Standing Orders for the Treatment of Outpatient Peritonitis

1. **Definition of Peritonitis: At least two of the following:**
   a. Clinical signs of peritonitis (Cloudy effluent and/or abdominal pain)
   b. WBC > 100 cells/mm3 with >50% polymorphonuclear (PMN) cells with minimum 2-hour dwell.
   c. Positive dialysis effluent culture

Start empiric antibiotics if any one of these are present and peritonitis is suspected

2. **Nurse will instruct patient to:**
   a. Save the cloudy bag (refrigerated or on ice if delayed).
   b. Record temperature, blood pressure, pulse, note any other symptoms.
   c. Notify NKC Peritoneal staff for further instructions.
   d. Patient will be directed to come into unit or go to ER. If patient does not have PD fluid for testing, minimum of 1L, if tolerated, PD fluid should be instilled and dwelled for a minimum of two hours before sample is taken.

3. **Lab Sampling and Requisitions**
   a. Cell Count and Differential (ICD10 = K65.9)
      i. Send 3 ml lavender topped tube filled with effluent.
   b. Bacterial Culture and Sensitivity with Gram Stain (ICD10 = K65.9)
      i. Send 10 ml of cloudy effluent into each bottle of a set of two Bactec Culture Bottles (1 aerobic & 1 anaerobic).
      ii. Send 10 ml sterile, yellow-topped tube filled with effluent.
   c. Fungal Culture (ICD10 = K65.9)

   Send 10 ml sterile, yellow-topped tube filled with effluent.

4. **Antibiotic Therapy**
   a. Antibiotics should have a minimum dwell time of six hours.
   b. CAPD patients will add the antibiotics to the overnight exchange.
   c. APD patients will add the antibiotics to the day exchange. If a day exchange is not usually done, one will be added for the duration of the antibiotic therapy.

5. **Initial Treatment – Empiric Antibiotics**
   a. Antibiotics will be initiated in clinic unless this will lead to a significant

delay in care and patient has an Emergency Kit at home.
   i. If Emergency Kit present, can initiate antibiotics at home with recommended clinic evaluation the same day.

b. Notify MD by fax and phone call to office.
c. Check for antibiotic allergies.
d. Look for evidence of exit site or tunnel infection.
e. Drug dose may depend on the presence of residual kidney function (RKF).
   i. If urine output > 100 ml/day = RKF is present.
   ii. If urine output is $\leq$ 100 ml/day = no RKF.
f. Antibiotics are administered by the intraperitoneal (IP) route as a single daily dose in the long dwell for APD patients or can be dosed in each exchange for patients on CAPD. Vancomycin is an exception, which is administered every 3-7 days.
g. Empiric antibiotics will be given until culture results become available.
   i. **Give combination of Vancomycin and Ceftazidime (Use Tobramycin for cephalosporin allergy)**
      1. Vancomycin is given IP q 3-7 days (based on vancomycin random levels).
         a. Standard dose: 15-30 mg/kg (See Dosing Chart).
         b. Vancomycin random level before second and all subsequent doses (target greater than 15 mcg/ml and less than 20 mcg/ml).
         c. Adjust dose and subsequent dosing interval per specific MD order based on vancomycin random level.

      AND

      2. Ceftazidime 1000 mg IP for weight <50 kg and 1500 mg IP for weight $\geq$50 kg.
      3. **For Cephalosporin Allergy Use**
         a. Tobramycin 0.75 mg/kg/day IP with **RKF present.**
         b. Tobramycin 0.6 mg/kg/day IP with **no RKF.** (See Dosing Chart)
            i. Prolonged aminoglycoside use should be avoided if an alternative agent is available. When used, levels should be closely monitored to avoid nephrotoxicity and ototoxicity in patients with residual kidney function.
      4. For vancomycin allergy use Cefazolin.
h. Refer to Appendix A to adjust antibiotics based on culture and sensitivities. Cefazolin should not be used unless sensitivities known.
i. Refer to Appendix B tables for antibiotics.
j. Consider adding Heparin 500 u/L IP to each bag of dialysate per protocol. (Always use heparin 1:1000 u/ml.)
k. Fungal prophylaxis recommendation: Oral Nystatin 500,000 units 4 times daily while patients are on antibiotics for greater than 7 days.

Recommended to continue 7 days after antibiotic therapy

l. Notify physician if patient develops diarrhea during antibiotic therapy due to risk of Clostridium Difficile colitis.

1. Treatment Follow-Up

a. A repeat cell count should be completed 48-72 hours after starting antibiotics to ensure response to therapy.
b. Cell count with differential 2 weeks post completion of antibiotics other than vancomycin.
c. If patient is on vancomycin, cell count with differential 19 days post completion of vancomycin.

2. Retraining and Prevention of Future Infections

a. All patients who develop peritonitis must be evaluated in clinic for technique problems and scheduled for retraining and a home visit as needed per nursing evaluation.
b. Review of aseptic technique and infection-related education topics is mandatory for all patients who develop peritonitis.
c. Staff should ensure that Gentamicin 0.1% cream is being used to prevent exit site infections in all patients. If patient has a gentamycin allergy Mupirocin cream may be used.
d. Patients with suspected relapsing* or recurrent** peritonitis should be evaluated as per peritonitis standing orders.

- *Infection with same organism within 30 days of completion of therapy
- **Infection with different organism within 30 days of completion of therapy

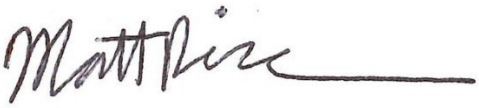
3. Technique Break (ICD10 = Z41.8)

a. To prevent a peritonitis following a wet break in sterile technique, Cephalexin 500mg PO BID x 3 days is recommended. Alternative treatment is a single dose of Vancomycin 1 gm IP. Each patient must come to PD clinic following a technique break to review aseptic technique and infection-related education topics and transfer set change. Retraining and home visit as needed per nursing evaluation.

4. References

a. ISPD Guidelines/Recommendations: 2022 Update.

