Outpatient Parenteral Antimicrobial Therapy (OPAT)

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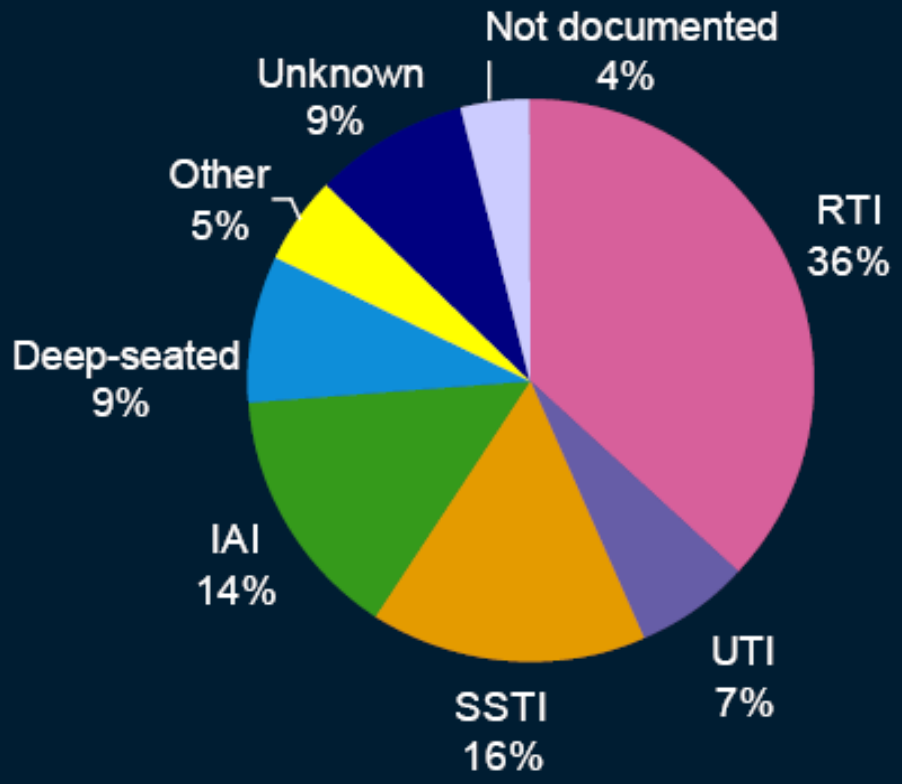
The burden of inpatient i.v. antibiotic therapy

- 1/3 hospital admissions receive antibiotic treatment[1]
- 1/10 receive i.v. antibiotics
  - ~24,000 per million population/yr
- All specialties
  - Integrated part of hospital care
  - Necessitate hospital admission
  - Prolong admission
  - Some could be discharged if they do not require i.v. antibiotic therapy[2]

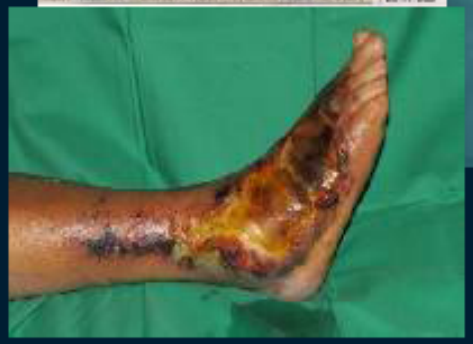
Infection types in acute admissions receiving i.v. antibiotics (n=381)[1]

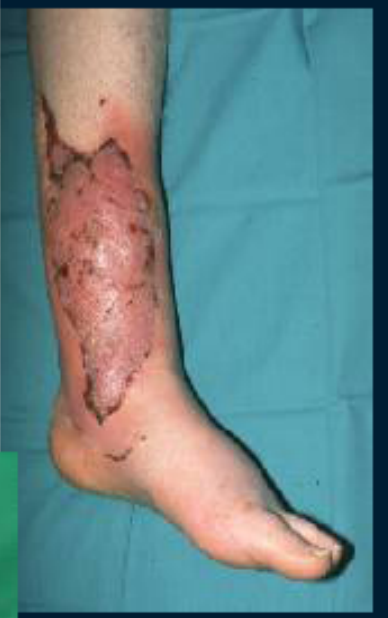


1. Seaton RA *et al. Int J Antimicrob Agents* 2007;29:693–699
2. McLaughlin C *et al. Q J Med* 2005;98:745–752

Risks associated with hospitalization

- Hospital-acquired infection (nosocomial)
  - 5% of patients admitted in the US[1]
  - 9.5% in UK[2]
  - Increases with each day of hospitalization[1]
  - 70% increase in length of stay[2]
- Increasing resistance
  - Methicillin-resistant staphylococci[2]
  - Vancomycin-resistant enterococci[3]
  - Gram-negative bacteria[4]





1. Nathwani D *et al*. *J Antimicrob Chemother* 2002;49:149–154
2. Health Protection Scotland. 2007. Available at: http://www.hps.scot.nhs.uk/index.aspx
3. Karchmer AW. *Clin Infect Dis* 2000;31 (Suppl 4):S139–S143
4. Murray BE. *N Engl J Med* 2000;342:710–721
5. Chastre J. *Clin Microbiol Infect* 2008;14 (Suppl 3):3–14

Global problem of multidrug resistance: ESKAPE

- ***E****nterococcus faecium:* VRE
- ***S****taphylococcus aureus:* MRSA, GISA
- ***K****lebsiella pneumoniae:* ESBL, CPE (VIM, KPC, OXA-48..)
- ***A****cinetobacter baumannii:* Carba -R (OXA..), (MDR, PDR, XDR)
- ***P****seudomonas aeruginosa:* Carba -R, (MDR, PDR, XDR)
- ***E****nterobacteriaceae:* ESBL, CPE (NDM, OXA-48..)

- In all healthcare sectors, travel importation and local spread
- Large diffusion of resistance (successful clones, horizontal transfer of mobile genetic elements

OPAT within an antimicrobial stewardship program

- **Initiation of oral antibiotics with high bioavailability upon hospital admission in stable patients able to absorb oral medication, instead of the paradigm that every severe infection/hospital admission equates parenteral therapy**
- **Early IV → oral switch (eg moxi in CAP 3)**
- **Even oral consolidation therapy possible in selected patients with infections judged to need a full parenteral treatment course (POET trial in infective endocarditis, NEJM 2019; septic arthritis)**

Promotion of IV to oral switch: repeat the message

OPAT within an antimicrobial stewardship program

- Initiation of oral antibiotics with high bioavailability upon hospital admission in stable patients able to absorb oral medication, instead of the paradigm that every severe infection/hospital admission equates parenteral therapy
- Early IV → oral switch
- PK/PD optimisation of both IV and oral ab
- OPAT in stable patients without other reasons for prolonged admission

Aim of OPAT

Safe and effective delivery of parenteral antimicrobial therapy in more patient friendly, comfortable and safer (decreased risk of nosocomial pathogen transmission) environments (home, day hospital)

Without the burden, complications and excess costs of prolonged hospitalisation

Providing an OPAT service

Patient considerations	Antibiotic properties	Healthcare support requirements[1,2]

