Choosing Wisely Champions Sample Submissions

Arielle Langer, MD, MPH, Brigham and Women's Hospital

Brief Bio *(max one paragraph)*:

Arielle Langer is currently an Instructor in Medicine at Harvard Medical School and an attending physician in the Division of Hematology at Brigham and Women's Hospital. She graduated Phi Beta Kappa and Magna cum Laude from Dartmouth College with a BA in Economics with High Honors for her thesis. She obtained her MD and MPH degrees concurrently from Columbia University College of Physicians and Surgeons and Mailman School of Public Health, graduating Alpha Omega Alpha. She did internal medicine residency and a Chief Resident year at New York Presbyterian/Columbia University Medical Center. She then went on to complete her fellowship in Hematology/Oncology and served as a Chief Fellow at Icahn School of Medicine at Mount Sinai. Dr. Langer is interested in benign hematologic disorders including anemia, venous thromboembolism, and hematologic issues affecting pregnancy.

Project Abstract *(max 300 words):*

Patients with venous thromboembolism (VTE) are often subjected to extensive testing to determine the etiology of their thrombosis, despite the fact that it usually should not impact management of the individual or their family members. We noted a high volume of low yield thrombophilia testing – on average 801 tests per month. We were concerned both that positive results could lead to excessive anticoagulation and negative results could lead to withholding of needed anticoagulation. Exploring the underlying causes, we observed that thrombophilia testing order sets in our medical record included a variety inappropriate tests including tests that should never impact management and that cannot be accurately assessed in the setting of acute VTE. To reduce testing, we developed a consensus testing algorithm, which included two sections – a flow diagram based on the clinical context of the patient and a table of different tests and their limitations. After this algorithm was developed, an educational campaign was implemented. In order to make default practices less likely to deviate from these guidelines, we changed the inpatient and outpatient order sets. Interventions were rolled out in sequence to allow attribution to a particular intervention. After these interventions, preliminary data shows an average decrease of 137 tests per month ($p = 0.007$), which represents a 17.1 percent reduction in testing. The reduction was heterogeneous across individual tests, ranging from no statistically significant reduction homocysteine and MTHFR testing to a 62.2 percent reduction in PAI-1 testing ($p = 0.002$). The greatest reduction in testing was in the outpatient practices of the hematology/oncology division, which showed a drop from 205 to 111 tests per month, a 45.9 percent reduction ($p = 0.007$). Due to the high cost of these tests, the reduction in testing resulted in $31,626.82 saving per month without comprising patient care.

How did the project develop? Please include information about what prompted the need for action.

While seeing benign hematology patients in outpatient setting and rotating on the hematology consult service as a fellow, I noticed that there were a large number of patients receiving thrombophilia work ups that were unlikely to impact management. This issue particularly drew my attention in part due to the original ASH Choosing Wisely Campaign that included not testing patients with VTE provoked by a major risk factor. However, my concern extended to additional clinical scenarios, such as recurrent unprovoked VTE, where testing should not impact management. Discussing this issue with our benign hematology faculty and the pathologist who is the director of the clinical laboratory at Mount Sinai, it was clear that this is was a persistent and widespread issue. I started by quantifying the baseline level of testing and confirm ed that many tests were being sent inappropriately frequently including some that should never impact management such as MTHFR testing. This prompted me to work on strategies

to reduce this testing as part of my research during fellowship. I first developed a consensus testing algorithm and got it approved by all of the benign hematology faculty and the director of the clinical laboratory. I disseminated this handout through the following routes: I presented it to the medicine house staff at their noon conference; it was added to both the medicine house staff program website and their iPhone app that includes similar guides; I sent it to all hematology/oncology fellows and added it to their program website; I presented it at the hematology/oncology division conference along with the data underlying the recommendations. Additionally, the fellows choose to post the algorithm in their work room. As well, I worked with our department QI chairs to have multiple inpatient and outpatient order sets changed, so that they were designed to facilitate testing that should impact anticoagulation decision in the right clinical setting and omit all other tests. I chose this simpler approach rather than an alert-based intervention because of concern about alert fatigue and our impression that remarkably few of these tests were clinically indicated. There were several challenges encountered along the way, which primarily related to convincing other physicians to support the project. Initially some of our benign hematology faculty were concerned that alterations in the ordering process would make it difficult to care for the rare patient for whom testing is indication. To address this concern, I made sure that any changes to the ordering system affected only order sets, but still permitted all individual tests to be ordered. Since our order sets are shared with affiliated sights, we also had to obtain approval from these other hematology faculty members. As with our main campus faculty, I shared the results of the extensive literature review and found that this was compelling enough to get approval from these other faculty members. In fact, one faculty member expressed that the only reason this was not his current practice was because of the expectation from referring physicians that testing would be done. This remains the most difficult challenge because it was requesting behavioral change from a broad and heterogeneous group of specialties. To address this issue, we felt it was most appropriate to engage in education when possible and hope that by establishing this as a department wide practice, expectations could change over time and individual providers would feel they had support needed to improve practice patterns.

Could this project be implemented at other centers? Has the project been emulated or exported to other centers?

