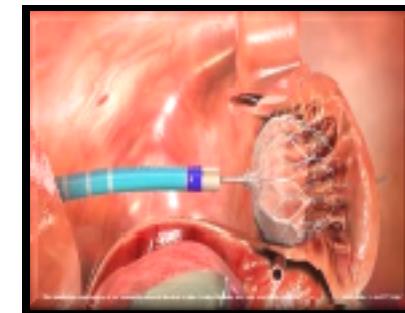
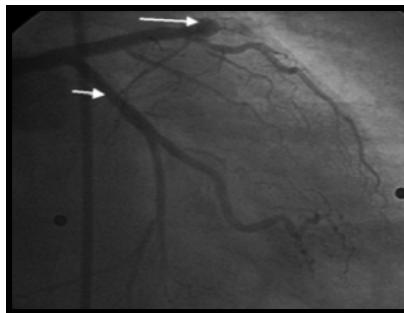
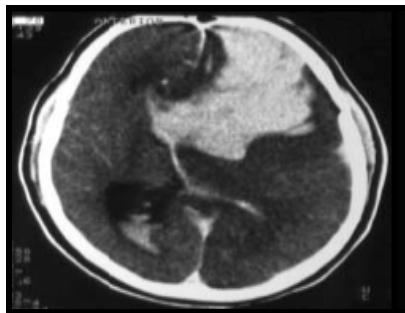


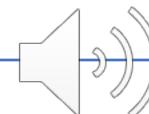


Integration of Clinical Predictors into a Diagnostic Pathway Model



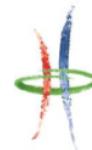
7th IMAD Meeting
70the ESCVS
Theatre de Liege, Belgium
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Conflict of Interest - Disclosure

I, *Ibrahim Akin* DO NOT have a financial interest / arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.



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Clinical Predictors – Diagnostic Scheme

1. Onset chest pain, back pain or both within 2 weeks of admission were subjected to history taking, physical examination, routine laboratory evaluation and 12-lead ECG

1. Exclusion of established diagnosis

1. Consultation of 2 experienced emergency physicians

Table 1. Characteristics of 250 Study Patients*

| Characteristic | Dissection | | |
|--------------------------------|--------------------|--------------------|-------------------|
| | Type A (n = 78) | Type B (n = 50) | None (n = 122) |
| Patient characteristics | | | |
| Age, mean ± SD, y | 50 ± 15 | 57 ± 12 | 55 ± 17 |
| Sex, M/F | 61/17 | 39/11 | 73/49 |
| Acute aortic dissection | 67 (86) | 38 (76) | NA |
| Subacute aortic dissection | 11 (14) | 12 (24) | NA |
| Chronic arterial hypertension | 58 (74) | 41 (82) | 52 (43) |
| Marfan syndrome | 9 (12) | NA | 2 (2) |
| Dissection | | | |
| Overt dissection | 71 (91) | 41 (82) | NA |
| Intramural hemorrhage | 7 (9) | 9 (18) | NA |
| Surgical treatment | 73 (94)† | 32 (64) | 40 (33)‡ |
| Death ≤30 d | 17 (22) | 7 (14) | 7 (6)§ |

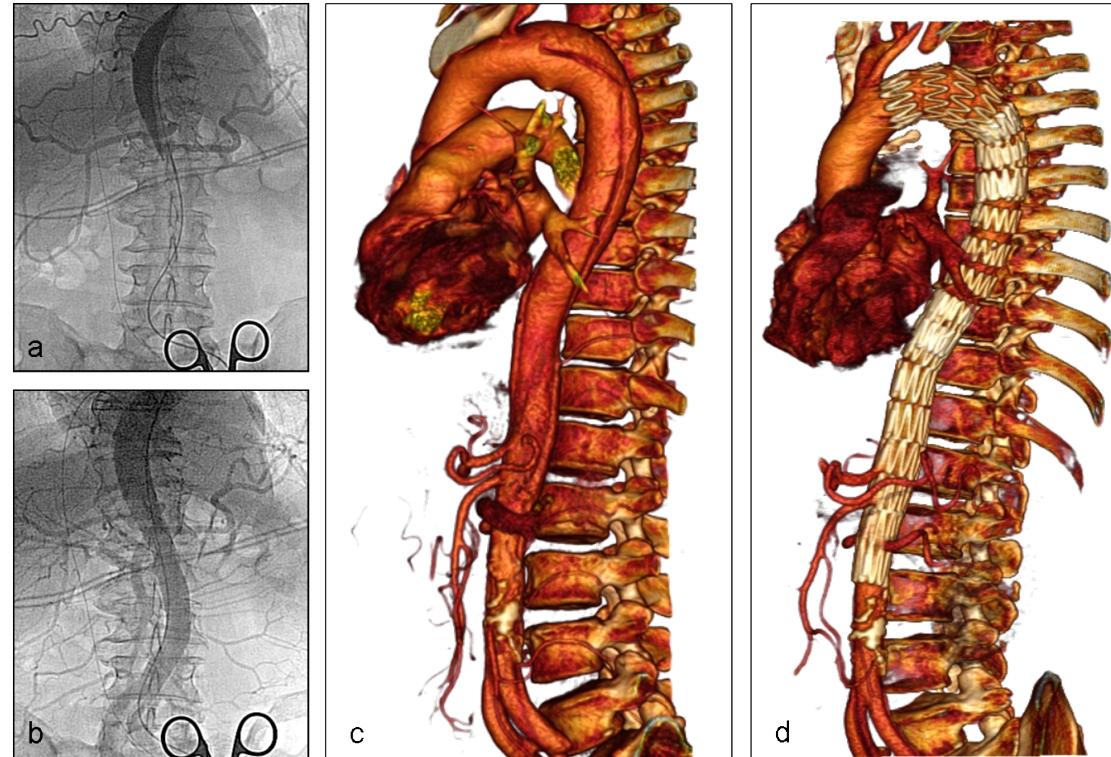
Von Kodolitsch Y, ... Nienaber CA. Arch Intern Med 2000;160:2977-82



