

Evaluation of the medical procedures on an administrative database to identify patients with suspected preeclampsia in the Brazilian Private Healthcare System

Rodrigo Ho, Mariana Mioti, João Carvalho, Marisa D'Innocenzo, Adriana Vassalli, Micha Nussbaum

Roche Diagnostic, São Paulo, SP, Brasil.



Disclosure

- Rodrigo is employee of Roche Diagnostic
 - This study was sponsored by Roche Diagnostic
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Preeclampsia (PE)

A serious hypertensive disorder in pregnancy¹



- Defined² as a **new onset** of
 - **Hypertension** (> 140 / 90 mmHg)
 - **Proteinuria**

And/or

Evidence of maternal acute kidney injury (AKI), liver dysfunction, neurological features, hemolysis or thrombocytopenia, or fetal growth restriction.

after 20 weeks of gestation

>500 000



Fetal and neonatal deaths²

>70 000

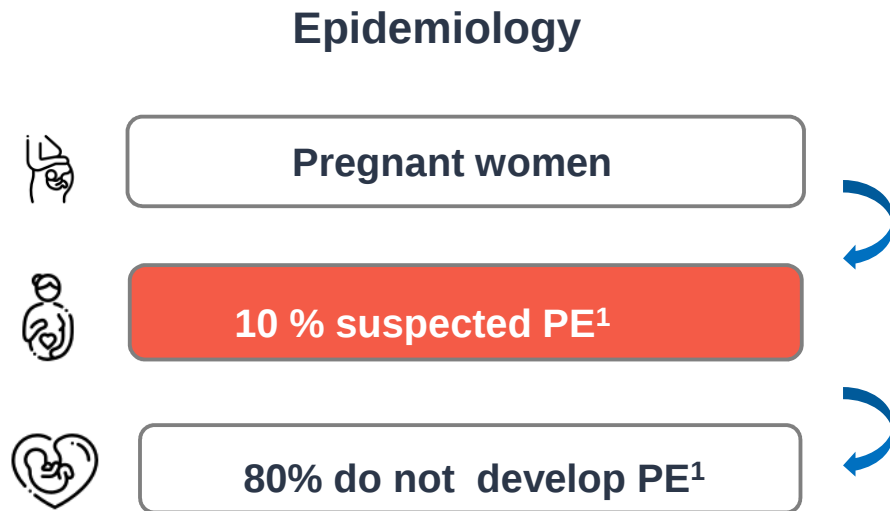


Maternal deaths²

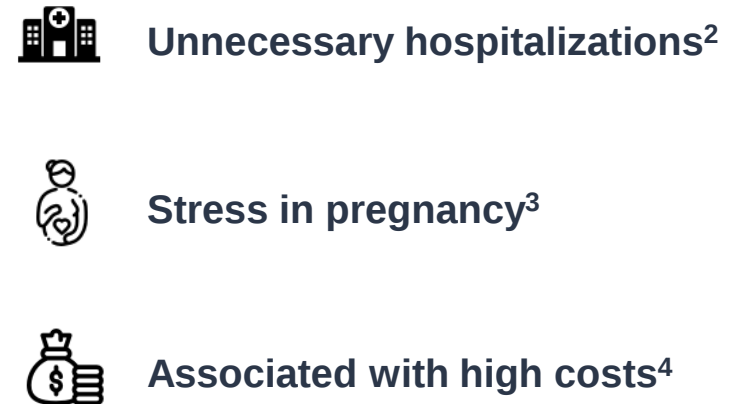


Preeclampsia

Epidemiology



Patient with suspected PE

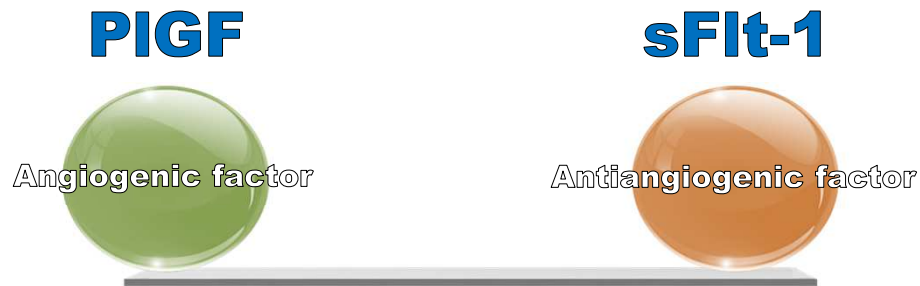


There is no technology incorporated in Brazil to improve the management of these patients.

