Antimicrobial Stewardship Strategy:

Disease-specific treatment guidelines, pathways, algorithms and/or associated order forms

Evidence-based practice recommendations that incorporate local resistance patterns and institution-specific formulary antimicrobials into a guideline, treatment pathway, algorithm and/or order form.

@istock.com/Hailshadow

Priority Level: **B**

Difficulty Level: **2**

Program Stage:

- Early
- ✓ Intermediate
- Advanced

Antimicrobial Stewardship Outcomes:

- Drug utilization outcomes
- Prescribing outcomes
- Clinical outcomes
- Reduction of *Clostridium difficile* infection
- Reduction in antimicrobial-resistant organisms

For more information on these criteria and how they were developed, please see the Antimicrobial Stewardship Strategy Criteria Reference Guide.

Description

This is an overview and not intended to be an all-inclusive summary. As a general principle, patients must be monitored by the health care team after changes to therapy resulting from recommendations made by the antimicrobial stewardship team.

Rationale

Numerous guidelines, often published by expert societies, are available to guide the management of various infectious diseases. Although the prescribing of antimicrobials in accordance with guideline recommendations has been shown to improve patient outcomes, there are challenges translating the recommendations into practice. In addition, some recommendations may not be applicable to local practice, epidemiology and resistance rates. Institution-specific or regional practice guidance documents are therefore recommended. This may be accomplished by developing disease-specific treatment guidelines/pathways/algorithms and/or associated order forms that summarize local treatment recommendations.

- **Local hospital guidelines:** Evidence-based practice recommendations that incorporate local resistance patterns and institution-specific formulary antimicrobials. Common examples include community-acquired pneumonia, sepsis and urinary tract infections.
- **Pathways/treatment algorithms:** Translation of clinical practice guidelines into a clear, user-friendly document specifying key actions to be performed at specific times. Allows for deviations or variations in care but requires documentation of rationale.

- **Order forms:** Preprinted paper or electronic (for computerized physician order entry) forms reflecting local recommendations and practice to facilitate the ordering of antimicrobials, laboratory tests and additional therapies when treating a certain infection. Can be used in conjunction with local treatment pathways/algorithms or as a standalone method to provide clinical decision-making support.

When deciding which infections would benefit from streamlining management by using this strategy, the frequency with which the infection occurs and the existence of issues with management of the infection in the institution (which may be determined through a drug use evaluation) should be taken into consideration. Respiratory and urinary tract infections are good targets, as they are common diagnoses and are often inappropriately treated.

General Recommendations

Antimicrobial choice for pathways and order sets should consider the site and severity of infection, appropriate dosing for that infection, most common pathogens causing the infection, local (hospital, community) susceptibility profiles, toxicity, potential comorbid conditions, the hospital formulary and costs. Recommendations should encourage prescribers to choose antimicrobials with the narrowest spectrum and lowest costs whenever possible, and to consider intravenous to oral conversion at the appropriate time, when applicable.

Guidelines, pathways, algorithms and/or order forms should include recommendations for cultures and other diagnostic tests, duration of therapy, ancillary therapies (e.g., vaccinations for patients with community-acquired pneumonia) and monitoring parameters. They should also take into consideration potentially complicating patient comorbid conditions (e.g., renal dysfunction), patient risk factors and the severity of the infection. The timing of when to take cultures (i.e., prior to starting antimicrobials) and the urgency of antimicrobial therapy should be clearly indicated.

Disease-specific treatment recommendations should be aimed at more common scenarios rather than less common ones. Broad-spectrum coverage that includes antimicrobial-resistant pathogens and is based on local susceptibility patterns should be considered for critically ill patients. Some institutions may find it useful to make antimicrobial susceptibility patterns and the cost of antimicrobials visible to clinicians at the point of care to encourage more appropriate prescribing.

It is imperative to include all relevant stakeholders and clinical services most likely to use the guidelines in the development process (e.g., involving general surgeons in developing intra-abdominal infection guidelines), and to include an opportunity for review and feedback. This has been shown to substantially improve the acceptance, adoption and promotion of institution-specific practice recommendations.

To improve uptake, implement a multidisciplinary supported education plan for staff that details the availability of the guidelines/pathways/algorithms/order forms, the rationale for their development and key points. Using a variety of strategies (formal and informal presentations, emails, posters in common areas, creation of pocket cards, etc.) to reach the intended audience is the most effective approach.

Ongoing evaluation, feedback and education are necessary to maintain improvements in prescribing after the introduction of treatment recommendations.

Existing guidelines, pathways, algorithms and/or order forms require regular review and revision based on new literature, changes in formulary, drug warnings etc.

Advantages

- Synthesizes and adapts treatment recommendations to local practice.
- Improves antimicrobial use and reduces practice variation if guidelines are followed.
- Studies have demonstrated decreased length of stay, reduction in costs, decreased rate of associated adverse events such as *Clostridium difficile* infection and decreased rates of antimicrobial resistance with guideline adherence.

Disadvantages

- Potential for poor buy-in and adherence: lack of awareness of guidelines, accessibility and use of separate order forms (time for prescriber to find and fill out form) can be a barrier to use.

Requirements

- Initial investment of time to create guidelines.
- Clinicians with expertise to develop guidelines, pathways, algorithms and/or order forms.
- Time and personnel to periodically review/revise existing guidelines.

Associated Metrics

- Adherence to guidelines (Were guidelines used when indicated? Were all aspects of the guideline/algorithm followed appropriately?).
- Patient outcomes such as length of stay, treatment success etc. (most effective if this information is fed back to prescribers).

Useful References

Select articles to provide supplemental information and insight into the strategy described and/or examples of how the strategy was applied; not a comprehensive reference list. URLs are provided when materials are freely available on the Internet.

- Dellit TH, Owens RC, McGowan Jr JE, Gerding DN, Weinstein RA, Burke JP, et al. Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship. Clin Infect Dis. 2007;44(2):159–77. Available from: http://cid.oxfordjournals.org/content/44/2/159.long
- Talpaert MJ, Rao GG, Cooper BS, Wade P. Impact of guidelines and enhanced antibiotic stewardship on reducing broad-spectrum antibiotic usage and its effect on incidence of *Clostridium difficile* infection. J Antimicrob Chemother. 2011;66:2168–74.
- Jenkins TC, Knepper BC, Sabel AL, Sarcone EE, Long JA, Haukoos JS, et al. Decreased antibiotic utilization after implementation of a guideline for inpatient cellulitis and cutaneous abscess. Arch Intern Med. 2011;171(12):1072–9. Available from: http://archinte.jamanetwork.com/article.aspx?articleid=227576

- Dubrovskaya Y, Papadopoulos J. Antibiotic stewardship for intra-abdominal infections: early impact on antimicrobial use and patient outcomes. Infect Control Hosp Epidemiol. 2012;33(4):427–9.
- Capelastegui A, España PP, Quintana JM, Gorordo I, Ortega M, Idoiaga I, et al. Improvement of process-of-care and outcomes after implementing a guideline for the management of community-acquired pneumonia: a controlled before-and-after design study. Clin Infect Dis. 2004;39(7):955–63. Available from: http://cid.oxfordjournals.org/content/39/7/955.long
- Wieczorkiewicz S, Zatarski R. Adherence to and outcomes associated with a *Clostridium difficile* guideline at a large teaching institution. Hosp Pharm. 2015;50(1):42–50.

