Supplementary 1, Table S1. Included studies

Authors **Title** **Journal, Year** **Country**	**Study design** **Population** **Therapeutic agent** **Diluent and dosage**	**Stability data** **Clinical efficacy**
Clarkson AM, Snape S. Clinical Effectiveness of Continuous Infusion Flucloxacillin in the Outpatient Parenteral Antimicrobial Therapy (OPAT) Setting in a UK Hospital: A Service Evaluation. Antibiotics (Basel), 2024 UK	Retrospective service evaluation 39 patients with complicated MSSA infections Continuous infusion of flucloxacillin 230 mL in 0.3% w/v citrate-buffered NaCl 0.9%	Not assessed Success rate: 74% (n = 29/39); Failure rate: 5% (n = 2/39); Partial success (complicated): 21% (n = 8/39). AEs: Total: 20.5% (n = 8/39); AKI: n = 3, Rash: n = 1; Axillary vein thrombosis: n = 1; Catheter-associated phlebitis: n = 1; Nausea: n = 1; Change of treatment due to new culture (Pseudomonas): n = 1. Relapse within 12 months: n = 2 (5%) 1 due to reintroduction of methotrexate, 1 following source control failure requiring further 12 weeks of IV therapy. Mortality (12-month follow-up): n = 1 (not treatment-related; due to Gram-negative bacteraemia and hepatocellular carcinoma)
Durojaiye OC, Cole J, Kritsotakis EI Effectiveness and safety of a disposable elastomeric continuous infusion pump for outpatient parenteral antimicrobial therapy (OPAT) in a UK setting J Chemother. 2024 UK	Retrospective cohort study 340 patients (432 episodes). Respiratory infections: 38.0% (n = 164/432); Bone and joint infections: 34.5% (n = 149/432); Necrotising otitis externa: 11.6% (n = 50/432); Spinal infections: 8.3% (n = 36/432); Endovascular infections: 3.9% (n = 17/432); Intra-abdominal infections: 1.6% (n = 7/432); Urinary tract infections: 1.4% (n = 6/432); Bacteraemia without focus: 0.7% (n = 3/432) Flucloxacillin or piperacillin/tazobactam Flucloxacillin: NR Piperacillin/Tazobactam: 0.9% NaCl, 13.5 g/24h	Not assessed Success rate: 84.3% (n = 364/432); Failure rate: 15.7% (n = 68/432, unrelated to OPAT) 30-day unplanned hospitalisation: 27.1% (n = 117/432, due to non-OPAT-related events) AEs: Total: 17.8% (n = 77/432; 81 events); Vascular access-related: n = 48 (59.3% of AEs; 4.6 events/1000 OPAT-days); Catheter migration: n = 25; Catheter-related thrombosis: n = 2 (0.5%); Line-related infection: n = 1 (0.2%); Medication-related: n = 33 (7.6%; 3.2 events/1000 OPAT-days). Major AEs: n = 29 (6.7%; 2.8 events/1000 OPAT-days). No device-related complications reported. Incomplete infusions: 38.2% (n = 165/432). No significant difference in success rate compared to complete infusions (83.2% vs 86.1%; p = 0.42).
