
Article:
Durojaiye, O.C. orcid.org/0000-0003-3130-9724 and Kritsotakis, E.I. orcid.org/0000-0002-9526-3852 (2024) Evaluation of health-related quality of life in patients receiving outpatient parenteral antimicrobial therapy (OPAT) in a UK setting. Expert Review of Anti-infective Therapy. ISSN 1478-7210

https://doi.org/10.1080/14787210.2024.2334059

This is the author's original copy of an article published by Taylor & Francis in Expert Review of Anti-infective Therapy on 25 Mar 2024, available at: https://doi.org/10.1080/14787210.2024.2334059

Evaluation of health-related quality of life in patients receiving outpatient parenteral antimicrobial therapy (OPAT) in a UK setting

Author names and affiliations:

Oyewole Christopher DUROJAIYE [a,b*], Evangelos I. KRITSOTAKIS [c,d]

[a]*Department of Microbiology, University Hospitals of Derby and Burton NHS Foundation Trust, Derby, Derbyshire, UK*

[b]*Department of Infection and Tropical Medicine, Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield, South Yorkshire, UK*

[c]*School of Medicine and Population Health, University of Sheffield, Sheffield, South Yorkshire, UK*

[d]*Laboratory of Biostatistics, School of Medicine, University of Crete, Heraklion, Greece*

* Corresponding author. E-mail: docwolex@yahoo.co.uk; Telephone: 0114 271 1975

ORCIDs: 0000-0003-3130-9724 (OC Durojaiye), 0000-0002-9526-3852 (EI Kritsotakis)

Abstract

Background:

Studies assessing the benefits of outpatient parenteral antimicrobial therapy (OPAT) have paid less attention to patient-centred factors such as patients' experiences and their health-related quality of life (HRQoL).

Research design and methods:

Prospective before-and-after quasi-experimental study enrolled adult patients receiving OPAT at a tertiary hospital in Derbyshire, UK, between October 2022 and October 2023. Consenting patients completed paired EQ-5D-3L questionnaires before OPAT initiation and upon completion of therapy or 30 days after its commencement (whichever occurred first). Changes and predictors of change in HRQoL indicators and associations with clinical outcomes (treatment failure, adverse events, and 30-day unplanned readmission) were examined.

Results:

Health state index and visual analogue scale (EQ VAS) scores of 162 enrolled patients at baseline were significantly lower than the UK population averages, but the patients experienced significant improvements in both scores and in four EQ-5D dimensions (mobility, self-care, usual activities, and pain/discomfort). Baseline health index and EQ VAS scores were significant independent predictors of positive changes in HRQoL scores.

Conclusions:

OPAT is associated with improved patient-reported quality of life and facilitates early return to work or school. Nevertheless, it is crucial to closely monitor patients with a lower baseline quality of life to optimize their overall OPAT experience.

Keywords: EQ-5D-3L; OPAT; outpatient parenteral antimicrobial therapy; patient-centred outcomes research; quality of life.

1. Introduction

Intravenous (IV) antimicrobial agents are increasingly administered in home and outpatient settings to treat a wide range of infections [1-3]. Outpatient parenteral antimicrobial therapy (OPAT) has proven to be a safe and effective alternative to inpatient care, offering substantial benefits to both patients and healthcare systems [4,5]. Published studies evaluating the benefits of OPAT have primarily focused on clinical outcomes and cost savings, with less attention given to patient-centred factors, including patients' experiences and perspectives on OPAT, as well as their overall quality of life [6].

Health-related quality of life (HRQoL) is a crucial aspect of patient-centred care; it encompasses various dimensions related to the physical, mental, emotional, and social well-being of individuals [7]. It also takes into account how one's states of heath impact their quality of life. Infections can severely impact HRQoL [8-10]. Thus, a comprehensive understanding of the HRQoL in patients receiving OPAT can aid better patient selection for OPAT and enhance the overall patient experience [11]. Additionally, HRQoL measures can be used to calculate quality-affected life years (QALYs) for cost-effectiveness studies of OPAT, where one QALY is equivalent to one year of life in perfect health [12].

In our present study, we examine the HRQoL in patients who received OPAT care at a large tertiary referral teaching hospital in Derbyshire, England, UK. The primary objective of the study was to assess changes in self-reported HRQoL and determine which patient groups experienced the most significant improvements in terms of HRQoL. A secondary objective was to examine HRQoL indicators at baseline as prognostic factors for subsequent clinical outcomes during OPAT treatment. To the best of our knowledge, there are no published studies evaluating the HRQoL of adult patients treated via OPAT within the UK National Health Service.

2. Patients and methods

2.1. Study design and recruitment

We conducted a one-group before-and-after quasi-experimental study involving adult patients referred to the OPAT service at University Hospitals of Derby and Burton (UHDB) in Derbyshire, England, UK, between October 2022 and October 2023. The OPAT service has been previously described [13,14]. It is managed by a multidisciplinary team comprising infectious diseases specialists, specialist nurses, clinical antimicrobial pharmacists, and community nurses. The choice of antimicrobial therapy is limited to agents that can be administered once daily or less frequently for dosing convenience. Antimicrobials were administered through three distinct pathways: delivery in the

patient's home by a visiting nurse, daily attendance at the OPAT clinic, and self/carer administration in the patient's home (after appropriate training). The OPAT service utilizes electronic databases to prospectively record patient demographics, clinical diagnoses, the method and duration of OPAT administration, clinical outcomes, and any associated complications.

Participants were eligible for the study if they were older than 18 years of age, capable of giving informed consent, and planned to receive a course of parenteral antimicrobial therapy lasting more than three days. We excluded patients from the study if they had previously received OPAT care.

2.2. HRQoL instrument

The three-level version of EQ-5D (EQ-5D-3L) questionnaire was used to assess participants' HRQoL (detailed in Supplementary Figure 1). Developed by the EuroQol Group, EQ-5D is a standardized and validated instrument for measuring health status, offering a generic assessment of health for clinical and economic appraisal [15]. The EQ-5D is the preferred UK National Institute for Health and Care Excellence (NICE) measure of HRQoL in adults [16], and the most extensively evaluated HRQoL instrument internationally [17]. EQ-5D-3L consists of two components: (1) a descriptive system that assesses health in five dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression), each with three levels of response (no problems, some problems, extreme problems) denoted as 1 to 3; and (2) a visual analogue scale (EQ VAS), that records patients' overall assessment of their health on a scale ranging from 0 (worst imaginable health) to 100 (best imaginable health). The descriptive system element of the EQ-5D questionnaire generates a 5-digit health state profile that represents the level of reported problems on each of the five dimensions of health (e.g., 12213). Using country-specific value set [15,18], each participant's health profile can be converted into a singular summary number, known as an index score, which may range from less than 0 (where 0 signifies a health state equivalent to death; negative values are considered worse than death) to 1 (perfect health) [15].

2.3. Sample size determination

A minimally important difference (MID) of 0.074 units was defined a priori as a clinically relevant change of the EQ-5D index score [19]. With an expected standard deviation (SD) of 0.29 [19], an MID of 0.074 corresponds to an effect size of 0.25, which is regarded as a small to medium effect. We calculated that approximately 160 patients were required to detect a change of 0.074 units in mean EQ-5D index scores from baseline to the final assessment, with power of 90% and a 5% significance

level in a paired *t*-test. This sample size allows for reliable estimation of 16 predictors in a multiple linear regression model, based on the 'rule-of-thumb' of 10 subjects per variable [20].

2.4. Data collection

Patient sociodemographics, comorbidities, treatment indications, antimicrobial regimens, mode of OPAT delivery, duration of OPAT care, OPAT outcomes, complications experienced, and hospital readmission data were extracted from the OPAT databases and hospital electronic health records. Age (in years) and Charlson Comorbidity Index (CCI) scores [21] were determined at the commencement of OPAT.

Before initiating OPAT (at baseline), consenting patients were asked to complete an EQ-5D-3L questionnaire. A second (follow-up) questionnaire was administered at the conclusion of OPAT treatment or 30 days after commencing OPAT (whichever occurred first). For the purposes of comparison, UK EQ-5D population norms for self-rated health status were obtained from published studies [22,23]. Patients who were employed or in education before their illness were asked, at the follow-up assessment, to self-report whether they had returned to work or school during OPAT.

2.5. Outcomes and definitions

Clinical outcomes (cure, improvement, or failure) were determined at the conclusion of OPAT treatment using the definitions provided in the BSAC National Outcomes Registry System (see Supplementary Table 1) [24]. Adverse drug reactions (i.e., events possibly related to administered medications) included diarrhoea, rash, blood dyscrasia, renal and hepatic dysfunction. Vascular access-related complications encompassed infection, line migration, occlusion, thrombosis, and allergic reactions to dressing. Thirty-day unplanned hospitalization was defined as an unplanned inpatient admission to an acute care hospital for any reason during or within 30 days of the completion of OPAT treatment.

2.6. Data analysis

Descriptive statistics were used to summarize sociodemographic, clinical, and outcome OPAT data. To present the EQ-5D-3L descriptive system, we calculated the numbers and percentages of patients reporting each level of problems on each of the dimensions at both the baseline and final assessments. Additionally, we determined the means (with SDs) of EQ VAS and EQ-5D-3L index scores at these two time points. The observed baseline mean scores were compared with published mean scores for the

UK general population using one-sample *t*-tests. The mean health state index and EQ VAS scores for the UK general population have previously been reported as 0.86 and 82.5, respectively [22,23].

