after they expressed their willingness to participate in the study. They were also assured that their information would be kept confidential.

Continuing Education Activities

Dear Doctor Letter

A "Dear Doctor" letter, or a "Dear Healthcare Professional" letter, is a written communication typically sent by a researcher, pharmaceutical company, medical device manufacturer, or

regulatory authority to healthcare professionals, including doctors, nurses, and pharmacists. The purpose of a Dear Doctor letter is to provide important information about a product or medication, such as new safety concerns, updated prescribing guidelines or recalls. These letters are typically used to inform healthcare professionals about significant changes or new findings regarding a particular drug or medical device. The letter aims to ensure that healthcare professionals know important updates and can take appropriate action to ensure patient safety.[13]

Personal Consultation with Doctors

Personal consultations are an essential method of effective healthcare communication, offering clarity and depth to treatment guidelines. They facilitate information exchange, aid in resolving doubts, and provide context-specific advice, which might not be fully conveyed through written communication. Such consultations address individual queries, present real-life cases, discuss potential obstacles, and provide specific guidance. They supplement written communication by reinforcing its content and offering continual support. In essence, personal consultations are integral to a comprehensive and personalized educational experience in healthcare, promoting understanding and support.

RESULTS

The data in table 1 highlights the most common diagnoses in the ENT OPD. Ear-related conditions primarily comprised of ASOM (21.17%), impacted ear wax (20.39%), and CSOM (17.25%). Nose-related diagnoses were dominated by allergic rhinitis (25.11%), upper respiratory tract infections (URTI, 17.94%), sinusitis (17.48%), and rhinosinusitis (16.14%). Throat conditions, on the other hand, were predominantly pharyngitis (51.49%), with tonsillitis (19.15%) and adenotonsillitis (18.30%) following suit.

The data in the table 2 reveals a clear predominance of certain pharmacological treatments over others in the ENT department. Specifically, Montelukast combined with Levocetirizine appears to be the most commonly prescribed drug, accounting for a substantial 13.77% of the prescriptions, indicating its central role in the therapeutic strategies employed. This is followed by the antimicrobial combination of Amoxicillin and Clavulanic Acid, representing 8.81% of the prescriptions. There is a marked presence of Levocetirizine, both in combination with other drugs and as a standalone treatment.

The average number of drugs per prescription was found to be 4.2%, which stands in contrast to the WHO reference value of less than 2%. Similarly, the percentage of drugs prescribed by generic name was 33.0%, notably lower than the WHO's ideal standard of 100%. In terms of encounters with an antibiotic prescribed, the percentage was recorded as 17.5%, which remains within the acceptable range set by the WHO of less than 30%. Interestingly, the percentage of encounters with an injection prescribed was discovered to be 0%, significantly lower than the WHO's benchmark of less than 20%. Moreover, the percent of drugs prescribed from the EDL was found to be 76.7%, a value that is less than the WHO reference value of 100%.

The investigation of WHO patient care indicators, as outlined in Table 4, provided some significant findings. The average consultation time observed was six minutes, which is considerably shorter than the WHO reference value of 30 minutes or more. Furthermore, the average dispensing time was recorded at 30 seconds, which is significantly below the WHO suggested minimum of 60 seconds. In terms of medication-related indicators, the percentage of drugs actually dispensed was 95.6%, slightly below the WHO standard of 100%. Of considerable note is the fact that the study found none of the drugs were adequately labelled, in stark contrast to the WHO reference value of 100%.

Table 5 illustrates the influence of DUE on first-line drug prescriptions for various ENT diseases, assessed one month after the DUE. An appreciable surge is observed across all five

diseases following the DUE. The percentage of first-line drug prescriptions for Sinusitis escalated from 53.4% to 81.9%. Similarly, the rates of first-line drugs used for Pharyngitis increased from 43.8% to 82.7%. For patients diagnosed with ASOM, there was a rise in the percentage of first-line drug prescriptions from 55.6% to 80.6%. For Otitis externa, an increase from 45.0% to 84.2% was noticed, indicating a substantial shift towards the use of first-line drugs post DUE. Likewise, the percentage of first-line drugs prescribed for CSOM jumped from 47.8% to 87.4%.

