

# Multicentre insights into OPAT: A comprehensive analysis of Türkiye's unstructured system

**Elif AGÜLOĞLU BALI**

[elifaguloglubali@gmail.com](mailto:elifaguloglubali@gmail.com)

Directorate General of Public Health In Turkey Infectious Diseases And Early Warning Department

**Belgin Coskun**

Ankara Bilkent City Hospital

**Halime Araz**

Ankara Bilkent City Hospital

**Yakup Gezer**

Konya City Hospital

**Arzu Tarakçı**

Konya City Hospital

**Feyza Nur Akçin Balan**

Ankara University

**Lütfiye Nilsun Altunal**

University of Health Sciences, Ümraniye Training and Research Hospital

**Barış Manavlı**

Afyonkarahisar University of Health Sciences University Hospital

**Petek Konya**

Afyonkarahisar University of Health Sciences University Hospital

**Cihan Semet**

Bandırma Onyedil Eylül University, Faculty of Medicine

**Sevda Özdemir Al**

Turhal State Hospital

**Elif Yılmaz İlmin**

Dicle University Faculty of Medicine

**Çiğdem Mermutluoğlu**

Dicle University Faculty of Medicine

**Ayşe Şenbaba Kara**

Zile State Hospital

**Melike Nur Özçelik**

Namık Kemal University of Medicine

**Neşe Saltoğlu**

Istanbul University Cerrahpaşa

**Gözde Dalgan**

Istanbul University Cerrahpaşa

**Uğur Önal**

Bursa Uludağ University

**Ahmet Doğan**

Bolu Abant İzzet Baysal University

**Meryem Sena Toker**

Süleyman Demirel University

**Mehmet Çelik**

Harran University

**Duygu Çerçioğlu-Özdemir**

Kayseri City Hospital

**Sibel Karabulut**

Bucak State Hospital

**Süleyman Koç**

Rize State Hospital

**Yasemin Çakır Kıymaz**

Sivas Cumhuriyet University

**Özge Eren Korkmaz**

Dokuz Eylül University

**Hacer Demirköse**

Directorate General of Public Health In Turkey Infectious Diseases And Early Warning Department

**Büşra Tanır**

Fethi Sekin City Hospital

**Eda Alp**

Basaksehir Cam and Sakura City Hospital

---

## Research Article

**Keywords:** Outpatient parenteral antimicrobial therapy (OPAT), healthcare-associated infections, antimicrobial stewardship, patient safety, treatment adherence

**Posted Date:** July 9th, 2026

**DOI:** <https://doi.org/10.21203/rs.3.rs-9888335/v1>

**License:**  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

**Additional Declarations:** No competing interests reported.

---

**Version of Record:** A version of this preprint was published at BMC Infectious Diseases on August 25th, 2026. See the published version at <https://doi.org/10.1186/s12879-026-14269-4>.

# Abstract

## Background/Objective:

Outpatient parenteral antimicrobial therapy (OPAT) is a well-established, cost-effective treatment modality delivered through structured, multidisciplinary programs worldwide. In Türkiye, no standardized OPAT framework exists; patients continue therapy through emergency departments, primary care facilities, or privately funded nursing services. This is the first multicentre study to evaluate clinical outcomes, treatment adherence, and patient satisfaction with OPAT in Türkiye.

## Methods

This prospective multicentre study enrolled adult patients receiving OPAT for chronic osteomyelitis, spondylodiscitis, prosthetic joint infection, or urinary tract infection across 20 hospitals in Türkiye between March and September 2024.

## Results

A total of 265 patients were included (53.2% male; mean age  $61.4 \pm 13.5$  years). Gram-positive pathogens predominated (76%); the most frequently used antibiotics were teicoplanin (70.5%), ceftriaxone (16.6%), and aminoglycosides (6.8%). The clinical success rate was 94.3%. ADEs led to treatment discontinuation in only 3 patients (1.1%). OPAT initiated at university hospitals was significantly more likely to be continued via emergency departments than at state hospitals ( $p = 0.010$ ). Treatment-related adverse events occurred significantly more frequently outside dedicated OPAT units (18% vs. 3.1%;  $p = 0.03$ ). Patient satisfaction was high overall; however, urinary tract infection patients reported significantly greater satisfaction than those with bone and joint infections across multiple domains.

## Conclusion

The absence of a structured OPAT system in Türkiye increases emergency department burden and elevates complication risk. Despite this, high clinical success rates and patient satisfaction confirm OPAT's potential as a viable alternative to inpatient care. A standardized, multidisciplinary OPAT framework is imperative to improve patient safety and optimize healthcare resource utilization.