▪ Medically stable
  ▪ Infection
  ▪ Co-morbidity
▪ Low risk of complications
▪ Infection responding to treatment/low risk of deterioration
▪ Ease of access to hospital
▪ Home support available
	▪ Proven efficacy
	▪ Good safety/ tolerability
	▪ No/little need for therapeutic drug monitoring
	▪ Long half-life
	▪ Short administration time
	▪ Stable when reconstituted
		▪ Efficient communication among healthcare teams
		▪ Clear guidelines/ procedures
		▪ Outcomes monitoring

1. Nathwani D *et al*. *Clin Microbiol Infect* 2000;6:464–467
2. Tice AD *et al*. *Clin Infect Dis* 2004; 38:1651–1672

Variable OPAT infrastructure and attitudes in Europe

	France	Germany	Greece	Italy	Spain	UK
Outpatient clinics exist	✓✓	✓✓	✓	✓✓	✓✓	✓✓
In-home infrastructure for i.v. admin	✓✓	x	x	? (not 'legal' but occurs)	✓ (varies by region)	✓✓ (varies by region)
Cultural attitudes support theoretical concept overall	+	–	+/–	+/–	+	+

TNS Healthcare. Market research data. 2008

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Table 1 Main types of infection treated in OPAT units.

Type of infection	Clinical picture
Cardiovascular infections	Native and prosthetic valve endocarditis; endovascular device infection
Respiratory infections	Worsening of COPD; infected bronchiectasis; community-acquired and nosocomial pneumonia; lung abscess
Intra-abdominal infections	Cholecystitis, diverticulitis, intra-abdominal collections
Urinary tract infections	Pyelonephritis; perirenal abscesses; prostatitis; complicated cystitis in catheterized; urinary tract infections in patients with ureteral devices (pigtails, or double J stents)
Skin and soft tissue infections	Primary infections (cellulitis, pyomyositis), secondary infections (surgical wound infection, diabetic ulcers, pressure ulcers)
Osteoarticular infections	Bursitis; septic arthritis; primary osteomyelitis and spondylodiscitis; osteomyelitis and spondylodiscitis in patients with osteosynthesis material
Bacteraemias	Febrile neutropenia (MASSC low risk), bacteraemia from any source
Neurological infections	Meningitis, brain abscess

OPAT: outpatient parenteral antimicrobial therapy. COPD: chronic obstructive pulmonary disease, MASSC: Multinational Association for Supportive Care in Cancer

F. J. Candel, et al.

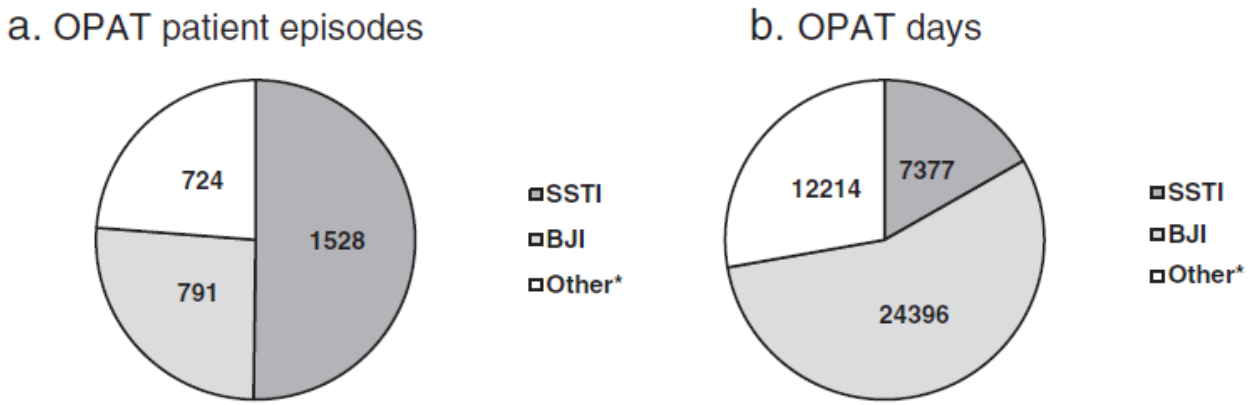


Fig. 2. Distribution of patients within the Glasgow OPAT service (2001–2011). SSTI: skin and soft tissue infection, BJI: bone and joint infection, "Other" includes bacteraemia or endocarditis, meningitis, syphilis, lower respiratory tract infection, urinary tract infection, tuberculosis and other mycobacterial infections, enteric fever, miscellaneous other infections and outpatient administration of other parenteral substances (e.g. heparin, blood, bisphosphonates).

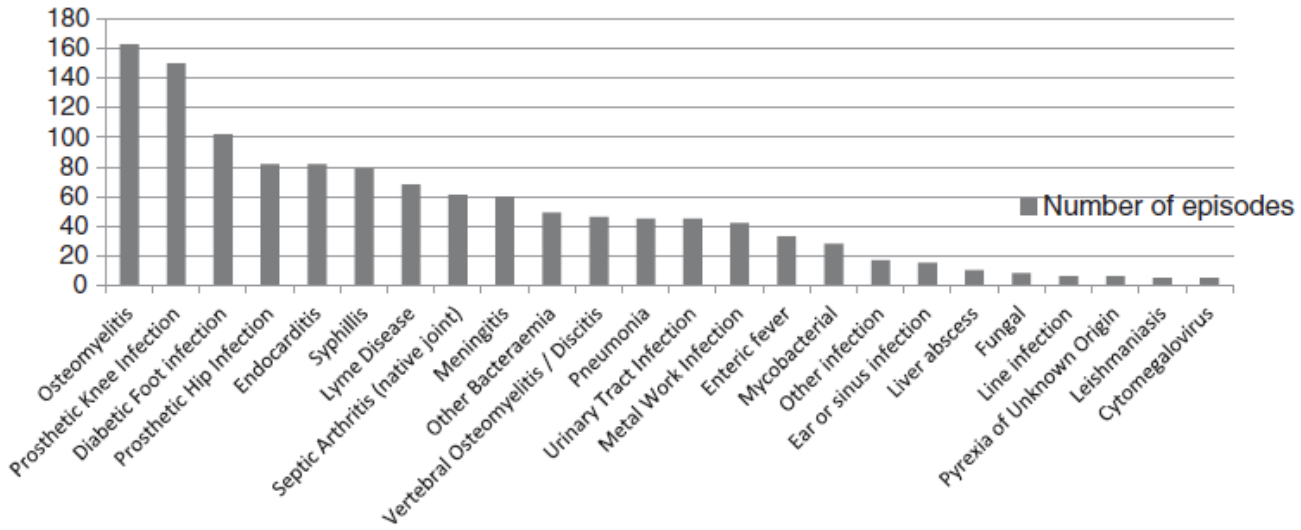


Fig. 3. Non skin and soft tissue infections treated in the Glasgow OPAT service (2001–2011)*. *Excludes 1389 episodes of OPAT treated skin and soft tissue infection.

Table 2
Antimicrobial agents commonly used in the Glasgow OPAT service.

