

**Supplementary tables:****Supplementary table 1 Costing model assumptions**

No	Assumption	Source/Justification
1	All patients with long term infections are assessed on admission and upon discharge by a specialist consultant. Patients spend 30 minutes with a specialist consultant and 1h with a nurse at initial and final assessment.	BSAC good practice recommendations (3.1-3.15); communication with clinical experts in OPAT.
2	Skin and soft tissue infections are a nurse-led condition unless patient is treated with dalbavancin.	BSAC good practice recommendations (3.1-3.15); communication with clinical experts in OPAT.
3	All patients with complex UTI are assessed by a consultant once.	BSAC good practice recommendations (3.1-3.15); communication with clinical experts in OPAT.
4	All patient are allocated 15 minutes of pharmacist time per treatment episode.	BSAC good practice recommendations (3.1-3.15); communication with clinical experts in OPAT.
5	Laboratory tests including UE, LFT, FBC, C-reactive protein are done at initial and final assessment and once weekly for longer-term infections. Patients treated with teicoplanin receive weekly teicoplanin levels blood tests.	BSAC good practice recommendations (4.4); personal communication with clinical experts in OPAT.  Type of tests might vary with the choice of antimicrobial
6	All patients requiring longer term treatment (more than 7 days), are assessed weekly at a MDT meeting. This is approx. 5 minutes of consultant, pharmacist and specialist nurse time per patient.	BSAC good practice recommendations (4.2); personal communication with clinical experts in OPAT
7	Each daily visit to outpatient clinic lasts 40 minutes during which a band 6 nurse examines the patient, prepares and administers medication. A nurse visiting patient's home would spend the equivalent amount of time.	Personal communication with clinical experts in OPAT  This might be a conservative approach given that some antimicrobials are administered in 2-3 minutes.
8	Patients with infections requiring longer-term treatment who self-administer, visit the clinic once weekly for a check-up with a nurse and to have blood work done.	BSAC good practice recommendations (4.3); assumption
9	Patients who self-administer with bolus IV receive 3 training sessions with a nurse (50:50 split band 5/band 6), each lasting 1 h. Patients who self-administer with elastomeric device receive 1 training session.	Personal communication with clinical experts in OPAT. Assumption BSAC good practice recommendations (3.13);

10	Single-use elastomeric devices administered in an outpatient setting (CIVI) are filled up by hospital staff (approximately 15 minutes of nurse's time).	Assumption; Expert opinion;
11	Single-use elastomeric devices used for self-administration are commercially pre-filled.	Assumption; Expert opinion;
12	Consumables: each patient receives 1 PICC line; per administration: 1 apron, 1 pair of gloves, 4 needles, 4 syringes, 1 pre-injection swab, 3 0.9% sodium chloride ampoules;	Personal communication with clinical experts in OPAT. Assumption Varies with method of administration
13	A nurse travelling to patients home would spend 33 minutes (non-patient contact time) per journey travelling with an ambulance car (£10.63 per journey). This is approximately 11 miles per journey.	ISD Cost book for Scotland. This is an approximation due to lack of available data for distances travelled in OPAT. Distance travelled varies with geographic location. Longer distances might be travelled in the Highlands and islands in Scotland. It was assumed that this estimate for Scotland is relevant to UK.
14	Type and distribution of medicines for each condition in the analysis are based on clinical expert opinion	NORS data do not link conditions to antimicrobials.
15	Cost of linezolid comes from eMIT; all other costs of antimicrobials come from the BNF (cheapest tariff)	A generic version of linezolid is used in OPAT but this is not reflected in the BNF. The BNF cost is substantially higher.
16	Antimicrobials requiring more than once daily administration (temocillin, ceftazidime, meropenem and piperacillin with tazobactam) are assumed to be self-administered (bolus IV) only.	More than once daily visit (hospital or nurse home visit) in OPAT are not primarily available options in clinical practice.
17	Piperacillin with tazobactam, flucloxacillin and ceftriaxone are administered with commercially pre-filled elastomeric device in the six conditions included in the analysis. Only piperacillin with tazobactam and flucloxacillin can be administered with elastomeric device filled up by hospital staff.	BSAC good practice recommendations (3.12); Clinical expert opinion;
18	For bronchiectasis: patients can travel daily to outpatient clinic for piperacillin with tazobactam (with buffered saline) to be administered as continuous IV with elastomeric device; Although the same model of care with piperacillin with tazobactam is available for the treatment of intra-abdominal infections, for simplicity only ertapenem was assumed to be used if patients attend clinic daily in the outpatient service delivery model. A CIVI as outpatient model is shown separately.	An assumption was made that if a patient attends the OPAT clinic daily or is visited by a nurse, the cheapest treatment option will be used in clinical practice. In the case of treating intra-abdominal infections, ertapenem once daily is cheaper than continuous piperacillin with tazobactam with elastomeric device.  In patients with bronchiectasis, continuous piperacillin with tazobactam with elastomeric device is the only treatment option in the hospital or nurse daily visits OPAT service delivery models.