## BACKGROUND

Outpatient parenteral antibiotic therapy (OPAT) is a treatment in which antimicrobials are administered intravenously (IV) on an outpatient basis as an alternative to hospitalization for specific indications and patient groups. OPAT is a treatment option that is widely accepted and considered to be safe. It is

selected for patients with infections requiring long-term intravenous antibiotic therapy. It is evident that there is a substantial body of evidence supporting the clinical efficacy and cost-effectiveness of OPAT, given its utilisation in developed countries for a period exceeding four decades [1–4]. The implementation of OPAT within a structured programme has been demonstrated to engender a number of potential benefits, including a reduction in hospitalisation times, a decrease in the number of occupied beds, a decline in out-of-pocket expenses for patients, an enhancement in patient satisfaction, and a decrease in hospital-acquired infections [5, 6, 7]. In a significant number of cases of infections requiring parenteral antibiotic therapy, even if clinical stability is achieved, patients often remain in hospital solely for the continuation of intravenous or intramuscular antibiotic therapy. This is due to the lack of an appropriate sequential oral treatment option or insufficient oral bioavailability. The aforementioned issue has been shown to exert a significant strain on hospital bed capacity, resulting in an increase in workload and a disruption to patients' ability to continue their daily lives. This is particularly evident in cases requiring long-term treatment, such as chronic osteomyelitis, spondylodiscitis, and prosthetic joint infections.

In Türkiye, no national standardised OPAT framework exists. Patients continue treatment through emergency departments, family medicine clinics, or privately funded nursing services, resulting in fragmented care and limited outcome data.

This multicentre study evaluates clinical characteristics, implementation practices, and patient-reported outcomes of OPAT across centres from different regions of Türkiye, aiming to provide evidence to support the development of a standardised national OPAT framework.

## **MATERIAL and METHODS**

### **The design, setting and participants of the study**

This prospective multicentre study enrolled adult patients at 20 voluntarily participating hospitals across six regions of Türkiye (nine university, seven secondary-care, four tertiary-care hospitals) between 1 March and 1 August 2024, with follow-up completed by 1 October 2024. Patients with chronic osteomyelitis, spondylodiscitis, prosthetic joint infection, or urinary tract infection who initiated OPAT were monitored throughout treatment and for 30 days thereafter; primary outcomes included adverse effects, rehospitalisation, surgical debridement, and treatment non-response. Eligible patients were aged  $\geq 18$  years, clinically stable (afebrile  $\geq 48$  hours, normal vital signs and blood glucose, no need for close monitoring or concurrent surgical intervention), with confirmed susceptibility to the prescribed antibiotic, and receiving agents permissible under the national Health Services Regulation (e.g. teicoplanin, ceftriaxone, aminoglycosides, piperacillin-tazobactam). Patients under 18 years, those receiving a single parenteral dose, or those treated outside guideline-specified antibiotics were excluded. All participants provided written or verbal informed consent.

## Data collection and analysis

Clinical data (physical examination, medical history, laboratory tests, culture results, imaging) were extracted from hospital automation systems by research assistants.

In addition to data obtained from clinical records, patients' treatment adherence during the OPAT process, the manner in which OPAT was administered, and conditions of access to treatment were assessed using a structured 10-question patient questionnaire developed for this study (an English-language version is provided as Supplementary File 1). The questionnaire comprised items relating to the occurrence of any issues during treatment and the nature of these issues, the reasons for opting for outpatient treatment, adherence to dosage and timing, reasons for non-adherence, the status of payment for treatment access and the method of payment, as well as dressing requirements and the individual responsible for providing the dressings. The response formats were recorded as binary (yes/no), ordinal categorical, or multiple-choice options, depending on the question type. In questions allowing multiple responses, each option was coded as a separate variable. The assessment of treatment adherence was not confined exclusively to patient self-reports; it was interpreted in conjunction with inferential indicators derived from treatment flow and administration records entered into the database by physicians/research assistants at the centres (e.g. planned treatment duration, administration setting, records of interruptions or delays in dose administration). In instances where substantial discrepancies were identified between patient-reported data and data derived from medical records, data verification was conducted by contacting the relevant centre.

Patient satisfaction was measured using a 10-item, 5-point Likert-scale survey (1 = strongly disagree; 5 = strongly agree), adapted from previously published OPAT patient-satisfaction instruments [8, 9] and the Patient Satisfaction Questionnaire-3 (PSQ-3) [10], covering follow-up, examination, laboratory monitoring, daily activity continuity, and overall satisfaction, completed in person at treatment conclusion (an English-language version is provided as Supplementary File 2).

The data collection form, prepared by the principal investigator, the treatment adherence and implementation conditions questionnaire, the patient satisfaction questionnaire and the database file (Microsoft Office Excel®) were shared via email with the research assistants at the centres wishing to participate in the study. The principal investigator was responsible for consolidating all data from the relevant centres and ensuring its consistency prior to analysis. Discrepancies or conflicts in the data were addressed through consultation with the respective centre's researcher, with corrections being applied wherever feasible. The patient data were processed in an anonymized manner.

All clinical outcomes were evaluated during OPAT and within 30 days following its completion. Clinical response was defined as marked improvement or resolution of symptoms with no need for additional systemic antibacterial therapy; sustained response required the absence of clinical worsening, antibiotic escalation, or new antibacterial therapy during 30-day follow-up. Adverse drug events (ADEs) were defined per ICH E2A criteria [11]. Rehospitalisation was defined as unplanned emergency admission during or within 30 days after OPAT; elective admissions were excluded.