Matthew Rivara, MD
Physician Name (Please Print)



Physician signature

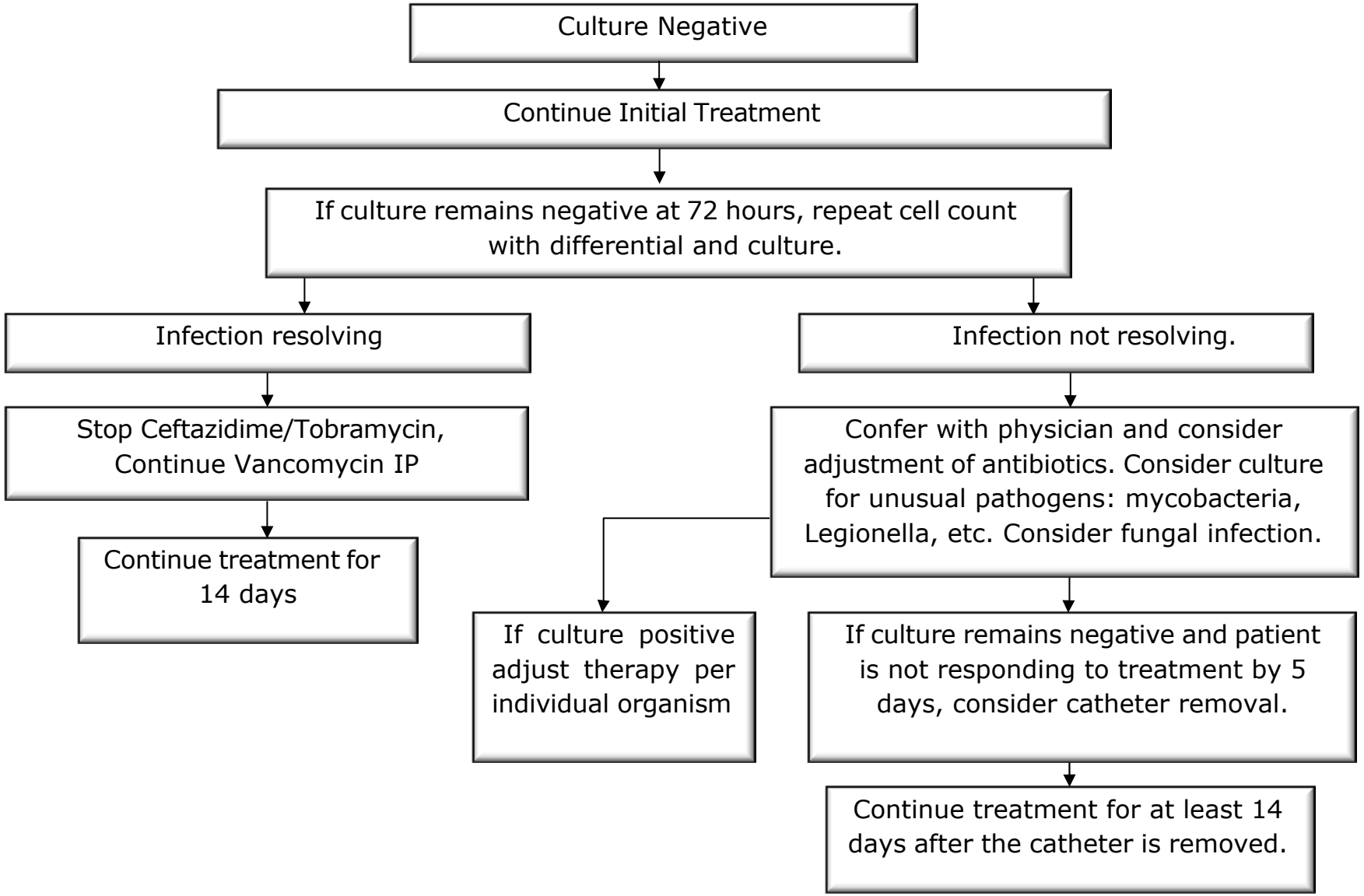
February 3rd, 2025
Date

(see Initial Orders)

Patient Name_____ **NKC#**_____

APPENDIX A: ANTIBIOTIC ADJUSTMENT ALGORITHMS

1.



