

Blunt Chest Trauma:

To CT or Not To CT

Providing our highest-value care

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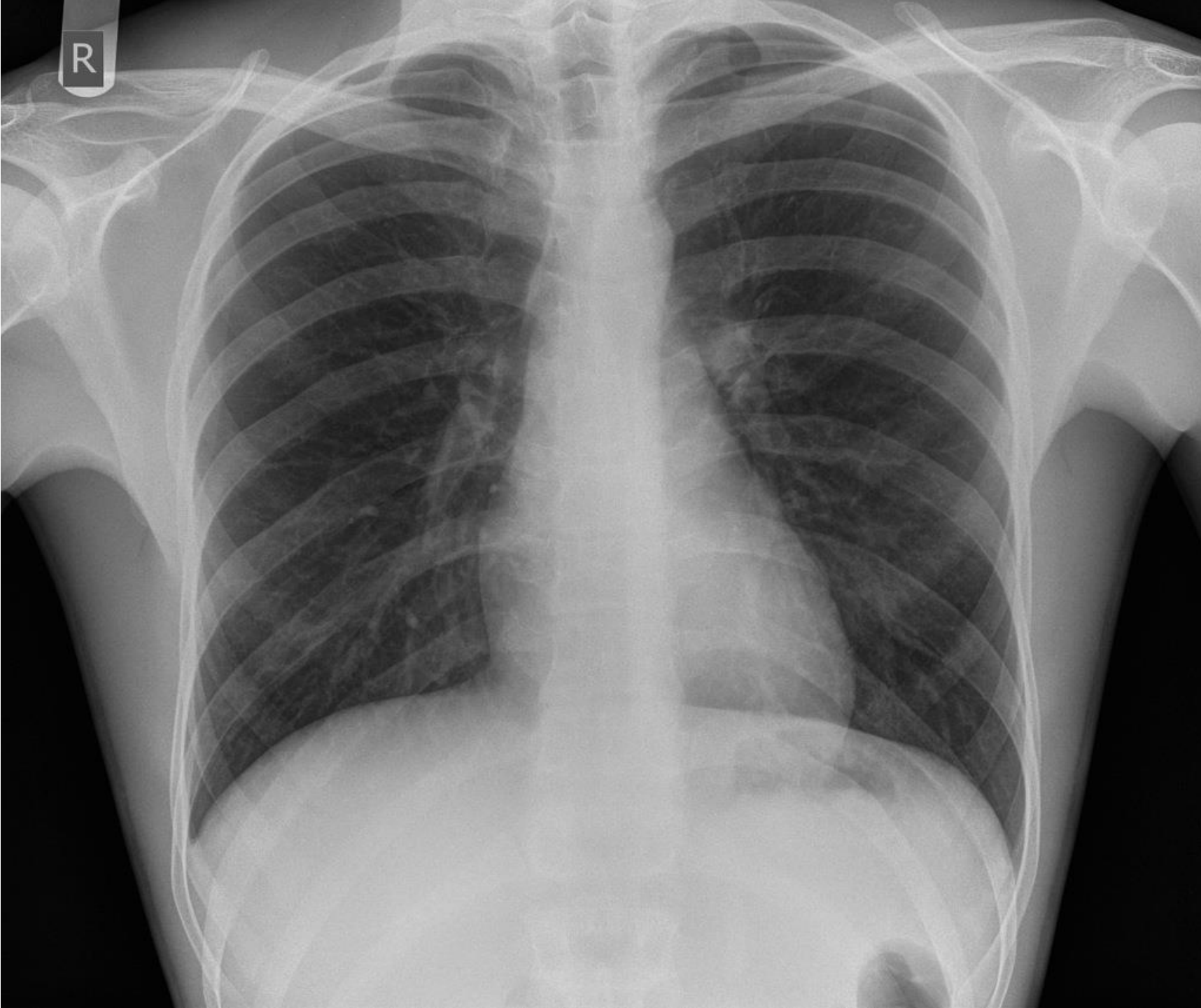
Rocky Mountain Trauma & Emergency Medicine Summer Conference
August 2022

I believe we provide our highest-value care when we employ patient-center, evidence-based care.

Case 1

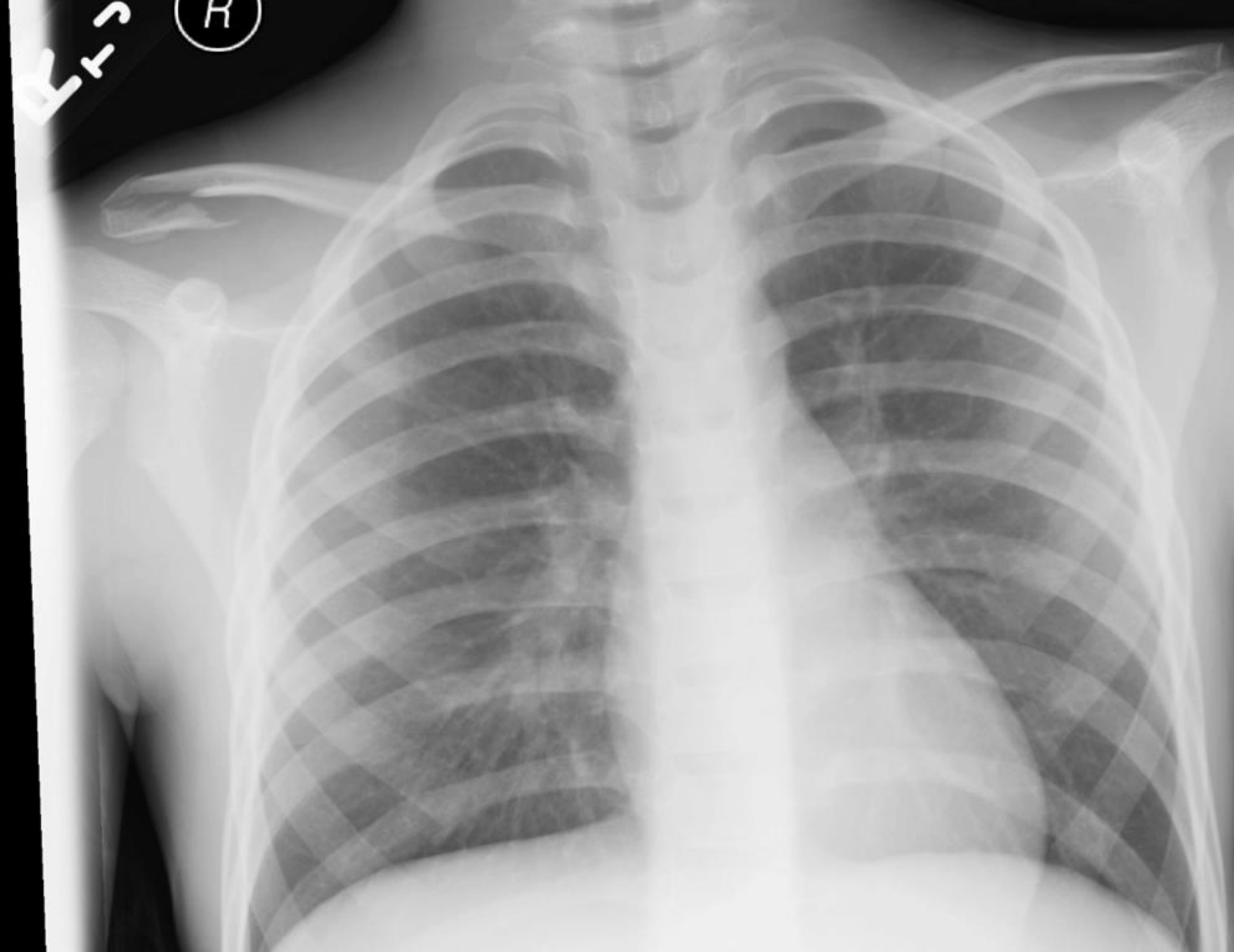


Case 1





Case 2



Case 2

What's the Difference?

The Probability of Disease

**Low
Probability**



**High
Probability**

Physician Gestalt for Chest Trauma

Very Low PTP

Sens 97

Spec 18

Neg LR 0.16

High PTP

Sens 26%

Spec 99%

Neg LR 0.76

Pos LR 27

Smith C et al. Prediction of blunt traumatic injury in high-acuity patients: bedside examination vs computed tomography. Am J Emerg Med. 2011

Concern for Chest Trauma

Very Low
Probability



STOP

High-value
Evidence-based
Care

High
Probability



CT SCAN

Physician Gestalt for Chest Injury

Very Low PTP

Sens 97

Spec 18

Neg LR 0.16



High PTP

Sens 26%

Spec 99%

Neg LR 0.76

Pos LR 27

What about those in between?

NOW OPEN

Kelina Hospital opens at
**NO 7, OLOGUN AGBAJE STREET,
OFF ADEOLA ODEKU STREET,
VICTORIA ISLAND, LAGOS**
on Monday April 11, 2022.

As part of our Corporate Social
Responsibility, we will be doing Free
CT-scan for all patients who need it.

**FREE
CT-SCAN**

Monday - Friday
11-15th April, 2022

CALL OR TEXT

08033644644 07016837070

08129908324 08033309669

**WE
CAN'T
SCAN
EVERYONE!**

Remember The Goal...

We provide our highest-value care when we employ patient-center, evidence-based care.

Scanning Everyone Comes at a Cost!

CT Chest Average Charge

\$3500

CT Chest Radiation Exposure

7 mSv (~350 CXRs)

Time and Other Resources

Significant

Other Institutional Charges

\$20 - \$40K

American College of Radiology

Appropriateness Criteria

Chest radiography and chest CT/CTA are complementary first-line imaging modalities in the workup of patients with high-mechanism blunt trauma.

When initial trauma survey and mechanism of injury suggest a low probability of significant thoracic trauma (normal mental status, normal clinical examination, and normal chest radiograph), further assessment with chest CT/CTA may not be necessary. Inclusion or exclusion of CT in this setting should be site and/or case specific.