## Statistical analysis:

Continuous variables were presented as mean  $\pm$  standard deviation or median (interquartile range), based on their distribution characteristics; categorical variables were presented as counts and percentages. Responses to the treatment adherence and implementation conditions questionnaire were analysed as categorical or ordinal categorical variables; for items allowing multiple responses, each option was coded as a separate binary variable, and counts and percentages were calculated for each option. Satisfaction survey items were treated as 5-point Likert-type (ordinal) scales, and response distributions for each item were reported as counts and percentages; in analyses deemed necessary, “positive responses” were presented by combining the “agree” and “strongly agree” options. In comparisons based on center types and/or the settings where OPAT was implemented; for the analysis of continuous variables, the Student’s t-test was used for independent groups when parametric conditions were met, and the Mann–Whitney U test when they were not; for categorical variables, the chi-square test or Fisher’s exact test was used; and logistic regression analysis was employed to identify independent parameters. Risk was presented as the estimated relative risk (“odds ratio”, OR). In all statistical tests, a p-value < 0.05 was considered statistically significant.

## RESULTS

### Demographic and clinical characteristics

A total of 265 patients were included (53.2% male; mean age  $61.4 \pm 13.5$  years; median 63, range 22–94). Comorbidities were present in 75.8%; the most common were diabetes (27.1%), hypertension (24.1%), and coronary artery disease (12.0%) (Table 1).

### Presenting Infections:

OPAT indications were chronic osteomyelitis (39.6%), prosthetic joint infection (25.7%), urinary tract infection (25.7%), and spondylodiscitis (9.1%) (Table 1).

### Microbiological findings

Culture specimens were obtained from 211 patients; growth was detected in 128. Gram-positive organisms predominated, and 55% of culture-positive isolates were ESBL-producing or methicillin-resistant (Fig. 1).

### Antibiotics, route of administration, and administration setting

The most frequently used antibiotics were teicoplanin (70.5%), ceftriaxone (16.6%), and aminoglycosides (6.8%). Administration was intravenous in 57.8% and intramuscular in 42.2% of patients. Mean OPAT duration was  $21.8 \pm 11.9$  days (median 14, range 1–120); mean prior hospitalisation was  $11.67 \pm 9.59$

days. In 78% of patients, the OPAT antibiotic matched the in-hospital regimen. The main reasons for outpatient continuation were cost reduction (44.9%) and insufficient bed capacity (42.2%) (Table 1).

The most common administration settings were the emergency department (46.7%) and dedicated OPAT units (40.0%). OPAT was nurse-administered in 96.6% of cases; however, 3 patients (1.1%) received administration at home by non-healthcare professionals (Table 1).

## **Clinical course, readmission, and safety**

Clinical success was achieved in 94.3% of patients. Treatment completion was most commonly due to clinical response (58.8%) or planned duration (41.1%); ADEs led to discontinuation in only 3 patients (1.1%). Unplanned rehospitalisation occurred in 37 patients (14.0%), most commonly for surgical debridement (n = 19) or infection relapse (n = 7) (Table 1).

Table 1  
Comprehensive Profile of OPAT Patients: Demographics and  
Treatment Characteristics

|                                           | n           | (%)* |
|-------------------------------------------|-------------|------|
| <b>Age</b>                                |             |      |
| Mean ± SD                                 | 61.4 ± 13.5 |      |
| Median (min-max)                          | 63 (22–94)  |      |
| Gender                                    |             |      |
| Male                                      | 141         | 53.2 |
| Female                                    | 124         | 46.8 |
| Comorbidity                               |             |      |
| Yes                                       | 63          | 23.8 |
| No                                        | 202         | 76.2 |
| Reason for continuing treatment via OPAT* |             |      |
| To reduce hospitalization costs           | 119         | 44.9 |
| Insufficient hospital bed capacity        | 112         | 42.2 |
| Patient preference                        | 51          | 19.2 |
| Other                                     | 5           | 1.8  |
| OPAT indications*                         |             |      |
| Chronic osteomyelitis                     | 105         | 39.6 |
| Spondylodiscitis                          | 24          | 9.1  |
| Prosthetic joint infection                | 68          | 25.7 |
| Urinary tract infection                   | 68          | 25.7 |
| Treatment facility                        |             |      |
| University hospital                       | 86          | 32.5 |
| Secondary care state hospital             | 75          | 28.3 |
| Tertiary care state hospital              | 104         | 39.2 |
| OPAT administration location*             |             |      |
| OPAT treatment unit                       | 66          | 40   |
| *Percentage of columns                    |             |      |

|                                            | n           | (%)* |
|--------------------------------------------|-------------|------|
| Age                                        |             |      |
| Emergency department/state hospital        | 124         | 46.7 |
| Emergency department/university hospital   | 11          | 4.1  |
| Private healthcare facility                | 24          | 9    |
| Home                                       | 15          | 5.6  |
| Other                                      | 18          | 6.8  |
| OPAT duration(days)                        |             |      |
| Mean ± SD                                  | 21.8 ± 11.9 |      |
| Median (min-max)                           | 14(1-120)   |      |
| OPAT application method                    |             |      |
| Intravenously                              | 153         | 57.8 |
| Intramuscularly                            | 112         | 42.2 |
| Reasons for OPAT completion                |             |      |
| Upon achievement of culture negativity     | 21          | 7.9  |
| Upon achievement of clinical response      | 156         | 58.8 |
| Due to completion of treatment duration    | 109         | 41.1 |
| Patient discontinued treatment voluntarily | 15          | 5.6  |
| Due to serious adverse effect              | 3           | 1.1  |
| Other                                      | 19          | 7.1  |
| Requirement for patient rehospitalization  |             |      |
| Yes, rehospitalization required            | 37          | 14   |
| No, rehospitalization not required         | 228         | 86   |
| *Percentage of columns                     |             |      |

