RVH
Royal Victoria
Regional Health Centre

PRE-PRINTED ORDERS
FEBRILE NEUTROPENIA:
INPATIENT

ADDRESSOGRAPH

ALLERGIES ☐ NO KNOWN ALLERGY ☐ LATEX ☐ DRUGS/ ENVIRONMENTAL/ FOOD **(SPECIFY BELOW)**

MEDICATION/FOOD	REACTION

λ **Weight (kg):** __________ Height (cm): ____________

Transcribe all black dots (•) and checked boxes (☐) as orders

EOL- ENTERED ON-LINE K - ENTERED ON KARDEX
PMO - PROFILE MADE OUT N - NOTED
PLEASE ENTER IN THIS COLUMN

Diagnosis: ____________________Co-Morbidities: _________________________

Attending Physician: __________________ Family Physician: ________________

ACTION TAKEN

SIGNATURE, DESIGNATION, DATE AND TIME

Consults λ NOTIFY ONCOLOGY AT EXT. 43333

☐ **Infection Prevention & Control** ☐ **Registered Respiratory Therapy** λ **Nurse Practitioner (ext: 43332)**
☐ **Pharmacist** ☐ **Internist** λ **Dietitian** ☐ **Infectious Diseases Physician** ☐ **Oncologist**

Assessments & Observations

λ **NO FRESH PLANTS OR FLOWERS**
λ VS q4h and prn X 24 hours then reassess (include BP supine/sitting vs. standing)
λ O_2 Saturation q4h and prn X 24 hours then reassess
λ O_2 to maintain O_2 Saturation greater than or equal to 92%

Nutrition/Fluids

λ **NO <u>RAW</u> FRUIT OR VEGETABLES**
☐ Diet as tolerated
☐ Low Microbial Diet (if ANC less than 0.5×10^9 cells/L)
☐ Clear Fluids
☐ Intake and Output

Activity

λ **Activity as tolerated and reduce exposure to other patients who may have infectious diseases. <u>ISOLATION IS NOT REQUIRED.</u> Reinforce good hand hygiene practice.**

Tests & Procedures

λ **ER – ONC 1 (Febrile Neutropenic Medical Directive) if not already completed**
λ Reassess patient daily and follow decision trees for management
λ CBC, LFT's, Creatinine, Urea, Electrolytes, Glucose, PT, PTT & INR DAILY
λ Access Central Line if present for lab draws and IV infusions
☐ Central Line Flush as per medical directive HW #7
☐ Peripheral IV
☐ Start IV: 0.9 % Sodium Chloride with _____mmol Potassium Chloride per litre at_____mL/hr

Date: _____________ Time: ________ Practitioner's Signature: _______________________

Date: _____________ Time: ________ Transcriber's Signature: _______________________

Faxed to Pharmacy _______

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Royal Victoria Regional Health Centre

ADDRESSOGRAPH

PRE-PRINTED ORDERS
FEBRILE NEUTROPENIA:
INPATIENT

ALLERGIES ☐ NO KNOWN ALLERGY ☐ LATEX ☐ DRUG / ENVIRONMENTAL / FOODS **(SEE PAGE 1)**

Transcribe all black dots (●) and checked boxes (☐) as orders	ACTION TAKEN SIGNATURE, DESIGNATION, DATE & TIME

Medications (ANTIBIOTICS AS PER DECISION TREE RVH # 0496) ADJUST DOSE ACCORDING TO RENAL FUNCTION

☐ Low Risk: MASCC score greater than or equal to 21

☐ Ciprofloxacin 750 mg po q12h and Clavulin 500 mg po q8h X 7 days or until afebrile for 48 hours and ANC greater than or equal to .5 X 10^9 cells/L for 48 hours		
OR IF PENICILLIN ALLERGY:		
☐ Ciprofloxacin 750 mg po q12h and Clindamycin 450 mg po q6h X 7 days or until afebrile for 48 hours and ANC greater than or equal to .5 X 10^9 cells/L for 48 hours		

☐ High Risk: MASCC score less than 21 (NO DEFINED FOCUS: RECOMMENDED EMPIRICAL ANTIBIOTICS)