The table 6 presents a comparative evaluation of WHO core indicators pre and post Drug Use Evaluation (DUE) implementation. It shows an increase in both the percentage of drugs prescribed generically (33.0% to 45.3%) and those from the Essential Drugs List (76.6% to 82.1%). Additionally, the average consultation time improved slightly from 6 to 7 minutes post-DUE.

DISCUSSION

Our comprehensive study evaluated the prevalence of ENT diseases, identifying ASOM, allergic rhinitis, and pharyngitis as the most common, while otitis externa, epistaxis, and tonsillopharyngitis were least frequent. Predominantly, a combination of Montelukast and Levocetirizine was prescribed, with Amoxicillin-Clavulanic Acid as the most commonly used antimicrobial agent. However, the study identified concerns in prescription practices, including a high mean number of medicines per prescription, limited use of generic names, and subpar reliance on the EDL. Additionally, it indicated potential areas of improvement in patient care, particularly in terms of consultation and dispensing times, and drug labelling practices. This research underscores the need for enhancing these practices to optimize patient care and safety in the treatment of ENT diseases.

Our study on ENT diseases aligns with and deviates slightly from previous research, highlighting the influence of regional environmental factors. ASOM was the most prevalent condition, while otitis externa was the least common, consistent with Anandhasayanam et al.[5] Allergic rhinitis was the dominant nasal disorder, and epistaxis was the least frequent, supporting Dhanasekharan et al.[14] and suggesting region-specific allergens. Pharyngitis was the most frequent throat disease, in line with Phukan & Das[15], while tonsillopharyngitis had the lowest prevalence, contrasting Anandhasayanam et al.[5] These findings emphasize the need for tailored health strategies and further environmental research to inform future public health interventions.

Our study on prescription patterns reveals a high prevalence of the Montelukast and Levocetirizine combination, which contrasts with several other studies. Chandra et al.[16] demonstrated that antimicrobials were the most prescribed drugs, which is a significant difference from our findings. Suman et al.,[6] on the other hand, reported Levocetirizine as the most commonly prescribed single drug, and our study also observed a high prescription rate for it, typically in combination with Montelukast. These findings suggest a regional preference for combination therapy. Lastly, Vijay and Atray[1] found that NSAIDs were the most frequently prescribed drug group. These disparities could be attributed to differences in prevalent conditions or prescribing habits among the respective study populations.

Our research identified Amoxicillin-Clavulanic Acid as the most frequently prescribed antimicrobial agent, comprising 8.81% of the total drug prescriptions. This outcome aligns well with the discoveries reported by Naqvi et al.[17] and Padwal et al.,[7] reinforcing the reliability of our findings. However, there was a contrasting finding in the study conducted by Srinivasa et al.,[18] where Cefpodoxime and Clavulanic Acid was the most frequently prescribed antibiotic. This difference may suggest variability in prescription patterns, influenced by a numerous factor such as patient needs, physician preferences, the availability of antibiotics, or the local microbial resistance patterns.

The research conducted by Olzowy et al[19] highlights the prevalence of specific pathogens in infections of the ENT. When analysing bacterial samples from patients with ENT infections, the predominant organisms identified were Streptococcus species, including Streptococcus pneumoniae, along with Staphylococcus species and Haemophilus influenzae. Importantly, Akhavan et al[20] emphasize that these microorganisms generally exhibit susceptibility to Amoxicillin, which further supports our prescribing practices. As a result, Amoxicillin is widely recognized as the primary treatment option for most ENT infections requiring antibiotic therapy, as corroborated by Cohen et al. [21] Consequently, our study contributes valuable insights to the existing literature on the effective management of ENT infections. Using WHO core indicators, our study evaluated rational use of drugs, and found that a total of 3,405 drugs were prescribed, yielding an average of 4.2 drugs per prescription. This count contrasts with higher values reported by Geetah et al.[22] and Gupta et al.[23] but exceeds WHO's reference of less than 2 drugs. Our average reflects a practical approach to drug therapy, limiting polypharmacy (defined as more than five drugs)[24], potentially reducing healthcare costs, improving patient compliance, and mitigating adverse events. Chandra et al [16] emphasised increased drug interaction risks with the number of prescribed drugs, indicating the importance of reducing prescriptions to improve patient outcomes and healthcare efficiency. [25]

