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# Facilitating Anticoagulation for Safer Transitions: Preliminary Outcomes From an Emergency Department Deep Vein Thrombosis Discharge Program

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## Abstract

**Introduction:** Patients presenting to the emergency department (ED) with an acute uncomplicated deep vein thrombosis (DVT) may be eligible for outpatient treatment. This study aims to establish a transition of care program in the ED for patients with DVT presenting with an acute uncomplicated DVT. **Methods:** This article specifies the transition of care program for DVT patients in the ED. Data was collected on patients admitted and discharged from the ED who had an acute DVT both prior to the initiation of facilitating anticoagulation for safer transitions (FAST) and after initiation of FAST. Follow-up phone calls were made to patients discharged from the ED after the initiation of FAST, and data were collected on follow-up appointments, anticoagulation adherence, readmission rates, and patient satisfaction. **Results:** The FAST program has been successfully implemented. By the 30-day follow-up phone call, 100% of patients had attended a follow-up appointment. The average time to the follow-up appointment post-discharge was 4.4 days (range, 1–7 days). None of the patients at the 3- to 5-day follow-up phone call and 30-day phone call had any issues taking their anticoagulant, and none reported side effects of significant bleeding. One patient was re-admitted after discharge with a pulmonary embolism. Patient satisfaction has also been very high with the program, with all patients indicating at the 30-day phone call that they would recommend the program to a friend or family member. The educational components of this program also improved the discharge process for this population compared with patients discharged prior to the initiation of FAST. **Conclusion:** The FAST program is an example of a successful transition-of-care program for discharging DVT patients from the ED. Reassessment and improvements to the program are underway to ensure it remains current, sustainable, and provider friendly.

**Keywords:** health transition; anticoagulants; emergency care; deep vein thrombosis

## Introduction

Transitions of care are a critical element of focus in contemporary medicine. Studies have found that inappropriately transitioning patients through different health care settings increases the rate of adverse events and medication discrepancies.<sup>1-3</sup> With increasing health care costs and lower reimbursement, it is imperative that health care organizations strive to enact programs that enable more effective transitions of care. In 2009, the American College of Physicians, Society of General Internal Medicine, Society of Hospital Medicine, American Geriatrics Society, American College of

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Emergency Physicians, and Society of Academic Emergency Medicine published a Transitions of Care Consensus policy statement highlighting the significance of transition of care programs and to address current quality gaps in transitioning patients from one health care setting to another.<sup>4</sup>

One particular area in which transitions-of-care programs are beneficial is in the setting of anticoagulation, particularly in the treatment of deep vein thrombosis (DVT). An early study looking at outpatient treatment for acute DVT with a low-molecular-weight heparin (LMWH) concluded that it was safe and effective.<sup>5</sup> Other studies and review articles found no difference in the risk of recurrent thromboembolism or side effects on patients treated in-hospital with intravenous unfractionated heparin (UFH) compared with those treated at home with LMWH.<sup>6-9</sup> Outpatient therapy is also associated with an increase in physical activity and social functioning.<sup>6,8</sup> There are economic benefits to treating DVT in the outpatient setting. Studies and pharmacoeconomic analyses have demonstrated that outpatient treatment with LMWH for an acute DVT is significantly less costly than inpatient UFH treatment.<sup>7,9</sup> One review article noted that outpatient treatment reduces hospital length of stay, therefore improving health care efficiency.<sup>8</sup>

Patients presenting to the emergency department (ED) with an acute uncomplicated DVT may not require a hospital admission and can be treated and followed as outpatients. As early as 1999, health care providers acknowledged the need for a process to ensure appropriate patients are selected for outpatient treatment. This entails education, counseling on DVT treatment, affordable access to drug therapy, and assurance of outpatient follow-up.<sup>10</sup> Only with such a process in place can practitioners ensure that patients discharged from the ED are appropriately transitioned to the outpatient setting.

Once it was established that outpatient DVT treatment was safe and cost effective, a number of hospitals and clinics developed programs and pathways to coordinate care. Wells et al<sup>11</sup> reported successful outpatient treatment of venous thromboembolism with LMWH using 2 care models, both of which involved daily contact with patients from nurse managers. Pearson et al<sup>12</sup> described safety and cost effectiveness with their centrally coordinated care model for outpatient treatment of DVT. In this model, patients diagnosed with a DVT were examined by a physician and deemed eligible for outpatient care. Patients were then educated and provided with a 5-day supply of enoxaparin. Patients were seen either once or twice daily by a visiting nurse until they were completely bridged to warfarin.<sup>12</sup> From that point, the patient's

care was transferred back over to the primary care physician (PCP).<sup>12</sup> Another study from Vinson et al<sup>13</sup> described 2 models for outpatient DVT treatment, the ED-centered model and the decentralized model. In the ED-centered model, patients went to the ED for initial DVT diagnosis, then were discharged on LMWH and warfarin, then had home health visits daily from nurses until a therapeutic International Normalized Ratio (INR) was achieved. In the decentralized model, the diagnosis of DVT was made at the clinic. In this model, patients were educated, started on LMWH and warfarin, and provided with a follow-up appointment in 5 days with their PCP.<sup>13</sup> The patients were asked to return to clinic the following day for an outpatient appointment with a nurse educator.<sup>13</sup> They found both models to be successful in terms of safety and efficacy, but suggested the decentralized model had the added benefit of continuity of care through the PCP.<sup>13</sup> More recently, Misky et al<sup>14</sup> wrote on a successful outpatient treatment of DVT and low-risk pulmonary embolism (PE) using order sets, system-wide education, follow-up phone calls, and coordinated post-hospital care.

The Facilitating Anticoagulation for Safer Transitions (FAST) DVT Discharge Program, also known as FAST, established a pathway for which patients presenting to the ED with an acute DVT are evaluated for outpatient treatment, educated, provided with affordable medication, and scheduled for a follow-up appointment. Unlike some of the programs discussed previously, the FAST program was developed to be applicable to a larger patient population. The pathway can be used for patients insured by a number of different insurance plans and does not involve home nursing care. By having this process in place, we aimed to improve patient outcomes by increasing medication adherence and improving continuity of care.

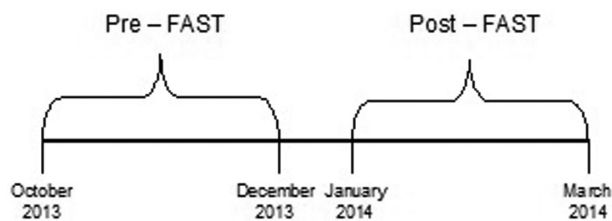
## Methods

This was an institutional review board (IRB) approved, single-center, retrospective analysis conducted at Thomas Jefferson University Hospital from October 2013 to March 2014. Two time frames were defined in this study; pre-FAST, or prior to the initiation of FAST, for which data were collected from October to December 2013, and post-FAST, or after the initiation of FAST, for which data were collected from January to March 2013 (Figure 1).

## Objective

The objective of this study was to establish a transition-of-care program for DVT treatment in the ED for patients presenting with an acute uncomplicated DVT.

**Figure 1.** Pre-FAST and Post-FAST Timeline. The pre-FAST period was October to December 2013, while the post-FAST period was January to March 2014.



**Abbreviation:** FAST, facilitating anticoagulation for safer transitions.

## Developing the FAST DVT Discharge Program

The FAST DVT Discharge Program was led by a group of pharmacists, and involved key physician, nursing, and social work stakeholders. Pharmacy representation included 2 ED clinical pharmacists, 2 anticoagulation clinical pharmacists, and a PGY2 pharmacy cardiology resident. Important physician stakeholders included those of the Jefferson Antithrombotic Service (JATS) and the ED. Key nursing stakeholders included nurse practitioners from the observation unit and ED nursing leadership. Early on it was decided that 4 fundamental questions would need to be answered for the program to move forward: 1) What patients should be included in the program?; 2) What evidence-based recommendations would constitute optimal care for this population?; 3) How will patients be retrospectively identified for data collection?; and 4) How will patients be followed after discharge?

### What patients should be included in the program?

The decision of what patients were eligible for the program required input from pharmacy, physicians, nursing, and social work. The core group met bi-weekly for 3 months to revise and finalize the criteria.