¹Milne F, Redman C, Walker J, Baker P, Black R, Blincowe J, et al. Guidelines: Assessing the onset of pre-eclampsia in the hospital day unit: Summary of the pre-eclampsia guideline (PRECOG II). BMJ. 2009;339(7721):626–8. ². Caillon H, Tardif C, Dumontet E, Winer N, Masson D. Evaluation of sFlt-1/PlGF ratio for predicting and improving clinical management of pre-eclampsia: Experience in a specialized perinatal care center. Ann Lab Med. 2018;38(2):95–101. ³. Schetter C, Tanner L. Anxiety, depression and stress in pregnancy: implications for mothers, children, research, and practice. Curr Opin Psychiatry. 2012;25(2):141–8. ⁴. Figueira, S. F. et al. (2018). Pregnancy Hypertension, 13(December 2017), pp. 30–36. doi: 10.1016/j.preghy.2018.04.014.

sFlt-1:PIGF ratio in women with suspected PE

► Biomarkers associated with PE



► Clinical utility

The sFlt-1:PIGF ratio test has the potential to improve clinical decisions and generate savings

2



Context



1

Payers



Real world evidence

In order to incorporate the sFlt-1:PIGF ratio test, payers are requesting HEOR studies with real world data from their patients

2

ICD

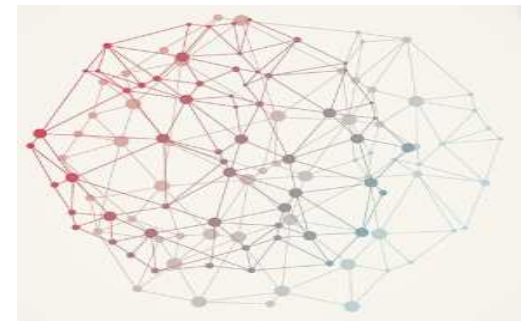


Lack of ICD code

PE has ICD code, but suspected PE does not have it

3

Algorithm



Database analysis

An algorithm was developed to identify patients with suspected PE in an administrative database

Algorithm development

Q. Identify similarities among patients before PE diagnosis



Suspected of PE



**Procedures use to
manage these
patients**



Diagnosis of PE

Algorithm development



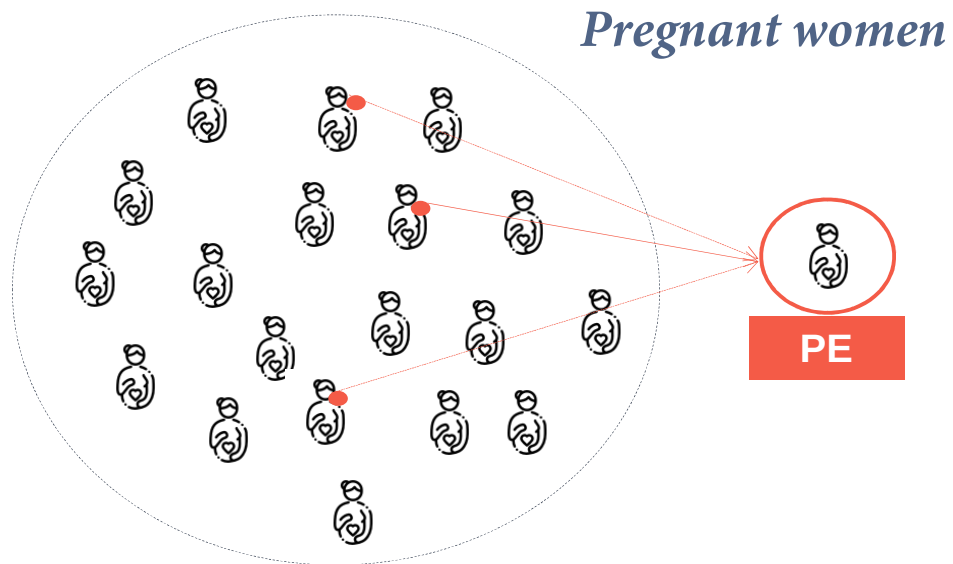
Steps to develop the algorithm



Data collection of the private healthcare system in Brazil



Data collection



ICD 10	Description
O14	Gestational [pregnancy-induced] hypertension with significant proteinuria
O14.0	Moderate pre-eclampsia
O14.1	Severe pre-eclampsia
O14.9	Pre-eclampsia, unspecified

