

Antibiotic policy group in the Ghent University Hospital: experiences and results

Séminaire de pathologie infectieuse
Cliniques Universitaires Saint-Luc, Bruxelles

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Content

- ➔ **Introduction**
- ➔ **Activities Antibiotic Policy Group UZ Gent**
 - ➔ Formulary and guidelines
 - ➔ Restrictions/support antibiotic prescribing
 - ➔ Surveillance
 - ➔ Antibiotic consumption and feedback
 - ➔ Resistance profiles
 - ➔ Audit
 - ➔ Drug Use Evaluation
 - ➔ Time of initialisation of antibiotics
 - ➔ Kidney failure and antibiotic dose
 - ➔ Therapeutic drug monitoring
 - ➔ Parenteral to oral conversion
 - ➔ Future projects
- ➔ **References for the clinical pharmacist**
- ➔ **Conclusion**

Introduction: who are we?



- **1.062 hospital beds**
- **34.000 admissions**
- **300.000 beddays**
- **4.799 staff members**
 - 660 physicians
 - 1.500 nurses
 - 20 pharmacists
- **Mean LOS: < 9 days**

Introduction: Antibiotic Policy Group

- ➔ **Multidisciplinary composition (19)**
 - ➔ Infectiologists (4) (prof. dr. D. Vogelaers – president)
 - ➔ Hospital hygiene physician (1)
 - ➔ Microbiologist (1)
 - ➔ Virologist (1)
 - ➔ Intensive care physicians (4)
 - ➔ Haematologist (1)
 - ➔ Orthopedic physician (1)
 - ➔ Pharmacists (5) (secretary)
 - ➔ Scientific collaborators (2)
- ➔ **Monthly plenary meeting**

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Activities Antibiotic Policy Group: general information

- ➔ **Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America Guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship**
 - ➔ Clinical Infectious Diseases 2007;44:159–177

Table 1. Infectious Diseases Society of America–United States Public Health Service grading system for ranking recommendations in clinical guidelines.

Category, grade	Definition
Strength of recommendation	
A	Good evidence to support a recommendation for use
B	Moderate evidence to support a recommendation for use
C	Poor evidence to support a recommendation for use
Quality of evidence	
I	Evidence from ≥ 1 properly randomized, controlled trial
II	Evidence from ≥ 1 well-designed clinical trial, without randomization; from cohort or case-controlled analytic studies (preferably from >1 center); from multiple time-series; or from dramatic results from uncontrolled experiments
III	Evidence from opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees

NOTE. Adapted from [1].

Activities Antibiotic Policy Group: formulary and guidelines

- **Local formulary (book and intranet):**
 - Product information (dose, indication)
 - Guidelines: empirical, documented and prophylactic treatment (AI)
 - Recent guidelines
 - Empirical treatment for abdominal infections
 - HIV occupational post exposure prophylaxis
 - Bacterial meningitis and meningococcal sepsis
 - Extended and continuous infusions of antibiotics
 - Administration and monitoring of glycopeptides and aminoglycosides
 - Monthly revision of one chapter
- **The Sanford Guide for Antimicrobial therapy**
- **Technical information for drug administration**

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Activities Antibiotic Policy Group: restrictions/support antibiotic prescribing

- ➔ **Elimination of antibiotic stock on the wards**
- ➔ **Implementation of antibiotic/antimycotic order form (BII)**
 - ➔ Requirements for physicians
 - ➔ General
 - ➔ Motivation of therapy (empirical, documented and prophylactic treatment)
 - ➔ Start date
 - ➔ Clinical focus
 - ➔ Why no enteral administration (for high bioavailable products)?
 - ➔ Detailed motivation for linezolid
 - ➔ Information for physicians
 - ➔ Price per unit
 - ➔ IV/PO possibility
 - ➔ Attestation necessary
 - ➔ Limited dosages delivered by pharmacy



VPE [] [] [] []

Patiëntgegevens (in te vullen of klever)

- Te leveren met volgende ronde
- Dringend leveren tegen uur

VOORSCHRIFT GERESERVEERDE ANTIBIOTICA EN ANTIMYCOTICA

(BUITEN RESERVEKAST)

EEN VOLLEDIG INGEVULD VOORSCHRIFT IS GELDIG VOOR 4 DAGEN THERAPIE

Buiten de openingsuren van de apotheek zijn de producten beschikbaar in de centrale spoedkast: -1K12IC, -1K2 en 1K6 (lokale reanimatiewaars)

- teruggave
- uit centrale spoedkast genomen

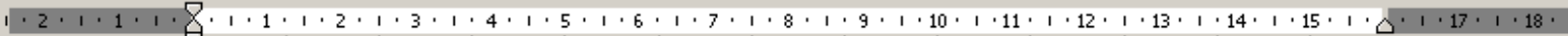
MOTIVATIE THERAPIE

- EMPIRISCH (kiem onbekend)
- GERICHT (kiem vermelden):
- PROFYLACTISCH

- STARTDATUM THERAPIE:
- DIAGNOSE/KLINISCH BEELD (infectie).....

Geneesmiddel	Prijs per stuk (euro)	Advies	Doelt / 24uur	Gevraagd aantal	Actie	Geleverd aantal	Apr.	Terug aantal
Ambisome 50 MG IV	161,33	Attest noodzakelijk			46322			
Abelcet 100 MG/20ML IV	124,86	Attest noodzakelijk			136986			
Avelox 400 MG PO	3,45				1542892			
Avelox 400 MG IV (2)	32,95	Eualteet, IV/PO switch			1829637			
Candidas 50 MG IV	483,88	Attest noodzakelijk			1596045			
Candidas 70 MG IV	615,48	Attest noodzakelijk			1596144			
Ciproxine 250 MG co PO	0,69				186476			
Ciproxine 500 MG co PO	1,07				18707			
Ciproxine 200 MG IV (2)	15,49	Eualteet, IV/PO switch			186773			
Ciproxine 400 MG IV (2)	27,88	Eualteet, IV/PO switch			1292672			
Colistineb 2 miljoen E	6,24				2347794			
Diflucan 50 MG co PO	1,74				270610			
Diflucan 150 MG co PO	5,52				270808			
Diflucan 200 MG co PO	5,65				93238			
Diflucan 1400 MG 200 MG/5ML PO sir	41,23				1241994			
Diflucan 350 MG 50 MG/5ML PO sir	12,20				1241796			
Diflucan 200 MG IV (2)	17,41	Eualteet, IV/PO switch			270907			