To assess the magnitude and statistical significance of changes between the two time points, we calculated 95% confidence intervals (CIs) for the differences in the proportion of patients reporting improvements in each dimension and performed McNemar's test. For the summary EQ-5D-3L index and EQ VAS scores, we calculated 95% CIs for mean differences and paired *t*-test statistics. To aid in the interpretation of the estimated changes, we computed standardized effect sizes using Cohen's g and d statistics for proportion and mean differences, respectively [25]. Following Cohen's benchmarks, we identified effect sizes as negligible ($g < 0.05$, $d < 0.2$), small ($0.05 <= g < 0.15$, $0.2 <= d < 0.5$), medium ($0.15 <= g < 0.25$, $0.5 <= d < 0.8$), or large ($g >= 0.25$, $d >= 0.8$) [25].

Changes in EQ-5D-3L were also analysed using the Paretian Classification of Health Change (PCHC) approach [26]. Patients were classified as "improved" if they demonstrated improvement in at least one dimension without worsening in any other dimension of the EQ-5D-3L system; "worsened" if they worsened on at least one dimension and did not show improvement in any other dimension; and "no change" if they exhibited the same response in each dimension at baseline and the final assessment. Patients who improved in one or more dimensions and worsened in others were classified as "mixed change." PCHC summarizes overall changes in patients' self-reported health without relying on preference weights (utility scores) from the general public, thereby avoiding potential inference bias [27]. We estimated the proportion of patients in each PCHC class by calculating 95% CIs using Wilson's score method.

Analysis of covariance with ordinary least squares estimation was employed to identify groups of patients that derived heterogeneous effects from OPAT treatment in terms of improvements in HRQoL. EQ VAS and EQ-5D-3L health index scores at the follow up assessment were examined as response variables in two separate multiple linear regression models. A set of a priori selected baseline covariates were examined, including patient characteristics (age, sex, CCI, and clinical frailty score) and therapy-related variables (combination antimicrobial therapy, indication for OPAT, mode of delivery, and type of vascular access device). In these models, we controlled for imbalances in baseline EQ VAS and EQ-5D-3L scores to estimate the direct causal effects of baseline exposures [28]. Covariate-specific effect sizes were assessed using Cohen's f^2 statistic and were interpreted as small ($f^2 \geq 0.02$), medium ($f^2 \geq 0.15$), or large ($f^2 \geq 0.35$) effects, respectively. Multicollinearity of predictor variables was ruled out by examining variance inflation factors (Supplementary Table 2). Graphical inspection of residuals indicated deviations from normality and homoscedasticity (Supplementary Figures 2 and 3). Therefore, bootstrapping was performed (1,000 replications) to estimate the

standard errors and *P*-values. CIs were constructed using the bias-corrected and accelerated bootstrap method.

Multivariable Poisson regression with a log-link function and robust variance estimation was performed to estimate relative risks (RR) with 95% CIs [29]. This analysis aimed to quantify the associations between self-reported HRQoL indices at baseline (EQ-5D-3L dimensions, full health state, EQ-5D-3L index score, and EQ VAS score) and subsequent patient outcomes (complications during OPAT, treatment failure, and 30-day unplanned hospitalizations). The models were adjusted for sex, age, and CCI. The log-linearity of continuous variables was examined using restricted cubic splines (Supplementary Figures 4 and 5).

No missing values were observed for any of the study variables. Two-sided *P*-values were reported for all analyses, and statistical significance was considered at $P < 0.05$. All analyses were performed using Stata version 18 (Stata Corporation, College Station, Texas, USA).

2.7. Ethical approval

The study was approved by the North West – Greater Manchester South (UK) Research Ethics Committee (REC Reference number 22/NW/0299). The study also received organizational approval and support from the Research and Development department at the study institution. All patients agreed to participate in the study by signing an informed consent form.

3. Results

3.1. Baseline characteristics of the study cohort

A total of 162 eligible patients were enrolled in the study and completed the paired EQ-5D questionnaires. Figure 1 shows the flowchart of the study. Table 1 shows the participants' sociodemographic and clinical characteristics. At baseline, 8.0% (13/162) of the participants reported being in a state of perfect health (i.e., a health state index score of 1.0) while 2.5% (4/162) reported being in the best imaginable health (i.e., an EQ VAS score of 100). There was a significant moderate positive correlation between the baseline EQ-5D VAS and index scores ($r = 0.61$, $P < 0.001$) (Supplementary Figure 6). Compared to the UK population averages, the study patients had significantly lower baseline EQ-5D VAS scores (mean 57.9 *vs.* 82.5; $P < 0.001$) and EQ-5D index scores (mean 0.5 *vs.* 0.9; $P < 0.001$). Out of the 37 patients who self-reported being employed before their

illness, 43.2% (16/37) were able to return to work while receiving OPAT. Additionally, two patients were students, both of whom were able to continue their education while on OPAT.

3.2. Change in HRQoL scores

The mean increase in the health state index score was 0.2 ($P < 0.001$). The respective Cohen's effect size value ($d = 0.51$) suggested a medium improvement in the mean EQ-5D-3L index value (Table 2). There was also statistically significant but small gain in mean EQ-VAS score (difference of 7.5; $P < 0.001$; $d = 0.33$) (Table 2). Additionally, there were significant and large increases in the proportion of patients who reported being in perfect health (increase by 7.4%; $P = 0.008$; $g = 0.33$); who had no problems walking about (+10.5%; $P = 0.003$; $g = 0.27$); no problems with self-care (+15.4%; $P < 0.001$; $g = 0.28$); no problems performing daily activities (+19.2%; $P < 0.001$; $g = 0.34$); and no pain/discomfort (+19.2%; $P < 0.001$; $g = 0.28$) (Table 2; Supplementary Figure 7). However, there was no significant change in the proportion of patients with no anxiety/depression (increase of 4.9%; $P = 0.341$; $g = 0.07$). Using the PCHC principle [25], 18.5% (30/162) had no change, 51.9% (84/162) had improved health, 12.3% (20/162) had worse health, and 17.3% (28/162) had a 'mixed' change (Figure 2).

3.3. Predictors of change in HRQoL and association with clinical outcomes

Table 3 shows the results of linear regression analysis examining factors associated with changes in HRQoL scores. No heterogeneous changes in follow up HRQoL scores were detected in relation to patient age, sex, CCI, or treatment-related variables measured at baseline. In multivariable analysis, there was no significant association between follow-up HRQoL scores and the baseline clinical frailty score analysis ($f^2 = 0.02$; $P = 0.07$). Only baseline EQ VAS (adjusted mean difference (aMD), 3.96 per 10 units increase; 95% CI, 2.09 – 5.72) and EQ-5D-3L index (aMD, 0.04 per 0.1-unit increase; 95% CI, 0.03 – 0.06) scores were significant predictors of a positive change in follow up HRQoL scores.

The association between baseline HRQoL scores and clinical outcomes is presented in Table 4 (the respective univariate analysis is presented as Supplementary Table 3). Accounting for patients' age, CCI, and clinical frailty score in multivariable regression analysis, there were no statistically significant associations between baseline HRQoL scores and the risk of 30-day unplanned readmission, treatment failure, or adverse events.

4. Discussion

Internationally, very few studies have examined the quality of life in patients receiving OPAT. To our knowledge, this study represents the first comprehensive assessment of HRQoL in a UK population of OPAT patients. In this longitudinal pre-post study, we investigated the HRQoL of patients treated with OPAT at a tertiary hospital in the UK. We included patients who received more than three days of OPAT care, as we had previously observed clinical improvement after 48 hours of IV antimicrobial therapy in our setting. Patients with prior OPAT experience were excluded to avoid response bias in their expectations and, consequently, in self-reported HRQoL [30,31].

Similar to studies conducted in Canada by Goodfellow *et al.* and in the United States by Keller *et al.*, we found that OPAT patients have a lower quality of life compared to the general population [32, 33]. The reduced HRQoL can be attributable not only to the need for OPAT but also to the presence of underlying comorbidities. It is well-documented that HRQoL can be impaired in patients with infections such as bacteraemia [8], infective endocarditis [10], and osteomyelitis [34], which are commonly treated with OPAT. Consequently, OPAT patients should receive adequate support to enhance and optimize their HRQoL.

We observed a significant improvement in the EQ-VAS and health state index scores at follow-up compared to the baseline assessment. While the gains in the VAS and index scores were small and moderate, respectively, it is essential to note that these are weighted means designed to reflect the preferences of the general public rather than patients [26]. Additionally, we observed significant and large improvements in patients' mobility, self-care, their ability to perform daily activities, and a large reduction in pain or discomfort. Goodfellow *et al.* also documented marked improvements in various domains of self-perceived health among a cohort of OPAT patients four weeks after hospital discharge [32]. By promoting early hospital discharge and averting hospitalization, OPAT can effectively enhance patients' quality of life by enabling them to sustain their daily activities and social interactions, contributing to their overall well-being. Interestingly, we found only a small non-significant improvement in the proportion of patients experiencing no anxiety or depression. Although the exact reasons for this remain unclear, it is important to acknowledge that anxiety and depression are chronic conditions that may not be effectively addressed by antimicrobial therapy.

Forty-six percent of the participants in our cohort, who were employed or in education before their illness, managed to return to work or school while receiving OPAT. This finding is comparable to a similar study in Singapore by Wee *et al.*, who reported that half of OPAT patients returned to work

while on treatment [35]. The ability of eligible patients to resume school or work and maintain their income while receiving OPAT may help reduce the financial strain that could result from prolonged absence from work. It can contribute to financial stability, job security, preserve educational progress, and prevent interruptions in career advancement and educational attainment.