Time horizon: **January 2016 to December 2017**

Patients with PE were extracted from database using the ICD codes

Algorithm development



Steps to develop the algorithm



Data collection of the private healthcare system in Brazil



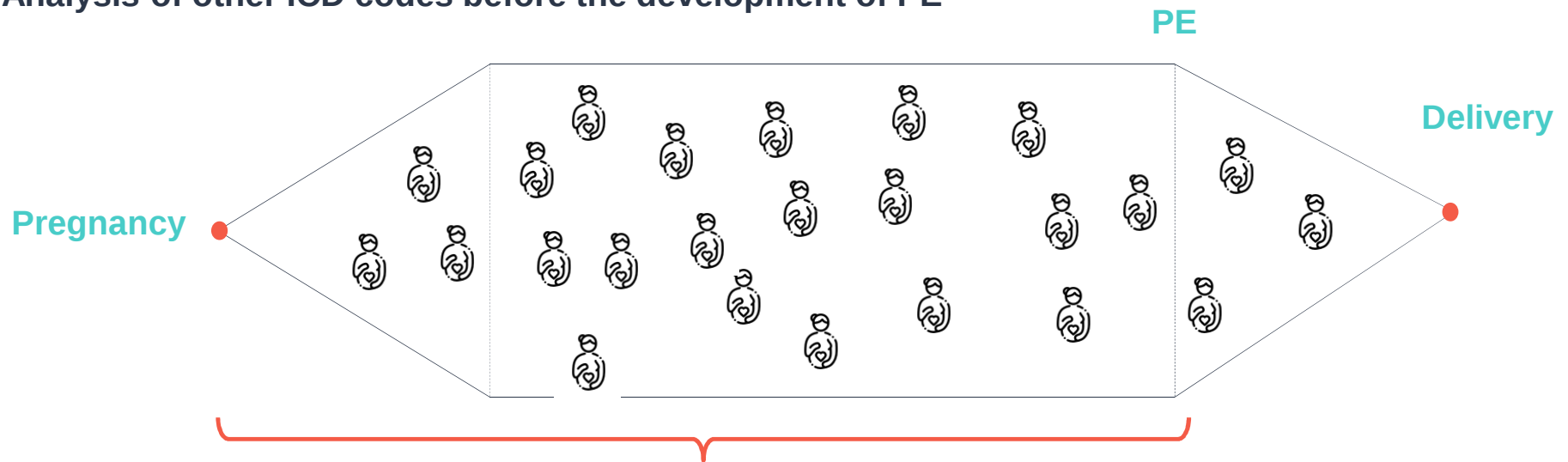
Analysis of ICD codes prior to the development of PE



Analysis of ICD

Restrospective study

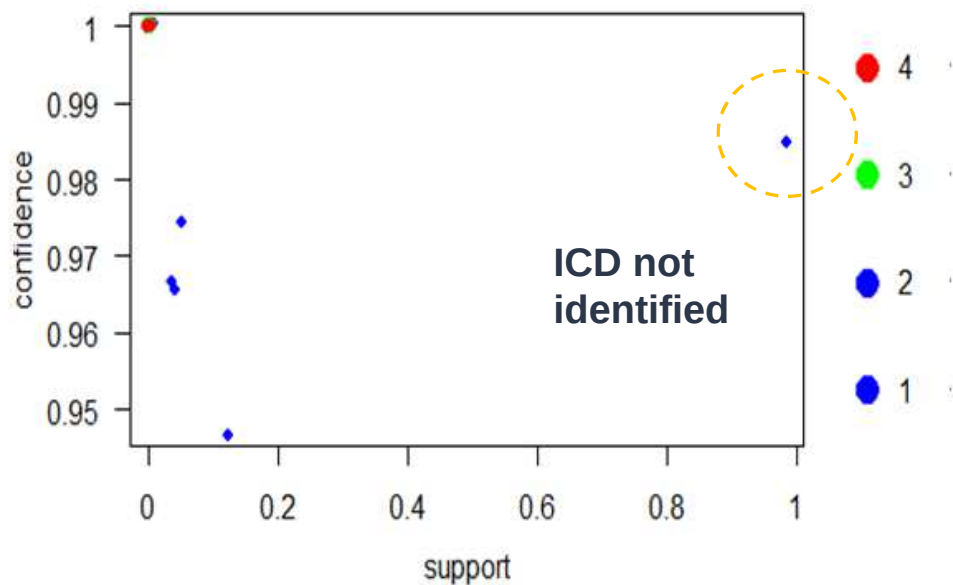
Analysis of other ICD codes before the development of PE



