Prophylaxis for Venous Thromboembolism in General Medical Patients

Rumi Pattar, Zahra Kanji, Mark Collins, Michael Boldt, and Rajesh Mainra

ABSTRACT

Background: Despite the availability of published guidelines, prophylaxis for venous thromboembolism (VTE) remains underused.

Objective: To measure the impact of educational interventions on the use of VTE prophylaxis according to current practice guidelines for patients admitted to hospital with exacerbation of congestive heart failure (CHF) or chronic obstructive pulmonary disease (COPD).

Methods: Interventions were undertaken to educate health care professionals about current practice guidelines for VTE prophylaxis in general medical patients and to disseminate the results of a hospital audit highlighting poor utilization of such prophylaxis. A retrospective analysis was conducted over a 5-month period following the educational intervention to assess use of VTE prophylaxis in patients admitted with CHF or COPD. In addition, physicians were surveyed about perceived barriers to prescribing VTE prophylaxis.

Results: During the assessment period after the educational intervention, 57 patients met the inclusion criteria, including 4 patients who had both CHF and COPD; of these, 13 (46%) of 28 with CHF and 10 (30%) of 33 with COPD received VTE prophylaxis upon admission to hospital. Physicians attributed the low rates of prophylaxis mainly to oversight and lack of awareness of current practice guidelines.

Conclusion: At the authors' institution, utilization rates for VTE prophylaxis for patients with exacerbation of CHF and COPD are poor, and it appears that education alone is insufficient to ensure routine use of prophylaxis in clinical practice.

Key words: venous thromboembolism, prophylaxis, general medicine, educational intervention

RÉSUMÉ

Historique : Malgré la publication de lignes directrices, la prophylaxie de la thromboembolie veineuse (TEV) demeure s ous-utilisée.

Objectif : Mesurer l'incidence des interventions éducatives sur l'utilisation de la prophylaxie de la TEV conformément aux lignes directrices actuelles chez les patients admis à l'hôpital pour une exacerbation d'une insuffisance cardiaque congestive (ICC) ou d'une maladie pulmonaire obstructive chronique (MPOC).

Méthodes : Des interventions ont été mises de l'avant pour former les professionnels de la santé sur les lignes directrices actuelles en matière de prophylaxie de la TEV chez les patients traités en médecine générale et pour diffuser les résultats d'une vérification soulignant l'utilisation peu courante de ce type de prophylaxie au sein de l'hôpital. Une analyse rétrospective a été réalisée sur une période de cinq mois suivant l'intervention éducative pour évaluer l'utilisation de la prophylaxie de la TEV chez les patients hospitalisés pour une ICC ou une MPOC. De plus, on a sondé les médecins sur ce qu'ils perçoivent comme des barrières à la prescription de la prophylaxie de la TEV.

Résultats : Dans le cadre de la période d'évaluation post-i ntervention éducative, 57 patients ont satisfait aux critères d'admissibilité, dont quatre présentaient à la fois une ICC et une MPOC; de ces 57 patients, 13 (46 %) des 28 qui présentaient une ICC et 10 (30%) des 33 atteints d'une MPOC ont reçu une prophylaxie de la TEV à leur admission à l'hôpital. Les médecins ont attribué le faible taux d'utilisation de la prophylaxie principalement à la négligence et au manque de connaissance des lignes directrices actuelles.

Conclusion : Les taux d'utilisation de la prophylaxie de la TEV chez les patients présentant une exacerbation d'une ICC ou d'une MPOC dans l'établissement des auteurs sont faibles, et il semble qu'une intervention éducative à elle seule soit insuffisante pour assurer l'utilisation courante de la prophylaxie dans la pratique clinique.

Mots clés : thromboembolie veineuse, prophylaxie, médecine générale, intervention éducative

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INTRODUCTION

The incidence of venous thromboembolism (VTE) is predicted to escalate as the population ages, and complications of VTE, such as pulmonary emboli, are a significant cause of in-hospital morbidity and mortality.[1] It has been reported that 10% of the deaths observed in hospitals are related to pulmonary embolism and that 75% of these deaths occur in nonsurgical patients.[2] General medical patients admitted to hospital may have multiple risk factors putting them at risk for VTE. Exacerbations of congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD) have been identified as independent risk factors for a venous thromboembolic event[1] and have accounted for the majority of general medicine patients admitted to the authors' institution. The 2001 guidelines of the American College of Chest Physicians (ACCP) recommended the use of low-dose unfractionated heparin (LDUH) or low-molecular-weight heparin (LMWH) for VTE prophylaxis in general medical patients with risk factors for VTE (including cancer, bed rest, heart failure, and severe lung disease) (grade 1A recommendation).[1]

