

IHQI Proposal: Increasing Utilization of DVT Transition Clinic

1. Project Lead/Key Contact:

Cassiopeia Frank, MMSc, PA-C, Benign Hematology

Cassiopeia.frank@unchealth.unc.edu

301-802-6334

2. Why are you interested in participating in the Improvement Scholars Program?

Though I practice clinically as a physician assistant, my long-term goal is to more broadly impact quality of care at a systems level. To that end, I am a Doctor of Public Health (DrPH) student at the Johns Hopkins School of Public Health where I am specifically focused on Quality and Patient Safety. I have a professional interest in the development of academic-community partnerships to improve care delivery, especially for patients experiencing transitions of care. I persistently aim to exercise skills learned academically in my clinical work, but without integration into the quality improvement programs at my home institution, I am limited. I am eager to participate in this program as an opportunity to connect with the quality improvement resources and experts within UNC and establish a connection between my division and system-wide efforts. Regarding this project specifically, I have been growing the DVT Walk-In Clinic for three years and have been thrilled with its success. This program has grown substantially and provides transitions of care to newly diagnosed venous thromboembolism (VTE) patients. After presenting this clinical model at national conferences in 2021 and 2022, significant interest has been expressed in developing similar clinics at other institutions (UCSF and Yale, as examples). At this critical junction in the future of this model, to ensure an effective, sustainable, and translatable model of care, I feel the program would benefit from formal systematic assessment and process improvement.

3. Which UNC Health improvement priority will your project address?

The improvement priorities addressed by this project include both patient experience promotion and patient harm prevention. Improving transitions of care in thrombosis supports patients making complex medical decisions such as anticoagulant choice, decisions about hormones and contraception, and procedural planning. Additionally, the clinic addresses patient safety issues associated with anticoagulant medications including appropriate dosing and drug choice, medication access, and management of complications such as bleeding.

4. What is the problem or gap in quality you seek to improve?

Acute VTE is a high-risk medical condition that has transitioned to primarily outpatient management since the introduction of direct oral anticoagulants (DOACs). While evidence supports the safety and efficacy of outpatient management, initiation of DOAC therapy often occurs in the outpatient setting or the Emergency Department (ED), which places patients at risk for inadequate education and follow-up. This gap in care transition can lead to insufficient treatment due to medication access issues, bleeding complications due to anticoagulants prescribed without adequate counseling or medication reconciliation, and other downstream effects. Appropriate evaluation, education, and counseling in the short-term following diagnosis can reduce the risk of these complications and therefore readmission as well as morbidity and mortality. Additionally, newly diagnosed VTE can be a traumatic and stressful experience, and this program seeks to provide support for patients facing this diagnosis.

The following are real cases (simplified and de-identified) that demonstrate the impact of this program. The first two are examples of where the clinic was not appropriately utilized, and the poor outcomes that could have been prevented. The third is an illustration of the positive impact the clinic had when used effectively.

Care Gap Examples:

Case 1: A young female was newly diagnosed with a pulmonary embolism in the ED. She was prescribed a DOAC and told to follow-up with her primary care provider (PCP). Because oral contraceptive pills (OCPs) are a risk factor for VTE, she was told to discontinue them. She was unable to afford her DOAC after initial 30 days, therefore discontinued therapy, and *did not complete 3 months* of treatment. Shortly thereafter, she presented to the ED with worsening PE. Because she discontinued her OCPs and had not been counseled regarding safe alternatives, she was not using contraception, and was also found to have an **unplanned high-risk pregnancy**.

Case 2: A male with newly diagnosed prostate cancer was seen in the ED and initial read of his imaging indicated possible iliac vein thrombosis. DOAC therapy was initiated. Subsequent read of the imaging clarified that the compression noted was *not* likely DVT. This patient was not referred to the Walk-In DVT clinic, the finding was not reviewed by a specialist, and *the DOAC was continued unnecessarily*. He subsequently presented with **intracranial hemorrhage** requiring surgical intervention, complicated by difficult hemostasis secondary to DOAC, and hemicraniectomy. His case has not yet resolved, and the patient remains hospitalized at the time of this writing.

Successful Intervention Example:

Case 3: A female with known cardiac amyloidosis was referred to the DVT Walk-In Clinic with concern for DOAC failure due to imaging concerning for new pulmonary emboli. She had been switched to a higher-risk anticoagulant, despite having tolerated her DOAC, due to this concern. She was seen in the DVT clinic and the treating provider reviewed the case, compared years of imaging findings, and determined there was no DOAC failure, but a transcription error in the CTA reading “pulmonary *emboli ptosis*” where the finding should have been “pulmonary *amyloidosis*”. Given the patient’s known history of cardiac amyloid, she was transitioned back to her well-tolerated anticoagulant and referred for further work-up of new pulmonary findings.