Clinical Predictors – Diagnostic Scheme

Table 3. Risk for Types A and B Acute Aortic Dissection According to 3 Clinical Predictors

| Variable | No. (%) of Patients | | |
|---|-------------------------|----------------------------|---------------------------------|
| | Dissection (n = 128) | No Dissection (n = 122) | Probability of Dissection, % |
| No sign present | 5 (4) | 65 (53) | 7 |
| Aortic pain alone | 13 (10) | 29 (24) | 31 |
| Mediastinal widening, aortic widening, or both alone | 11 (9) | 17 (14) | 39 |
| Aortic pain + mediastinal widening, aortic widening, or both | 50 (39) | 10 (8) | 83 |
| Pulse differentials, blood pressure differentials, or both alone | 2 (2) | 0 | 100 |
| Aortic pain + pulse differentials, blood pressure differentials, or both | 11 (9) | 1 (1) | 92 |
| Mediastinal widening + pulse differentials, blood pressure differentials, or both | 2 (2) | 0 | 100 |
| Aortic pain + mediastinal widening, aortic widening, or both + pulse differentials, blood pressure differentials, or both | 34 (27) | 0 | 100 |



Von Kodolitsch Y, ... Nienaber CA. Arch Intern Med 2000;160:2977-82

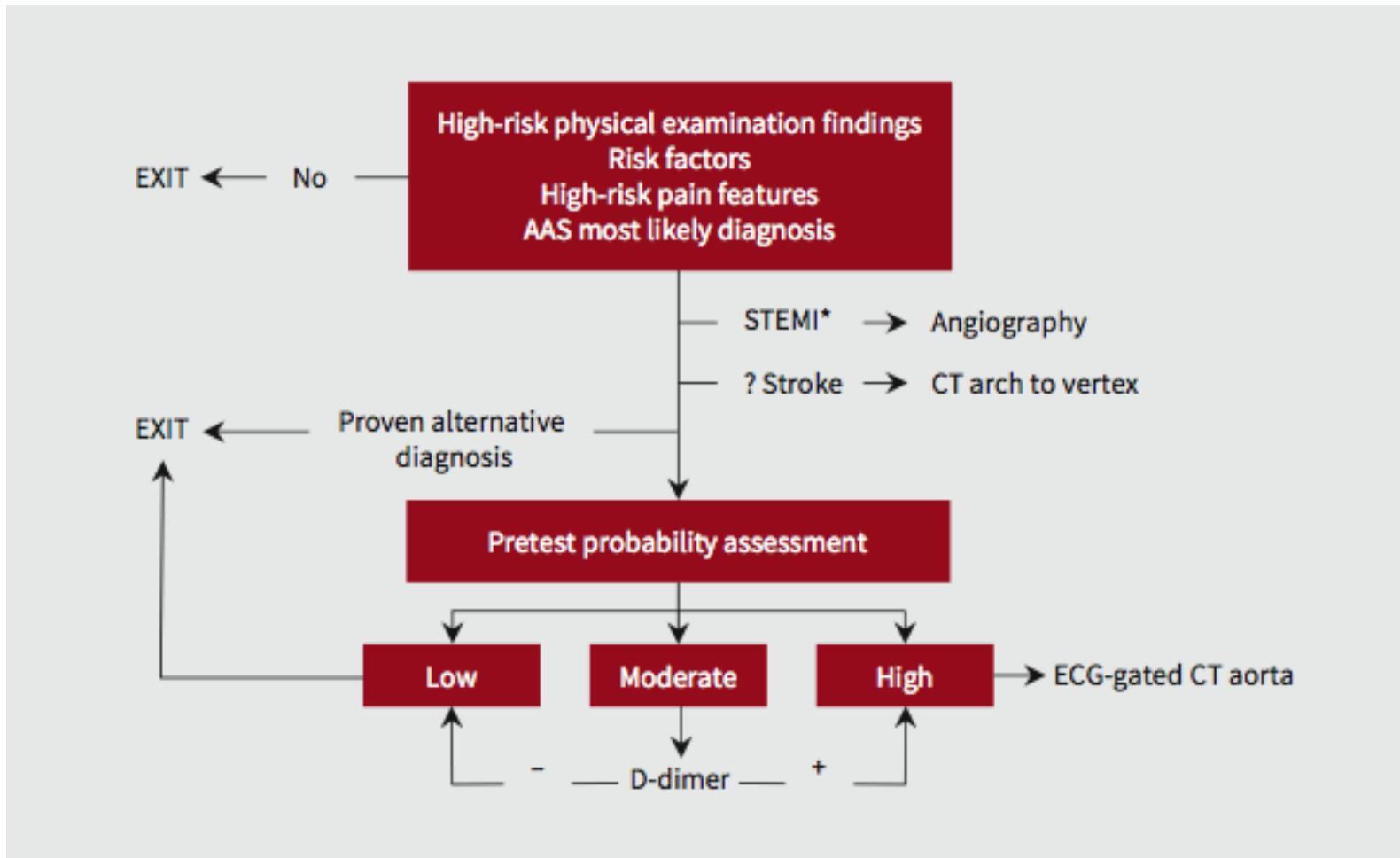
Clinical Predictors – Canadian Guidelines