**\*\*Note:** Due to overlap among variables, total percentages may exceed 100%.

## Access to treatment, challenges encountered during the process and treatment adherence

The outcomes of the process, as assessed based on patient reports, are presented in Table 2. While 205 patients (78%) reported experiencing no issues during the treatment process; among those reporting

issues, procedure-related problems (17, 6.4%) and antibiotic-related adverse effects (10, 3.8%) were the most frequently reported issues; the most common drug-related adverse effect was the development of diarrhea (7 patients), though this diarrhea was not reported as being associated with *Clostridioides difficile* (Table 2). 239 patients (90.2%) reported not making any additional payments for OPAT; details regarding payment situations and who covered the cost of dressing changes are provided in Table 2 (among those requiring dressing changes, 44.5% were performed at home by family members, and 36.3% were performed at a healthcare facility for a fee) (Table 2).

Overall, 88.2% of patients completed all doses and 68.7% adhered fully to the dosing schedule; 87.9% continued daily activities during OPAT (Table 2).

Among non-adherent patients, the main barriers were distance to the treatment facility (34.3%), personal workload (24.3%), and difficulty finding an administration site (14.3%).

Table 2  
Conditions Affecting Patient Adherence to OPAT

| Conditions                                                     | n   | (%)* |
|----------------------------------------------------------------|-----|------|
| Continuation of daily activities during OPAT                   |     |      |
| Yes, continued daily activities                                | 233 | 87.9 |
| No, did not continue daily activities                          | 32  | 12.1 |
| Issues experienced by the patient during OPAT                  |     |      |
| No issues experienced                                          | 205 | 78.2 |
| Antibiotic-related adverse effect                              | 10  | 3.8  |
| Issues related to drug administration method                   | 17  | 6.4  |
| Inappropriate treatment course                                 | 1   | 1.8  |
| High treatment cost                                            | 10  | 3.8  |
| Other                                                          | 16  | 6    |
| Adherence to Medication Schedule                               |     |      |
| Yes, I adhered to all administration times                     | 150 | 68.7 |
| Except for 1–2 doses, I adhered to others                      | 65  | 24.8 |
| I improperly followed my 4–6 dose schedule                     | 11  | 4.2  |
| I mostly failed to adhere to administration times              | 6   | 2.3  |
| Patient adherence to treatment schedule                        |     |      |
| Completed all doses                                            | 231 | 88.2 |
| Missed 1–2 doses                                               | 26  | 9.9  |
| Missed 4–6 doses                                               | 3   | 1.1  |
| Missed less than half of doses                                 | 1   | 0.4  |
| Missed more than half of doses                                 | 1   | 0.4  |
| OPAT treatment expenses covered by patient                     |     |      |
| No, extra payment required from patient                        | 236 | 90.2 |
| Yes, payment made to private healthcare facility               | 20  | 7.5  |
| Yes, payment provided to home care healthcare personnel        | 9   | 2.3  |
| Wound Dressing Application Status in Patients Needing Dressing |     |      |
| At home, administered by a healthcare professional for a fee   | 2   | 1.9  |

| Conditions                                     | n  | (%)* |
|------------------------------------------------|----|------|
| At home, administered by my relatives          | 49 | 44.5 |
| At the healthcare facility, provided for a fee | 40 | 36.3 |
| At the healthcare facility, provided for free  | 18 | 16.3 |
| My wound dressings were not done regularly     | 1  | 1    |

## Patient satisfaction

Positive responses predominated across all satisfaction domains (Fig. 2). Patients with urinary tract infections reported significantly higher satisfaction than those with bone and joint infections across multiple domains, including follow-up regularity, physical examination, laboratory monitoring, physician access, perceived improvement, overall satisfaction, and willingness to recommend OPAT (all  $p \leq 0.025$ ; Table 3).