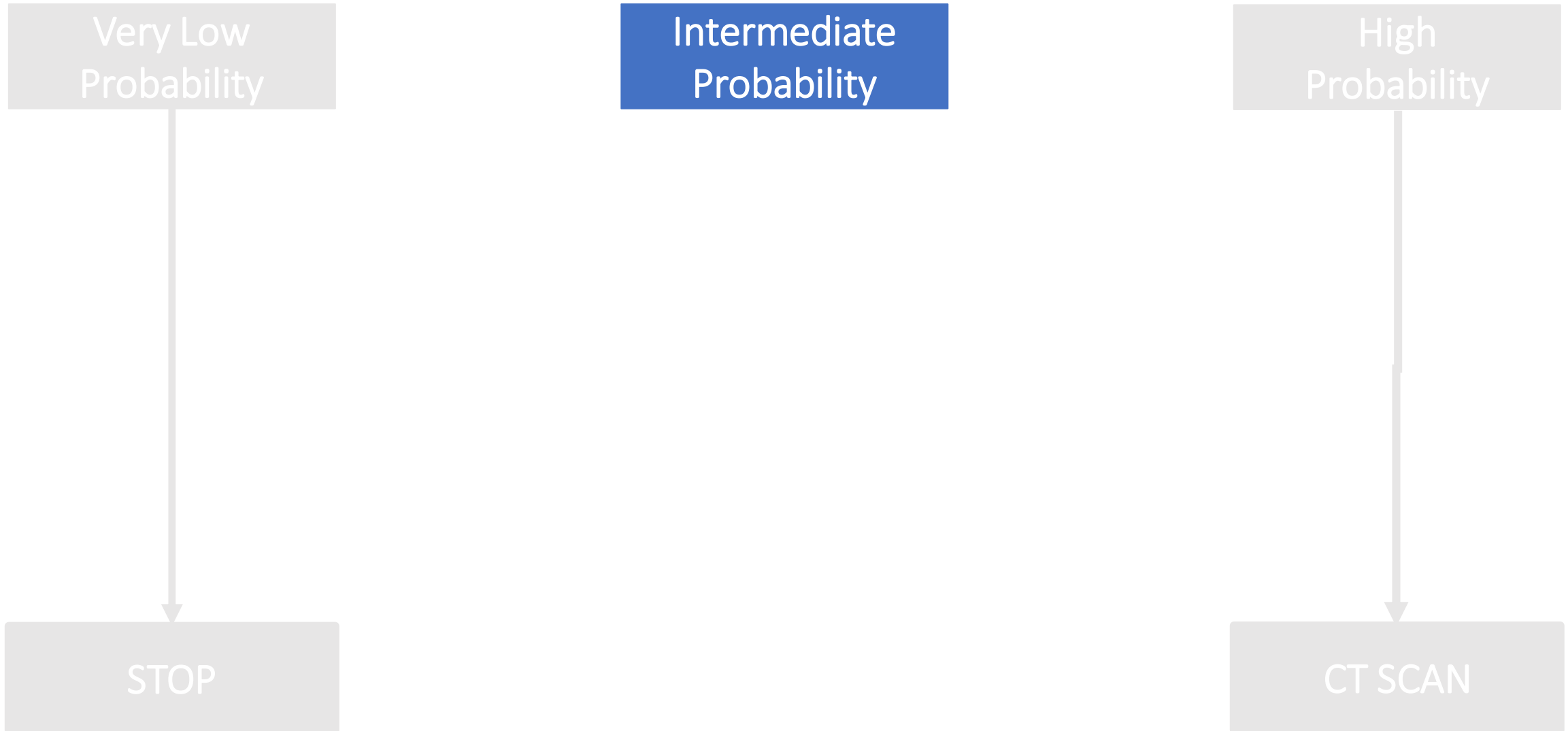
American College of Surgeons

Choosing Wisely

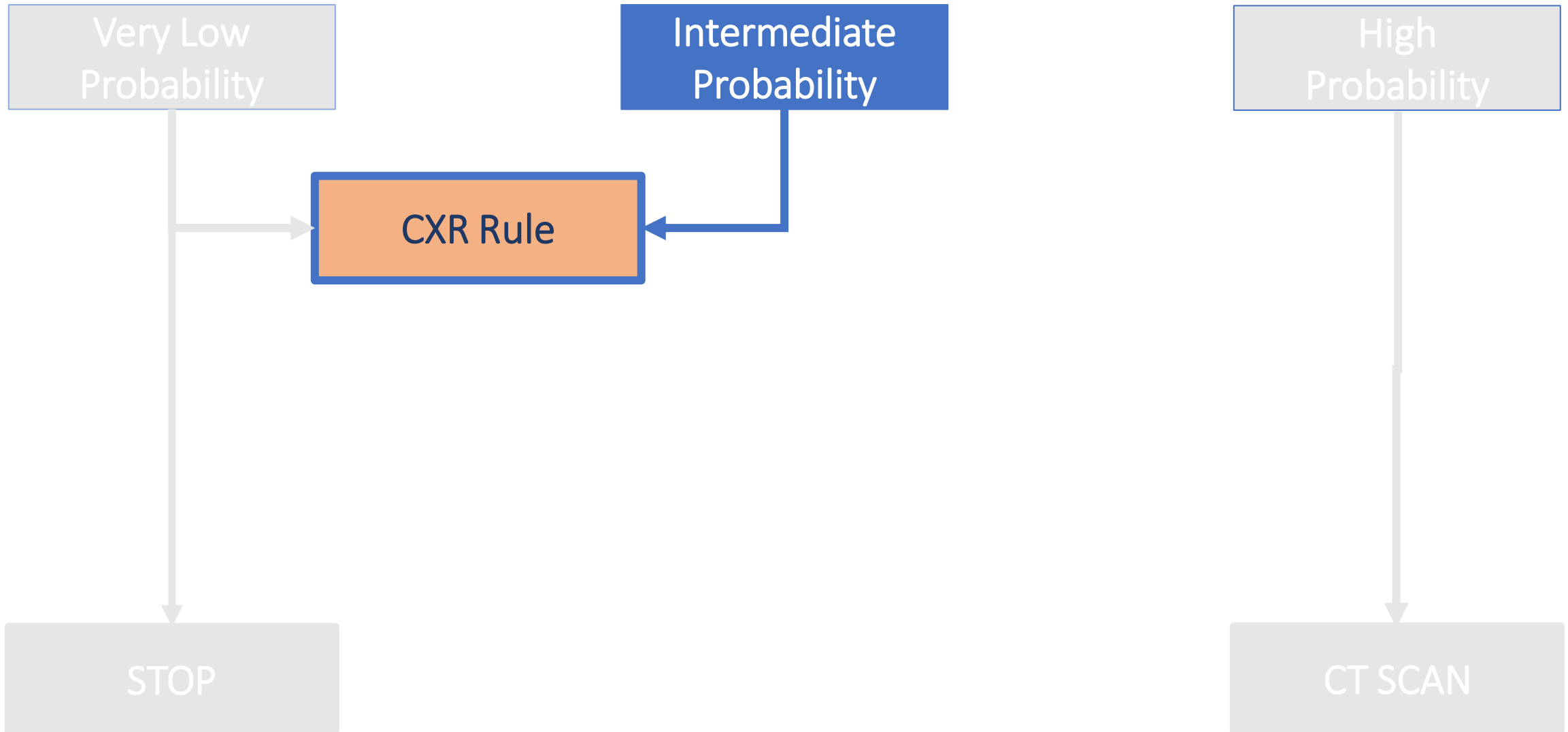
Avoid the routine use of “whole-body” diagnostic computed tomography (CT) scanning in patients with minor or single system trauma.

Aggressive use of “whole-body” CT scanning improves early diagnosis of injury and may even positively impact survival in polytrauma patients. However, **the significance of radiation exposure as well as costs associated with these studies must be considered, especially in patients with low energy mechanisms of injury and absent physical examination findings consistent with major trauma.**

Concern for Chest Trauma



Concern for Chest Trauma



Nexus CXR Rule

Rodriguez et al JOT 2011 & JAMA Surg 2013

12 Variables → Multivariate CART → Final Rule (7)

Age > 60 years
Rapid deceleration
Hypoxia
Chest pain
Shortness of breath
Intoxication
Distracting injury
Chest Wall TTP
Pain on lat chest compression
Abnormal auscultation
Abnormal mental status
Visible chest wall skin injury

Goal Sensitivity
99%

**Age > 60 years
Rapid deceleration**

Chest pain

**Intoxication
Distracting injury
Chest Wall TTP**

Abnormal mental status

Nexus CXR Rule

Rodriguez et al JOT 2011 & JAMA Surg 2013

12 Variables → Multivariate CART → Final Rule (7)

Derivation & Validation

Sensitivity 99%

Specificity 14%

Neg LR 0.07

10% Pre Test Probability =
0.8% Post Test Probability

Age > 60 years
Rapid deceleration

Chest pain

Intoxication
Distracting injury
Chest Wall TTP

Abnormal mental status

The Details: Rapid Deceleration

Mechanism of blunt trauma that exerts rapid deceleration force on the patient:

Fall from a height >20 feet, or

Motor vehicle accident at speeds > 40 mph with sudden deceleration

The Details: Distracting Injuries

Any condition thought by the clinician to be producing sufficient pain to significantly distract the patient from a second injury.