All patients aged > 18 years presenting to the ED with an acute uncomplicated DVT were eligible for the program. It was decided early on that patients would not be included if they had a PE. At the time of project development, the group felt hospital admission would be more appropriate for treatment. In order to ensure that only appropriate patients were discharged, the group developed a list of admission criteria. As a starting point for the admission criteria, the Centers for Medicare and Medicaid Services Interqual (McKesson, San Francisco, CA) Criteria for DVT were used.<sup>15</sup> The specific admission criteria were chosen to ensure that patients would only be discharged home from the ED with an acute uncomplicated DVT if they could receive safe and effective anticoagulation and would be able to follow-up with

an outpatient provider. A list of recommended baseline labs was also developed (Table 1). Ideally, patients meeting any 1 of the admission criteria would not be discharged home; however, the final decision to admit or discharge was left to the discretion of the provider armed with the information provided through the program. The admission criteria can be broken down into 3 categories: vital signs and laboratory values, past medical history, and social history. See Table 2 for the admission criteria.

### What evidence based recommendations would constitute optimal care for this population?

The FAST program was created to ensure that patients who presented to the ED with an acute DVT and were discharged home would have appropriate follow-up care. To help streamline clinician decision making, a stepwise process for evaluation and follow-up was created. The first steps of the process included evaluation of the patient for discharge and assuring pertinent labs, vitals, past medical history, and social history. Once it was determined the patient was eligible for discharge, then discharge planning should begin. To ensure that all steps were completed prior to discharging a patient, the 24 hour observation unit was available to allow for more time for discharge planning. This was beneficial in cases where assuring follow-up was difficult, or if a patient presented during nights or weekends.

Guaranteeing that the patient could afford and pick up the selected anticoagulant from a pharmacy was of utmost importance to safely transition these patients. It was encouraged that social work became involved early in the process for prescription insurance screening. While developing the insurance screening process, it was noted by one of the anticoagulation pharmacists that there was a delay in treatment, and patients were not receiving anticoagulation upon diagnosis of a DVT, but waiting until the insurance screening was completed. That prompted the group to add a step about providing anticoagulation on diagnosis by considering

**Table 1.** Recommended Baseline Labs for Discharge Assessment

#### Recommended Baseline Labs

- CBC
- Chem 7 or BMP
- LFTs
- PT and PTT
- Urinalysis
- Stool for occult blood (only if hemoglobin < 10 g/dL)
- Pregnancy screening as applicable

**Abbreviations:** BMP, basic metabolic panel; CBC, complete blood count; LFT, liver function test; PT, prothrombin time; PTT, partial thromboplastin time.

**Table 2.** Admission Criteria Based on InterQual

Parameters for Assessment	Admission Criteria
Past Medical History	<ul style="list-style-type: none"> <li>• Pregnant</li> <li>• Morbid obesity (BMI <math>\geq</math> 40 kg/m<sup>2</sup>)</li> <li>• Malignancy with active cancer treatment</li> <li>• High risk for fall or trauma</li> <li>• History of coagulopathy</li> <li>• HIT (suspected or by history)</li> <li>• Liver disease and prolonged PTT/INR</li> <li>• Prolonged immobilization (<math>\geq</math> 4 days)</li> <li>• GI bleeding &lt; 6 weeks</li> <li>• Stroke within last 3 months</li> <li>• Recent hospitalization, trauma, or surgery within 1 month</li> <li>• Previous DVT <math>\geq</math> 2 episodes, episode within past 3 months, recurrent event despite therapy</li> <li>• Extensive or bilateral DVT with risk for vascular compromise</li> </ul>
Lab/Vital Signs	<ul style="list-style-type: none"> <li>• Hemoglobin &lt; 10 g/dL</li> <li>• CrCl &lt; 30 mL/min</li> <li>• Platelet count &lt; 100 000</li> <li>• AST and ALT &gt; 3 times ULN</li> <li>• BP &gt; 180/110 mmHg</li> </ul>
Social History	<ul style="list-style-type: none"> <li>• No medical <b>OR</b> prescription insurance coverage</li> <li>• Cannot access medications</li> <li>• Homeless</li> <li>• Psych disorder that prohibits from taking medication</li> </ul>

**Abbreviations:** ALT, alanine aminotransferase; AST, aminotransferase; BMI, body mass index; BP, blood pressure; CrCL, creatinine clearance; DVT, deep vein thrombosis; GI, gastrointestinal; HIT, heparin-induced thrombocytopenia; INR, International Normalized Ratio; PTT, partial thromboplastin time; ULN, upper limit of normal.

a one-time dose of enoxaparin. The next steps include selecting the appropriate anticoagulant, educating the patient and family, and providing the patient with a prescription. For the patient education component, a general DVT handout and medication-specific handouts were created. Each handout was made concise to assist with the education process. Hard copies of these documents were stored in 2 locations in the ED and the observation unit. These documents were also made available on the hospital intranet (Appendix 1). The final step in the program was to schedule a follow-up appointment for the patient prior to discharge. If the patient did not have a PCP, then it was recommended the JATS service be contacted for an outpatient appointment. Although it was still encouraged to make the follow-up appointment prior to discharge, it quickly became apparent that this would not be possible at all times (eg, weekends, evenings) when outpatient offices were not available. In these situations, the ED clinician could transfer the patient to the observation unit. Table 3 details the Steps of the FAST program.

## How would we be able to identify these patients retrospectively?

One of the main challenges undertaken by the group was figuring out how to identify patients included in the FAST program retrospectively. The ED at Jefferson uses 2 software systems (Wellsoft [Wellsoft Corp., Somerset, NJ]) a documentation program, which physicians and nurses utilize to document vitals, labs, and notes; and a computerized physician order entry system (Centricity Enterprise, GE healthcare, Seattle, Washington), in which medications are ordered and charted upon in the medication administration record (MAR). Unfortunately, the 2 systems do not interface completely. The group believed the best approach to identify patients would depend on a software system that would not require a provider intervention to flag patients. Fortunately, the Wellsoft system generates a callback report for patients discharged from the ED and can sort the patients based on diagnosis. Utilization of the Wellsoft callback list and filtering tool for a diagnosis of DVT enhanced our ability to quickly identify patients who were discharged from the ED with an acute DVT.

## How would these patients be followed after discharge?

From the beginning of project development, setting measurable endpoints was essential to monitor efficacy of the program. The group decided the most effective way to perform this task was with follow-up phone calls to patients. The follow-up phone calls would provide a means for data collection and a way to reinforce DVT and anticoagulation education with patients. After discussion, the decision was

**Table 3.** Steps of the FAST Program

### Discharge Planning Steps

1. Enter order for Fast DVT Discharge Program in Jeff Chart
2. Consider a transfer to the observation unit for initiation of the discharge process
3. Consult case management for insurance screening
  - a. If medication requires prior authorization that cannot be attained within 4 hours, choose another medication or consider admission
4. Do **NOT** delay treatment for prescription coverage verification; consider a one-time dose of enoxaparin
5. Select appropriate discharge anticoagulant based upon history, physical, labs, and insurance coverage (see next page)
6. Call in prescription to patient's pharmacy or provide patient with prescription
7. Provide formal education to the patient and/or family member; patient or family member **MUST** be able to demonstrate ability to administer subcutaneously if discharging on an injection
8. Make follow-up appointment confirmed within 3–5 days of discharge  
**\*If patient does not have PCP or PCP cannot be contacted, consult JATS service for appointment**

made to call the patients twice, once within the first 3 to 5 days of discharge from the ED and then again at 30 days. The person responsible for making the follow-up phone calls was initially the pharmacy resident with plans for transferring the follow-up phone calls to another individual at a later time (see the Future Plans for FAST Program). A series of questions were created and approved by our IRB to ask the patient or designated caregiver at each follow-up phone call. Questions included on the follow-up phone call pertained to efficacy, adherence, side effects, and follow-up appointments. Appendix 2 provides the full Follow-Up Phone Call Questionnaire. The pharmacist performing the follow-up phone call was also responsible for answering any questions of the patient or caregiver. In addition to the follow-up phone call questionnaire, a patient satisfaction survey was created to obtain patients' perspectives on the program. This questionnaire was created later on in the process, and its use began in the summer of 2014. Appendix 3 shows the Patient Satisfaction Survey.

### Provider Education

Prior to rolling out the program, a fundamental task was to educate those who would be utilizing the newly developed FAST system. A number of different education approaches were taken to ensure all providers involved knew about the program. Prior to the start of the program, a 10-question survey was developed through SurveyMonkey.com and e-mailed to all ED staff, including physicians, nurse practitioners, and bedside nurses. The questions included on the survey can be found in Appendix 4. The questions asked pertained to discharge planning for a patient with an acute DVT, pertinent lab values and vitals to assess, as well as dosing, drug interactions, and monitoring for specific anticoagulants used in the treatment of DVT. The same quiz was sent out 4 months after the initiation of the FAST program to evaluate the effect of time on the level of competency.