19	The cost of empty elastomeric devices is based on the average cost of 2 commercially available devices assuming equal market share	BSAC good practice recommendations (3.12); Clinical expert opinion;
20	A patient would spend the equivalent amount of time in hospital care in absence of OPAT	Clinical expert opinion
21	A patient has a small probability (0.064) to be re-admitted to hospital half-way during their treatment in OPAT	Clinical effectiveness data; Clinical expert opinion
22	Condition-specific HRG cost per excess bed day in hospital to estimate the cost of inpatient stay	<p>The true cost per day of inpatient stay of patients who are eligible for OPAT is unknown. NHS England reference costs are considered a standard source of cost estimates associated with certain diagnoses or interventions. However, costs are presented as per episode of average treatment duration and cost of excess bed days if treatment goes beyond the expected treatment duration (trim point). Due to lack of better evidence, excess bed day costs were considered the best source of costs of inpatient stay for the purposes of this analysis.</p> <p>Condition-specific costs were selected to allow for granularity. However, costs were similar so assuming the same cost for each condition is also a reasonable assumption.</p>

BSAC, British Society for Antimicrobial Chemotherapy; OPAT, Outpatient Parenteral Antimicrobial Therapy ; UTI, urinary tract infections ; UE, urea and electrolytes; LFT, liver function test; FBC, full blood count; MDT, multi-disciplinary team; IV, intravenous ;CIVL, continuous intravenous infusion; ISD, information services division; PICC, peripherally inserted central catheter ; HRG, health resource group ;eMIT, electronic market information tool ; BNF, British National Formulary ;

### Supplementary table 2 Breakdown of infection categories

Infection category	Infection included in this category
<b>Skin and soft tissue infections</b>	Cellulitis
	Other skin and soft tissue infections
<b>Orthopaedic infections (bone and joint)</b>	Prosthetic joint infection (knee)
	Osteomyelitis – native
	Prosthetic joint infection (hip)
	Osteomyelitis - surgically related
	Discitis/vertebral osteomyelitis
	Prosthetic joint infection (other)
	Discitis/vertebral osteomyelitis - device related
	Osteomyelitis (other)
<b>Diabetic foot infections</b>	Osteomyelitis - diabetic foot
	Diabetic foot infection - no osteomyelitis

<b>Complex urinary tract infections</b>	Drug resistant lower urinary tract infections and pyelonephritis
<b>Bronchiectasis</b>	Bronchiectasis
	Other complex respiratory tract infection
<b>Intra-abdominal infections</b>	Gastro-intestinal infection
	Hepatic abscess
	Pelvic abscess