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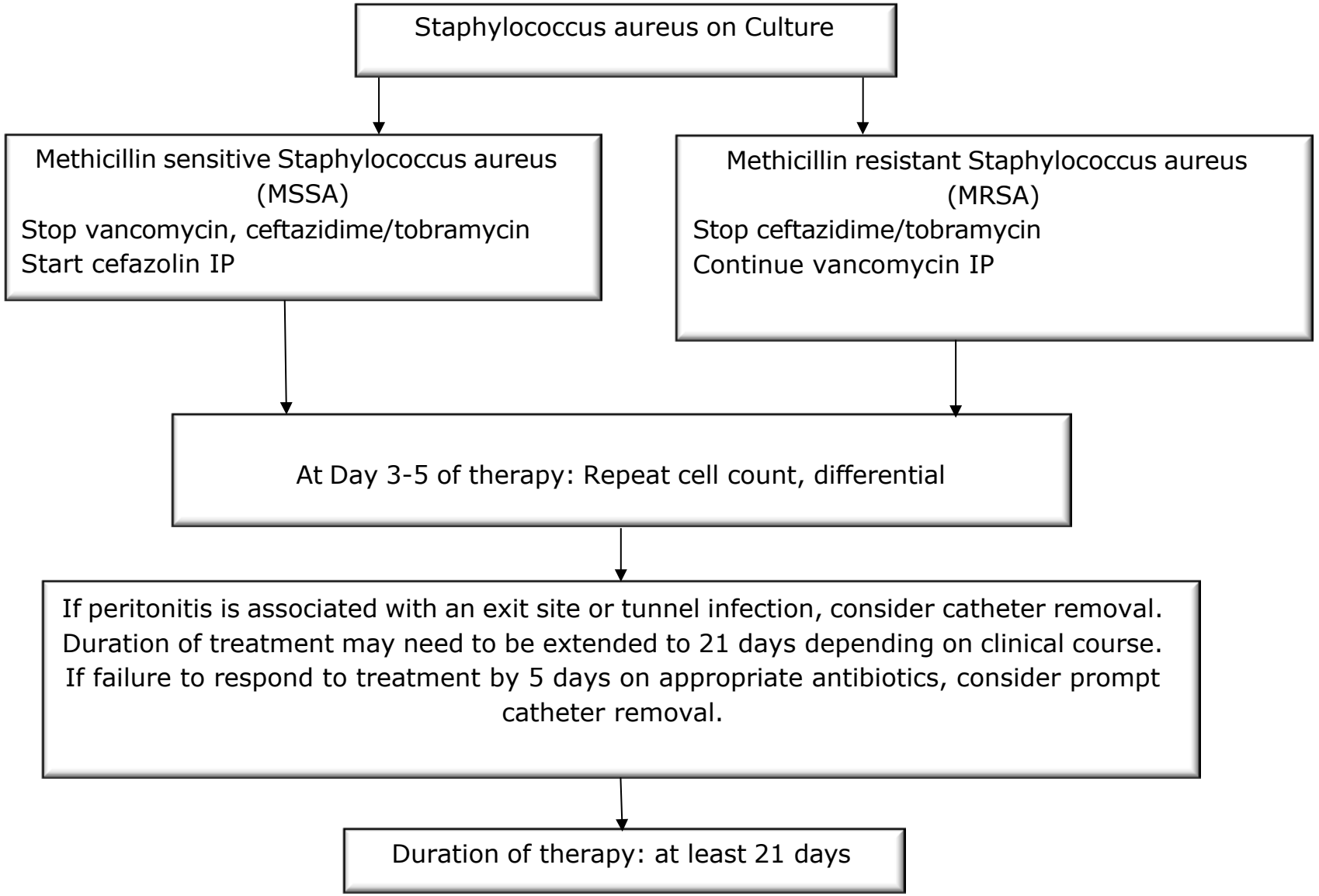
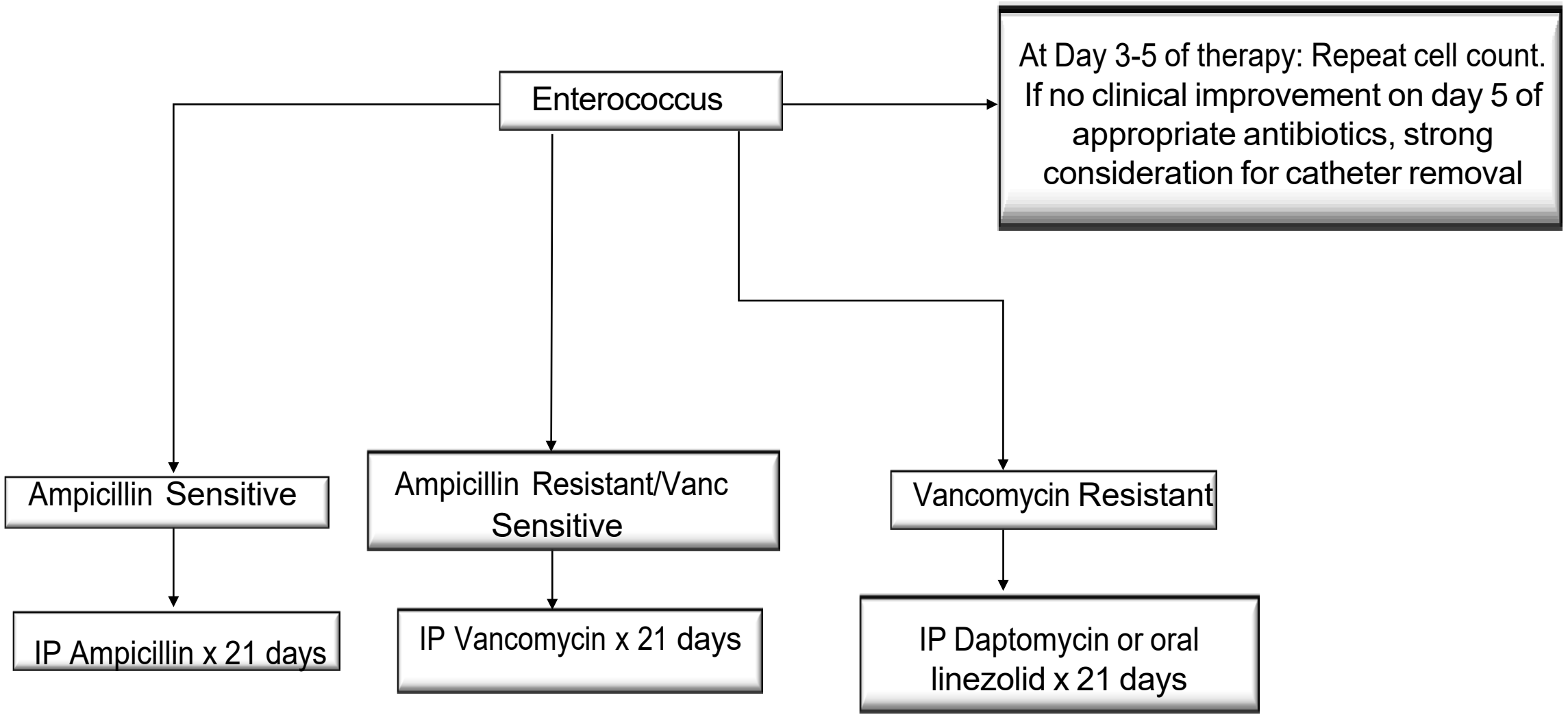

Staphylococcus aureus on Culture
Methicillin sensitive Staphylococcus aureus (MSSA)
Stop vancomycin, ceftazidime/tobramycin
Start cefazolin IP
Methicillin resistant Staphylococcus aureus (MRSA)
Stop ceftazidime/tobramycin
Continue vancomycin IP
At Day 3-5 of therapy: Repeat cell count, differential
If peritonitis is associated with an exit site or tunnel infection, consider catheter removal.
Duration of treatment may need to be extended to 21 days depending on clinical course.
If failure to respond to treatment by 5 days on appropriate antibiotics, consider prompt catheter removal.
Duration of therapy: at least 21 days

3.



Patient Name _____ **NKC#** _____

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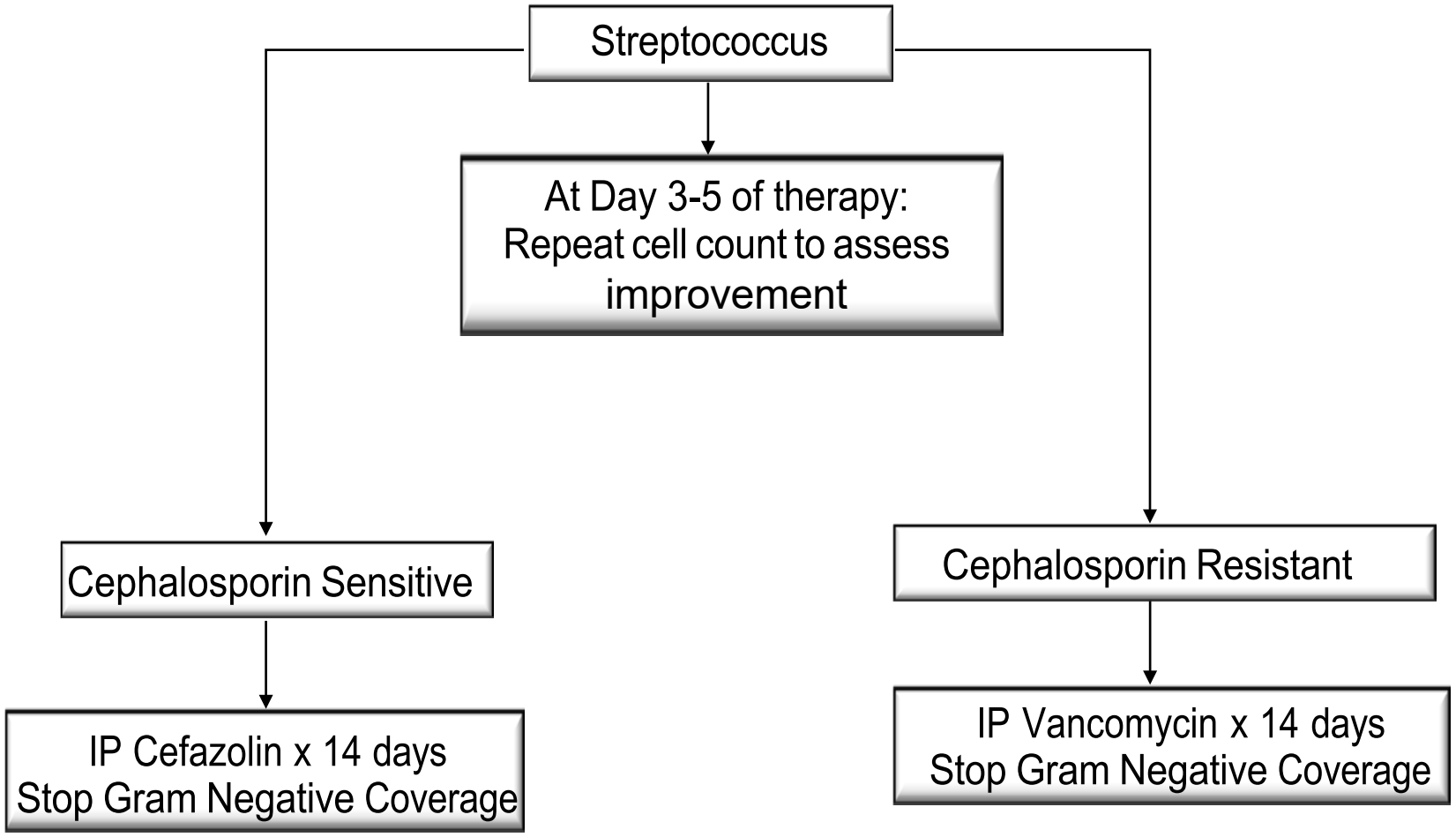