Diflucan 1400 MG 200 MG/SML PO sir	41,23			1241994
Diflucan 350 MG 50 MG/SML PO sir	12,20			1241796
Diflucan 200 MG IV (2)	17,41	Evalueer IV/PO switch		270907
Glazidim 500 MG flacon	6,81			784809
Glazidim 1 G flacon	13,20			392750
Glazidim 2 G flacon	26,11			392651
Maxipim 1 G IV	13,85			370776
Maxipim 2 G IV	27,40			109668
Meropenem 500 MG IV	15,71			164306
Meropenem 1000 MG IV	28,28			164603
Targocid 200 MG IV	32,42			911701
Targocid 400 MG IV	61,75			911996
Tavanic 250 MG co PO	2,16			1482318
Tavanic 500 MG co PO	3,47			1327910
Tavanic 500 MG IV (2)	30,35	Evalueer IV/PO switch		1492909
Tazocin 4 G IV	24,01			57210
Vancocin 500 MG IV	11,20			1000484
Vancocin 1000 MG IV	20,16			2047787
Vfend 50 MG co PO	12,05	Attest noodzakelijk		1837258
Vfend 200 MG co PO	42,13	Attest noodzakelijk		1717393
Vfend 200 MG IV (2)	156,56	Attest noodzakelijk Evalueer IV/PO switch		1717591
Vfend PO susp 40 MG/ML 70 ML	674,80	Attest noodzakelijk		2207640
Zyvoxid 600 MG co PO (1)	65,82	Indicatie noodzakelijk		1610693
Zyvoxid 600 MG IV (1) (2)	65,82	Evalueer IV/PO switch Indicatie noodzakelijk		1608319
Zyvoxid 100 MG/5ML susp. 150 ML (1)	329,12	Indicatie noodzakelijk		1672655

(1) Indicatie Zyvoxid
 - Infectie met MRSA, MR-CNS, ARE, VRE
 Resistent of intermediair gevoelig aan glycopeptiden
 Of
 Gevoelig aan glycopeptide maar
 glycopeptide intolerant OF
 IV toediening niet meer nodig/mogelijk
 Zyvoxid opgestart in overleg met infectioloog, ja nee
Zyvoxid voor verderzetting thuis moet op ambulant voorschrift met attest.

(2) Enterale toediening (oraal of via maagsonde) NIET mogelijk wegens:
 Eraken
 Diarree
 Postoperatieve context
 Darmparalyse

Transport
 Buispost
 Koerier
 Ronde
 Datum:
 Klaargezet door
 Gecontroleerd door:.....

Datum, stempel + handtekening arts
 (conform KB 19/10/1978 art 5)

Activities Antibiotic Policy Group: restrictions/support antibiotic prescribing

- ➔ **Support by infectiologists/microbiologists**
 - ➔ Weekly antibiotic meetings (SICU, MICU, orthopedic ward, pediatric ward ..) (AIII)
 - ➔ Consultation on demand
 - ➔ Spontaneous consultations based on (AI)
 - ➔ Positive hemocultures
 - ➔ Antibiotic prescriptions from pharmacy
 - ➔ Link database pharmacy and microbiology
 - ➔ Education (BII)

LabView - Microbiologie & Antibiotica

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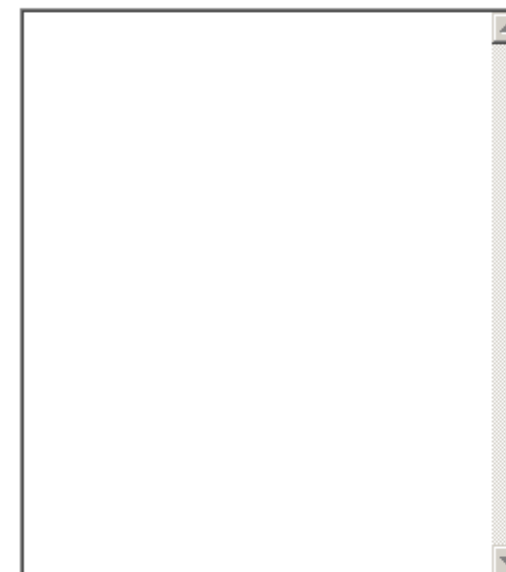
Patiënten Li

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Datum	Nr	Type staal	Kweek / Antibiotherapie	Aantal
4/12/2006	(061204-2381)	B.A.L.-vocht	1 : Pseudomonas aeruginosa ++	Antibiogram
4/12/2006	(061204-2100)	Keeluitstrijk	1 : Pseudomonas aeruginosa +-	Antibiogram
4/12/2006	(061204-2098)	Aspiraats bij geintubeerde	1 : Pseudomonas aeruginosa ++	Antibiogram
11/12/2006			GLAZIDIM 2 G BOLUS	6
11/12/2006			TAZOCIN FL 4 G/500 MG INJ	4
7/12/2006			TAZOCIN FL 4 G/500 MG INJ	16
6/12/2006			GLAZIDIM 2 G BOLUS	3
5/12/2006			AUGMENTIN 1 G IV FLAC	1
5/12/2006			GLAZIDIM 2 G BOLUS	4
30/11/2006			CIPROXINE COMP 500MG	2

9 stalen.