Agent	Antimicrobial activity	Dose and administration	Adverse drug reactions (ADRs)	Other comments
Ceftriaxone	Gram-positive (excluding MRSA, Enterococci), Gram-negative (including Salmonellae)	1–2 g OD	Allergy, cholestasis, leucopenia, *Clostridium difficile*	*Clostridium difficile* risk low in OPAT
Teicoplanin	Gram-positive (including MRSA, coagulase negative Staphylococci and Enterococci)	6–10 mg/kg OD or 15–20 mg/kg 3×s/wk*	Fatigue, allergy, myelotoxicity	Prior loading dose for 3 days. TDM required*
Daptomycin	Gram-positive (including MRSA, coagulase-negative Staphylococci and Enterococci)	4–6 mg/kg OD 6–10 mg/kg OD	Myositis (monitor CPK weekly) Eosinophilic pneumonitis (rare)	"Round dose up" to full vial Alternate day dosing when Creat clearance <30 ml/min Interference with some prothrombin time assays
Ertapenem	Gram-positive and resistant Gram negatives	1 g OD	Allergy	No activity against Enterococci or Pseudomonads

ADR = adverse drug reaction; TDM = Therapeutic drug monitoring OD = once a day dosing; * ×s/wk = times per week; CPK = creatinine kinase.

Table 2 Characteristics of intravenous antimicrobials potentially useful for OPAT programmes.

Drug	Dose range	Half-life	Stability at 5ºC	Stability at 20–25ºC	Infusion pump	Risk of phlebitis	ADRs	Recommended monitoring
Penicillin G sodium	2-4 mU/4h	< 1hour	7 days	24 hours	Yes	I		
Ampicillin	0,5-2 g/4-6h	1 hour	3 days	8 hours	No	I		
Amoxicillin-clavulanic acid	1-2 g/8h	1 hour	24 hours. 7-10 days reconstituted	1 hour	No	I		
Cloxacillin	1-2 g/4-6h	< 1hour	3-7 days	24 hours	Yes	I		
Cefazolin	0,5-2 g/6-8h	1-2 hours	24 hours	6 hours	Yes	L		
Cefoxitin	1-2 g/6-8h	1 hours	4 days	24 hours	ND	L		
Cefuroxime	1-1,5 g/8h	1-2 hours	7 days	24 hours	Yes	L		
Ceftriaxone	2 g/24h	5-10 hours	10 days	3 days	Not recommended	L	M, R, H	CBC, LFT, R and I once per week
Ceftazidime	1-2 g/8h	1,5-2 hours	7 days	24 hours	Yes	L		
Cefepime	0,5-2 g/12h	2 hours	7 days	24 hours	Not recommended	L		
Ceftaroline	1 g/8-12h	2,5 hours	24 hours	6 hours	ND	ND		
Aztreonam	1-2 g/8h	1-2 hours	7 days	2 days	Little experience	L		
Piperacillin-tazobactam	4 g/6h	1 hour	48 hours	24 hours	Yes	I		
Ertapenem	1 g/24h	4 hours	24 hours	6 hours	Not recommended	I		
Imipenem	0,5-1 g/6-8h	1 hour	24-48 hours	1 hour	Not recommended	I		
Meropenem	0,5-2 g/8-12h	1 hour	24 hours	4 hours	Not recommended	L		
Amikacin	10-15 mg/kg/24h	2-3 hours	7 days	24 hours	Not recommended	L	R, N	R twice per week, LFT once per week and hearing test every visit
Tobramycin	5-10 mg/kg/24h	2-3 hours	4 days	24 hours	Not recommended	L		
Gentamycin	5-10 mg/kg/24h	2-3 hours	4 days	24 hours	Not recommended	L		
Streptomycin	15 mg/kg/24h	2-4 hours	24 hours	ND	Not recommended	L		
Azithromycin	500 mg/24h	48-60 hours	1-7 days	24 hours	Not recommended	H	R, H, C, GI	R, LFT and ECG once per week, ask about GI disorders
Tigecycline	100 mg load and 50 mg/12h	40-60 hours	48 hours 5% dextrose or SSF	24 hours	Not recommended	I	H, GI	LFT twice per week, ask about GI symptoms every visit

Table 2 Characteristics of intravenous antimicrobials potentially useful for OPAT programmes.

Drug	Dose range	Half-life	Stability at 5ºC	Stability at 20-25ºC	Infusion pump	Risk of phlebitis	ADRs	Recommended monitoring
Clindamycin	300-900 mg /6-8h	2-3 hours	7 days	24 hours	Yes	L	GI	CBC, R and LFT once per week, ask about diarrhoea every visit
Metronidazole	500 mg/8h	6-12 hours	10 days	24 hours	Yes	L	H, M, GI	LFT and CBC once per week, ask about GI symptoms every visit
Cotrimoxazole	160/800 mg/8-12h	10 hours	Not recommended	24 hours in glucose, 14 hours in NaCl solution	Not recommended	I	GI, D, M, H	CBC, LFT, R and I once per week, ask about GI and D symptoms every visit
Fosfomycin	100-300 mg/kg/day	1,5-2 hours	Not recommended	24 hours	Yes	H	GI, H, M, C	CBC and LFT once per week, I twice per week, ask about GI symptoms, check for blood pressure, oedemas and dyspnoea every visit
Vancomycin	2 g/12h	6 hours	4-7 days	24 hours	Yes	I	R, D, N	R twice per week, slow infusion, ask about ototoxicity every visit
Teicoplanin	6 mg/kg in 3 doses every 12h, then every 24h	50-70 hours	24 hours en API	24-36 hours	Not recommended	I	R, D, N	R twice per week, slow infusion, ask about ototoxicity every visit
Daptomycin	6-10 mg/kg/day	8-9 hours	24 hours	12 hours	Not recommended	L	Myopathy	R and CPK once per week, ask about myalgia every visit
Linezolid	600 mg/12h	5 hours	7 days	7 days	Not recommended	L	H, M, GI	LFT and CBC once per week
Ciprofloxacin	400 mg/8-12h	4 hours	14 days	14 days	Not recommended	L	N, GI, H, C, tendinitis	H once per week, ECG, ask about tendinitis and GI symptoms every visit
Levofloxacin	500 mg/12-24h	7 hours	14 days	3 days	Not recommended	L	N, GI, H, C, tendinitis	LFT once per week, ECG, ask about tendinitis and GI symptoms every visit
Moxifloxacin	400 mg/24h	12 hours	Not recommended	Not recommended	Not recommended	L	N, GI, H, C, tendinitis	LFT once per week, ECG, ask about tendinitis and GI symptoms every visit
Isoniazid	4-6 mg/kg/day	1-2 hours	21 days	24 hours	Not recommended	I	H, N (optic neuritis)	LFT once per week, ask about N (visual disorders) every visit

Table 2 Characteristics of intravenous antimicrobials potentially useful for OPAT programmes.