For any center that has an inpatient or outpatient thrombophilia testing order set, the order set changes we made are an intervention could be readily appropriated and would be expected to have comparable impact. I am working on doing so myself at my new institution, Brigham and Women's Hospital (BWH). Our testing algorithm could be readily appropriated by any center, as none of the decisions are based on local factors. We are happy to share this with other centers. Where there is overlaps, it is in agreement with ASH VTE guidelines, but presents information in a manner that is accessible to non-specialists and includes citations for interest parties. Along with the order set changes, I am also working on bring this algorithm into use at BWH, but this was put on hold in the setting of COVID-19.

Is this project scalable for implementation at larger or smaller practices and institutions? Why or why not?

Our interventions would be applicable to practices and institutions of any size. Our testing algorithm is designed to be usable by non-hematologist and hematologists alike and could be easily posted on the wall in a clinic or made available on a house staff iPhone app and fellowship program website, as is the case at our institution. Our order set changes are an intervention that would be feasible in any setting were an electronic medical record and order sets are utilized.

Were patients involved in the genesis, design, or implementation of this project? If so, how?
While patient cases inspired the project, patients themselves were not directly involved in the design or implementation.

Have educational resources or an implementation toolkit been developed as part of the project? If yes, would you be interested in collaborating with ASH to share these tools with a wider audience? If no, would you be interested in developing these resources and collaborating with ASH to share with a wider audience?
A testing algorithm was developed that serves as both an educational resource and as a handout. I also have a PowerPoint presentation used to describe part of the rationale behind the algorithm. We would love to collaborate with ASH to share these resources with a wider audience and would welcome any changes thought to be helpful to its wider use.

Additional Data/Information *(optional)*

Please include any additional information you think would be helpful to provide context to your project.
The complete list of order set changes is below. I am happy to make the testing algorithm available, if desired for review with the application. Deleted from outpatient thrombophilia order sets: MTHFR mutation, PAI-1 gene polymorphism, Prothrombin mutation, Homocysteine, APC resistance, Factor V Leiden, Plasminogen act inhibitor, Factor VIII, Factor IX, Factor XI, D-Dimer, Fibrinogen, Euglobulin lysis
Deleted from inpatient thrombophilia order sets: Protein S activity, Protein S Ag free, Protein S Ab total, Protein C function, Protein C antigen, Antithrombin test, Homocysteine, APC resistance, Factor V Leiden

Hind Salama, MD, King Abdulaziz Medical City

Brief Bio *(max one paragraph)*:
Dr. Salama is a consultant hematologist in King Abdulaziz Medical City, Riyadh, Saudi Arabia

Project Abstract *(max 300 words):*
Reducing futile acute care interventions for terminally ill cancer patients (Dignity Project) Hind Salama, Nashmia AL Mutairi, Ashwaq Alolayan, Ahmed Binahmed, Hagir Salama, Hussam Shehata, Mona Shami, Mohammad Alkaiyat, Abdul Rahman Jazieh Department of Oncology, King Abdulaziz Medical City, Riyadh, Saudi Arabia King Abdullah International Medical Research Center, Riyadh, Saudi Arabia King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia Abstract Introduction Documentation of the goal of care for patients with advanced cancer is critical for providing appropriate patient care. We conducted a quality improvement project aimed to reduce futile critical care interventions for cancer patients treated with a palliative intent. Methodology A multidisciplinary team retrospectively reviewed the records of terminally ill cancer patients who died during their admission at our institution, King Abdulaziz Medical City, Riyadh, Saudi Arabia. We included all patients expired between November 2017 to May 2018. The review aimed to assess the magnitude of improper utilization of acute care services (CCS) such as: critical care response team (CCRT), cardio-pulmonary resuscitations (CPR) and admission to intensive care unit (ICU). A root cause analysis and process mapping were conducting to identify reasons for over utilizations of these services. Timely documentation of goals of care was identified as a main reason for this problem. Then interventions were implemented to improve the practice. Post intervention data was captured and compared to the baseline data. Result The timely documentation of goal of care for patients with palliative intent had significantly increased from 59% of cases in the baseline to 86% for the post intervention phase. As a result, admission to ICU decreased from 32% of cases in the pre intervention phase to 14% in the post intervention phase reducing monthly cost of admission to the ICU by 40% and estimated to be on average of 48000 USD monthly(576,000 USD annually). Conclusions Our intervention resulted in improved documentation of the goal of care leading to decrease in the utilization of critical care interventions including reduction of intensive care unit (ICU) bed admissions and cost. This outcome is even more relevant nowadays during COVID-19 pandemic and the pressure on critical care resources. Improvement is sustained by integrating the changes in the work process and electronic medical records.