A brief PowerPoint (Microsoft Corp, Redmond, WA) presentation was created by the group and presented at the ED grand rounds. The presentation described the purpose of FAST, eligibility criteria for discharge, the steps of the program, and a review of pertinent anticoagulants for the treatment of an acute DVT. The presentation was initially given by the pharmacy resident in December of 2013. The ED pharmacists returned to the ED grand rounds on 3 more occasions to review and promote the program.

A number of documents were created to enhance the education process and make the FAST program physician and nursing friendly. As mentioned previously, a series of

concise patient education documents were created to assist with counseling (Appendix 1). A clinician education guide was also created to assist clinicians in educating patients. Appendix 5 provides the Clinician Education Guide. Finally, a pocket card was created for clinicians to carry. The pocket card includes the eligibility criteria, steps of FAST program, and information on pertinent anticoagulants used in DVT treatment (Appendix 6). The Patient Education Documents, Clinician Education Guide, Education power-point, and pocket card were all made available on the hospital intranet to improve access to these documents.

### Future Plans for the FAST Program

In establishing the FAST program, it was known from the beginning that there needed to be a way for the program to remain current and sustainable after the completion of the PGY2 pharmacy cardiology resident's research project. In order to accomplish this, several individuals were trained in how to identify FAST patients for follow-up. It was decided that follow-up phone calls would become the responsibility of a care coordinator who worked closely with the anticoagulation pharmacists. This coordinator was trained on how to use WellSoft to find patients discharged from the ED with an acute uncomplicated DVT as well as how to perform the follow-up phone calls. A pharmacist is always available for the coordinator to help answer patient or caregiver questions. It was decided that the ED pharmacists and anticoagulation pharmacists would meet quarterly to review the documents of the FAST program and make any updates as necessary. At this time, the group is working on a plan to perform more data collection and analysis as the program accrues more patients.

### Patient Population

Patients were included in this analysis if they were aged > 18 years and presented to the ED at Thomas Jefferson University Hospital with an acute uncomplicated DVT as the primary diagnosis. Patients were excluded if they presented with a PE or presented with an already established (non-acute) DVT. Patients were identified using the University Health Consortium database that stores both demographic and clinical data for all patients at TJUH. Patients were flagged using a primary diagnosis of DVT. Four separate groups of patients were identified for 2 comparator groups. The first comparator group was DVT patients discharged from the ED pre-FAST compared with post-FAST. The second comparator group was DVT patients admitted through the ED pre-FAST compared with post-FAST.

## Endpoints

The primary objective of this initiative was to establish a transition of care program for patients presenting to the ED with an uncomplicated DVT. To measure the success of the program, a number of endpoints were evaluated, including assessment of patient and caregiver responses to the follow-up phone call questionnaire. Through the follow-up phone call, a number of endpoints important to the transition program could be reviewed. These included completion of a follow-up appointment, ability of patient to afford/access to their anticoagulant at a pharmacy, medication adherence, occurrence of adverse drug events or side effects, and hospital readmission related to their DVT. Appendix 7 (Patient Outcome Worksheet) provides additional details.

Other endpoints included assessing provider adherence to obtaining the recommended labs in the ED as well as evaluating each component of the admission criteria (Table 2) for all four patient groups (discharged pre- and post-FAST and admitted pre- and post-FAST). The admission criteria were evaluated to assess whether the appropriate patients were being admitted to the hospital with a diagnosis of DVT; to review whether the appropriate patients with a DVT were being selected for discharge from the ED; and to describe any changes in practice pre- and post-initiation of the FAST program. For those discharged from the ED, documentation of whether the first dose of anticoagulant was administered in the ED and whether or not appropriate discharge instructions for anticoagulation were provided were also assessed.

## Statistics

The patient population assessed for this analysis was small. Therefore, statistical tests for significance were not conducted. For the data collected in each of the 4 groups, a descriptive analysis was done. Continuous data that were normally distributed were expressed as a mean, while non-normally distributed data were expressed with a median. Categorical data were expressed with frequencies and percentages.

## Results

A total of 32 patients were analyzed. Eight patients were included in the group discharged from the ED pre-FAST, and 7 patients were included in the group discharged from the ED post-FAST. Of the patients discharged from the ED pre-FAST, 6 were discharged on rivaroxaban, 1 on enoxaparin bridge to warfarin, and 1 on enoxaparin alone. Of the patients discharged from the ED post-FAST, 4 were discharged on rivaroxaban, and 3 were discharged on enoxaparin, 2 with a bridge to warfarin. Nine patients were included in the group

admitted pre-FAST, and 8 patients were included in the group admitted to the hospital post-FAST.

## Patients Discharged From the ED

Of the 7 patients discharged from the ED post-FAST, 6 were able to be contacted for follow-up. All patients were initially contacted within 3 to 5 days of discharge. Of the patients who were able to be contacted at the first phone call (total of 6 patients), 5 had a follow-up appointment scheduled. At the first phone call, all patients had picked up their medication from the pharmacy and were taking their anticoagulant without any issues. None of the patients had experienced any side effects of bleeding, and none had been re-hospitalized due to their DVT at the first phone call. After completion of the initial phone call, 1 of the contacted patients was re-admitted to our institution with a PE. This patient was not contacted for the 30-day phone call. Of the 5 remaining patients, all were contacted within 28 to 35 days of discharge from the ED. At the time of this phone call, all patients had completed a follow-up appointment and were taking their anticoagulant without any issues. At the second phone call, none of the patients had experienced any side effects of bleeding and none had been re-hospitalized due to their DVT. The average time to the follow-up appointment post-discharge was 4.4 days (range, 1–7 days). All 5 patients indicated that they would recommend the follow-up phone call service to a friend or family member.

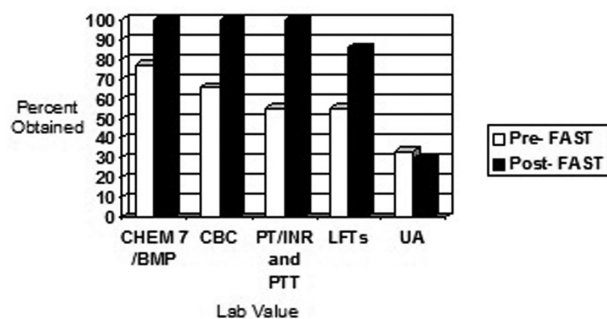
In patients discharged pre-FAST versus post-FAST, rates of obtaining recommended baseline labs were as follows: CHEM 7/basic metabolic panel (BMP), 7 (77%) vs 7 (100%); complete blood count (CBC), 6 (66%) vs 7 (100%), liver function test (LFT), 5 (56%) vs 6 (86%), prothrombin time (PT)/INR and partial thromboplastin time (PTT), 5 (56%) vs 7 (100%), and urinalysis, 3 (33%) vs 2 (29%), respectively (Figure 2).

One patient discharged from the ED pre-FAST never received anticoagulant therapy prior to discharge, and 1 patient's discharge paperwork did not contain the appropriate instructions for the anticoagulant. In contrast, all patients discharged from the ED post-FAST received the first dose of anticoagulant prior to discharge, and all patients had appropriate instructions in the discharge paperwork about the anticoagulant.

In terms of admission criteria, 8 (88%) of the patients discharged from the ED pre-FAST were appropriate for discharge (did not meet admission criteria). In contrast, only 2 (29%) of the patients discharged from the ED post-FAST were appropriate for discharge according to the admission



**Figure 2.** Pre- and post-FAST labs. Lab values obtained for patients pre- and post-FAST. Lab values, including CHEM 7/BMP, CBC, PT/INR and PTT, LFTs, and urinalysis, are on the x-axis and the percentage attained are on the y-axis.



**Abbreviations:** BMP, basic metabolic panel; CBC, complete blood count; FAST, facilitating anticoagulation for safer transitions; INR, International Normalized ratio; LFT, liver function test; PT, prothrombin time; PTT, partial thromboplastin time; UA, urinalysis.

criteria. It should be noted that due to the retrospective nature of this study, evaluating admission criteria in the pre-FAST group was difficult.

## Patients Admitted Through the ED

Patients were admitted to the hospital through the ED for number of reasons, including presenting with a PE along with a DVT, having active cancer, having an extensive or bilateral DVT with vascular compromise, being morbidly obese, and having trauma, surgery, or hospitalization within the past month. These reasons were consistent among patients admitted pre- and post-FAST. None of the patients received thrombolytic therapy after admission.

In terms of recommended laboratory values, in patients admitted pre-FAST and post-FAST, 100% ( $n = 9$  and  $n = 8$ , respectively) of patients had a CHEM7/BMP, CBC, and PT/INR and PTT. In comparing the differences pre- and post-FAST, 3 (33%) versus 2 (25%) patients had LFTs done, and 4 (33%) versus 3 (39%) patients had a urinalysis. In terms of admission criteria, 88% ( $n = 8$  and  $n = 7$ , respectively) of patients admitted in both groups (pre- and post-FAST) did meet admission criteria. One patient admitted pre-FAST who did not meet admission criteria was discharged within 3 days, while 1 patient admitted post-FAST who did not meet the admission criteria was discharged within 2 days.