☐ Piperacillin/Tazobactam 4.5 g/0.5 g (Tazocin® 4.5 g) IV q8h		
OR IF PENICILLIN ALLERGY		
☐ Tobramycin _____mg (4.5 - 6 mg/kg) IV once daily (according to once daily aminoglycoside ordering protocol) **+** Vancomycin 1g IV q12h **OR**		
☐ Ciprofloxacin 750 mg po q12h **+** Vancomycin 1g IV q12h		
☐ **GI malabsorption indicated/suspected use Ciprofloxacin 400mg IV q12h**		
☐ Metronidazole 500 mg ☐ po **OR** ☐ IV q12h for lower GI symptoms (abdominal pain, diarrhea, rectal pain, proctitis, fissure)		
Granulocyte Colony Stimulating Factor: Filgrastim (Neupogen ®) if: ANC less than 0.1 X 10^9 cells/L and febrile greater than 48 hours on empirical treatment (until ANC greater than 0.5 X 10^9 cells/L) or until stable: ☐ Filgrastim 300 mcg subcutaneously once daily		
REASSESS AT 72 HOURS : if patient afebrile for 48 hours and ANC greater than or equal to 0.5 X 10^9 cells/L for 48 hours, may change to oral antibiotics and discharge – follow up in Oncology Clinic (Refer to 72h Decision Tree RVH-1390)		

OTHER ORDERS

Date: _____ Time: _____ Practitioner's Signature: _____

Date: _____ Time: _____ Transcriber's Signature: _____

Faxed to Pharmacy _____

References: Bradley, J., Davis, K. (2003). *Orthostatic Hypotension*. Retrieved May 24, 2007, from American Family Physician Web site: www.aafp.org/afp; Hughes, WT, Armstrong, D, Bodey, GP, et al (2002). Guidelines for the use of antimicrobial agents in neutropenic patients with cancer. *Clinical Infectious Diseases,* 34(6), 730-751; National Comprehensive Cancer Network (2006). *NCCN practice guidelines in oncology: fever and neutropenia. V.1.2006*. Retrieved March 21, 2007, from http://www.nccn.org/professional/physician-gls/pdf/fever.pdf#search=%22MASCC%20system%20for%20febrile%20neutr-openia%22; Paul,M., Yahav, D., Fraser, A., Leibovici, L. (2005). Empirical antibiotic monotherapy for febrile neutropenia: systematic review and meta-analysis of randomized controlled trials. *Journal of Antimicrobial Chemotherapy*, 57, 176-189.

Febrile Neutropenia Risk Assessment Tool **Appendix 1**

Multinational Association for Supportive Care in Cancer (MASCC) Risk-Index Score1, 2 or 3

Characteristic	Point Score	Actual Score
BURDEN OF ILLNESS (select scoring for 1, 2 or 3)		
1. Burden of febrile neutropenia with no or mild symptoms OR	5	
2. Burden of febrile neutronpenia with moderate symptoms OR	3	
3. Burden of febrile neutropenia with severe symptoms or moribund	0	
No hypotension (systolic BP greater than 90 mm Hg)	5	
No chronic obstructive pulmonary disease	4	
Solid tumor or hematological malignancy with no previous fungal infection	4	
No dehydration requiring parenteral fluids	3	
Outpatient status	3	
Age less than60 years	2	
Total Score greater than or equal to 21 LOW RISK **Total Score less than 21: HIGH RISK: Treat as Inpatient**	26	

ELIGIBILITY FOR OUTPATIENT MANAGEMENT OF FEBRILE NEUTROPENIA CHECK LIST[3]	**YES**	**NO**
1. MASCC Score greater than or equal to 21		
2. No history of leukemia or allogeneic bone marrow transplant		
3. Expected duration of neutropenia less than 10 days.		
4. Ability to swallow, no contraindications for oral drug intake or condition likely to severely impair oral drug absorption		
5. No known allergy to ciprofloxacin or Clavulin or history of immediate or accelerated reaction to Penicillin, Cephalosporins, or Quinolones		
6. No severe liver dysfunction (AST/ ALT/ALP or bilirubin greater than 3 X normal).		
7. No creatinine greater than 300 umol/L or CrCl below 25mL/min		
8. No known bacterial or highly suspected viral or fungal infection		
9 No signs of exit-site or tunnel intravascular catheter infection		
10. No indication for intravenous supportive therapy such as BP less than 90 mmHg, dehydration, respiratory insufficiency, or uncontrolled bleeding		
11. No co-morbidity requiring continued in-hospital observation		
12. No acute changes on chest x-ray		
13. Less than 1 hour driving distance to nearest acute care hospital and reliable transportation		
14. 24 hour companion and telephone accessible at home		
15. Expected compliance with oral drug intake, frequent temperature readings and follow-up visits		
16. Follow-up appointment arranged		
17. Patient given list of symptoms/signs for return to emergency or oncology clinic		
18. Oncology clinic notified: **Ext. 43333**		