Geel: Volgt, Groen: geen kweek, Rood: Kweek

Vorige Pagina

Hoofdmenu

Heraanloggen

Help

Historische resultaten

Indien u problemen vaststelt, gebruik indien nodig Zielab en verwittig Dr. Tom Fiers (4565)

Activities Antibiotic Policy Group: restrictions/support antibiotic prescribing

➔ Support by pharmacists

- ➔ Prospective follow up of IV/PO in the central pharmacy (AI)
- ➔ Clinical pharmacists
 - ➔ Pediatric oncology
 - ➔ Pediatric intensive care unit
 - ➔ Geriatric unit
 - ➔ Medical intensive care unit
 - ➔ Abdominal surgery
 - ➔ Emergency department (funded project “Clinical pharmacy - Federal government)
- ➔ Education for nurses (BII)

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Activities Antibiotic Policy Group: surveillance and feedback of consumption (BIII)

- ➔ **ATC/DDD classification** (Anatomical Therapeutic Chemical classification /Defined Daily Dose)
 - ➔ Nominator
 - ➔ DDD
 - ➔ Costs (euro)
 - ➔ Denominator
 - ➔ Patient-days
 - ➔ Admissions
- ➔ **Level of analyses**
 - ➔ Global hospital level
 - ➔ Ward level
- ➔ **Monthly review by Antibiotic Policy Group**
- ➔ **Assigned physician by medical discipline for drug consumption**

Activities Antibiotic Policy Group: surveillance and feedback of consumption

Table 1. Evolution antibiotic consumption (correction for admissions and beddays)

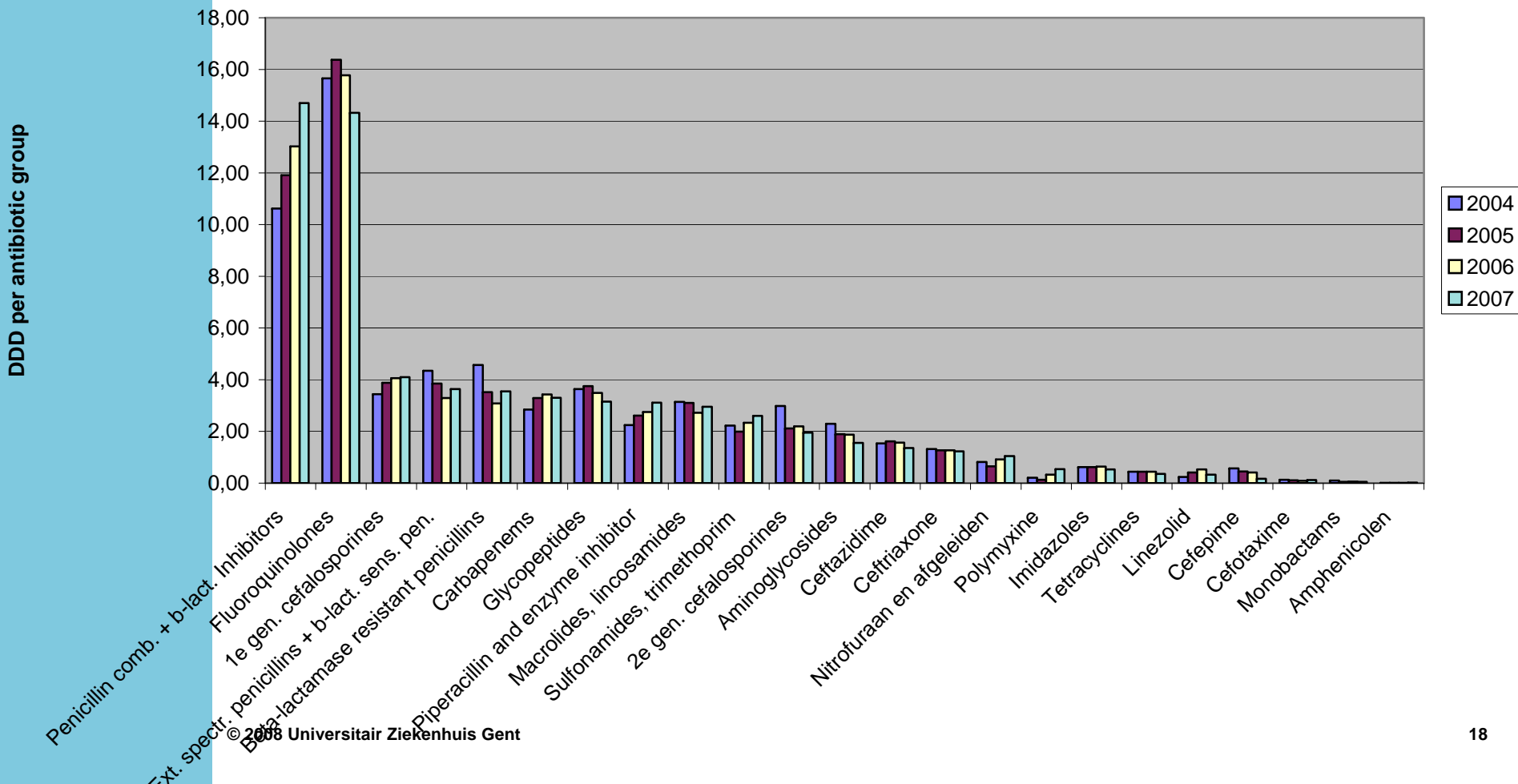
year	amount (euro) per admission	% diff	amount per 100 beddays	% diff	DDD per admission	% diff	DDD per 100 beddays	% diff
2004	99,24	#VERW!	1.088,61	#VERW!	5,84	#VERW!	64,06	#VERW!
2005	104,54	5,34	1.146,92	5,36	5,84	0,01	64,08	0,03
2006	97,43	-6,81	1.112,13	-3,03	5,63	-3,58	64,29	0,33
2007	89,22	-8,42	1.040,07	-6,48	5,57	-1,15	64,90	0,94