Fernández-Rubio B, Herrera-Hidalgo L, López-Cortés LE, Luque-Márquez R, De Alarcón A, Luque-Pardos S, Fernández-Polo A, Gutiérrez-Urbón JM, Rodríguez-Baño J, Gil-Navarro MV, Gutiérrez-Valencia A Stability of temocillin in outpatient parenteral antimicrobial therapy: is it a real option? J Antimicrob Chemother. 2023 Spain	Experimental stability study NA Temocillin 6 g daily, diluted in 500 mL 0.9% NaCl, final concentration of 12 g/L, stored in polypropylene infusion bags and polyisoprene elastomeric devices at different temperatures	Stability was assessed using LC-MS/MS following FDA guidelines for drug stability evaluation. Temocillin remained chemically stable for 72 hours at 4°C, 25°C, and 32°C in both polypropylene infusion bags and polyisoprene elastomeric pumps. At 37°C, stability was maintained for 24 hours before dropping below 90%. No precipitation was observed, but minor color changes occurred at higher temperatures. Not assessed
Fernández-Rubio B, Herrera-Hidalgo L, de Alarcón A, Luque-Márquez R, López-Cortés LE, Luque S, Gutiérrez-Urbón JM, Fernández-Polo A, Gutiérrez-Valencia A, Gil-Navarro MV Stability Studies of Antipseudomonal Beta Lactam Agents for Outpatient Therapy	Experimental stability study NA Aztreonam, Cefepime, Cefiderocol, Ceftazidime, Ceftazidime/Avibactam, Ceftolozane/Tazobactam, Meropenem, Meropenem/Vaborbactam, Piperacillin/Tazobactam	The study followed FDA guidelines for drug stability assessments. Antibiotics were considered chemically stable if ≥90% of the initial drug concentration was retained. At 4°C: All antibiotics remained stable for 72 hours. At 25°C: All except cefepime, ceftazidime, and ceftazidime/avibactam were stable for 72 hours (these three were stable for 48 hours). At 32°C: • Cefepime stable for 48 hours • Ceftazidime and ceftazidime/avibactam stable for 30 hours

Pharmaceutics. 2023 Spain	All antibiotics were diluted in 0.9% NaCl. Aztreonam: 6 g/day (final concentration 12 g/L); Cefepime: 6 g/day (final concentration 12 g/L); Cefiderocol: 6 g/day (final concentration 12 g/L); Ceftazidime: 6 g/day (final concentration 12 g/L); Ceftazidime/Avibactam: 6/1.5 g/day (final concentration 12/3 g/L); Ceftolozane/Tazobactam: 6/3 g/day (final concentration 12/6 g/L); Meropenem: 6 g/day (final concentration 12 g/L); Meropenem/Vaborbactam: 6/6 g/day (final concentration 12/12 g/L); Piperacillin/Tazobactam: 16/2 g/day (final concentration 32/4 g/L)	• Cefiderocol stable for 24 hours • Meropenem and meropenem/vaborbactam stable for 12 hours At 37°C: • Only aztreonam and piperacillin/tazobactam remained stable for 72 hours • Meropenem and meropenem/vaborbactam were unstable at all time points Not assessed
Giuliano G, Tarantino D, Tamburrini E, Nurchis MC, Scoppettuolo G, Raffaelli F Outpatient parenteral antibiotic therapy (OPAT) through elastomeric continuous infusion pumps in a real-life observational study: Characteristics, safety, and efficacy analysis. Enferm Infecc Microbiol Clin (Engl Ed). 2024 Italy	Retrospective observational cohort study 94 patients: bone/prosthetic infections: 28.8%, skin/soft tissue infections: 14.9%, bloodstream infections: 14.9% Cefepime (34.0%), Piperacillin/Tazobactam (30.9%), Ceftolozane/Tazobactam (7.5%), Oxacillin (7.5%), Meropenem (6.4%), Ceftazidime (3.2%), Cefazolin (3.2%), Colistin (3.2%), Ceftazidime/Avibactam (2.1%), Acyclovir (2.1%) Acyclovir: 2.9–3.3 mg/mL (NaCl), Cefazolin: 25 mg/mL (NaCl or DW5%), Cefepime: 25 mg/mL (NaCl or DW5%), Ceftazidime: 25 mg/mL (NaCl or DW5%), Ceftazidime/Avibactam: 25 mg/mL (NaCl), Ceftolozane/Tazobactam: 18.75–37.5 mg/mL (NaCl), Colistin: 