| Risk assessment category | Characteristic | Score |
|---|---|-------|
| Risk factors <ul style="list-style-type: none">• Connective tissue disease• Aortic valve disease• Recent aortic manipulation• Family history of AAS• Aortic aneurysm | No risk factors | 0 |
| | Any nonaneurysmal risk factors | 1 |
| | Aortic aneurysm | 2 |
| Pain features <ul style="list-style-type: none">• Severe or worst ever• Thunderclap or abrupt• Tearing or ripping• Migrating or radiating | No high-risk pain features | 0 |
| | 1 or 2 high-risk pain features | 1 |
| | 3 or more high-risk pain features | 2 |
| Physical examination findings <ul style="list-style-type: none">• Pulse deficit• Neurological deficit• Aortic insufficiency• Hypotension or pericardial effusion | No high-risk physical examination findings | 0 |
| | Any high-risk physical examination findings | 2 |
| Alternative diagnosis | Suspicion for an alternative diagnosis†‡ | -1 |
| | Unsure | 0 |
| | AAS the most likely diagnosis | 1 |
| Score results | | |
| 0: Low-risk probability (< 0.5%) — no further investigations | | |
| 1: Moderate-risk probability (0.5%–5%) — D-dimer testing | | |
| ≥ 2: High-risk probability (> 5%) — ECG-gated CT aorta | | |

Ohle R, et al. CMAJ 2000;192:E832-43



Clinical Predictors – Canadian Guidelines



Ohle R, et al. CMAJ 2000;192:E832-43



Clinical Predictors – ACCF/AHA Guidelines

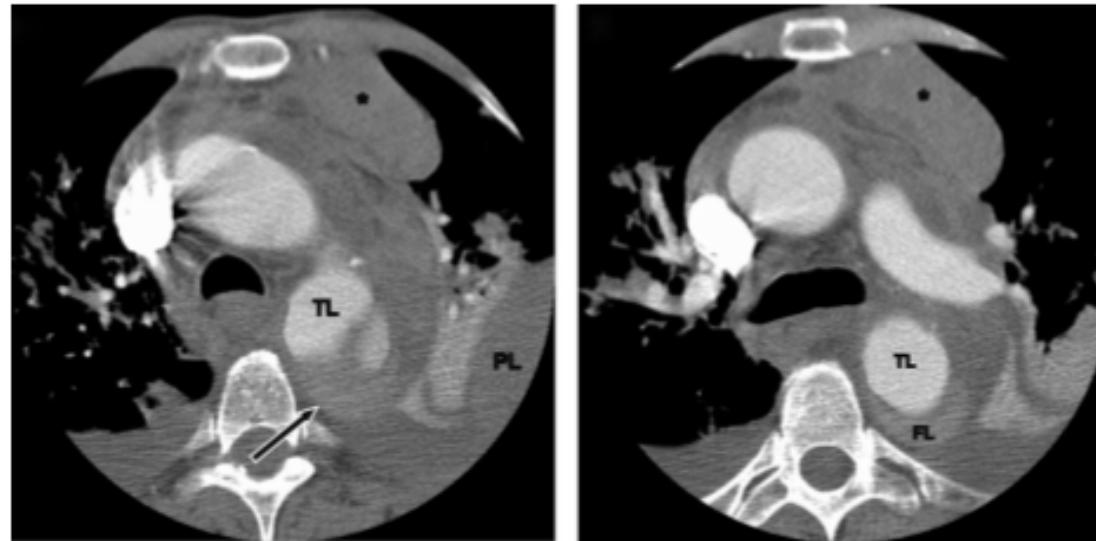
Table 9. Risk Factors for Development of Thoracic Aortic Dissection

Conditions associated with increased aortic wall stress

- Hypertension, particularly if uncontrolled
- Pheochromocytoma
- Cocaine or other stimulant use
- Weight lifting or other Valsalva maneuver
- Trauma
- Deceleration or torsional injury (eg, motor vehicle crash, fall)
- Coarctation of the aorta