## Provider Education

In terms of provider education, there was improvement seen in the assessment quiz pre- and post-education. Sixty-seven practitioners took the initial FAST quiz while 29 took the post-FAST quiz. A greater number of questions were answered correctly after education took place. For example,

only 43 (64%) of individuals were able to identify all the recommended lab values in the pre-quiz as opposed to 26 (90%) in the post-quiz, and only 55 (82%) were able to identify the social criteria for a recommended admission in the pre-quiz compared to 27 (93%) in the post-quiz. However, providers continued to struggle with the appropriate dose of rivaroxaban and appropriate follow-up time frame, with only 12 (41%) individuals choosing rivaroxaban 15 mg twice daily with a follow-up in 3 to 5 days on the post-quiz, which was an increase from 23 (34%) individuals in the pre-quiz group.

## Discussion

The FAST DVT discharge program was developed to help transition patients presenting to the ED with an acute uncomplicated DVT to the outpatient setting. Thus far, the program has been successful. Looking at the data from the follow-up phone calls, all patients were satisfied with the service. All patients who were contacted had a follow-up appointment, were able to afford and take their medication, did not have any significant side effects, and only 1 patient was re-admitted. When compared with patients discharged prior to FAST, there has been improvement in terms of administering the first dose of anticoagulant before discharge, and improvement in the appropriateness of discharge instructions related to anticoagulation.

It appears that there has also been some improvement in terms of obtaining recommended labs for assessment in the ED. The data from this analysis indicate that more education and reinforcement is needed in terms of obtaining LFTs and urinalysis consistently. Liver function tests are important to obtain to rule out underlying liver disease and help in anticoagulant selection. The urinalysis is recommended to ensure that the patient is not experiencing hematuria prior to being started on an anticoagulant. Repeat education sessions will be conducted at the ED Grand Rounds on a regular basis for continued reinforcement.

The FAST program recommended criteria to consider for admission to the hospital, although data collected showed that compliance with the recommendations was only 29%. This low level of compliance was not surprising as the FAST hospital admission criteria were very conservative. As stated in the section on the development of FAST, these criteria were presented as recommendations. Clinical judgment remains important, and ED clinicians were able to decide whether or not a patient was fit for discharge. The criteria were designed as a tool to remind clinicians of specific information to consider when making a final decision if a patient was appropriate for discharge.

A number of other studies have reported outcomes on programs and pathways for outpatient DVT treatment. Many of these pathways included setting up visiting nursing services and daily contact with a health care provider after the diagnosis of DVT, especially during early therapy.<sup>11–13</sup> Although visiting nursing services are ideal, it may not be covered by every patient's insurance, nor is it quick to determine coverage and set it up the home visits within a few hours. In FAST, we tried to create a pathway in which home nursing visits and daily contact with a health care provider were not needed to make the model applicable to a larger patient population. By following the pathway, we hoped to streamline care and help avoid long visits in the ED or observation unit.

Other studies looking at outpatient DVT treatment all used a LMWH and warfarin as their anticoagulants.<sup>11–14</sup> With the more recent approval of target specific oral anticoagulants (TSOACs) for DVT treatment, this adds another layer of complexity to outpatient DVT treatment. The FAST program represents one of the first DVT treatment transitions-of-care programs to incorporate the TSOACs. During the development of FAST only rivaroxaban was approved for DVT treatment and it was included in our management guide. After the launch of FAST, dabigatran and apixaban were also approved for DVT treatment. The group will have to make a decision during updating the documents of whether to include dabigatran and other TSOACs in the management guide if and when they become approved.

## Limitations

This study is not without limitations. The small number of patients and short period analyzed thus far are not enough to draw any conclusions, nor enough to conduct analysis on statistical significance. As the program continues, a larger set of information will be analyzed and presented. The FAST program is very new and figuring out the best approach to educate the staff and update the materials for the program will be a challenge.

The admission criteria used for FAST were based on those from InterQual and are both extensive and conservative. As the program continues to be reassessed the admission criteria will be refined to allow for a larger population of patients to be selected for discharge. Initially, the FAST program did not include PE patients. However, as more data become available on the outpatient treatment of low-risk PE<sup>14</sup> these patients will be considered for addition to the program as well.

## Conclusion

Transitions-of-care programs for the treatment of DVTs have shown to be safe, effective, and a cost-savings measure. Ensuring safe transitions of care is of utmost importance for health systems today. The FAST program has shown that it provides a way for patients to be safely and effectively discharged directly from the ED into the outpatient setting by providing a standard stepwise approach to care. Continued program monitoring and updating will be necessary for its continued success and sustainability.

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## Conflict of Interest Statement

Lynda Thomson, PharmD, CACP, discloses a conflict of interest with Pfizer. Glenn Oettinger, PharmD, BCPS, and Michael Palladino, PharmD, MBA, CACP, disclose a conflict of interest with Janssen. Geno Merli, MD, discloses conflicts of interest with BMS, Johnson & Johnson, Portola, and sanofi-aventis. Laura Falconieri, PharmD, Robert Pugliese, PharmD, BCPS, and Taki Galanis, MD, disclose no conflicts of interest.

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## Appendix I. FAST DVT Discharge Program—Patient Education Documents

### General Information on Deep Vein Thrombosis

#### What is a Deep Vein Thrombosis (DVT)?

- \* A DVT is a blood clot that forms inside a vein. It may partially or completely block blood flow, or break off and travel to the lung. This is different from clots in superficial veins, where clots rarely break off
- \* A DVT usually involves the lower legs (calves) or lower abdomen, but occasionally affects other veins in the body
- \* It is most common in persons over age 60

#### What are signs and symptoms of a DVT?

- \* Sometimes no symptoms
- \* Swelling and pain in the area drained by the vein, usually the ankle, calf or thigh. Swelling in the leg includes everything below the clot, extending to the toes
- \* Tenderness and redness of the affected parts
- \* Soreness or pain when walking. The soreness does not disappear with rest
- \* Pain when raising the leg and flexing the foot (sometimes)
- \* Fever (sometimes)
- \* Increased heartbeat (sometimes)

#### What causes a DVT?

- \* The pooling of blood in the vein can trigger blood-clotting mechanisms. The pooling may occur after prolonged bed rest following surgery, or from debilitating illness, such as heart attack, stroke, or bone fracture.

#### What are risks for developing a DVT?

- \* Persons over 60
- \* Obesity
- \* Smoking
- \* Use of estrogen in oral contraceptives or for replacement after menopause. This is especially hazardous if estrogen use is combined with smoking
- \* Surgery, trauma
- \* Pregnancy
- \* Cancer
- \* Disorders such as heart failure and stroke

#### How can I prevent a DVT?

- \* Avoid prolonged bed rest during illnesses. Start moving the lower limbs as soon as possible after any surgical procedure or during any bed-confining illness
- \* On long auto or airplane trips, exercise your legs at least every 1 or 2 hours
- \* Stop smoking, especially if you take estrogen

#### What are possible complications of a DVT?

- \* If the clot breaks away and travels to the lung, it can cause a condition known as a pulmonary embolism (PE). The lung's blood supply is blocked, causing affected lung tissue to die.

#### What should I expect from DVT Treatment?

- \* Improvement of symptoms should gradually be seen with appropriate treatment

## What kinds of medications are used to treat a DVT?

- \* Intravenous, subcutaneous, or oral *anticoagulants (blood thinners)* are used to prevent the extension of the clots
- \* Oral anticoagulants may be necessary for 6 months or longer.

## What should I do after I have a DVT?

- \* Rest in bed until all signs of inflammation have disappeared. While resting, make it a habit to move leg muscles, bend ankles and wiggle toes
- \* Wear fitted elastic stockings or wrapped elastic bandages, but don't wear garters or knee-high hosiery
- \* Elevate the feet higher than the hips when sitting for long periods
- \* Elevate the foot of the bed

## When should I seek medical attention?

- \* You have continued or increased swelling and pain, despite treatment
- \* The following occur during treatment:
  - Unexpected bleeding anywhere
  - Chest pain
  - Coughing up blood
  - Shortness of breath
- \* New, unexplained symptoms develop

## Medication Supplement: Rivaroxaban (Xarelto®)

Patient Name: \_\_\_\_\_

### Specific Instructions:

### Important Information about rivaroxaban (Xarelto®)

#### What is rivaroxaban?

- \* Rivaroxaban (Xarelto®) is a medication used to treat and prevent blood clots. It is commonly referred to as a blood thinner or anticoagulant.