Using the Short Form-36 [36] as a measure of HRQoL in a cohort of 82 OPAT patients, Goodfellow *et al.* [32] found that non-orthopaedic infection and prolonged hospital stay were associated with a positive change in the physical component summary and mental component summary scores, respectively. Meanwhile, these summary scores at baseline were negative predictors of changes at follow up assessments. In our cohort, we observed that baseline HRQoL scores were the sole predictors of a positive change in HRQoL scores – in other words, the higher the baseline HRQoL scores, the higher the follow-up scores. We noted some evidence for a weak association between baseline clinical frailty score and a subsequent negative change in HRQoL scores (p = 0.07). Our findings remained consistent when using the EQ VAS or health index scores, which may capture somewhat different aspects of HRQoL; and suggest that patients with high baseline quality of life are likely to benefit most from OPAT in terms of HRQoL, while frail patients may experience the least benefit. These improvements of HRQoL were otherwise homogenous, irrespective of baseline patient characteristics (age, sex, CCI) or OPAT-related variables measured at baseline (combination therapy, indication, mode of delivery, type of vascular access device). Differences in our findings compared to those of Goodfellow *et al.* [32] may stem from variations in methodology and the case-mix of patients. The most common indications for OPAT in our cohort were respiratory infections and bone and joint infections. For our regression analyses, we excluded other indications for OPAT due to a limited number of events. Additionally, we omitted the length of hospital stay as it is an intermediate variable in the causal pathway between baseline covariates (e.g., CCI, clinical frailty score) and HRQoL.

Unlike Wee *et al.* [35], we observed small and statistically non-significant decreases in the risks of clinical outcomes (treatment failure, complications, and 30-day unplanned readmission) associated with increasing HRQoL scores at baseline. In addition, there was limited evidence in our cohort for an association between being in a full health state upon OPAT initiation and lower risk of subsequent treatment failure and complications. The small numbers of events in our cohort did not allow for precise estimates of the respective relative risks for the clinical outcomes.

Our study is limited by a number of factors, including its confinement to a single hospital, and as a result, our findings may not accurately reflect experiences in other UK OPAT services. We used a validated questionnaire (EQ-5D-3L) to measure HRQoL, which is limited to three levels of response categories. Compared to the five-level EQ-5D version, the three-level version exhibits a more

pronounced ceiling effect and diminished discriminatory power [37]. Therefore, using the five-level version could have provided greater granularity in our data analysis. We also used either 'end of treatment' or '30 days of treatment' as endpoints, depending on which occurred first. This approach was adopted because, based on previous experience [38,39], OPAT patients could develop complications unrelated to OPAT after completing their therapy (but within 30 days), which could negatively affect their HRQoL. However, substantial changes in HRQoL may occur after 30 days of therapy [9,10,34]. Consequently, it is possible that we have not fully captured the impact of OPAT on the quality of life in some patients. Another important limitation is the absence of a comparison with inpatient care. It is possible that the improvements in HRQoL scores observed in our study could have also occurred if the cohort had been treated as inpatients [40]. As OPAT is firmly established in many countries, including the UK, and its benefits are widely recognized, conducting a definitive randomized controlled trial to compare HRQoL in OPAT with inpatient care is not likely to be feasible and may pose ethical challenges. Nonetheless, OPAT offers several potential advantages over inpatient care, including lower healthcare costs and a reduced risk of nosocomial infections, among others [4]. Furthermore, using a control group comprising inpatients in a non-randomized study would require accounting for several non-health-related confounding factors (e.g., income, lifestyle, sleeping patterns) as health is neither the exclusive nor the most crucial contributor to quality of life.

5. Conclusions

While OPAT patients generally experience a lower quality of life compared to the general population, OPAT is associated with improvements in patient-reported quality of life measures and facilitates an early return to work or school for some patients. Identifying patients with low baseline quality of life is essential for providing closer monitoring and sufficient support to optimize their HRQoL and enhance their OPAT experience. Patient-reported outcomes, such as HRQoL, should be included in the evaluation of OPAT programmes.

Declarations

Sponsor:

The research sponsor for this study was University Hospitals of Derby and Burton NHS Foundation Trust.

Funding:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Competing interests:

None declared.

Acknowledgements:

The authors would like to thank all the clinical staff working at the Derby OPAT service and the Research and Development Department at the study institution for their contributions to the study.

Ethical approval: North West – Greater Manchester South (UK) Research Ethics Committee (12/09/2022; REC Reference number 22/NW/0299; IRAS 316619).

References

1. Chapman AL. Outpatient parenteral antimicrobial therapy. BMJ. 2013; 346: f1585. https://doi.org/10.1136/bmj.f1585.

2. Parkash V, Laundy N, Durojaiye OC. Outpatient parenteral antimicrobial therapy for leishmaniasis: 13 years' experience at a large UK infectious diseases centre. Trans R Soc Trop Med Hyg. 2023; 117: 473-5. https://doi.org/10.1093/trstmh/trac128.

3. Shakoor S, Durojaiye OC, Collini PJ. Outcomes of outpatient parenteral antimicrobial therapy (OPAT) for urinary tract infections – a single center retrospective cohort study. Clin Infect Pract. 2023; 17: 100212. https://doi.org/10.1016/j.clinpr.2022.100212.

4. Bryant PA, Katz NT. Inpatient versus outpatient parenteral antibiotic therapy at home for acute infections in children: a systematic review. Lancet Infect Dis. 2018; 18: e45-e54. https://doi.org/10.1016/S1473-3099(17)30345-6.

5. Barr DA, Semple L, Seaton RA. Outpatient parenteral antimicrobial therapy (OPAT) in a teaching hospital-based practice: a retrospective cohort study describing experience and evolution over 10 years. Int J Antimicrob Agents. 2012; 39: 407-13. https://doi.org/10.1016/j.ijantimicag.2012.01.016.

6. Mitchell ED, Czoski Murray C, Meads D, Minton J, Wright J, Twiddy M. Clinical and cost-effectiveness, safety and acceptability of community intravenous antibiotic service models: CIVAS systematic review. BMJ Open. 2017; 7: e013560. https://doi.org/10.1136/bmjopen-2016-013560.

7. Hand C. Measuring health-related quality of life in adults with chronic conditions in primary care settings: Critical review of concepts and 3 tools. Can Fam Physician. 2016; 62: e375–83.

8. Dalager-Pedersen M, Thomsen R, Schønheyder H, Nielsen H. Functional status and quality of life after community-acquired bacteraemia: a matched cohort study. *Clin Microbiol Infect.* 2016; 22: 78.e1-78.e8. https://doi.org/10.1016/j.cmi.2015.09.006.

9. Zhang K, Mao X, Fang Q, Jin Y, Cheng B, Xie G, et al. Impaired long-term quality of life in survivors of severe sepsis: Chinese multicenter study over 6 years. *Anaesthesist.* 2013; 62: 995–1002. https://doi.org/10.1007/s00101-013-2257-8.

10. Verhagen D, Hermanides J, Korevaar J, Bossuyt P, van den Brink R, Speelman P, et al. Health-related quality of life and posttraumatic stress disorder among survivors of left-sided native valve endocarditis. *Clinical Infect Dis*. 2009; 48: 1559-65. https://doi.org/10.1086/598930.

11. Chapman ALN, Patel S, Horner C, Green H, Guleri A, Hedderwick S, et al. Updated good practice recommendations for outpatient parenteral antimicrobial therapy (OPAT) in adults and children in the UK. JAC Antimicrob Resist. 2019; 1:dlz026. https://doi.org/10.1093/jacamr/dlz026.

12. Bravo Vergel Y, Sculpher M. Quality-adjusted life years. Pract Neurol. 2008; 8: 175-82. https://doi.org/10.1136/pn.2007.140186.

13. Durojaiye OC, Jibril I, Kritsotakis. Palliative outpatient parenteral antimicrobial therapy (OPAT): A single center experience and systematic scoping review. Clin Infect Pract. 2022;16: 100205. https://doi.org/10.1016/j.clinpr.2022.100205.

14. Durojaiye OC, Slucka A, Kritsotakis EI. Retrospective analysis of outcomes of outpatient parenteral antimicrobial therapy (OPAT) for necrotising otitis externa. Eur J Clin Microbiol Infect Dis. 2022; 41: 941-949. https://doi.org/10.1007/s10096-022-04455-y.

15. EuroQol Research Foundation. EQ-5D-3L User Guide, 2018. Available from: https://euroqol.org/publications/user-guides.

16. National Institute for Health and Care Excellence (NICE). Guide to the methods of technology appraisal 2013. London: NICE; 2013. Process and Methods Guides No. 9. Available at https://www.nice.org.uk/process/pmg9/resources/guide-to-the-methods-of-technology-appraisal-2013-pdf-2007975843781.

17. Nikolova S, Hulme C, West R, Pendleton N, Heaven A, Bower P, et al. Normative estimates and agreement between 2 measures of health-related quality of life in older people with frailty: findings from the community ageing research 75+ cohort. Value Health. 2020; 23: 1056-62. https://doi.org/10.1016/j.jval.2020.04.1830.

18. Dolan P. Modeling valuations for EuroQol health states. Med Care. 1997; 35: 1095-108. https://doi.org/10.1097/00005650-199711000-00002.

19. Walters SJ, Brazier JE. Comparison of the minimally important difference for two health state utility measures: EQ-5D and SF-6D. Qual Life Res. 2005; 14: 1523-32. https://doi.org/10.1007/s11136-004-7713-0.

20. Austin PC, Steyerberg EW. The number of subjects per variable required in linear regression analyses. J Clin Epidemiol. 2015; 68: 627-36. https://doi.org/10.1016/j.jclinepi.2014.12.014.

21. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chronic Dis. 1987; 40: 373-83. https://doi.org/10.1016/0021-9681(87)90171-8.

22. Janssen MF, Szende A, Cabases J, Ramos-Goñi JM, Vilagut G, König HH. Population norms for the EQ-5D-3L: a cross-country analysis of population surveys for 20 countries. Eur J Health Econ. 2019; 20: 205-16. https://doi.org/10.1007/s10198-018-0955-5.