Conditions associated with aortic media abnormalities

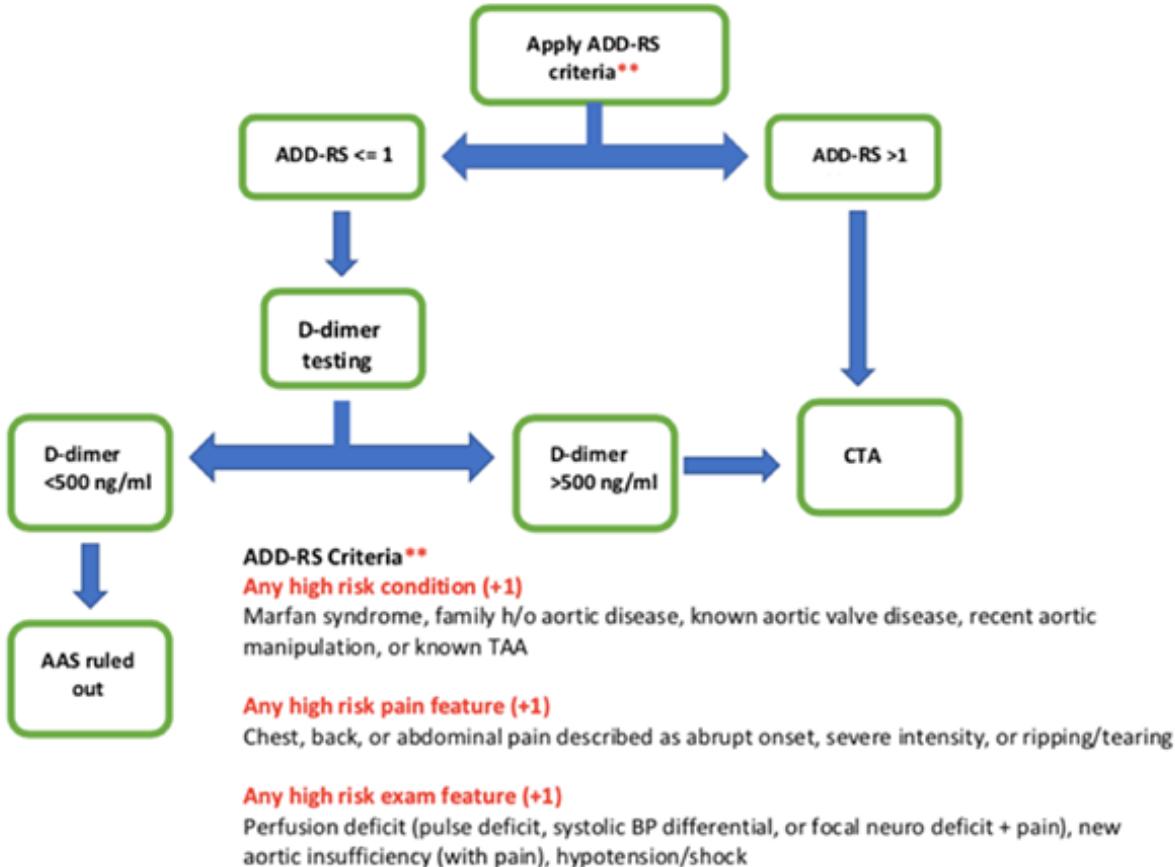
- Genetic
 - Marfan syndrome
 - Ehlers-Danlos syndrome, vascular form
 - Bicuspid aortic valve (including prior aortic valve replacement)
 - Turner syndrome
 - Loeys-Dietz syndrome
 - Familial thoracic aortic aneurysm and dissection syndrome
- Inflammatory vasculitides
 - Takayasu arteritis
 - Giant cell arteritis
 - Behçet arteritis
- Other
 - Pregnancy
 - Polycystic kidney disease
 - Chronic corticosteroid or immunosuppression agent administration
 - Infections involving the aortic wall either from bacteremia or extension of adjacent infection