Tools and Resources

- Many societies produce treatment guidelines that can be used to guide local recommendations and treatment pathways. The Infectious Diseases Society of America (IDSA) have authored a number of useful North American guidelines which can be found at: http://www.idsociety.org/idsa_practice_guidelines/

  Note that recommendations in these guidelines may not necessarily reflect Canadian local bacterial epidemiology and antimicrobial susceptibility.

- Mount Sinai Hospital and University Health Network Antimicrobial Stewardship Program. Antimicrobial stewardship clinical summaries [Internet]. Toronto, ON: Mount Sinai Hospital, University Hospital Network; c2015 [cited 2015 Sep 24]. Available from: http://www.antimicrobialstewardship.com/sites/default/files/mshuhn_antimicrobial_stewardship_clinical_summaries.pdf
- Australian Commission on Safety and Quality in Health Care. Antimicrobial stewardship resource materials [Internet]. Sydney, Australia: Australian Commission on Safety and Quality in Health Care; c2015 [cited 2015 Sep 23]. Available from: http://www.safetyandquality.gov.au/our-work/healthcare-associated-infection/antimicrobial-stewardship/resource-materials/

  Prescribing guidelines section 3.1–3.5: examples from various institutions in Australia.

Samples/Examples

- Example 1: The Ottawa Hospital - Clinical Pathway for Antibiotics in COPD Exacerbation
- Example 2: Markham Stouffville Hospital Corporation - Guidelines for the Management of Urinary Tract Infections and Asymptomatic Bacteriuria in Adult Inpatients
- Example 3: North York General Hospital - Intra-abdominal Infections Antimicrobial Guidelines
- Example 4: Royal Victoria Regional Health Centre - Pre-printed Orders for Community-acquired Pneumonia
- Example 5: Lakeridge Health - Pre-printed Orders for *Clostridium difficile* Infection (CDI) -- Suspected or Confirmed
- Example 6: Mount Sinai Hospital and University Health Network - Investigation and Management of Ventilator-Associated Pneumonia Algorithm

These documents have been generously shared by various health care institutions to help others develop and build their antimicrobial stewardship programs. We recommend crediting an institution when adopting a specific tool/form/pathway in its original form.

Examples that contain clinical or therapeutic recommendations may not necessarily be consistent with published guidelines, or be appropriate or directly applicable to other institutions. All examples should be considered in the context of the institution's population, setting and local antibiogram.

The materials and information in this section are not owned by Public Health Ontario. Neither Public Health Ontario nor the institution sharing the document shall be responsible for the use of any tools and resources by a third party.

Links with Other Strategies

- Clinical decision support systems/computerized physician order entry
- Empiric antibiotic prescribing guidelines
- Prescriber education

Disclaimer

Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario). Antimicrobial Stewardship Strategy: Disease-specific treatment guidelines, pathways, algorithms and/or associated order forms. Toronto, ON: Queen's Printer for Ontario; 2016.

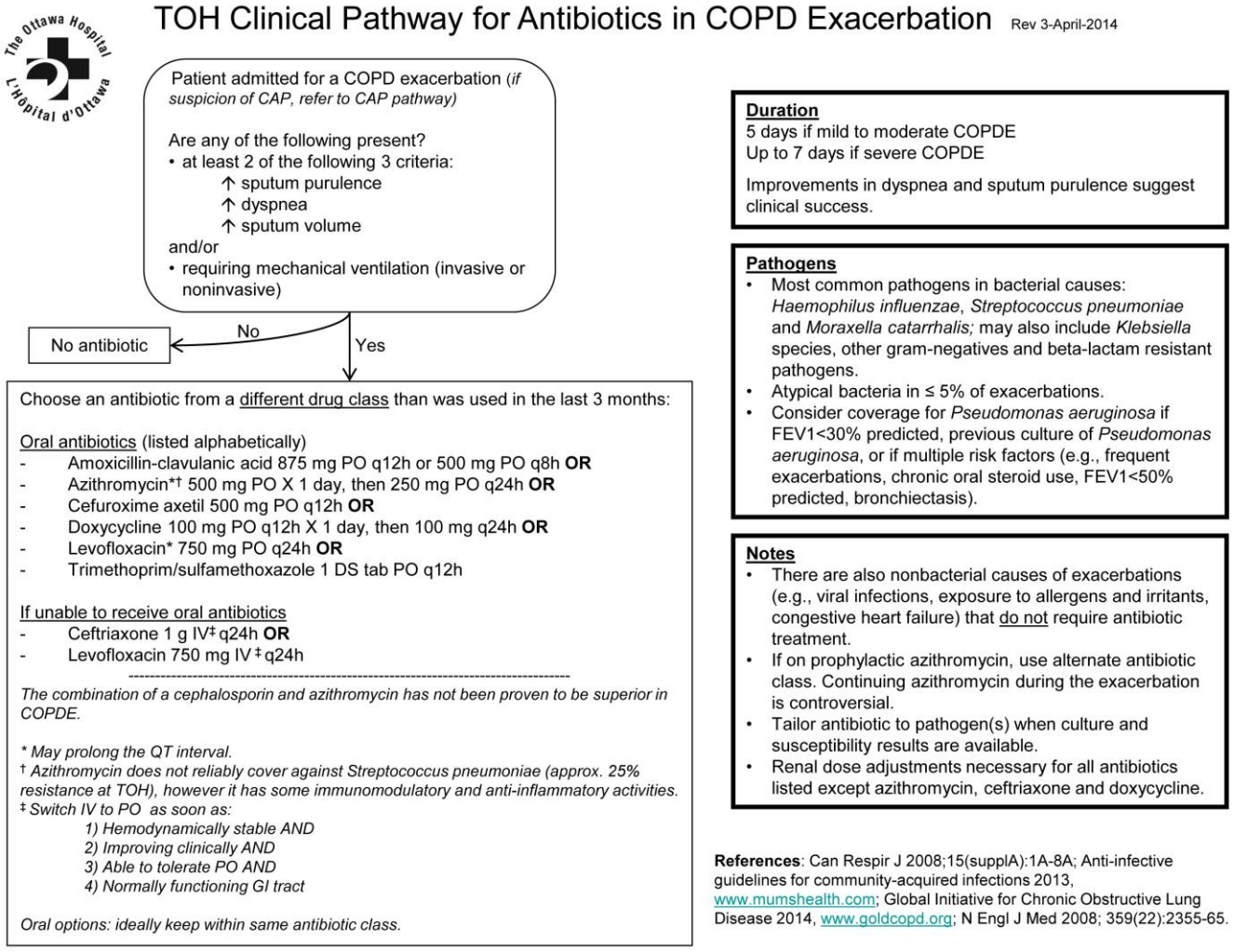
For further information

Antimicrobial Stewardship Program, Infection Prevention and Control, Public Health Ontario.