For the 1-year period from April 1, 1999, to March 31, 2000, a total of 95 cases of pulmonary embolism occurred at the authors' institution, a community hospital with 260 acute care beds. Of these, approximately 80% occurred in nonsurgical patients. A recent audit conducted for the same 1-year period indicated that only 19% of patients with CHF (29/155) and 34% of those with COPD (37/110) received an anticoagulant for prevention of VTE during their hospital stay. Educational interventions were undertaken to disseminate the findings of the audit and to educate physicians, nurses, and pharmacists about current practice guidelines for VTE prophylaxis in medical patients. The purpose of this study was to measure the impact of the educational interventions on the use of VTE prophylaxis according to current guidelines for medical patients admitted with exacerbation of CHF or COPD.

METHODS

Educational interventions were conducted in November 2001 in conjunction with 2 physicians (R.M., a respirologist, and M.B., an internal medicine specialist) and consisted of written memos sent to all physicians, nurse clinicians, and pharmacists and presentations at departmental and committee meetings (e.g., meetings of hospital department heads, family practice and internal medicine departments, the Pharmacy and Therapeutics Committee, joint pharmacy and nursing committees, and pharmacy staff). Both the memos and the presentations reported on use of VTE prophylaxis for patients with COPD and CHF admitted to the institution and described current practice guidelines for VTE prophylaxis in medical patients. Following the educational intervention, a chart review was conducted of consecutive patients with exacerbation of CHF or COPD (or both) who were admitted over the 5-month period between December 1, 2001, and April 30, 2002.

Several exclusion criteria were applied. Pregnant and breast-feeding women, patients with hypercoagulability disorders, those who had received anticoagulant therapy within the 48 hours before admission, and those who had experienced VTE within the year before admission were excluded. Because there is little evidence in the literature to support the first-line use of mechanical methods to prevent VTE (intermittent pneumatic compression or the wearing of graded compression elastic stockings), patients who had received this type of therapy were excluded. Patients with other well-defined indications for VTE prophylaxis or anticoagulation were excluded (i.e., acute myocardial infarction; ischemic stroke; general, gynecologic, or urologic surgery; major orthopedic surgery [elective hip or knee replacement, surgery for hip fracture]; neurosurgery; trauma; spinal cord injury). Patients admitted to the intensive care unit, patients with sepsis (including hospital- and community-acquired pneumonia), and patients with active cancer or a history of cancer were excluded because they have many confounding risk factors for VTE, which would have made the study population exceptionally heterogeneous.[1,2] Patients with contraindications to LDUH or LMWH therapy were excluded (i.e., hypersensitivity to heparin, heparin-induced thrombocytopenia, active bleeding [hemophilia, intracranial hemorrhage], conditions that could increase the risk of hemorrhage [bacterial endocarditis, active tuberculosis, or uncontrolled severe hypertension, defined as systolic pressure above 180 mm Hg and diastolic pressure above 120 mm Hg], or ulcerative lesions of the gastrointestinal tract]).[1,3,4]

The following data, collected by one investigator (R.P.), were recorded in a standardized Microsoft Access database: patient demographic characteristics, risk factors for VTE, length of hospital stay, and pharmacologic VTE prophylaxis (drug, dose, and frequency). VTE prophylaxis was defined as one of the following regimens, as outlined in the ACCP guidelines[1] and depending on the agents available on formulary at the authors' institution: LDUH 5000 units subcutaneously every 8 to 12 h or enoxaparin 40 mg subcutaneously once daily for 7 to 10 days or until discharged from hospital.

A survey about perceived barriers to VTE prophylaxis for patients with CHF or COPD was sent to the hospital mailboxes of all physicians at the beginning of April 2002, following preliminary analysis of the chart review. The survey was formatted to allow physicians to select 1 or more of 4 perceived barriers: oversight, belief that risks of prophylaxis exceed benefits, lack of awareness of indications, and cost. Space was also allowed for comments. The survey form included a reminder of the current guidelines and the results of the interim analysis of the chart review.

RESULTS

A total of 124 patients were admitted with a primary diagnosis of exacerbation of CHF or COPD during the study period (Table 1). Of these, 67 were excluded, most because of active anticoagulation before or at the time of admission to hospital. The demographic characteristics and risk factors of the 57 patients included in the study are reported in Table 2. The baseline characteristics of the patients with CHF were similar to those of the patients with COPD.