How did the project develop? Please include information about what prompted the need for action.
Reducing futile acute care interventions for terminally ill cancer patients (Dignity Project) Hind Salama, Nashmia AL Mutairi, Ashwaq Alolayan, Ahmed Binahmed, Hagir Salama, Hussam Shehata, Mona Shami, Mohammad Alkaiyat, Abdul Rahman Jazieh Department of Oncology, King Abdulaziz Medical City, Riyadh, Saudi Arabia King Abdullah International Medical Research Center, Riyadh, Saudi Arabia King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia Abstract Introduction Documentation of the goal of care for patients with advanced cancer is critical for providing appropriate patient care. We conducted a quality improvement project aimed to reduce futile critical care interventions for cancer patients treated with a palliative intent. Methodology A multidisciplinary team retrospectively reviewed the records of terminally ill cancer patients who died during their admission at our institution, King Abdulaziz Medical City, Riyadh, Saudi Arabia. We included all patients expired between November 2017 to May 2018. The review aimed to assess the magnitude of improper utilization of acute care services (CCS) such as: critical care response team (CCRT), cardio-pulmonary resuscitations (CPR) and admission to intensive care unit (ICU). A root cause analysis and process

mapping were conducting to identify reasons for over utilizations of these services. Timely documentation of goals of care was identified as a main reason for this problem. Then interventions were implemented to improve the practice. Post intervention data was captured and compared to the baseline data. Result The timely documentation of goal of care for patients with palliative intent had significantly increased from 59% of cases in the baseline to 86% for the post intervention phase. As a result, admission to ICU decreased from 32% of cases in the pre intervention phase to 14% in the post intervention phase reducing monthly cost of admission to the ICU by 40% and estimated to be on average of 48000 USD monthly(576,000 USD annually). Conclusions Our intervention resulted in improved documentation of the goal of care leading to decrease in the utilization of critical care interventions including reduction of intensive care unit (ICU) bed admissions and cost. This outcome is even more relevant nowadays during COVID-19 pandemic and the pressure on critical care resources. Improvement is sustained by integrating the changes in the work process and electronic medical records. The project idea arose when we noticed that many terminal cancer patients ended in ICU and died there this led to increased cost and unnecessary interventions which 5prevent terminal cancer patients to die in dignity the reason is mainly lack or delayed decisions and documentations

Could this project be implemented at other centers? Has the project been emulated or exported to other centers?
Yes no

Is this project scalable for implementation at larger or smaller practices and institutions? Why or why not?
Yes we are planning to extend our projects to all departments within our hospital not only hematology

Were patients involved in the genesis, design, or implementation of this project? If so, how?
No

Have educational resources or an implementation toolkit been developed as part of the project? If yes, would you be interested in collaborating with ASH to share these tools with a wider audience? If no, would you be interested in developing these resources and collaborating with ASH to share with a wider audience?
Yes

Additional Data/Information *(optional)*

Please include any additional information you think would be helpful to provide context to your project.
Letter of support will be emailed

Simran Swarup, MD, Texas Tech University Health Sciences Center

Brief Bio *(max one paragraph)*:
I am the chief fellow in Hematology/Medical Oncology at Texas Tech University Health Science Center, Lubbock. My work focuses on benign hematology, patient safety, and policymaking. My oral presentation in ASH 2019 and my scholarship in HTRS were both based on my work related to improving patient safety specifically in the field of hematology for patients. I also pursued a master's degree in business administration with a focus on healthcare to enable me to further my work at institutional levels (graduating MBA in October 2020 from Texas A&M).

Project Abstract *(max 300 words):*
Heparin-induced thrombocytopenia (HIT) is a rare life-threatening prothrombotic disorder affecting patients treated with heparin or related substances. Its treatment depends on timely clinicopathologic diagnosis with the use of 4T score and subsequently a screening test like PF4 ab testing through ELISA or LIA (Latex Immuno Assay). Subsequently confirmed by serotonin release assay (SRA). We noticed that the 4T score was not being done consistently at our hospital and the lab relied upon a test with substandard results as compared to ELISA (lab used PIFA - Platelet Immunofiltration Assay). We initiated a quality improvement project to increase utilization of 4T score at the hospital by incorporating 4T scoring into HIT workup in the EMR. We also worked with the lab to change screening tests from PIFA to LIA as the initial screening test for HIT, with monitoring of change in trends in order, testing, and financial gains of the new method.

How did the project develop? Please include information about what prompted the need for action.
The project developed in my first-year fellowship in 2017 when I manned the consult service for hematology in the hospital. I noticed that most clinicians called me for consults on HIT without a 4T score. I also had concerns about the screening test when I noticed that the results didn't seem to correlate well with my clinical suspicion of HIT in the cases that were tested prior to the Hematology team's review.

Could this project be implemented at other centers? Has the project been emulated or exported to other centers?
The project should be fairly easy to emulate at other centers because our IT team was able to form a 'HIT workflow' fairly easily with the Hematology team's support. LIA as a screening test doesn't need extensive setup as ELISA and hence likely easier to implement at smaller centers with a turnaround time of roughly 10 minutes in patients who have a moderate-high 4T score, thus enabling treatment decisions fairly quickly and with a fairly high degree of sensitivity - the 2 characteristics that are needed for a good screening test.

Is this project scalable for implementation at larger or smaller practices and institutions? Why or why not?
As written above, the project is easily scalable to both larger and smaller institutions if they use electronic medical records. It involves making a HIT protocol for all patients of suspected HIT. The protocol begins with a prompt for the clinician to calculate 4T - if it is calculated as low, it discourages further testing. If 4T is moderate to high, it automatically initiates an order for the screening test (LIA) with samples forwarded to the lab. All high 4T scores and/or positive screening tests (LIA) automatically

get an additional sample drawn for serotonin release assay which is sent to an outside lab for confirmation of diagnosis. I will be happy to provide pictures (attached) and other required information for the incorporation of 4T scores into EMR.