Email: asp@oahpp.ca

Public Health Ontario acknowledges the financial support of the Ontario Government

Example 1: The Ottawa Hospital - Clinical Pathway for Antibiotics in COPD Exacerbation



TOH Clinical Pathway for Antibiotics in COPD Exacerbation Rev 3-April-2014

Patient admitted for a COPD exacerbation (*if suspicion of CAP, refer to CAP pathway)*

Are any of the following present?
- at least 2 of the following 3 criteria:
  - ↑ sputum purulence
  - ↑ dyspnea
  - ↑ sputum volume

and/or
- requiring mechanical ventilation (invasive or noninvasive)

No → No antibiotic

Yes →

Choose an antibiotic from a different drug class than was used in the last 3 months:

Oral antibiotics (listed alphabetically)
- Amoxicillin-clavulanic acid 875 mg PO q12h or 500 mg PO q8h **OR**
- Azithromycin*† 500 mg PO X 1 day, then 250 mg PO q24h **OR**
- Cefuroxime axetil 500 mg PO q12h **OR**
- Doxycycline 100 mg PO q12h X 1 day, then 100 mg q24h **OR**
- Levofloxacin* 750 mg PO q24h **OR**
- Trimethoprim/sulfamethoxazole 1 DS tab PO q12h

If unable to receive oral antibiotics
- Ceftriaxone 1 g IV‡ q24h **OR**
- Levofloxacin 750 mg IV ‡ q24h

The combination of a cephalosporin and azithromycin has not been proven to be superior in COPDE.

** May prolong the QT interval.*
† Azithromycin does not reliably cover against Streptococcus pneumoniae (approx. 25% resistance at TOH), however it has some immunomodulatory and anti-inflammatory activities.
‡ Switch IV to PO as soon as:
1) *Hemodynamically stable AND*
2) *Improving clinically AND*
3) *Able to tolerate PO AND*
4) *Normally functioning GI tract*

Oral options: ideally keep within same antibiotic class.

Duration
5 days if mild to moderate COPDE
Up to 7 days if severe COPDE

Improvements in dyspnea and sputum purulence suggest clinical success.

Pathogens
- Most common pathogens in bacterial causes: *Haemophilus influenzae*, *Streptococcus pneumoniae* and *Moraxella catarrhalis;* may also include *Klebsiella* species, other gram-negatives and beta-lactam resistant pathogens.
- Atypical bacteria in ≤ 5% of exacerbations.
- Consider coverage for *Pseudomonas aeruginosa* if FEV1<30% predicted, previous culture of *Pseudomonas aeruginosa*, or if multiple risk factors (e.g., frequent exacerbations, chronic oral steroid use, FEV1<50% predicted, bronchiectasis).

Notes
- There are also nonbacterial causes of exacerbations (e.g., viral infections, exposure to allergens and irritants, congestive heart failure) that do not require antibiotic treatment.
- If on prophylactic azithromycin, use alternate antibiotic class. Continuing azithromycin during the exacerbation is controversial.
- Tailor antibiotic to pathogen(s) when culture and susceptibility results are available.
- Renal dose adjustments necessary for all antibiotics listed except azithromycin, ceftriaxone and doxycycline.

References: Can Respir J 2008;15(supplA):1A-8A; Anti-infective guidelines for community-acquired infections 2013, www.mumshealth.com; Global Initiative for Chronic Obstructive Lung Disease 2014, www.goldcopd.org; N Engl J Med 2008; 359(22):2355-65.

Example 2: Markham Stouffville Hospital Corporation - Guidelines for the Management of Urinary Tract Infections and Asymptomatic Bacteriuria in Adult Inpatients

INTERDISCIPLINARY MANUAL

AUTHOR:	Director of Pharmacy	**FOLDER:**	Medication Guidelines and Protocols
APPROVED BY:	MAC	**REVIEW FREQUENCY:**	3 years
ELECTRONIC RESPONSIBILITY:	Director of Pharmacy	**ORIGINAL APPROVAL DATE:**	27/03/13
POLICY HISTORY/ NUMBER CHANGES:		**REVISED DATE:**	
		REVIEWED DATE:	

290.914.916.220 Guidelines for the Management of Urinary Tract Infections and Asymptomatic Bacteriuria in Adult Inpatients

GUIDELINE(S): Guidelines for the Management of Urinary Tract Infections and Asymptomatic Bacteriuria in Adult Inpatients

EXPECTED OUTCOME(S): Optimized and standardized antimicrobial therapy selection for admitted adult patients with urinary tract infections.

DEFINITION(S):

Bacteriuria*: A single voided clean-catch specimen or a single catheterized specimen with an organism isolated in a quantitative count of 100 E6 cfu/L or greater.

Asymptomatic Bacteriuria: The presence of bacteriuria, as defined above, in a patient without symptoms of a urinary tract infection.

Urinary Tract Infection: The presence of bacteria in a urine culture, as defined above, in a patient with symptoms of a urinary tract infection. Symptoms of urinary tract infection include:

- dysuria
- hematuria
- urinary frequency
- pain: supra-pubic pain, lower abdominal pain, lower back or flank pain; testicular or penile pain may occur
- fever with or without chills or rigors
- elevated white blood cell count.

Example 2: Markham Stouffville Hospital Corporation - Guidelines for the Management of Urinary Tract Infections and Asymptomatic Bacteriuria in Adult Inpatients (continued)

PROCEDURE(S):
See chart below

REFERENCE(S):

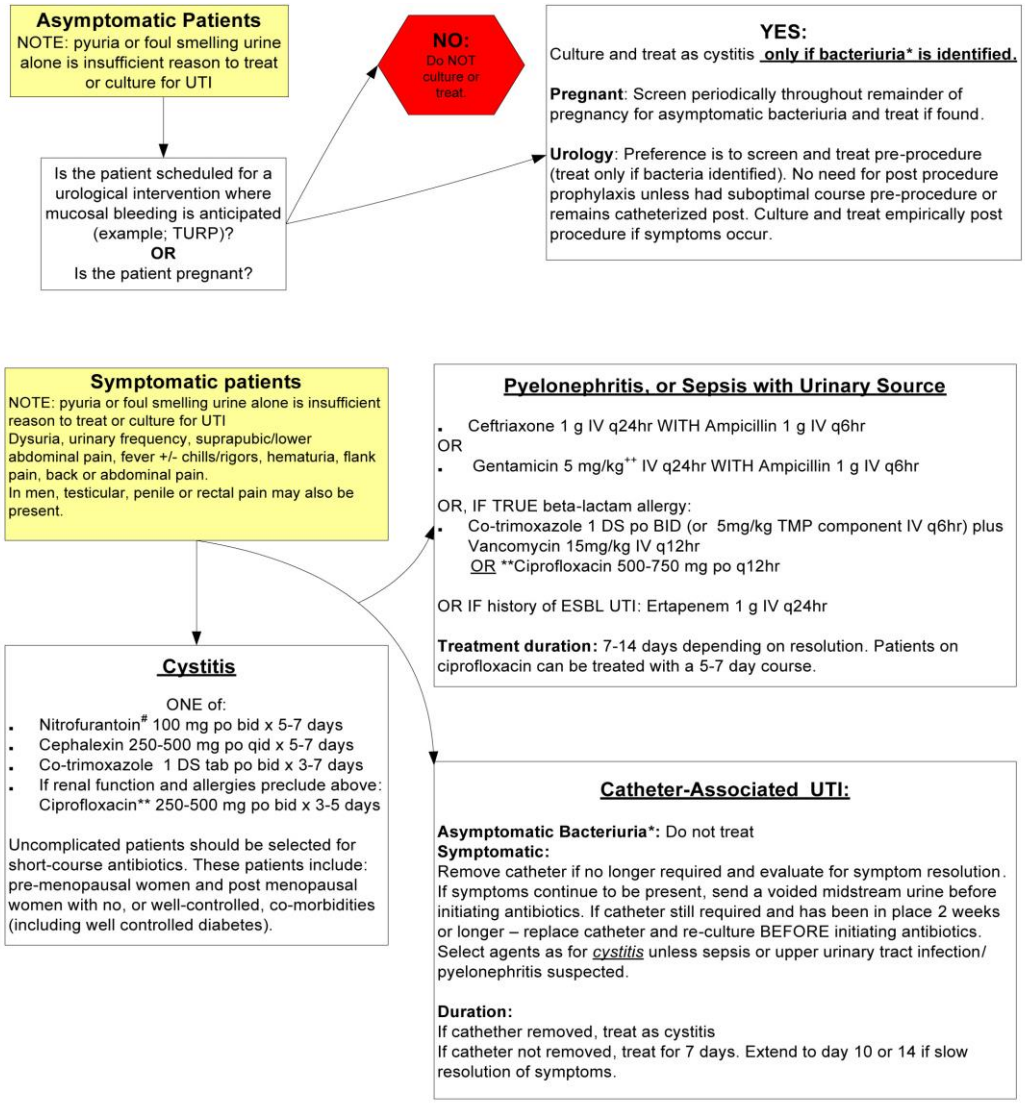
- Nicolle et al. CID 2005:40 (1 March): IDSA Guidelines for the Diagnosis and Treatment of Asymptomatic Bacteriuria
- IDSA CID 2010:50 (1 March): Diagnosis, Prevention, and Treatment of Catheter-Associated Urinary Tract Infection in Adults (IDSA Guideline)
- Gupta et al. CID 2011:52 (1 March): International Clinical Practice Guidelines for the Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women: A 2010 Update by the Infectious Diseases Society of America and the European Society for Microbiology and Infectious Diseases
- Markham Stouffville Hospital 2012 Antibiogram