Long bone fractures

Visceral injuries requiring surgical consultation

Large lacerations, de-gloving injuries, or crush injuries

Large burns

Spine fractures

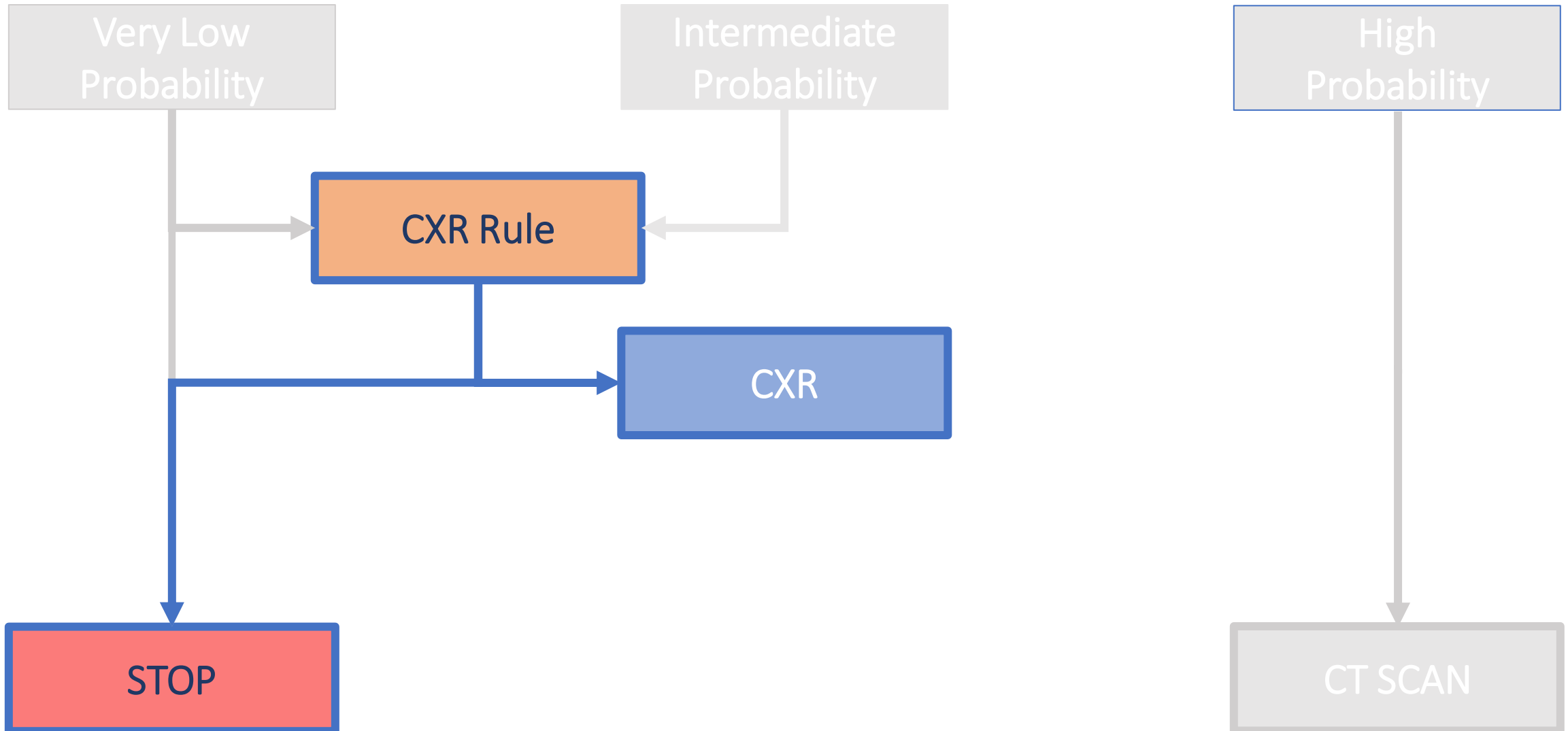
Spinal cord injuries

Any other injury producing acute functional impairment

NEXUS CXR Rule

1. Age > 60 years
2. Rapid Deceleration
3. Intoxication
4. Abnormal Mental Status
5. Distracting Painful Injury
6. Chest Pain
7. TTP Chest Wall

Concern for Chest Trauma



What Are We Looking For In The Chest?