Were patients involved in the genesis, design, or implementation of this project? If so, how?
Patient data was involved in the genesis, design, and implementation of the project. We started out by collecting data in 2017 on the number of patients who were tested for HIT Ab in the lab (at the time lab used PIFA). We retrospectively reviewed those charts with the help of 3 independent reviewers who scanned the charts for 4T score, SRA results, use of alternative anticoagulation (each chart was read by 2 reviewers to ensure accuracy while the third reviewer would get involved if there was a discrepancy between the first two reviewers). We noted that less than 1% of the charts with HIT ab testing had 4T scores documented. We also noted that the PIFA test had a sensitivity of 60% and specificity of 50% in our study with potentially 5 cases of missed HIT diagnosis during 2017 (missed because of high 4T score and negative PIFA). We also noted that over 50% of cases tested had a low 4T score leading to inappropriate testing, sometimes with potentially dangerous use of anticoagulation. Hence, we worked with the IT department to design and implement a HIT protocol in the system which will be the only way to access tests for HIT, after calculation of 4T (picture attached.) It will also automate serotonin release assay for those with positive screening test or high HIT (moderate scores with negative screening left to clinician discretion). Also, given the subpar performance of PIFA, we worked with the lab to switch over to LIA. It took about 6 months to achieve above, after which we gave a 6-month washout period to implement the above system. Our post-intervention period began in Jan 2019 and we now have data for the period Jan-June 2019. We noted that we improved compliance of 4T scoring from 1% to 100%. We also noted a 18.8% reduction in HIT Ab testing, 50% reduction in SRA testing and 42% reduction in alternative anticoagulation used (refer to attached excel sheet). We went ahead and involved the finance department in the project and noted that length of stay for HIT suspected patients reduced by 4 days on an average. We also reduced total cost by 49% (about 41,000$ per case) for HIT suspected cases. Contribution margin (reimbursement less direct cost to hospital) per case was increased by 94% (nearly 8,000$)

Have educational resources or an implementation toolkit been developed as part of the project? If yes, would you be interested in collaborating with ASH to share these tools with a wider audience? If no, would you be interested in developing these resources and collaborating with ASH to share with a wider audience?
I would love to develop these resources further with the help of ASH, for a wider audience. I truly believe this project saves lives, improves utilization and saves money.

Additional Data/Information *(optional)*

Please include any additional information you think would be helpful to provide context to your project.

Jordan Schaefer, MD, University of Michigan

Brief Bio *(max one paragraph)*:

Jordan Schaefer is an Assistant Professor of Internal Medicine in the Division of Hematology/Oncology at the University of Michigan. He earned a BS in Sociology Health and Aging; Social Inequality; Race, Class and Gender with a minor in Chemistry from the University of Michigan and his MD from Michigan State University. He then completed an Internal Medicine residency at the Mayo Clinic in Rochester, MN prior to entering the Hematology/Oncology fellowship program at the University of Michigan. Following completion of his fellowship, Dr. Schaefer joined the hematology/oncology faculty at the University of Michigan where his clinical and research interests focus on health disparities in anticoagulation care, cancer associated thrombosis, and the optimal use of antiplatelet/anticoagulant therapies.

Project Abstract *(max 300 words)*:
The combination of aspirin (ASA) and warfarin increases bleeding events, often without a reduction in thrombotic outcomes. Combination therapy with warfarin and ASA is associated with a 1.5-1.8 fold risk of major bleeding compared to warfarin alone. As a result, guidelines advocate for warfarin monotherapy instead of combined warfarin-ASA therapy for many patients with an indication for chronic anticoagulation. Despite these recommendations, the combined use of warfarin and ASA is pervasive. To date, no established method has been developed, implemented, and tested to address this issue. In an effort to reduce the number of patients unnecessarily on aspirin, each of the six clinical sites of the Michigan Anticoagulation Quality Improvement Initiative (MAQI2) implemented a common intervention to reduce the inappropriate use of aspirin. Each participating site used a tailored screening process to identify potential inappropriate ASA use based on an agreed upon set of criteria (e.g. no prior coronary disease, mechanical valve replacement, etc.). If the indication for a patient's ASA use was unclear or potentially inappropriate, communication with the patient's primary care provider or managing specialist ensued to alert them to their patient's use of ASA and discuss the need for ASA therapy. All patient management decisions are deferred to their managing physician but facilitated by the anticoagulation clinic staff. To allow for local tailoring of the intervention, the various sites differed in the personnel carrying out the intervention, how technology was used, and how providers were contacted. Rates of inappropriate aspirin use were assessed monthly. Between August 2017 and May 2019, a total of 3,766 patients on warfarin were followed by MAQI2. Inappropriate aspirin use was reduced by 34%, from 27.9% (401/1,437) to 18.5% (251/1,356) of patients, with a limited investment in anticoagulation clinic time and resources. It is anticipated this will translate to improved patient outcomes.