ENDORSEMENT(S):

- Infectious Disease (02/2013)
- Antimicrobial Stewardship (02/2013)
- Drugs and Therapeutics Committee (03/2013)

PREVIOUS REVIEWED/REVISED DATE(S):

Example 2: Markham Stouffville Hospital Corporation - Guidelines for the Management of Urinary Tract Infections and Asymptomatic Bacteriuria in Adult Inpatients (continued)



Notes:

1. **Antibiotic selection should be further tailored to culture and susceptibility results. This includes deescalating pyelonephritis or sepsis patients to oral therapy if susceptibility pattern and symptom resolution permits. If unclear of choices (especially when pregnant, allergic or due to drug resistance) please consult your pharmacist, the antimicrobial stewardship team or infectious disease physician.**

Example 2: Markham Stouffville Hospital Corporation - Guidelines for the Management of Urinary Tract Infections and Asymptomatic Bacteriuria in Adult Inpatients (continued)

2. *** Definition of Bacteriuria:**
   A single voided clean-catch specimen or a single catheterized specimen with an organism isolated in a quantitative count of 100 E6 cfu/L or greater

3. **** Ciprofloxacin** use is discouraged empirically for most patients due to increasing rates of resistance (may be ineffective) and due to increased risk for *Clostridium difficile* infection compared to the alternative agents. Ciprofloxacin use during pregnancy remains controversial. Choose other agents if possible.

4. **++ Gentamicin** dosing for pregnant and postpartum patients should be 1mg/kg IV q8hr.

5. **# Nitrofurantoin** is likely to be ineffective for those with creatinine clearance less than 60 ml/min – this includes elderly patients with otherwise normal creatinine. Inadequate tissue/blood levels are achieved for treating upper urinary tract infections or bacteremia

Example 3: North York General Hospital - Intra-abdominal Infections Antimicrobial Guidelines

Antimicrobial Guidelines North York General Hospital

NORTH YORK GENERAL

INTRA-ABDOMINAL INFECTIONS

Definitions

- Intra-abdominal infections (IAIs) represent a wide spectrum of infectious processes that occur within the peritoneal cavity or retroperitoneal space.
- Clinically, IAIs fall into one of 3 categories (**see Table 1**). Grouping IAIs into these categories helps determine first-line antimicrobial therapy, duration of therapy, and whether microbiological evaluation (blood cultures, peritoneal samples) is advisable.

Table 1. Intra-abdominal infection definitions

	Definition	Example
Mild-to-Moderate Severity Community-Acquired IAI (CA-IAI)	No recent hospitalization / surgical intervention Localized peritonitis No organ dysfunction Patient is not immunosuppressed	Routine Appendicitis or Cholecystitis
High Severity Community-Acquired IAI (CA-IAI)	No recent hospitalization / surgical intervention Generalized peritonitis Organ dysfunction / Sepsis Immunosuppressed patient	Perforated diverticulitis with free air & sepsis or Diverticulitis in a patient on prednisone
Healthcare-Associated IAI (HA-IAI)	IAI which is absent at time of admission but becomes evident 5 or more days after admission	Anastomotic leak on POD#6 following elective colon resection

Management

- Once IAI is diagnosed (or highly suspected), management involves interventions to control the source of infection, along with timely initiation of appropriate antimicrobial therapy.
- IAIs are typically polymicrobial. Empiric antimicrobial therapy should be directed against enteric GNB and anaerobes.
- In the biliary tract, therapy against anaerobes is not routinely required.
- Enterococcal coverage (with Ampicillin, Piperacillin-Tazobactam, or Vancomycin) should be included in all HA-IAI, and only a subset of High Severity CA-IAI (for example: ICU patients, immunosuppressed patients, post-op peritonitis < 5 days, history of extensive cephalosporin use / valvular heart disease / prosthetic material)
- MRSA coverage (with Vancomycin) should be considered in HA-IAI, known MRSA colonization, or history of MRSA infection.
- Antifungal coverage should be considered if yeast is identified in peritoneal samples OR there is clinical evidence of ongoing infection 4 to 7 days after source control. At the same time, success of source control should be re-evaluated (eg, CT scan or consideration of surgical re-exploration) and ID consult should also be considered.

Example 3: North York General Hospital - Intra-abdominal Infections Antimicrobial Guidelines (continued)

	Antimicrobial Evaluation (eg, blood cultures, peritoneal samples)	Duration of Antimicrobial Therapy after Source Control
Mild-to-Moderate Severity Community-Acquired IAI (CA-IAI)	No	Discontinue immediately after source control (post-operative antibiotics are not required after the majority of appendectomies / emergency cholecystectomies)
High Severity Community-Acquired IAI (CA-IAI)	Yes	If clinical improvement: 3 – 7 days If evidence of ongoing infection at 4 to 7 days: • Re-evaluate source control • Consider antifungal therapy • Consider prolonged course of antibiotics if difficulty in achieving source control • Consider ID consult
Healthcare-Associated IAI (HA-IAI)		

