



# Survey of Pulmonary Embolism Risk Stratification Methods in the Emergency Department and Barriers to Electronic Health Record Documentation

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## INTRODUCTION

- Pulmonary Embolism (PE) is major cause of morbidity & mortality.
- Diagnosis is essential; untreated PE has 30% mortality rate.
- Computer tomography pulmonary angiogram (CTPA) is standard of care to diagnose PE.
  - CPTA is expensive, exposes patients to radiation and increases risk of contrast induced nephropathy.
  - **Only 5% of CTPAs performed are positive for PE signifying that many unnecessary tests are being performed.**
- To address this gap, **Pre-Test Probability (PTP) tools** exist to safely **exclude** patients with low risk of PE & **limit** iatrogenic harm from over testing.
- Despite tools being developed > 20 years ago, they are not widely available in electronic health record (EHR) systems and even when they are built in, **uptake remains low.**

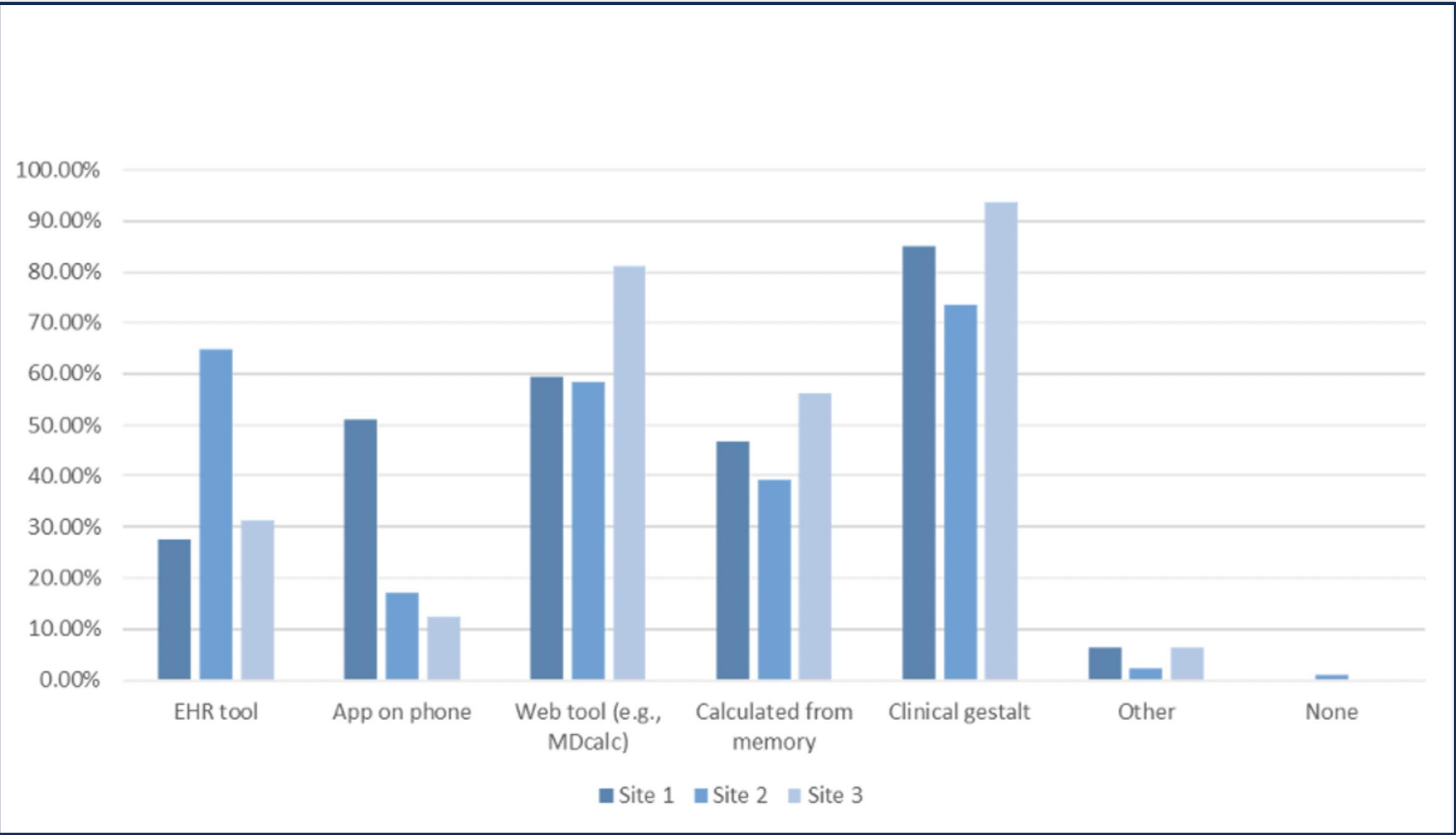
## AIM

- To **assess usability** of EHR tools, our team conducted a survey with ED clinicians.
- **Survey** was created:
  - to identify which **PE risk stratification methods** were employed by ED clinicians (EHR embedded PTP tool, apps on their phone, web applications like MDcalc, calculations from memory, or if they relied on clinical gestalt)
  - to **identify barriers** to using EHR embedded PTP.

## RESULTS

- Number of Responses
  - Site 1 had 47.
  - Site 2 had 94.
  - Site 3 had 16.
- Key findings from survey (Fig. 1)
  - Clinicians used variety of risk stratification approaches.
  - Few clinicians documented their risk assessments in structured fields in medical record.
  - Clinical gestalt was most used PE risk stratification approach - across all 3 test sites.
- Health system with PTP prompt before clinicians could proceed with CTPA order (Site 3) did not have higher % of clinicians who reported using EHR embedded tool than sites that did not prompt clinicians to fill in PTP.
- Clinicians cited a variety of different barriers to using EHR embedded PTP tool (Table 1)

**Figure 1. Pulmonary embolism risk stratification approaches used by Emergency Department clinicians to aid in the diagnosis of pulmonary embolism**



**Table 1. Barriers identified by ER clinicians to using EHR embedded Pre-Test Probability tool**

| Rationale   | # Responses (%) | EHR Build Related |
|---|-----------------|-------------------|
| Total number of responses   | 82 (100%)       | N/A               |