Patient Name _____ **NKC#** _____

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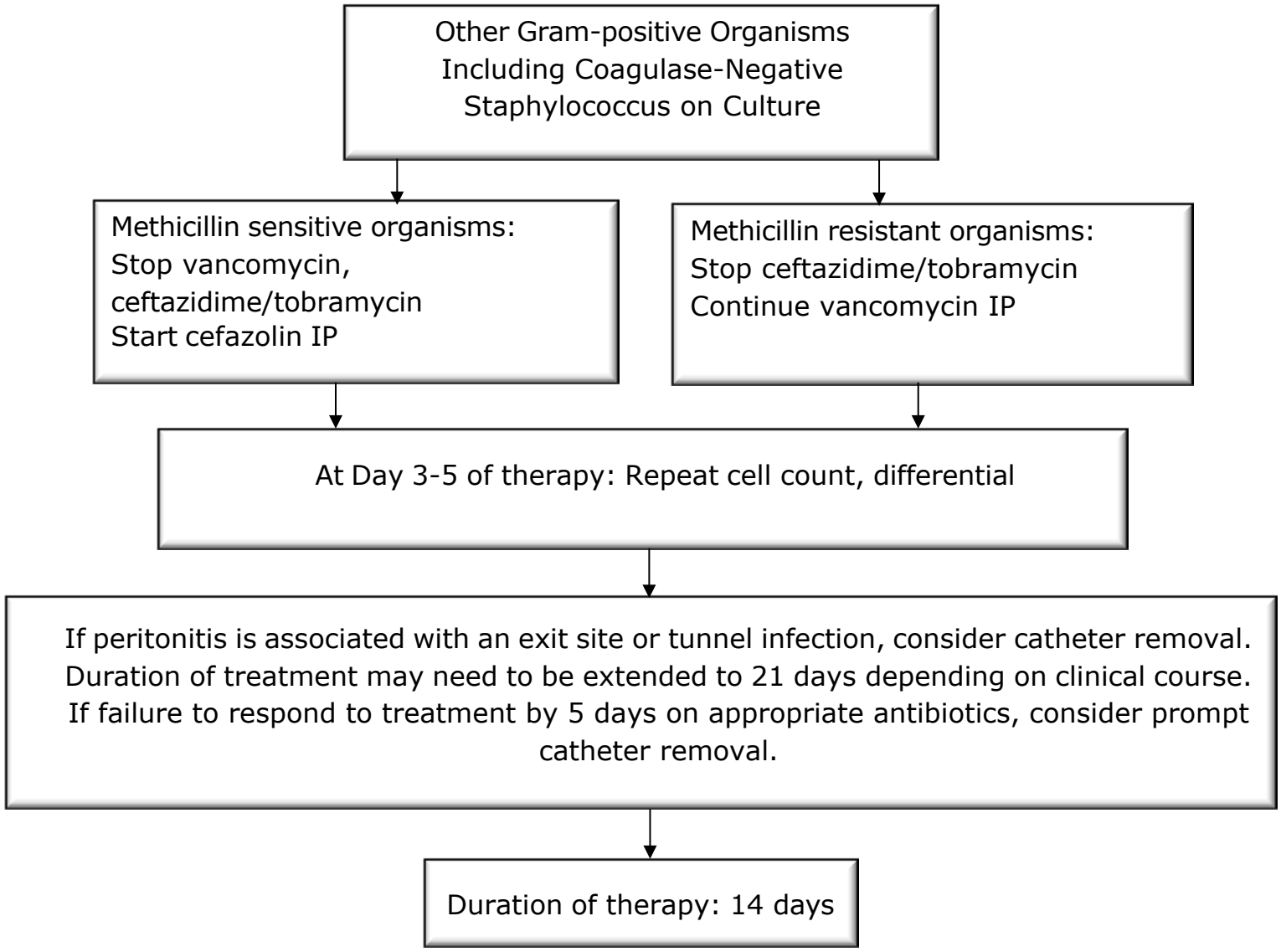