Treatment Recommendations

Type of IAI	First-line therapy	Beta-lactam allergic patients[a]
Mild-to-Moderate Severity CA-IAI	Cefazolin 1g IV q8h + Metronidazole 500mg IV q12h	Gentamicin 5mg/kg IV q24h*+ Metronidazole 500mg IV q12h
High severity CA-IAI	Ceftriaxone 1g IV q24h + Metronidazole 500mg IV q12h *Alternative[b]:* *Piperacillin-tazobactam 4.5g IV q8h*	
HA-IAI	Piperacillin-tazobactam 4.5g IV q8h[c]	Vancomycin 1g IV q12h + Gentamicin 5mg/kg IV q24h + Metronidazole 500mg IV q12h OR Meropenem 1g IV q8h (ID restricted) + Vancomyin 1g IV q12h
Biliary Tract		
Mild-to-moderate severity CA-IAI	Cefazolin 1g IV q8h	Gentamicin 5mg/kg IV q24h*
High severity CA-IAI	Ceftriaxone 1g IV q24h + Ampicillin 1g IV q6h	Gentamicin 5mg/kg IV q24h* + Vancomycin 1g IV q12h

[a] Patients with history of IgE-mediated reactions eg anaphylaxis, angioedema, or bronchospasm
[b] Consider enterococcal coverage if ICU patient, immunosuppressed, post-op peritonitis < 5 days, extensive cephalosporin use, valvular heart disease, prosthetic material
[c] Consider anti-fungal therapy if yeast isolated in peritoneal samples, recurrent perforation, surgically treated pancreatic infection, prolonged antibiotic exposure, or incomplete source control
* β-lactam allergic patients with severe renal dysfunction consider meropenem with the addition of vancomycin when needed, with infectious diseases or allergist consultation when neccessary

Oral step-down therapy

- Oral step-down therapy is rarely required after source control. In patients with a short length of stay that precludes thorough assessment of clinical response, oral therapy may be considered. These oral therapies may also be used in circumstances where source control is not obtained through surgery (eg, medical management of diverticulitis / cholecystitis / appendicitis).

Type of IAI	First-line oral alternative	Beta-lactam allergic patients
Community-acquired IAI	Cephalexin 500mg PO q6h + Metronidazole 500mg PO q12h	TMP/SMX 1 DS PO bid + Metronidazole 500mg PO q12h[a]
Hospital-acquired IAI	May consider tailoring based on intra-operative cultures	

[a] If enterococcal coverage is required, use amoxicillin/clavulanate 875mg PO q12h

2

Disclaimer

This resource was created by North York General Hospital. PHO is not the owner of this content and does not take responsibility for the information provided within this document. Neither PHO nor North York General Hospital shall be responsible for the subsequent use of any tools and resources by any third party.

Example 3: North York General Hospital - Intra-abdominal Infections Antimicrobial Guidelines (continued)

[b] Due to rising resistance of enterobactericiae (eg *E. coli*) to fluoroquinolones, oral fluoroquinolones may not provide adequate empiric coverage

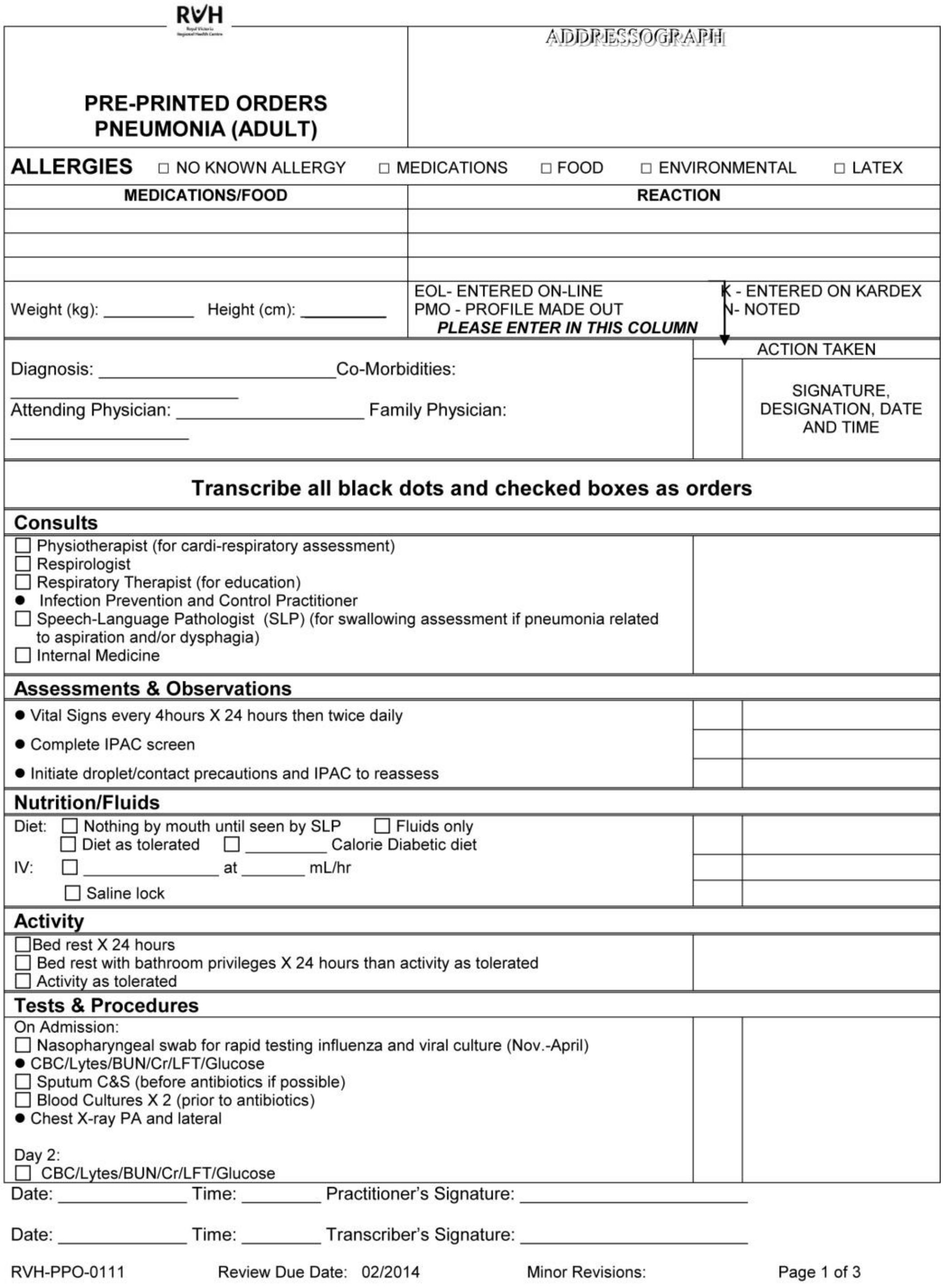
References:

1. Chow AW, Evans GA, Nathens AB, et al. Canadian Practice Guidelines for Surgical Intra-abdominal Infections. Can J Infect Dis Med Microbiol 2010; 21:11-37.
2. Doyle J, Nathens A, Morris A, et al. Best Practice in General Surgery Guideline #4: Management of Intra-abdominal Infections. University of Toronto Faculty of Medicine, 2011.
3. Solomkin JS, Mazuski JE, Bradley JS, et al. Diagnosis and Management of Complicated Intra-abdominal Infection in Adults and Children: Guidelines by the Surgical Infection Society and the Infectious Diseases Society of America. Clin Infect Dis 2010; 50:133-164.