Multiple rib fractures

Sternal fractures

Spinal fractures

Pneumothorax

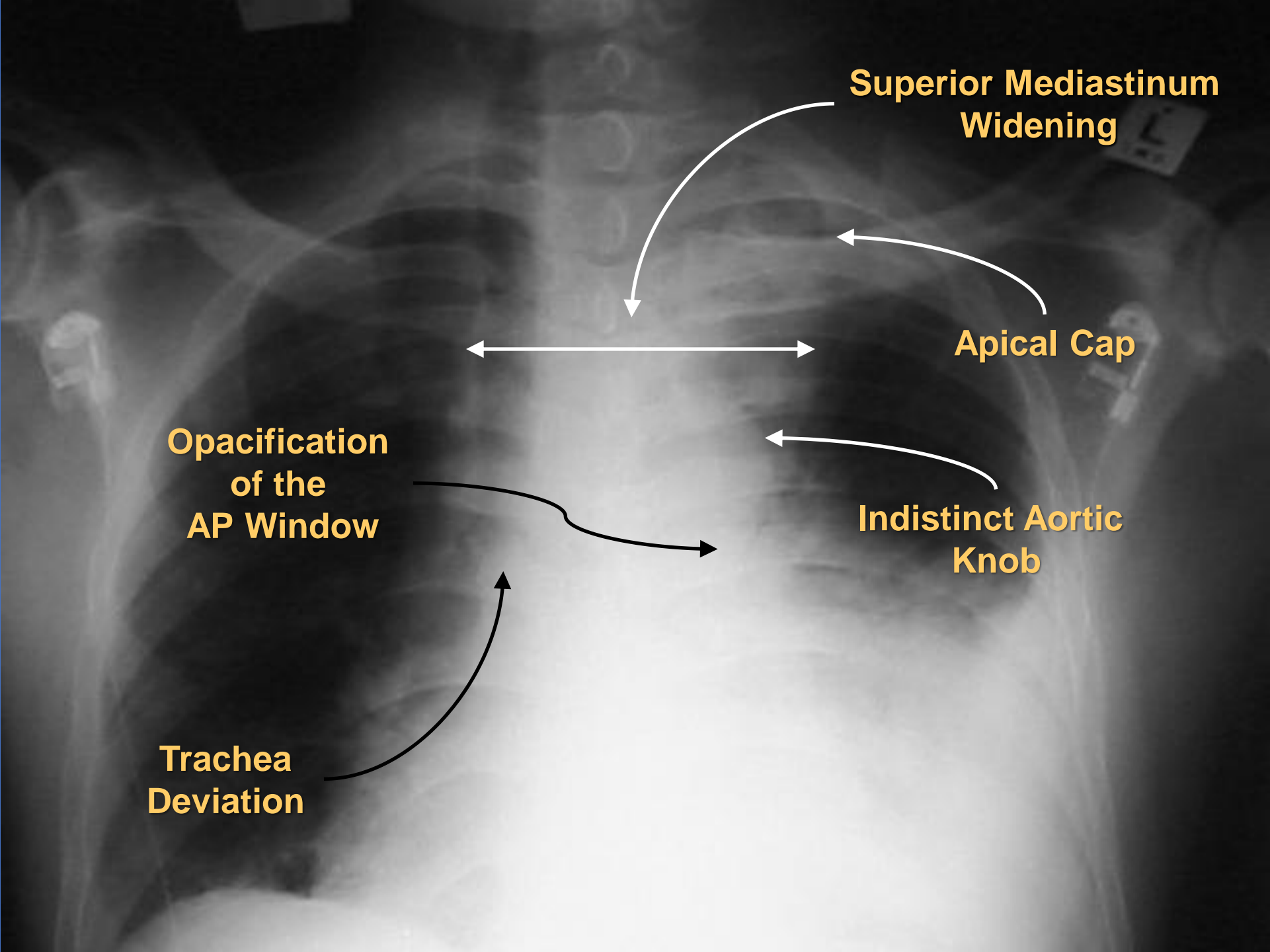
Hemothorax

Pneumomediastinum

Pulmonary contusion

Ruptured diaphragm

Aortic or great vessel injury



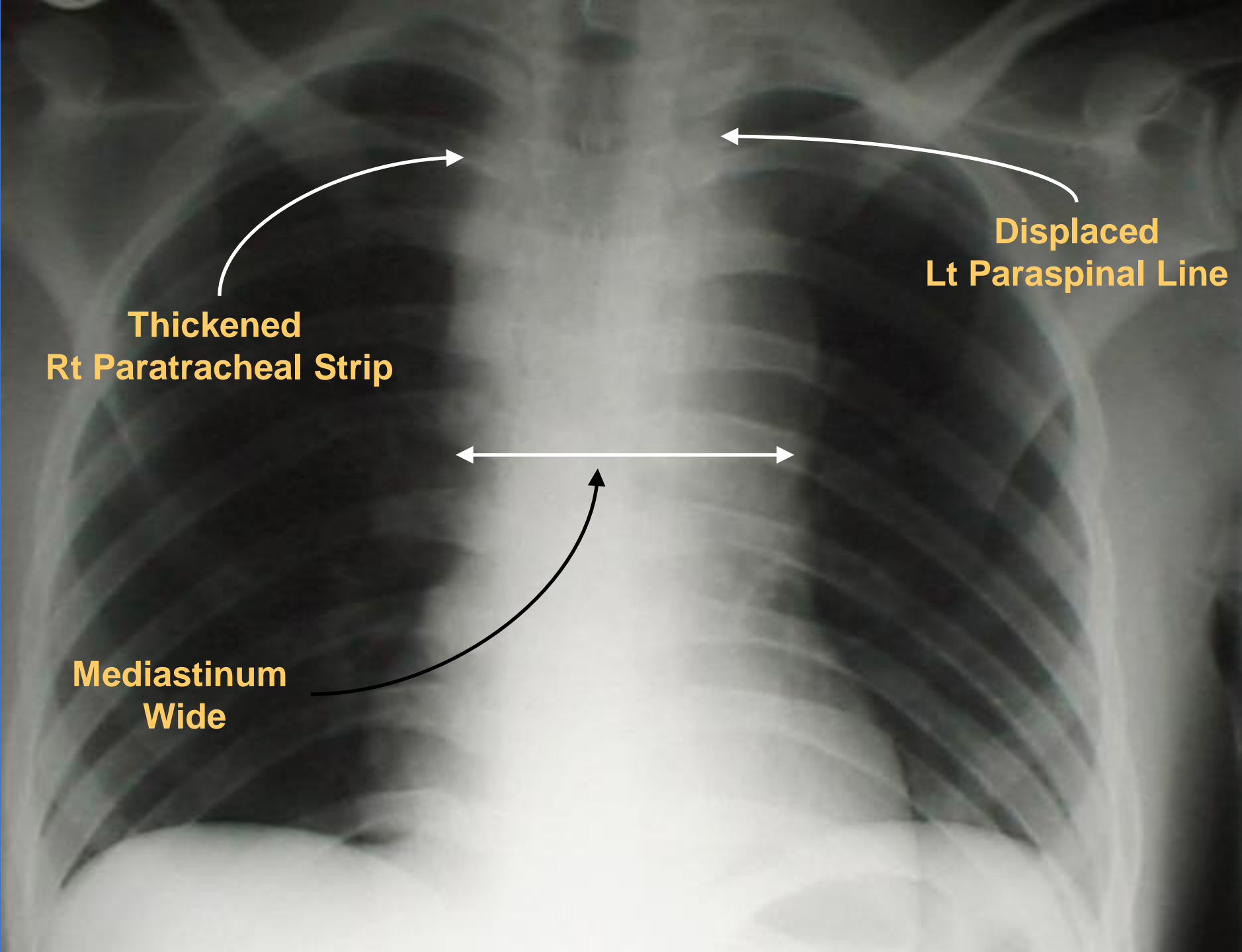
Superior Mediastinum Widening

Apical Cap

Indistinct Aortic Knob

Opacification of the AP Window

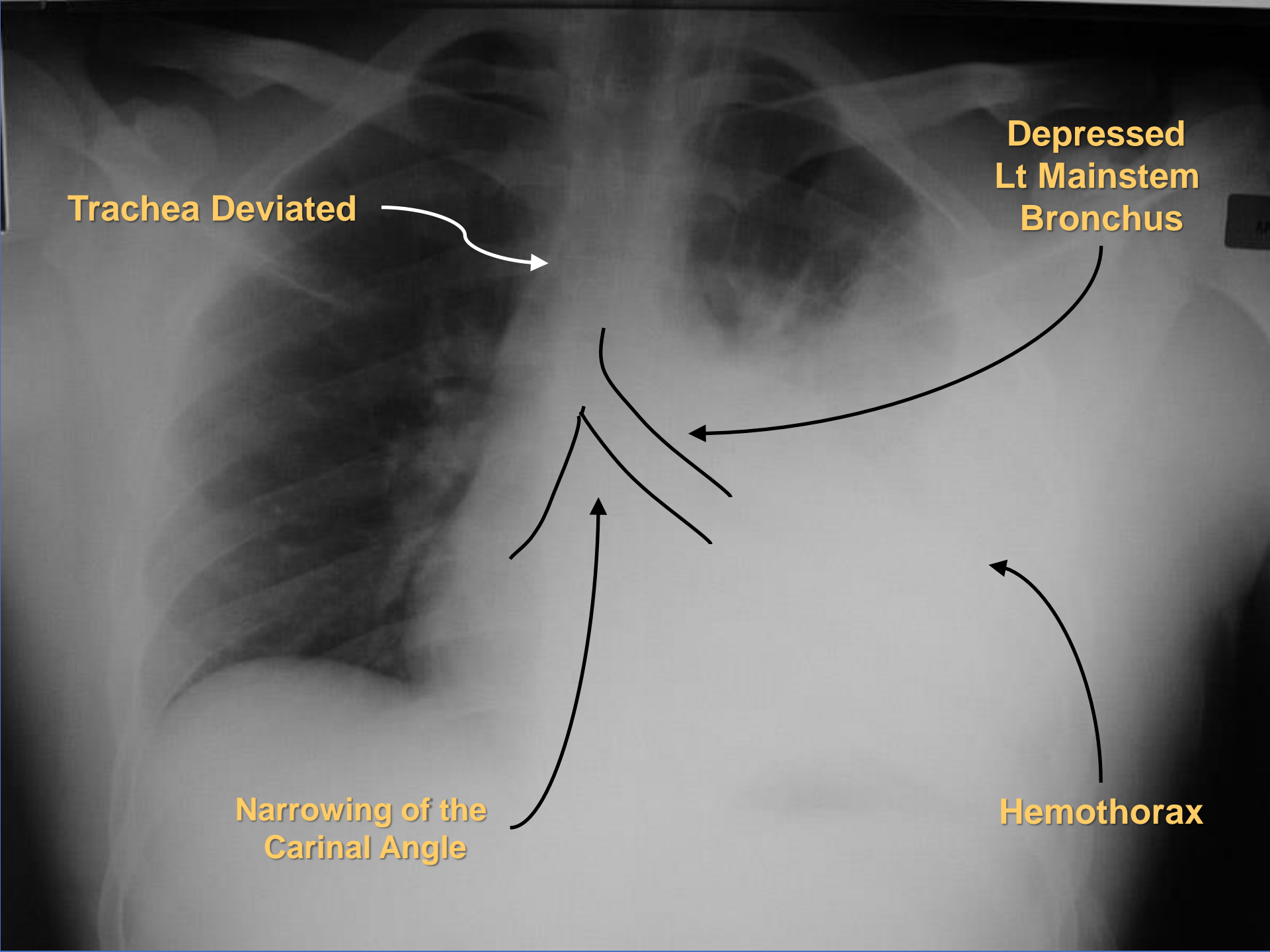
Trachea Deviation



**Thickened
Rt Paratracheal Strip**

**Displaced
Lt Paraspinal Line**

**Mediastinum
Wide**



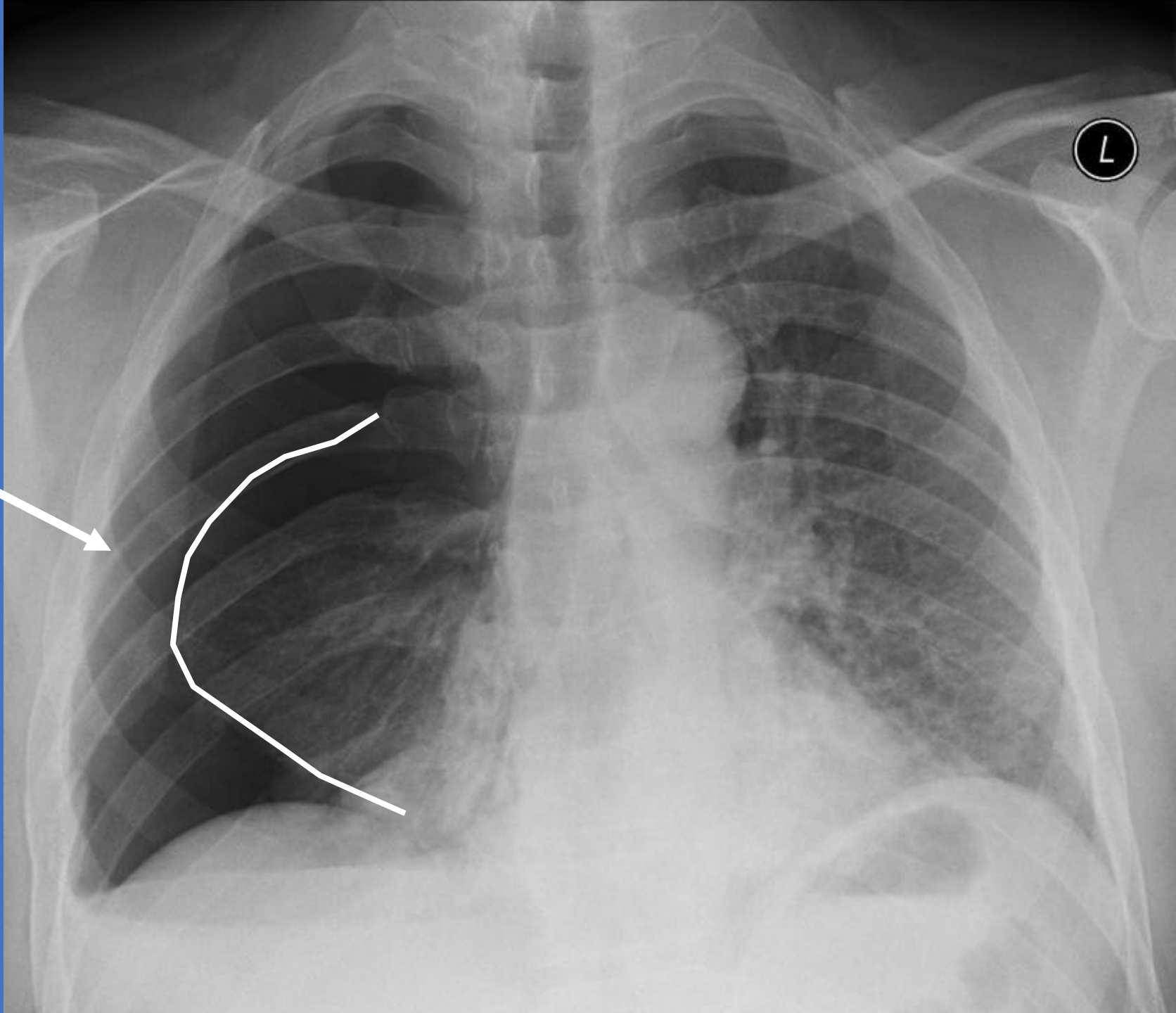