727 patients were analysed with 45 different ICD codes

Analysis of ICD

Restrospective study



Confidence: conditional probability

Support: frequency of occurrence

98.6%

Patient had procedures
with ICD not identified

The analysis considered only patients with procedures with ICD not identified

Algorithm development



Steps to develop the algorithm



Data collection of the private healthcare system in Brazil



Analysis of ICD codes prior to the development of PE



Evaluation of the occurrence of procedures that were possible associated with the management of patient with suspected PE



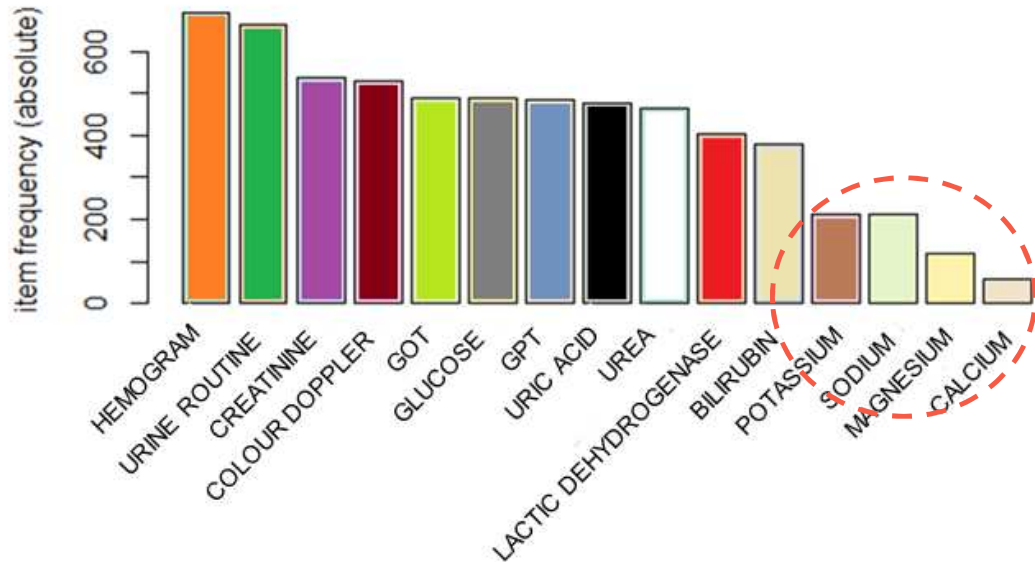
Procedures evaluated

PROCEDURES
BILIRUBIN
CREATININE
LACTIC DEHYDROGENASE
GLUTAMIC OXALOACETIC TRANSAMINASE (GOT)
GLUTAMIC PIRUVIC TRANSAMINASE (GPT)
HEMOGRAM
UREA
URINE ROUTINE EXAMINATION
COLOUR DOPPLER
URIC ACID
POTASSIUM
SODIUM
MAGNESIUM
GLUCOSE
CALCIUM