5. Describe the patient population affected, scope, and impact of the problem (1 page)

a. What is the specific patient population?

The patient population consists of newly diagnosed patients with deep vein thrombosis (DVT) or low-risk pulmonary embolism (PE), as well as patients with superficial vein thrombosis (SVT). Initially this will include patients diagnosed within the UNC system, but the long-term goal is to include patients diagnosed at non-system locations within North Carolina.

b. How many patients are in it?

There are no surveillance data on VTE in North Carolina. Therefore, it is difficult to estimate the total number of patients who might benefit from this program within the state if access were to expand in the future. However, for DVT alone (not including isolated PE or SVT cases), there were 304 patients diagnosed by the UNC peripheral vascular labs from August 2021-July 2022. Of these, 191 (62.8%) were *not* seen by the clinic and would be targeted by this program, at minimum.

Table 1: Patients Diagnosed with DVT in UNC Peripheral Vascular Lab August 2021-July 2022

	ED	Non-ED Outpatient	Total
Patients Diagnosed	122	182	304
Patients Seen in DVT Clinic	72 (59%)	41 (23%)	113 (37%)

c. How frequently does it occur?

Assuming an average distribution across all months, about 300 DVT cases within the UNC system per year equates to 25 cases per month. Based on DVT-only diagnosis data, 113 patients diagnosed with DVT (37%) at UNC were seen in the clinic, which is about 9.4 per month. The clinic averaged about 12.5 visits per month in 2021-2022, which is higher than this estimate, likely due to other types of referrals (SVT and isolated PE) as well as non-UNC referrals. There are therefore likely more than 15 patients per month not referred to the clinic who might benefit from it, and far more when all-VTE types and outside providers are considered.

d. What is the impact?

The clinic impacts multiple aspects of care. First, the clinic provides an opportunity to identify and correct any deviations from standard practice in referred patients, which improve patient safety. From August 2021-July 2022, deviations from protocol were documented for all referred cases (n=19, 12.67%) significant enough to require a change in plan of care. These errors included incorrectly started or dosed anticoagulation and outpatient management of patients who did require hospitalization.

The second major impact is in patient education, medication access, and patient satisfaction. A local news story highlighting the benefit of the clinic was produced in October 2021 and can be found at <https://www.cbs17.com/news/local-news/orange-county-news/unusual-accident-blood-clot-diagnosis-lead-leasburg-woman-to-uncs-dvt-clinic>. The clinic has consistently provided financial assistance (typically for medication access) to at least 10% of patients. Feedback from patients is reliably positive, with many expressing gratitude for a quick follow-up after receiving a scary diagnosis.

The last impact the clinic has clearly had is on referring providers. The referrals to the clinic have grown rapidly, with 84 referrals in 2020-2021 up to 150 referrals in 2021-2022. A note received from a resident physician in the ED noted "It is incredibly helpful for our work-flow from the ED. The patients love the close follow up and it makes us so much more comfortable sending out acute clots knowing they'll get such awesome follow up." Similarly, support has been expressed by oncology, maternal fetal medicine, orthopedics, and vascular surgery, who feel that complex cases are more confidently managed in the outpatient setting with this resource.

6. What do you think are the underlying causes of the problem? Why do you think it is happening? (half page)

The issue of inadequate follow-up for newly diagnosed venous thromboembolism in general, throughout the state, is likely due to a combination of limited resources/access as well as limited recognition for the need among providers. At UNC in particular, the problem of patients who are diagnosed within the system and have access to the clinic but are not seen by the clinic is likely multifactorial, driven by some combination of the following:

- **Driver 1 - Staff Awareness:** We have undertaken routine visits to some groups at UNC including ED, orthopedic surgery, and oncology staff. However, we have not had ongoing outreach to other groups. Additionally, with the nature of an academic center and rotating students/residents, it is difficult to maintain a high level of awareness of referral pathways year over year. We have to date not developed a broad advertising campaign.
- **Driver 2 - Ease of Access:** Referring providers who know that the clinic exists may find it challenging to refer to. They may not recall the triage number or pager, and there is not a dedicated "referral" to the clinic in the electronic medical record (EMR) at UNC. This means some providers likely send patients to the ED, knowing they can then refer to the DVT clinic, to save time.
- **Driver 3 - Communication with Patients:** Some number of patients are being referred to the clinic, but are not seen by the clinic. Some of these patients will "no-show" and we are able to identify and reach out to them to reschedule. However, it is very difficult to quantify the total number because patients will appear in the clinic schedule and disappear, without a record of the referral or visit,

making it impossible to reach out to them. These patients are canceling their appointments, but it is not clear why. A lack of communication regarding the purpose of the appointment, the location, and other details, may contribute to this.