#### What does blood thinner mean?

- \* This means your blood takes longer to clot.
- \* It does not mean your blood is really thinner.

#### What do you need to do when you take rivaroxaban?

- \* The dose of this medication varies, depending upon the reason for use. Please go over the dosing instructions carefully with your doctor or pharmacist to make sure that you are taking the right dose.
- \* A calendar may be helpful for writing down the daily amount to take of this medicine, especially when starting, since the dose may be different for the first few weeks of treatment.
  - **If you have atrial fibrillation:**
    - \* If you have been prescribed rivaroxaban for preventing blood clots and strokes for an abnormal heart rhythm, called Atrial Fibrillation (AFib):
    - \* You will be instructed to take this medicine once a day, it is recommended that you take this medication once a day with your evening meal.
  - **If you just had hip or knee replacement surgery:**
    - \* You have been prescribed rivaroxaban to reduce the risk of forming a blood clot in the legs and lungs after having hip or knee replacement surgery:
    - \* You will be instructed to take this medicine once a day.
  - **If you have been prescribed rivaroxaban for treatment of a blood clot/DVT:**
    - \* You will be instructed to take this medicine twice a day for the first 3 weeks of therapy. Then the dose of rivaroxaban will change to a different tablet strength taken once a day.
    - \* Please make sure that you are taking the correct tablet strength each day during the first few weeks that you are taking this medicine. If you are not sure, please call your doctor or pharmacist to go over your instructions.
    - \* You should take this medicine with food, with a meal is ideal.

#### What about other medicine you need to take?

- \* Tell your doctor or pharmacist before taking new medicines, vitamins or herbal supplements.
- \* Some of these can interact with rivaroxaban.
- \* You should not take aspirin or aspirin-like medicines. These are things like ibuprofen, naproxen, Advil®, Aleve®, Motrin®, Naprosyn®, Nuprin®, Kaopectate®, Pepto-Bismol® unless your doctor tells you.
- \* These medicines in combination with rivaroxaban can increase the risk for bleeding/bruising.

#### What can you take for minor aches and pains?

- \* It is usually okay to take acetaminophen (Tylenol®) in limited doses. Ask your doctor for the correct dose for you.

#### What happens if I forget to take my rivaroxaban?

- \* If you miss a dose, call your doctor for further instruction.

## Medication storage:

Store this medicine in a closed container away from heat, moisture and light.

## What can you do to be safe when your blood takes longer to clot?

- \* Please be careful to prevent injuries or falls.
- \* Alcohol use is not recommended with this medication, since it can increase your risk for bruising and bleeding.
- \* In case of an emergency, such as a fall or accident, it is best to go to the nearest hospital right away to be checked out for any injuries and possible bleeding.

## What are some side effects to look for?

- \* It is important to watch for any signs of bleeding and bruising.
- \* Call your doctor right away for any of these types of bleeding:
  - Bowel movements that are bloody, black or tarry
  - Urine that is a dark red to brown color
  - Coughing up blood
  - Large, raised or hard bruises
  - Severe headache or continuous headache
  - Large amounts of bleeding
- \* Small bruises, gums that bleed easily while brushing, or some bleeding after minor cuts is usually nothing to worry about
- \* **Call your doctor** if you are concerned about the bleeding or side effects
- \* Rivaroxaban can cause an upset stomach and indigestion. Call your doctor if you experience any severe stomach pain or indigestion that does not go away.
- \* Rivaroxaban can rarely cause an allergic reaction, which may include an itchy, red rash or hives. Call your doctor if you experience any of these problems.

## General information:

- \* If you miss a dose, take it as soon as you remember on the same day. Do not take double the amount to make up for a missed dose. Notify your doctor if you miss more than one dose. Do not stop taking this medicine or change your dose without talking to the doctor that prescribed it.
- \* If you think you may have taken more than your recommended daily dose of rivaroxaban, call your doctor.
- \* It is important to call your doctor immediately if you are pregnant, breast-feeding or are planning a pregnancy.
- \* Rivaroxaban must be stopped before any planned surgeries or invasive procedures to avoid bleeding. Please contact your doctor or dentist at least one week before any planned surgeries, medical procedures, or invasive dental procedures so that you can be instructed when to stop taking your medicine, if necessary.
- \* Rivaroxaban is eliminated from your body through the kidneys, your doctor should be notified if any problems with your kidney function have been discovered. Periodic blood tests to determine your level of kidney function is recommended to prevent accumulation of this medicine.
- \* Do not take this medication if you are pregnant, it has not been studied for safety during pregnancy. Call your doctor right away if you think you may be pregnant.

## Medication Supplement: Warfarin (Coumadin®)

Patient Name: \_\_\_\_\_

### Specific Instructions:

### Important Information about Warfarin (Coumadin®, Jantoven®)

#### What is warfarin?

- \* Warfarin is a medicine used to treat or reduce the risk of blood clots. You may hear warfarin called an anticoagulant or blood thinner.

#### What does blood thinner mean?

- \* This means your blood takes longer to clot.
- \* It does not mean your blood is really thinner.

#### What do you need to do when you take warfarin?

- \* You need to get regular blood tests called a PT/INR.
- \* Your doctor will let you know how often to get a PT/INR. Please call the doctor if you have not heard from this office or you have any questions about your dose.
- \* Always keep your blood test appointments and your doctors' appointments to be sure you are taking the right amount of warfarin.

#### Will I take the same amount every day?

- \* Your dose of warfarin may change according to your doctor's recommendations.
- \* The dose depends on your PT/INR results.
- \* Your dose of warfarin has to be just right so that is not too much or not too little.

#### Does it matter what time I take my warfarin?

- \* It is best to take warfarin at the same time every day.

#### What happens if you forget to take your warfarin?

- \* If you remember on the same day, take your warfarin.
- \* If you remember the next day, only take your regular dose for that day at your normal time.
- \* You should never take 2 doses on the same day.

#### What about other medicine you need to take?

- \* Tell your doctor or pharmacist before taking new medicines, vitamins or herbal supplements.
- \* Some of these can interact with warfarin.
- \* You should not take aspirin or aspirin-like medicines. These are things like ibuprofen, naproxen, Advil®, Aleve®, Motrin®, Naprosyn® or Nuprin®, Kaopectate®, Pepto-Bismol® unless your doctor tells you.
- \* These medicines in combination with warfarin can increase the risk for bleeding/bruising.

#### What can you take for minor aches and pains?

- \* It is usually okay to take acetaminophen (Tylenol®) in limited doses. Ask your doctor for the correct dose for you.

#### Do you need to follow a special diet?

- \* Keep the number of servings of foods high in vitamin K the same from week to week.
- \* These are foods such as green leafy vegetables, spinach, broccoli, asparagus, cauliflower, soy, and lettuce. These foods can decrease the effectiveness of warfarin because they have large amounts of vitamin K.



- \* If you eat about the same amounts of these foods from week to week, it may help keep your warfarin dose from changing as much.
- \* If you eat about the same amounts of these foods from week to week, you may need less frequent blood testing.

### What can you do to be safe when your blood takes longer to clot?

- \* Please be careful to prevent injuries or falls.
- \* Alcohol use is not recommended with this medication, since it can increase your risk for bruising and bleeding.
- \* In case of an emergency, such as a fall or accident, it is best to go to the nearest hospital right away to be checked out for any injuries and possible bleeding.
- \* Warfarin is generally well tolerated if you get regular PT/INR blood tests and your dosage is adjusted.
- \* You should know to look for possible side effects that can occur.

### What are some side effects to look for?

- \* It is important to watch for any signs of bleeding and bruising.
- \* Call your doctor right away for any of these types of bleeding:
  - bowel movements that are bloody, black or tarry
  - urine that is a dark red to brown color
  - coughing up blood
  - large, raised or hard bruises
  - severe headache or continuous headache
  - large amounts of bleeding
- \* Small bruises, gums that bleed easily while brushing, or some bleeding after minor cuts is usually nothing to worry about.
- \* **Call your doctor** if you are concerned about the bleeding or side effects
- \* Once in a while warfarin can cause an allergic reaction.
- \* Signs of allergy to warfarin are an itching red rash or hives.
- \* Other rare reactions are purple toes or darkened areas of skin, usually in the belly area.

### Medication storage:

Store this medicine in a closed container away from heat, moisture and light.

### General Information:

Warfarin must be stopped before any planned surgeries or invasive procedures to avoid bleeding. Please contact your doctor or dentist at least one week before any planned surgeries, medical procedures, or invasive dental procedures so that you can be instructed when to stop taking your medicine, if necessary.