Table 2. Evolution antibiotic consumption in DDD per 100 beddays for products with high bioavailability

year	DDD IV	% diff	DDD PO	% diff	DDD PO+IV	% diff	%IV/IV+Po	% diff
2004	7,37	#VERW!	10,18	#VERW!	18	#VERW!	42	#VERW!
2005	7,16	-2,82	11,15	9,54	18	4,35	39	-6,87
2006	5,42	-24,38	12,09	8,49	18	-4,37	31	-20,92
2007	3,72	-31,24	12,35	2,10	16	-8,21	23	-25,09

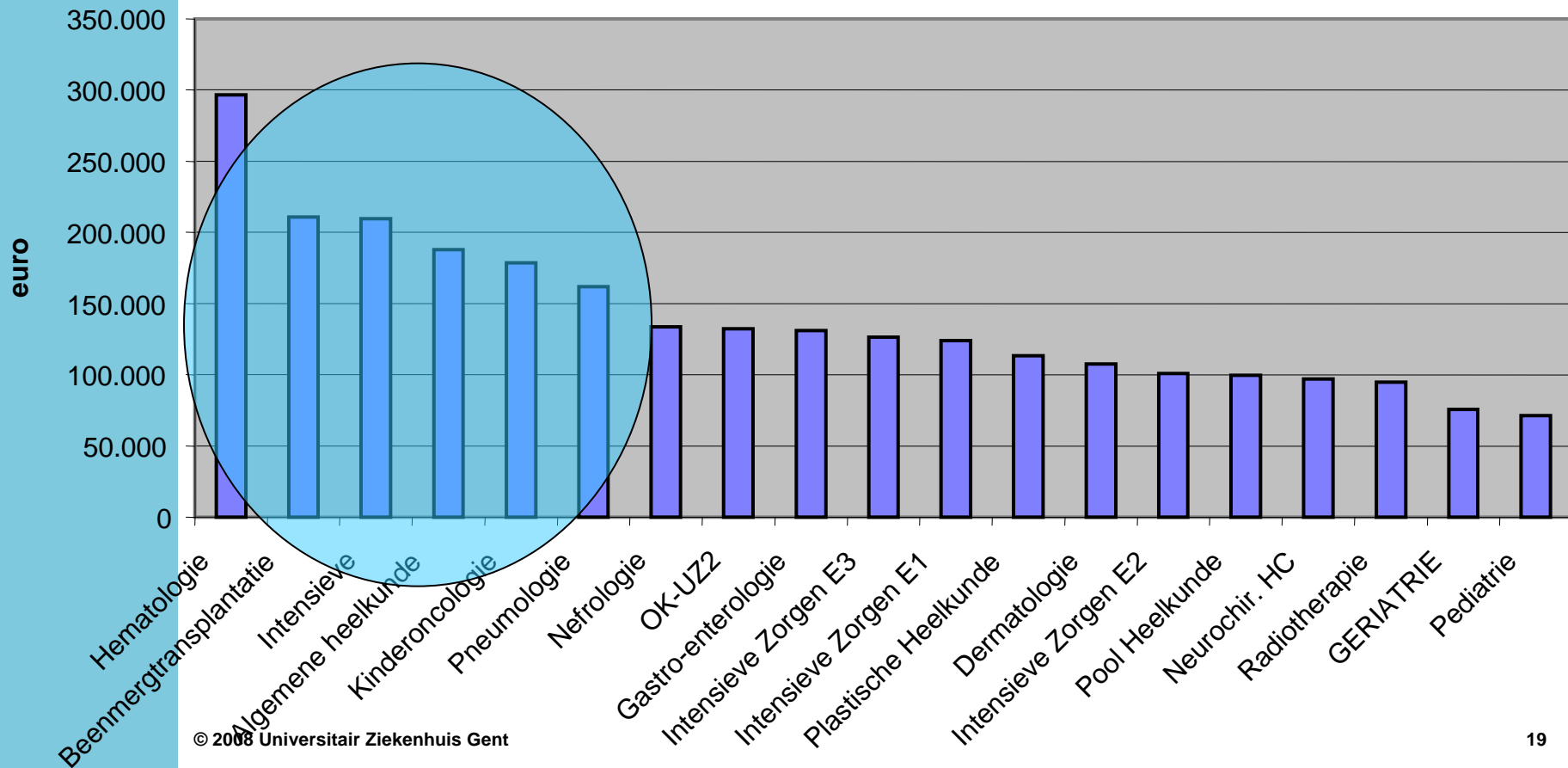
Activities Antibiotic Policy Group: surveillance and feedback of consumption

Evolution antibiotic consumption



Activities Antibiotic Policy Group: surveillance and feedback of consumption

Top 20 : Wards with highest antibiotic consumption (in euro)





Activities Antibiotic Policy Group: surveillance of resistance profiles

- ➔ **Hospital hygiene committee**
- ➔ **Resistance patterns are available in the formulary**