23. Kind P, Dolan P, Gudex C, Williams A. Variations in population health status: results from a United Kingdom national questionnaire survey. BMJ. 1998; 316: 736-41. https://doi.org/10.1136/bmj.316.7133.736.

24. British Society for Antimicrobial Chemotherapy (BSAC). The British Society for Antimicrobial Chemotherapy Outpatient Parenteral Antimicrobial Therapy National Outcomes Registry System (NORS) User Guide. BSAC, Birmingham, UK, 2018. Available online: https://e-opat.com/wp-content/uploads/2018/12/NORS-UserGuide-141218.pdf.

25. Cohen J. A power primer. Psychol Bull. 1992; 112: 155-9. https://doi.org/10.1037//0033-2909.112.1.155.

26. Devlin NJ, Parkin D, Browne J. Patient-reported outcome measures in the NHS: new methods for analysing and reporting EQ-5D data. Health Econ. 2010; 19(8): 886-905. https://doi.org/10.1002/hec.1608.

27. Parkin D, Rice N, Devlin N. Statistical analysis of EQ-5D profiles: does the use of value sets bias inference? Med Decis Making; 2010;30: 556-65. https://doi.org/10.1177/0272989X09357473.

28. Tennant PWG, Arnold KF, Ellison GTH, Gilthorpe MS. Analyses of 'change scores' do not estimate causal effects in observational data. Int J Epidemiol. 2022; 51: 1604-1615. https://doi.org/10.1093/ije/dyab050.

29. Chen W, Qian L, Shi J, Franklin M. Comparing performance between log-binomial and robust Poisson regression models for estimating risk ratios under model misspecification. BMC Med Res Methodol. 2018; 18: 63. https://doi.org/10.1186/s12874-018-0519-5.

30. John J. Patient satisfaction: the impact of past experience. J Health Care Mark. 1992; 12: 56-64.

31. Watson A, Power A, Brown C, El-Deredy W, Jones A. Placebo analgesia: cognitive influences on therapeutic outcome. Arthritis Res Ther. 2012;1 4: 206. https://doi.org/10.1186/ar3783.

32. Goodfellow AF, Wai AO, Frighetto L, Marra CA, Ferreira BM, Chase ML, et al. Quality-of-life assessment in an outpatient parenteral antibiotic program. Ann Pharmacother. 2002; 36: 1851-5. https://doi.org/10.1345/aph.1c153.

33. Keller SC, Williams D, Levering M, Cosgrove SE. Health-Related Quality of Life in Outpatient Parenteral Antimicrobial Therapy. Open Forum Infect Dis. 2018; 5: ofy143. https://doi.org/10.1093/ofid/ofy143.

34. Lang S, Walter N, Froemming A, Baertl S, Szymski D, Alt V, et al. Long-term patient-related quality of life outcomes and ICD-10 symptom rating (ISR) of patients with pyogenic vertebral osteomyelitis: What is the psychological impact of this life-threatening disease? Eur Spine J. 2023; 32: 1810-7. https://doi.org/10.1007/s00586-023-07616-5.

35. Wee LE, Sundarajoo M, Quah WF, Farhati A, Huang JY, Chua YY. Health-related quality of life and its association with outcomes of outpatient parenteral antibiotic therapy. Eur J Clin Microbiol Infect Dis. 2020; 39:765-72. https://doi.org/10.1007/s10096-019-03787-6.

36. Ware JE Jr, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. Med Care. 1992; 30: 473-83.

37. Pattanaphesaj J, Thavorncharoensap M. Measurement properties of the EQ-5D-5L compared to EQ-5D-3L in the Thai diabetes patients. Health Qual Life Outcomes. 2015; 13: 14. https://doi.org/10.1186/s12955-014-0203-3.

38. Durojaiye OC, Morgan R, Chelaghma N, Palit J, Keil C, Omer R, et al. External validity and clinical usefulness of a risk prediction model for 30 day unplanned hospitalization in patients receiving outpatient parenteral antimicrobial therapy. J Antimicrob Chemother. 2021; 76: 2204-12. https://doi.org/10.1093/jac/dkab127.

39. Durojaiye OC, Cole J, Kritsotakis E. Effectiveness and safety of a disposable elastomeric continuous infusion pump for outpatient parenteral antimicrobial therapy (OPAT) in a UK setting. J Chemother. 2023: 1-8. https://doi.org/10.1080/1120009X.2023.2277507.

40. Wolter JM, Cagney RA, McCormack JG. A randomized trial of home vs hospital intravenous antibiotic therapy in adults with infectious diseases. J Infect. 2004; 48: 263-8. https://doi.org/10.1016/S0163-4453(03)00135-X.

Tables

Table 1. Sociodemographic and clinical characteristics (N = 162)

Characteristic	n (%)
Age (years), median [IQR]	67 [54 – 75]
Male sex	98 (60.5)
Charlson comorbidity index score, median [IQR]	1 [0-3]
Clinical frailty score, median [IQR]	3 [3-4]
Marital status	
Married/Domestic partnership	119 (73.5)
Single	19 (11.7)
Widowed	12 (7.4)
Divorced/Separated	12 (7.4)
Employment status	
Retired	100 (61.7)
Employed	37 (22.8)
Unemployed	16 (9.9)
Homemaker	7 (4.3)
Student	2 (1.2)
Indication for OPAT	
Bone and joint infection (excluding spinal infection)	66 (40.7)
Respiratory infection	34 (21.0)
Endovascular infection	14 (8.6)
Malignant otitis externa	10 (6.2)
Urinary tract infection	10 (6.2)
Spinal infection	7 (4.3)
Skin and soft tissue infection	7 (4.3)
Other indications[a]	14 (8.6)
Mode of antimicrobial (OPAT) delivery	
Visiting nurse	97 (59.9)
Self/carer administration	58 (35.8)
Daily attendance	7 (4.3)
Duration of inpatient (pre-OPAT) stay (days)[b], median [IQR]	11 [6 – 18]
Duration of OPAT care (bed days saved), median [IQR]	12 [8 – 28]
Total bed days saved[c]	3337
Complications during OPAT	
Antimicrobial-related adverse events	13 (8.0)
Vascular access related adverse events	10 (6.2)
Antimicrobial and vascular related adverse events	1 (0.6)
Infection Outcomes	
Cure/Improved	135 (83.3)
Failure	27 (16.7)
30 days unplanned hospitalisation[d]	37 (22.8)

Data are presented as n (%) for categorical variables and median [interquartile range] for continuous variables.

IQR, interquartile range; OPAT, outpatient parenteral antimicrobial therapy

[a] Other indications included bacteraemia (*n* = 1), central nervous system infection (*n* = 4), intra-abdominal abscess (*n* = 4), and hepatobiliary infection (*n* = 5).

[b] 15 patients had no preceding inpatient admission (admission avoidance pathway).

[c] Total duration of OPAT care for the cohort.

[d] Defined as unplanned inpatient admission for any reason during or within 30 days of OPAT discharge.

Table 2. Changes in self-reported health-related quality of life indication of patients (N = 162), from baseline to final assessment.

	Baseline	Final	Difference (95% CI)	*P* value	Cohen's ES [a]
EQ-5D-3L dimensions [b]					
Mobility					
No problem	51 (31.5%)	68 (42.0%)	10.5% (3.3% to 17.7%)	0.003	0.27 (large)
Some problems	111 (68.5%)	94 (58.0%)			
Self-care					
No problem	90 (55.6%)	115 (71.0%)	15.4% (7.1% to 23.8%)	< 0.001	0.28 (large)
Some problems	72 (44.4%)	45 (29.0%)			
Usual activities					
No problem	24 (14.8%)	55 (34.0%)	19.2% (11.0% to 27.3%)	< 0.001	0.34 (large)
Some problems	138 (85.2%)	107 (66.0%)			
Pain/discomfort					
No problem	60 (37.0%)	91 (56.2%)	19.2% (10.0% to 28.2%)	< 0.001	0.28 (large)
Some problems	102 (63.0%)	71 (43.8%)			
Anxiety/depression					
No problem	90 (55.6%)	98 (60.5%)	4.9% (-4.5% to 14.4%)	0.34	0.07 (small)
Some problems	72 (44.4%)	64 (39.5%)			
Summary indices					
EQ-5D-3L full health state [c], *n* (%)	13 (8.0%)	25 (15.4%)	7.4% (1.8% to 13.0%)	0.008	0.33 (large)
EQ-5D-3L index score, mean (SD)	0.5 (0.3)	0.7 (0.3)	0.2 (0.1 to 0.2)	< 0.001	0.51 (medium)
EQ VAS score, mean (SD)	57.9 (20.7)	65.4 (21.4%)	7.5 (3.9 to 11.1)	< 0.001	0.33 (small)

Data are presented as n (%) unless otherwise specified.

CI, confidence interval; ES, effect size; SD, standard deviation; VAS, visual analogue scale.

[a] Effect sizes were calculated with Cohen's *g* for categorical variables and Cohen's *d* for continuous variables.

[b] No problem = level 1; some problems = levels 2 + 3

[c] Full health state was defined as EQ-5D-3L level ''11111'' (no problems in all five dimensions).