How did the project develop? Please include information about what prompted the need for action.
This study was the direct result of a previous investigation conducted by the Michigan Anticoagulation Quality Improvement Initiative (MAQI2) that showed over one-third of patients on warfarin for non-valvular atrial fibrillation or venous thromboembolic disease were taking aspirin without a clear indication. The patients taking aspirin had significantly higher bleeding rates, major bleeding events, emergency department visits and hospitalizations for bleeding; they experienced a similar rate of thrombotic outcomes. The study included over 6,539 patients and was limited to patients without a recent myocardial infarction or history of a heart valve

replacement. We analyzed two propensity score matched cohorts of 1,844 patients (warfarin and ASA compared to warfarin only). At one year, patients receiving combination warfarin and aspirin compared with those receiving warfarin only had higher rates of overall bleeding (cumulative incidence, 26.0%; 95% CI, 23.8%-28.3% vs 20.3%; 95% CI, 18.3%-22.3%; P < 0.001), major bleeding (5.7%; 95% CI, 4.6%-7.1% vs 3.3%; 95% CI, 2.4%-4.3%; P < 0.001), emergency department visits for bleeding (13.3%; 95% CI, 11.6%-15.1% vs 9.8%; 95% CI, 8.4%-11.4%; P = 0.001), and hospitalizations for bleeding (8.1%; 6.8%-9.6% vs 5.2%; 4.1%-6.4%; P = 0.001). Rates of thrombosis were similar, with a one-year cumulative incidence of 2.3% (95% CI, 1.6%-3.1%) for those receiving combination warfarin and aspirin therapy compared with 2.7% (95% CI, 2.0%-3.6%) for those receiving warfarin alone (P = 0.40). Similar findings persisted during three years of follow-up as well as in sensitivity analyses. Similar findings had been seen in several other studies, including those published over a decade before our study, with strikingly similar numbers. Analyzing our data over time showed that from 2010-2016, there was no improvement in the rate of inappropriate aspirin use despite greater knowledge of this topic. This made it clear that an intervention was necessary to try to reduce the overuse of aspirin among patients anticoagulated with warfarin.

What challenges did you encounter? How did you overcome them?

The greatest challenge to this intervention was the variation in clinical practice, size, personnel, and technology/medical record systems between the six participating clinical sites. While there was a shared goal of reducing inappropriate aspirin use, the optimal way to achieve this likely varies by institution. We overcame this barrier by allowing anticoagulation experts, familiar with their local anticoagulation clinic, resources, and culture, adapt the intervention in the way they felt best worked for their institution. Another challenge was defining which patients to target as potentially on aspirin inappropriately, as there is uncertainty regarding the role of warfarin and aspirin for several patient subgroups. For example, it is not clear if patients with a history of percutaneous coronary intervention/stenting without a recent cardiac event, but vascular risk factors should remain on aspirin. Our group of anticoagulation experts met regularly before the intervention and conducted an extensive review of the literature to develop a consensus on this matter. We also met regularly after implementation of the intervention to ensure that it was successful. Patients targeted through the implementation intervention were those who were agreed upon that aspirin would potentially not be indicated. Specifically, patients targeted for ASA deprescribing were those without any history of coronary artery disease, myocardial infarction, any percutaneous coronary intervention, coronary artery bypass grafting, peripheral artery disease, mechanical valve replacement, or left ventricular assist devices who were taking warfarin for another indication (e.g. atrial fibrillation or venous thromboembolism). Sites were also allowed to further limit patients targeted for ASA deprescribing; for example, some sites did not include patients with a history of stroke.

Could this project be implemented at other centers? Has the project been emulated or exported to other centers?

We believe that this project could be implemented at other centers, as it was successfully tailored to each of our six distinct anticoagulation clinics; each anticoagulation clinic was similarly successful in reducing the overuse of aspirin. We would be happy to work with other centers to try to develop similar interventions in other clinical settings and follow patient outcomes.

Is this project scalable for implementation at larger or smaller practices and institutions? Why or why not?

Our anticoagulation clinics ranged in size from a few hundred to several thousand patients followed per year in both face-to-face and phone-based models. Both small and large anticoagulation clinics were able to implement this intervention. However, all of our involved personnel have had extensive training on anticoagulation management, participate regularly in continuing education, and have access to local anticoagulation experts. We believe that the project would be scalable for larger institutions and many small clinics, as long as there is the local expertise to appropriately assess which patients could be considered to stop aspirin.

Were patients involved in the genesis, design, or implementation of this project? If so, how?
The project developed directly from a de-identified, comprehensive study of the patients directly affected by the project. We are in the process of seeking funding to facilitate patient interviews and focus groups to get additional patient input on the project. Furthermore, we plan to conduct interviews with anticoagulation clinic personnel and the providers caring for patients impacted by the intervention to obtain qualitative data regarding the impact of the intervention, along with ways to further improve it.

Have educational resources or an implementation toolkit been developed as part of the project? If yes, would you be interested in collaborating with ASH to share these tools with a wider audience? If no, would you be interested in developing these resources and collaborating with ASH to share with a wider audience?
The Michigan Anticoagulation Quality Improvement Initiative (MAQI2) has developed an "Anticoagulation Toolkit" that could be shared by the American Society of Hematology to interested providers. Pending further evaluation of our intervention, we would be interested in disseminating resources for interested institutions to implement a similar intervention to the one described above.