During the study period, which followed the educational intervention, 13 (46%) of the 28 patients with CHF exacerbations and 10 (30%) of the 33 patients with COPD exacerbations received VTE prophylaxis. The poor rate of prophylaxis, despite the educational intervention (Table 3), prompted the survey of physicians, described above. Of the 285 surveys that were mailed, 46 (16%) were returned. Most respondents attributed the low rate of prophylaxis to oversight and lack of awareness of current guidelines and indications (Table 4).

Table 1. Characteristics of Patients Included in and Excluded from Study*

Characteristic	No. (%) of Patients	
Charts reviewed	124	(100)
Patients included	57	(46)
COPD only	29	(51)
CHF only	24	(42)
Both COPD and CHF	4	(7)
Patients excluded	67	(54)
Active anticoagulation	38	(57)
Cancer (past or current)	15	(22)
Critical care	11	(16)
Surgery	3	(4)

COPD = chronic obstructive pulmonary disease,
CHF = congestive heart failure.
*Percentages within the inclusion and exclusion groups were calculated according to the number of patients in each group.

Table 2. Demographic Characteristics of 57 Patients Included in Study

Characteristic	No. (%) of Patients*	
Sex		
Men	37	(65)
Women	20	(35)
Mean age (years)	80	
Mean length of stay (days)	19	
Risk factor		
Prolonged immobility (confined to bed for more than 72 h)	41	(72)
Acute infection	39	(68)
Older age (> 75 years)	32	(56)
Obesity (> 20% over ideal body weight)	4	(7)
Previous VTE (more than 1 year ago)	1	(2)
Inflammatory bowel disease	3	(5)
2 or more risk factors	48	(84)

VTE = venous thromboembolism.
*Except where otherwise indicated

Table 3. Use of VTE Prophylaxis before and after Educational Intervention

	No. (%) of Patients Receiving LDUH or LMWHi n Accordance with Guidelines		
	CHF	**COPD**	**All patients**
Initial audit (April 1, 1999, to March 31, 2000)	29/155 (19)	37/110 (34)	66/265 (25)
Chart review after intervention (December 1, 2001, to April 30, 2002)	13/28* (46)	10/33* (30)	19/57 (33)

VTE = venous thromboembolism, LDUH = low-dose unfractionated heparin, LMWH = low-molecular-weight heparin,
CHF = congestive heart failure, COPD = chronic obstructive pulmonary disease.
*Four patients had both CHF and COPD and are therefore included in each of these groups. They are counted only once in the combined group.

Table 4. Perceived Barriers to VTE Prophylaxis (*n* = 46)

Perceived Barrier	No. (%) of Physicians*	
Unaware of indication and current guidelines	19	(41)
Oversight	25	(54)
Risks exceed benefits	9	(20)
Cost	2	(4)

*Respondents could select more than one option.

DISCUSSION

VTE is potentially preventable in general medical patients, but until recently the frequency of this condition in patients admitted to general medicine wards had not been established, because of the different methods used to diagnose deep vein thrombosis and the heterogeneity of the patient population studied.[1,5] In 3 recent randomized trials (MEDENOX,[3] PREVENT,[6] and ARTEMIS[7]) LMWH was compared with placebo in the general medical population; these studies helped to establish that VTE prophylaxis with LMWH can significantly and safely reduce the incidence of VTE in general medical patients admitted to hospital. In several randomized clinical trials (most recently the PRINCE trial[8]) directly comparing LDUH and LMWH, there have been no significant differences in rates of deep vein thrombosis or bleeding between these 2 agents.[1,9]

Many hospital inpatients have risk factors for VTE, and these risks appear to be cumulative[1] The average age of this study population was 80 years, and most of the patients had acute infection or were confined to bed for more than 72 hours. More than 80% of the study population had at least 2 independent risk factors for VTE, which suggests that this population had multiple risk factors.[1,10] The heterogeneity of the general medical population may make it challenging for health care professionals to determine the risk of VTE. However, some medical conditions such as CHF and COPD have been identified as independent risk factors for VTE, and patients with these conditions should receive prophylaxis until the risk factors have been reversed.