Trachea Deviated

**Depressed
Lt Mainstem
Bronchus**

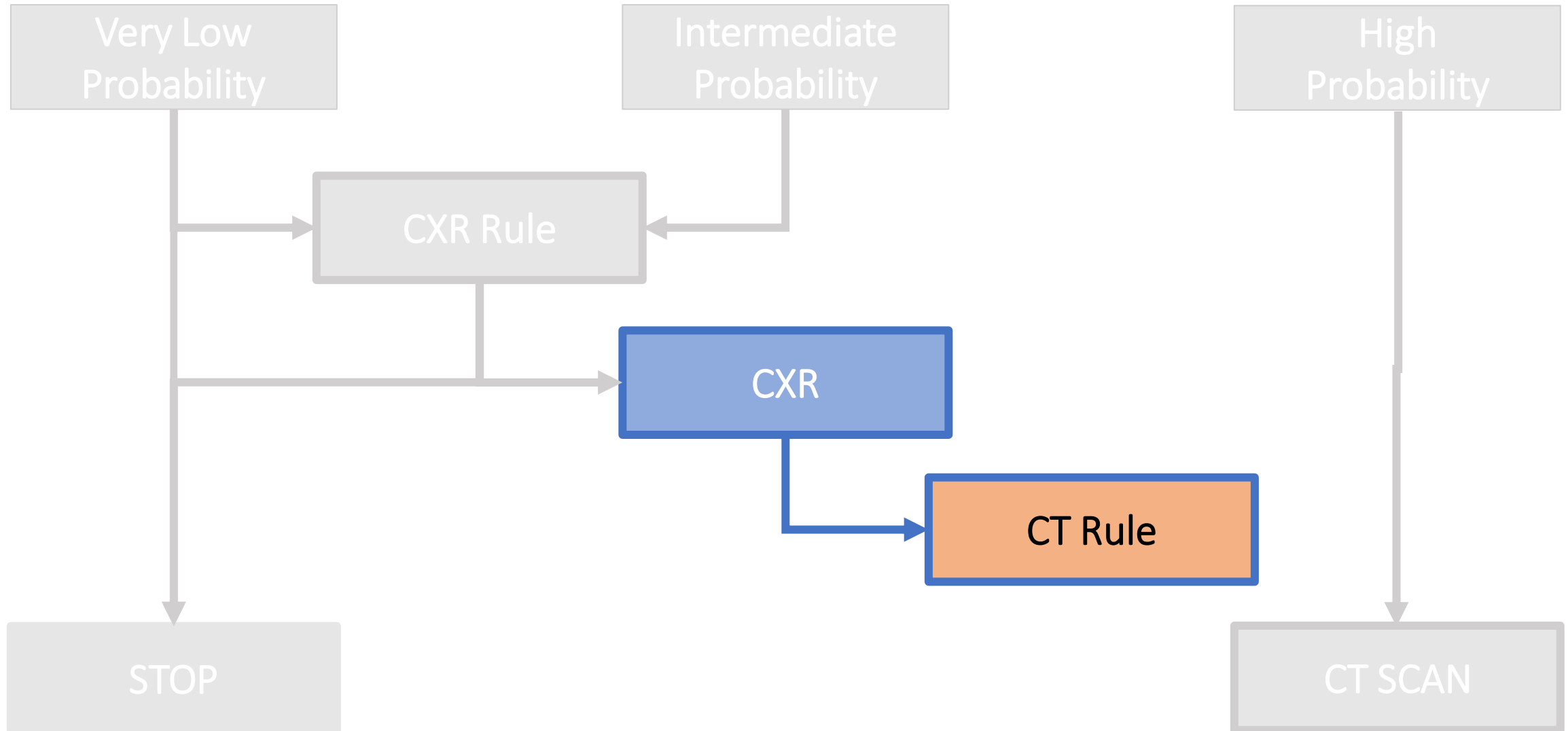
**Narrowing of the
Carinal Angle**

Hemothorax

Rt
PTx



Concern for Chest Trauma



Nexus CT Chest Rule

Rodriguez et al, PLoS Med 2015

14 Variables → Multivariate CART → Final Rule (7)

Age > 60 years
Rapid deceleration mechanism
Hypoxia
Chest pain
Shortness of breath
Intoxication
Distracting injury
Chest Wall TTP
Pain on lat chest compression
Abnormal auscultation
Abnormal mental status
Visible chest wall skin injury