Additional Data/Information *(optional)*

Please include any additional information you think would be helpful to provide context to your project.
This quality improvement intervention is based on the following publication: Schaefer JK, Li Y, Gu X, et al. Association of Adding Aspirin to Warfarin Therapy Without an Apparent Indication With Bleeding and Other Adverse Events. JAMA Intern Med. March 2019. doi:10.1001/jamainternmed.2018.7816

Stephen L. Wang, MD, Kaiser Permanente Santa Clara Medical Center

Institution/Practice
Kaiser Permanente Hospital Santa Clara and Kaiser Permanente Northern California

Brief Bio *(max one paragraph)*:
Stephen L. Wang is a vascular and interventional radiologist at Kaiser Permanente Northern California. He has spent over 12 years doing basic science and clinical research on inferior vena cava (IVC) physiology and computational flow modeling with a particular interest in IVC filters. Over the last decade, Dr. Wang has implemented a step wise approach for Kaiser Permanente Northern California to reduce unnecessary IVC filters and to maximize IVC filter retrieval.

Project Abstract *(max 300 words)*:
Title: Reduction in inferior vena cava filter (IVCF) utilization and increase in IVCF retrievals across a large healthcare region through physician education and a novel IVC filter tracking system. Purpose: To evaluate the effects of physician education and a novel IVCF tracking system on IVCF utilization and IVC retrievals. Materials and Methods: Fourteen CME approved in-hospital grand rounds covering evidence-based review of IVCF efficacy, guidelines, and complications were performed at 14 medical centers across a large US healthcare region serving more than 3.5 million members. Physician attendance at each facility was recorded. A computer-based IVCF tracking system was deployed at the same time. IVCF use, rates of retrieval, and fulfillment of guidelines were evaluated for 12 months pre (n=427 filters) and post intervention (n=347 filters). Results: After education, IVC filter use decreased 18.7% with a member enrollment-adjusted decrease of 22.2%. Reduction in IVC filter use at each of the 14 facilities strongly correlated with physician attendance at grand rounds (r=-0.69; p= 0.007). Rates of attempted IVCF retrieval increased from 38.9% to 54.0% (p=0.0006) with increase in retrieval attempt correlated to physician attendance at grand rounds (r=0.51; p=0.051). Similar rates of successful retrieval at first attempt were noted (82.3% pre-education and 85.8% post-education). Conclusion: Physician education dramatically reduced IVC filter utilization and increased IVC filter retrieval across a large US healthcare region. Based on lessons learned from this first education and tracking system, a second version of the tracking tool, which is now integrated within the electronic medical record, was just recently deployed.

How did the project develop? Please include information about what prompted the need for action.
IVC filters have been ingrained in medical culture for decades, but the evidence behind them has been lacking. Dr. Wang took care of several patients early in his career that had complications related to chronic, in-dwelling IVC filters resulting in IVC thrombosis and debilitating post thrombotic syndrome. After doing his own evidence-based review of IVCFs, it became apparent that IVCF use in the United States was rapidly increasing, but while most of the filters placed were retrievable, the vast majority were not being retrieved. Two major problems were present: 1. an assumption by ordering and placing physicians that IVCFs are safe and effective and 2. a lack of follow-up on these patients to get the filters retrieved in a timely manner. Dr. Wang started a pilot project with his own hospital to deliver education to ordering physicians and set up a computer-based tracking system with the help of one of the regional imaging consultants. Additionally, a safety net was set up in collaboration with the local controller's office to use CPT codes to generate a master list so that all patients who had IVCFs placed were captured in the tracking system. Finally, another collaboration between interventional radiology and our anticoagulation clinic was set up. The anticoagulation clinic would follow patients on the safety net list with interventional radiology to promptly identify which patients anticoagulated and reasonable candidate for retrieval. The goal was set to retrieve filters within 9 weeks of placement, and for

interventional radiology to be the lead service in tracking and retrieval. Our initial single center study showed an increase in retrieval rate from 10%-54% and IVF follow-up from 10-99%. The results led to administrative sponsorship for regional deployment of our educational grand rounds to 14 medical centers and to regionalize tracking of filters. Regional collaboration with the regional leads for hospitalist services, critical care, pulmonology, hematology, and surgical specialties (often ordering IVCFs for pre-surgical prophylaxis) was necessary. This multi-specialty took one year to complete and the results, as discussed in the abstract (22% reduction in IVCFs and increased retrieval s by 15%, both which correlated strongly with physician attendance at grand rounds), were well-received. Further support was given to develop an automated tracking system within the workflow of the electronic medical record which was just deployed across northern California.

What challenges did you encounter? How did you overcome them?
The first major challenge was changing clinicians' understanding of IVCFs. For most, these devices were so prevalent in decades past and largely accepted without evidence. Keeping up with journals that may not be in one specialty's reading list can make changing long-held practice patterns difficult. The first challenge was to develop an efficient presentation highlighting the need for change in how we approach IVCFs. This was focused mainly on reviewing the evidence and evidence-based guidelines and long-term risks. The long-term risks question was one that was not well-studied and Dr. Wang collaborated with Kaiser Permanente Southern California to do another clinical study to shed more light on long-term complications of IVCFs. This study was recently published and has continued to be used in discussing the long-term risks of these devices with patients. The next challenge was to get multiple specialties to collaborate and spread the word. Education was key and getting people to the presentations was critical. We worked with regional leadership for multiple specialties and encouraged all to attend our grand rounds. Collaboration with hematology, critical care, pulmonology, hospitalist services, and anticoagulation clinics was central to our success. After our regional deployment the next challenge was making our tracking system more streamlined with workflows. The first version of the tracking system was housed in a regional server, but it was outside of the electronic medical record. Resources were made available to develop an automated tracking system and reporting system within the electronic medical record. This has made tracking much more efficient.