Table 3

Comparison of Patient-Reported Outcomes Between Bone and Joint Infections (Prosthetic Joint Infection, Osteomyelitis, Spondylodiscitis) and Urinary Tract Infections (Independent Samples t-test Analysis)

| Parameter                              | Mean $\pm$ SD                       |                                   | p value |
|----------------------------------------|-------------------------------------|-----------------------------------|---------|
|                                        | Bone and joint infections (n = 194) | Urinary tract infections (n = 68) |         |
| Regular follow-up                      | 4,25 $\pm$ 0,87                     | 4,68 $\pm$ 0,50                   | 0,000   |
| Thorough physical examination          | 4,25 $\pm$ 0,83                     | 4,59 $\pm$ 0,0,58                 | 0,002   |
| Necessary laboratory investigations    | 4,31 $\pm$ 0,80                     | 4,69 $\pm$ 0,50                   | 0,000   |
| Uninterrupted daily activities         | 3,99 $\pm$ 1,10                     | 4,28 $\pm$ 0,90                   | 0,056   |
| Access to physician                    | 4,09 $\pm$ 0,98                     | 4,41 $\pm$ 0,79                   | 0,017   |
| Need for wound dressing                | 3,91 $\pm$ 1,22                     | 4,00 $\pm$ 1,21                   | 0,680   |
| My condition improved                  | 4,07 $\pm$ 1,10                     | 4,51 $\pm$ 0,70                   | 0,000   |
| Treatment satisfaction                 | 4,11 $\pm$ 1,06                     | 4,43 $\pm$ 0,78                   | 0,025   |
| I would prefer OPAT                    | 3,95 $\pm$ 1,14                     | 4,31 $\pm$ 0,86                   | 0,008   |
| I would recommend OPAT to my relatives | 4,02 $\pm$ 1,10                     | 4,40 $\pm$ 0,85                   | 0,010   |

# Comparative analyses

It was found that OPAT, when initiated in university hospitals, was continued via the emergency department at a significantly higher rate compared to state hospitals ( $p = 0.010$ ).

The incidence of adverse drug reactions was found to be higher among patients treated outside the OPAT unit compared to those treated within the OPAT unit ( $p = 0.03$ ).

## DISCUSSION

This study provides the first multicentre real-world data on OPAT in Türkiye. The absence of a standardised national framework results in heterogeneous practices across settings. Critically, adverse drug reactions were significantly more common outside dedicated OPAT units, consistent with IDSA guidelines emphasising systematic monitoring as mandatory for safe implementation [12]. A meta-analysis of 13 studies confirmed that organised systems are prerequisite for equivalence with inpatient care [13], and inclusion of an infectious disease pharmacist was shown to reduce serious ADE risk by 74% (OR: 0.26;  $p = 0.01$ ) [14]. Clinician-supervised OPAT achieves higher success rates with lower readmission and medication-change rates [15–17], underscoring that organised OPAT is a fundamental requirement for patient safety.

Emergency department overreliance is a major structural concern. University hospital-initiated OPAT was disproportionately continued via emergency departments, likely reflecting limited bed capacity. Turkish emergency departments managed over 129 million visits in 2021 [18], making them poorly suited to planned long-term OPAT follow-up. Organisational deficiencies in OPAT are associated with increased emergency visits and readmissions [19]; even emergency department-based models shown feasible in paediatric populations operated within structured frameworks not present in our setting [20].

Despite structural limitations, high clinical success (94.3%), low readmission (14.0%), and overall high patient satisfaction confirm OPAT's viability as an inpatient alternative. Satisfaction rates of 83–97% are consistently reported internationally [8], and OPAT participants demonstrate improved quality of life within four weeks of discharge [21, 22].

The significantly higher satisfaction in UTI patients compared to those with bone and joint infections likely reflects the distinct nature of these conditions. UTIs are typically acute with short, predictable treatment courses, whereas chronic osteomyelitis, spondylodiscitis, and prosthetic joint infections involve prolonged therapy, high recurrence risk, and complex wound care that adversely affect quality of life and satisfaction [23]. To our knowledge, comparative satisfaction analyses by OPAT indication remain scarce, and our findings offer a novel contribution to the literature.

The infection distribution and predominant causative organisms are consistent with the OPAT literature. The high prevalence of bone and joint infections reflects the necessity for prolonged parenteral therapy in these conditions [24]. Gram-positive predominance and teicoplanin as the most used antibiotic align

with established glycopeptide preference in bone and joint infections, where once-daily dosing supports adherence [25].

Clinical success exceeding 90% and a readmission rate of 14% are consistent with large cohort studies reporting success rates up to 86% in bone and joint infections [26, 27].

This is among the first multicentre prospective studies to evaluate OPAT organisation and clinical outcomes nationwide in Türkiye, enabling reliable assessment of process indicators including ADEs, treatment adherence, and patient experience under real-world conditions.

Limitations include potential response bias from physician-supervised questionnaire completion, a sample size that may limit subgroup statistical power (although findings were consistent across centres), and the inability to perform formal cost analysis given heterogeneous treatment settings.

In conclusion, this study demonstrates that OPAT treatments in Türkiye are not conducted within a standardized program, and that this is reflected in clinical outcomes. The fact that a significant portion of these treatments is administered through emergency departments increases the burden on emergency departments, makes effective follow-up difficult, and raises the risk of complications—which can be directly linked to the higher incidence of adverse drug reactions in settings outside of dedicated OPAT units. However, high clinical success rates, low readmission rates, and overall high patient satisfaction indicate that OPAT can serve as a genuine and effective alternative to hospitalization when appropriate conditions are met. The establishment of a standardized, multidisciplinary OPAT framework could improve the patient experience, increase treatment adherence, and contribute to the creation of a safer and more accessible antimicrobial treatment system across Türkiye by reducing healthcare costs.