Table 3. Results of linear regression analysis to identify baseline covariates that derived the greatest changes in the HRQoL (N = 162)

	EQ-5D-3L index score					EQ VAS score				
	Univariate analysis		Multivariable analysis			Univariate analysis		Multivariable analysis		
Baseline covariate	**MD (95%CI)**	***P* value**	**aMD (95%CI)**	***P* value**	**Cohen's f^2**	**MD (95%CI)**	***P* value**	**aMD (95%CI)**	***P* value**	**Cohen's f^2**
Age, per 10 years	-0.02 (-0.05, 0.00)	0.10	-0.01 (-0.04, 0.02)	0.48	<0.01 (negl.)	-1.98 (-3.92, -0.03)	0.04	-1.40 (-3.59, 0.71)	0.22	0.01 (negl.)
Male sex (Reference: female)	-0.05 (-0.14, 0.05)	0.33	-0.06 (-0.14, 0.04)	0.22	0.01 (negl.)	0.40 (-5.94, 7.21)	0.90	-3.58 (-10.24, 3.63)	0.31	0.01 (negl.)
Charlson comorbidity index, per unit	-0.03 (-0.06, -0.00)	0.05	-0.00 (-0.03, 0.03)	0.91	<0.01 (negl.)	-1.64 (-3.60, -0.17)	0.05	0.16 (-1.62, 1.97)	0.86	<0.01 (negl.)
Clinical frailty score, per unit	-0.06 (-0.10, -0.03)	<0.001	-0.02 (-0.07, 0.02)	0.28	0.01 (negl.)	-4.51 (-7.12, -2.43)	<0.001	-2.56 (-5.42, 0.05)	0.07	0.02 (small)
Bone and joint infection	0.02 (-0.06, 0.11)	0.62	0.06 (-0.04, 0.16)	0.23	0.01 (negl.)	2.85 (-3.58, 9.80)	0.40	1.66 (-4.68, 8.43)	0.63	<0.01 (negl.)
Respiratory infection	-0.02 (-0.19, 0.10)	0.78	-0.02 (-0.17, 0.10)	0.79	<0.01 (negl.)	-5.83 (-17.12, 3.93)	0.26	-1.76 (-12.49, 7.86)	0.74	<0.01 (negl.)
Combination antimicrobial therapy	0.02 (-0.09, 0.12)	0.69	-0.02 (-0.14, 0.08)	0.72	<0.01 (negl.)	0.56 (-7.05, 8.16)	0.89	-2.43 (-9.07, 3.83)	0.48	<0.01 (negl.)
Mode of OPAT delivery										
Visiting nurse	Reference	.	Reference	.		Reference	.	Reference	.	
Self/carer administration	0.10 (0.01, 0.19)	0.03	0.01 (-0.09, 0.11)	0.87		6.87 (0.71, 13.17)	0.04	-1.24 (-8.31, 6.20)	0.74	
Daily attendance	0.20 (0.09, 0.33)	0.001	0.02 (-0.14, 0.14)	0.77	<0.01 (negl.)	10.36 (-6.13, 23.31)	0.16	4.64 (-15.23, 14.52)	0.50	<0.01 (negl.)
Vascular access type										
Midline	Reference	.	Reference	.		Reference	.	Reference	.	
PICC line	0.01 (-0.10, 0.10)	0.87	0.05 (-0.05, 0.15)	0.35	<0.01 (negl.)	-4.61 (-12.55, 3.32)	0.25	-2.96 (-10.61, 4.65)	0.44	<0.01 (negl.)
Baseline EQ-5D-3L score, per 0.1 unit	0.04 (0.03, 0.06)	<0.001	0.04 (0.03, 0.06)	<0.001	0.25 (med.)	-	-	-	-	
Baseline EQ VAS score, per 10 units	-	-	-	-		4.18 (2.33, 5.92)	<0.001	3.96 (2.09, 5.72)	<0.001	0.15 (med.)

aMD, adjusted mean difference; CI, confidence interval; MD, mean difference; med., medium; negl., negligible; PICC, peripherally inserted central catheter; VAS, visual analogue scale.

Table 4. Association between health-related quality of life (HRQoL) indicators and clinical outcomes (N = 162)

	30-day readmission [a] (n = 37)			Treatment failure [b] (n = 27)			OPAT adverse event [c] (n = 24)		
HRQoL indicator at baseline	**aRR**	**95% CI**	***P* value**	**aRR**	**95% CI**	***P* value**	**aRR**	**95% CI**	***P* value**
EQ-5D-3L dimension (level 1 *vs*. 2+3)									
Mobility	1.17	0.59 - 2.36	0.65	1.03	0.47 - 2.28	0.94	0.82	0.37 - 1.80	0.61
Self-care	0.91	0.50 - 1.64	0.75	0.47	0.23 - 0.97	0.04	0.68	0.31 - 1.49	0.34
Usual activities	1.74	0.88 - 3.45	0.11	0.79	0.25 - 2.47	0.68	0.66	0.23 - 1.93	0.45
Pain/discomfort	1.00	0.55 - 1.80	0.99	1.18	0.60 - 2.34	0.63	0.89	0.39 - 2.03	0.78
Anxiety/ depression	1.00	0.58 - 1.74	>0.99	0.93	0.47 - 1.83	0.84	0.85	0.40 - 1.78	0.66
In full health state [d]	1.71	0.73 - 3.98	0.22	0.44	0.05 - 3.61	0.45	0.41	0.07 - 2.55	0.34
EQ-5D-3L index score, per 0.1 units	0.97	0.89 - 1.06	0.54	0.99	0.90 - 1.08	0.76	0.94	0.84 - 1.04	0.22
EQ VAS score, per 10 units	0.92	0.80 - 1.05	0.22	1.01	0.88 - 1.16	0.90	0.91	0.75 - 1.09	0.30

aRR, adjusted risk ratio; CI, confidence interval; OPAT, outpatient parenteral antimicrobial therapy; VAS, visual analogue scale.

[a] Defined as unplanned inpatient admission for any reason during or within 30 days of OPAT discharge.

[b] Progression or non-response of infection, readmission during OPAT or death for any reason.

[c] Antimicrobial- and vascular access-related adverse events

[d] Full health state was defined as EQ-5D-3L level ''11111'' (no problems in all five dimensions).

Figures

Fig. 1. Screening and eligibility flow chart

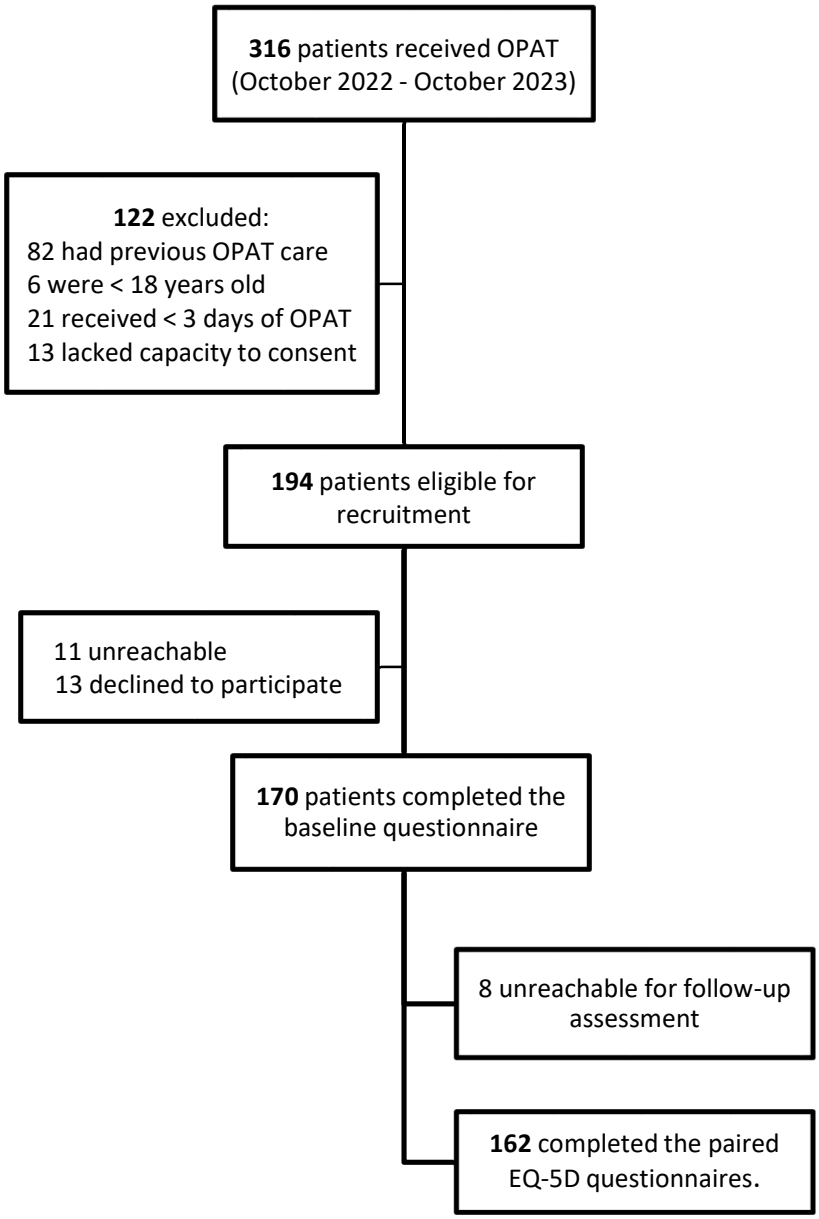
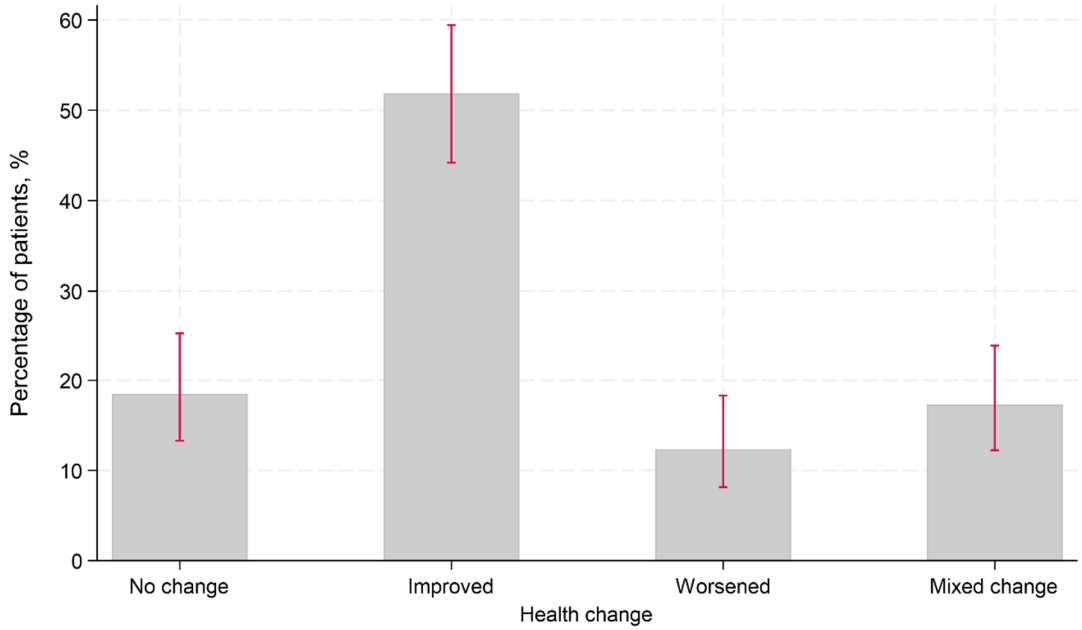