Drug	Dose range	Half-life	Stability at 5ºC	Stability at 20-25ºC	Infusion pump	Risk of phlebitis	ADRs	Recommended monitoring
Rifampicin	10-20 mg/kg/day	3-4 hours	72 hours	7 days	Not recommended	I	H, M, D (exanthema, urticaria)	LFT and CBC once per week, ask about D every visit
ANTIFUNGALS								
Fluconazole	50-800 mg/day	30 hours	24 hours	24 hours	Not recommended	I	H, GI, D	LFT once per week, ask about D and GI every visit
Voriconazole	6 mg/kg/day the first day, then 4 mg/kg/day	6 hours	4-6 days	24 hours	Not recommended	I	H, GI, D, visual disorders	LFT once per week, ask about D, visual disorders and GI every visit
Caspofungin	70 mg/kg/day the first day, then 50 mg/kg/day	9-11 hours	48 hours	24 hours	Not recommended	L	D, GI, H	LFT once per week, ask about D and GI every visit
Anidulafungin	200 mg the first day, then 100 mg	26 hours	48-96 hours	24-48 hours	Not recommended	L	D, GI, H	LFT once per week, ask about D and GI every visit
Micafungin	100 mg/day	15 hours	48 hours	24 hours	Not recommended	L	D, GI, H	LFT once per week, ask about D and GI every visit
Ambisome	1-3 mg/kg day	24-30 hours	7 days in glucose, 24 hours in API	3 days in glucose, 24 hours in API	Not recommended	I	R	R and I twice per week
ANTIVIRALS								
Aciclovir	5-15 mg/kg/8h	3 hours	24 hours	8-12 hours	Not recommended	L	R, H, M, D	CBC, LFT and R once per week, ask about D every visit
Ganciclovir	5 mg/kg/12h	3-4 hours	10 days	24 hours	Yes	L	M, H, R, N	CBC, LFT and R once per week, ask about N every visit
Cidofovir	3-5 mg/kg in a single dose every 7 days during 2 weeks	3 hours	1-5 days	24 hours	Not recommended	L	R, M	CBC and R once per week

Risk of phlebitis: H: high, I: intermediate, L: Low. ADRs (Adverse drug reactions): M (myeloid: leukopenia, thrombocytopenia, anaemia), R (renal: deterioration of renal function), H (hepatic: deterioration of liver function), N (Neurotoxicity: ototoxicity), C (Cardio: changes in ECG, signs of CHF), GI (Gastrointestinal: nausea, vomits, diarrhoea), D (Dermatological: photosensitivity, exanthema, urticaria, pruritus). Recommended monitoring: CBC: Hemogram (complete cell count and white blood cell formula), R: renal profile (sediment, urea and creatinine), LFT: Liver function tests (aspartate transaminase, alanine transaminase, gamma-glutamyl transferase, alkaline phosphatase and total and direct bilirubin), I: ionogram (Na and K), CPK: creatine phosphokinase, ECG: electrocardiogram, CHF: congestive heart failure, ND: not determined. Based on references 1,6,26-30.


KATHETERINFECTIES
INFLAMMATORY
SEPTISCHE
MENINGITIS
SINUSITIS
NEUTROPENEKOORTS
BACTERIËMIE
HERPESINFECTIES
RESPIRATOIRE
DISEASE
CMV
PELVIC
INFECTIES
ARTRITIS
FUNGALE
LYME
STENT
VASCULAIRE
EN
CYTOMEGALOVIRUS
OTITIS
URINEWEGINFECTIES
INTRAABDOMINALE
MASTOÏDITIS

OPAT experience in Belgium

- Limited implementation in a limited number of hospitals but rapidly increasing
- Long term experience in particular in bone and joint infections (including prosthetic infections) with selected antibiotics, such as teicoplanin, for prolonged treatment durations (THP up to 3 and TKP up to 6 months) and also in the treatment of infection in mucoviscidosis (organized through RIZIV/INAMI convention)
- Mostly in the reconvalescence phase following a complicated disease course
- But also possible in less complicated infections
- Hence no uniform patient profile: large variability that needs to be taken into account in the future reimbursement modalities

Regulatory setting for OPAT

- **Prolongation of parenteral therapy initiated in the hospital, into the ambulatory setting**
- **Possible only if this option was included in the reimbursement criteria for a specific antimicrobial, after attestation (medical report with indication and treatment duration), subject to approval by the advisory MD of the mutuality**
  - For most antibiotics: meropenem, aztreonam, flucloxacilline, …
  - But not the rule with exceptions such as tigecycline, ceftaroline, …
  - Depending on the initiative of the pharmaceutical company when filing for reimbursement

Focusing on a particular antimicrobial: reimbursement of ceftriaxone in ambulatory practice

- **Ambulatory prolongation of parenteral antimicrobial treatment initiated within hospital**
  - Subacute uncomplicated streptococcal endocarditis
- **Directed treatment of UTI with documented resistance to oral antibiotics**
- **Lyme disease refractory to initial treatment with doxycycline**
  - Loopholes: no defintion of clinical entities covered nor of what “refractory” means, similar to grey zone in the reimbursement criteria for echinocandins in invasive candidiasis (“refractory to fluconazole”)
  - Reflection of advantage of parenteral therapy: oral first choice anyhow; ceftriaxone IV in disseminated disease (typically neuroborreliosis), mostly necessitating hospital admission (mainly for diagnostic reasons)
- **Not covering empirical treatment of STD urethritis**

Organisational model with role of different partners in home OPAT: reference centre

- Central contact person (SPOC) for the ambulatory careprovider
- Educational check list for each type of treatment in collaboration with provider
- Regular patient assessment
- Take care of the paperwork: reimbursement/ communication to all stakeholders involved
- Evaluation of provider service

Organisational model with role of different partners

- **Hospital or ambulatory pharmacy**
  - Preparation of medications, ready for use
- **Provider**
  - Contact with institution
  - Personalised training of patient and home nurse (service)
  - Evaluation of quality of care of home nurse (service)
  - Logistics: delivery, maintenance material
  - Help desk function
- **Home nursing (service) preferetially with a imited number of trained/accredited partners**
  - Training
  - Delivery of care according to procedures
  - Assessments as prescribed by reference centre
  - Reporting according to preset timing and to coordinator (SPOC)

Organisational model with role of different partners: shared decision making with the patients

- **Explicit agreement with home care (incl OPAT)**
- **Informed consent on realistic therapeutic expectations, treatment modalities, advantages and disadvantages, risks and procedures**
- **Agreement with provider and home nursing (service)**
- **Training in minimal active participation in emergencies**
  - Or self-responsibility
- **Clarity on whom to rely on**