Prepared by:
Tiffany Kan, BScPhm-PharmD Student, August 2012

Reviewed by:
S Raybardhan BSc Phm, MPH, Pavani Das MD, Peter Stotland MD, Neelesh Jain MD, January 2013
Approved by:

Example 4: Royal Victoria Regional Health Centre - Pre-printed Orders for Community-acquired Pneumonia



ADDRESSOGRAPH

PRE-PRINTED ORDERS
PNEUMONIA (ADULT)

ALLERGIES ☐ NO KNOWN ALLERGY ☐ MEDICATIONS ☐ FOOD ☐ ENVIRONMENTAL ☐ LATEX

MEDICATIONS/FOOD	REACTION

Weight (kg): __________ Height (cm): _________

EOL- ENTERED ON-LINE
PMO - PROFILE MADE OUT
PLEASE ENTER IN THIS COLUMN

K - ENTERED ON KARDEX
N- NOTED

Diagnosis: ________________________ Co-Morbidities: ____________________

Attending Physician: __________________ Family Physician: __________________

ACTION TAKEN

SIGNATURE, DESIGNATION, DATE AND TIME

Transcribe all black dots and checked boxes as orders

Consults

☐ Physiotherapist (for cardi-respiratory assessment)
☐ Respirologist
☐ Respiratory Therapist (for education)
● Infection Prevention and Control Practitioner
☐ Speech-Language Pathologist (SLP) (for swallowing assessment if pneumonia related to aspiration and/or dysphagia)
☐ Internal Medicine

Assessments & Observations

● Vital Signs every 4hours X 24 hours then twice daily
● Complete IPAC screen
● Initiate droplet/contact precautions and IPAC to reassess

Nutrition/Fluids

Diet: ☐ Nothing by mouth until seen by SLP ☐ Fluids only
☐ Diet as tolerated ☐ _________ Calorie Diabetic diet
IV: ☐ _______________ at _______ mL/hr
☐ Saline lock

Activity

☐ Bed rest X 24 hours
☐ Bed rest with bathroom privileges X 24 hours than activity as tolerated
☐ Activity as tolerated

Tests & Procedures

On Admission:
☐ Nasopharyngeal swab for rapid testing influenza and viral culture (Nov.-April)
● CBC/Lytes/BUN/Cr/LFT/Glucose
☐ Sputum C&S (before antibiotics if possible)
☐ Blood Cultures X 2 (prior to antibiotics)
● Chest X-ray PA and lateral

Day 2:
☐ CBC/Lytes/BUN/Cr/LFT/Glucose

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

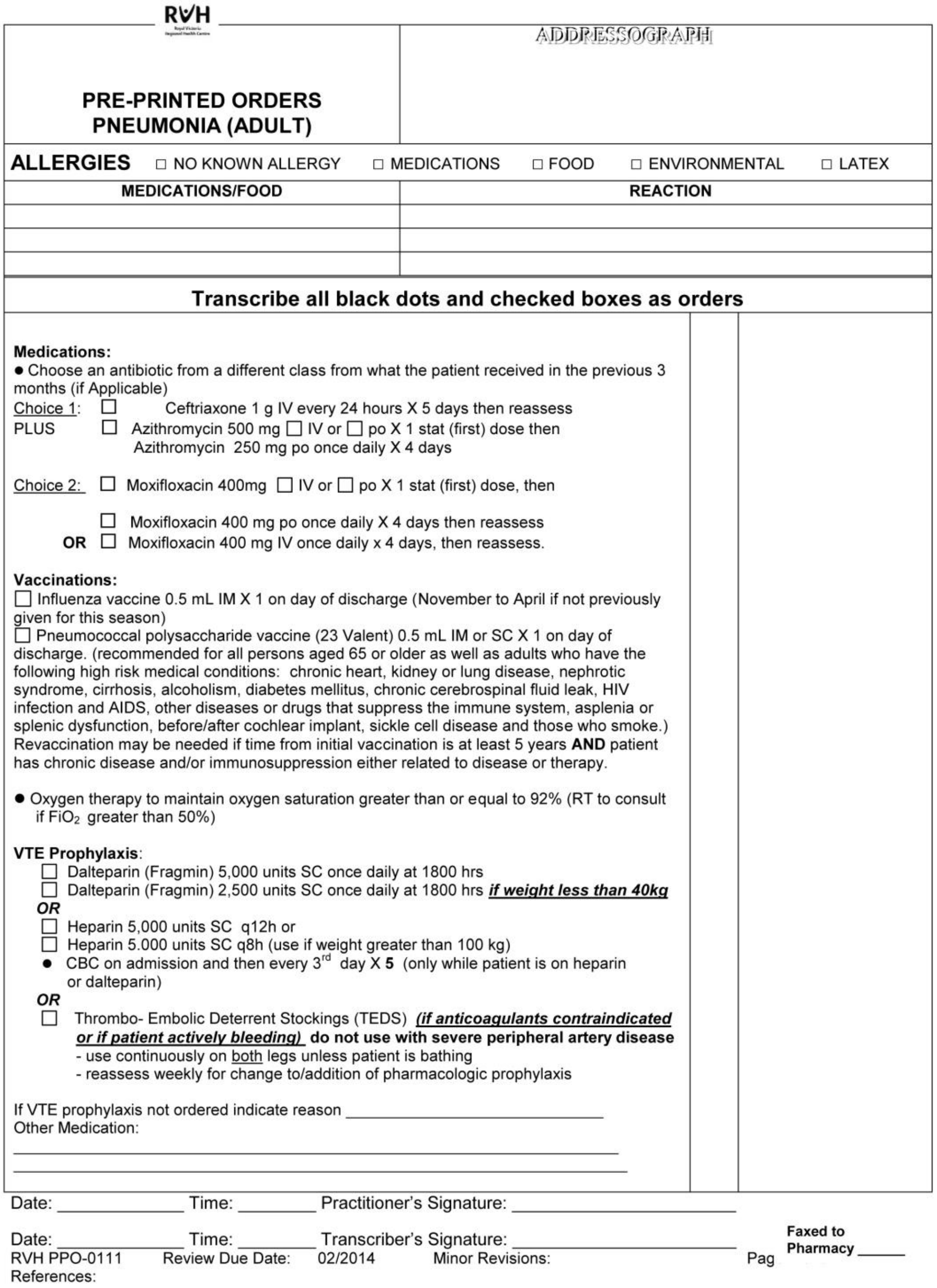
Date: _____________ Time: ________ Transcriber's Signature: _______________________

RVH-PPO-0111 Review Due Date: 02/2014 Minor Revisions: Page 1 of 3

Disclaimer

This resource was created by Royal Victoria Regional Health Centre. PHO is not the owner of this content and does not take responsibility for the information provided within this document. Neither PHO nor Royal Victoria Regional Health Centre shall be responsible for the subsequent use of any tools and resources by any third party.

Example 4: Royal Victoria Regional Health Centre - Pre-printed Orders for Community-acquired Pneumonia (continued)



RVH

ADDRESSOGRAPH

PRE-PRINTED ORDERS
PNEUMONIA (ADULT)

ALLERGIES ☐ NO KNOWN ALLERGY ☐ MEDICATIONS ☐ FOOD ☐ ENVIRONMENTAL ☐ LATEX

MEDICATIONS/FOOD	REACTION

Transcribe all black dots and checked boxes as orders

Medications:

● Choose an antibiotic from a different class from what the patient received in the previous 3 months (if Applicable)

Choice 1: ☐ Ceftriaxone 1 g IV every 24 hours X 5 days then reassess
PLUS ☐ Azithromycin 500 mg ☐ IV or ☐ po X 1 stat (first) dose then
Azithromycin 250 mg po once daily X 4 days

Choice 2: ☐ Moxifloxacin 400mg ☐ IV or ☐ po X 1 stat (first) dose, then

☐ Moxifloxacin 400 mg po once daily X 4 days then reassess
OR ☐ Moxifloxacin 400 mg IV once daily x 4 days, then reassess.