Patient Name _____ **NKC#**

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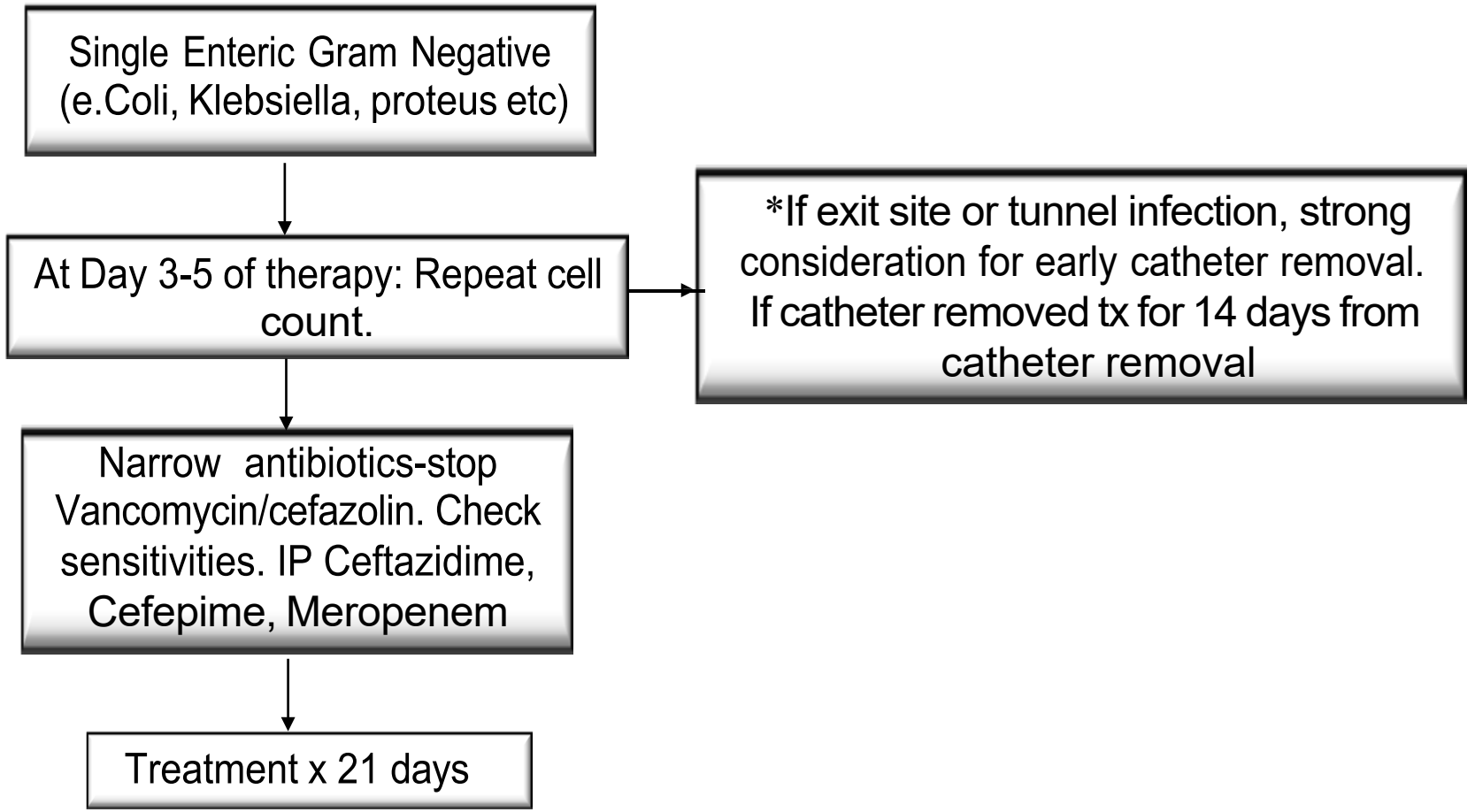
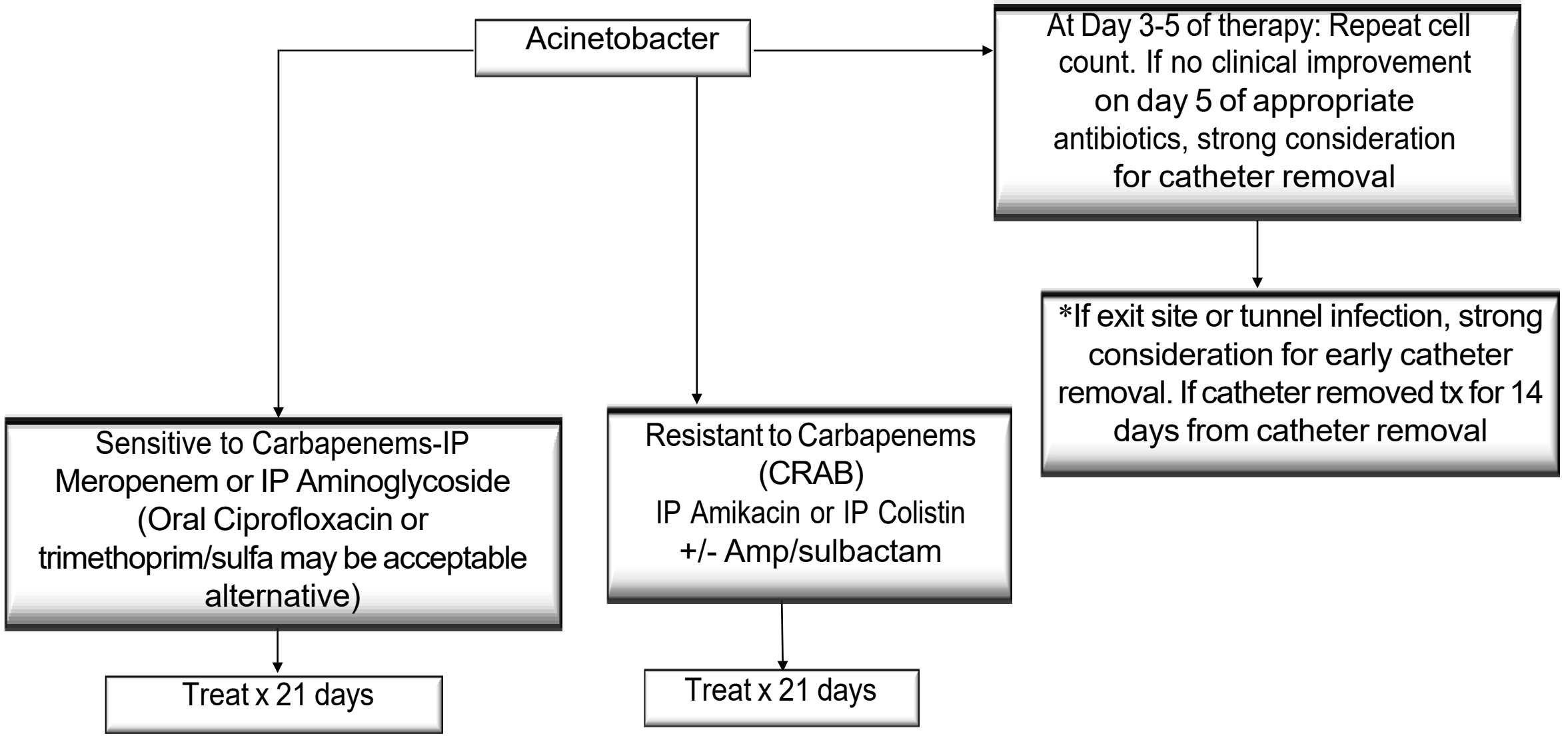

Single Enteric Gram Negative (e.Coli, Klebsiella, proteus etc)
At Day 3-5 of therapy: Repeat cell count.
*If exit site or tunnel infection, strong consideration for early catheter removal. If catheter removed tx for 14 days from catheter removal
Narrow antibiotics-stop Vancomycin/cefazolin. Check sensitivities. IP Ceftazidime, Cefepime, Meropenem
Treatment x 21 days

7.