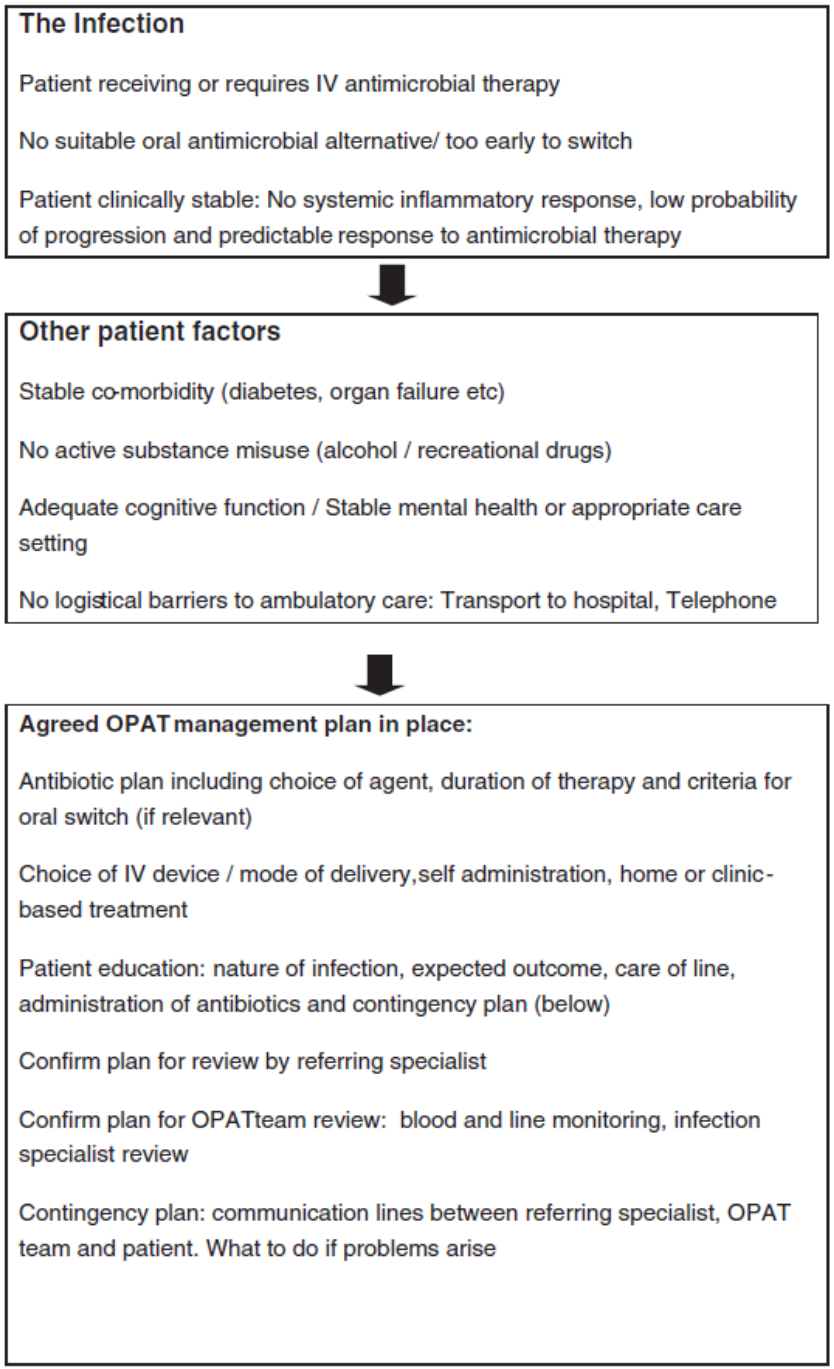
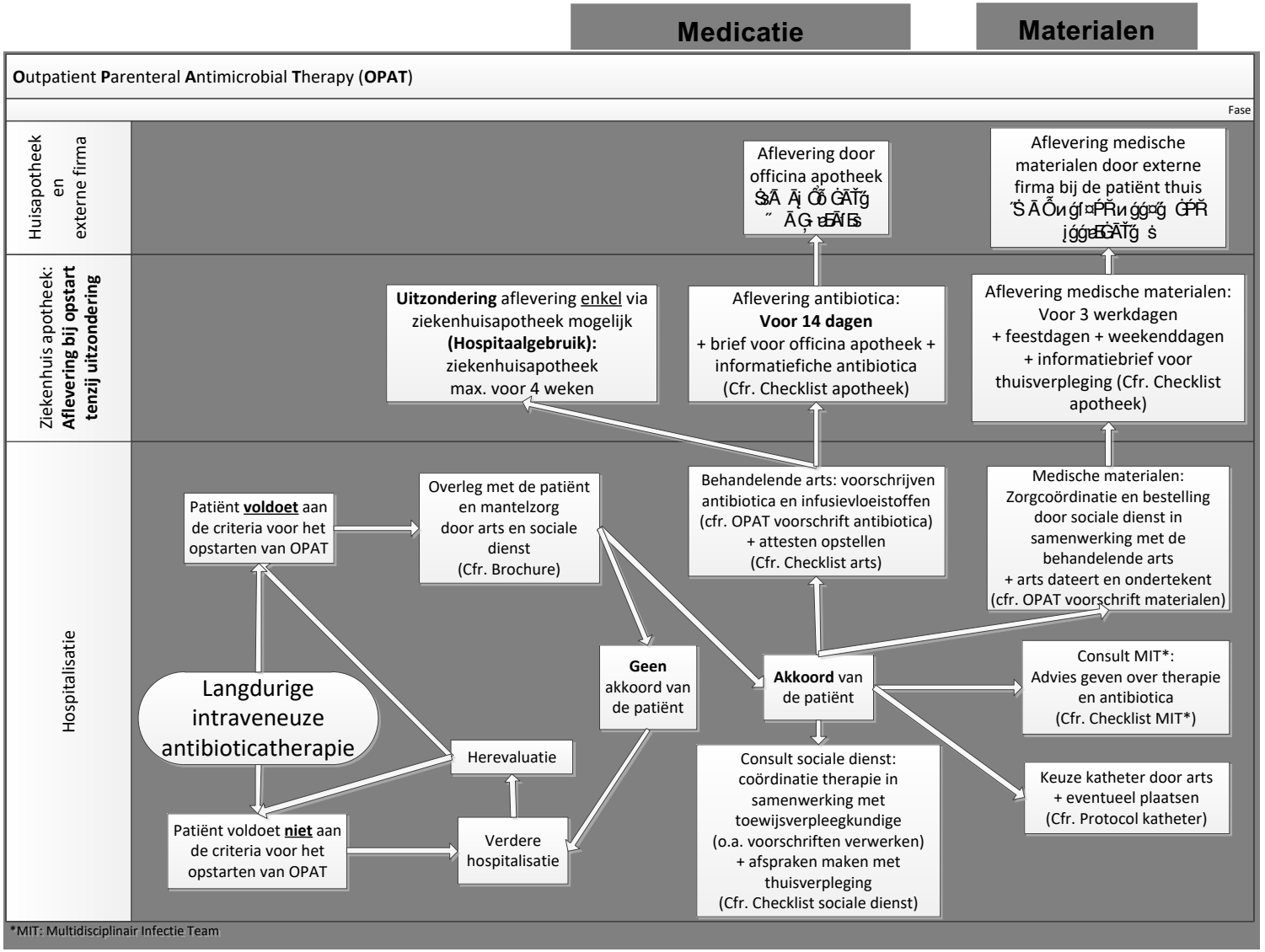


Fig. 1. Outline of OPAT assessment and management pathway.