Fig. 2. Paretian Classification of Health Change (PCHC) from baseline to final assessment for N = 162 patients. Vertical lines are 95% confidence intervals.



Evaluation of Health-related Quality of Life in Patients Receiving Outpatient Parenteral Antimicrobial Therapy (OPAT) in a UK setting

SUPPLEMENTARY DATA

Supplementary Table 1. BSAC NORS Definitions of OPAT Outcomes [19].

Infection outcomes	
Cure	Completed OPAT therapy +/- oral step down for defined duration with resolution of infection and no requirement for long term antibiotic therapy (usually relates to less severe infections e.g., SSTI, UTI unless prosthetic material removed).
Improved	i. Completed OPAT therapy +/- oral step down with partial resolution of infection but need for further follow up OR ii. Completed OPAT therapy but required escalation of antimicrobial therapy during OPAT (without admission) +/- oral step down with ultimate cure or partial improvement (as above) e.g., osteomyelitis, any infections where prosthetic material has not been removed.
Failure	Progression or non-response of infection despite OPAT, required admission, surgical intervention or died for any reason.
OPAT outcomes	
Success	Completed therapy in OPAT with no change in antimicrobial agent, no adverse events, cure or improvement of infection and no readmission
Partial Success	Completed therapy in OPAT with either change in antimicrobial agent or adverse event not requiring admission
Failure of OPAT	Readmitted due to infection worsening or due to adverse event. Death due to any cause during OPAT
Indeterminate	Readmission due to unrelated event e.g., chest pain

BSAC, British Society for Antimicrobial Chemotherapy; NORS; national outcomes registry system; OPAT, outpatient parenteral antimicrobial therapy; SSTI, skin and soft tissue infection; UTI, urinary tract infection.

Supplementary Table 2. Examination of baseline covariates, including multicollinearity assessment with variance inflation factors, prior to performing regression analyses

Examined were patient-related variables (age, sex, Charlson comorbidity index [CCI], common comorbid conditions, clinical frailty score [CFS], baseline EQ-5D-3L index score and EQ VAS score), infection-related variables (pre-OPAT length of hospital stay, most common indications for OPAT, use of combination therapy), and OPAT-related factors (mode of delivery, type of vascular access). The most common indications for OPAT were bone & joint infection (n=66) and respiratory infection (n=34), whereas other indications for OPAT were not considered in the regression models due to limited sample size. The most common comorbid conditions were chronic pulmonary disease (*n* = 40) and diabetes (*n* = 39); however, the former was highly correlated with respiratory infection and was excluded. As sample sizes were too small to examine individual comorbidities, only the overall CCI score was examined in the regression analyses. Pre-OPAT LOS was considered an intermediate variable in the causal pathway between baseline covariates (e.g. CCI, CFS) and HRQoL scores, and was excluded from the covariate list of the respective regression models.

Variable	VIF
Clinical frailty score	1.90
Baseline EQ VAS score	1.73
Baseline EQ-5D-3L index score	1.71
Respiratory infection	1.62
Age (years)	1.53
Mode of antimicrobial (OPAT) delivery	1.37
Bone and joint infection (excluding spinal)	1.31
Charlson comorbidity index	1.28
Sex	1.26
Pre-OPAT stay (days)	1.20
Combination antimicrobial therapy	1.20
Type of vascular access	1.06
Average	1.43
Range	1.06 - 1.90

OPAT, outpatient parenteral antimicrobial therapy; VAS, visual analogue scale; VIF, variance inflation factor.

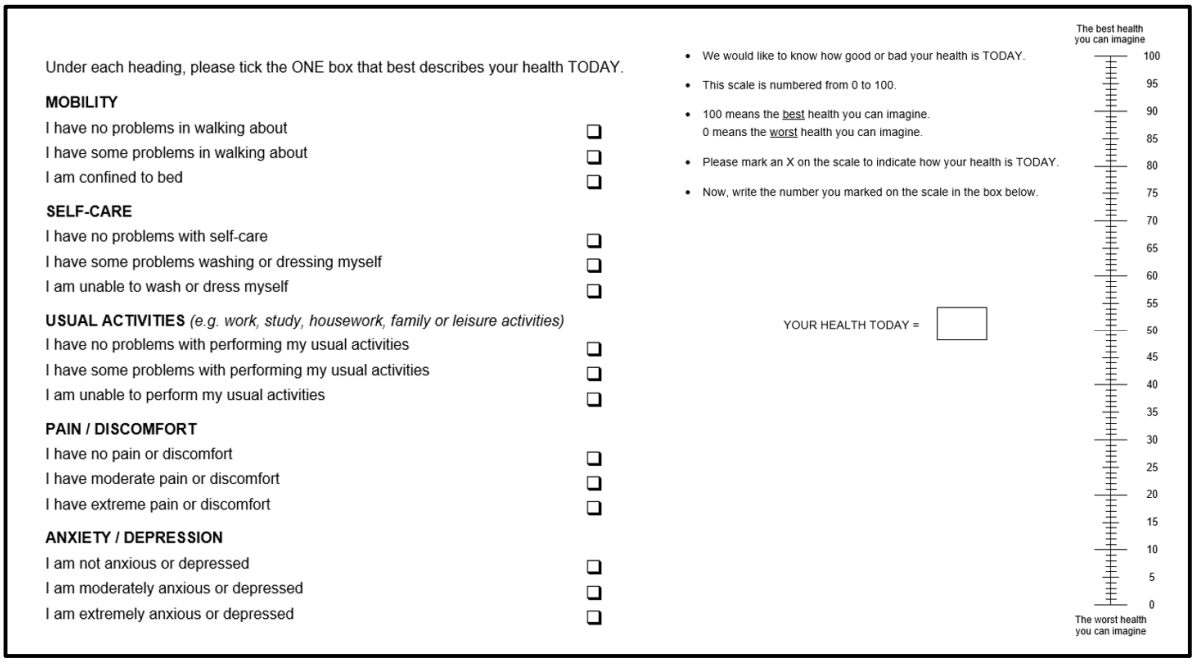
Note. The variance inflation factor (VIF) measures the amount by which the variance of the regression coefficient of a predictor variable is increased due to its association with the other covariates, relative to the variance that would result if there was no linear association between them. A rule of thumb is that VIF > 5 is suspiciously high and VIF > 10 is a more serious concern that multicollinearity may cause problems in regression model estimation.

Supplementary Table 3. Univariate analysis of the relationships of patient outcomes with baseline patient characteristics and health-related quality of life indicators (N = 162).

Patient characteristic	30-day readmission (n = 37)			Treatment failure (n = 27)			OPAT adverse event (n = 24)		
	RR	**95% CI**	***P* value**	**RR**	**95% CI**	***P* value**	**RR**	**95% CI**	***P* value**
Age, per 10 years	1.03	0.86 - 1.25	0.73	1.04	0.83 - 1.30	0.72	0.93	0.75 - 1.16	0.53
Male sex	1.07	0.60 - 1.93	0.81	1.55	0.72 - 3.34	0.26	1.59	0.70 - 3.62	0.27
CCI, per unit	1.29	1.15 - 1.45	<0.001	1.25	1.08 - 1.44	0.002	0.96	0.78 - 1.18	0.68
CFS, per unit	1.23	1.03 - 1.46	0.02	1.22	0.99 - 1.50	0.06	0.75	0.59 - 0.94	0.01
HRQoL indicator at baseline									
EQ-5D-3L dimension (level 1 *vs*. 2+3)									
Mobility	0.81	0.42 - 1.54	0.51	0.76	0.34 - 1.69	0.50	1.09	0.50 - 2.38	0.83
Self-care	0.68	0.38 - 1.20	0.18	0.47	0.23 - 0.97	0.04	0.95	0.45 - 1.99	0.88
Usual activities	1.34	0.67 - 2.71	0.41	0.72	0.23 - 2.21	0.56	0.82	0.26 - 2.55	0.73
Pain/discomfort	0.92	0.51 - 1.67	0.79	1.17	0.58 - 2.35	0.66	1.02	0.47 - 2.19	0.96
Anxiety/ depression	0.84	0.48 - 1.49	0.56	0.74	0.37 - 1.48	0.40	0.95	0.45 - 1.99	0.88
In full health state (level 11111)	1.39	0.58 - 3.32	0.46	0.44	0.06 - 3.01	0.40	0.50	0.07 - 3.42	0.48
EQ-5D-3L index score, per 0.1 units	0.94	0.86 - 1.02	0.16	0.96	0.87 - 1.05	0.36	0.98	0.88 - 1.10	0.72
EQ VAS score, per 10 units	0.88	0.76 - 1.00	0.06	0.97	0.84 - 1.12	0.67	0.96	0.79 - 1.17	0.72

CCI, Charlson comorbidity index; CFS, clinical frailty score; CI, confidence interval; OPAT, outpatient parenteral antimicrobial therapy; RR, risk ratio; VAS, visual analogue scale

Supplementary Fig. 1. UK (English) EQ-5D-3L questionnaire [14].