## Abbreviations

OPAT

Outpatient parenteral antimicrobial therapy

IV

Intravenous

ADE

Adverse drug event

UTI

Urinary tract infection

ESBL

Extended-spectrum  $\beta$ -lactamase

IDSA

Infectious Diseases Society of America

PSQ-3

Patient Satisfaction Questionnaire-3

OR

Odds ratio  
SD  
Standard deviation  
IQR  
Interquartile range.

## Declarations

## Ethics approval and consent to participate

This study was conducted in accordance with the Declaration of Helsinki. Ethics approval was obtained from the Etlik City Hospital Ethics Committee (Decision No.: AEŞH-EK1-2024-0011, Date: 14.02.2024). All participants provided written or verbal informed consent prior to participation.

### Consent for publication

Not applicable.

## Competing interests

The authors declare that they have no competing interests.

## Funding

This study received no external funding.

## Author Contribution

E.A.B. contributed to all stages of the work, including the conception, design, data collection, analysis, interpretation, drafting, and critical revision of the manuscript. E.A. served as the supervisor, contributed to the study design, and substantively revised the manuscript text. B.C., H.A., Y.G., A.T., F.N.A.B., L.N.A., B.M., P.K., C.S., S.Ö.A., E.Y.İ., Ç.M., A.Ş.K., M.N.Ö., N.S., G.D., U.Ö., A.D., M.S.T., M.Ç., D.Ç.Ö., S.K., S.K., Y.Ç.K., Ö.E.K., H.D., and B.T. contributed to the acquisition of data for the work. All authors reviewed, edited, and approved the final version of the manuscript to be published.

## Acknowledgement

The authors wish to thank all participating centres and patients for their contribution to this study. During the preparation of this manuscript, the authors used Claude (Anthropic) for language editing and for translation from Turkish into English. After using this tool, the authors reviewed and edited the content as necessary and take full responsibility for the content of the publication.

## Data Availability

The datasets generated and/or analysed during the current study are available from the corresponding author, Elif Ağuloğlu-Balı (elifaguloglubali@gmail.com), on reasonable request.

## References

1. Mansour O, Heslin J, Townsend JL. Impact of the implementation of a nurse-managed outpatient parenteral antibiotic therapy (OPAT) system in Baltimore: a case study demonstrating cost savings and reduction in re-admission rates. *J Antimicrob Chemother.* 2018;73:3181–8.
2. Paladino JA, Poretz D. Outpatient parenteral antimicrobial therapy today. *Clin Infect Dis.* 2010;51:S198–208.
3. Ruh CA, Parameswaran GI, Wojciechowski AL, et al. Outcomes and pharmacoeconomic analysis of a home intravenous antibiotic infusion program in veterans. *Clin Ther.* 2015;37:2527–35.
4. Mitchell ED, Czoski Murray C, Meads D, et al. Clinical and cost-effectiveness, safety and acceptability of community intravenous antibiotic service models: CIVAS systematic review. *BMJ Open.* 2017;7:e013560.
5. Chapman AL, Dixon S, Andrews D, et al. Clinical efficacy and cost-effectiveness of outpatient parenteral antibiotic therapy (OPAT): a UK perspective. *J Antimicrob Chemother.* 2009;64:1316–24.
6. Wai AO, Frighetto L, Marra CA, et al. Cost analysis of an adult outpatient parenteral antibiotic therapy (OPAT) programme. A Canadian teaching hospital and Ministry of Health perspective. *Pharmacoeconomics.* 2000;18:451–7.
7. Yong C, Fisher DA, Sklar GE, et al. A cost analysis of outpatient parenteral antibiotic therapy (OPAT): an Asian perspective. *Int J Antimicrob Agents.* 2009;33:46–51.
8. Saillen L, Arensdorff L, Moulin E, et al. Patient satisfaction in an outpatient parenteral antimicrobial therapy (OPAT) unit practising predominantly self-administration of antibiotics with elastomeric pumps. *Eur J Clin Microbiol Infect Dis.* 2017;36:1387–92.
9. Mansour O, Arbaje AI, Townsend JL. Patient Experiences With Outpatient Parenteral Antibiotic Therapy: Results of a Patient Survey Comparing Skilled Nursing Facilities and Home Infusion. *Open Forum Infect Dis.* 2019;6(12):ofz471. 10.1093/ofid/ofz471. . PMID: 32128322; PMCID: PMC7047954.
10. Ware JE Jr, Snyder MK, Wright WR, Davies AR. Defining and measuring patient satisfaction with medical care. *Eval Program Plann.* 1983;6(3–4):247–63. 10.1016/0149-7189(83)90005-8.