Content

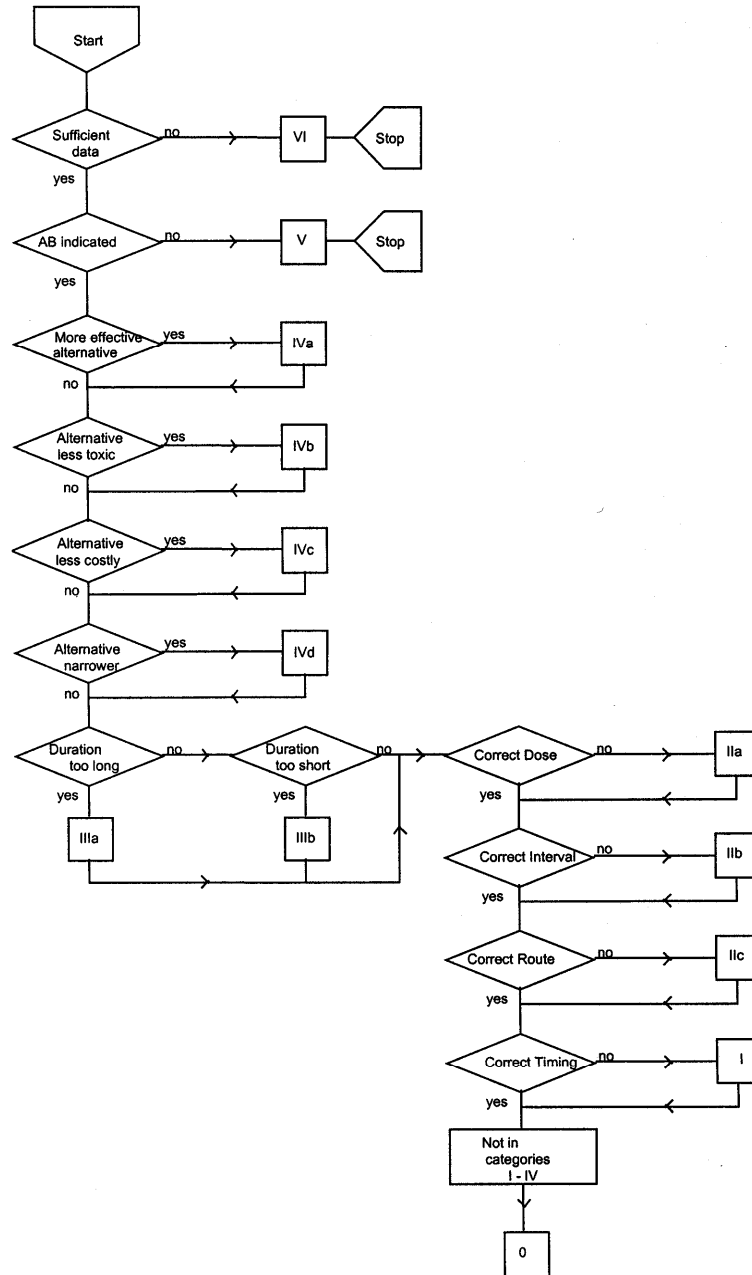
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Activities Antibiotic Policy Group: Audit – Drug Use Evaluation (AII)

- ➔ **Experience with vancomycin, teicoplanin, fluoroquinolones, piperacilline/tazobactam**

- ➔ **Main outcome measures**
 - ➔ Degree of concordance with predefined intra-muros published guidelines
 - ➔ initial empiric therapy
 - ➔ subsequent therapy beyond 72 hours

 - ➔ **Evaluation by infectiologist** (Gyssens et al. J Antimicrob Chemother 1992;30:724-727)
 - ➔ indication, duration, dosage



Activities Antibiotic Policy Group: Audit – Drug Use Evaluation

- ➔ **Retrospective observational study in 2001**
- ➔ **Surgical intensive care unit in Ghent University Hospital**
- ➔ **Outcome:**
 - ➔ Degree of concordance of initial empiric and subsequent directed therapy beyond 72 hours with piperacilline/tazobactam with predefined intra-muros published guidelines.

Activities Antibiotic Policy Group: Audit – Drug Use Evaluation

Indication antibiotic therapy		Number of courses	Inappropriate initial therapy	More effective alternative	Less broad alternative	Inappropriate continuation (>72hours)	More effective alternative	Less broad alternative	Excessive length
PIPERACILLINTAZOBACTAM COURSES									
	Abdominal sepsis	9	3	1	2	4	2	2	-
	Late onset nosocomial infection	14	3	1	2	8	1	5	2
	Others	4	4	2	2	2	1	1	-
	Total courses	27	10	4	6	14	4	8	2
	Percentage (%)	100	37	15	22	52	15	30	7

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Activities Antibiotic Policy Group: Audit: time of initialisation of antibiotics

- ➔ **Concomitant observational study (All)**
- ➔ **Patient inclusion criteria**
 - ➔ a proven or suspected infection
 - ➔ community acquired pneumonia (CAP), meningitis, pyelonephritis, erysipelas, intra-abdominal infections and exacerbation of chronic obstructive pulmonary disease (COPD)
 - ➔ transfer to a ward after admission to the ED
- ➔ **Measured indicators**
 - ➔ time interval between admission to ED and first antibiotic administration
 - ➔ antibiotic selection in accordance with local guidelines

Activities Antibiotic Policy Group: Audit: time of initialisation of antibiotics

Patients characteristics

Number of patients	65
Type of infection	
CAP (%)	35 (54)
intra-abdominal infections (%)	9 (14)
exacerbation of COPD (%)	8 (12)
pyelonephritis (%)	3 (5)
erysipelas (%)	3 (5)
meningitis (%)	1 (2)
others (%)	6 (9)
Mean age, years	61
Gender ratio; M:F	32:33

Outcomes

Time interval (hours) between admission to ED and first antibiotic administration (S.D)	3,9 (3,7)
<i>first dose in the E.D. (N=46) (S.D)</i>	2,4 (1.3)*
<i>first dose on the ward (N=19) (S.D)</i>	7,5 (4,9) *
Percentage treatments in accordance with local guidelines %	86%

* P < 0.01

Conclusion

- Administration of the first antibiotic dose on the ward is associated with longer time intervals.

Improvements

- First dose on ED
- Critical antibiotics available on ED
- Accelerate delivery of antibiotics by pharmacy

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Activities Antibiotic Policy Group: Audit: Kidney failure and antibiotic dose (AIII)

- **Retrospective observational study**
- **Inclusion criteria**
 - > 18 years
 - Admitted on internal medicine, abdominal surgery or nephrology (April 2006 – March 2007)
 - eGFR < 60 mL/min/1,73m² (Modification of Diet in Renal Disease (MDRD) formula)
 - Antibiotic-treatment
- **Exclusion criteria**
 - Dialysis patiënten
- **Measurement kidney function**
 - eGFR met MDRD-formula (serum creatinine, age, sex and race)
 - creatinine clearance with Cockcroft & Gault (if weight available)
- **Evaluation antibiotic dose**
 - By panel (infectiologist, intensivist, pharmacist) based on creatinine clearance