Do not take this medication if you are pregnant, it may cause birth defects to your unborn baby. Call your doctor right away if you think you may be pregnant.

## Medication Supplement: Enoxaparin (Lovenox®)

Patient Name: \_\_\_\_\_

### Specific Instructions:

There are some important things you need to know when you take Enoxaparin (Lovenox®).

### What is Enoxaparin?

- \* Enoxaparin is a medicine used to treat or prevent blood clots. You may hear enoxaparin called an anticoagulant or blood thinner.
- \* You can **only** give enoxaparin **by injection**, using a very small needle.

### What does blood thinner mean?

- \* This means your blood takes longer to clot.
- \* It does not mean your blood is really thinner.

### What do you need to know about giving enoxaparin injections?

**First, wash your hands.**

#### Things you will need:

- \* Pre-filled enoxaparin syringe.
- \* Alcohol swab.
- \* Sharps container<sup>1</sup> - for your used syringes and needles.

### Where does the injection go?

- \* The enoxaparin injection goes into the layer of fat just under the skin of your stomach or thigh.

### Giving the injection:

- \* Clean the area of skin you will inject with an alcohol swab.
- \* Hold the syringe like a pencil.
- \* Pinch the skin where you are going to inject and push the needle in at a 90 degree angle.
- \* Push the enoxaparin in, then pull the needle straight out.
- \* Throw away the syringe and needle into the 'sharps container'.
- \* **Do not** rub the spot where you injected the enoxaparin, as it can increase bruising.

### Other important things to know about giving the enoxaparin injection:

- \* You should change the place where you give the injection each time.
- \* For example: if you used the left side of your stomach last time, next time use the right side of your stomach.
- \* Take enoxaparin at the **same time (or times)** every day.
- \* **Only** use the amount of enoxaparin your doctor prescribed each day.
- \* **Only** use enoxaparin for the number of days instructed by your doctor.

### What happens if I forget to take my Enoxaparin?

- \* If you miss a dose, call your doctor for further instruction.

### Medication Storage:

- \* Keep syringes at room temperature away from heat and direct light
- \* Dispose of needles in a sharps container or hard container in which needles cannot poke through. Keep away from children and pets.

## What can I do to be safe when my blood takes longer to clot?

- \* Be sure to get your blood tests and keep all of your doctor's appointments.
- \* Please be careful to prevent injuries or falls.
  
- \* In case of an emergency, such as a fall or accident, it is best to go to the nearest hospital right away to be checked out for any injuries and possible bleeding.

## What are some side effects to look for?

- \* Watch for any signs of bleeding or bruising.
- \* Be sure to tell **every** doctor and dentist you see that you are taking enoxaparin.
- \* Call your doctor **right away** if you notice any of these signs of bleeding:
  - Bowel movements that are bloody, black or tarry
  - Urine that is a dark red to brown color
  - Coughing up blood
  - Large, raised or hard bruises
  - Severe headache or continuous headache
  - Large amounts of bleeding
- \* Small bruises, gums that bleed easily while brushing, or some bleeding after minor cuts is usually nothing to worry about
- \* **Call your doctor** if you are concerned about the bleeding or side effects

## Can I drink alcohol with this medicine?

- \* You should **not** drink alcohol while taking this medicine.

## What about other medicine(s) I need to take?

- \* Tell your doctor or pharmacist before taking new medicines, vitamins, or herbal supplements.
- \* Some of these medicines can interact with enoxaparin.
- \* You should **not** take aspirin or aspirin-like medicines. These are things like ibuprofen, naproxen, Advil<sup>®</sup>, Aleve<sup>®</sup>, Motrin<sup>®</sup>, Naprosyn<sup>®</sup> or Nuprin<sup>®</sup>, unless your doctor tells you it's OK.
- \* These medicines in combination with enoxaparin can increase the risk for bleeding/bruising.

## What can you take for minor aches or pains?

- \* It is usually OK to take acetaminophen (Tylenol<sup>®</sup>). **Ask your doctor to be sure.**

## General information:

Enoxaparin must be stopped before any planned surgeries or invasive procedures to avoid bleeding. Please contact your doctor or dentist at least one week before any planned surgeries, medical procedures, or invasive dental procedures so that you can be instructed when to stop taking your medicine, if necessary.

## Medication Supplement: Fondaparinux (Arixtra®)

Patient Name: \_\_\_\_\_

### Specific Instructions:

There are some important things you need to know when you take Fondaparinux (Arixtra®):

#### What is Fondaparinux?

- \* Fondaparinux is a medicine used to treat or prevent blood clots. You may hear fondaparinux called an anticoagulant or blood thinner.
- \* You can **only** give fondaparinux **by injection**, using a very small needle.

#### What does blood thinner mean?

- \* This means your blood takes longer to clot.
- \* It does not mean your blood is really thinner

#### What do you need to know about giving fondaparinux injections?

**First, wash your hands.**

##### Things you will need:

- \* Pre-filled fondaparinux syringe
- \* Alcohol swab
- \* ‘Sharps container’ - for your used syringes and needles

#### Where does the injection go?

- \* The fondaparinux injection goes into the layer of fat just under the skin of your stomach or thigh.

#### Giving the injection:

- \* Clean the area of skin you will inject with an alcohol swab.
- \* Hold the syringe like a pencil.
- \* Pinch the skin where you are going to inject and push the needle in at a 90 degree angle.
- \* Push the fondaparinux in, then pull the needle straight out.
- \* Throw away the syringe and needle into the ‘sharps container’.
- \* **Do not** rub the spot where you injected the fondaparinux, as it can increase bruising.

#### Other important things to know about giving the fondaparinux injection:

- \* You should change the place where you give the injection each time.
- \* For example: if you used the left side of your stomach last time, next time use the right side of your stomach.
- \* Take fondaparinux at the **same time (or times)** every day.
- \* **Only** use the amount of fondaparinux your doctor prescribed each day.
- \* **Only** use fondaparinux for the number of days instructed by your doctor.

#### Medication Storage:

- \* Keep syringes at room temperature away from heat and direct light.
- \* Dispose of needles in a sharps container or hard container in which needles cannot poke through. Keep away from children and pets.

#### What happens if I forget to take my Fondaparinux?

- \* If you miss a dose, call your doctor for further instruction.

## What can I do to be safe when my blood takes longer to clot?

- \* Be sure to get your blood tests and keep all of your doctor's appointments.
- \* Please be careful to prevent injuries or falls.
  
- \* In case of an emergency, such as a fall or accident, it is best to go to the nearest hospital right away to be checked out for any injuries and possible bleeding.

## What are some side effects to look for?

- \* Watch for any signs of bleeding or bruising.
- \* Be sure to tell **every** doctor and dentist you see that you are taking fondaparinux.
- \* Call your doctor **right away** if you notice any of these signs of bleeding:
  - Bowel movements that are bloody, black or tarry
  - Urine that is a dark red to brown color
  - Coughing up blood
  - Large, raised or hard bruises
  - Severe headache or continuous headache
  - Large amounts of bleeding
- \* Small bruises, gums that bleed easily while brushing, or some bleeding after minor cuts is usually nothing to worry about.
- \* **Call your doctor** if you are concerned about the bleeding or side effects.

## Can I drink alcohol with this medicine?

- \* You should **not** drink alcohol while taking this medicine.

## What about other medicine(s) I need to take?

- \* Tell your doctor or pharmacist before taking new medicines, vitamins, or herbal supplements.
- \* Some of these medicines can interact with fondaparinux.
- \* You should **not** take aspirin or aspirin-like medicines. These are things like ibuprofen, Advil<sup>®</sup>, Aleve<sup>®</sup>, Motrin<sup>®</sup>, Naprosyn<sup>®</sup> or Nuprin<sup>®</sup>, unless your doctor tells you it's OK.
- \* These medicines can increase the risk for bleeding or bruising.

## What can you take for minor aches or pains?

- \* It is usually OK to take acetaminophen (Tylenol<sup>®</sup>). **Ask your doctor to be sure.**

## General information:

Fondaparinux must be stopped before any planned surgeries or invasive procedures to avoid bleeding. Please contact your doctor or dentist at least one week before any planned surgeries, medical procedures, or invasive dental procedures so that you can be instructed when to stop taking your medicine, if necessary.

**Appendix 2. Follow-up Phone Call Questionnaire**

Patient's Name: \_\_\_\_\_ MR # \_\_\_\_\_

Phone # \_\_\_\_\_

Date of Discharge from ED: \_\_\_\_\_

Anticoagulant(s) discharged on: \_\_\_\_\_

Date for 3-day Phone Call: \_\_\_\_\_

Attempt 1: \_\_\_\_\_ Attempt 2: \_\_\_\_\_ Attempt 3: \_\_\_\_\_

Completed or unable to reach: \_\_\_\_\_

If unable to reach, reason: \_\_\_\_\_

Were you educated in the ED about your blood clot and about the medication you were sent home on?