37,000 IU/mL (NaCl), Meropenem: 8 mg/mL (NaCl), Oxacillin: 50 mg/mL (NaCl or DW5%), Piperacillin/Tazobactam: 56 mg/mL (NaCl or DW5%)	Not assessed Success rate: 88.3% (n = 83/94); Partial success (clinical improvement without confirmed cure): 6.4% (n = 6/94); Therapeutic failure: 3.2% (n = 3/94); Relapse: 2.1% (n = 2/94). Median inpatient treatment duration before OPAT: 14 days (IQR 10–23); Median OPAT treatment duration: 15 days (IQR 8.5–30). Completion of full therapeutic course: 91.4% (n = 86/94). AEs: Total complications: 12.8% (n = 12/94); Drug-related AEs: 6.4% (n = 6); Rash: n = 4 (4.3%); Clostridioides difficile infection: n = 1 (1.1%); Elevated liver function tests: n = 1 (1.1%); Catheter-related AEs: 6.4% (n = 6); Thrombosis: n = 4 (4.3%); Catheter rupture: n = 1 (1.1%); Catheter-related bloodstream infection: n = 1 (1.1%). Hospital readmissions: Total: 10.6% (n = 10/94); Related to infection: n = 5 (5.3%); Related to comorbidities: n = 4 (4.3%); Related to OPAT complication: n = 1 (1.1%)
Giuliano G, Tarantino D, Tamburrini E, Nurchis MC, Scoppettuolo G, Raffaelli F Effectiveness and safety of Ceftolozane/Tazobactam administered in continuous infusion through elastomeric pumps in OPAT regimen: a case series Infect Dis (Lond). 2024 Italy	Retrospective case series 7 patients with Pseudomonas aeruginosa infections (71% of isolates were MDR, 29% were DTR). Prosthetic joint infection: n = 3 (43%); Osteomyelitis: n = 2 (29%); Otomastoiditis: n = 1 (15%); Pneumonia: n = 1 (15%). Ceftolozane/Tazobactam 4.5 g or 9 g per day, diluted in 0.9% NaCl, final concentration: 18.75–37.5 mg/mL	Not assessed Success rate: 86% (n = 6/7 patients achieved clinical resolution of infection); Failure rate: 14% (n = 1/7) Median treatment duration: 37 days (IQR 25–42) [71% (n = 5/7) started therapy as inpatients for a median of 19 days (IQR 12–21) before switching to OPAT. 29% (n = 2/7) started OPAT directly following prior inappropriate outpatient antibiotic therapy.] AEs: Total: 29% (n = 2/7); Peri-catheter thrombosis: n = 1; Catheter-related bloodstream infection: n = 1; catheter removed and appropriate therapy initiated. No drug-related AEs reported.
Kamalpersad K, Luna G, Sunderland B, Czarniak P An Evaluation of Amoxicillin/Clavulanate Stability in Aqueous Systems, Including Its Suitability for Outpatient Parenteral Antimicrobial Therapy (OPAT)	Experimental stability study NA Amoxicillin/Clavulanate	Retention of ≥90% of the initial concentration was considered stable, referring to United States Pharmacopeia. Low concentration (1 mg/mL amoxicillin, 0.2 mg/mL clavulanate): • Shelf-life at 40°C: 4.85 hours for amoxicillin, 1.38 hours for clavulanate • Shelf-life at 25°C: 22.8 hours for amoxicillin, 4.0 hours for clavulanate • Lowering pH from 8.73 to 6.52 increased shelf-life at 2.9°C from 72 hours to >263.8 hours Intermediate concentration (7.5 mg/mL amoxicillin, 1.5 mg/mL clavulanate):

Drug Des Devel Ther. 2024 Australia	Diluition 0.9% NaCl with pH adjustment using 10M hydrochloric acid, from 1 mg/mL to 0.2 mg/mL (pH adjusted from 8.73 to 6.52), to 15 mg/mL / 3 mg/mL (pH adjusted from 8.68 to 8.40)	• Shelf-life at 40°C: 2.74 hours for amoxicillin, 1.03 hours for clavulanate • Lowering pH from 8.85 to 7.69 increased shelf-life at 2.9°C from 4.2 hours to 51.8 hours for amoxicillin and from 4.2 hours to 48.0 hours for clavulanate High concentration (15 mg/mL amoxicillin, 3.0 mg/mL clavulanate): • Shelf-life at 40°C: 0.11 hours for amoxicillin, 0.41 hours for clavulanate • Shelf-life at 25°C: Too short for OPAT feasibility • Shelf-life at 2.9°C: 3.8 hours for amoxicillin, 1.6 hours for clavulanate • Lowering pH further caused precipitation, limiting feasibility for OPAT Not assessed