This study revealed poor rates of VTE prophylaxis for general medical patients admitted with exacerbations of CHF or COPD. Even after the poor rates of prophylaxis had been highlighted and health care professionals had been educated about the indications for VTE prophylaxis outlined in current practice guidelines, the rates of prophylaxis remained poor. Many barriers to the implementation and adherence of guidelines have been identified in the literature, including insufficient staff, oversight at the time of admission because of the focus on acute problems, existing outdated protocols, physician concerns regarding safety and cost, patient choice or refusal, and lack of physician cooperation or interest.[11,12] At the authors' institution, most physicians acknowledged oversight and lack of awareness of current guidelines as barriers to VTE prophylaxis for patients with CHF and COPD. Much improvement in initiating VTE prophylaxis is necessary, and literature is available to guide health care professionals in assessing the risk of VTE.

The ACCP recommends that physicians be given hospital-specific data demonstrating the potential benefits of prophylactic strategies and that they be involved in educational programs, to motivate them to use such strategies.[1] Despite the employment of these recommendations in educational interventions at the authors' institution, rates of prophylaxis remained poor. Previous studies have found that didactic education, printed continuing education materials, conferences, and mailings are all weak tools for implementing change when used alone.[11] To be successful, educational strategies must incorporate methods that continuously reinforce change, such as automated reminder systems (e.g., preprinted order sheets), academic detailing, and concurrent and retrospective feedback.[1,11] Furthermore, multiple interventions are more effective than any single approach.[1]

Several studies have highlighted underuse of VTE prophylaxis in medical patients and have indicated that only about one-third of eligible medical patients receive VTE prophylaxis upon admission to hospital (Table 5).[13-15] The reasons for underuse may relate to uncertainty about optimal use of VTE prophylaxis in a clinical setting, including patient selection, optimal time to assess the need for VTE prophylaxis, appropriate type of VTE prophylaxis, and appropriate duration of therapy.[5,14] However, because CHF and COPD have been identified as independent risk factors for VTE, there should be a greater appreciation of the need for prophylaxis in patients with these conditions. Only one other study has assessed a patient population similar to the one studied here; in that study, the rate of prophylaxis was also poor, but no educational intervention was undertaken.[13] In another study that did involve an educational intervention, the rates improved significantly because orders for VTE prophylaxis were added to preprinted orders.[14]

The limitations of this study include the retrospective nature of the analysis, the limited sample size, and the short follow-up period. The methods used to determine

Table 5. Other Clinical Trials Illustrating Underutilization of VTE Prophylaxis in Medical Patients

Study	Type of Study	Eligibility Criteria	ACCP-Recommended Pharmacologic Prophylaxis	Patients Receiving VTE Prophylaxis		Educational Intervention
				ACCP-Recommended Prophylaxis	Some Form of Prophylaxis*	
Stark and Kilzer[13]	Chart review at 2 US university medical centers	> 40 years of age, admitted for CHF (NYHA class III or IV), COPD, or respiratory infection	LDUH 5000 units SC q8–12h OR enoxaparin 40 mg SC once daily OR dalteparin 2500 units SC once daily	6% (5/84)	31% (26/84)	None
Stinnent et al.[14]	Chart reviews before and after intervention at a US tertiary care center	≥ 18 years of age; admitted to cardiology, oncology, or general medical services for at least 48 h	LDUH 5000 units SC q8h OR enoxaparin 40 mg SC once daily	Unknown	*Before intervention:* 43% (52/122) of high-risk patients† *After intervention:* 71% (70/99) high-risk patients†	Education and development of a standard admission form that included VTE risk stratification and optimal VTE prevention regimens
Rahim et al.[15]	Chart review at 2 teaching hospitals in Canada	Inpatients admitted	LDUH 5000 units to medical wards OR LMWH (drug and dosage not specified)	Unknown SC twice daily	33% (146/446) 43% (27/63) of patients with at least 2 risk factors	None overall

VTE = venous thromboembolism, ACCP = American College of Chest Physicians, CHF = congestive heart failure, NYHA = New York Heart Association, COPD = chronic obstructive pulmonary disease, LDUH = low-dose unfractionated heparin; LMWH = low-molecular-weight heparin.
*Includes ambulation, use of intermittent pneumatic compression devices, use of anti-embolic stockings, and pharmacologic anticoagulation, not necessarily according to ACCP guidelines.
†Defined as 1 major risk factor or 2 minor risk factors, according to a risk stratification scheme used in the MEDENOX trial.[3]

the rates of VTE prophylaxis in the initial audit did not correspond to those used in the retrospective analysis; therefore, direct comparisons of these 2 data sets are not possible. In addition, this study included only medical patients with CHF or COPD and thus might not reflect VTE prophylaxis rates for all general medical patients at the authors' institution.