Could this project be implemented at other centers? Has the project been emulated or exported to other centers?
Absolutely. As discussed above, this project started at Dr. Wang's hospital, but then was deployed across Kaiser Northern California to 14 medical centers. Dr. Wang has also given grand rounds lectures to Kaiser Northwest and multiple facilities in Southern California.

Is this project scalable for implementation at larger or smaller practices and institutions? Why or why not?
Our Northern California practice serves over 3.5 million patients and is one of the larger regional healthcare providers. This has been scaled up from a single facility to fourteen medical centers. It can be done on a single hospital level or regional level and our results prove this.

Were patients involved in the genesis, design, or implementation of this project? If so, how?
The inspiration came from some patients who had sub-optimal outcomes with long-term IVC filters, but patients did not actually participate in this project's design or implementation.

Have educational resources or an implementation toolkit been developed as part of the project? If yes, would you be interested in collaborating with ASH to share these tools with a wider audience? If no,

would you be interested in developing these resources and collaborating with ASH to share with a wider audience?
Yes. In the right context, would be willing to share our grand rounds information.

Additional Data/Information *(optional)*

Please include any additional information you think would be helpful to provide context to your project.
We were delighted to see that IVC filters were included in the first ASH Choosing Wisely Campaign in 2013. While some academic centers have developed clinic models to follow patients with IVCFs, we believe that education is the key to changing practice patterns. Our project focused on education to change long-held practice patterns and leveraging new technology to improve tracking and follow-up of these potentially risky devices. Collaboration was key to our project's local and regional success. We appreciate the collaboration of our hematologists, pulmonologists, hospitalists, surgeons, and anticoagulation clinics.

Rachael F. Grace, MD, Boston Children's Hospital, Dana-Farber/Boston Children's Cancer and Blood Disorders Center

Institution/Practice
Dana-Farber/Boston Children's Cancer and Blood Disorders Center

Brief Bio *(max one paragraph)*:
I am an Assistant Professor of Pediatrics at Harvard Medical School and the medical director of the Boston Children's Outpatient Hematology Clinic and the Hematology Clinical Research program. In my role as director of the ambulatory hematology program, I am actively involved in following quality metrics and projects which aim to improve quality of care. My clinical work and research is focused entirely on non-malignant hematology. In 2012, I developed the pediatric Immune Thrombocytopenia (ITP) Consortium of North America (ICON), a group of 45 investigators and sites in North America focused on improving ITP care, for which Boston Children's Hospital is the data coordinating center. The consortium's studies have ranged from multicenter retrospective chart reviews, prospective observational studies, biobanking studies, to a randomized clinical trial. My other clinical and research focus is in rare hemolytic anemias. I developed the Pyruvate Kinase Deficiency Natural History Study (PKD NHS), open at >30 sites in North America and Europe, to improve our understanding of the range of symptoms, complications, monitoring, and treatment in PKD. The registry data have helped to inform the design of clinical trials in pyruvate kinase deficiency, including trials of an oral small molecule activator of pyruvate kinase and a gene therapy trial.

Project Abstract *(max 300 words)*:
An observational approach is recommended in newly diagnosed children with immune thrombocytopenia (ITP) with no or mild bleeding. This recommendation is based both on the low incidence of bleeding in childhood ITP and that studies have shown that upfront treatment does not impact the rate of future bleeding. This recommendation was highlighted in the 2014 ASH Choosing Wisely campaign. Despite this recommendation, many centers continue to treat newly presenting children with ITP with intravenous immunoglobulin (IVIG), corticosteroids, and/or anti-D globulin, likely related to both physician and family anxiety. This practice leads to many children being treated with medications who could otherwise be safely observed in the outpatient setting leading to over-utilization of resources including inpatient admissions, medication administration, and medical encounters for management of medication-related side effects. At Boston Children's Hospital, the historic consensus among hematologists was to observe newly diagnosed children with ITP in the absence of bleeding. However, the institutional historic rate of observation was only 40%. In 2012, we established a modifiable practice guideline based on local expert consensus to unify the approach to management of newly diagnosed pediatric ITP, decrease practice variation, identify and learn from deviations in decision making, and decrease resource utilization by increasing observation rates in low-risk patients. Since inception, the guideline has unified our center's initial laboratory approach, pharmacologic treatment (unifying steroid dose and duration of treatment and decreasing treatment with IVIG), and timing of follow up for all newly diagnosed children with ITP. Implementation of the initial guideline from 2012-2014, however, made no impact on observation rates, which led to a second iteration in which the guideline was modified to stratify low- and high-risk grade 3 bleeding. With this change, from 2014-present, observation rates have increased from 40% to 74% with no increase in bleeding complications.