Activities Antibiotic Policy Group: Audit: Kidney failure and antibiotic dose

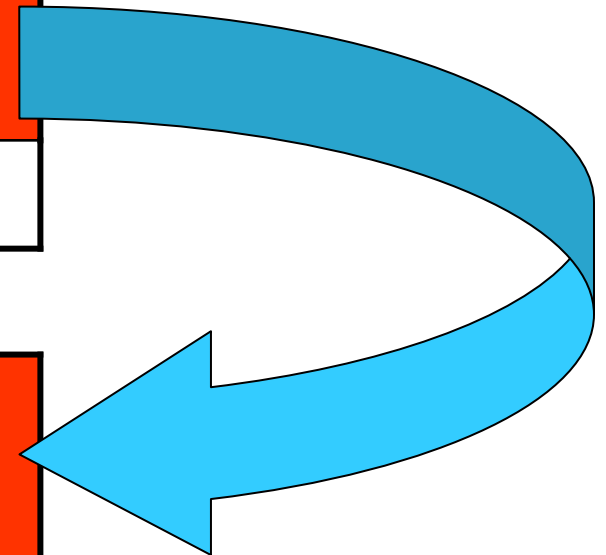
Patient characteristics

Number of patients	99
Nephrology	27
Internal medicine	21
Abdominal surgery	51
Mean age (SD) (years)	65 (15)

Activities Antibiotic Policy Group: Audit: Kidney failure and antibiotic dose

Number administered doses	Number correct doses (%)	Number incorrect doses (%)
1.364	1.068 (78,3%)	296 (21,7%)

Number administered doses with overdose (%)	Number correct doses with underdose (%)	Number doses not possible to evaluate
183 (61,8%)	74 (25,0%)	39 (13,2%)



Activities Antibiotic Policy Group: Audit: Kidney failure and antibiotic dose

➔ Improvements

- ➔ Warning in the on-line electronic laboratory database
 - ➔ Patients between 18 and 70 years and MDRD $< 60 \text{ ML/MIN}/1.73\text{m}^2$
 - ➔ *“Possible increased kidney function. Take this in account by selecting and dosing drugs”.*
- ➔ *Letter to al physicians*
- ➔ *Task for clinical pharmacist*

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Activities Antibiotic Policy Group: Audit: Therapeutic drug monitoring (All)

- **Retrospective observational study**
- **Inclusion criteria**
 - Treatment with teicoplanine or vancomycin
 - Admission on infectious diseases, abdominal surgery and nephrology
- **Exclusion criteria**
 - =< 1 day treatment
- **Outcome measurement**
 - Degree of concordance with intra-muros guidelines
- **Evaluation antibiotic dose and level**
 - Panel of 2 senior pharmacists

Activities Antibiotic Policy Group: Audit: Therapeutic drug monitoring

Patient characteristics - results

Number of patients	50
Mean age (SD) (years)	56,8 (13,4)
Number vancomycin treatments (continuous infusion)	39
<i>Mean treatment duration (days)</i>	<i>14,6</i>
<i>Number doses evaluated</i>	<i>583</i>
Number teicoplanin treatments	11
<i>Mean treatment duration (days)</i>	<i>10,8</i>
<i>Number doses evaluated</i>	<i>108</i>

Activities Antibiotic Policy Group: Audit: Therapeutic drug monitoring - vancomycin

Correct loading dose	17/28	61%
Correct maintenance dose day 1	25/30	83%
Correct maintenance dose day 2	25/30	83%
Number correct doses	268/583	46%
Correct concentration infusion	35/39	90%

Improvements

- Update guidelines for administration and monitoring of glycopeptides (flow chart)
- Pop-up in the on-line electronic laboratory database linked to results drug monitoring



Zie richtlijn 1A
(INTERMITTENT INFUUS)

CONTINU INFUUS

- 1) Dosis geven over 2 uur (Red Man syndroom)
- 2) Maximale concentratie infuus 0.5 % (1% bij vochtrestrictie)
Vb 500 MG vancomycine in 50 ML NaCL 0,9% of glucose 5%
Vb 1000 MG vancomycine in 100 ML NaCL 0,9% of glucose 5%
Vb 1500 MG vancomycine in 250 ML NaCL 0,9% of glucose 5%
- 3) Check andere medicatie (zie 2.11.) (eventueel infuus maximaal 2 x 2 uur/ dag onderbreken)

1. **LADINGSDOSIS**
 15mg/kg lichaamsgewicht oplossen in glucose 5%
 of NaCl 0.9 %

START DAG 1: 0 uur

2. Onmiddellijk NA beëindigen LADINGSDOSIS
GEEF ONDERHOUDSDOSIS:
 30 mg/kg over 24 uur

DAG 1: 2 uur later

- 1) **Maximale concentratie infuus 0.5 % (1% bij vochtrestrictie)**
Vb 1000 MG vancomycine in 100 ML NaCL 0,9% of gluc 5%
Vb. 2000 MG vancomycine in 250 ML NaCL 0,9% of gluc 5%
Vb 3000 MG vancomycine in 500 ML NaCL 0,9% of gluc 5%
- 2) **Check andere medicatie (zie 2.11.) (eventueel infuus maximaal 2 x 2 uur/ dag onderbreken)**

NA 24 uur

Bloedafname voor spiegelbepaling

Bloedafname voor spiegelbepaling niet via infuus waarlangs medicatie is toegediend.