Procedures

Procedures that occur before the preeclampsia ICD code

Absolute item frequency*



* Only procedures that occur 112 days prior to delivery

Analysis



Frequency of measuring the levels of K^+ , Na^+ , Mg^+ and Ca^{2+} were very low

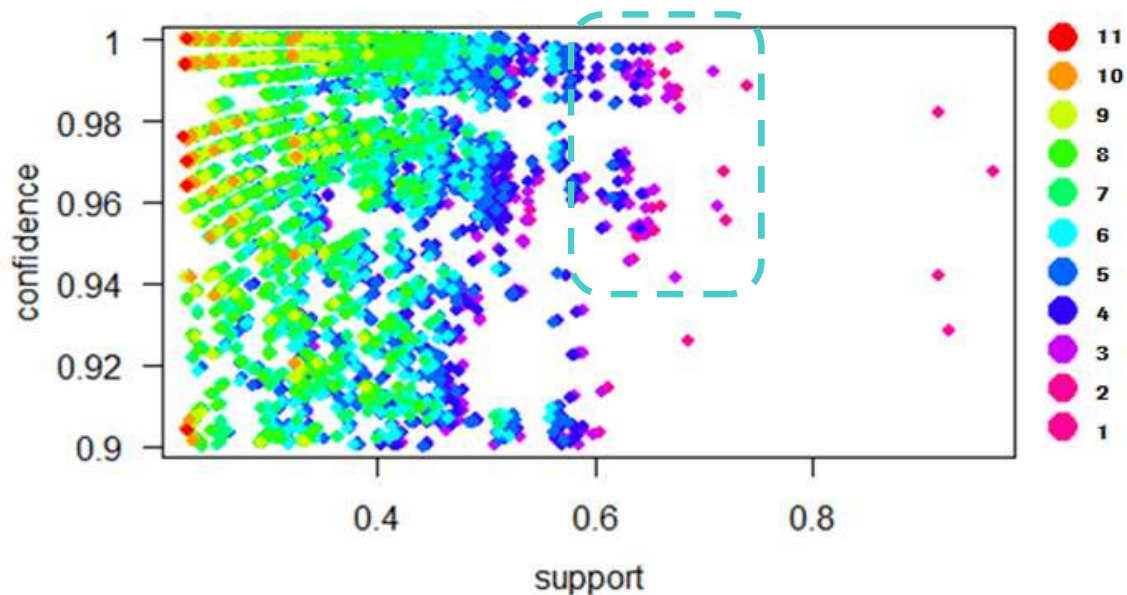


They were not considered in the analysis

Procedures

Procedures that occur before the preeclampsia ICD code

Combination of procedures



Conditional probability

{}	=>	{URINE ROUTINE}
{LACTIC DEHYDROGENASE}	=>	{HEMOGRAM}
{BILIRUBIN}	=>	{LACTIC DEHYDROGENASE}
{LACTIC DEHYDROGENASE}	=>	{BILIRUBIN}
{GLUCOSE}	=>	{URINE ROUTINE}
{URIC ACID}	=>	{LACTIC DEHYDROGENASE}
{BILIRUBIN}	=>	{CREATININE}
{LACTIC DEHYDROGENASE}	=>	{GOT}

Clusters were created with 3 and 4 procedures

Algorithm development



Steps to develop the algorithm



Data collection of the private healthcare system in Brazil



Analysis of ICD codes prior to the development of PE



Evaluation of the occurrence of procedures that were possible associated with the management of patient with suspected PE



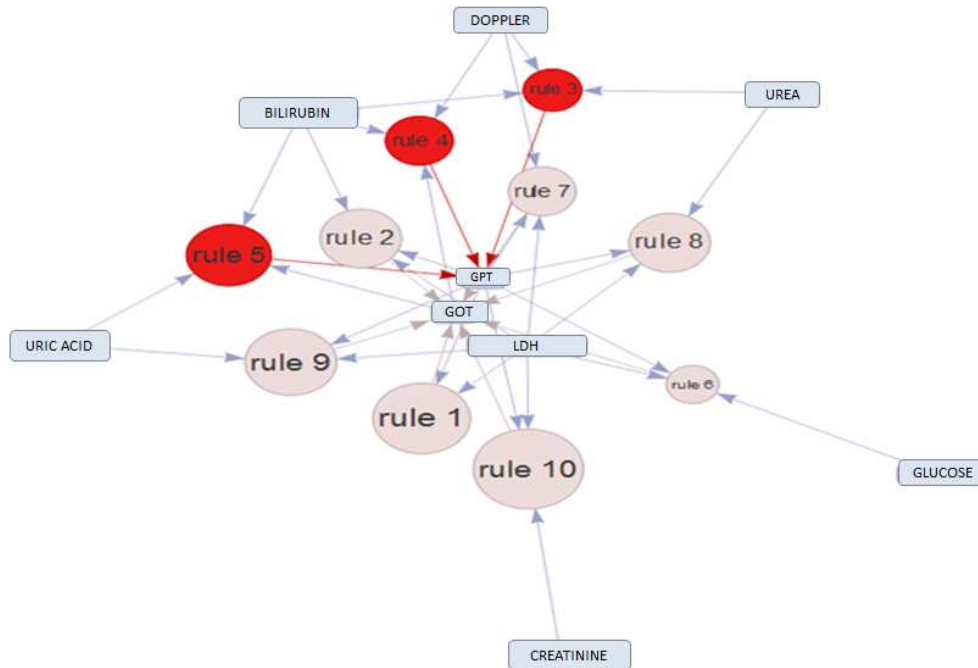
Algorithm development that can identify patient with suspected PE