CONCLUSIONS

VTE prophylaxis was underused for medical patients with CHF or COPD exacerbation at the authors' institution, and educational interventions alone were insufficient to ensure routine use of prophylaxis in clinical practice. After completion of this study, VTE prophylaxis was added to preprinted order sheets for patients admitted with CHF or COPD exacerbations, to ensure that these patients are considered for appropriate VTE prophylaxis (see Appendixes 1 and 2).

References

1. Geerts WH, Heit JA, Clagett GP, Pineo GF, Colwell CW, Anderson FA Jr, et al. Prevention of venous thromboembolism. *Chest* 2001; 119(1 Suppl):132S-175S.
2. Mismetti P, Laporte-Simitsidis S, Tardy B, Cucherat M, Buchmuller A, Juillard-Delsart D, et al. Prevention of venous thromboembolism in internal medicine with unfractionated or low-molecular-weight heparins: a meta-analysis of randomised clinical trials. *Thromb Haemost* 2000;83:14-9.
3. Samana MM, Cohen AT, Darmon JY, Desjardins L, Eldor A, Janbon C, et al. A comparison of enoxaparin with placebo for the prevention of venous thromboembolism in acutely ill medical patients. Prophylaxis in Medical Patients with Enoxaparin Study Group. *N Engl J Med* 1999;341:793-800.
4. Hirsh J, Warkentin TE, Shaughnessy SG, Anand SS, Halperin JL, Raschke R, et al. Heparin and low-molecular-weight heparin: mechanisms of action, pharmacokinetics, dosing, monitoring, efficacy and safety. *Chest* 2001;119(1 Suppl):64S-94S.
5. Brophy DF, Dougherty JA, Garrelts JC, Parish RC, Rivey MP, Stumpf JL, et al. Venous thromboembolism prevention in acutely ill nonsurgical patients. *Ann Pharmacother* 2005;39:1318-24.
6. Leizorovciz A, Cohen AT, Turpie AG, Olsson CG, Vaitkus PT, Goldhaber SZ. Dalteparin reduced venous thromboembolic

events without increased bleeding in acutely ill medical patients. *Circulation* 2004;110:874-9.

7. Cohen AT, Davidson BL, Gallus AS, Lassen AR, Tomkowski W, Turpie AGG, et al. Thromboprophylaxis with fondaparinux in acutely ill medical patients with moderate renal impairment. [abstract 42]. *Blood* 2003;102:15a.
8. Kleber FX, Witt C, Vogel G, Koppenhagen K, Schomaker U, Flosbach CW. Randomized comparison of enoxaparin with unfractionated heparin for the prevention of venous thromboembolism in medical patients with heart failure or severe respiratory disease. *Am J Heart* 2003;145:614-21.
9. Lopez L. Low-molecular-weight heparins are essentially the same for treatment and prevention of venous thromboembolism. *Pharmacotherapy* 2001;21(6 Pt 2):56S-61S.
10. Davidson BL. Applying risk assessment models in non-surgical patients: overview of our clinical experience. *Blood Coag Fibrin* 1999;10(suppl 2):S85-9.
11. Armstrong EP, Lipsy RJ. Clinical practice guidelines. In: Carter BL, chair, Editorial Board. *Pharmacotherapy self-assessment program.* 3rd ed. Kansas City (MO): American College of Clinical Pharmacy; 1999. p. 35-61.
12. Enders JM, Burke JM, Dobesh PP. Prevention of venous thromboembolism in acute medical illness. *Pharmacotherapy* 2002;22(12):1564-78.
13. Stark JE, Kilzer WJ. Venous thromboembolism prophylaxis in hospitalized medical patients. *Ann Pharmacother* 2004;38:36-40.
14. Stinnent JM, Pendleton R, Skordos L, Wheeler M, Rodgers GM. Venous thromboembolism prophylaxis in medically ill patients and the development of strategies to improve prophylaxis rates. *Am J Hematol* 2005;78(3):167-72.
15. Rahim SA, Panju A, Pai M, Ginsberg J. Venous thromboembolism prophylaxis in medical inpatients: a retrospective chart review. *Thromb Res* 2003;111:215-9.

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Appendix 1. Preprinted order sheet for patients admitted with exacerbation of congestive heart failure.