| Difficulty locating tool in EHR   | 16 (20%)        | ✓                 |
| Not aware of or unfamiliar with tool in EHR                               | 14 (17%)        | ✓                 |
| Takes extra time / more clicks  | 11 (13%)        | ✓                 |
| Used to using other methods / habit                                       | 9 (11%)         | ✓                 |
| Cannot navigate chart while using EHR tool                                | 7 (9%)          | ✓                 |
| Prefer clinical gestalt   | 7 (9%)          | ✓                 |
| Prefer calculating from memory  | 3 (4%)          | ✓                 |
| Prefer app on phone   | 3 (4%)          | ✓                 |
| Prefer PERC   | 3 (4%)          | ✓                 |
| Prefer modified Geneva and/or YEARS criteria                              | 3 (4%)          | ✓                 |
| Prefer not to have PERC and Wells combined (Specific to site 2)           | 3 (4%)          | ✓                 |
| Prefer to choose tool rather than linking to CT scan (Specific to Site 3) | 3 (4%)          | ✓                 |

**Survey on PTP assessments in ED setting can help inform further research that is needed to continue to improve diagnosis of PE.**

## METHOD

- 3 large integrated health systems, across 5 states (MA, WI, MN, AZ, FL) built electronic PTP assessments into Epic EHR systems to safely exclude patients with low risk of PE and limit over testing.
- Two sites made PTP optional; one site made it forced function (providers were forced to complete PTP prior to ordering CTPA)
- All 3 sites conducted the survey.

## CONCLUSIONS

- While many clinicians use PTP criteria to aid in PE diagnosis, risk factors and scores from phone apps, web tools, and calculations from memory are unlikely to be documented in patients' medical record, which means that they are not accessible to all members of ED care team and cannot be used for electronic clinical quality measure.
- Biggest hurdles to increasing use of structured PTP assessments in ED setting to exclude PE & limit iatrogenic harm are:
  - 1. Obtaining buy-in from ED clinicians** that PTP tools provide value over clinical gestalt, at least for subset of patients who could most benefit
  - 2. Identifying best practices** for incorporating PTP tools into EHR systems that make the tools easier to access & use
  3. Developing and implementing **effective education and awareness programs** around PTP tools.

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