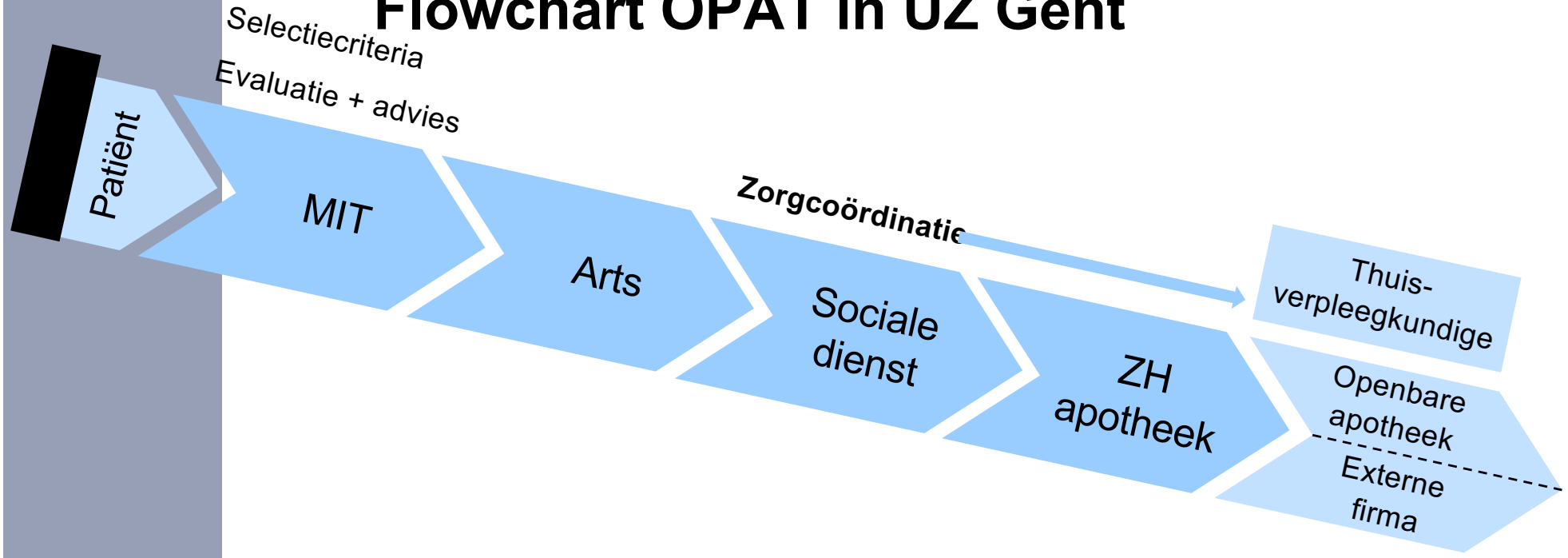
Patient identification and selection
Evaluation of inclusion into an OPAT programme, estimation of related risks (treatment failure, re-admission etc.) and benefits. Commitment to including the patient into the OPAT programme. Satisfactory coverage by the heath care insurance.
Evaluation by an infectious disease specialist
Selection of an optimal antimicrobial treatment according to the type of infection, comorbidities and factors of resistant pathogen selection, prior to referral to the OPAT unit.
Education and commitment of the patient and their family
Education about sterile and functional maintenance of the venous access. Contact numbers in case of drug- or disease-related incidents.
Education and commitment of the health care professionals during the treatment
Efficient communication and fast patient flow in case of complementary examinations or re-admission. Clear plan for the OPAT unit and the infectious disease specialist.
Outpatient monitoring
PICC line care and removal when not necessary. Laboratory and microbiological disease monitoring. Clinical follow-up and daily inquiries about disease- or drug-related incidents.
End of treatment
Patient discharge report that includes indication, treatment, time of treatment, follow-up and incidents.
Programme evaluation
Satisfaction questionnaires Failure/re-admission index Suggestions for improvement

Figure 1 | **Proposed OPAT bundle. Adapted from Muldoon et al[65].**

OPAT: Outpatient parenteral antimicrobial treatment, PICC: Peripherally inserted central catheter.


Medicatie
Materialen
Outpatient Parenteral Antimicrobial Therapy (OPAT)
Fase
Huisapotheek en externe firma
Ziekenhuis apotheek: Aflevering bij opstart tenzij uitzondering
Hospitalisatie
Aflevering door officina apotheek
Aflevering medische materialen door externe firma bij de patiënt thuis
Uitzondering aflevering enkel via ziekenhuisapotheek mogelijk (Hospitaalgebruik): ziekenhuisapotheek max. voor 4 weken
Aflevering antibiotica: Voor 14 dagen + brief voor officina apotheek + informatiefiche antibiotica (Cfr. Checklist apotheek)
Aflevering medische materialen: Voor 3 werkdagen + feestdagen + weekenddagen + informatiebrief voor thuisverpleging (Cfr. Checklist apotheek)
Patiënt voldoet aan de criteria voor het opstarten van OPAT
Overleg met de patiënt en mantelzorg door arts en sociale dienst (Cfr. Brochure)
Behandelende arts: voorschrijven antibiotica en infusievloeistoffen (cfr. OPAT voorschrift antibiotica) + attesten opstellen (Cfr. Checklist arts)
Medische materialen: Zorgcoördinatie en bestelling door sociale dienst in samenwerking met de behandelende arts + arts dateert en ondertekent (cfr. OPAT voorschrift materialen)
Langdurige intraveneuze antibioticatherapie
Geen akkoord van de patiënt
Akkoord van de patiënt
Consult MIT*: Advies geven over therapie en antibiotica (Cfr. Checklist MIT*)
Herevaluatie
Consult sociale dienst: coördinatie therapie in samenwerking met toewijsverpleegkundige (o.a. voorschriften verwerken) + afspraken maken met thuisverpleging (Cfr. Checklist sociale dienst)
Keuze katheter door arts + eventueel plaatsen (Cfr. Protocol katheter)
Patiënt voldoet niet aan de criteria voor het opstarten van OPAT
Verdere hospitalisatie
*MIT: Multidisciplinair Infectie Team

Flowchart OPAT in UZ Gent



Ravelingien T. et al. Optimization of a model of out-of-hospital antibiotic therapy (OPAT) in a Belgian university hospital resulting in a proposal for national implementation. Acta Clinica Belgica. 2016;71(5):297–302.

SELECTIECRITERIA voor patiënten in aanmerking voor OPAT

Deze criteria worden bij voorkeur door een multidisciplinair infectieteam (o.a. infectioloog, microbioloog, klinisch apotheker,…) besproken.

Medische factoren:

OK?	
☐	Geen switch naar orale therapie mogelijk.
☐	Klinisch stabiele patiënt.
☐	Stabiel infectieus proces met een laag risico op complicaties of progressie.
☐	Aanwezigheid geschikte katheter. (zie protocol katheterkeuze)
☐	Geen geneesmiddel-, alcohol- of drugsmisbruik.
☐	Geen bijwerkingen of problemen tijdens een eerdere therapie.