Goal Sensitivity
99%

Distracting Injury
Chest Wall Tenderness
Sternal Tenderness
Spinal Tenderness
Scapular Tenderness
Rapid Deceleration*
Abnormal CXR

Nexus CT Chest Rule

Rodriguez et al PLoS Med 2015

14 Variables → Multivariate CART → Final Rule (7)

Major Injury

Sensitivity 99.2%

Specificity 31.7%

Neg LR 0.03

Any Injury

Sensitivity 95.4%

Specificity 25.5%

Neg LR 0.18

Distracting Injury

Chest Wall Tenderness

Sternal Tenderness

Spinal Tenderness

Scapular Tenderness

Rapid Deceleration*

Abnormal CXR

Nexus CT Chest Rule(s)

CT Rule for Major Injury

Distracting Injury
Chest Wall Tenderness
Sternal Tenderness
Spinal Tenderness
Scapular Tenderness

Abnormal CXR

CT Rule for All Injury

Distracting Injury
Chest Wall Tenderness
Sternal Tenderness
Spinal Tenderness
Scapular Tenderness
Rapid Deceleration
Abnormal CXR

The Details: Distracting Injuries

Any condition thought by the clinician to be producing sufficient pain to significantly distract the patient from a second injury.

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Spine fractures

Spinal cord injuries

Any other injury producing acute functional impairment

The Details: Rapid Deceleration

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The Details: Abnormal CXR

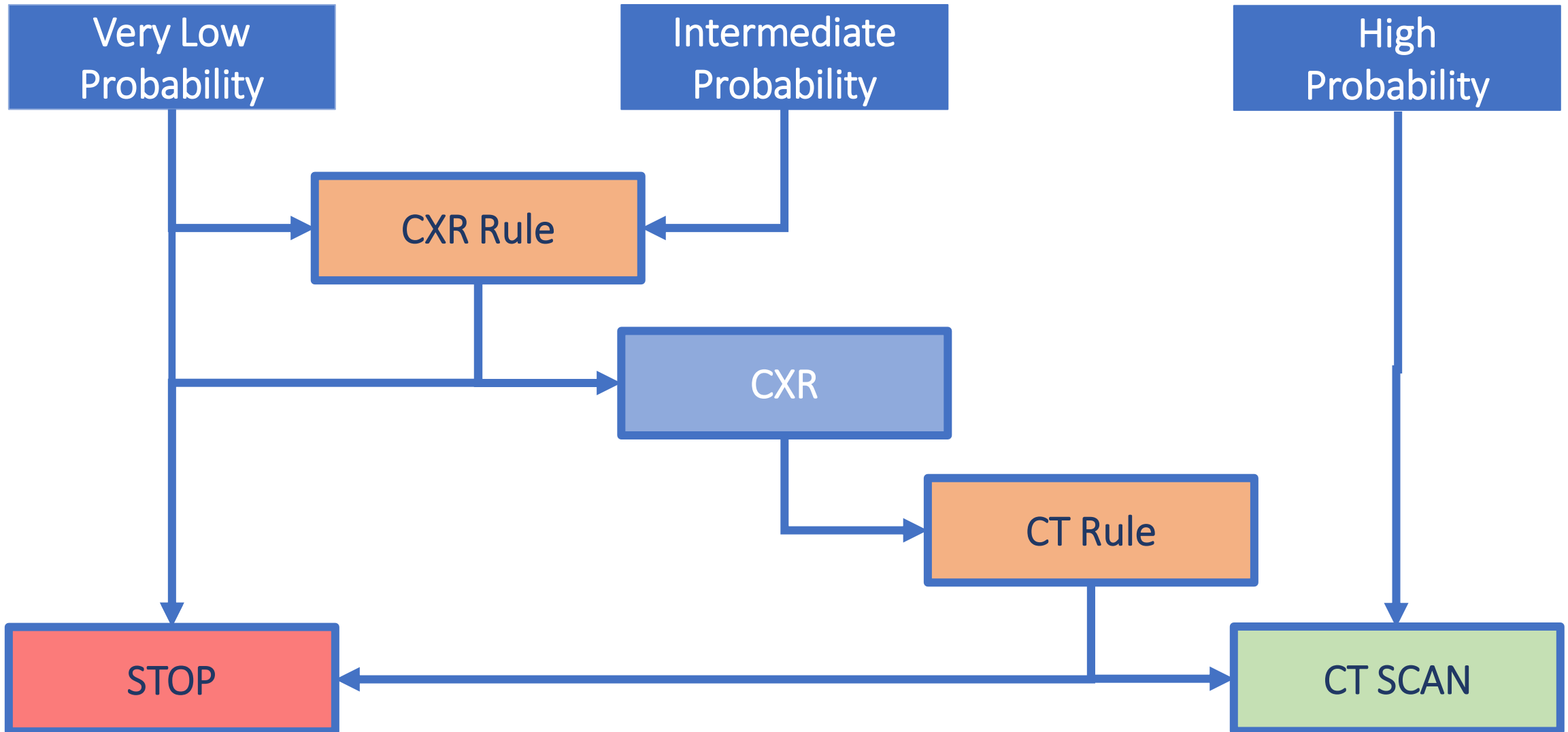
Any thoracic injury

? Isolated clavicular fracture

? Isolated rib fracture

Widened mediastinum

Concern for Chest Trauma



CASE 3

65 yo RD of an moderate-to-high speed (45 mph) MVC. The car slide off the road on a bend, sideswiping the guardrail before coming to rest in a field. Airbags did not deploy. He denies hitting his head or LOC. His only complaint is right ankle pain and left shoulder pain from the seatbelt.