MUST ANSWER "YES" TO ALL TO BE ELIGIBLE FOR OUTPATIENT MANAGEMENT

References:

Klatersky et al. (2002). The Multinational Association for Supportive Care in Cancer Risk Index: A multinational scoring system for identifying low-risk febrile neutropenic cancer patients. *Journal of Clinical Oncology,* 18(16), pp 3038-3051.

Hughes et al. (2002). 2002 Guidelines for the Use of Antimicrobial Agents in Neutropenic Patients with Cancer. *CID:34: pp 730-751.*

Princess Margaret Hospital. (2006). Febrile Neutropenia Risk Assessment Tool.

Decision Tree for Initial Empirical Treatment of Febrile Neutropenia:

Adult medical Oncology Solid Tumor and Lymphoma Patients

FEBRILE NEUTROPENIC PATIENT
ANC less than 1.0 x 10^9 cells/L or less than 1.0 X 10^9 cells/L and predicted to be less than 0.5 X 10^9 cells/L in 48 hours
Temperature greater than or equal to 38.3 ° C orally or greater than or equal to 38.0 ° C for one hour

LOW RISK

Factors Favoring Low-Risk for Severe Infection:

- **Absolute neutrophil count greater than or equal to 0.1 10^9/L**
- **Absolute monocyte count greater than or equal to 0.1 10^9/L**
- **Duration of neutropenia less than 7 days**
- **Resolution of neutropenia expected in less than 10 days**
- **No acute process on chest X-ray**
- **Near normal liver and renal function tests**
- **No intravenous catheter site infection**
- **Peak temperature of less than 39^{0}C**
- **No neurological or mental changes**
- **No abdominal pain**
- **Malignancy in remission (no advanced disease)**
- **No co-morbid illness: e.g. diabetes, COPD, collagen vascular disease**
- **MASCC Score greater than or equal to 21**

CONSIDER SENDING HOME IF MASCC Score is greater than or equal to 21 and patient meets eligibility criteria for outpatient management

- λ **RELIABLE patient who has a 24 hour companion and can return to facility easily and can take oral medications**
- λ **Home care can be arranged for daily nursing visits to monitor**
- λ **Arrangements can be made to contact and/or formally reassess patient daily to assess condition (i.e. emergency dept., family physician, OP clinics, CCAC, phone call).**
- λ **IF NO to above - ADMIT on Oral Antibiotics**

Notify Oncology at Ext: 4333
Fax chart/lab results to Ext: 43394

RECOMMENDED EMPIRICAL ANTIBIOTICS

Oral Ciprofloxacin 750 mg po q12h and Clavullin 500 mg po q8h X 7 days or until afebrile for 48 hours and ANC greater than or equal to .5 X 10^9 cells/L for 48 hours

OR IF PENICILLIN ALLERGY:

Oral Ciprofloxacin 750 mg po q12h and Clindamycin 450 mg po q6h X 7 days or until afebrile for 48 hours and ANC greater than or equal to 0.5 X 10^9 cells/L for 48 hours

FORMALLY REEVALUATE clinically (lab work in 48 – 72 HOURS)
Follow-up Appt: scheduled with family physician or Oncology clinic

Outpatient Booklet reviewed and given to patient prior to discharge
To return to emergency department (off hours) or oncology clinic if:

- ☑ **Unable to take oral medications**
- ☑ **Fever greater than 39 ° C**
- ☑ **Fever greater than 38 ° C for more than 72 hours**
- ☑ **Clinical Deterioration or new symptoms:**
  - ➢ **Respiratory Symptoms**
  - ➢ **Diarrhea**
  - ➢ **Vomiting**
  - ➢ **Decreased urine output compared to patient's normal**
  - ➢ **Pre-syncope (feeling faint), confusion**
  - ➢ **Rash**
  - ➢ **Redness, drainage, tenderness at vascular access site**