Algorithm development

Cluster development

► Probability of combination were studied



► Clusters of procedures

The number of procedures and their combination were chosen based on their **accuracy**

 *Sensibility*

 *Specificity*

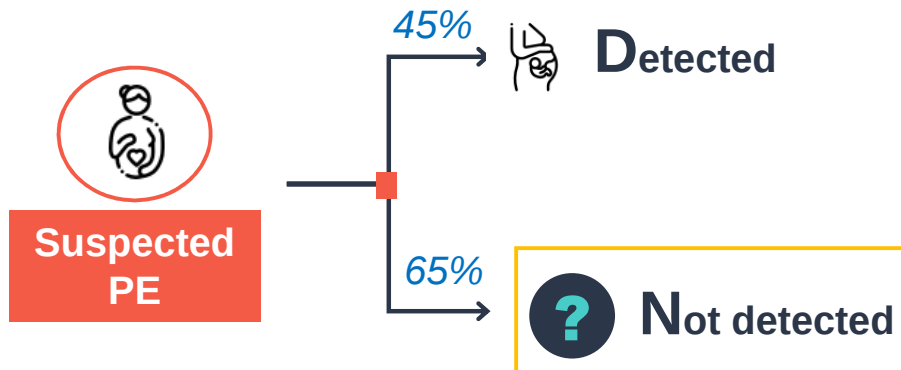
Algorithm development

Testing the sensibility and specificity



Evaluation of accuracy of each cluster

▶ Testing cluster of procedures



▶ Cluster 1

LACTIC DEHYDROGENASE
GPT
GOT
COLOUR DOPPLER



Sensibility = 45%

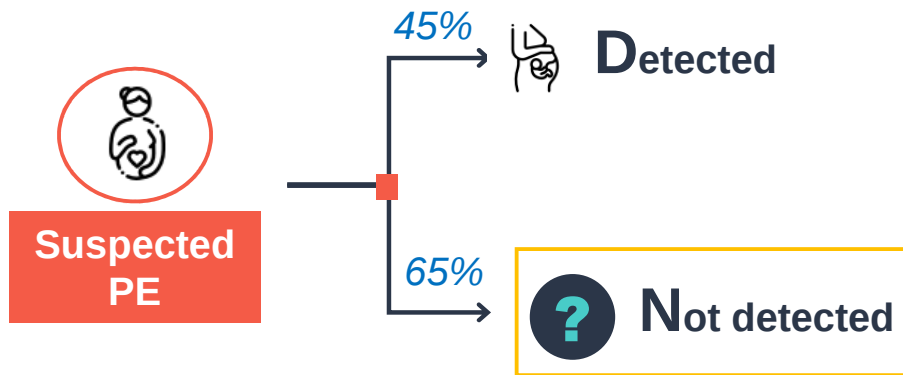
Specificity = 88%



Need to combine new clusters to increase the sensibility

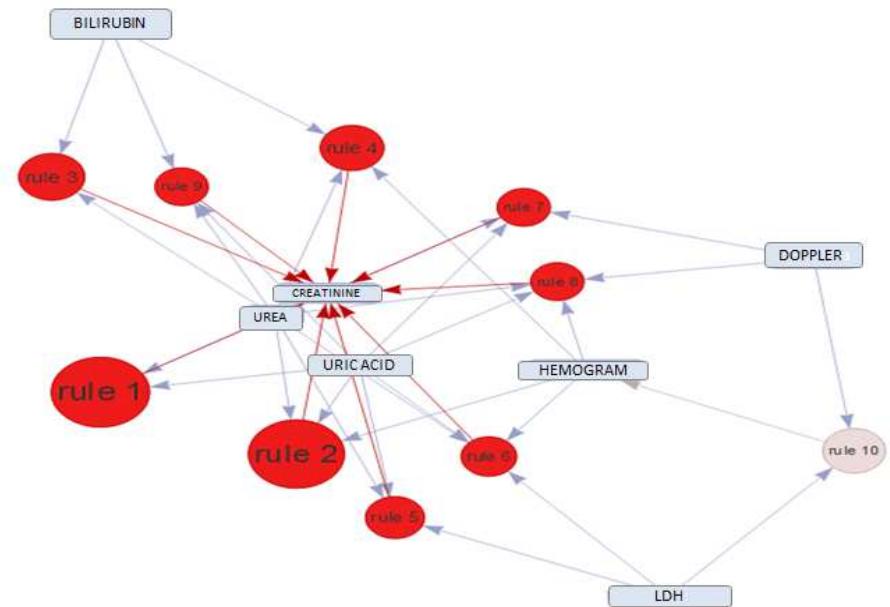
Algorithm development

New clusters development



- ▶ New clusters were developed based on undetected patients