Loeuille G, D'Huart E, Vigneron J, Nisse Y-E, Beiler B, Polo C, Ayari G, Sacrez M, Demoré B, Charmillon A. Stability Studies of 16 Antibiotics for Continuous Infusion in Intensive Care Units and for Performing Outpatient Parenteral Antimicrobial Therapy Antibiotics, 2022 France	Experimental physicochemical stability study NA 16 antibiotics including: Amoxicillin, Aztreonam, Cefazolin, Cefepime, Cefiderocol, Cefotaxime, Cefoxitin, Ceftazidime, Ceftazidime/Avibactam, Ceftolozane/Tazobactam, Cloxacillin, Meropenem, Piperacillin, Piperacillin/Tazobactam, Temocillin, Vancomycin Syringes: prepared at high concentrations in NaCl, DW5% or SWFI Elastomeric devices: solutions prepared for 120 or 240 mL at 37°C	Defined as ≥90% of initial drug concentration + absence of color/precipitate. In elastomeric devices at 37°C: • 48h: Aztreonam, Vancomycin • 24h: Piperacillin/Tazobactam (DW5%), Temocillin (NaCl) • 8–12h: Ceftolozane/Tazobactam, Ceftazidime/Avibactam (NaCl), Piperacillin/Tazobactam (NS) • <8h or unstable: Meropenem, Cefotaxime, Cefazolin, Cloxacillin, Cefoxitin Not assessed
Manca A, Palermiti A, Mula J, Cusato J, Maiese D, Simiele M, De Nicolò A, D'Avolio A Stability Study of Fosfomycin in Elastomeric Pumps at 4 °C and 34 °C: Technical Bases for a Continuous Infusion Use for Outpatient Parenteral Antibiotic Therapy Pharmaceutics. 2023 Italy	Experimental stability study NA Fosfomycin Fosfomycin disodium (InfectoFos®). Diluition SWFI and DW 5%	At 4°C (storage temperature before administration): • Fosfomycin remained stable for at least 5 days • No significant degradation was observed within this timeframe At 34°C (external body temperature during administration): • Stable for 6 days at a 16 g/250 mL concentration in elastomeric pumps • At 24 g/250 mL concentration, stability exceeded 9 days (study limit), indicating potential for extended use • On Day 5, degradation was -2.9% (SD 5.8%) for 16 g/250 mL and -1.6% (SD 5.3%) for 24 g/250 mL • On Day 9, degradation was -12.9% (SD 4.5%) for 16 g/250 mL and -4.9% (SD 5.5%) for 24 g/250 mL Not assessed
Nosrati A, Ch'en PY, Torpey ME, Shokrian N, Ball G, Benesh G, Andriano TM, Zhu TR, Heibel HD, Hosgood HD, Campton KL, Cohen SR Title: Efficacy and Durability of Intravenous Ertapenem Therapy for Recalcitrant Hidradenitis Suppurativa JAMA Dermatology, 2024 USA	Retrospective cohort study 98 with recalcitrant hidradenitis suppurativa Ertapenem 1 g IV daily via a 100-mL elastomeric pump (Avanos Medical, Inc.), self-administered at home through a PICC for 12–16 weeks. Diluent NR	Not assessed Significant clinical improvements from baseline to posttherapy follow-up: hidradenitis Suppurativa Physician Global Assessment score: Improved from 3.9 (SD 1.0) to 2.7 (SD 1.2) (P < .001); numerical rating scale for pain (0–10 scale): Decreased from 4.2 (SD 3.3) to 1.8 (SD 2.7) (P < .001); C-reactive protein: from 5.4 mg/dL (SD 11.4) to 2.4 mg/dL (SD 2.0) (P < .001); Interleukin-6 (IL-6): from 25.2 pg/mL (SD 21.1) to 13.7 pg/mL (SD 13.9) (P < .001); leukocyte count: from 11.34 (SD 3.9) to 10.0 (SD 3.4) (P < .001). Patient Satisfaction: 78% of patients (76/98) participated in a follow-up survey. 80.3% reported medium-to-high satisfaction with treatment. 90.8% would recommend ertapenem therapy to others. AEs: 9.2% PICC line complications requiring replacement; 7.1% developed dermatitis at the PICC insertion site; 8.2% experienced diarrhea, 5.1% nausea, 2% headaches, 1% candidiasis, and 1% syncope.