7. What is the history of improvement or attempted improvement at UNC health? What work will proposed improvement build on?



An APP-led acute VTE clinic located within the Benign Hematology specialty clinic was established in January, 2020 to provide transitions of care from outpatient or ED providers to hematology. The initial structure included one appointment reserved each weekday morning. Patients with newly diagnosed VTE were referred by any UNC-affiliated provider. In the two year period studied since inception, a total of 234 patients have been seen in the clinic.

Figure 1: Patient volume by month from August 2020 through August 2022.

Prior efforts targeting improving access to the clinic include a triage system with direct pager and phone line (“1-DVT”) available during business hours. For patients referred after-hours through the Emergency Department (ED), direct scheduling is available 24 hours/day through a patient access phone line more broadly utilized by UNC Health. To address lower initial utilization, outreach has been conducted in an ongoing manner through visits to faculty meetings of referring providers (ED, orthopedics, and oncology). However, utilization increased so rapidly that these efforts were discontinued until a second APP could be hired on July 5, 2022.

New efforts to improve the clinic access and utilization include a second reserved slot each day with the second APP and the integration of two medical assistants who help track and contact referred patients. To address issues with scheduling and missed appointments, new data tracking methods were introduced to try to capture referrals previously missed and provide pre-visit outreach. At this time, they are imperfect, with limited ability to track referrals and reach patients in time to prevent missed appointments. There is no current method to ensure patients are offered an appointment after diagnosis, and future efforts will aim to improve this.

8. Measures Table

Measure Name	Measure Type	Measure Calculation	Measure Exclusion	Data Source	Baseline	Goal	Collection Frequency
Percentage of patients seen for transition visit in DVT Clinic within 7 days of new VTE diagnosis	Outcome	Numerator: Patients 18+ with new diagnosis of VTE <i>seen</i> by the DVT Walk-In Clinic Denominator: Patients 18 and over diagnosed with new VTE at a UNC affiliated institution.	Patients with preestablished hematology care.	Electronic Health Records	Estimated 30%	80%	Weekly
Percentage of Patients Referred to the DVT Clinic	Process	Numerator: Patients 18+ with new diagnosis of VTE with <i>referral placed</i> to the DVT Walk-In Clinic Denominator: Patients 18+ diagnosed with new VTE at a UNC affiliated institution.	Patients with pre-established hematology care.	Electronic Health Records	Estimated 40%	80%	Weekly
Percentage of patients reached for pre-visit outreach.	Process	Numerator: Patients 18+ with new diagnosis of VTE scheduled in the Clinic who are reached prior to visit by medical assistant. Denominator: Patients 18 and over diagnosed with new VTE scheduled in the Clinic	Patients with pre-established hematology care. Patients who present to clinic same day as diagnosis.	Electronic Health Records	10%	80%	Weekly
Percentage of Patients with Change in Plan of Care to Adhere to Treatment Guidelines	Outcome	Numerator: Patients seen in the clinic with a documented change in care plan. Denominator: Patients seen in the clinic.	None	Electronic Health Records	12%	12%	Monthly
Percentage of inappropriate referrals	Balancing	Numerator: Patients referred to the clinic who do NOT meet criteria for referral. Denominator: Total number of patients referred to the clinic	None	Electronic Health Records	Unknown	2%	Monthly

9. What ideas do you have for changes that will result in improvement?

The transition clinic as an intervention has demonstrated value in medication access and error mitigation, and changes in the clinic design itself are not the focus of this project. The goal of this project is to improve implementation through increased awareness, referral, and ultimately successful utilization of this resource by patients. A similar intervention utilizing Plan-Do-Study-Act (PDSA) cycles has been demonstrated as successful in reducing readmissions in high-risk geriatric populations, and a similar method would be pursued by this project.¹ The following interventions would be implemented and evaluated through PDSA cycles:

1. **Specific referral order in Epic:** At present, referrals to the Walk-In Clinic are submitted as referrals to hematology and must be triaged through the same system as all hematology referrals. Referring providers must also directly reach the clinic to ensure patients are scheduled appropriately. Establishing a specific referral type in Epic would help eliminate an added step in the referral process and timely scheduling of referred patients.
2. **Warm hand-off:** While a pager and phone number (974-1DVT) have been established for the DVT clinic to immediately reach a provider, these are underutilized. A warm hand-off of referred patients would improve continuity of care and ensure fewer patients are lost in the referral process. Encouraging warm hand-offs could be done through education and outreach to referring providers.
3. **Pre-visit outreach to patients:** Two medical assistants support the transitions clinic. These medical assistants could reach out to patients prior to scheduled appointment to ensure patients understand when/where their appointment is, as well as the purpose of the appointment.
4. **Provider Education:** At present, intermittent efforts are made to educate groups of providers about the clinic. This has been effective but tends to cause a short-term increase in referrals that is not sustained. A formalized program of education, with standardized materials and messaging, might improve utilization.
5. **Routine Utilization Review:** Utilization data is monitored regularly for the clinic, but to date, coding/diagnosis data from radiology and the vascular lab has not been used for comparison. Establishing consistent and standardized reporting and analysis of frequency of diagnoses will help determine 1) how many patients are being diagnosed, 2) how many of these would be ideal candidates for referral, 3) how many are being appropriately referred/seen, and 4) where these patients are being initially diagnosed. This would allow best assessment of how well interventions are working and identify targets for further education and outreach.

10. How has problem been addressed successfully elsewhere?

Similar efforts have been pursued at UNC Health for atrial fibrillation and were found to be not only feasible, but **specialty care improved adherence to ACC/AHA clinical performance and quality measures when compared to standard follow-up.**² These patients were also more likely to have screening for other relevant conditions and to be prescribed anticoagulation appropriately.² In the published literature for transitions of care specifically in venous thrombosis, a comparable clinic was developed utilizing clinical pharmacists and demonstrated similar safety outcomes when compared to primary care follow-up.³ An APP-led clinic for stroke patients was demonstrated at a midwestern Comprehensive Stroke Center, where patients were seen by an APP post-discharge, was feasible and highly utilized.⁴

11. How will high performance management tools (Just Culture, SAFE, team communication and teaming skills, huddles, and visual management boards) be used to support?

The DVT Clinic already utilizes a Teams document to keep track of referred patients, phone calls/outreach to patients, medication access, and pharmacy follow-up. However, this is new to the clinic, and has not been perfected. A future aim would include a more user-friendly visual management

board (see below for prototype) which tracks not only individual patient progression through the clinic, but also the overall goals being achieved.

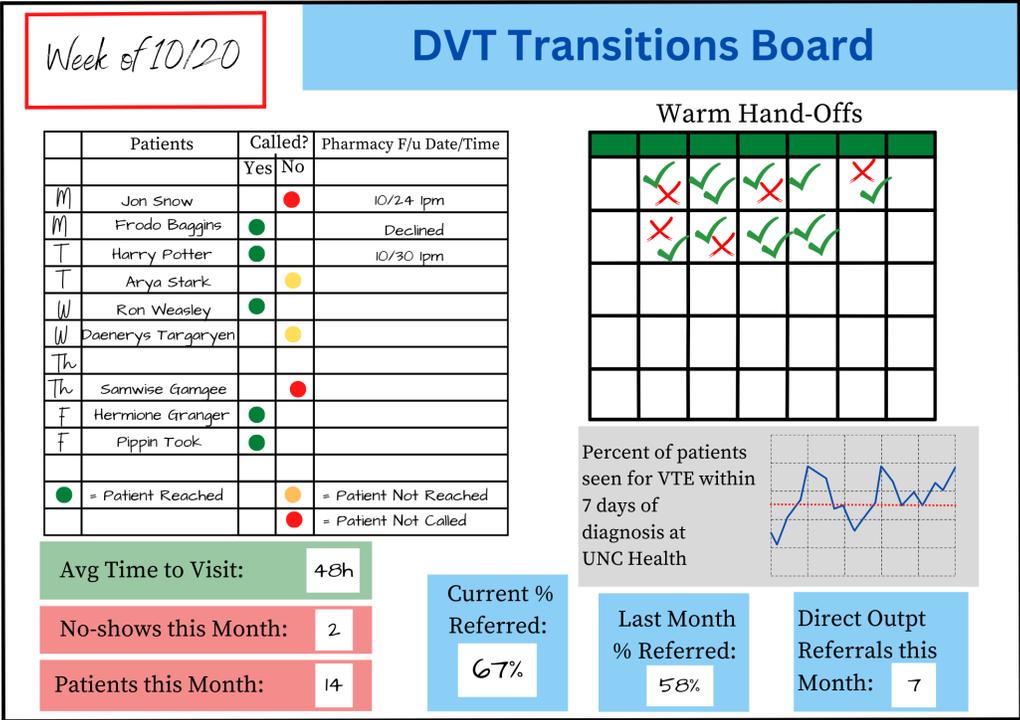


Figure 2: Visual management board concept for DVT Transition Clinic.