11. International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (ICH). ICH harmonised tripartite guideline: clinical safety data management: definitions and standards for expedited reporting E2A. 1994.  
[https://database.ich.org/sites/default/files/E2A\\_Guideline.pdf](https://database.ich.org/sites/default/files/E2A_Guideline.pdf)
12. Norris AH, Shrestha NK, Allison GM, et al. 2018 Infectious Diseases Society of America clinical practice guideline for the management of outpatient parenteral antimicrobial therapy. *Clin Infect Dis*. 2019;68:e1–35.
13. Mohammed SA, Roberts JA, Cotta MO, et al. Safety and efficacy of outpatient parenteral antimicrobial therapy: a systematic review and meta-analysis of randomized clinical trials. *Int J Antimicrob Agents*. 2024;64:107263.
14. Billmeyer KN, Ross JK, Hirsch EB, et al. Predictors of adverse safety events and unscheduled care among an outpatient parenteral antimicrobial therapy (OPAT) patient cohort. *Ther Adv Infect Dis*. 2023;10:20499361231179668.
15. Thijs L, Quintens C, Vander Elst L, et al. Clinical efficacy and safety of vancomycin continuous infusion in patients treated at home in an outpatient parenteral antimicrobial therapy program. *Antibiotics*. 2022;11:702.
16. Ng N, Bailey P, Pryor R, et al. Experiences in outpatient parenteral antimicrobial therapy (OPAT): barriers and challenges from the front lines. *Antimicrob Steward Healthc Epidemiol*. 2021;1:e42.
17. Townsend J, Keller S, Tibuakuu M, et al. Outpatient parenteral therapy for complicated *Staphylococcus aureus* infections: a snapshot of processes and outcomes in the real world. *Open Forum Infect Dis*. 2018;5:ofy274.
18. Beştemir A, Aydın H. Yıllık 300 milyon hasta muayenesi; Türkiye'de 2. ve 3. basamak kamu sağlık tesisleri acil servis ve poliklinik hizmetlerinin değerlendirilmesi. *Sakarya Tıp Dergisi*. 2022;12:496–502.
19. Bouzigard R, Arnold M, Msibi SS, et al. Outpatient parenteral antimicrobial therapy in a safety net hospital: opportunities for improvement. *Open Forum Infect Dis*. 2024;11:ofae190.
20. Bin Salleeh HM, Ahmad SA, Ahmadi TA, et al. Short-term outpatient parenteral antimicrobial therapy administration in the pediatric emergency department: feasibility, safety, and outcome. *Pediatr Emerg Care*. 2024;40:866–70.
21. Goodfellow AF, Wai AO, Frighetto L, et al. Quality-of-life assessment in an outpatient parenteral antibiotic program. *Ann Pharmacother*. 2002;36:1851–5.
22. Reidy P, Breslin T, Muldoon E. Outpatient parenteral antimicrobial therapy (OPAT) across the world: a comparative analysis—what lessons can we learn? *JAC Antimicrob Resist*. 2024;6:dlae111.
23. Panteli M, Giannoudis PV. Chronic osteomyelitis: what the surgeon needs to know. *EFORT Open Rev*. 2017;1:128–35.
24. Galpérine T, Ader F, Piriou P, et al. Antibiothérapie parentérale ambulatoire (APA), par voie intraveineuse dans les infections ostéoarticulaires. *Med Mal Infect*. 2006;36:132–7.

25. Asumang J, Heard KL, Troise O, et al. Evaluation of a thrice weekly administration of teicoplanin in the outpatient setting: a retrospective observational multicentre study. JAC Antimicrob Resist. 2021;3:dlab012.

26. Mackintosh CL, White HA, Seaton RA. Outpatient parenteral antibiotic therapy (OPAT) for bone and joint infections: experience from a UK teaching hospital-based service. J Antimicrob Chemother. 2011;66:408–15.

27. Tice A. The use of outpatient parenteral antimicrobial therapy in the management of osteomyelitis: data from the outpatient parenteral antimicrobial therapy outcomes registries. Chemotherapy. 2001;47:5–16.