Rentsch KM, Khanna N, Halbeisen D, Osthoff M	Experimental in vitro stability study + in vivo TDM	Unbuffered benzylpenicillin degraded significantly even at refrigerated temperatures (2–8°C). After 7 days at 4°C, only 81% of the original concentration remained. After 8 days, the drug was completely degraded and undetectable.

Enhancing Stability and Investigating Target Attainment of Benzylpenicillin in Outpatient Parenteral Antimicrobial Therapy: Insights from In Vitro and In Vivo Evaluations Antibiotics (Basel). 2024 Switzerland	5 patients for conditions such as infective endocarditis Benzylpenicillin Benzylpenicillin administered at 10 MIU, 20 MIU, or 40 MIU concentrations. Diluents NaCl 0.9% or sodium citrate solution plus NaCl 0.9%	Buffered benzylpenicillin (sodium citrate) was much more stable: At 4°C for 7 days, degradation was ≤2.2% across all concentrations. At 37°C for 24 hours, stability was ≥94.9% for all concentrations: • 10 MIU: 97.6% (±1.3%) remaining • 20 MIU: 96.3% (±0.8%) remaining • 40 MIU: 94.9% (±1.1%) remaining At 37°C for 48 hours, degradation increased: • 10 MiIU: 86% remaining • 20 MIU: 81% remaining • 40 MIU: 63% remaining Degradation products included penicilloic acid, penillic acid, and penilloic acid, known to be allergenic and toxic at high concentrations. TDM in 5 patients: Continuous infusion resulted in sufficient-to-high plasma levels of benzylpenicillin; levels in intermittent bolus dosing were suboptimal (0.5–6.6 mg/L); during OPAT, levels increased to 7.2–60 mg/L, ensuring sustained efficacy; no significant inter-individual variability was found (p = 0.85); benzylpenicillin was well-tolerated, but one patient with renal impairment showed an 18% increase in creatinine levels
Rodríguez SF, Legaspi YC, Romay LEM, Ayuso García B, Castellano Copa P, Peinó Camba P, Barcia Losada A, Rodríguez Díaz C Retrospective Study of Home Antibiotic Infusion Therapy in Elastomeric Infusion Pumps. Farmacia Hospitalaria, 2024 Spain	Retrospective observational study 81 patients: respiratory infections (27.2%), bacteremia (16%), skin and soft tissue infections (12.3%), urinary tract infections (11.1%), endocarditis (9.9%), osteoarticular infections (7.4%), intra-abdominal infections (3.7%), CNS infections (1.2%) Ampicillin (7.4%), Cefazolin (16%), Cefepime (3.7%), Ceftaroline (1.2%), Ceftazidime (24.7%), Ceftazidime/Avibactam (3.7%), Meropenem (10%), Piperacillin/Tazobactam (33.3%). Diluition NR	Not assessed Success rate: 85.2% (n=69/81) Microbiological findings: Pseudomonas aeruginosa was the most frequently isolated pathogen (39.6%), Enterobacteriaceae were present in 23.6% of cases (including E. coli, K. pneumoniae, Morganella morganii), MRSA was rare (n=1), while MSSA was isolated in 11 patients. Therapeutic failure: 22.2% within 30 days AEs: 16% of patients experienced venous access complications (extravasation, loss of IV line, mild phlebitis), nephrotoxicity (n=1) sage adjustment.