Hiratzka LF, et al. Circulation 2010;121:e266-e369



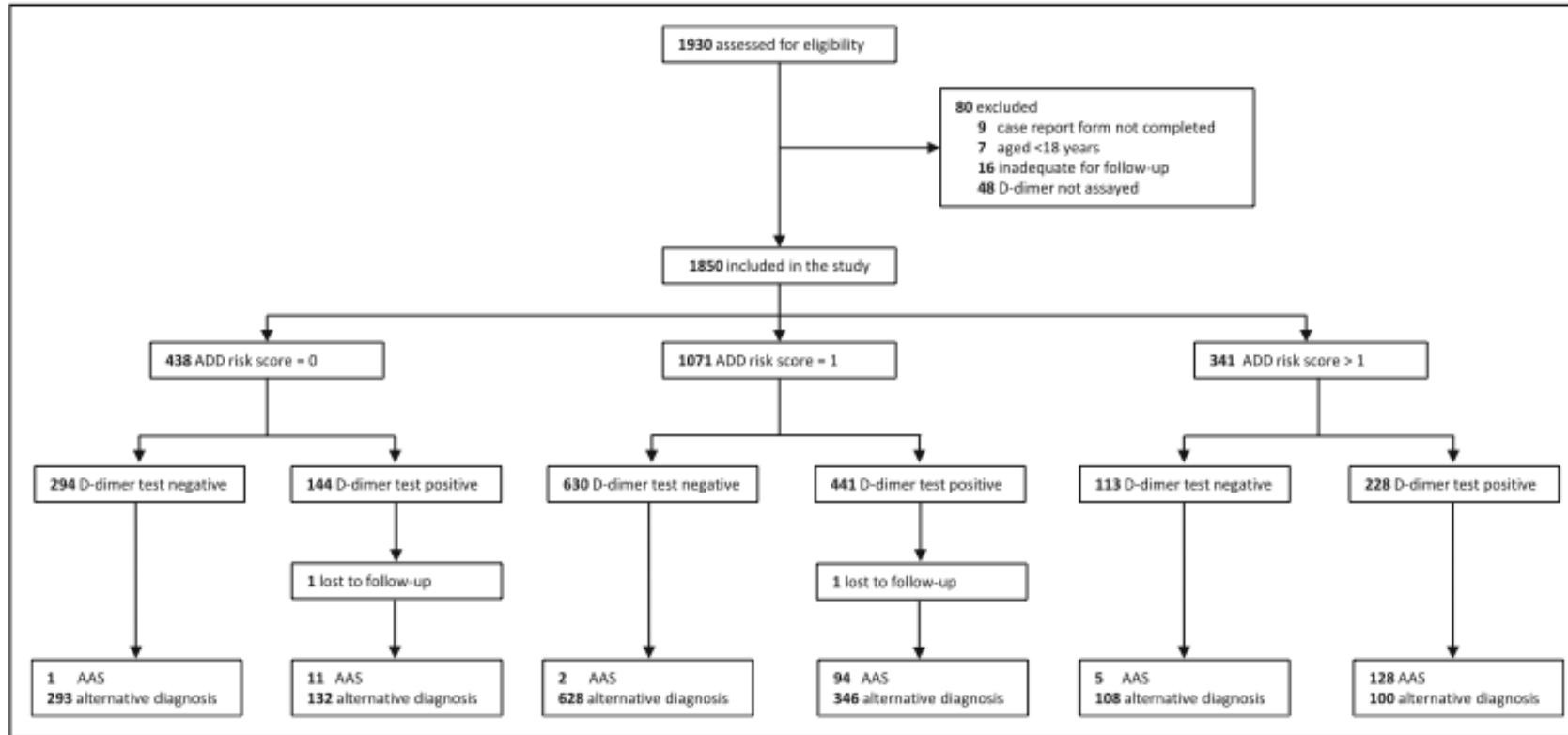
Clinical Predictors – ACCF/AHA Guidelines