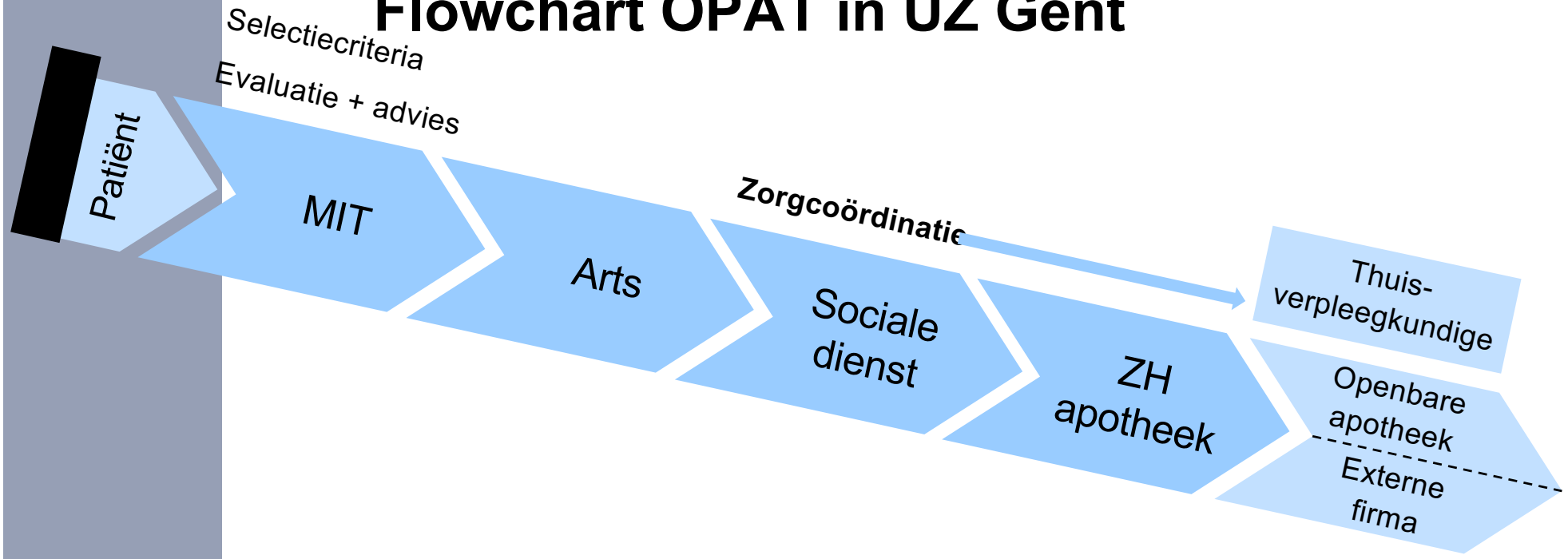
Patiënt gerelateerde factoren:

OK?	
☐	Akkoord van de patiënt/mantelzorger voor ambulante verderzetting van de therapie en bereidheid tot medewerking.
☐	Goede cognitieve functie: de patiënt begrijpt de relevante informatie.
☐	Stabiele mentale gezondheid van de patiënt.
☐	Financieel haalbaar voor de patiënt.

Omgevingsfactoren:

OK?	
☐	Geschikte veilige omgeving voor de behandeling (hygiëne,…).
☐	Voldoende ondersteuning door mantelzorgers of familie buiten het ziekenhuis.
☐	Beschikbaarheid van een thuisverpleegkundige organisatie met expertise in intraveneuze toedieningen.
☐	Mogelijkheid van snelle en duidelijke communicatie tussen arts, thuisverpleegkundige en patiënt bij problemen.
☐	Mogelijkheid van snel transport/opname in het ziekenhuis in geval van nood.

Flowchart OPAT in UZ Gent

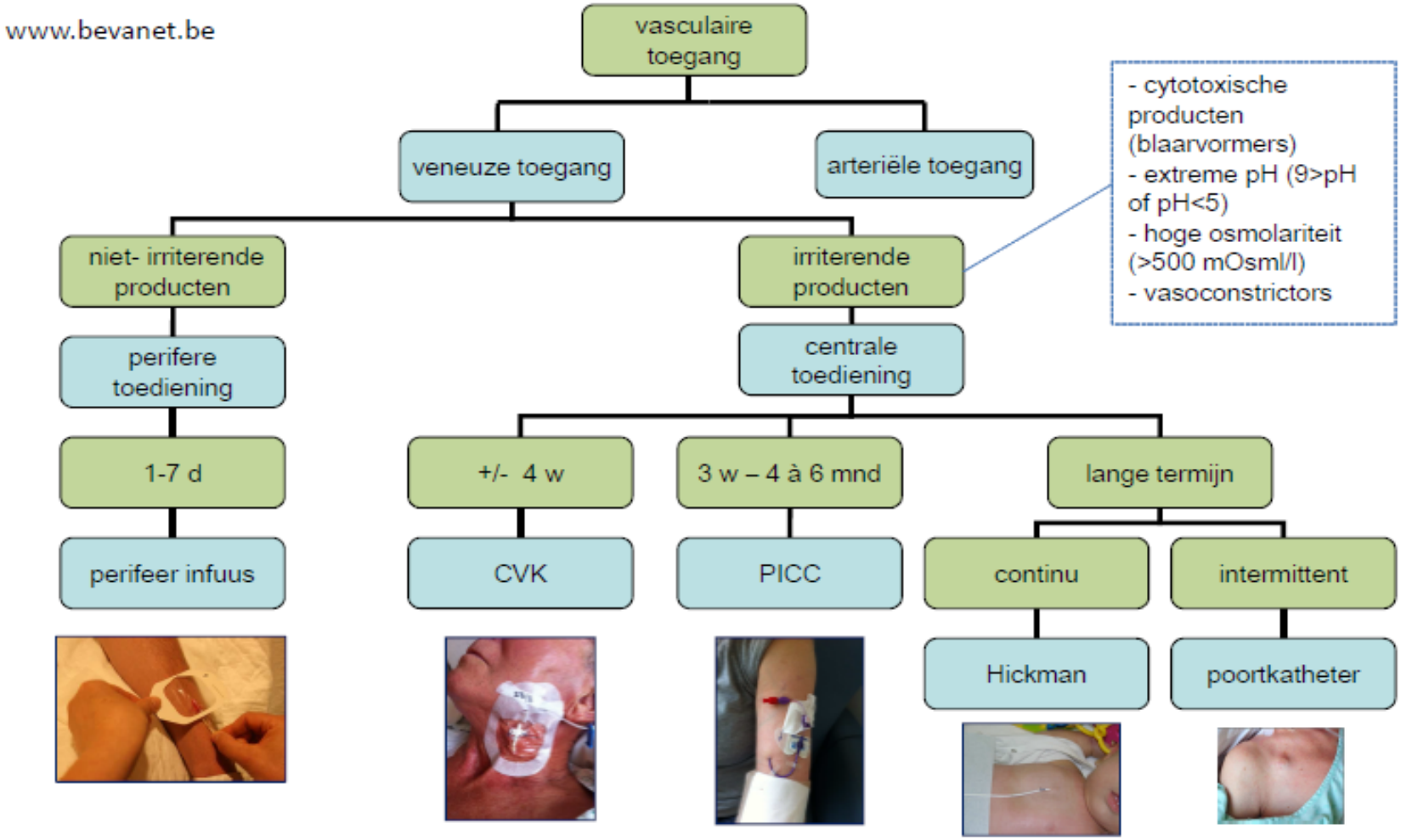


Ravelingien T. et al. Optimization of a model of out-of-hospital antibiotic therapy (OPAT) in a Belgian university hospital resulting in a proposal for national implementation. Acta Clinica Belgica. 2016;71(5):297–302.