Our research revealed that merely 33% of medications were issued under their generic names, while the vast majority utilized brand names, surpassing the findings of Kumari et al.[2] Shifting to generic drug prescriptions can significantly mitigate therapy costs and circumvent medication errors. Consequently, it becomes vital for medical practitioners to emphasize prescribing medications by their generic names. They should ensure clear, readable handwriting or utilize electronic prescribing mechanisms to maintain top-notch safety and quality in medication administration.[26] Padwal et al.[7] conducted a comparable study that likewise demonstrated a predominant preference for brand names in drug prescriptions over generic equivalents.

Our study reported a lower antibiotic usage (17.5%) compared to prior research.[5,6] This may be attributed to the predominance of self-limiting viral infections, with antibiotics reserved for severe cases.[21] Notably, there was a 0% utilization of injections, far below WHO's reference (<20%), corroborating findings by Joshi et al.[3] and Suman et al.[6] This lack may be due to our OPD patient focus or increased physician awareness about adverse effects from overuse of injections.

Our study found 76.7% of prescriptions used an EDL, surpassing prior studies like Chandra et al.,[16] Geetha et al.,[22] and Chandra et al.[27] This highlights the growing acceptance of essential medicines, known for promoting health equity and cost-effectiveness.[28] Despite this positive trend, further optimization in EDL utilization is necessary. Our study also employed a set of patient care indicators defined by the WHO, which helped us understand different aspects of healthcare services. Previous studies focusing on drug utilization in the OPD for ENT had not used these measures before. Using these WHO measures in a new way, we were able to study the healthcare system uniquely, giving us new insights into how drugs are used in this specialized area.

Our investigation reported a brief six-minute average consultation time, significantly lower than the WHO-recommended 30 minutes, likely due to high patient-to-doctor ratios and multiple responsibilities in an OPD setting, especially in teaching hospitals. While a half-hour consultation might be impractical, there is scope for a moderate increase in consultation duration.

In our research, we recorded an average dispensing time of merely 30 seconds, which is significantly less than the WHO's recommended minimum duration of 60 seconds. This marked deviation might indicate the existence of time constraints in the medication

dispensing process, potentially increasing the risk of errors or contributing to an inadequate patient comprehension about their medication regimen and management.

Our research revealed that an encouraging 95.6% of prescribed medications were successfully dispensed to patients. Although this percentage is slightly less than the WHO's perfect benchmark of 100%, it nevertheless signifies a praiseworthy achievement in the efficient dispensing of medication. Such an accomplishment sets a strong platform for future endeavours to align fully with the WHO's ideal standard, promoting enhanced patient satisfaction and enriched health outcomes in our healthcare system.

Our research identified a stark deficiency in drug labelling, with an alarming 0% compliance with WHO guidelines, which mandate inclusion of dosage regimen, patient's name, and drug dosage.[29] This absence of critical information poses substantial risks to patients, possibly causing usage or dosage mistakes, thereby impacting safety and treatment outcomes. These findings emphasize the essential need for substantial improvements in consultation, dispensing, and labelling processes.