Hiratzka LF, et al. Circulation 2010;121:e266-e369



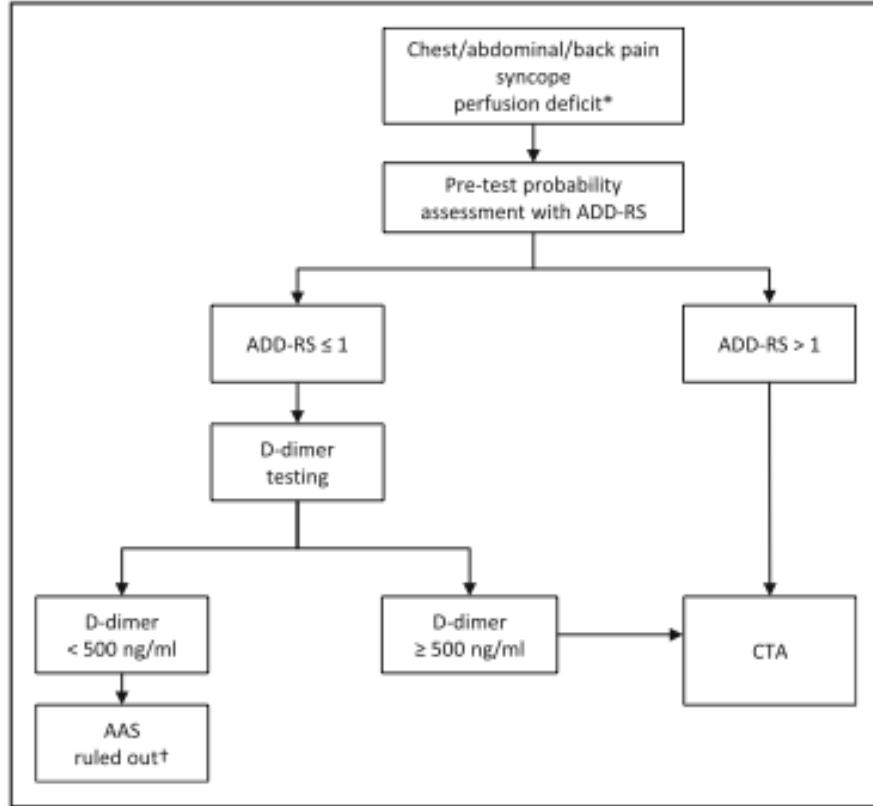
ADvISED Study



Nazerian P, et al. Circulation 2018;137:250-8



ADvISED Study



| Diagnostic Variable | Diagnostic Strategy (95% CI) | |
|---------------------|--------------------------------|---------------------------------|
| | ADD-RS=0 Plus DD <500 ng/mL | ADD-RS ≤1 Plus DD <500 ng/mL |
| Sensitivity, % | 99.6 (97.7–100) | 98.8 (96.4–99.7) |
| Specificity, % | 18.2 (16.4–20.2) | 57.3 (54.9–59.7) |
| PPV, % | 15.4 (13.7–17.3) | 25.8 (23–28.7) |
| LR+ | 1.22 (1.19–1.25) | 2.31 (2.18–2.45) |
| NPV, % | 99.7 (98.1–100) | 99.7 (99.1–99.9) |
| LR- | 0.02 (0.003–0.16) | 0.02 (0.01–0.07) |