Vaccinations:

☐ Influenza vaccine 0.5 mL IM X 1 on day of discharge (November to April if not previously given for this season)

☐ Pneumococcal polysaccharide vaccine (23 Valent) 0.5 mL IM or SC X 1 on day of discharge. (recommended for all persons aged 65 or older as well as adults who have the following high risk medical conditions: chronic heart, kidney or lung disease, nephrotic syndrome, cirrhosis, alcoholism, diabetes mellitus, chronic cerebrospinal fluid leak, HIV infection and AIDS, other diseases or drugs that suppress the immune system, asplenia or splenic dysfunction, before/after cochlear implant, sickle cell disease and those who smoke.) Revaccination may be needed if time from initial vaccination is at least 5 years **AND** patient has chronic disease and/or immunosuppression either related to disease or therapy.

● Oxygen therapy to maintain oxygen saturation greater than or equal to 92% (RT to consult if FiO_2 greater than 50%)

VTE Prophylaxis:

☐ Dalteparin (Fragmin) 5,000 units SC once daily at 1800 hrs
☐ Dalteparin (Fragmin) 2,500 units SC once daily at 1800 hrs ***if weight less than 40kg***
OR
☐ Heparin 5,000 units SC q12h or
☐ Heparin 5.000 units SC q8h (use if weight greater than 100 kg)
● CBC on admission and then every 3rd day X **5** (only while patient is on heparin or dalteparin)
OR
☐ Thrombo- Embolic Deterrent Stockings (TEDS) ***(if anticoagulants contraindicated or if patient actively bleeding)*** **do not use with severe peripheral artery disease**
- use continuously on both legs unless patient is bathing
- reassess weekly for change to/addition of pharmacologic prophylaxis

If VTE prophylaxis not ordered indicate reason ____________________________
Other Medication:
____
____

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

Date: ______________ Time: ________ Transcriber's Signature: _______________________ **Faxed to Pharmacy** ______
RVH PPO-0111 Review Due Date: 02/2014 Minor Revisions: Pag
References:

Disclaimer

This resource was created by Royal Victoria Regional Health Centre. PHO is not the owner of this content and does not take responsibility for the information provided within this document. Neither PHO nor Royal Victoria Regional Health Centre shall be responsible for the subsequent use of any tools and resources by any third party.

Example 4: Royal Victoria Regional Health Centre - Pre-printed Orders for Community-acquired Pneumonia (continued)

1. Canadian Immunization Guide Seventh Edition (2006) Retrieved Oct 13, 2011 from www.phac-aspc.gc.ca/naci-ccni/index.html
2. Geerts. WH., Bergvist, D., Pineo, GF et al. (2008). Prevention of venous thromboembolism. American College of Chest Physicians Evidence-Based Clinical Practice Guidelines 8th ed. *Chest* 2008: 133(Suppl): 381s-443s
3. Guthrie, R (2001) Community-Acquired Lower Respiratory Tract Infections: Etiology and Treatment *Chest* 120:6(2021-2034) December, 2001
4. Mandell, L.A., Bartlett, J.G. et al. (2003) Update of practice guidelines for the management of community-acquired pneumonia in immnumocompetent adults. *CID* 2003; 37: 1405-33.
5. National Institute for Health and Clinical Excellence (2008) Respiratory tract infections – antibiotic prescribing: Prescribing of antibiotics for self-limiting respiratory tract infections in adults and children in primary care *NICE clinical guideline 69* Developed by the Centre for Clinical Practice at NICE available from www.nice.org.uk Ontario Ministry of Health and Long Term Care (2002)
6. Ontario Ministry of Health and Long Term Care (2002)

Example 5: Lakeridge Health - Pre-printed Orders for *Clostridium difficile* Infection (CDI) - Suspected or Confirmed

Lakeridge Health

Lakeridge Health

Preprinted Order ***Clostridium difficile* Infection (CDI) Suspected or Confirmed** 1. Delete orders not required. 2. Specify dose, route and frequency for medications. 3. Where optional orders occur, select appropriate order(s). 4. Write additional orders on Doctor Order sheet. 5. Sign and date all orders.	

Date (dd/mm/yy)		Drug Sensitivities: None Known If yes, please list:_____ _____

Clinicians should consider the possibility of CDI in any patients with diarrhea and previous antibiotic exposure. Leukocytosis and/or fever are commonly present.

Laboratory/Monitoring

1. Obtain serum albumin x 1.
2. Obtain serum lactate x 1.
3. CBC, electrolytes, serum creatinine, glucose daily x 3 then then reassess.
4. Send stool sample (MUST be loose or liquid) for *C. difficile* toxin assay.
   - Consider initiating empiric therapy for CDI prior to toxin assay result.
   - Repeat x 1 if negative result **and** the patient is still symptomatic.
   - If toxin assay negative and clinical suspicion of *C. difficile* exists initiate treatment & consider Gastroenterology and/or Infectious Disease consultation.
   - There is no role for *C. difficile* toxin assay as a test of cure.

Imaging (consider for moderate to severe disease)

5. ☐ Abdominal x-ray (2 views) for *C. difficile* colitis
   ☐ CT abdomen for *C. difficile* colitis. **MRP to complete requisition.**

Treatments (Initiate immediately)

6. IV Fluids
   ☐ bolus sodium chloride 0.9% _____mL over ____hour(s)
   ☐ solution:_____ at _____mL/h and reassess in _____
   ☐ saline lock IV
7. Treatments:
   - Discontinue all routine and PRN laxatives and stool softeners.
   - Discontinue all antidiarrheals [e.g. loperamide, diphenoxylate/atropine(Lomotil)].
   - MRP to review and discontinue unnecessary opiate medications on "Doctor's Orders" sheet.

   ☐ discontinue the following antibiotics: _____
   ☐ discontinue the following proton pump inhibitors and H_2 antagonists if nonessential:
   _____

Physician's Signature	Date:	Time:
Nurse's Signature	Date:	Time:
Unit Clerk's Signature	Date:	Time:

Originating Committee/Council: Infection Control Committee – November 2011
Medical Advisory Committee: April 24, 2012

Page 1 of 2
CRO6191

Disclaimer

This resource was created by Lakeridge Health. PHO is not the owner of this content and does not take responsibility for the information provided within this document. Neither PHO nor Lakeridge Health shall be responsible for the subsequent use of any tools and resources by any third party.