Post DUE analysis

Our research, a unique post Drug Utilization Evaluation (DUE) conducted in the ENT Outpatient Department, revealed over half of prescribed drugs deviated from the first-line choice for specific ENT conditions. This suggests a significant opportunity for improvement since studies affirm better patient outcomes with adherence to first-line prescriptions. Emphasizing such optimal prescribing practices is crucial for enhanced patient care.[30-34] Amoxicillin has been identified as the primary medication for conditions such as sinusitis, pharyngitis, and ASOM. The American Academy of Otolaryngology's updated 2015 guidelines for Adult Sinusitis recommend amoxicillin, with or without clavulanate, as the first-line therapy for most adults for a period of 5 to 10 days.[30] Similarly, for pharyngitis, particularly for cases caused by group A streptococcus, penicillin or amoxicillin is the treatment of choice.[35] For acute otitis media, a common middle ear infection, amoxicillin continues to be the drug of choice, as affirmed by Le Saux et al.[34] These recommendations highlight the versatility and efficacy of amoxicillin in managing a range of ENT conditions. Table 7 compares the therapeutic efficacy of Amoxicillin with other antibiotics (Cefaclor, Cefixime, Clarithromycin, and Cephradine) for treating ENT diseases. Overall, multiple studies indicate that Amoxicillin is either comparable or slightly more effective. It performs well in treating Streptococcus pneumonia-induced Otitis media and shows slightly better bacteriological response in Sinusitis compared to Clarithromycin.

The information provided above, clearly shows that Amoxicillin is the preferred medication for specific ENT diseases. Therefore, increasing the prescription rate of Amoxicillin could potentially enhance patient treatment outcomes.

In the case of Otitis externa, current treatment guidelines underscore the use of topical antibiotics as the preferred choice.[41] These guidelines also advocate for combining the use of topical antibiotics with steroids and pain medications as the first line of treatment. Notably, the application of oral antibiotics has been found to lack substantial evidence of benefit. Indeed, their misuse may heighten the resistance among common Otitis externa pathogens, leading to more complicated treatment scenarios in the future.[31] Therefore, prudently following these treatment guidelines can help prevent unnecessary complications and foster better patient outcomes.

Topical quinolones have emerged as powerful and effective treatment for the persistent ear condition known as CSOM. Quinolones applied topically have been recognized as the preferred treatment for this persistent condition, as noted by Rosario & Mendez.[32] These quinolones demonstrate a high degree of effectiveness, seen through their ability to not only stop otorrhoea, a symptom of the disease characterized by discharge from the ear but also

eradicate the underlying microbes causing the infection.[33] Hence, it is clear that the prescription of topical quinolones can bring significant benefits in the treatment of CSOM. In addressing irrational prescription practices and promoting evidence-based, first-line medication use, "Dear Doctor" letters were distributed to pertinent physicians in ENT OPD. These letters, designed to optimize prescription practices, underscore two pivotal points: encouraging the use of first-line medications supported by scientific evidence and reducing irrational prescribing. Further, these letters aim to extend average consultation times, increase the proportion of drugs prescribed by generic names, and boost prescriptions from the EDL. Acknowledging physicians' demanding schedules and the potential oversight of such critical correspondence, personal consultations were incorporated into our communication strategy. This proactive approach allows physicians to absorb the information, ask questions, and provide feedback, thus enhancing understanding, fostering collaboration, and strengthening our communication system.

Impact of continuing educational activities

Post-implementation of continuing education programs, a one-month evaluation revealed a significant shift in prescribing habits, with an increase to around 80% in first-line prescribing, nearing our 90% target. Furthermore, there was a positive trend in WHO core indicators, crucial benchmarks in prescription medicine, implying enhanced adherence to suggested practices. Our findings indicate that continuing education has been pivotal in improving medical practices, promoting more informed, rational decision-making, and optimizing patient treatment strategies. The success of this initiative offers valuable insights for future interventions and suggests considerable potential benefits for the broader healthcare community.

Strengths and limitations

Our research article stands out for its academic contributions and novel approach to existing gaps in the field. The study is remarkable for its large sample size collected within six months, demonstrating efficient data collection. A significant feature of our research is the comprehensive evaluation of WHO patient care indicators, an element typically absent in similar studies. Furthermore, our unique approach includes a one-month post-DUE analysis, offering a deeper understanding of drug prescription patterns post-DUE, thereby presenting a dynamic perspective unexplored in prior works.