Yes \_\_\_\_\_ No \_\_\_\_\_

Who educated you (nurse, doctor, pharmacist)? \_\_\_\_\_

\_\_\_\_\_

Do you have a follow-up appointment scheduled for your blood clot or have you already had a follow-up appointment?

Yes \_\_\_\_\_ No \_\_\_\_\_

When is/was the follow-up appointment? \_\_\_\_\_

If no, why not? \_\_\_\_\_

\_\_\_\_\_

Have you picked up your medication from the pharmacy? Yes \_\_\_\_\_ No \_\_\_\_\_

If no, why not? \_\_\_\_\_

\_\_\_\_\_

Have you had any issues with taking the medication? Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, what? \_\_\_\_\_

\_\_\_\_\_

Have you had any side effects or signs of bleeding from the anticoagulant (blood thinning) medication?

Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, what? \_\_\_\_\_

\_\_\_\_\_

Have you returned to an emergency room because of the blood clot? Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, when? \_\_\_\_\_

If yes, what happened? \_\_\_\_\_

\_\_\_\_\_

Have you been admitted to a hospital because of the blood clot? Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, when? \_\_\_\_\_

If yes, what happened? \_\_\_\_\_

\_\_\_\_\_

Would you recommend this anticoagulation service to a friend or family member?

Yes \_\_\_\_\_ No \_\_\_\_\_

If not, what could we improve upon? \_\_\_\_\_

\_\_\_\_\_

**Date for 30-day Phone Call:** \_\_\_\_\_

**Attempt 1:** \_\_\_\_\_

**Attempt 2:** \_\_\_\_\_

**Attempt 3:** \_\_\_\_\_

**Completed or unable to reach:** \_\_\_\_\_

Do you have a follow-up appointment scheduled for your blood clot or have you already had a follow-up appointment?

Yes \_\_\_\_\_ No \_\_\_\_\_

When is/was the follow-up appointment? \_\_\_\_\_

If no, why not? \_\_\_\_\_

\_\_\_\_\_

Have you picked up your medication from the pharmacy? Yes \_\_\_\_\_ No \_\_\_\_\_

If no, why not? \_\_\_\_\_

\_\_\_\_\_

Have you had any issues with taking the medication? Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, what? \_\_\_\_\_

\_\_\_\_\_

Have you had any side effects or signs of bleeding from the anticoagulant (blood thinning) medication?

Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, what? \_\_\_\_\_

\_\_\_\_\_

Have you returned to an emergency room because of the blood clot? Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, when? \_\_\_\_\_

If yes, what happened? \_\_\_\_\_

\_\_\_\_\_

Have you been admitted to a hospital because of the blood clot? Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, when? \_\_\_\_\_

If yes, what happened? \_\_\_\_\_

\_\_\_\_\_

## Appendix 3. Patient Satisfaction Survey

1. Before discharge from the Emergency Department, were you educated about your blood clot and medication which was prescribed for you?

Yes \_\_\_\_\_ No \_\_\_\_\_

I was educated by: \_\_\_\_\_ Doctor

(check all that apply) \_\_\_\_\_ Pharmacist

\_\_\_\_\_ Nurse

\_\_\_\_\_ Other: \_\_\_\_\_

Please grade the value of the information provided to you:

Very Poor	Poor	Fair	Good	Very Good
1	2	3	4	5

If you marked 1 – 3, please explain what could have been more helpful:

Please grade the amount of time spent discussing your new anticoagulant medicine:

Very Poor	Poor	Fair	Good	Very Good
1	2	3	4	5

If you marked 1 – 3, please explain what could have been more helpful:

2. Were you able to obtain your new anticoagulant medicine?

Yes \_\_\_\_\_ No \_\_\_\_\_

Please grade the ease of obtaining your new anticoagulant medicine:

Very Poor	Poor	Fair	Good	Very Good
1	2	3	4	5

If you marked 1 – 3, please describe the difficulty you experienced:

3. Was the importance of taking your anticoagulant medicine and following up with your doctor explained to you?

Yes \_\_\_\_\_ No \_\_\_\_\_

4. Would you recommend this anticoagulation service to a friend or family member?

Yes \_\_\_\_\_ No \_\_\_\_\_

If no, please explain why: \_\_\_\_\_

5. Would you have preferred to stay in the hospital for treatment?

Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, please explain why: \_\_\_\_\_



6. Did you have any additional questions that you needed to contact the healthcare team about related to your blood clot or medication?

Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, please describe the ease of making contact with one of our health care providers to answer your question?

Very Poor	Poor	Fair	Good	Very Good
1	2	3	4	5

If you marked 1 – 3, please explain how we could improve this process:

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## Appendix 4. Survey Questions

- 1) Which of the following labs should be attained to guide medication selection for DVT treatment?
  - a. CBC
  - b. LFTs
  - c. PT and INR
  - d. Urinalysis
  - e. All of the above**
- 2) Which of the following lab values may require an admission?
  - a. BP > 160/90
  - b. CrCl < 30 mL/min**
  - c. Hemoglobin < 12 mg/dL
  - d. Platelet count < 150 K
- 3) Which of the following is an indication for admission?
  - a. Falls Risk
  - b. Homeless
  - c. Lack of prescription coverage
  - d. All of the above**
- 4) When should the first dose of anticoagulant be administered after the diagnosis of a DVT?
  - a. After the transfer of the patient to the Observation Unit
  - b. After it is determined which anticoagulant the insurance will pay for
  - c. After the patient is deemed appropriate for anticoagulation**
  - d. After the patient is educated
- 5) After the patient is deemed eligible for discharge on anticoagulation, what is next step that should be taken?
  - a. Call the prescription into the pharmacy
  - b. Contact case management for prescription insurance screening**
  - c. Decide upon the appropriate anticoagulant
  - d. Educate the patient
- 6) Which of the following medications is a contraindication to the use of rivaroxaban?
  - a. Amlodipine
  - b. Haloperidol
  - c. Metformin
  - d. Ritonavir**
- 7) Which of the following is a barrier to discharging a patient on enoxaparin?
  - a. The patient or family member cannot administer a SC injection
  - b. The patient's insurance does cover the medication
  - c. The patient has an documented allergy to heparin
  - d. All of the above are barriers**
- 8) For an 80 kg patient with normal renal function (CrCl = 100 mL/min), what is the appropriate dose of enoxaparin?
  - a. 120 mg SC once daily
  - b. 80 mg SC Q12H
  - c. 80 mg SC once daily
  - d. A or B are correct**
- 9) If a patient does not have a PCP, but does have prescription insurance, is he/she eligible for discharge?
  - a. No, the patient needs to be admitted to ensure adequate follow-up
  - b. No, the patient does not meet the criteria to be enrolled, but he/she does not have to be admitted
  - c. Yes, the JATS service can be consulted and a follow-up appointment made with the Vascular Center**
  - d. Yes, the patient can be enrolled, but a PCP needs to be identified prior to being discharged

- 10) Which of the following is the correct dose of rivaroxaban for treatment of DVT paired with the appropriate follow-up appointment time?
- a. **Rivaroxaban 15 mg PO BID, with follow-up in 3-5 days**
  - b. Rivaroxaban 15 mg PO BID, with follow-up in 3 weeks
  - c. Rivaroxaban 20 mg PO daily, with follow-up in 3–5 days
  - d. Rivaroxaban 20 mg PO daily, with follow-up in 3 weeks

## Appendix 5. Clinician Education Guide

What is a Deep Vein Thrombosis (DVT)?

- Blood clot that forms in one of the large veins in your arm or leg
- Causes damage by blocking blood flow that leads to swelling and discomfort in part of the involved arm or leg
- Can sometimes break-off and travel to the lungs, causing a pulmonary embolism (PE), which is a clot in the lungs

What are the signs and symptoms of a blood clot?

- Signs and symptoms of a DVT
  - Pain, redness, swelling in an arm or leg
- Signs and symptoms of PE
  - Chest pain (usually sharp), shortness of breath

How do anticoagulants work?