HIGH RISK: ADMIT

Factors Favoring High Risk for Severe Infection:

- **ANC lesser than or equal to 0.1 X 10^9 cells/L**
- **Leukemia patient or previous fungal infection**
- **Prophylactic treatment with fluoroquinolones**
- **Hypotension**
- **Diarrhea**
- **Suspected typhilitis – toxic megacolon**
- **Right lower quadrant pain/mass**
- **COPD**
- **Vascular access infection**
- **MASCC Score less than 21**

Notify Oncology ext. 43333

NO DEFINED FOCUS – RECOMMENDED EMPIRICAL ANTIBIOTICS

Tazocin 4.5 mg IV q8h (Piperacillin/Tazobactam 4.5g /0.5g IV q8h)

OR IF PENICILIIN ALLERGY:

Ciprofloxacin 750mg po q12h + Vancomycin 1g IV q12h
OR
Tobramycin _____mg (4.5 - 6 mg/kg) IV once daily **(according to once daily aminoglycoside ordering protocol)** + Vancomycin 1g IV q12h

Ciprofloxacin 400 mg IV q8h should be considered if impaired GI absorption is indicated or suspected.

CONSIDER ADDING FLAGYL 500 mg po OR IV q12h IF:

- **Right lower quadrant abdominal pain**
- **Rectal pain/proctitis, fissure**
- **Diarrhea**

REASSESS AT 72 HOURS – DURATION: Afebrile for 48 hours and ANC greater than 0.5 X 10^9 cells/L for 48 hours, may change to oral and consider discharge with follow-up in oncology clinic.

CONSIDER ADDING g-CSF Filgrastim (Neupogen ®) IF:

- **ANC less than 0.1 X 10 ^{9} cells/L and febrile greater than 48 hours on empirical treatment (until ANC greater than 0.5 X 10 cells/L) or until stable.**

DEFINED FOCUS
ENSURE ANTIBIOTICS PROVIDE OPTIMAL THERAPY FOR FOCUS, WHILE ALSO MAINTAINING GRAM NEGATIVE COVERAGE

OVERALL DURATION: Specific to focus, signs & symptoms resolved. Until afebrile 5 – 7 days, ANC greater than or equal to .5 X 10^9 cells/L. MONITOR AND REASSESS.

IF POSSIBLE- AVOID AMINOGLYCOSIDES OR OTHER NEPHROTOTOXIC ANTIBIOTICS FOR PATIENTS WHO HAVE RECEIVED CISPLATIN CHEMOTHERAPY are on Vancomycin and/or Amphotericin B., Tobramycin 4.5-6 mg/kg q24h when double gram - negative coverage is deemed necessary.

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Clinical Pathway
FEBRILE NEUTROPENIA

(addressograph)

MRP:_____

Target Discharge Date: _____Nursing Unit: _____

Clinical Component	Admission	Day 1	Day 2
Date			
Consult/ Referrals	λ Consider appropriate referrals as per orders	⇐	
Assessments/ Observations/ Measurements	λ Vital signs q4h and prn X 24 hrs then reassess λ Orthostatic BP λ O_2 Sat q4h and prn X 24 hrs then reassess λ **Systems' Assessments** q4h & prn X 24 hours then reassess: Neurological, Respiratory, Cardiovascular, Genitourinary, and Gastrointestinal λ **Ongoing assessment for symptoms of impending sepsis**	⇐ ⇐ ⇐ ⇐	⇐ #1 **FEVER SUBSIDING** Date Met and Initial _____ Variance: date _____ **(Document in Interdisciplinary Progress Notes if variance)** ⇐
Nutrition/ Fluids	λ Dietitian to assess λ No raw fruits or vegetables λ Diet as ordered by Practitioner	⇐ ⇐ ⇐	⇐ ⇐ ⇐
Personal Care	λ Personal care as tolerated λ *** Good hand washing*** λ Good oral hygiene λ Intake and output (monitor for diarrhea) λ Ongoing assessment for oliguria and/or sudden	→	
Activity	λ Private room as symptoms warrant λ May be in a semi-private with acceptable roommate, i.e. - no infectious process - no diarrhea - no COPD patient - no pneumonia - no draining wounds λ Activity as tolerated	⇐	⇐
Tests & Procedures	λ Bloodwork daily λ Initial CXR – PA and lateral λ MRSA and VRE screening results	⇐ ⇐	⇐ ⇐ reassess culture results
Medications	λ Appropriate antibiotic therapy (see Febrile Neutropenia Guideline) λ Medications will be adjusted for renal function	⇐ ⇐	⇐ ⇐
Psychosocial & Education	λ Ongoing education λ Febrile Neutropenia education sheet λ Patient Clinical Pathway for Febrile Neutropenia λ No visitors with infectious diseases	⇐ λ Consult Social Worker prn ⇐ ⇐	⇐ ⇐ ⇐
Discharge			λ Consider CCAC