Under each heading, please tick the ONE box that best describes your health TODAY.

MOBILITY

I have no problems in walking about ❑
I have some problems in walking about ❑
I am confined to bed ❑

SELF-CARE

I have no problems with self-care ❑
I have some problems washing or dressing myself ❑
I am unable to wash or dress myself ❑

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*

I have no problems with performing my usual activities ❑
I have some problems with performing my usual activities ❑
I am unable to perform my usual activities ❑

PAIN / DISCOMFORT

I have no pain or discomfort ❑
I have moderate pain or discomfort ❑
I have extreme pain or discomfort ❑

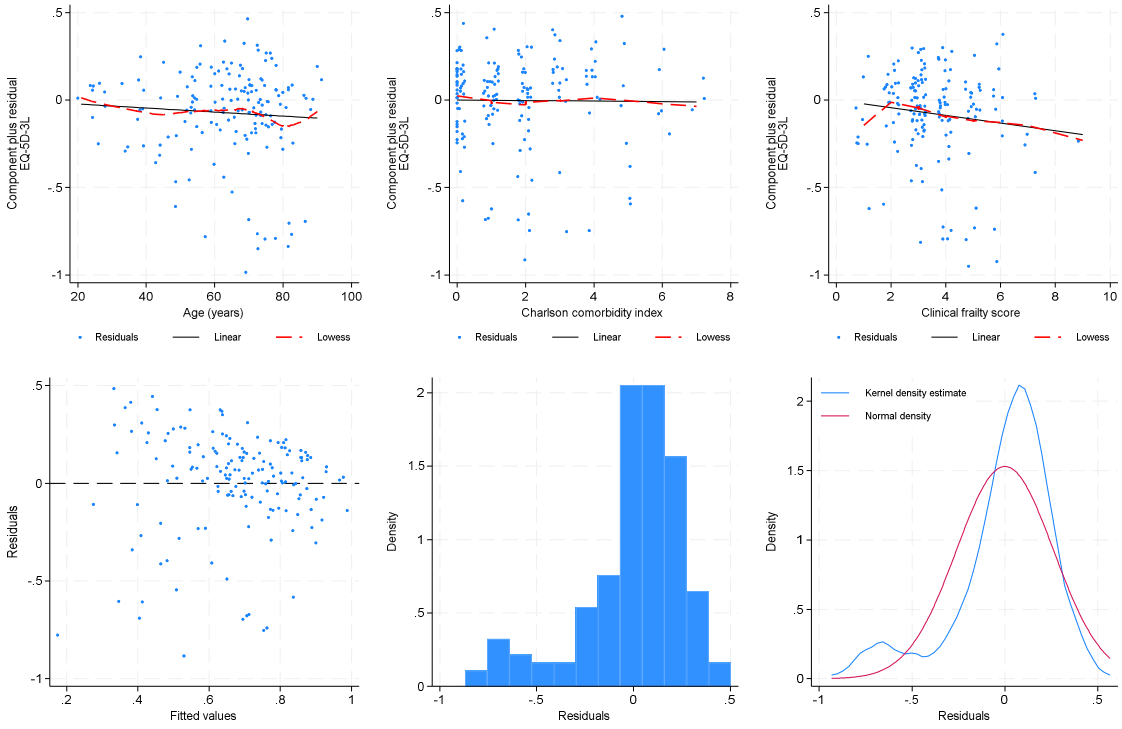
ANXIETY / DEPRESSION

I am not anxious or depressed ❑
I am moderately anxious or depressed ❑
I am extremely anxious or depressed ❑

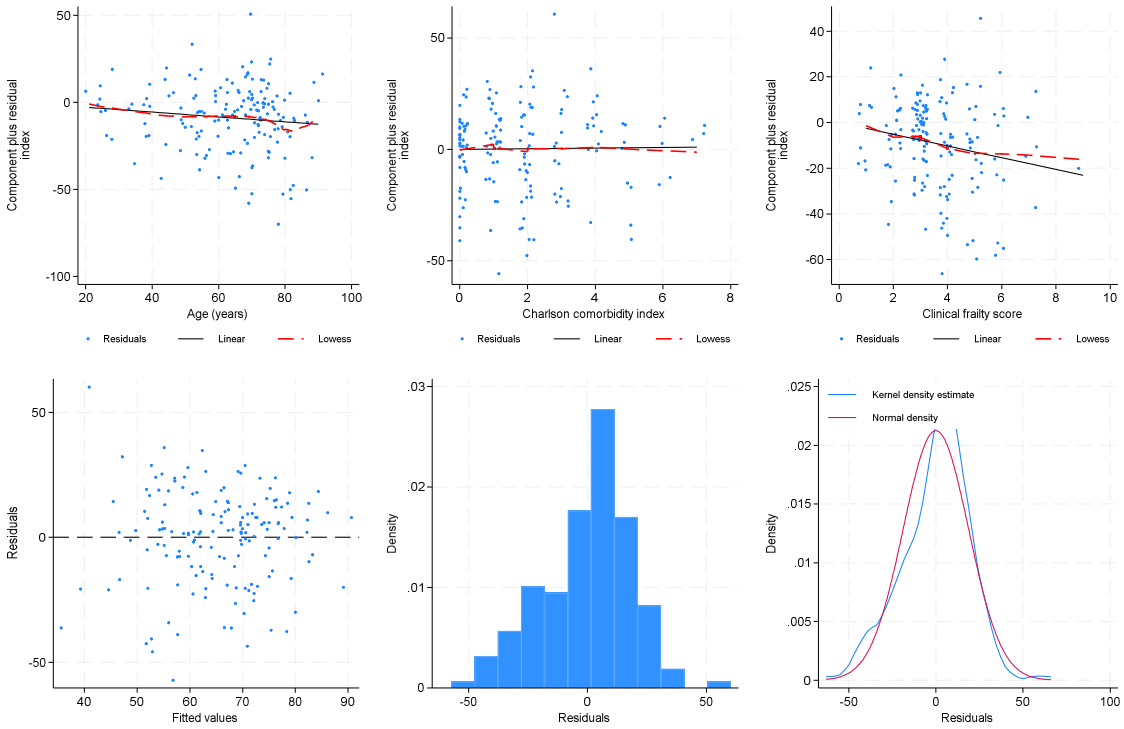
- We would like to know how good or bad your health is TODAY.
- This scale is numbered from 0 to 100.
- 100 means the best health you can imagine.
  0 means the worst health you can imagine.
- Please mark an X on the scale to indicate how your health is TODAY.
- Now, write the number you marked on the scale in the box below.

YOUR HEALTH TODAY = ☐

Supplementary Fig. 2. Regression diagnostics for linearity, normality and homoscedasticity based on residual plots from the regression model for EQ-5D-3L index score presented in Table 3.

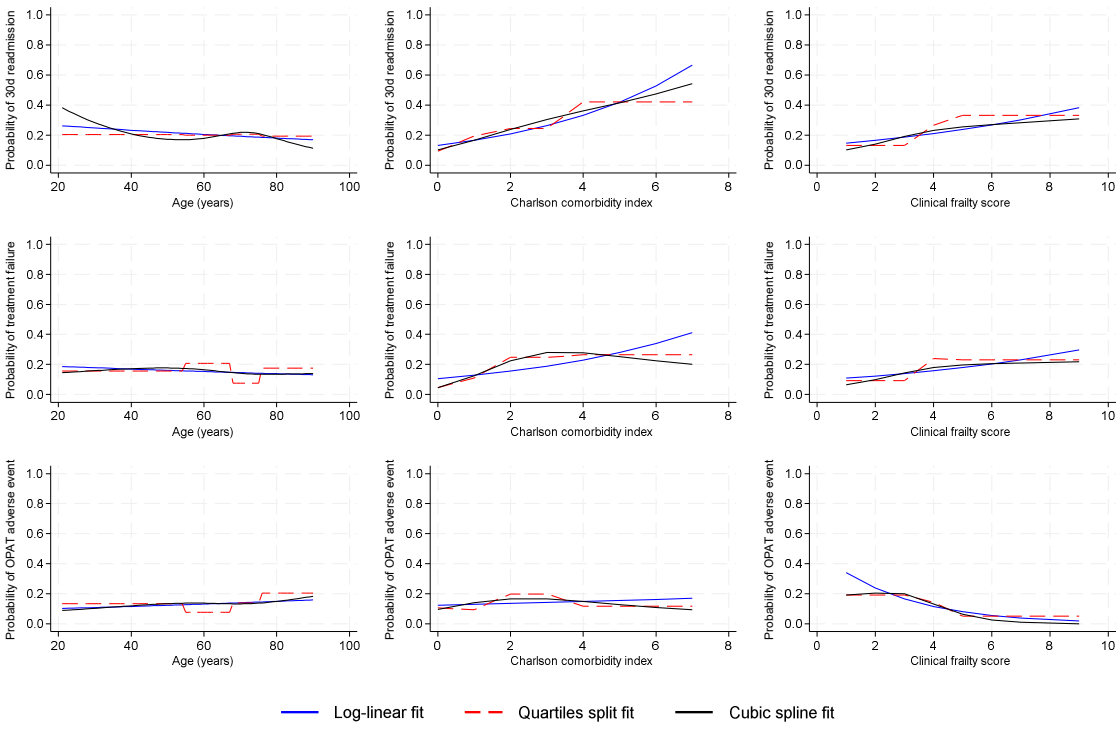


Supplementary Fig. 3. Regression diagnostics for linearity, normality and homoscedasticity based on residual plots from the regression model for EQ VAS score presented in Table 3.