Example 5: Lakeridge Health - Pre-printed Orders for *Clostridium difficile* Infection (CDI) - Suspected or Confirmed (continued)

Lakeridge Health

Preprinted Order
***Clostridium difficile* Infection (CDI) Suspected Or Confirmed**

1. Delete orders not required.
2. Specify dose, route and frequency for medications
3. Where optional orders occur, select appropriate order(s)
4. Write additional orders on Doctor Order sheet.
5. Sign and date all orders

Lakeridge Health

Date (dd/mm/yy)		Drug Sensitivities: None Known If yes, please list:_____

Clinical definition	Supportive clinical data	Treatment
Initial episode, mild or moderate	WBC less than 15 x 10^9/L and serum creatinine less than 1.5 times pre-morbid level	☐ MetroNIDAZOLE 500 mg PO/enteral tube Q8H x 10 days *Consider change to vancomycin PO if deterioration or symptoms not improved after 72 hours*
Initial episode, severe	WBC greater than 15 x 10^9/L **or** serum creatinine greater than or equal to 1.5 times pre-morbid level	☐ Vancomycin 125 mg PO/enteral tube QID x 14 days **If unable to take po:** ☐ MetroNIDAZOLE 500 mg IV Q8H x 14 days (or until able to take PO) ☐ Vancomycin Rectal Enema: Insert rectal tube and instill vancomycin 500mg diluted in 100mL normal saline PR Q6H x 14 days (clamp rectal tube x 1 hr with each dose)
Initial episode, severe, complicated	Hypotension or shock, ileus, megacolon	☐ Vancomycin 500 mg PO/enteral tube QID x 14 days **plus** metroNIDAZOLE 500 mg IV Q8H x 14 days **If complete ileus**, consider adding rectal instillation of vancomycin. ☐ Vancomycin Rectal Enema: Insert rectal tube and instill vancomycin 500mg diluted in 100mL Normal Saline PR Q6H x 14 days (clamp rectal tube x 1 hr with each dose) **Consult (there must be MRP to physician communication for consult):** ☐ Infectious Disease _____ ☐ General Surgery _____ ☐ Internal Medicine _____ ☐ Intensivist _____ ☐ Gastroenterology _____ ☐ Other_____
1st recurrence		See initial episode and stratify by disease severity.
2nd or more recurrence		☐ Vancomycin 125 mg PO/enteral tube QID x 14 days **THEN** vancomycin taper regimen of: Vancomycin 125 mg PO/enteral tube BID x 7 days then daily x 7 days then q2days x 7 days then q3days x 15 days then stop. ☐ *Saccharomyces boulardii* 500 mg PO BID x 28 days; start on Day 14 of vancomycin treatment if patient does not have immunosuppression, implanted grafts or vascular devices or active inflammatory bowel disease. ☐ Infectious Disease consult _____ **(There must be MRP to physician communication.)**

Physician's Signature	Date:	Time:
Nurse's Signature	Date:	Time:
Unit Clerk's Signature	Date:	Time:

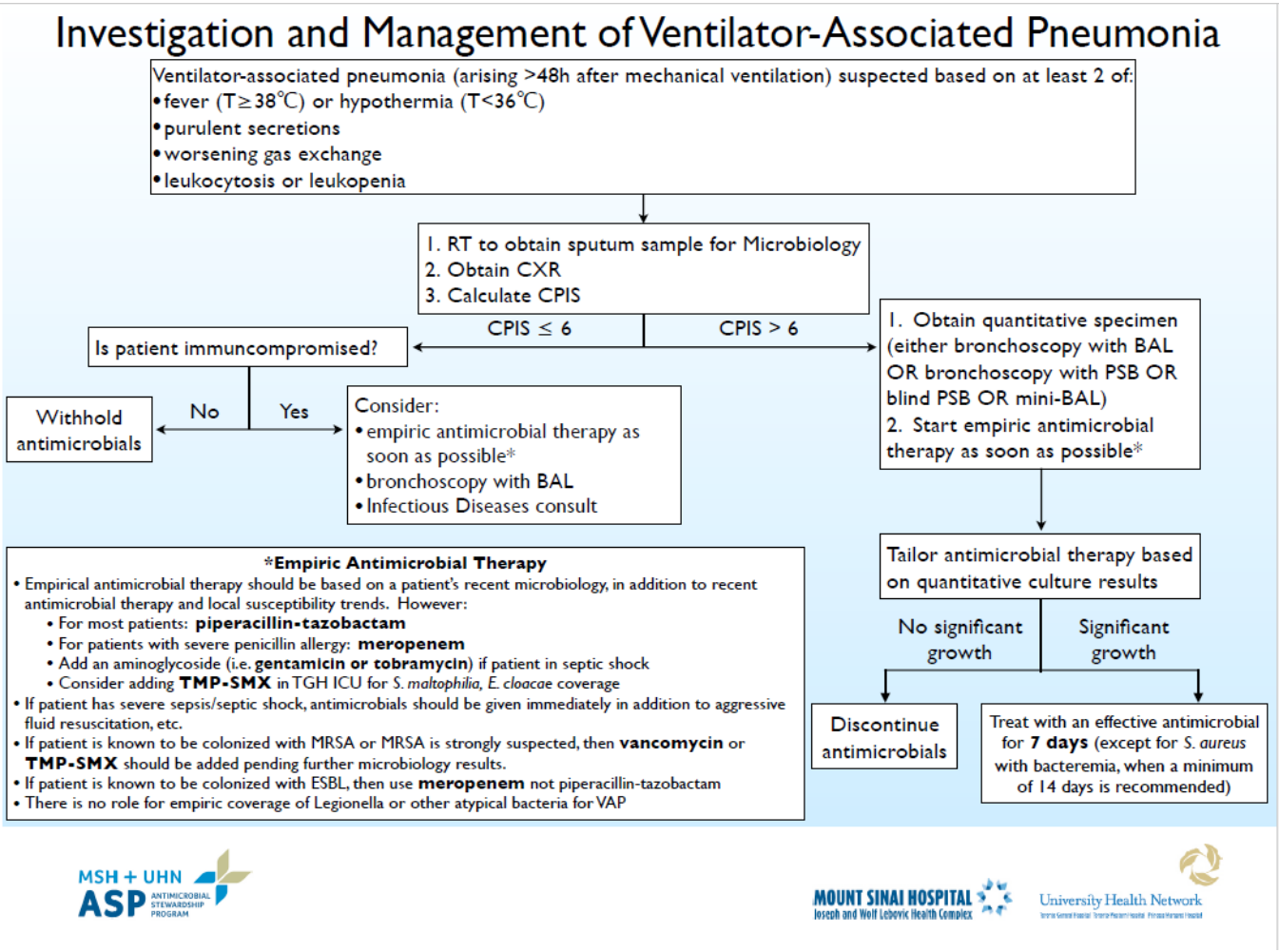
Originating Committee/Council: Infection Control Committee – November 2011
Medical Advisory Committee: April 24, 2012

Page 2 of 2
CRO6191

Disclaimer

This resource was created by Lakeridge Health. PHO is not the owner of this content and does not take responsibility for the information provided within this document. Neither PHO nor Lakeridge Health shall be responsible for the subsequent use of any tools and resources by any third party.

Example 6: Mount Sinai Hospital and University Health Network - Investigation and Management of Ventilator-Associated Pneumonia Algorithm



Available online from:

http://www.antimicrobialstewardship.com/sites/default/files/article_files/msh-uhn_vap_algorithm.pdf

Disclaimer

This resource was created by Mount Sinai Hospital and University Health Network. PHO is not the owner of this content and does not take responsibility for the information provided within this document. Neither PHO nor Mount Sinai Hospital and University Health Network shall be responsible for the subsequent use of any tools and resources by any third party.