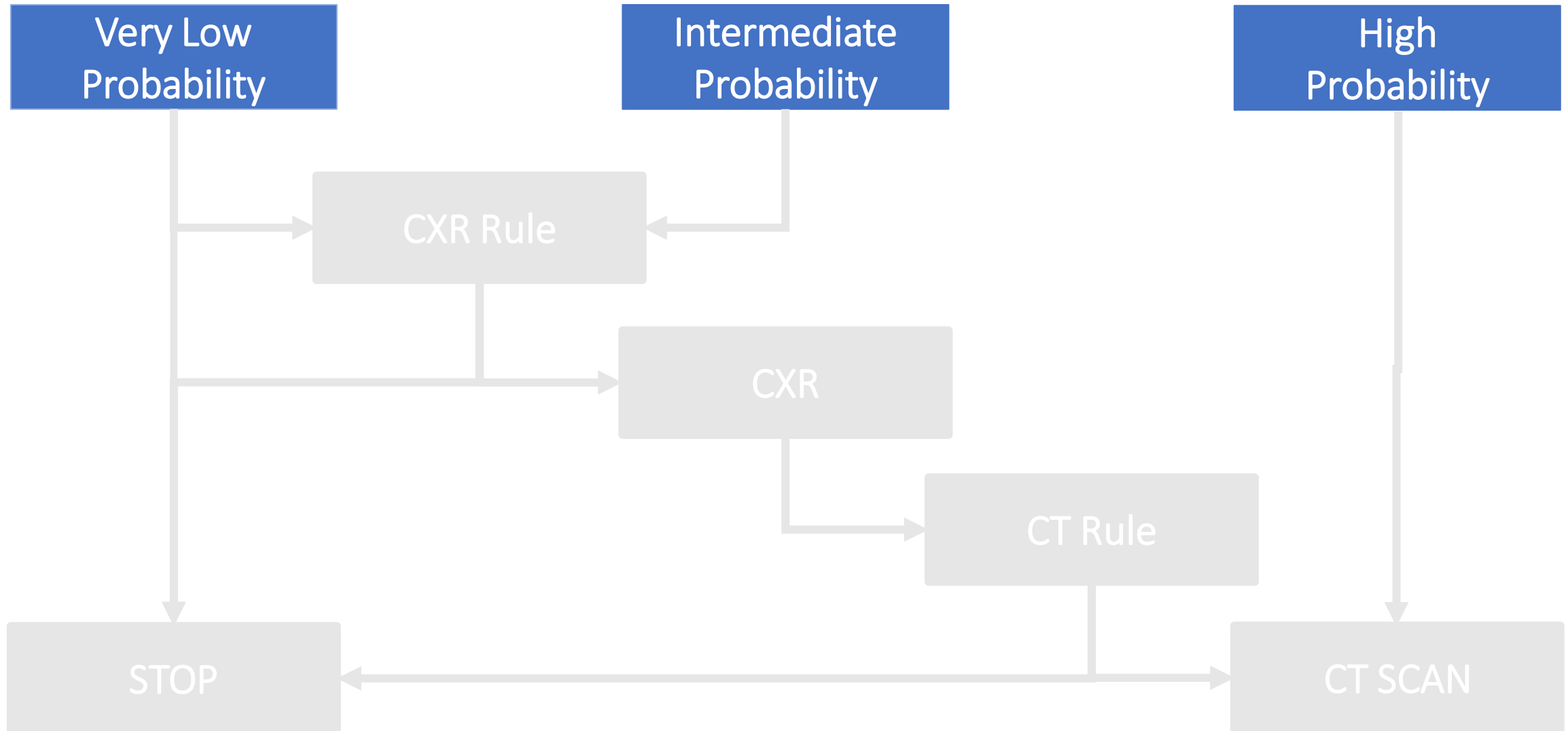
VS: 145/84 105 18 99% on RA

ABC: good, moderate pain

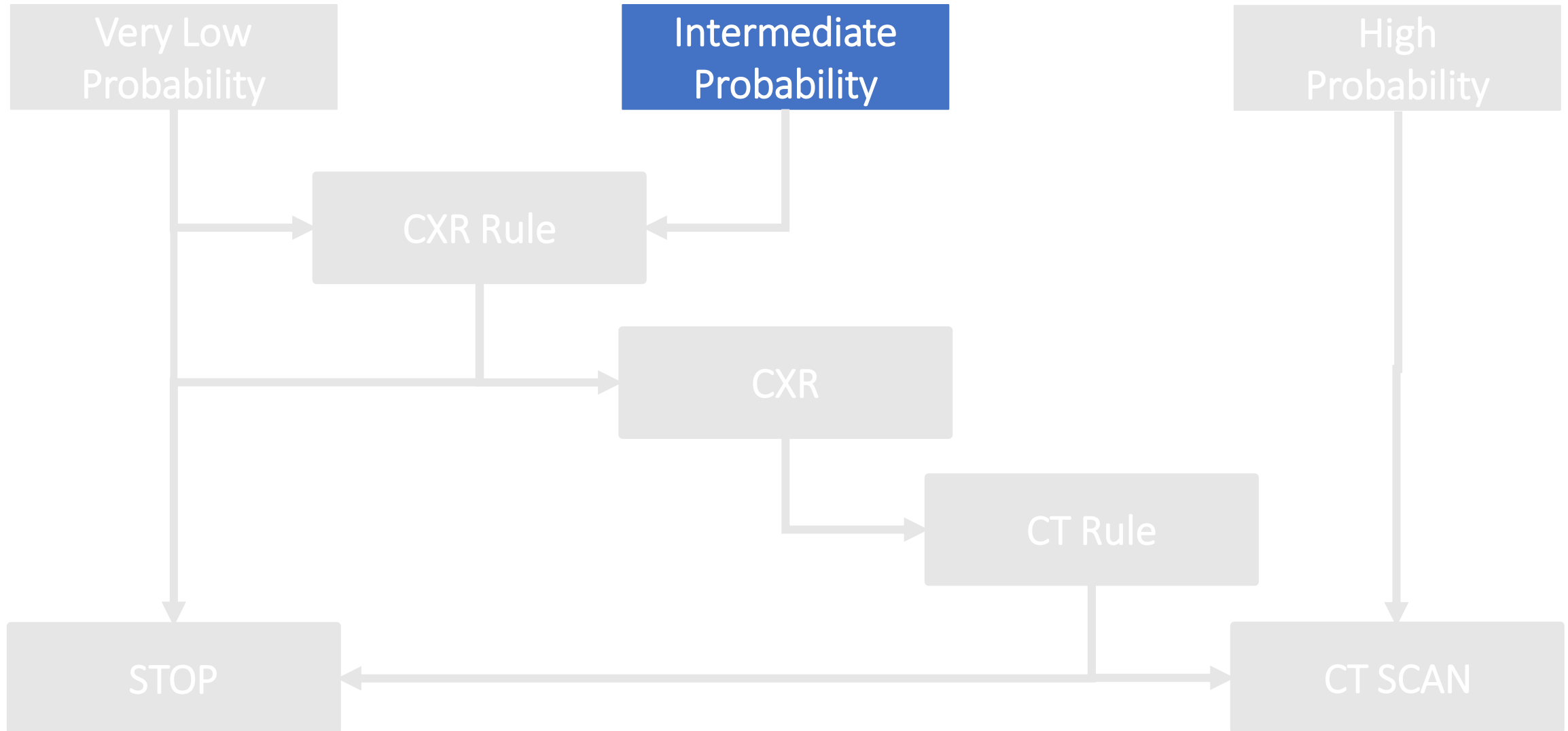
Chest: TTP lt anterior shoulder

Ankle: significant swelling and TTP lat malleolus

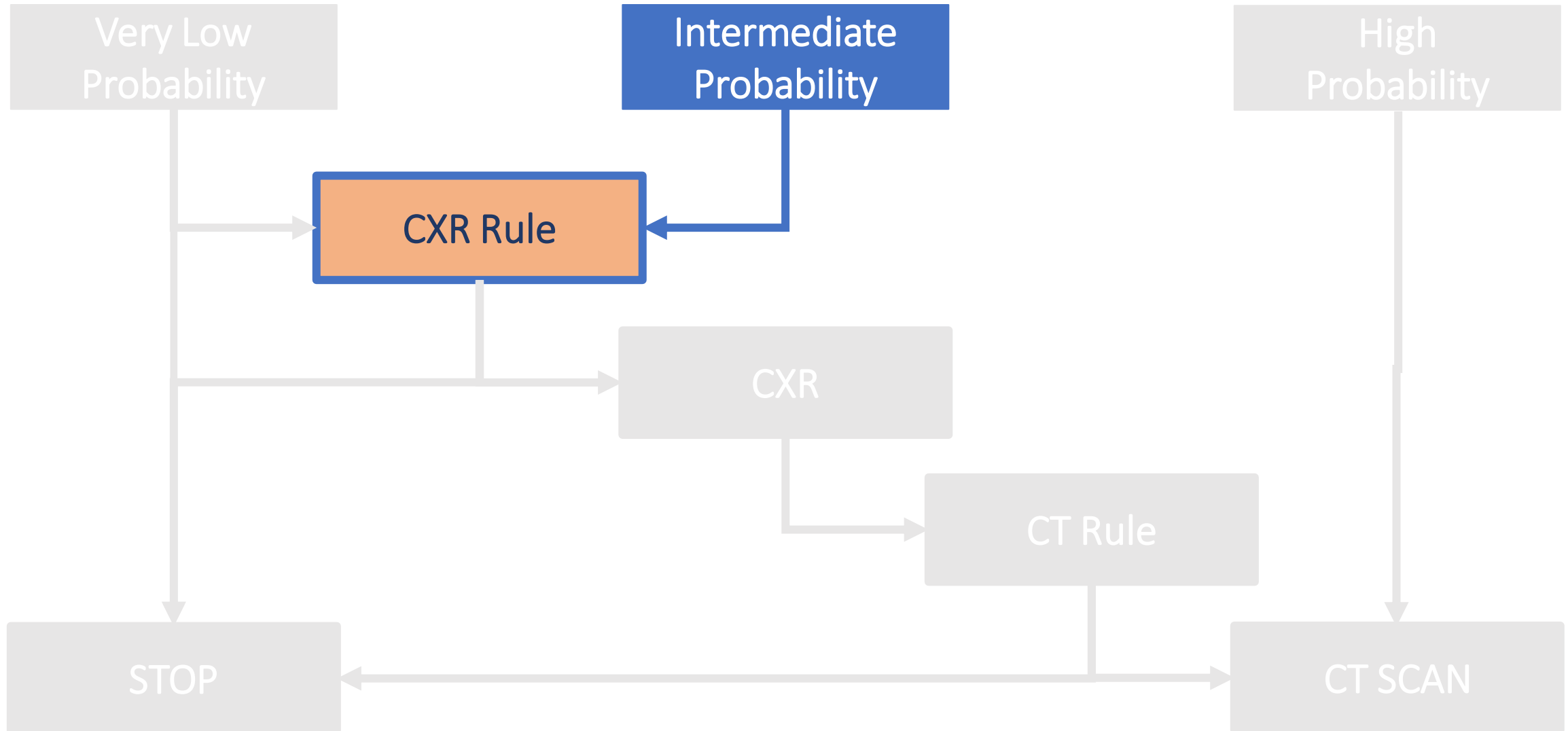
Concern for Chest Trauma



Concern for Chest Trauma



Concern for Chest Trauma



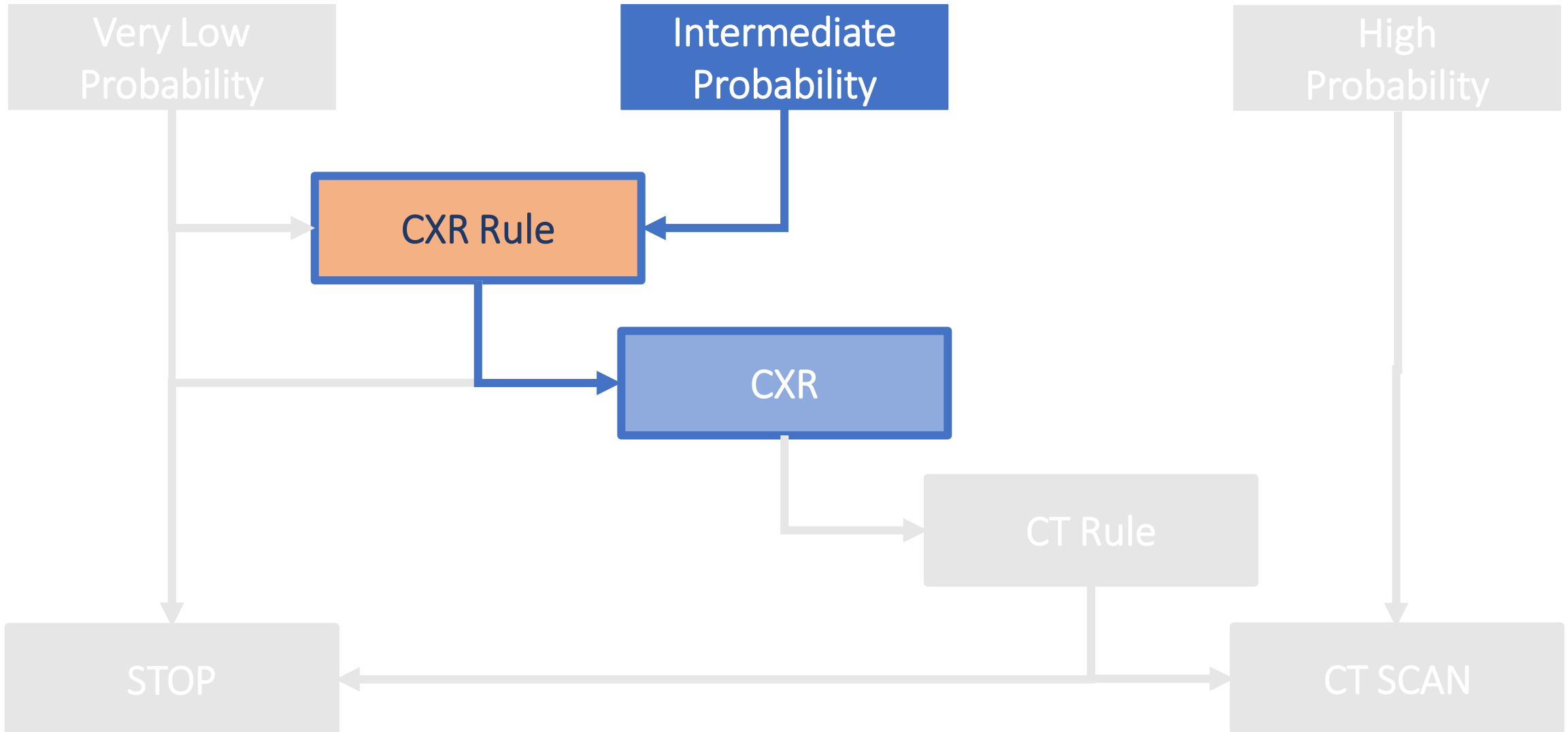
NEXUS CXR Rule

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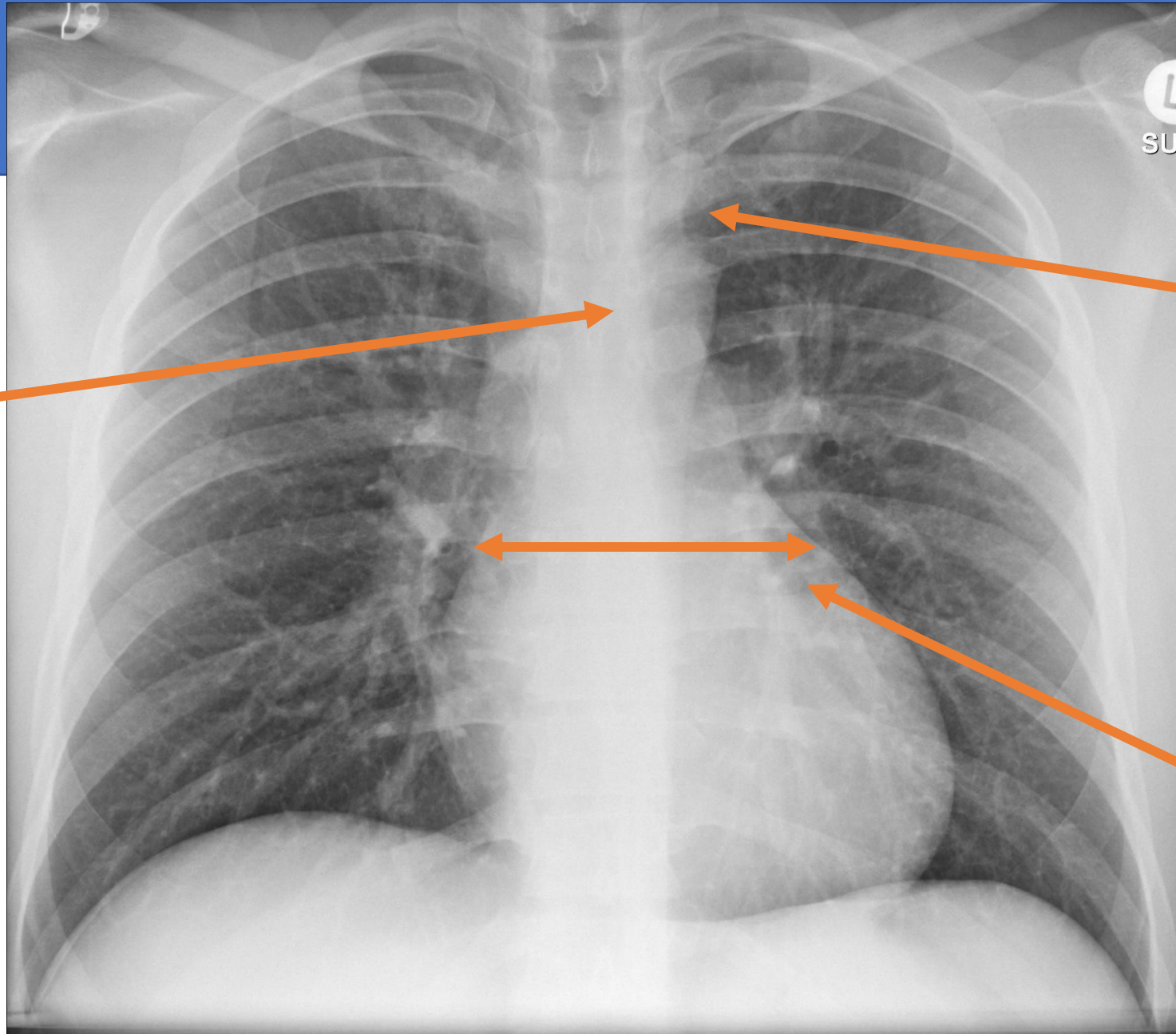
NEXUS CXR Rule

1. **Age > 60 years**
2. Rapid Deceleration
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4. Abnormal Mental Status
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7. TTP Chest Wall