Schmidt-Hellerau K, Baade N, Günther M, Scholten N, Lindemann CH, Leisse C, Oberröhrmann C, Peter S, Jung N, Suarez I, Horn C, Ihle P, Küpper-Nybelen J, Hagemeier A, Hellmich M, Lehmann C. Outpatient parenteral antimicrobial therapy (OPAT) in Germany: insights and clinical outcomes from the K-APAT cohort study. Infection. 2024 Germany	Prospective observational cohort study 77 patients (Joint and bone infections (26%), Staphylococcus aureus bloodstream infections (21%), Infectious endocarditis (14%), Neurosyphilis (12%), Pulmonary infections (4%), Other severe infections (32%). Caspofungin (4%), Cefazolin (5%), Ceftriaxone (13%), Flucloxacillin (23%), Fosfomycin (5%), Meropenem (8%), Penicillin G (17%), Vancomycin (10%), Others (22%). Diluition NR	Not assessed Cured at end of OPAT: 66% (49/74 patients); Switched to oral sequential therapy: 28%, Treatment failure: 0%, Mortality during OPAT: 4% (3 patients), Lost to follow-up: 4% (3 patients). AEs: Severe catheter-related complications in 5% of patients (mostly related to PICC line displacements), No diagnosed catheter-related infections, Rehospitalization rate: 21% before completion of OPAT, with 56% of these cases related to the underlying disease.
Sime FB, Wallis S, Jamieson C, Hills T, Gilchrist M, Santillo M, Seaton RA, Drummond F, Roberts J Evaluation of the Stability of Temocillin in Elastomeric Infusion Devices Used for Outpatient Parenteral Antimicrobial Therapy in Accordance	Experimental stability study NA Temocillin	At 5°C (Refrigerated Storage): • Stable for 14 days in both elastomeric devices across all concentrations. • Percentage of temocillin remaining exceeded 97% in all conditions. At 32°C (In-Use Temperature for 24 h): • Maintained >95% stability for at least 12 hours at all concentrations. • High concentration (25 mg/mL) in the Dosi-Fusor device only met this criterion for 10 hours.

with the Requirements of the UK NHS Yellow Cover Document European Journal of Hospital Pharmacy, 2023 United Kingdom	Reconstitution with 30 mM sodium phosphate buffer solution at pH 7	• After 24 hours, degradation remained <9% for all devices and concentrations. Degradation Products: • Five degradation peaks were identified, corresponding to penicilloic acid and penillic acid derivatives. • No significant subvisible particle formation was detected. pH Stability: • Maintained pH ~7.0 in refrigerated storage. • Slight pH drop during 32°C exposure, with a final range of 6.26–6.51 after 24 hours. Not assessed

Legend. AKI Acute kidney injury; CNS central nervous system; DTR Difficult to treat-resistant; DW dextrose in water; FDA Food and Drug Administration; h Hours; IV intravenous; LC-MS/MS: Liquid Chromatography-Tandem Mass Spectrometry; MDR multidrug resistant; MRSA Methicillin-Resistant Staphylococcus aureus; MSSA Methicillin-Sensitive Staphylococcus aureus; NA Not applicable; NaCl sodium chloride; NR Not reported; OPAT Outpatient Parenteral Antimicrobial Therapy; PICC Peripherally Inserted Central Catheter; RT Room Temperature; SD standard deviation; SWFI Sterile Water for Injection; TDM therapeutic drug monitoring; YCD Yellow Cover Document.