Nazerian P, et al. Circulation 2018;137:250-8



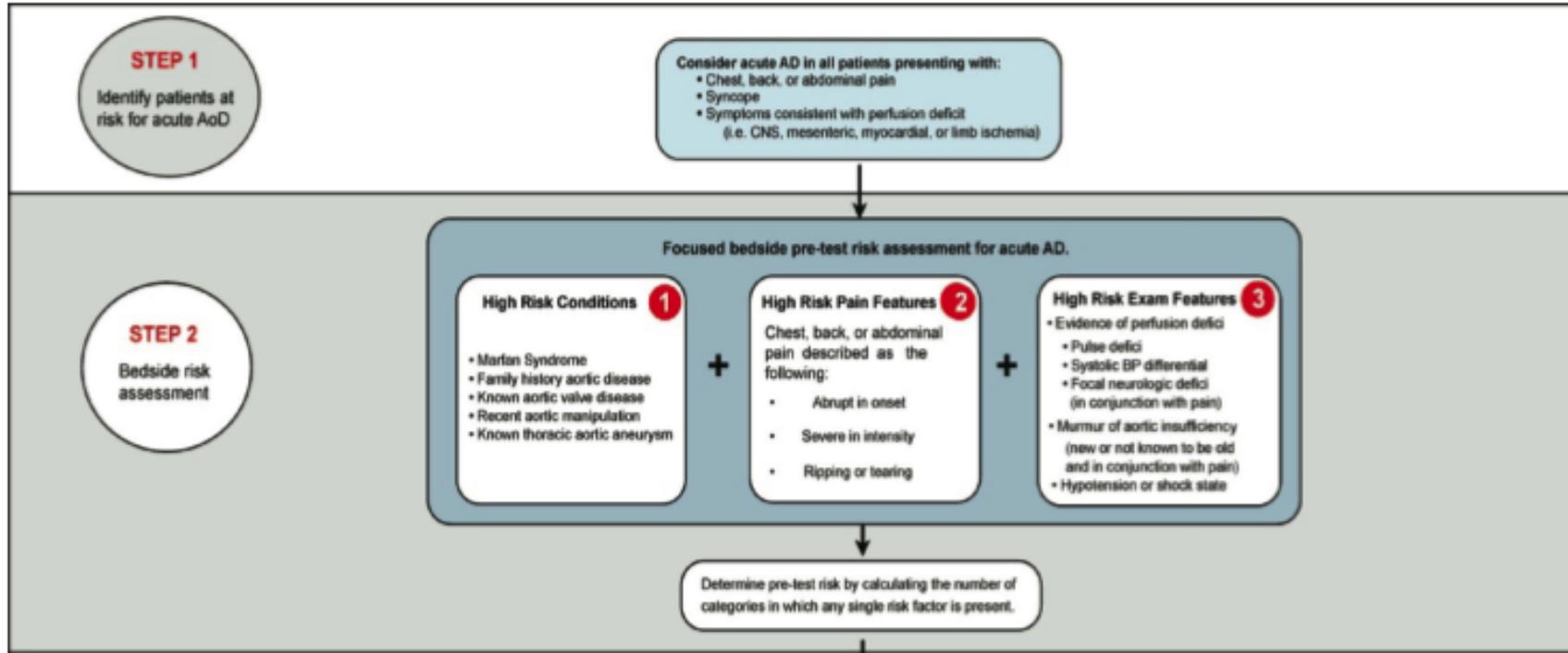
IRAD – 20 Year Experience

| Category | Total (N=4428) | Type A (n=2952) | Type B (n=1476) | P Value Type A vs Type B |
|--|-------------------|--------------------|--------------------|--------------------------------|
| Demographics | | | | |
| Age, y, mean±SD | | 61.5±14.6 | 63.6±14.1 | <0.001 |
| Male | 2964 (66.9) | 1992 (67.5) | 972 (65.8) | 0.272 |
| Referred from primary site to International Registry of Acute Aortic Dissection center | 3089 (69.7) | 2022 (68.5) | 1067 (72.2) | 0.010 |
| Ethnicity | | | | |
| White | 3609 (86.4) | 2455 (88.6) | 1154 (82.1) | <0.001 |
| Asian | 184 (4.4) | 101 (3.6) | 83 (5.9) | |
| Black | 295 (7.1) | 164 (5.9) | 131 (9.3) | |
| Hispanic | 57 (1.4) | 29 (1.0) | 28 (2.0) | |
| Other | 31 (0.7) | 22 (0.8) | 9 (0.6) | |
| Patient history | | | | |
| Marfan syndrome | 178 (4.4) | 122 (4.5) | 56 (4.0) | 0.404 |
| Hypertension | 3247 (76.6) | 2089 (74.4) | 1158 (80.9) | <0.001 |
| Atherosclerosis | 1079 (26.5) | 636 (23.8) | 443 (31.7) | <0.001 |
| Known aortic aneurysm | 628 (15.5) | 337 (12.7) | 291 (20.7) | <0.001 |
| Previous acute aortic dissection | 232 (5.7) | 107 (4.0) | 125 (8.9) | <0.001 |
| Diabetes mellitus | 316 (7.8) | 204 (7.7) | 112 (8.0) | 0.673 |
| Previous cardiac surgery | 643 (16.1) | 374 (14.2) | 269 (19.6) | <0.001 |
| Aortic valve replacement | 203 (5.1) | 118 (4.5) | 85 (6.2) | 0.022 |
| Aortic aneurysm and acute aortic dissection | 368 (9.2) | 168 (6.4) | 200 (14.5) | <0.001 |
| Coronary artery bypass graft surgery | 196 (4.9) | 130 (5.0) | 66 (4.8) | 0.851 |
| Mitral valve replacement | 35 (0.9) | 24 (0.9) | 11 (0.8) | 0.726 |
| Iatrogenic | 118 (2.8) | 85 (3.0) | 33 (2.3) | 0.212 |