▶ Probability of new combination



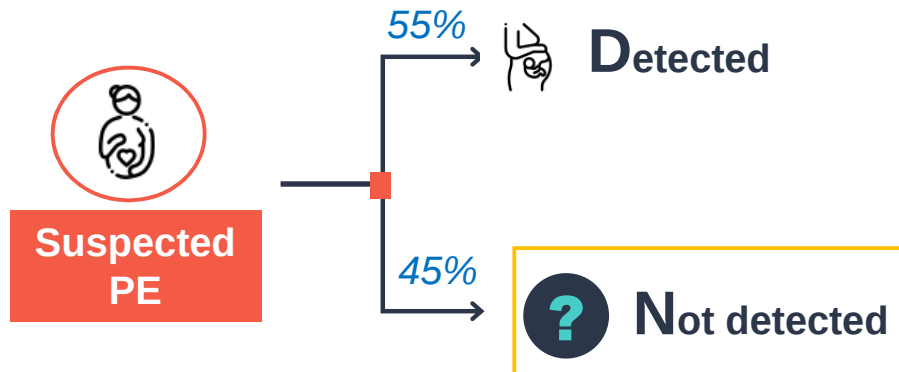
Algorithm development

Testing the sensibility and specificity



Evaluation of clusters combination accuracy

Cluster 1 + Cluster 2



Cluster 1



Sensibility = 45%

Specificity = 88%



Cluster 1 + Cluster 2



Sensibility = 55%

Specificity = 83%

Cluster 2

CREATININE
UREA
COLOUR DOPPLER

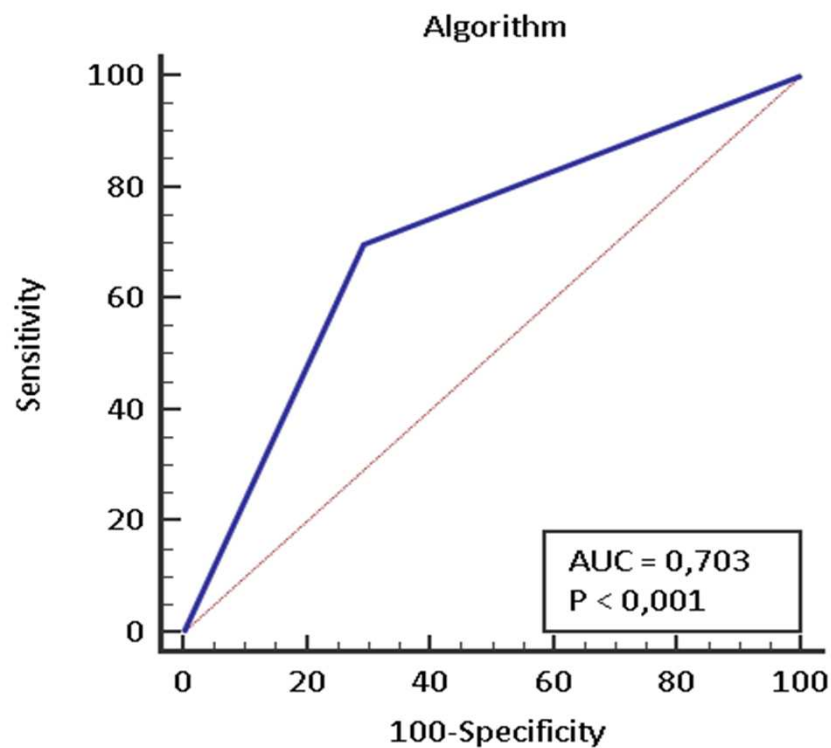
Algorithm development

Testing the sensibility and specificity

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
LACTIC DEHYDROGENASE	CREATININE	HEMOGRAM	GOT	LACTIC DEHYDROGENASE
GOT	UREA	URIC ACID	LACTIC DEHYDROGENASE	URIC ACID
GPT	COLOUR DOPPLER	COLOUR DOPPLER	URINE ROUTINE	UREA
COLOUR DOPPLER				