3. **GEEF ONDERHOUDSDOSIS:**
 30 mg/kg over 24 uur

DAG 2

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Activities Antibiotic Policy Group: Audit: Parenteral to oral conversion (AIII)

**“Big diseases need big treatments
and big treatments come in
syringes”**



Activities Antibiotic Policy Group: Audit: Parenteral to oral conversion

➔ **Definitions** (Nathwani et al. JAC 1997;39:441-446)

➔ **Streamlining therapy:**

- ➔ narrowing of the target specific pathogen, encompassing the overall strategy of altering the antimicrobial regimen in response to culture and susceptibility results (Quintilani)

➔ **Sequential therapy:**

- ➔ Conversion from IV to oral formulation of the same medication (maintaining equivalent potency)

➔ **Step-down therapy:**

- ➔ conversion from IV to oral agent of the same or different class of agent, with reduction in potency

➔ **Switch therapy:**

- ➔ conversion from IV therapy with one drug to an oral formulation of a different medication without losing potency

Activities Antibiotic Policy Group: Audit: Parenteral to oral conversion

➔ Advantage for patiënts

- ➔ faster mobilisation
- ➔ shorter stay in hospital
- ➔ reduced risk of adverse effects
 - ➔ pulmonary embolism
 - ➔ phlebitis (no IV line)
 - ➔ catheter associated infection

➔ Advantage for hospital/community budget

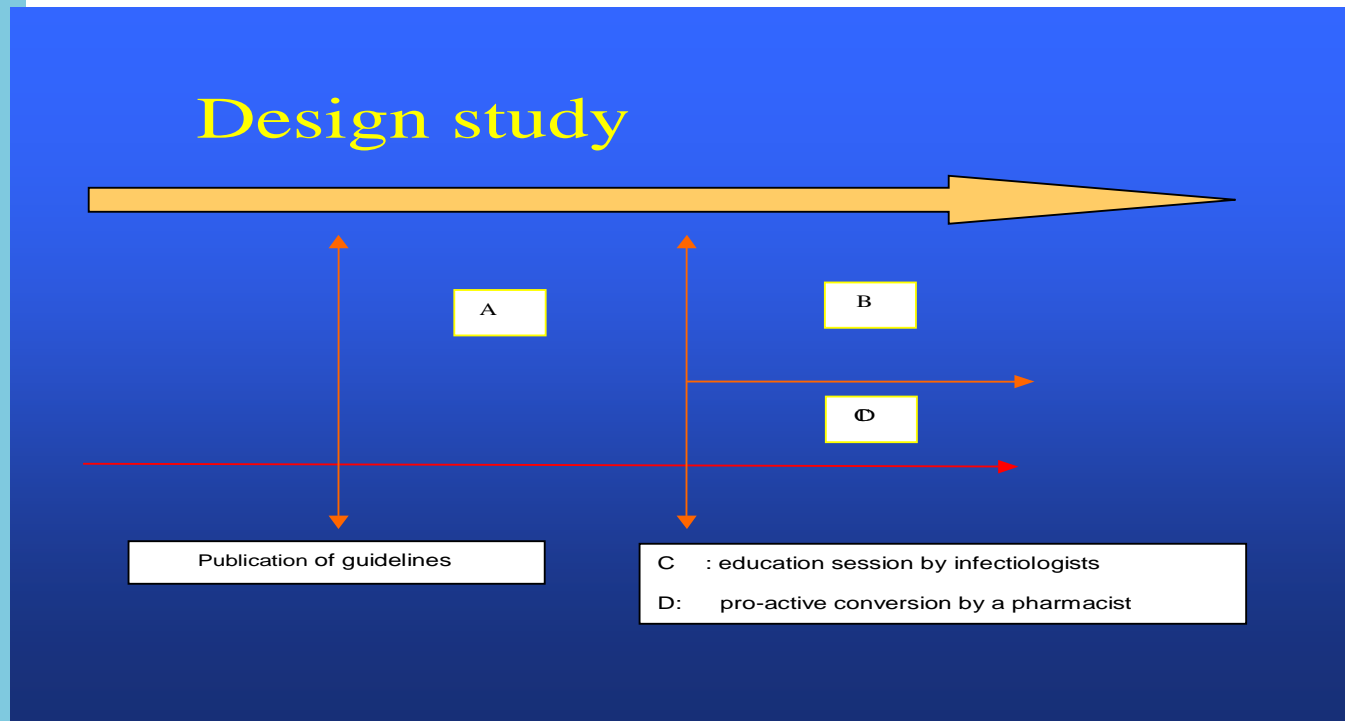
- ➔ reduction in drug acquisition cost
- ➔ reduction in drug wastage
- ➔ reduction laboratory costs, monitoring serum concentration and renal function
- ➔ reduced preparation and administration time

Activities Antibiotic Policy Group: Audit: Parenteral to oral conversion

- ➔ **Guidelines for IV/PO switch differ according to different literature data.**
 - ➔ body temperature < 38°C during 24 hours
 - ➔ decreasing or normal leukocyte count
 - ➔ no unexplained tachycardia
 - ➔ **intact functional gastro-intestinal tractus absence of malabsorption (no vomiting, no diarrhoea)**
 - ➔ **a functional gastric feeding tube**
 - ➔ no planned operation within 24 hours
 - ➔ **no severe sepsis**
- ➔ **For which products?**
 - ➔ Levofloxacin, ciprofloxacin, moxifloxacin, clindamycine, metronidazol, fluconazol, voriconazol linezolid
- ➔ **Pitfalls**
 - ➔ Drug-drug interactions
 - ➔ Drug-food interactions
 - ➔ Crushing of tablets

Activities Antibiotic Policy Group: Audit: Parenteral to oral conversion

- ➔ controlled before and after prospective study



Characteristic	Period B	Period C	Period D	<i>P</i>
	N= 36	N= 21	N=24	
Type of infection				
Urinary tract infection	11	5	12	<i>0,117</i>
Skin and soft tissue infection	4	7	2	<i>0,048</i>
gastro-intestinal infections	7	0	6	<i>0,061</i>
Pneumonia	3	1	1	<i>0,857</i>
Prosthesis-infection	0	5	0	<i>0,001</i>
Osteomyelitis	0	2	0	<i>0,065</i>
Others	11	1	3	<i>0,037</i>
Pathology index (a) (source: Medicare) (<i>S.D.</i>)	1,7 (<i>1,4</i>)	1,5 (<i>0,9</i>)	1,6 (<i>1,4</i>)	<i>0,966</i>
Mean age, years (<i>S.D.</i>)	62 (<i>15</i>)	59 (<i>16</i>)	58 (<i>15</i>)	<i>0,574</i>
Gender ratio, m/v	22/14	9/12	14/10	<i>0,398</i>
Mean time start therapy until fulfilment of criteria (days) (<i>S.D.</i>)	5,2 (<i>5,2</i>)	5,8 (<i>6,2</i>)	5,0 (<i>4,7</i>)	<i>0,934</i>