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Clinical Pathway
FEBRILE NEUTROPENIA

MRP: _____

Target Discharge Date: _____Nursing Unit: _____

(addressograph)

Clinical Component	Day 3 (discharge if criteria met)	Day 4 (still febrile)	Day 5 (still febrile)	Discharge Criteria
Date				
Consult/ Referrals	λ GI consult prn λ Cardiologist prn λ Infectious Diseases Physician			λ Follow-up with Family Doctor, Oncologist or Nurse Practitioner
Assessments & Observations	**#2 AFEBRILE greater than 24 HRS** *ANC greater than 0. 5 X 10^9cells/L* Date Met and Initial _____ Variance: date _____ **(Document in Interdisciplinary Progress Notes if variance)**	⇐	⇐	**AFEBRILE greater than 24 HRS** *ANC greater than 0.5 X10^9 cells/L*
Nutrition/ Fluids	**#3 HYDRATION RETURNS TO PATIENT'S NORMAL** Tolerating diet and fluids Date Met and Initial _____ Variance: date _____ **(Document in Interdisciplinary Progress Notes if variance)**	⇐	⇐	λ Tolerating diet and fluids **HYDRATION RETURNS TO PATIENT'S NORMAL.**
Personal Care	**#4 CAN MANAGE ADL'S OR HOME SUPPORTS IN PLACE** Date Met and Initial _____ Variance: date _____ **(Document in Interdisciplinary Progress Notes if variance)** **#5 BOWEL AND BLADDER HABITS RETURN TO PATIENT'S NORMAL** Date Met and Initial _____ Variance: date _____ **(Document in Interdisciplinary Progress Notes if variance)**	λ Bath with minimal assistance ⇐	λ Able to do own care ⇐	λ Return to normal prior to admission **ABLE TO MANAGE ADL'S OR HOME SUPPORTS IN PLACE.** **BOWEL AND BLADDER HABITS RETURN TO PATIENT'S NORMAL.**
Activity	⇐	⇐	⇐	λ Return to previous activity level
Tests & Procedures	λ Recheck bloodwork, test results daily **Consider:** λ MRI, CT, U/S liver/spleen λ Repeat CXR λ Repeat blood cultures X 2			
Medications	λ **Refer to Decision Tree for 72 hour reassessment of Febrile Neutropenia** RVH-1390 for antibiotic/ antifungal reassessment			λ Prescription for IV meds or po meds as per Family Doctor, Oncologist, or Nurse Practitioner
Psychosocial & Education	⇐	⇐	⇐	λ Linked to community resources in the home or as outpatient
Discharge	λ QUMP to assess λ Consider CCAC	⇐ ⇐	⇐ ⇐	λ CCAC services if needed

References: Bradley, J., Davis, K. (2003). *Orthostatic Hypotension*. Retrieved May 24, 2007, from American Family Physician Web site: www.aafp.org/afp; Hughes, WT, Armstrong, D, Bodey, GP, et al (2002). Guidelines for the use of antimicrobial agents in neutropenic patients with cancer. *Clinical Infectious Diseases,* 34(6), 730-751; National Comprehensive Cancer Network (2006). *NCCN practice guidelines in oncology: fever and neutropenia. V.1.2006*. Retrieved March 21, 2007, from http://www.nccn.org/professional/physician-gls/pdf/fever.pdf#search=%22MASCC%20system%20for%20febrile%20neutr-openia%22;