Algorithm development

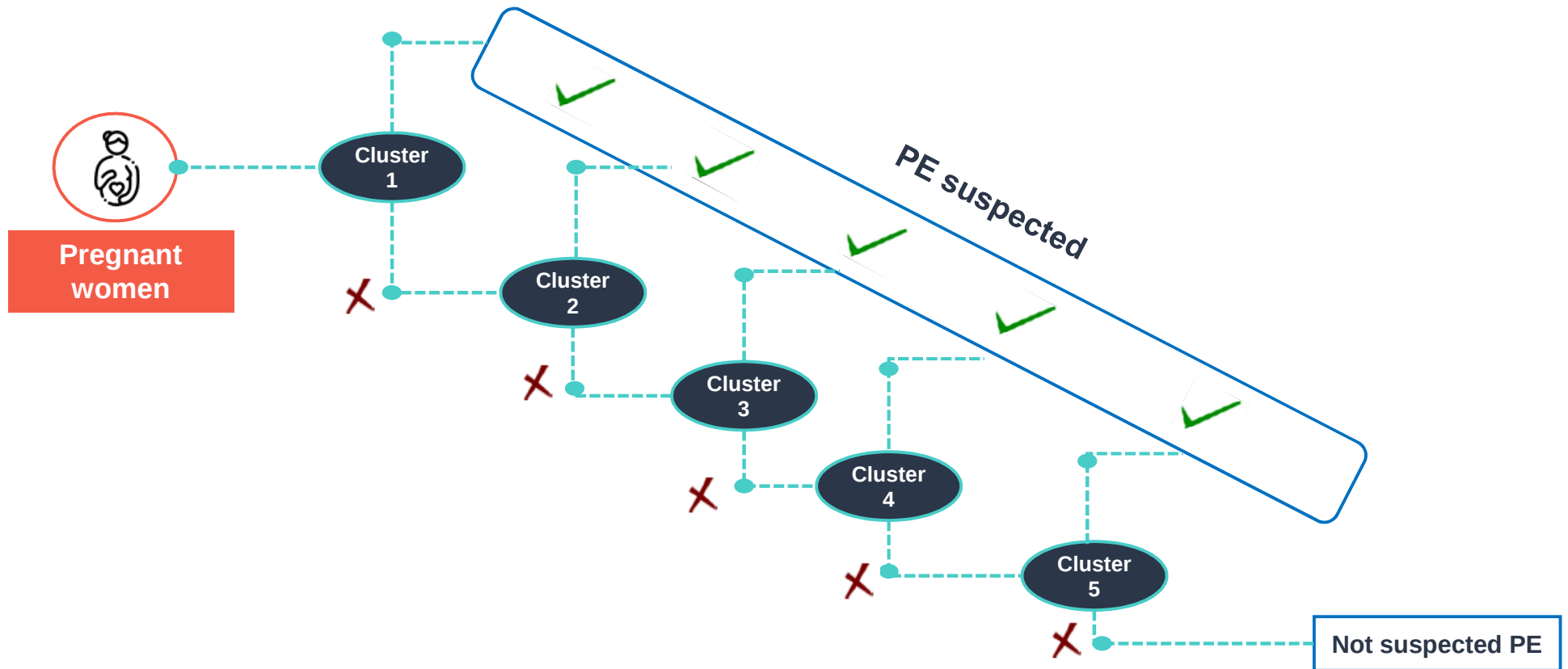
Testing the sensibility and specificity



	IC 95%
Sensitivity	70% (66.3 - 73.2)
Specificity	71% (57.3 - 81.9)
Accuracy	70% (66.9 - 73.5)
p-value	<0.0001

The algorithm demonstrated an accuracy of 70% to identify patient with suspected PE

Algorithm



Conclusion



The methodology presented in this study demonstrated a high accuracy in detecting patients with health conditions that do not have ICD codes

Doing now what patients need next