12. Describe how project addresses each of the 5 elements reflected in the Quintuple Aim for Health Care Improvement.

- Improved health:** Improving access to medication and reducing opportunity for error and complications, as the clinic aims to do, directly improves health of those referred. Therefore, a project aimed at increasing utilization also contributes to improving population health.
- Enhanced patient experience:** While it is not something that has been measured or recorded, as the provider for this clinic for the past three years, I can attest to the appreciation patients have for access to this resource. Contrastingly, patients who wait months to have their questions answered express frustration and anxiety. The patient experience is enhanced by a shorter wait time to specialty care and immediate connection to resources and support. Increasing timely referrals and utilization will further enhance patient experience.
- Enhanced clinician and staff experience:** The clinic provides an opportunity for rapid referral, which is often not possible in large healthcare systems. Referring clinicians frequently comment on the benefit to their practice and efficiency derived from the direct referral pathway. The interventions suggested in this proposal seek to improve this even further.
- Health equity:** Patients of ethnic minorities are at increased risk of adverse safety events.⁵ While there are many contributing factors, two issues mitigated by this program are language barriers in patient education and economic limitations due to insurance and healthcare/medication costs.⁵ The DVT Clinic has expanded its reach to minority patients over time and has prioritized improving patient education materials and making up-to-date Spanish translations available. The clinic also addresses barriers to care and offers financial counseling and medication access assistance to all patients.

5. **Reduced cost:** Reduced costs to patients and payors are possible in this model as it has potential to reduce return visits to the ED with questions, worsening symptoms, or complications of treatment. Increased revenue to the healthcare system in this case is primarily a byproduct of reduced ED use, through direct outpatient referrals, which make the ED more available to provide higher-level (and higher revenue) interventions.

13. Please describe the support and engagement you have from leadership for the work you are proposing. Please indicate leaders with whom you have consulted about this proposal.

Outside of the hematology division, the value of this clinic has previously been discussed with, and support offered by, Andrew Chen MD (orthopedics), Matthew Milowsky MD (oncology), William Goodnight MD (Maternal Fetal Medicine), William Marston MD and Katharine McGinagle MD (vascular surgery), Amanda McKay NP (Emergency Department), and Dale Henion (Cardiac Services and Peripheral Vascular Lab). Within the division of hematology, the program has the support of Stephan Moll MD, Nigel Key MD, Raj Kasthuri MD, Micah Mooberry MD, and the division chief, Jonathan Serody MD.

14. Project Team

Name and Title	Description
Dale Henion Asst. Director Cardiac Services	As the leader of the vascular lab, Dale Henion will coordinate with the DVT Clinic to facilitate the referral pathway and educate referring providers.
Nancy Vogler, NP Benign Hematology	As the second APP providing care in the DVT Clinic, Ms. Vogler will provide direct patient care and coordination.
Leslie Parker, CMA Benign Hematology	As a medical assistant, Ms. Parker will contribute to pre and post-visit interventions such as phone calls and patient education.
Martina Corbett-Gonzalez, CMA Benign Hematology	As a medical assistant, Ms. Parker will contribute to pre and post-visit interventions such as phone calls and patient education.
Sheh-li Chen, CPP Benign Hematology	The pharmacist on the benign hematology team supports medication access and patient counseling.

15. How will you ensure sufficient time to dedicate to the project over the scholar year?

I am currently a 0.9 FTE employee with 0.1 of my non-UNC effort dedicated to education (doctoral program) and teaching. In addition, I have 0.1 FTE dedicated to establishing, maintaining, and growing the thrombosis program. This is my primary area of interest both clinically and academically, and much of this 0.2 total FTE effort will be dedicated to this project. I am also physically located within the hematology clinic Monday through Friday mornings to continuously monitor and support the program.

16. What factors do you anticipate will foster and hinder improvement?

An engaged team that is dependable for referring providers will foster improvement. The success of transitional programs relies on dependability. If a referring provider does not trust that a patient will make it to the clinic and receive the necessary service, they are unlikely to utilize it. What might hinder improvement is the diversity of referral pathways that must be managed. To accept patients from the ED, urgent cares, outpatient clinics of all kinds, and eventually non-UNC clinics, reliable and replicable pathways are required. Any turbulence in these pathways that create barriers rather than removing them will hinder improvement.

References

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