Patient Name _____ **NKC#** _____

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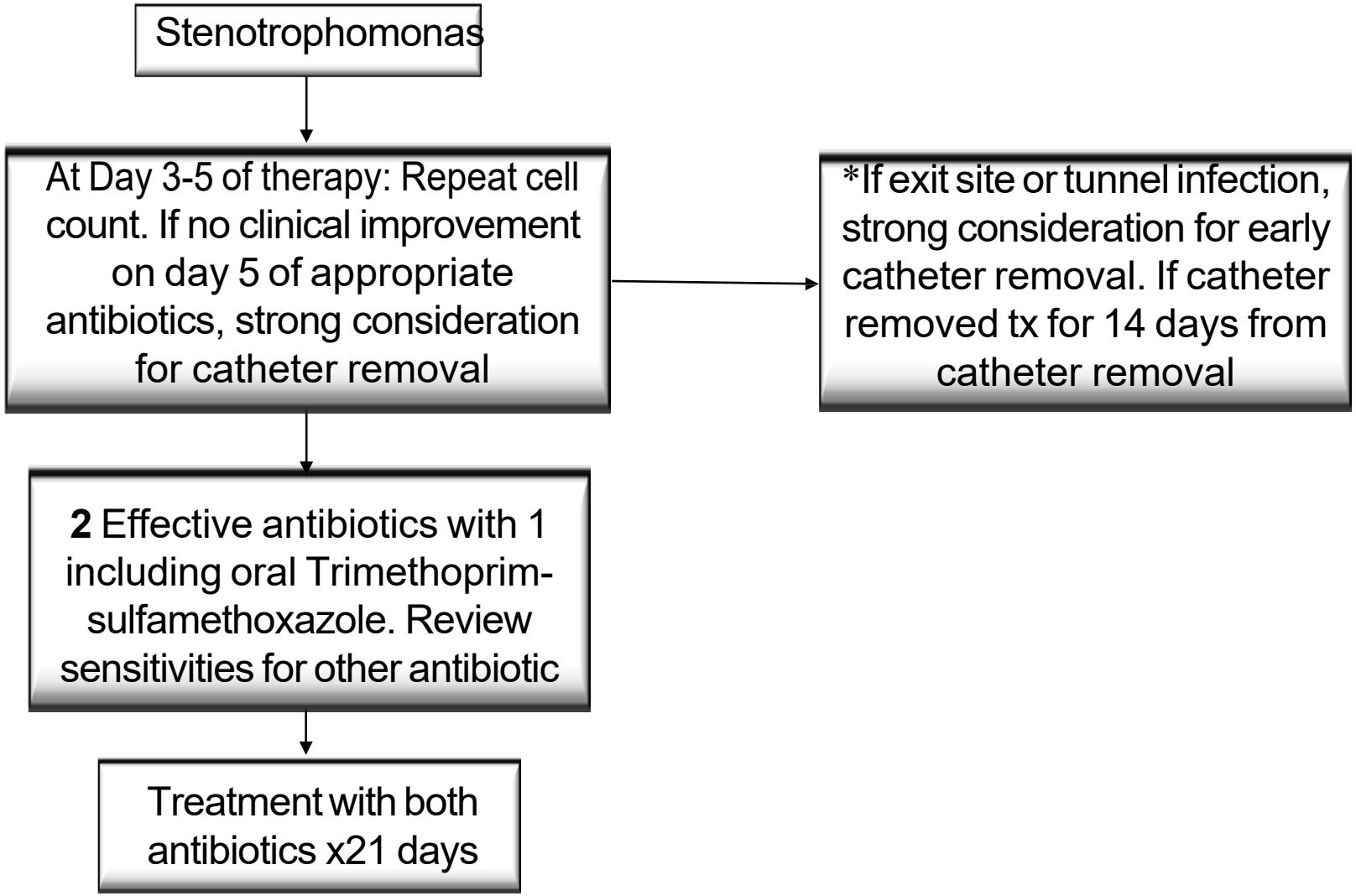
Stenotrophomonas
At Day 3-5 of therapy: Repeat cell count. If no clinical improvement on day 5 of appropriate antibiotics, strong consideration for catheter removal
*If exit site or tunnel infection, strong consideration for early catheter removal. If catheter removed tx for 14 days from catheter removal
2 Effective antibiotics with 1 including oral Trimethoprim-sulfamethoxazole. Review sensitivities for other antibiotic
Treatment with both antibiotics x21 days

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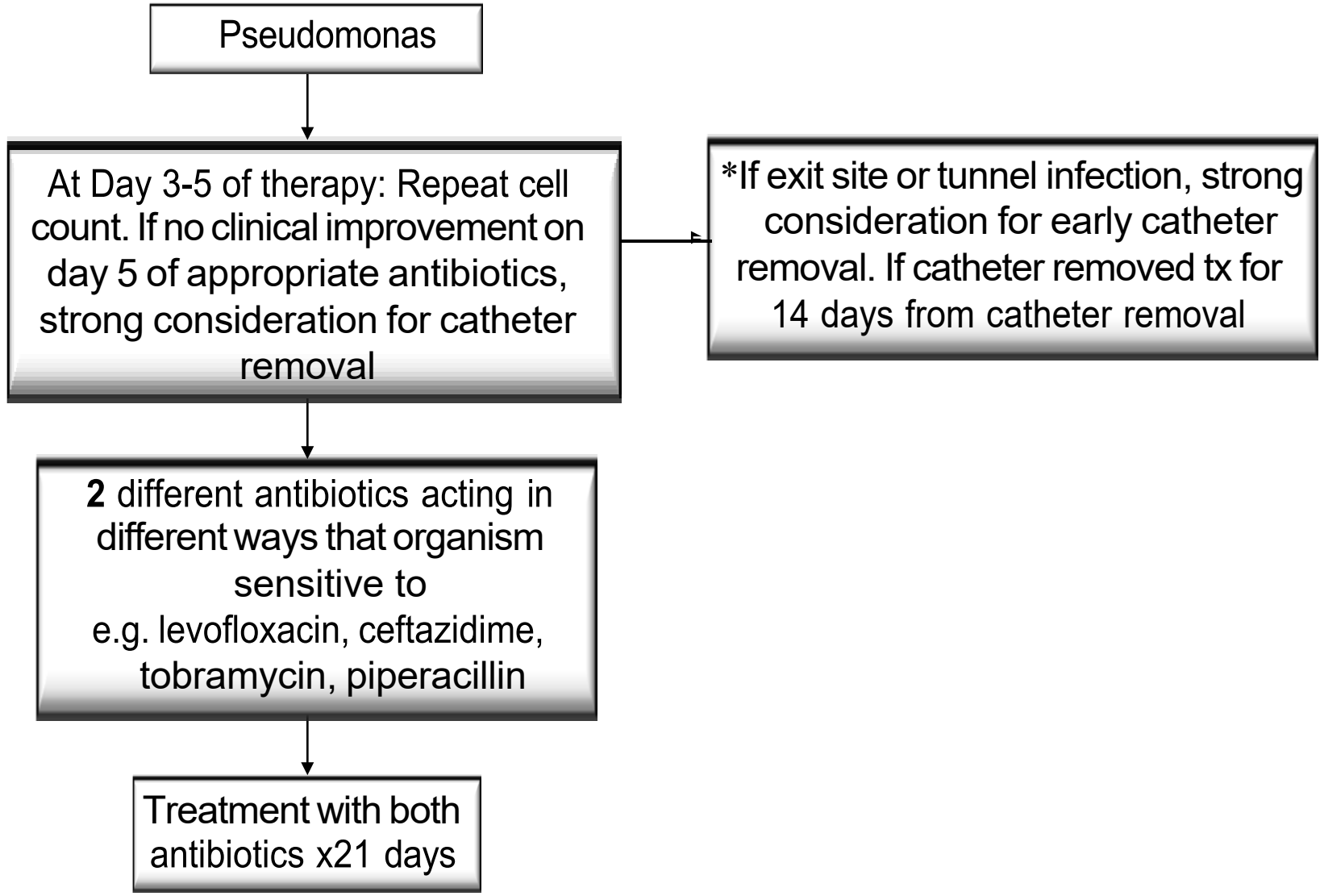