Despite providing valuable insights, our study has limitations that should be considered. Firstly, convenience and purposive sampling techniques may have introduced selection bias, limiting generalizability. Secondly, the short one-month follow-up period may not capture long-term effects. Thirdly, the focus on outpatient prescriptions may not reflect inpatient practices. Lastly, the single-centre design restricts generalizability to other settings. These limitations caution the interpretation of our findings in different healthcare contexts.

The study has significant implications for patient care and hospital operations. It provides a deep understanding of drug utilization in the ENT OPD, enabling evidence-based prescribing and optimizing patient outcomes. It promotes cost-effectiveness by identifying underused, overused, or misused drugs, leading to resource savings. It enhances patient safety by detecting potential drug interactions and over-prescription. Moreover, it improves prescription practices by highlighting prevailing trends, facilitating updates in guidelines and physician training.

Recommendations and Further Research

Healthcare professionals should receive training interventions to improve their prescription practices by using generic drug names and utilizing the Essential Drug List (EDL). Consultation and dispensing times should be addressed for comprehensive patient care. Patient education on prescribed drugs, potential side effects, and correct usage can be integrated into dispensing processes for safety and efficacy. Adequate labelling before drug

dispensation is crucial for better patient compliance. Post-Drug Utilization Evaluation (DUE) has shown a positive impact on prescribing first-line drugs. Further studies are needed to explore the long-term benefits and cost-effectiveness of DUE in managing ENT conditions.

CONCLUSION

The study investigated ENT diagnoses distribution, prescription patterns, and adherence to WHO standards. The most common diagnoses were pharyngitis, allergic rhinitis, and ASOM, with Montelukast + levocetirizine and Amoxicillin + clavulanic acid being the predominant prescribed drugs. The analysis showed a higher than ideal number of drugs per prescription, low use of generic names, and suboptimal use of the EDL. Patient care indicators revealed the need to improve consultation and dispensing times, along with better labelling of dispensed drugs. Despite high drug dispensation rates, these aspects demand attention for improved patient care. Lastly, DUE positively influenced WHO core indicator values and the prescribing of first-line drugs for various diseases, indicating a shift towards recommended treatment guidelines.

Data Sharing: In response to preferable requests, the data are available from the corresponding author.

Author contributions: Vinodkumar Mugada: Conceptualization, Methodology, Project Administration, Visualization, Supervision, Writing-Original Draft, Writing-Reviewing and Editing, Blessy Jayamon: Investigation, Resources, Data Curation, Visualization, Writing-Original Draft, Writing-Reviewing and Editing, Bindu Krishna Kosireddy: Investigation, Resources, Data Curation, Visualization, Writing-Original Draft, Writing-Reviewing and Editing, Bhagya Sri Palisetty: Investigation, Resources, Data Curation, Visualization, Writing-Original Draft, Writing-Reviewing and Editing, Apoorva Pinisetti: Investigation, Resources, Data Curation, Visualization, Writing-Original Draft, Writing-Reviewing and Editing.

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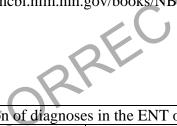
Table 1. Distribution of diagnoses in the ENT outpatient department		
ENT	**Diagnoses**	**N (%)**
Ear related disease	ASOM [a]	54(21.17)
	Impacted ear wax	52(20.39)
	CSOM [b]	44(17.25)
	Otomycosis	29(11.37)
	Otitis externa	20(7.84)
	Others	56(21.9)
Nose related disease	Allergic rhinitis	56(25.11)
	URTI [c]	40(17.94)
	Sinusitis	39(17.48)
	Rhinosinusitis	36(16.14)
	Post-OP FESS [d]	26(11.66)

	Epistaxis	9(4.04)
	Others	17(7.62)
Throat related disease	Pharyngitis	121(51.49)
	Tonsillitis	45(19.15)
	Adenotonsillitis	43(18.30)
	Tonsillopharyngitis	10(4.26)
	Others	16(6.80)
[a]ASOM- Acute Suppurative Otitis Media; [b]CSOM- Chronic Suppurative Otitis Media; [c]URTI- Upper Respiratory Tract Infection.; [d]FESS- Functional Endoscopic Sinus Surgery.		