Activities Antibiotic Policy Group: Audit: Parenteral to oral conversion

Patient outcome

	GROUP A	GROEP B	GROEP C	<i>P</i>
	N= 36	N= 21	N=24	
Mean LOS (S.D)	29,8 (27,4)	23,9 (19,8)	24,7 (21,9)	0,619
Mean duration FQ IV treatment in days (S.D) -	8,6 (6,6)	9,3 (7,9)	4,7 (4,5)	0,029
Mean extra IV treatment in days (S.D.)	4,1 (5,8)	3,5 (4,9)	1,0 (1,3)	0,006
Mean cost caused by extra IV treatment in euro (SD) (a)	188,7 (292,9)	103,6 (131,5)	44,8 (60,2)	0,037

Activities Antibiotic Policy Group: Audit: Parenteral to oral conversion

Year 2005



Slikken is soms beter dan prikken!

*** WAT?**

1. Antibiotica moeten in het zwaartste niet meer intraveneus gegeven worden.
 2. Geef voor of na zo ver mogelijk orale antibiotica.

*** WAAROM?**

1. Behandeling met intraveneuze middelen met een goede biologische beschikbaarheid (diazepam, amoxicilline, ceftriaxon, cefuroxim, cefepime, meropenem, vancomycine, linezolid, daptomycine (Cubicin®), moxifloxacin (Avelox®), chloramphenicol (Chloral®), streptomycine (Flegel®), fusidic acid (Fusidex®), rifampicine (Rifampin®), rifabutine (Zydelo®)).
 2. Prikken kan een af verhoogde kans op infectie van de naald.
 3. Geen intraveneuze met andere geneesmiddelen of voeding die kan worden vermijden door toedieningswijze te wijzigen. (zie UZ Gent Intra-venieuze Toediening en Zorgplicht bij Slikken is soms beter dan prikken)

*** WAAROM?**

1. Oudere mensen verliezen hun intraveneuze behandeling geleidelijk de hele lever van de lever met een slechte aanpak naar deze therapie want de meeste deactiviteit van.
 2. Vermeden
 a. infectie met meer ernstig (meer kans op infectie) verhoogt risico op complicaties van infectie
 b. het risico op infectie
 c. pijn
 d. overmatig medicatie van

*** NIEUW VINDING?**

Prof. dr. G. Nagels, tel. 3499
 Apr. 8. Begijnv. 266



Activities Antibiotic Policy Group: Audit: Parenteral to oral conversion

Year 2007

Further promotion:

- By clinical pharmacists
- Frequently audits
- Follow up usage indicator
 - % IV/IV+PO
 - in 2007: 23%



SLIKKEN BLIJFT SOMS BETER DAN PRIKKEN



Proficiat!

Dankzij uw medewerking bij het frequenter starten of sneller switchen van producten met een hoge biologische beschikbaarheid werd in 2006 bijna 65.000 euro bespaard en de patiënt even doeltreffend behandeld.

Tavanic 500 MG PO (=3,74 €) is 10 x goedkoper i.v.m. IV (=30,35 €).

DE ANTIBIOTICABELEIDSGROEP REKENT VERDER OP U!

Producten met een hoge biologische beschikbaarheid zijn: levofloxacin (Tavanic®), ciprofloxacine (Ciproxine®), moxifloxacine (Avelox®), linezolid (Zyvoxid®), clindamycine (Dalacin®), metronidazol (Flagyl®), fluconazol (Diflucan®) en voriconazol (Vfend®).

Consulteer ook Intranet

<http://serapis/docz/apotheek/UZGeneesmiddelenbulletin24Prikken.pdf>

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 - Time of initialisation of antibiotics
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 - **Future projects**
- **References for the clinical pharmacist**
- **Conclusion**

Future projects

- ➔ **Reducing duration of antibiotic treatment**
 - ➔ Procalcitonin: better diagnostic marker?
- ➔ **Extended and continuous infusion of antibiotics (All)**
 - ➔ Implementation in daily practice
 - ➔ Pitfalls
 - ➔ Incompatibilities
 - ➔ Loadingdose
- ➔ **ABS project: validation of indicators**
 - ➔ *Staphylococcus aureus* bacteremia
 - ➔ Prophylaxis in surgery
 - ➔ IV/PO switch
- ➔ **Decision support system into CPOE (computer physician order entry) (BI)**

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References for the clinical pharmacist

Electronic databases	<ul style="list-style-type: none"> - Up to date (http://www.utdol.com/online/about/contact_us.html) - Micromedex (www.micromedex.com/products/clinicalxpert) - Clinical Pharmacology (http://www.goldstandard.com)
Handbooks	<ul style="list-style-type: none"> - Handbook of injectable drugs. Trissel L. (ISBN 1-58528-016-X) - Interpretation laboratory data. M. Lee ASHP (ISBN 1-58528-059-3) - Clinical pharmacy and therapeutics. Walker R., Edwards C (0-443-07137-3) - Antibiotic policies. Gould I. (ISBN 0-306-48500-1) - The Sanford Guide to antimicrobial therapy
Websites	<ul style="list-style-type: none"> - The Infectious Diseases Society of America (IDSA). http://www.idsociety.org/ - European Society of Clinical Microbiology and Infectious Diseases. http://www.escmid.org/ - The Cochrane Collaboration. Cochrane Reviews “Infectious Diseases”. http://www.cochrane.org/reviews/en/topics/72.html - European Society of Clinical Pharmacy. http://www.escpweb.org/

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Conclusion

- ➔ **Multidisciplinary team approach is necessary**
- ➔ **Combination of different interventions can reduce inappropriate use of antibiotics**
- ➔ **Quality indicators in development or already available**

Thank you for your attention