- Increase the time it takes for the blood to clot by reducing the number of clotting factors in the blood
- Help treat current blood clots and prevent future clots

Anticoagulant Agents

- Rivaroxaban (Xarelto™)
  - 15 mg twice a day for 21 days (3 weeks), then 20 mg daily for the rest of treatment (VTE treatment doses)
  - Take with food – allows for better absorption of the medication
  - Drug interactions
    - Always check with your physician or pharmacist before starting any new prescription medications, non-prescription medications, or herbals/supplements
- Enoxaparin (Lovenox™)
  - Dosed once daily or every 12 hours based on weight in kilograms
  - Subcutaneous injection – See Injection Handout
  - Patient or family member MUST be able to demonstrate ability to administer subcutaneously
  - Drug interactions
    - Always check with your physician or pharmacist before starting any new prescription medications, non-prescription medications, or herbals/supplements
- Fondaparinux (Arixtra™)
  - Dosed once daily based on weight in kilograms
  - Subcutaneous injection – See Injection Handout
  - Patient or family member MUST be able to demonstrate ability to administer subcutaneously
  - Drug interactions
    - Always check with your physician or pharmacist before starting any new prescription medications, non-prescription medications, or herbals/supplements
- Warfarin (Coumadin™)
  - Warfarin should be taken once around the same time every day
  - Requires laboratory monitoring
    - International Normalized Ratio (INR)
      - Measures how long it takes the blood to clot
      - Patients not taking warfarin have an INR around 1
      - Goal for DVT treatment is 2–3
      - Dose of warfarin will change to maintain an INR of 2–3

- Warfarin works on clotting factors that require Vitamin K for production
- Vitamin K can reduce the effects of warfarin and lower the INR
  - Try to eat foods containing Vitamin K in a similar amount each day
  - Foods that are high in Vitamin K include:
    - Broccoli
    - Collard Greens
    - Kale
    - Mustard Greens
    - Spinach
- Best to avoid alcohol while on warfarin, as it can affect the INR level
  - Limit to one drink (12 oz. of beer, 5 oz. of wine, or 1 oz. of liquor) per day
- Drug interactions
  - Always check with your physician or pharmacist before starting any new prescription medications, non-prescription medications, or herbals/supplements

#### Side Effects of Anticoagulants

- Bleeding is the main side effect of anticoagulants
  - Minor Bleeding
    - Gums bleed while brushing teeth
    - Easy bruising
    - Longer periods of bleeding after minor cuts
    - Occasional nose bleeds
  - Major Bleeding – **contact healthcare provider or go to nearest emergency room**
    - Blood in the urine (urine is dark red or brown in color)
    - Bowel movements that are bloody, black, or tarry
    - Coughing up blood
    - Severe headache
    - Very large bruises that do not heal
    - Continuous or large amounts of bleeding

#### Taking Care of Yourself While on Anticoagulants

- Physical activity
  - Avoid contact sports or activities where injuries are more likely to occur
  - Can continue safe physical activity, such as walking, swimming, or gardening
- Tell all physicians, nurse practitioners, dentists, and pharmacists that are involved in your care that you are taking an anticoagulant
  - Anticoagulant *may* need to be temporarily stopped or changed if the patient is undergoing more invasive procedures

## Appendix 6. FAST DVT Discharge Program – Management Guide

### REQUIRED LABS (following baseline labs are required for medication selection)

- CBC
- Chem 7 or BMP
- LFTs
- PT and PTT
- Urinalysis
- Stool for occult blood (only if hemoglobin < 10 g/dL)
- Pregnancy screening as applicable

### ADMISSION CRITERIA (If any of the below are met, consider admission, Interqual Criteria™)

#### HISTORY

- Pregnant
- Morbid obesity (BMI ≥ 40)
- Malignancy with active cancer treatment
- High risk for fall or trauma
- History of coagulopathy
- HIT (suspected or by history)
- Liver disease and prolonged PTT/INR
- Prolonged immobilization (≥ 4 days)
- GI bleeding < 6 weeks
- Stroke within last 3 months
- Recent hospitalization, trauma, or surgery within 1 month
- Previous DVT ≥ 2 episodes, episode within last 3 months, recurrent event despite therapy
- Extensive or bilateral DVT with risk for vascular compromise

#### LAB VALUES/VITALS

- Hemoglobin < 10 g/dL
- CrCl < 30ml/min
- Platelet count < 100,000
- AST and ALT > 3 times ULN
- BP > 180/110

#### SOCIAL HISTORY

- No medical **OR** prescription insurance coverage
- Cannot access medications
- Homeless
- Psych disorder that prohibits from taking medication

### DISCHARGE PLANNING (If eligible for outpatient therapy, enroll the patient and perform the following)

1. Enter order for Fast DVT Discharge Program in JeffChart
2. Consider a transfer to the observation unit for initiation of the discharge process
3. Consult case management for insurance screening
  - a. If medication requires prior authorization that cannot be attained within 4 hours, choose another medication or consider admission
4. Do **NOT** delay treatment for prescription coverage verification; consider a one-time dose of enoxaparin
5. Select appropriate discharge anticoagulant based upon history, physical, labs, and insurance coverage (see next page)
6. Call in prescription to patient's pharmacy or provide patient with prescription
7. Provide formal education to the patient and/or family member; patient or family member **MUST** be able to demonstrate ability to administer subcutaneously if discharging on an injection
8. Make follow-up appointment confirmed within 3-5 days of discharge

**\*If patient does not have PCP or PCP cannot be contacted, consult JATS service for appointment\***

**DRUG SELECTION** (Consider history, physical, labs, and insurance coverage)

Medication	Dosing / Prescribing Recommendations and Contraindications
Rivaroxaban	<p><b>Dosing:</b> 15 mg PO BID with food; CrCl must be &gt; 30 mL/min</p> <p><b>Discharge Prescription:</b> write for a 3 week supply (dose changes after 3 wks)</p> <p>Contraindications:</p> <ul style="list-style-type: none"> <li>- CrCl &lt; 30 mL/min</li> <li>- Severe liver disease (AST and ALT &gt; 3 times ULN)</li> <li>- Unable to take PO meds (Patient on continuous tube feeds, med administration via tube)</li> <li>- Pregnant or breast feeding</li> <li>- Concomitant strong p-glycoprotein/CYP3A4 inducers or inhibitors <ul style="list-style-type: none"> <li>- Carbamazepine, conivaptan, ketoconazole, indinavir, itraconazole, phenytoin, rifampin, St. John's Wort, ritonavir</li> </ul> </li> </ul> <p>Caution:</p> <ul style="list-style-type: none"> <li>- Moderate p-glycoprotein/CYP3A4 inducers or inhibitors <ul style="list-style-type: none"> <li>- Amiodarone, clarithromycin, erythromycin, fluconazole</li> </ul> </li> <li>- High risk factors for bleeding</li> <li>- High falls risk</li> <li>- Medications that can increase the risk of bleeding <ul style="list-style-type: none"> <li>- Antiplatelets, NSAIDS</li> </ul> </li> </ul>
Enoxaparin +/- warfarin <b>*If bridging to warfarin, give first dose of warfarin and enoxaparin concurrently*</b>	<p><b>Dosing:</b> 1 mg/kg SC Q12H or 1.5mg/kg SC Q24H; CrCl must be &gt; 30 mL/min</p> <p><b>Discharge Prescription:</b> write for a 1 week supply (+/- warfarin)</p> <p>Product: Syringes available in 30, 40, 60, 80, 100, 120, and 150 mg</p> <p>Contraindications:</p> <ul style="list-style-type: none"> <li>- History of heparin allergy or HIT</li> <li>- CrCl &lt; 15 mL/min</li> </ul>
Fondaparinux +/- warfarin <b>*If bridging to warfarin, give first dose of warfarin and fondaparinux concurrently *</b>	<p><b>Dosing:</b></p> <ul style="list-style-type: none"> <li>- &lt; 50 kg: 5 mg SC Q24H</li> <li>- 50-100 kg: 7.5 mg SC Q24H</li> <li>- &gt;100 kg: 10 mg SC Q24H</li> </ul> <p><b>Discharge Prescription:</b> write for a 1 week supply (+/- warfarin)</p> <p>Product: Syringes available in 2.5, 5, 7.5, and 10 mg</p> <p>Contraindications</p> <ul style="list-style-type: none"> <li>- CrCl &lt; 30 mL/min</li> </ul>

## Appendix 7. Patient Outcome Worksheet

Patient Name: \_\_\_\_\_

Medical Record Number: \_\_\_\_\_

Location of DVT: \_\_\_\_\_

Did patient meet criteria for inclusion in FAST Program: Yes / No

If no, state reason for not meeting criteria: \_\_\_\_\_

Was patient seen in the ED within 30 days after discharge? Yes / No

If yes, list chief complaint: \_\_\_\_\_

Was patient admitted to hospital within 30 days after discharge from the Emergency Dept? Yes / No

If yes, list diagnosis: \_\_\_\_\_

Bleeding event within 30 days? Yes / No

Thrombotic event within 30 days? Yes / No

Death? Yes / No