Table 2. Most commonly prescribed ENT-related drugs during the study		
Commonly prescribed drugs	**Frequency**	**%**
Tab. Montelukast + levocetirizine	469	13.77
Tab. Amoxicillin + clavulanic acid	300	8.81
Tab. Levocetirizine	117	3.44
Sodium chloride nasal drops	96	2.82
Azelastine + Fluticasone nasal spray	91	2.67
Tab. Ambroxol + Levocetirizine + Montelukast	72	2.12
Xylometazoline nasal drops	70	2.06
Tab. Ciprofloxacin	61	1.79
Paradichlorobenzene + Chlorbutol + Turpentine Oil + Lidocaine ear drops	53	1.56
Syp. Levodropropizine + Chlorpheniramine maleate	53	1.56
Others Tab. Pantoprazole	500	14.68
Tab. Acetaminophen	350	10.28
Tab. Thiamine, riboflavin, niacin, pyridoxine, pyridoxal, biotin, pantothenic acid, folic acid, and vitamin B12.	219	6.43

Table 3. WHO prescribing indicators		
Indicator	**Percentage of prescription**	**WHO reference value**
Average number of drugs per prescription	4.2%	< 2%
Percentage of drugs prescribed by generic name	33.0%	100%
Percentage of encounters with an antibiotic prescribed	17.5%	< 30%
Percentage of encounters with an injection prescribed	0%	< 20%
Percent of drugs prescribed from EDL[*]	76.7%	100%
[*]EDL- Essential Drugs List.		

Table 4. WHO patient care indicators		
Indicator	**Frequency/ percentage**	**WHO reference value**
Average consultation time (in mins)	6mins	≥ 30mins

Average dispensing time (in secs)	30sec	≥ 60secs
Percentage of drugs actually dispensed	95.6%	100%
Percentage of drugs adequately labelled	0%	100%

Table 5. Impact of Drug Utilization Evaluation on First-Line Drug Prescription for ENT Diseases		
Disease	**Baseline percentage of Prescribed drugs**	**[a] DUE impact on prescribed drugs after 1 month**
	Percentage of first line drug	**Percentage of first line drug**
Sinusitis	53.4	81.9
Pharyngitis	43.8	82.7
ASOM [b]	55.6	80.6
Otitis externa	45.0	84.2
CSOM [c]	47.8	87.4
[a] DUE- Drug Utilization Evaluation. [b] ASOM- Acute Suppurative Otitis Media. [c] CSOM- Chronic Suppurative Otitis Media.		

Table 6. Impact of DUE on WHO Core Prescribing and Patient Care Indicators		
WHO core indicators	**Base line values**	**Post DUE values**
Prescribing indicators **1.** Percentage of drugs prescribed by generic name.	33.0%	45.3%
2. Percent of drugs prescribed from EDL	76.6%	82.1%
Patient care indicator 1. Average consultation time (in mins)	6mins	7mins

Table 7. Comparative Efficacy of Amoxicillin and Other Antibiotics in Treating Certain Diseases		
Antibiotics	**Disease**	**Description**
Cefaclor	Sinusitis	Amoxicillin was compared with cefaclor, clinical cure was similar with either antibiotic, 81% with Amoxicillin and 78% with Cefaclor.[36]

	Respiratory tract infection	Amoxicillin and Cefaclor were compared for outpatient therapy, and the clinical response, defined as improvement or cure of infection, was observed in 62.5% of Cefaclor patients and 66% of amoxicillin patients.[37]
Cefixime	Otitis media	Amoxicillin was more effective at treating otitis media caused by Streptococcus pneumonia. A meta-analysis of the data from 4 studies comparing amoxicillin to Cefixime in the treatment of otitis media demonstrates the superiority of amoxicillin in these cases.[38]
Clarithromycin	Sinusitis	Bacteriological response, as defined by eradication of the original pathogen, was 89% for Clarithromycin and 93% for Amoxicillin.[39]
Cephradine	Otitis media	Response of Cephradine and Amoxicillin were compared. Cephradine showed 90%, whereas Amoxicillin showed 94% response.[40]