TEXAS MEDICAL ASSOCIATION
Physicians Caring for Texans

# *TexMed 2017 Quality Research Abstract*

**Description and Selection Criteria**

- Applicants should demonstrate an understanding of systematic investigation through research development, testing and evaluation designed to develop or contribute to generalizable knowledge. Judges will use the scoring described in this matrix to identify projects to be presented at the conference, as well as, projects to be considered for the awards.
- The focus for Quality Research abstracts is any project that is conducted with an intent to answer a research question or test a hypothesis related to quality improvement (QI). It is also intended to develop or contribute to generalizable knowledge. Projects in Quality Research need to have approval from an Institutional Review Board or have a formal letter of exemption. Traditional QI activities, on the other hand, cover the gamut of projects that are:
  - aimed at improving local systems of care, or improving the performance of institutional practice;
  - designed to bring about immediate improvements in health care delivery; or
  - intended to compare a program/process/system to an established set of standards such as standard of care, recommended practice guidelines, or other benchmarks.

  If you have a question about whether your project is Quality Research or a QI project, please contact us.
- These submissions should provide general information related to the one of the following categories: patient safety, patient centered care, equity, timeliness, efficiency, or effectiveness.
- Maximum points delineated with a brief explanation of the content that should be included under each section. Applicants may describe the problem and results in narrative or graphic format.

**PROJECT NAME:** Getting to Choosing Wisely: The Value of a PE Clinical Decision Tool to Enhance Appropriateness of Care

**Institution or Practice Name: University of Texas Health San Antonio**

**Setting of Care: Hospital setting; with focus on internal medicine services**

**Primary Author:** Gilda Digman

**Secondary Author:** Hallie E. Baer, MD

**Other Members of Project Team:** Taylor D. Hicks, MD, Georges M. Haidar, MD, Maureen K. Sheehan, MD, Matthew J. Sideman, MD, Lori L. Pounds, MD, Mark G. Davies, MD, PhD, MBA

**Is the Primary Author, Secondary Author or Member of Project Team a TMA member (required)?**

☒ Yes ☐ No

Please provide name(s): Gilda Digman

**Project Category:** *(Choose all categories)*

| | | | |
|---|---|---|---|
| ☒ Patient Safety | ☐ Patient Centered Care | ☐ Timeliness | ☐ Enhanced Perioperative Recovery |
| ☒ Efficiency | ☒ Effectiveness | ☐ Equity | ☐ Disaster Medicine & Emergency Preparedness |

For this poster session, TMA is looking for research projects that demonstrate the six aspects of Quality Care as defined by the Institute of Medicine.

- Safe - avoids injuries to patients from care that is intended to help them
- Timely - reduces waits and delays for both those who receive care and those who give care
- Effective - based on scientific knowledge, extended to all likely to benefit, while avoiding underuse and overuse
- Equitable - provides consistent quality, without regard to personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status
- Efficient - avoids waste, including waste of equipment, supplies, ideas, and energy
- Patient centered - respects and responds to individual patient preferences, needs, and values, ensuring that patient values guide all clinical decisions

**Introduction (15 points max):** *Describe 1) where the work was completed; 2) what faculty/staff/patient groups were involved, and 3) sufficient background information provided to establish the significance of the problem.*

Pulmonary embolism (PE) is a potentially life-threatening emergency that results from a blood vessel occlusion in the lungs. It is the third most common cause of cardiovascular death, affecting between 300,000 to 600,000 patients annually. Patients often present with non-specific symptoms, including unexplained sudden onset of dyspnea, tachypnea, pleuritic chest pain, syncope, tachycardia and/or hemoptysis, which makes it a challenging diagnosis for physicians as there is no single non-invasive test for all patients. This often leads to ordering expensive imaging such as computed tomography pulmonary angiography (CT PE Protocol), which has a negative predictive value (NPV) of 98.7% to 99.9%, but an overall low diagnostic yield (10-20%). However, reflexive use of imaging such as CT PE Protocol is not without risk to patients (increased life-time risk of malignancy, contrast induced nephropathy, and hypersensitivity reactions) and clinical tools such as Wells Criteria and D-dimer levels are validated non-radiographic methods to rule out PE. D-dimer has a NPV of 99.8%, which is comparable to that of CT PE, suggesting it may safely exclude PE. By using a clinical decision tool, it will likely increase diagnostic yield and effectively reduce diagnostic time, cost, and potential complications. The aim of this study was to determine our diagnostic yield of CT pulmonary angiography and implement a clinical decision making tool to reduce overutilization at the University Health Systems hospital in San Antonio, TX. Involved parties included mainly the Vascular department, Internal medicine department, and Emergency department for this study.

**Hypothesis (15 points max):** *State the pertinent research or change hypothesis. Using if/then format, describe the 1) assumption; 2) condition; and 3) prediction(s).*

If an embedded clinical decision tool is embedded into the EMR with Wells criteria and subsequent guidance on diagnostic tools to order, then the diagnostic yield of CT pulmonary angiography will increase at the UHS hospital while decreasing overuse of potentially harmful radiologic imaging to patients and reducing cost and time in diagnostics.

**Methods (25 points max):** *Describe the specific methods, resources, procedures, models and/or programs used to study and test the subject of the investigation. Note charts, graphs and tables here and send as addendum with abstract form.*

A retrospective chart review of all patients (699) who underwent CT pulmonary angiography from January to June 2016 was completed. Results were classified as positive, negative, or non-diagnostic based on the final report by board-certified radiologists. An electronic medical document utilizing Wells criteria was then created with embedded order links for D-Dimer and CT pulmonary angiography based on score. Physician education and introduction of the document was focused on the internal medicine services. Post-intervention data was then collected from November 2016 to January 2017 with a total of 458 CT scans completed. Comparison of positive results within the two time periods was completed with specific diagnostic rates focused on the internal medicine services where the diagnostic tool was implemented and the entire hospital as a whole.