Concern for Chest Trauma



CXR1

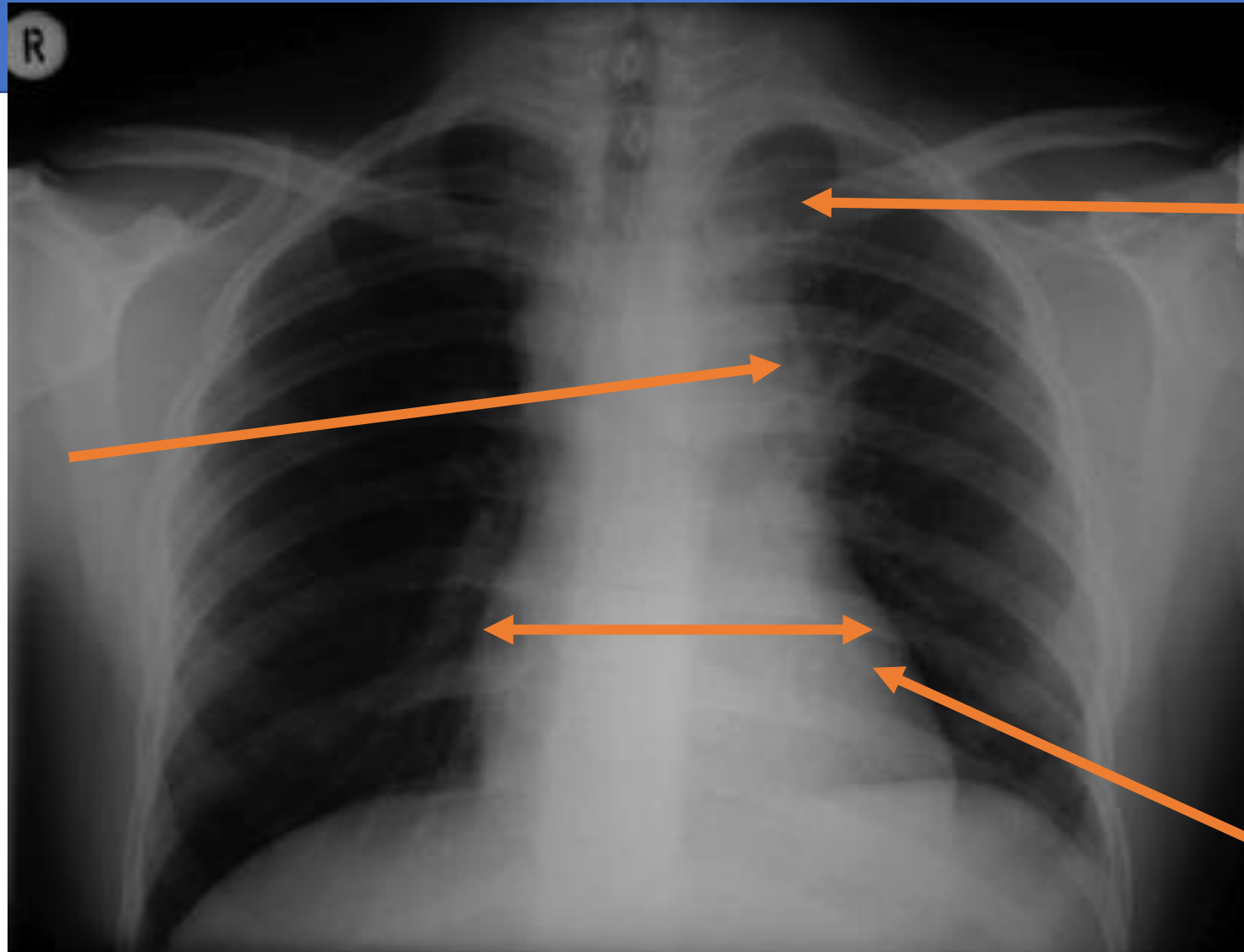


**Normal
Aortic
Knob**

**Normal LT
Paraspinal
Line**

**Normal
Mediastinum**

CXR2

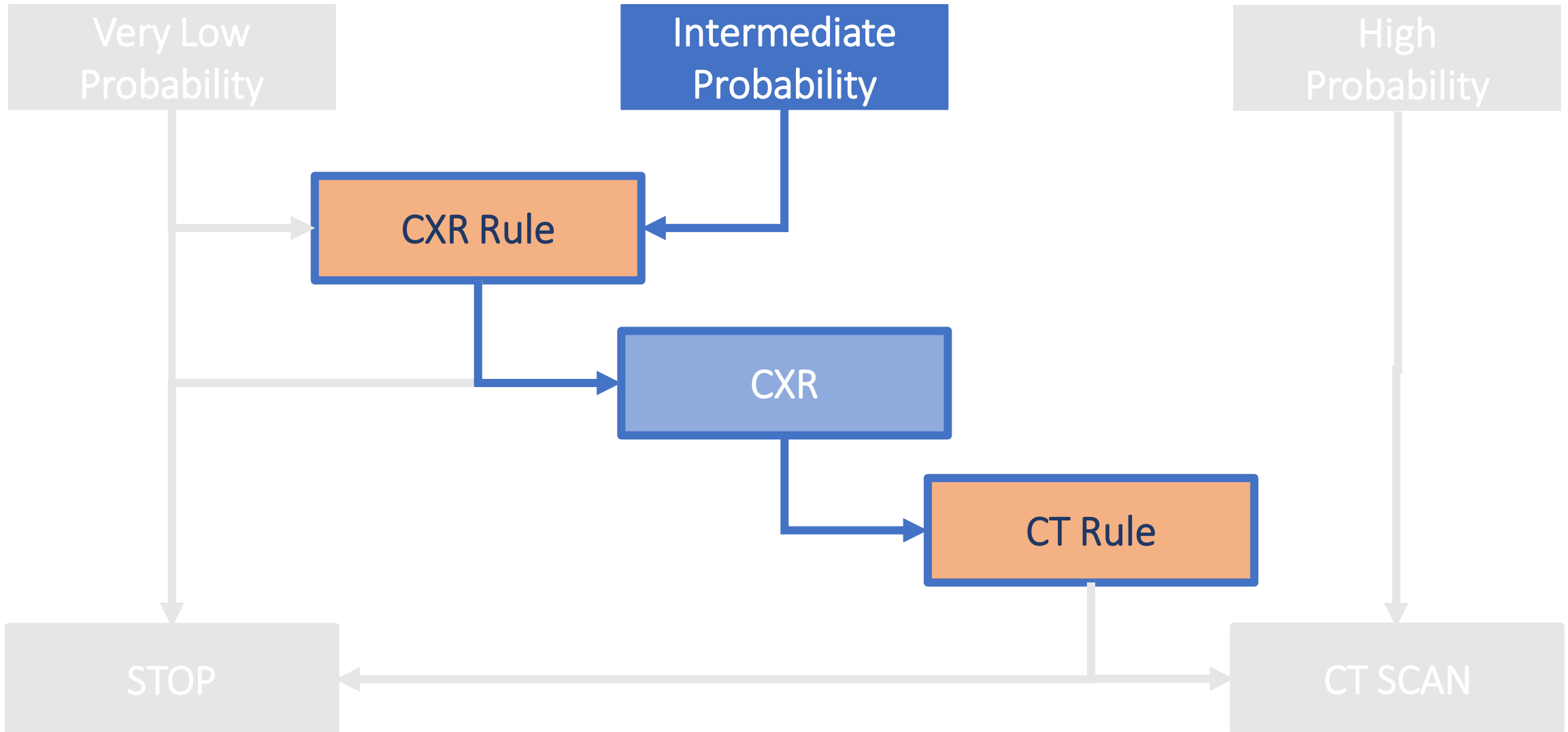


**Fuzzy
Aortic
Knob**

**? Displaced LT
Paraspinal
Line v.
Apical Cap**

**Normal
Mediastinum**

Concern for Chest Trauma



Nexus CT Chest Rule(s)

CT Rule for Major Injury

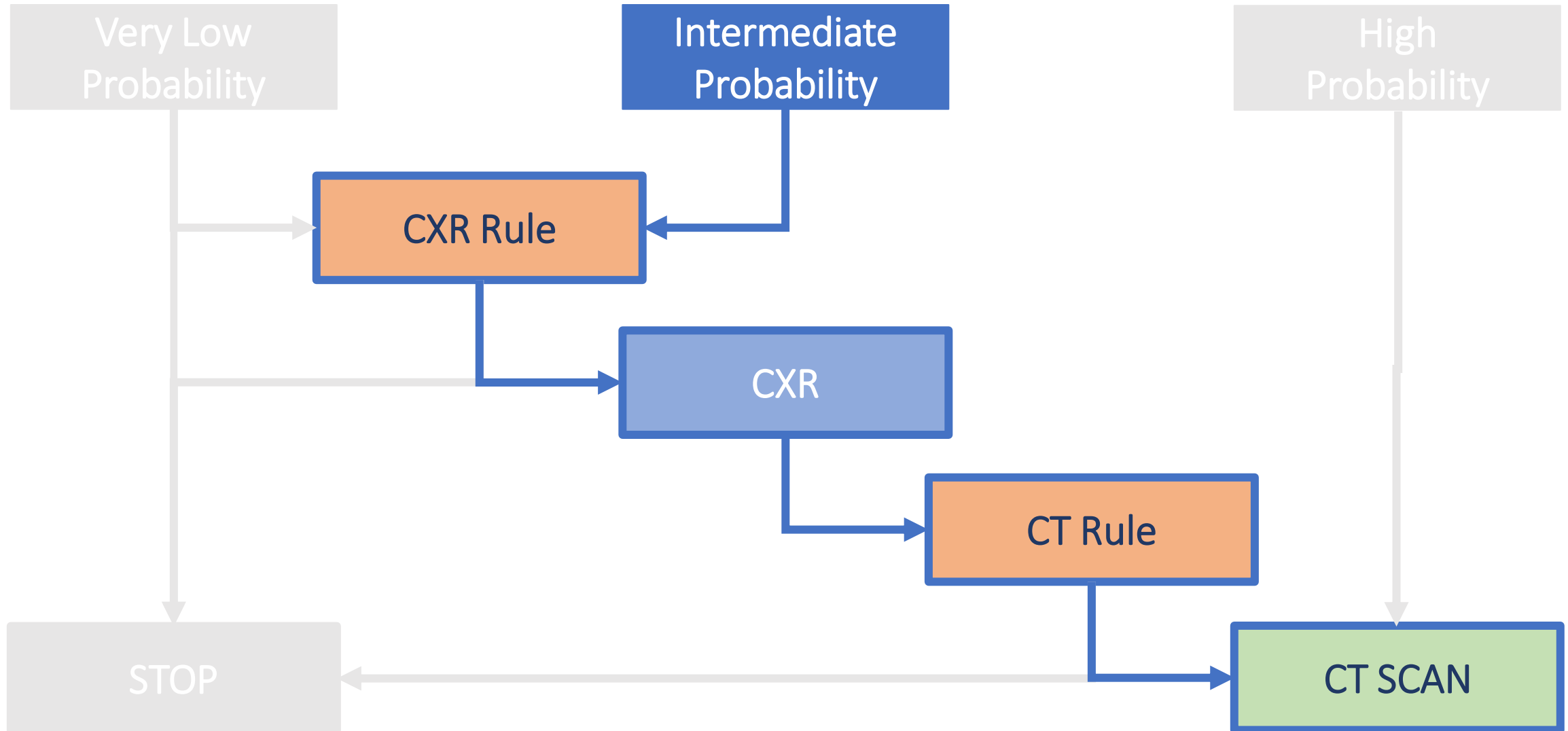
Distracting Injury
Chest Wall Tenderness
Sternal Tenderness
Spinal Tenderness
Scapular Tenderness

Abnormal CXR

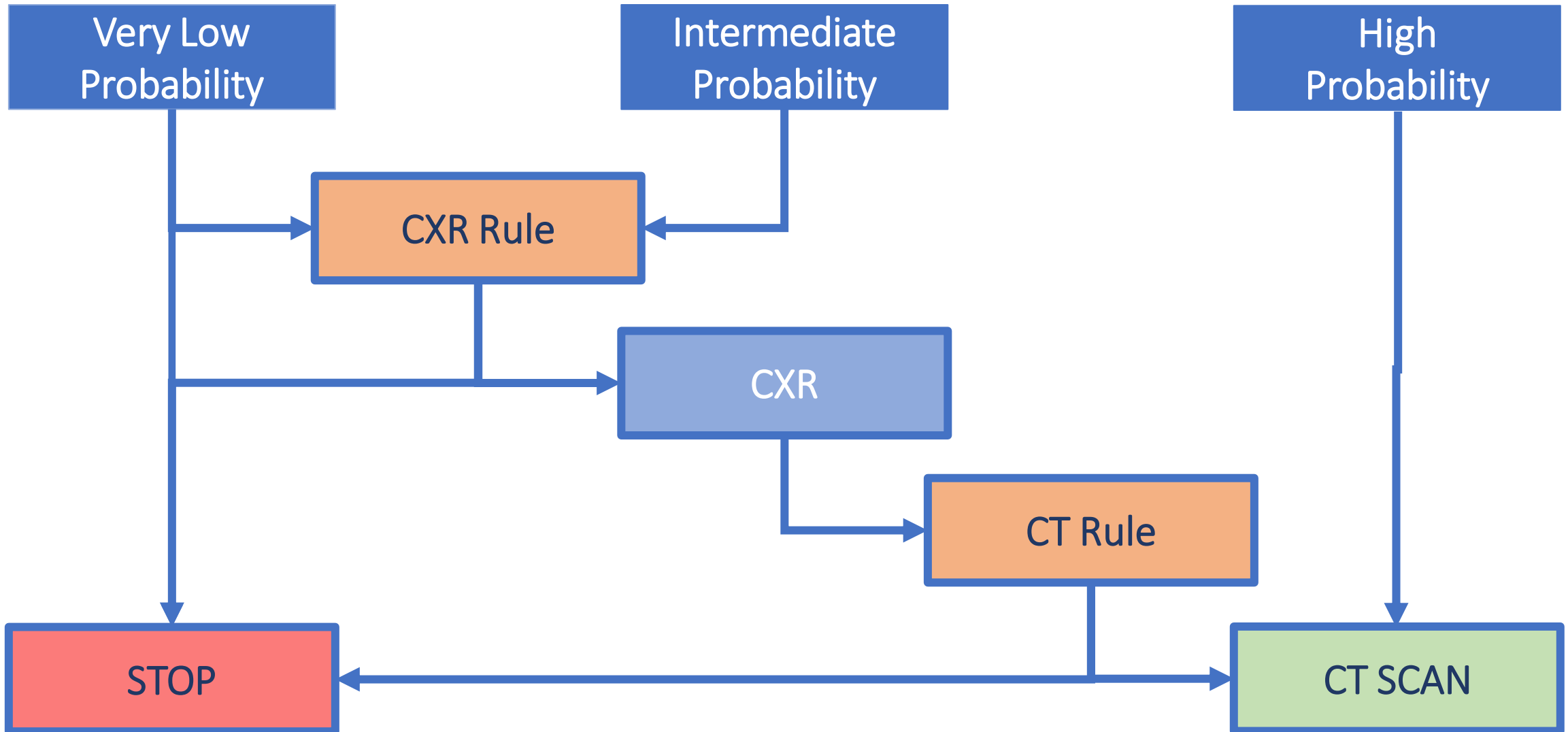
CT Rule for All Injury

Distracting Injury
Chest Wall Tenderness
Sternal Tenderness
Spinal Tenderness
Scapular Tenderness
Rapid Deceleration
Abnormal CXR

Concern for Chest Trauma (CXR2)



Concern for Chest Trauma



I believe we provide our highest-value care when we employ patient-center, evidence-based care.

Blunt Chest Trauma:

Thank You!

Providing our highest-value care

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Blunt Chest Trauma:

Questions?

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