NORTH SHORE Health Region
Sharing a Vision of Health

Lions Gate Hospital
PHYSICIAN'S ORDERS

CONGESTIVE HEART FAILURE

AUTOMATIC STOP ORDERS		DRUG ALLERGIES
Medication orders not stating the number of days or doses will be subject to the following automatic stop orders.		List:
Injectable narcotics and controlled drugs	5 days	
Oral narcotics and controlled drugs	10 days	None Known:
Injectable Antibiotics	7 days	
Oral Antibiotics	10 days	
Ventilation Medications	5 days	
All Other Medications	30 days	Physician's Signature:
If medications are needed for duration of hospital stay indicate this duration as F.D.H.S.		

ORDERS
DRUG - DOSE - ROUTE - FREQUENCY - DURATION

Date & Time: _____

Cross out all orders that do not apply

1. Start Congestive Heart Failure Timeline
2. CXR and ECG if not done in Emergency
3. Echocardiogram **(omit if done in past 12 months, ask Ultrasound to fax copy of result to ward)**
4. Labwork: CBC; Troponin T + CK on admission; Chem 7 daily x 3 days
5. Consult Dietitian, Physio, Pharmacist
6. Healthy Heart 2 gram sodium Diet
7. Restrict fluid intake to _____ ml. daily
8. Activity as per Timeline
9. IV Saline Lock
10. **Measured Admission Weight:** weight = _____
11. **Daily Weights:** (same time daily)
12. Vital Signs BID before medications
13. Oxygen to keep pulse oximetry > 92%
14. Complete Degree of Intervention Sheet if applicable
15. **Medications:**

☐ Heparin 5000 units subcut q12H **OR**
☐ If atrial fibrillation, consider anticoagulation **(see General Heparin Nomogram)** and/or Warfarin _____ mg daily with daily INR

Morphine 2-5 mg IV q 15 min. PRN for shortness of breath
Docusate 100 mg daily
Diuretic _____
ACE Inhibitor _____
Beta Blocker (if already on) _____
Spironolactone _____ for NYHA Class 3 or 4 Heart Failure
Digoxin _____

Avoid non-steroidal anti-inflammatory agents
Other: _____

_____

PHYSICIAN'S SIGNATURE:

A.9162 (Rev.10/02) STORES - wp

Appendix 2. Preprinted order sheet for patients admitted with exacerbation of chronic obstructive pulmonary disease.

Vancouver Coastal Health
Lions Gate Hospital

PHYSICIAN'S ORDERS

COPD EXACERBATION

AUTOMATIC STOP ORDERS		DRUG ALLERGIES
Medication orders not stating the number of days or doses will be subject to the following automatic stop orders.		List:
Injectable narcotics and controlled drugs	5 days	
Oral narcotics and controlled drugs	10 days	
Injectable Antibiotics	7 days	None Known:
Oral Antibiotics	10 days	
Ventilation Medications	5 days	
All Other Medications	30 days	Physician's Signature:
If medications are needed for duration of hospital stay indicate this duration as F.D.H.S.		

ORDERS
DRUG - DOSE - ROUTE - FREQUENCY - DURATION

1. Start COPD Timeline
2. Referral to: Respiratory Therapist, Physiotherapist (to screen), Other _____
3. DAT
4. AAT
5. Vital signs tid x 24 hours, bid X 48 hours, then daily or _____
6. Oxygen to keep oxygen saturation 88-92%
7. Saline lock or IV _____
8. ECG and CXR on admission
9. Lab Tests: CROSS OUT ALL ITEMS NOT ORDERED
   - CBC WITH DIFFERENTIAL, chem. 7, PTT, INR
   - Serum theophylline level (if on theoplylline)
   - Blood cultures X2 if temperature > 38.5^{0}C
   - Sputum for C&S and gram stain
10. Medications
    a) Heparin 5000 units SQ q12h
    b) MDI with spacer:
       - Salbutamol 100mcg/puff: 2-4 puffs q2-4h prn
       - Ipratroprium bromide 20 mcg/puff: 2 puffs q4-6h
       - Fluticasone propionate 250 mcg/puff: 2 puff bid

       OR

       Nebulizer:
       - Salbutamol 2.5-5.0 mg q2-4h prn
       - Ipratroprium bromide 0.25-0.5 mg q4-6h
       - Budesonide 0.5 mg bid

    c) Discontinue nebulizers after 3 days if tolerating MDI.
    d) ☐ Prednisone 1mg/kg= _____ mg PO od (max 50mg PO od, round to the nearest 5 mg)

       OR

       ☐ Methylprednisolone _____ mg IV q_____h

       Pt's weight: _____

    e) ☐ Antibiotics:

       _____

       _____

    f) ☐ Other:

       _____

       _____

CROSS OUT ALL ITEMS NOT ORDERED
Physician's Signature:

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