**Results (25 points max):** *Specifically explain what was discovered, accomplished, collected and/or produced; supports hypothesis and conclusions with adequate evidence and includes quantitative data. Note charts, graphs and tables here and send as addendum with abstract form.*

During the pre-intervention period, a total of 699 patients underwent CT pulmonary angiography. Of the 699 patients, positive results in 7.3% were seen and 91.5% were negative. Patients with a high modified Wells score made up 64.2% of patients with 10.2% resulting in positive CT pulmonary angiography. During post-intervention, 458 patients underwent CT pulmonary angiography and 7.4% resulted in a positive result. When isolating the internal medicine ward, where the diagnostic tool was implemented, the diagnostic yield increased from 3.5% to 10.9%, a significant difference compared to the change in diagnostic yield of the hospital where implementation had not yet begun.

**Conclusions (20 points max):** *Provide a succinct interpretation of the results and evaluate what the results mean to the investigation, OR evaluate the relevance or uniqueness of what was accomplished in the immediate context of the project's purpose and describe how the investigation fits within a larger field.*

Overutilization of CT Pulmonary Angiography is a pervasive problem with national diagnostic rates of only 10-20%. Our results demonstrate a diagnostic rate below the national average, but confirm the well-established validity of a Wells Criteria as a clinical decision making tool. Furthermore, as evidenced by the improved diagnostic rate of the internal medicine service, education and systematic tools can effectively aid physician decision making, thereby reducing cost, increasing diagnostic time, and reducing unnecessary risk to patients.

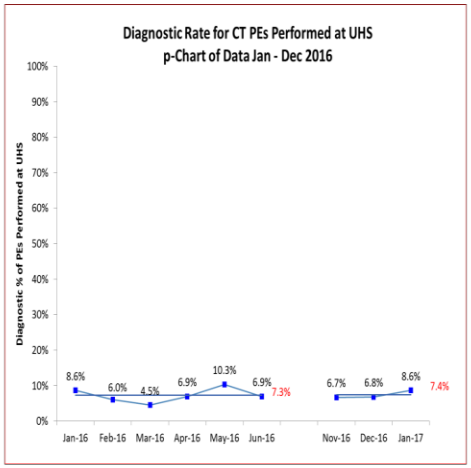
# Getting to Choosing Wisely: The Value of a PE Clinical Decision Tool to Enhance Appropriateness of Care

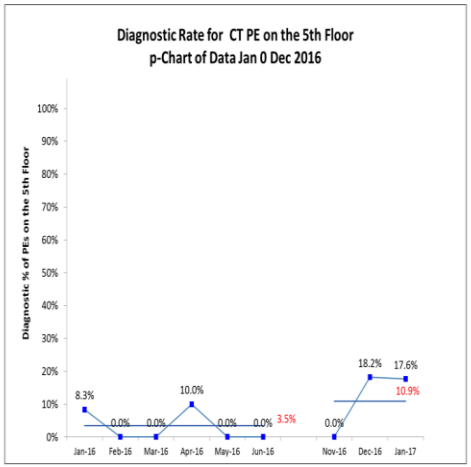
## Objective

Pulmonary embolism (PE) is third most common cause of cardiovascular death. Non-specific symptoms, including unexplained sudden onset of dyspnea, tachypnea, pleuritic chest pain, tachycardia and/or hemoptysis, make it a challenging diagnosis which often leads to the reflexive use of imaging such as computed tomography pulmonary angiography (CT PE). Clinical tools such as Wells Criteria and D-dimer levels are validated non-radiographic methods to rule out PE. By using a clinical decision tool, it will likely increase diagnostic yield and effectively reduce diagnostic time, cost, and potential complications. The aim of this study was to determine our diagnostic yield of CT PE and implement a clinical decision making tool to reduce overutilization

## Methods

A retrospective chart review of all patients (699) who underwent CT PE from January to June 2016 was completed. Results were classified as positive, negative, or non-diagnostic based on the final report by board-certified radiologists. An electronic medical document utilizing Wells criteria was then created with embedded order links for D-Dimer and CT pulmonary angiography based on score. Physician education and introduction of the document was focused on the internal medicine services. Post-intervention data was then collected from November 2016 to January 2017 with a total of 458 CT scans completed.




## Results

Diagnostic yield for the interval medicine service was 10.9% (post-intervention) versus 3.5% (pre-intervention).

Pre-Intervention: 699 patients

Positive CT PE: 7.3% (51 patients) Negative CT PE: 91.5% (639 patients) Non-Diagnostic CT PE: 1.3% (9 patients)

High Modified Wells Score: 64.2% (449 patients)

Negative CT PE: 88.4% Positive CT PE: 10.2%

Low Modified Wells Score: 35.8% (250 patients)

Negative CT PE: 96.8% Positive CT PE: 2%

Post-Intervention: 458 patients

Positive CT PE: 7.4% (34 patients) Negative CT PE: 91.9% (421 patients) Non-Diagnostic CT PE: 0.7% (3 patients)

## Conclusion

Overutilization of CT Pulmonary Angiography is a pervasive problem with national diagnostic rates of only 10-20%. Our results demonstrate a diagnostic rate below the national average, but confirm the well-established validity of a Wells Criteria as a clinical decision making tool. Furthermore, as evidence by the improved diagnostic rate of the internal medicine service, education and systematic tools can effectively aid physician decision making.

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