**Supplementary table 3 Condition-specific antimicrobials in OPAT**

<b>Condition</b>	<b>Medication</b>	<b>Distribution</b>
<b>Skin and soft tissue infections (IV)</b>	Ceftriaxone	75%
	Teicoplanin	10%
	Daptomycin	5%
	Flucloxacillin	5%
	Dalbavancin	5%
<b>Orthopaedic; Bone-Joint (IV)</b>	Ceftriaxone	60%
	Teicoplanin	30%
	Ertapenem	10%
<b>Orthopaedic; Bone-Joint (oral)</b>	Ciprofloxacin/Rifampicin	25%
	Levofloxacin/Rifampicin	12.50%
	Co-trimoxazole/Rifampicin	12.50%
	Clindamycin/Rifampicin	12.50%
	Linezolid/ciprofloxacin	12.50%
	Linezolid	25%
<b>Diabetic foot (IV)</b>	Ceftriaxone	45%
	Teicoplanin	10%
	Ertapenem	45%
<b>Diabetic foot (oral)</b>	Clindamycin/Doxycycline	25%
	Clindamycin/Co-trimoxazole	12.50%
	Clindamycin/Ciprofloxacin	12.50%
	Linezolid/ciprofloxacin	12.50%
	Ciprofloxacin/Doxycycline	25.00%
	Levofloxacin/Doxycycline	12.50%
<b>Complex urinary tract infections (IV)</b>	Ertapenem	90%
	Temocillin	10%
<b>Bronchiectasis (IV)</b>	Ceftazidime	70%
	Piperacillin with tazobactam	15%
	Meropenem	15%
<b>Intra-abdominal (IV)</b>	Ertapenem	75%
	Piperacillin with tazobactam	25%

IV, intravenous;

**Supplementary table 4 Unit costs of resources used in OPAT services**

Item	Unit cost	Notes	Source
Medical consultant	£109	Per working hour	PSSRU,2019
Pharmacist band 8a	£67	Per working hour	PSSRU,2019
Nurse band 6	£47	Per working hour	PSSRU,2019
Nurse band 5	£38	Per working hour	PSSRU,2019
Antimicrobial medicine (IV)	Variable*	Condition-specific	BNF,2020, eMIT, 2020
Antimicrobial medicine (oral)	Variable*	Condition-specific	BNF,2020, eMIT, 2020
Laboratory tests	£8	UE,LFT,CRP and FBC	ISD Cost book,2020
Laboratory tests (specialist)	£47	Teicoplanin levels	Expert
Consumables - PICC line	£36	Per patient	National Procurement
Consumables - Butterfly needle	£1	Per administration	National Procurement
Consumables (other)	£1.65	Single use; apron, needles, syringe, pre-injection swab	National Procurement
Elastomeric device; empty	£31	Based on equal market share of two devices (single use)	National Procurement
Elastomeric device; commercially pre-filled (piperacillin with tazobactam; flucloxacillin)	£90	Per administration	Expert
Elastomeric device; commercially pre-filled (ceftriaxone)	£45	Per administration	Expert
Buffered saline	£2	Per administration	Expert
Nurse travel	£11	Per journey - based on average travel of 11 miles	ISD Cost book,2020
Patient transport service	£42	Per journey - based on average travel of 11 miles	ISD Cost book,2020
General cost of using healthcare services (inflated)	£13	Per patient; per day (inflated to 2019 prices using the NHS cost inflation index)	Minton, 2017[3]

\*See tables S5 and S6 for costs of antimicrobials in OPAT

UE, urea and electrolytes; LFT, liver function test; CRP, c-reactive protein test; FBC, full blood count; PSSRU, Personal Social Services Research Unit; BNF, British National Formulary; eMIT, electronic market information tool; ISD, Information Services Division

**Supplementary table 5 Intravenously administered antimicrobials in OPAT**

Medicines (IV) - BNF	Dose in OPAT	Frequency of administration	Cost per pack	Source
Ceftriaxone	2g	Once daily	£19.18	BNF, 2020