Patient Name _____ **NKC#** _____

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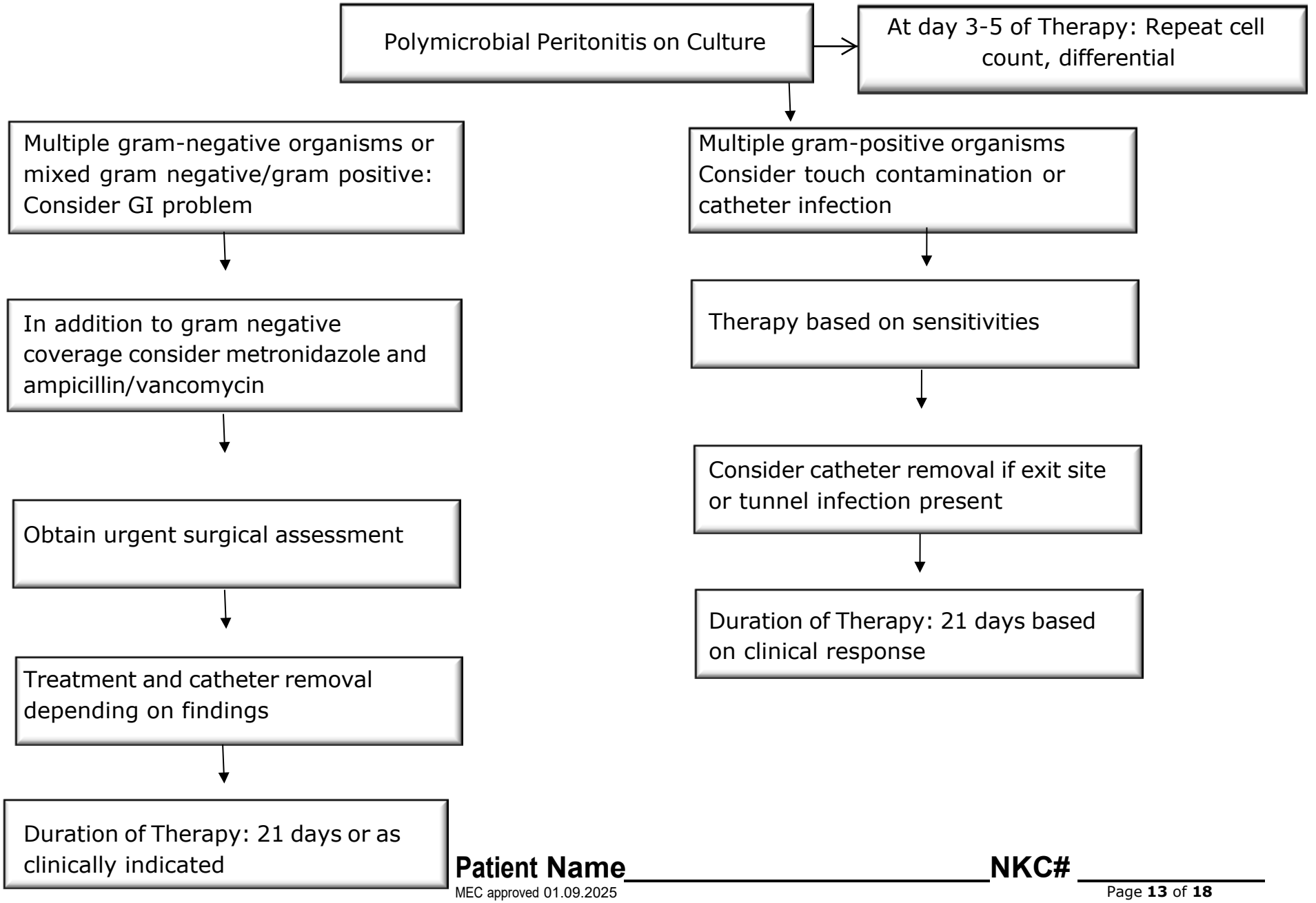
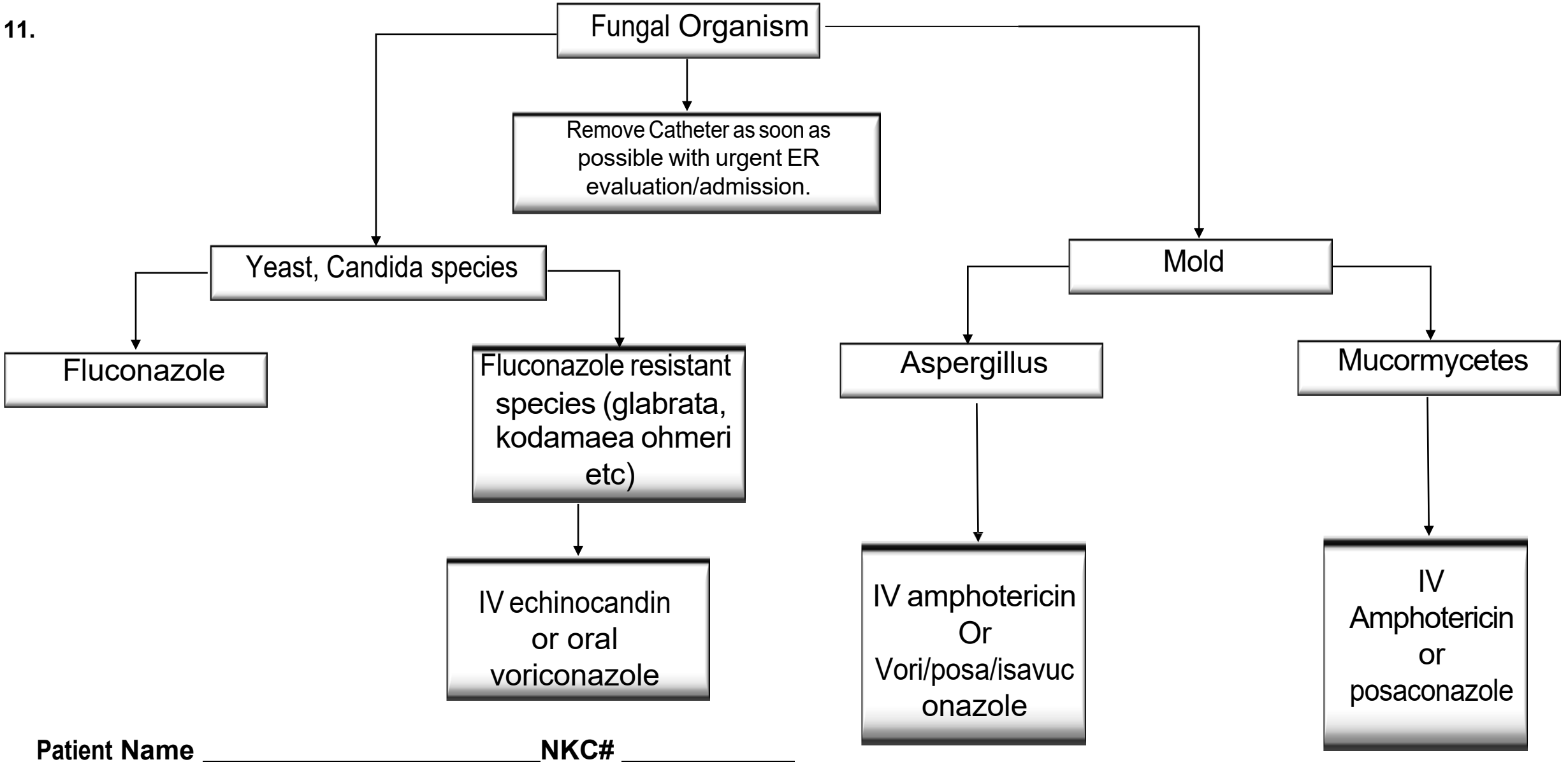