Belang keuze katheter

Indeling volgens tippositie/duur van de therapie

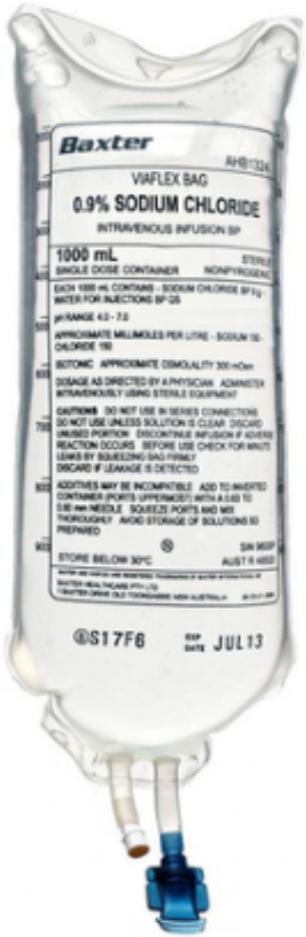
www.bevanet.be



OPAT

administration

- Bolus
- Infusion
- Portable administration systems
  (elastomeric pumps)



Algemeen	
Medische achtergrond	
Type infectie	(Keuzelijst infecties)
Andere	
MIT	
Consult MIT	(datum)
Antibioticum	
Dosering antibioticum	
Verwachte duur OPAT	
Opmerkingen	
Behandelende arts	
Datum opstart OPAT	(datum)
Toedieningswijze	PICC – Poortkatheter – CVC – Hickmann – Perifeer infuus - Intramusculair
Toediening via	Infuus – Bolus – Elastomeerpomp
Opvolgconsult	
Opmerkingen	
Katheterzorg	
Opmerkingen	
Dienst Patiëntenbegeleiding	
Contactpersoon Dienst Patiëntenbegeleiding	
Contactgegevens Thuisverpleegkundige	
Datum eerste levering door Remedus (materiaalkits)	(datum)
Opmerkingen	
Apotheek	
Datum eerste aflevering	(datum)
Afgeleverde stuks bij opstart (medicatie, oplosmiddel, infuusvloeistof, materiaal)	
Verderzetting via ziekenhuisapotheek of openbare apotheek?	
Opvolging verdere aflevering via ziekenhuisapotheek	
Opmerkingen	

External communication

- **Patiënt information leaflets**
  - OPAT
  - catheter
- **Information letters**
  - GP
  - Pharmacy
  - Home nurse
- **Product information files**

Financial considerations: hospital vs ambulatory parenteral antimicrobials

- **Different types of costs**
  - Hospitalisation including hotel costs
  - Pharmaceutical costs
    - Antimicrobials
    - Infusions
    - Non reimbursed medications
    - Materials
  - Nursing costs, both in hospital as in ambulatory care

Cost estimation (historical): meropenem 1 g tid (30 Days)

Costs	Hospitalisation UZ Gent		Ambulant (ziekenhuisapotheek)		Ambulant (open officina)		Day hospitalisation	
	VI	patient	VI	patient	VI	patient	VI	Patient
Hospital stay	12.231,30	430,17	-	-	-	-	2.234,70	-
Pharmaceutic costs								
Antibiotics	2.511,90	-	2.323,80	774,90	2.596,50	865,80	2.323,80	774,90
Infusion fluids	122,40	-	112,50	36,90	149,40	49,50	112,50	36,90
D-medication	-	102,72	-	102,72	-	137,90	-	102,72
Materials	-	-	-	223,03	3,18	244,63	-	-
Costs home nursing	-	-	1.702,58	-	1.702,58	-	-	-
Total	**14.865,60**	**532,89**	**4.138,88**	**1.137,55**	**4.451,66**	**1.297,83**	**4.671,00**	**914,52**
Total treatment	**15.398,49**		**5.276,43**		**5.749,49**		**5.585,52**	

Cost calculation (historical)

Ceftriaxone
1 x 2g

30 dagen:

30 x infuus toediening
4 x weekverzorging)

Aard kosten	Hospitalisatie UZ Gent		Ambulant (materialen via externe firma + antibiotica via officina- apotheek)	
	VI*	**Patiënt**	**VI***	**Patiënt**
Verblijfskosten	21.823	459	-	-
Farmaceutische kosten				
Antibiotica	70	19	353	116
Infusievloeistoffen	10	-	168	16
Materialen	-	-	-	244
Kosten thuisverpleging	-	-	1.100	366
Totaal per kolom	21.902	478	1.621	742
Totale behandeling	22.380		2.363	

Ceftriaxone: Niet hospitaalgebruik

* VI: verzekeringsinstelling

Cost of administration modality: elastomeric pumps; 1 week flucloxacillin continuous infusion

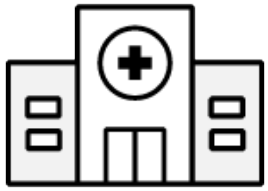
Price

	Materiaal	Prijs/stuk (euro)	Aantal stuks	Totale prijs		Ten laste van patiënt
Antibiotica	Floxapen 1g flacon	3,63	84	304,92		76,23
	Ecoflac NaCl 0,9% 250ml	1,63	7	11,41		2,8525
Pomp	Elastomeerpomp	30,44	7	213,08		53,27
	Bereidingsactiviteit apotheek	40,19	7	281,33		281,33
Medische materialen	Dagkit	0,1727	7	1,2089		1,2089
	Weekkit	1,2651	1	1,2651		1,2651
Verzorging/controle	Thuisverpleegkundig	x	x	x		x
	Consultatie	x	x	x		x
	Labocontrole	x	x	x		x
					TOTAAL	416,1565

International literature proves that OPAT has the same efficacy as hospitalization for the patient and accomplishes savings for health insurances

Successful outcomes

78 – 100%



Readmission rates

3 – 17,5%

Cost savings

€359 - €787 Per OPAT day

OPAT has same efficacy as in the hospital

OPAT is cost-effective internationally

OPAT is safe, comfortable and cost saving

Safe

Proven in national and international literature

Comfortable

OPAT offers an added value to the daily activity of the patient

Cost saving

€20 M of cost saving for 2500 OPAT patients can be obtained

Table 1
Advantages of OPAT for the patient and the organisation.

Potential benefits to the patient	Potential benefits to the organisation
Choice in delivery of care	Efficient use of bed resource for acute admissions
More rapid return to normality (work, education)	Improved capacity for elective surgery
Greater comfort and privacy	More organised care for selected groups
Nutritional and psychological benefits	Consistent specialist infection input into patient care
Reduced risk of health care associated infection	Resource for early discharge of patients with health care associated infection

The way forward

- **Improvement of reimbursement or financial hurdles (FOD pilot projects)**
- **Offering OPAT in all hospitals and expanding scope of implementation: move from the incidental mostly difficult cases to a systematic program aiming at early detection of patients qualifying for OPAT**
- **Quality improvement through bundling of expertise**
  - Insertion into a more global program of transmural care
  - Contracts between health care institutions, patients, home care nursing (organisations) and ambulatory care providers
    - Total parenteral nutrition
    - Home enteral nutrition
    - IV medication through ambulatory pump
      - Ab in mucoviscidosis
      - Ab in other indications
    - Home chemotherapy through ambulatory pump
    - Home pain therapy (IV, epidural, SC)
    - Complex wound care