How did the project develop? Please include information about what prompted the need for action.
At Boston Children's Hospital, the historic consensus among hematologists was to follow the 1996 and 2011 ASH ITP guidelines and observe newly diagnosed children with ITP in the absence of bleeding. With IRB approval, we performed a retrospective chart review of 524 children with ITP with a first hematology clinic visit at Children's Hospital Boston from April 2003 through June 2010. In this patient population, 60% of patients

were initially treated with pharmacologic therapy despite a low incidence of bleeding at presentation. Given the finding that our actual treatment did not match national guidelines or our stated approach, in 2012, we decided to establish a modifiable practice guideline based on local expert consensus to unify the approach to management of newly diagnosed children with ITP, decrease practice variation, identify and learn from deviations in decision making, and decrease resource utilization by increasing observation rates in low-risk patients. In addition, during this time period, the hospital provided financial support to implement such guidelines, collect data about management and treatment decisions, and periodically analyze the findings to iteratively modify the guideline. Given the success of the project, the guideline continues to be implemented in clinical care at our institution.

What challenges did you encounter? How did you overcome them?

Several challenges have been identified as the guideline was first implemented and as iterative changes have been made. The greatest initial challenge was coming to an internal consensus on the guideline given the lack of evidence in many aspects of the management childhood ITP. For example, the group initially had differences in opinion and, for some, equipoise, with regard to treatment with IVIG versus corticosteroids in those patients who present with moderate bleeding. This challenge was resolved by giving an option of either treatment, with dosing guidance, in those that required treatment. With analysis of the first iteration, all but one treated patient received corticosteroids, and, thus, the next iteration directed treatment to corticosteroids. Surprisingly, implementation within the group was straightforward and trainees, in particular, appreciate having a guideline to improve consistency in management across supervising physicians. Many patients continued to present to the ER with new thrombocytopenia, but our hematologists have been able to guide the ER physicians to manage the patients according to the guideline with close follow up in our ambulatory hematology clinic. Despite practice changes, we were surprised that our first algorithm did not increase the overall rate of observation of newly diagnosed ITP patients. The Buchanan and Adix bleeding score guided treatment decisions (Buchanan et al, J Pediatr 2002). Upon review of the data, it became clear that the clinicians interpreted grade 3 bleeding in different ways. We then collected more detailed information about the patients' bleeding symptoms and physicians' comfort level with those symptoms and provided more clear guidance about delineating mild bleeding symptoms that could potentially be observed. This modification has helped to increase the rate of observation without increasing the rate of bleeding.

Could this project be implemented at other centers? Has the project been emulated or exported to other centers?

It would be straight forward to implement this project at other centers. In addition, similar algorithms could be created to support treatment and management of adult patients with ITP. A different ITP management guideline was implemented in Montreal in 2013, and this group also found similar improvements with an increase in outpatient management, increase in observation, and more consistent prescribing practices for individual treatments (Labrosse R et al. Act Paediatrica 2017). The ITP Consortium of North America (ICON), a pediatric research collaborative of 45 institutions in the US and Canada, has discussed expanding this guideline to other centers and considered implementation more broadly. Several centers have recently approached their group about implementation of this or a similar guideline. Depending on the geography of individual practices and practice preferences, the guideline may need to be modified slightly to improve acceptability and uptake within a larger group of clinicians. In practices in which oncologists cover hematology patients on the weekends and nights, implementation of this guideline may be particularly beneficial.

Is this project scalable for implementation at larger or smaller practices and institutions? Why or why not?

Implementing a modifiable practice guideline for management of newly diagnosed children with ITP is scalable at both smaller and larger centers. Smaller centers may see new ITP patients infrequently and therefore benefit from guidelines to increase consistency over long periods of time. Larger centers may have many practitioners

covering hematology who primarily see oncology patients or other types of non-malignant hematology patients and may also benefit from guidelines to decrease provider-specific variability in management. From a clinical practice perspective, the algorithm and the associated data forms can be used regardless of the size of the institution. Depending on the geography of individual practices and practice preferences, the guideline may need to be modified slightly to improve acceptability within various practices and institutions. From a quality perspective, if institutions work together, the smaller centers can be more certain that their care according to the algorithm is both safe and cost effective and they can be part of collaborative iterative changes. If institutions work alone, smaller centers may find that the algorithm is more of a clinical practice guideline rather than truly modifiable due to the small number of new ITP patients seen per year.

Were patients involved in the genesis, design, or implementation of this project? If so, how?
Patients have not been involved in the genesis of the project. In the future, integrating patient and parent surveys of health-related quality of life would help to continue to evaluate how ITP management impacts patient and family well-being. ICON has a partnership with the Platelet Disorder Support Association (PDSA), and it would be helpful to partner with this group on this project and the design of the management guideline, particularly if implementation is being considered more broadly to other centers.

Have educational resources or an implementation toolkit been developed as part of the project? If yes, would you be interested in collaborating with ASH to share these tools with a wider audience? If no, would you be interested in developing these resources and collaborating with ASH to share with a wider audience?
The toolkit for this project includes the management algorithm for newly diagnosed children with ITP, data collection forms (clinicians complete these at the time of the encounters), and the elements of a REDCAP database. By collaborating with ASH, these could be readily shared with a wider audience. I would be interested in collaborating with ASH on creating patient education resources, so that patients and their families could feel comfortable with the management algorithm, particularly with a close observation approach. The Platelet Disorder Support Association has some of these resources available and may be willing to partner with ASH on this project as well.