INTRODUCTION

Physicians evaluating patients for a possible pulmonary embolism (PE) use Clinical Decision Rules (CDRs) to decide whether to proceed to CT pulmonary angiography (CTPA).

Two CDRs, the Wells’ rule and Geneva score have been validated in populations, and have good negative predictive value (NPV) but poor positive predictive value (PPV).

A D-dimer (a measure of fibrinolysis) can be used as adjunct to refine the predictive value of a CDR.

Clinicians often use a negative D-dimer to “rule-out” PE.

OBJECTIVES

To determine the predictive values of the CDRs in our patient population at UCDMC.

To determine if any element of the CDRs was independently predictive of PE.

To determine if the addition of a negative D-dimer test to a low or intermediate CDR improved the negative predictive values.

To determine the relationship of CDRs and D-dimer to the extent of PE as determined by CTPA.

METHODS

CDRs: Imaging reports for all patients referred for CTPA to evaluate for PE between 2012 and 2015 were screened, yielding 894 charts. Elements of the CDRs were recorded, and were results of D-dimer testing.

Groups were analyzed by CDR score (low-intermediate-high) and age-adjusted D-dimer (age x 10 over age 50).

Clot burden: CTPA images were analyzed for clot burden using a published scoring system (1 = sub-segmental clot, 32 = saddle embolus).

Logistic regression was used to model the probability of PE by each score, test element, and other clinical characteristics.

Saddle Pulmonary Embolism with Clot Score of 32

RESULTS

Characteristics of the Study Population that differed significantly (P<0.05)

<table>
<thead>
<tr>
<th>Variable</th>
<th>High Risk (N=674)</th>
<th>Low Risk (N=125)</th>
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<tbody>
<tr>
<td>Signs of DVT</td>
<td>61 (9.1%)</td>
<td>88 (6.9%)</td>
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<tr>
<td>Unilateral Limb Pain</td>
<td>97 (15.0%)</td>
<td>45 (31.6%)</td>
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Well’s rule and Geneva score

The overall incidence of PE was 15.3%, [5.3% in low CDR, 12.2% in intermediate CDR, and 41.5% in high CDR]

A negative D-dimer did not “rule out” PE.

Addition of negative D-dimer in patients with intermediate risk Well’s Rule and Geneva Score increased the NPV by 5.5% and 7.2% respectively, but did not improve the NPV in patients with low risk.

CONCLUSIONS

Neither CDR predicted the extent of clot burden on CTPA.

A negative D-dimer was always associated with a low clot burden (<4), irrespective of CDR.

Signs of DVT and Unilateral limb pain stand out as predictive of pulmonary embolism – no other elements were predictive.

Using D-dimer in patients with intermediate risk CDRs increases the NPV of those CDRs.

Clot burden cannot be reliably predicted using a CDR.

A negative D-dimer does not “rule out” a PE, but is associated with a low clot burden.

Christopher Little1, Jacob Ortiz MD1, Rabia Saeed MD1, Blyth Durbin-Johnson PhD2, Saul Schaefer MD1,2

1Department of Internal Medicine, Division of Cardiovascular Medicine, University of California Davis, 2 Cardiology Section, Department of Veteran Affairs, Northern California Health Care System, 3Department of Public Health Sciences