Teicoplanin	600mg	Once daily or 1200mg; 3 times per week	£3.93	BNF, 2020
Daptomycin	700mg	Once daily	£60.00	BNF, 2020
Flucloxacillin	8g	24h infusion	£6.00	BNF, 2020
Dalbavancin	1000 mg	One-off	£558.70	BNF, 2020
Ertapenem	1g	Once daily	£31.65	BNF, 2020
Temocillin	2g	every 12 h	£25.45	BNF, 2020
Ceftazidime	2g	3 times a day	£17.59	BNF, 2020
Piperacillin with tazobactam	4.5g/18g	4 times per day/24h infusion	£76.50	BNF, 2020
Meropenem	1g	0.5-1g every 8 hours	£186.70	BNF, 2020

IV, intravenous; BNF, British National Formulary

### Supplementary table 6 Oral antimicrobials for the treatment of orthopaedic and diabetic foot infections in OPAT

Medicines (oral)	Dose in OPAT	Frequency of administration	Cost per pack	Source
Ciprofloxacin	750mg	every 12h	£8.00	BNF,2020
Levofloxacin	500mg	every 12h	£24.50	BNF,2020
Co-trimoxazole	960mg	every 12h	£23.48	BNF,2020
Clindamycin	600mg	every 8h	£38.23	BNF,2020
Linezolid	600mg	every 12h	£7.48	eMIT,2020
Linezolid	600 mg	every 12h	£327.24	BNF, 2020
Doxycycline	100mg	every 12h	£1.64	BNF,2020
Rifampicin	400mg	every 12h	£123.60	BNF,2020
Rifampicin	50mg	every 12h	£54.69	BNF,2020

BNF, British National Formulary

### Supplementary table 7 Condition-specific healthcare resource group (HRG) and bed-day cost of inpatient stay

Condition	HRG code	Description	Cost	Source
SSTI	HD21 D-H	Soft Tissue Disorders with CC Score 0-12+	£387	NHS England Reference costs,2019
Complex UTI	LA04 N-S	Kidney or Urinary Tract Infections, without Interventions, with CC Score 0-13+	£301	
Orthopaedic /Diabetic foot infections	HD25 D-H	Infections of Bones or Joints, with CC Score 13+	£298	
	HE81 A-C	Infection or Inflammatory Reaction, due to, Internal Orthopaedic Prosthetic Devices, Implants or Grafts, with CC Score 0-13+		
Bronchiectasis	DZ23 M-N	Bronchopneumonia without Interventions, with CC Score 0-10	£297	
Intra-abdominal	FD01 F-J	Gastrointestinal Infections without Interventions, with CC Score 8+	£321	

SSTI, skin and soft tissue infections; UTI, urinary tract infections; NHS, National Health Service;

**Supplementary table 8 Total costs of models of care and savings associated with OPAT across all conditions included within the NORS data set**

Model of care	Total costs	Total savings (OPAT)
Inpatient stay	£103,070,256	
OPAT - once daily visits <sup>1</sup>	£33,014,148	£70,056,108
OPAT - nurse home visits	£43,333,446	£59,736,809
OPAT - self-administration (bolus IV)	£26,421,799	£76,648,457
OPAT - self-administration (device) <sup>2</sup>	£31,502,516	£67,578,565

<sup>1</sup>bronchiectasis excluded; <sup>2</sup>complex urinary tract infections excluded;  
OPAT, outpatient parenteral antimicrobial therapy, IV, intravenous;

**Supplementary table 9 Scenario Analyses: Results**

Scenario	SSTI	Complex UTI	Orthopaedic	Diabetic foot	Bronchiectasis	Intra-abdominal
0	25%	36%	30%	32%	44%	32%
1	21%	25%	22%	22%	34%	24%
2	20%	28%	24%	24%	31%	25%
3	33%	52%	40%	44%	77%	46%
4	-	-	21%	21%	-	-
5	28%	-	-	-	-	-
6	74%	-	-	-	-	-
7	76%	-	-	-	-	-

SSTI, skin and soft tissue infections; UTI, urinary tract infections