Polymicrobial Peritonitis on Culture
At day 3-5 of Therapy: Repeat cell count, differential
Multiple gram-negative organisms or mixed gram negative/gram positive: Consider GI problem
In addition to gram negative coverage consider metronidazole and ampicillin/vancomycin
Obtain urgent surgical assessment
Treatment and catheter removal depending on findings
Duration of Therapy: 21 days or as clinically indicated
Multiple gram-positive organisms Consider touch contamination or catheter infection
Therapy based on sensitivities
Consider catheter removal if exit site or tunnel infection present
Duration of Therapy: 21 days based on clinical response

11.



Patient Name _____ **NKC#** _____

APPENDIX B: DOSING ALGORITHM FOR COMMONLY USED IP ANTIBIOTICS

1. Vancomycin Dosing (same for RKF present or No RKF)

IMPORTANT: Vancomycin is dosed every 3-5 days depending on vancomycin random levels NOT DAILY. Add the entire dose in one bag of the dialysate.

Actual Weight (Kg)	Vancomycin Dose IP
<60	**1000 mg**
60-90	**1500 mg**
>90	**2000 mg**

- Vancomycin dose and interval will be affected by presence or absence of residual renal function. Shorter dosing intervals should be anticipated with residual renal function while longer dosing intervals should be anticipated in the absence of residual kidney function, guided by trough levels.
- Consult with physician for individual dosing parameters based on trough levels (target greater than 15 mcg/ml and less than 20 mcg/ml).

2. Ceftazidime Dosing: 1000 mg IP if < 50 kgs , 1500 mg IP if ≥ 50 kgs

3. Cefazolin dosing

Cefazolin dose IP	Actual Weight Urine output ≤100 ml/day Based on 15 mg/kg	Actual Weight Urine output >100 ml/day. Based on 18.75 mg/kg
1000 mg	**≤66**	**≤53**
1500 mg	**67-100**	**54-80**
2000 mg	**101-133**	**81-106**
2500 mg	**>133**	**>106**

4. Tobramycin Dosing

Actual Weight (Kg)	**<100 ml/day urine output: Tobramycin Dose IP Based on 0.6 mg/kg**
<34	**20 mg**
34-41	**25 mg**
42-50	**30 mg**
51-58	**35 mg**
59-66	**40 mg**
67-75	**45 mg**
76-83	**50 mg**
84-91	**55 mg**
92-100	**60 mg**
101-108	**65 mg**
109-116	**70 mg**
117-125	**75 mg**
126-133	**80 mg**

Actual Weight (Kg)	**≥100 ml/day urine output: Tobramycin Dose IP Based on 0.75 mg/kg**
<27	20 mg
28-33	25 mg
34-40	30 mg
41-46	35 mg
47-53	40 mg
54-60	45 mg
61-66	50 mg
67-73	55 mg
74-80	60 mg
81-86	65 mg
87-93	70 mg
94-100	75 mg
101-106	80 mg
107-113	85 mg
114-120	90 mg
121-126	95 mg
127-133	100 mg

- Tobramycin dose will be affected by presence or absence of residual renal function.
- Consult with physician for individual dosing parameters based on trough levels (target less than 1mcg/L).

APPENDIX C: Guidance for Procedure Prophylaxis

Northwest Kidney Centers Procedure Prophylaxis for Peritoneal Dialysis Patients Reference. Physicians will need to order to patient's preferred pharmacy,

To reduce risk of peritonitis for the following procedures we recommend:

Colonoscopy-

- Dry abdomen
- Antibiotic Prophylaxis
    - Cefazolin 2 grams (3grams if >120kg) IV + Metronidazole 500mg IV x 1 prior to procedure

    OR
    - Levofloxacin 750mg PO x 1
- Patient should resume regular PD after the procedure if they do not have ongoing effects from sedation and can perform PD safely. If not, it is okay to resume the following day.

Hysteroscopy:

- Dry abdomen
- Antibiotic Prophylaxis: consider adding *Fluconazole 200mg x1 g to the below regimen.*
    - Cefazolin 2 grams (3grams if >120kg) IV + Metronidazole 500mg IV x 1 prior to procedure

    OR
    - Levofloxacin 750mg PO x 1
- Patient should resume regular PD after the procedure if they do not have ongoing effects from sedation and can perform PD appropriately. If not, it is okay to resume the following day.

Recommendation for Dental Procedures:

- Dry abdomen
- Amoxicillin 2 grams x 1

Other procedures: It is recommended that the patient be dry for additional procedures such as endoscopy, ERCP, cystoscopy.

- Peritonitis risk for these procedures is lower and dependent on biopsies/additional procedures and the above antibiotics can be considered.

Wu HH, Li IJ, Weng CH, Lee CC, Chen YC, Chang MY, Fang JT, Hung CC, Yang CW, Tian YC. *Prophylactic antibiotics for endoscopy-associated peritonitis in peritoneal dialysis patients*. PLoS One. 2013;8(8):e71532. Epub 2013 Aug 1.

Yip T, Tse KC, Lam MF, Cheng SW, Lui SL, Tang S, Ng M, Chan TM, Lai KN, Lo WK. *Risks and outcomes of peritonitis after flexible colonoscopy in CAPD patients*. Perit Dial Int. 2007;27(5):560.