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Patient Pathway
FEBRILE NEUTROPENIA

MRP:_____

Target Discharge Date: _____Nursing Unit:_____

*** = PATIENT GOALS**

Clinical Component	Admission	Day 1	Day 2
Date			
Tests & Treatments	Bloodwork will be drawn daily Chest x-ray will be done Other tests may be done as needed You may require an Intravenous to have medications/fluids given directly into your veins If you have a Central Line, staff will access it when able for taking bloodwork or giving you medications/fluids You may require a blood transfusion	→	Results from blood cultures and other tests will be reassessed
Medications	Have your family or a friend bring in a list of all the medications you take – don't forget vitamins, cold medicines, sleeping pills or other medications you buy at the drug or health food store. Intravenous antibiotics will be started as soon as possible after blood cultures taken.	Your medications may change, a nurse or pharmacist will review your medications before you are discharged. IV therapy continues →	
Education	No visitors with infectious diseases or exposed to communicable diseases, e.g. flu, measles, mumps, etc. No live plants or flowers You will be given a Febrile Neutropenia education booklet to review along with this pathway	→	Read education booklet on Febrile Neutropenia →
Discharge Planning	You may be seen by a discharge planner, social worker, and/or home care case manager	→	

Patient Pathway

FEBRILE NEUTROPENIA

MRP:_____

Target Discharge Date: _____Nursing Unit:_____

- **= PATIENT GOALS**

Clinical Component	Day 3 (if discharge criteria not met)	Day 4 (still febrile)	Day 5 (still febrile)	Discharge Criteria
Date				
Consults	→	→	→	Make appointment to see Family Doctor, Oncologist or Nurse Practitioner
Assessments	→ *Temperature normal *Bloodwork normal	→ →	→ →	
Nutrition	→ * Fluid intake and urinary output is satisfactory	→ →	→ →	*Tolerating diet and fluids
Personal Care	→ * Able to care for self or home support is in place * Regular bowel and bladder habits	→ Able to bathe with minimal assistance	→ Able to do own care	→ *Able to do own personal hygiene *Bowel and bladder habits return to normal
Activity	→	→	→	*Return to previous activity level
Tests & Procedures	Your bloodwork may be continued → You may require further tests depending on your health condition →			*Your bloodwork is at a safe level for you to be discharged home
Medications	Your doctor may change or order different antibiotics	→	→	You may receive a prescription for antibiotics from your Family Doctor, Oncologist or Nurse Practitioner

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Patient Pathway
FEBRILE NEUTROPENIA

MRP:_____

Target Discharge Date: _____Nursing Unit:_____

*** = PATIENT GOALS**

Clinical Component	Day 3 (if discharge criteria not met)	Day 4 (still febrile)	Day 5 (still febrile)	Discharge Criteria
Date				
Education	Review Education booklet on Febrile Neutropenia and ask questions (if any)	→	→	You may be linked to community resources either at home or as an outpatient Make sure you read your discharge handout for further follow up instructions concerning your medications, appointments, and/or Home Care services
Discharge Planning	Keep a list of all questions you and your family may have for your health professional team.	→	→	Home Care services may be involved if needed Any questions for your health practitioners?

Febrile Neutropenia Bibliography

Bradley, J., Davis, K. (2003). *Orthostatic Hypotension*. Retrieved May 24, 2007, from American Family Physician Web site: www.aafp.org/afp

Hughes, WT, Armstrong, D, Bodey, GP, et al (2002). Guidelines for the use of antimicrobial agents in neutropenic patients with cancer. *Clinical Infectious Diseases*, 34(6), 730-751.

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National Comprehensive Cancer Network (2006). *NCCN practice guidelines in oncology: fever and neutropenia. V.1.2006*. Retrieved March 21, 2007, from http://www.nccn.org/professional/physician-gls/pdf/fever.pdf#search=%22MASCC%20system%20for%20febrile%20neutr-openia%22

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Vidal, L., Paul M., Ben dor, I., Soares-Weiser, K., Leibovici, L. (2004). Oral versus intravenous antibiotic treatment for febrile neutropoenia in cancer patients: a systematic review and meta-analysis of randomized trials. *Journal of Antimicrobial Chemotherapy*, 54, 29-37.