Figures

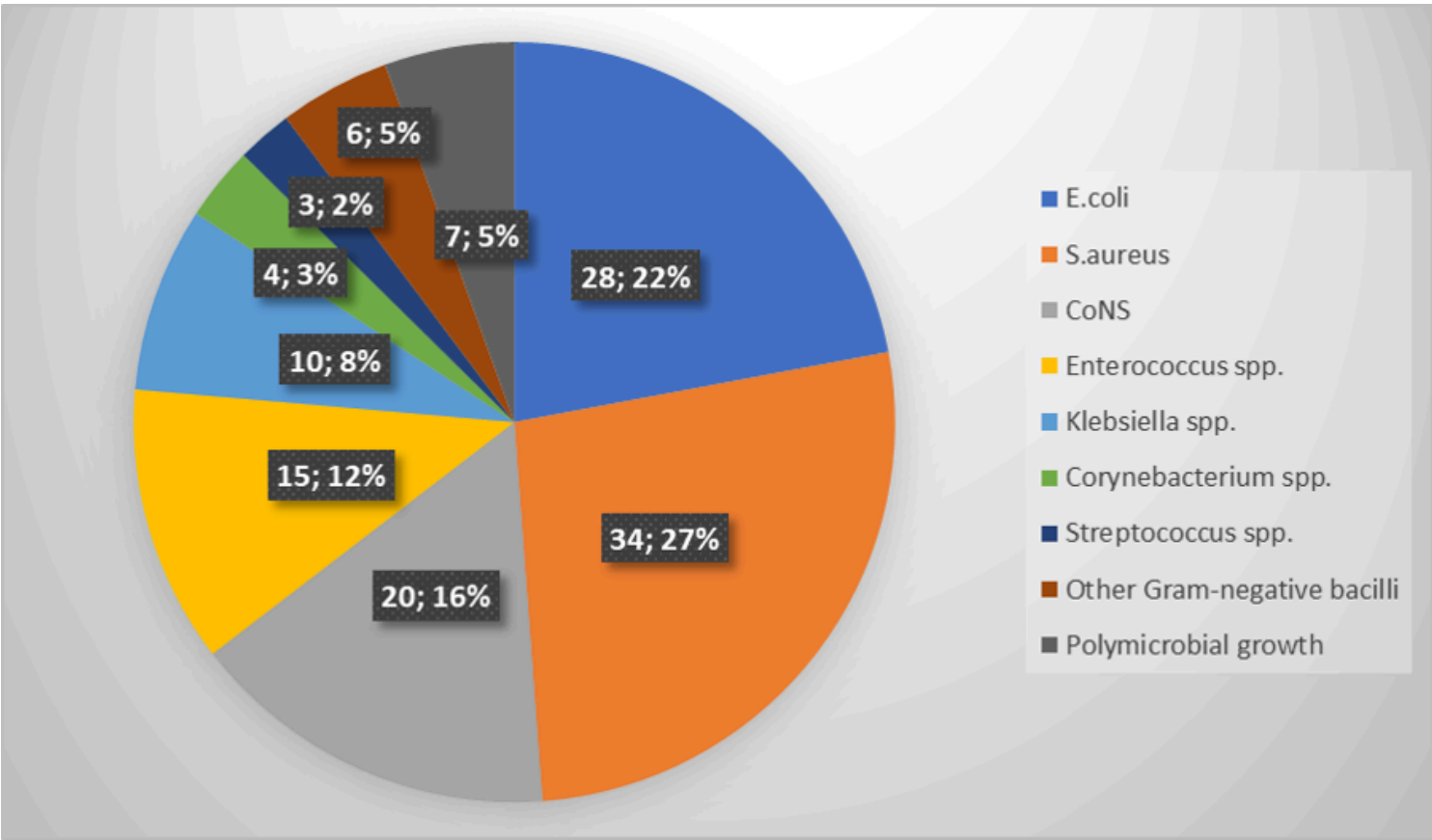


Figure 1

Distribution of microorganisms isolated from patients with positive culture results

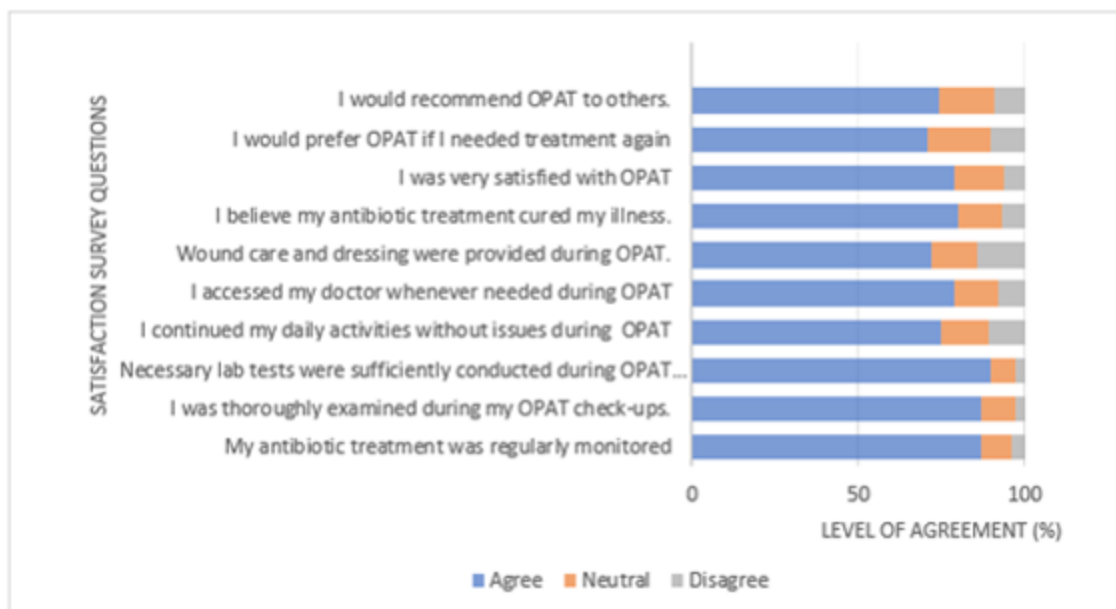


**Figure 2**

Patient satisfaction survey results graphic

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SupplementaryFile1.docx](#)
- [Supplementaryfile2.docx](#)