Supplementary Fig. 4. Graphical assessment of linearity of the relationship between clinical outcomes (30-day unplanned readmission, treatment failure, and OPAT adverse event) and continuous covariates (age, Charlson comorbidity index, clinical frailty score).

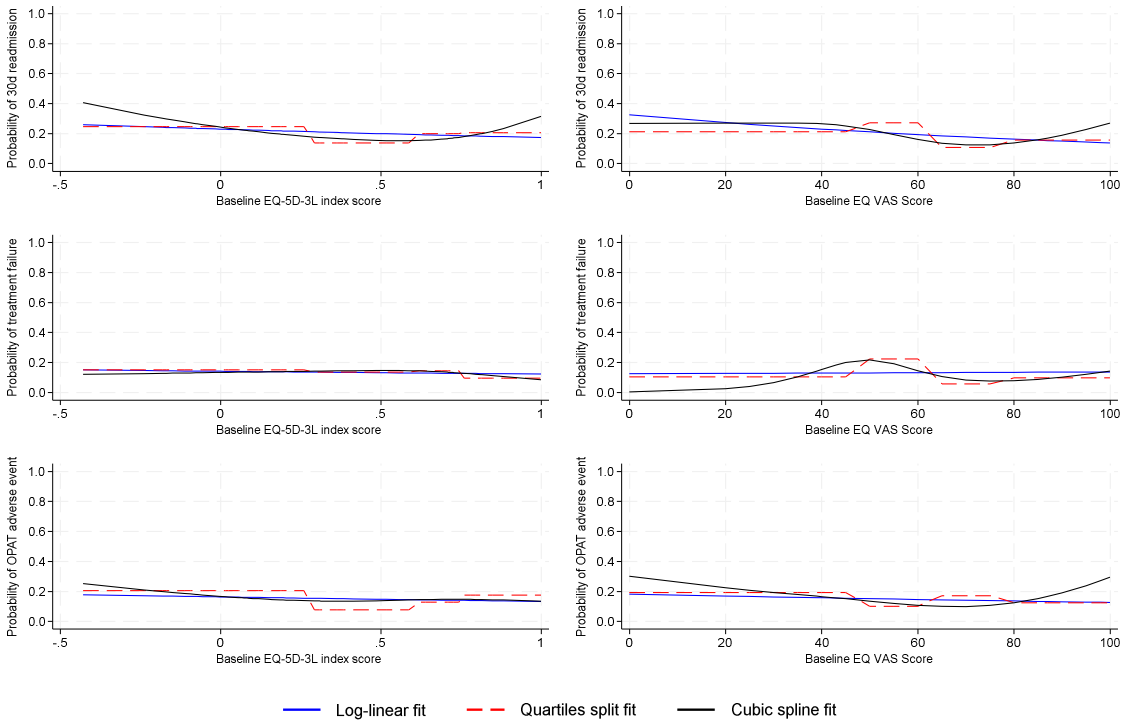
For each outcome, three multivariable robust Poisson regression models were fitted with different functional forms for each covariate (log-linear, categorical based on quartile cut offs, and flexible based on restricted cubic splines with 3 or 4 knots) in the presence of the other covariates. The log-linear form was preferred for further modelling, unless there was substantial deviation from the other functional forms and a restricted cubic spline was used.



OPAT, outpatient parenteral antimicrobial therapy

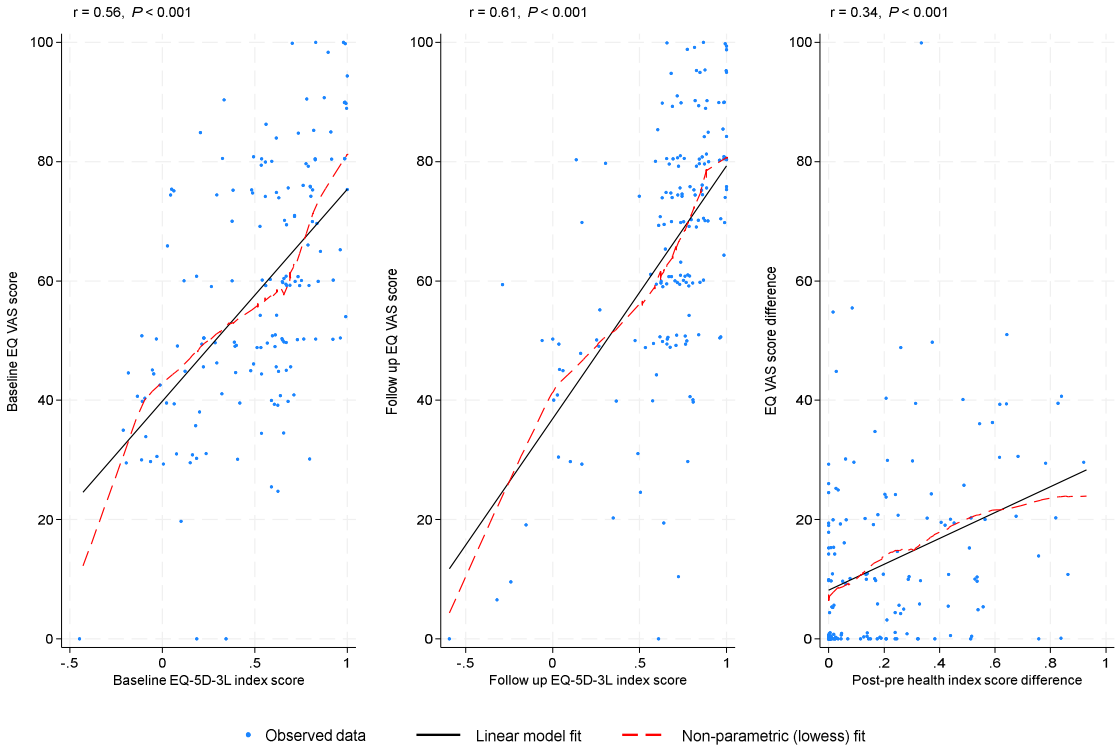
Supplementary Fig. 5. Graphical assessment of linearity of the relationship between clinical outcomes (30-day unplanned readmission, treatment failure, and OPAT adverse event) and two continuous indicators of health-related quality of life (EQ-5D-3L index and EQ VAS scores).

For each outcome, three multivariable robust Poisson regression models were fitted with different functional forms for each HRQoL indicator (log-linear, categorical based on quartile cut offs, and flexible based on restricted cubic splines with 4 knots), adjusting for baseline covariates (age, Charlson comorbidity index, and clinical frailty score). The log-linear form was selected as a good approximation for modelling the relationship between HRQoL indicators and clinical outcome for all outcomes.



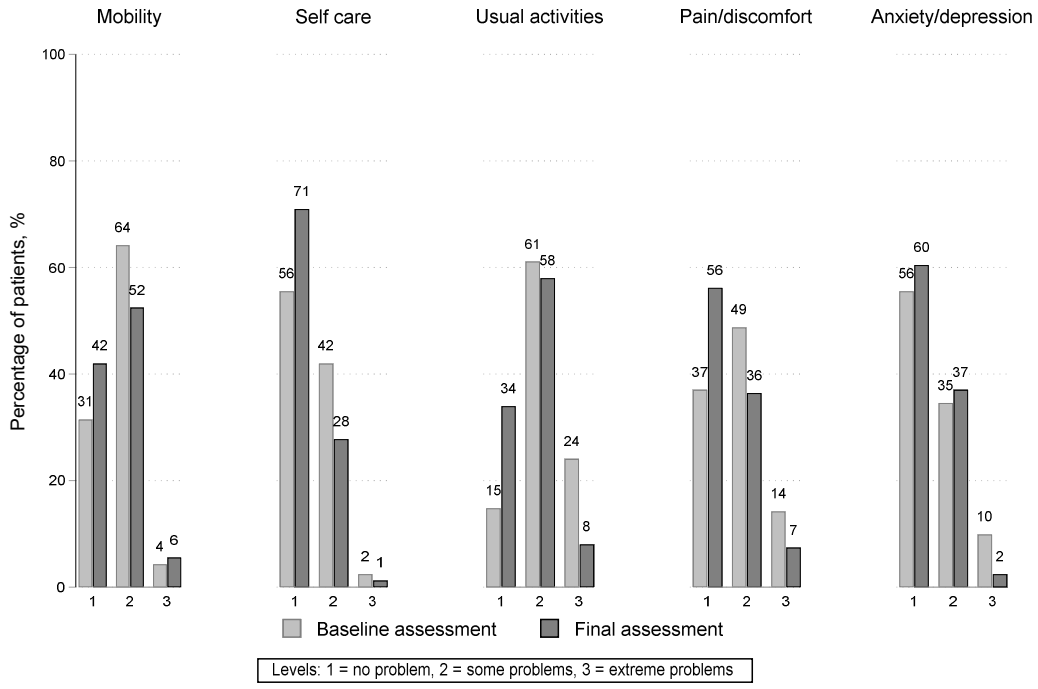
HRQoL, health-related quality of life; OPAT, outpatient parenteral antimicrobial therapy; VAS, visual analogue scale

Supplementary Fig. 6. Linear correlations of EQ-5D-3L index and EQ VAS scores (N = 162) at baseline and follow up assessments.



VAS, visual analogue scale

Supplementary Fig. 7. EQ-5D-3L descriptive system for patients (N = 162) at both baseline and at final assessments.



.