Evangelista A, et al. Circulation 2018;137:1846-60



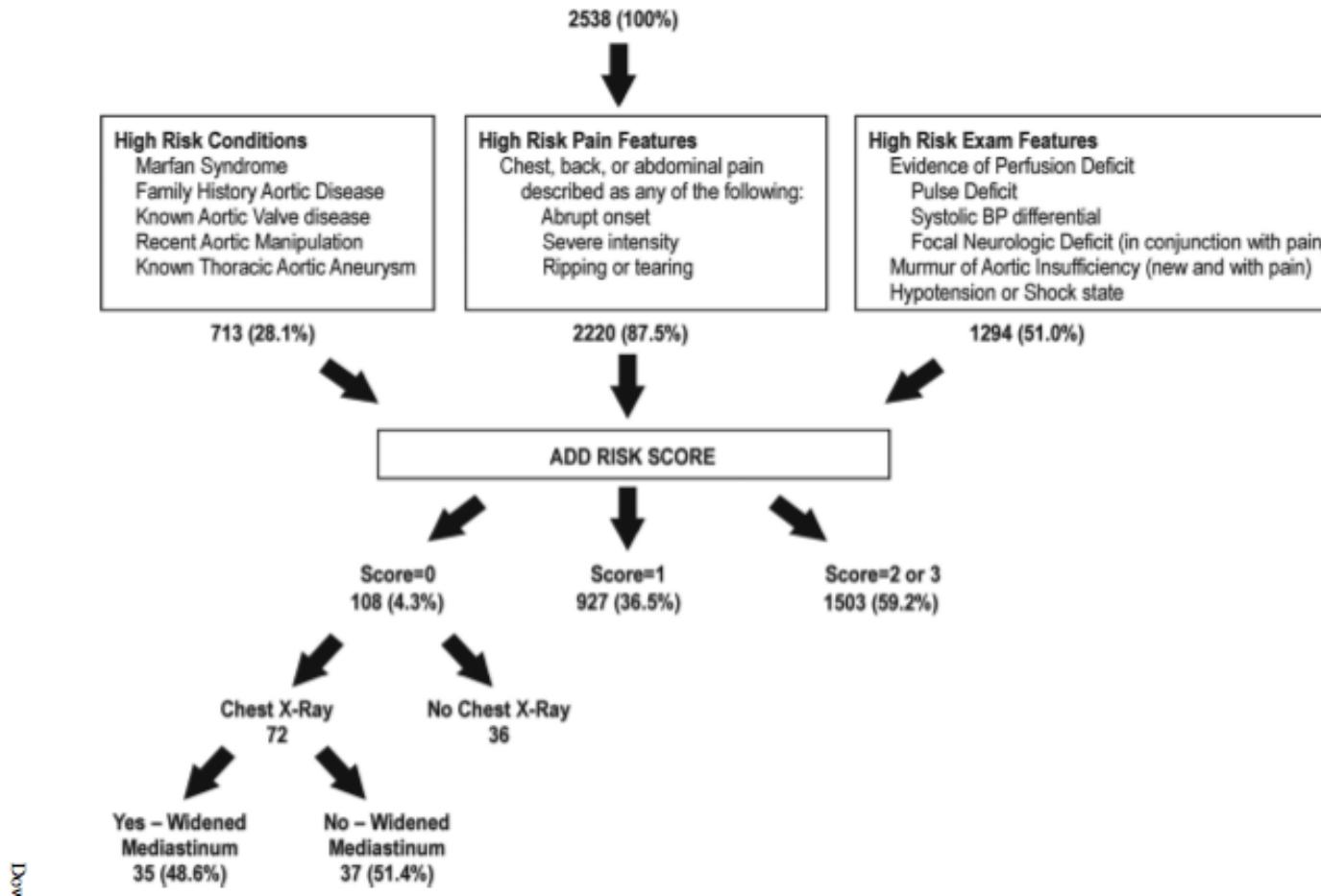
IRAD – ADD Risk Score



Rogers AM, et al. Circulation 2011;123:2213-8



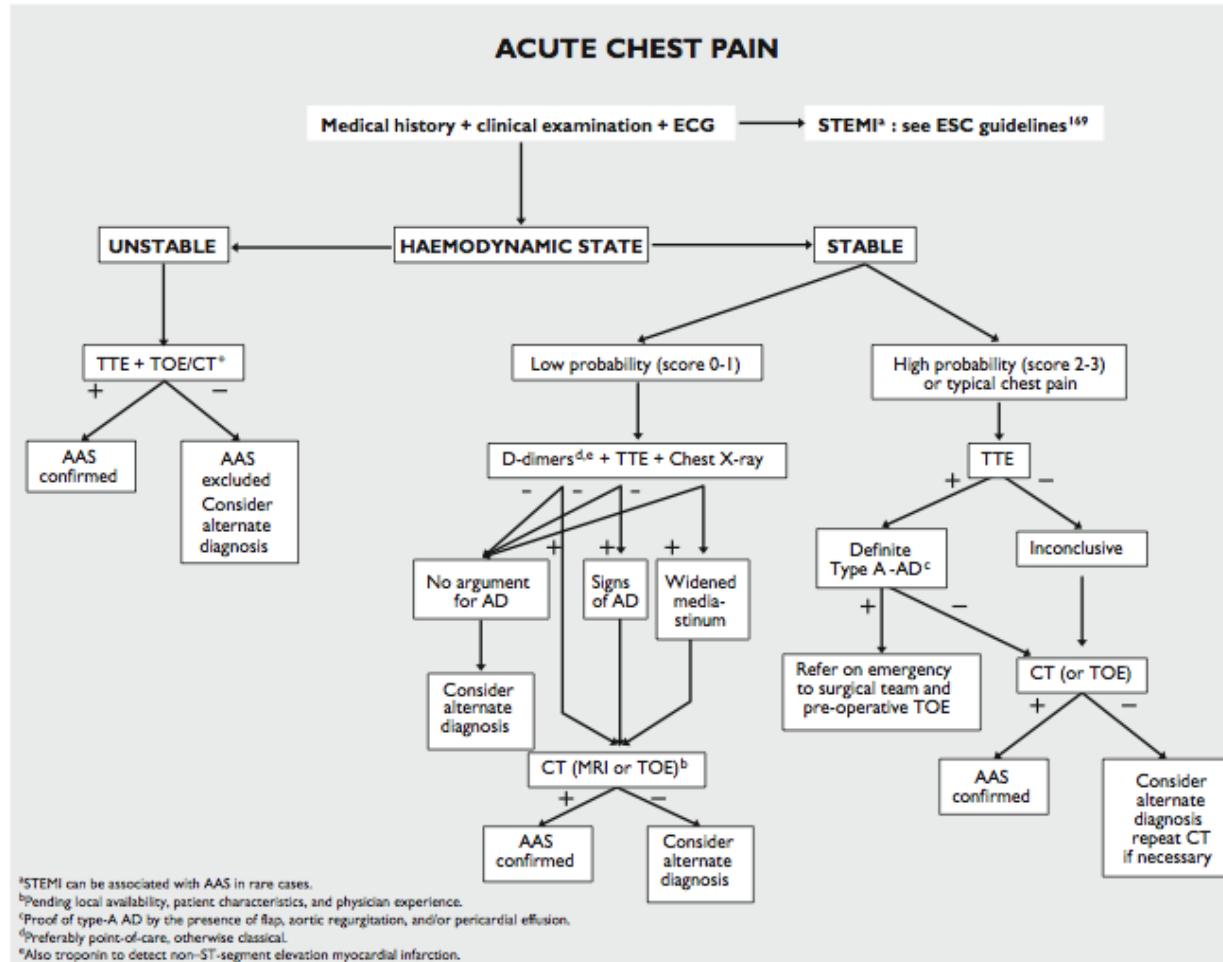
IRAD – ADD Risk Score



Rogers AM, et al. Circulation 2011;123:2213-8



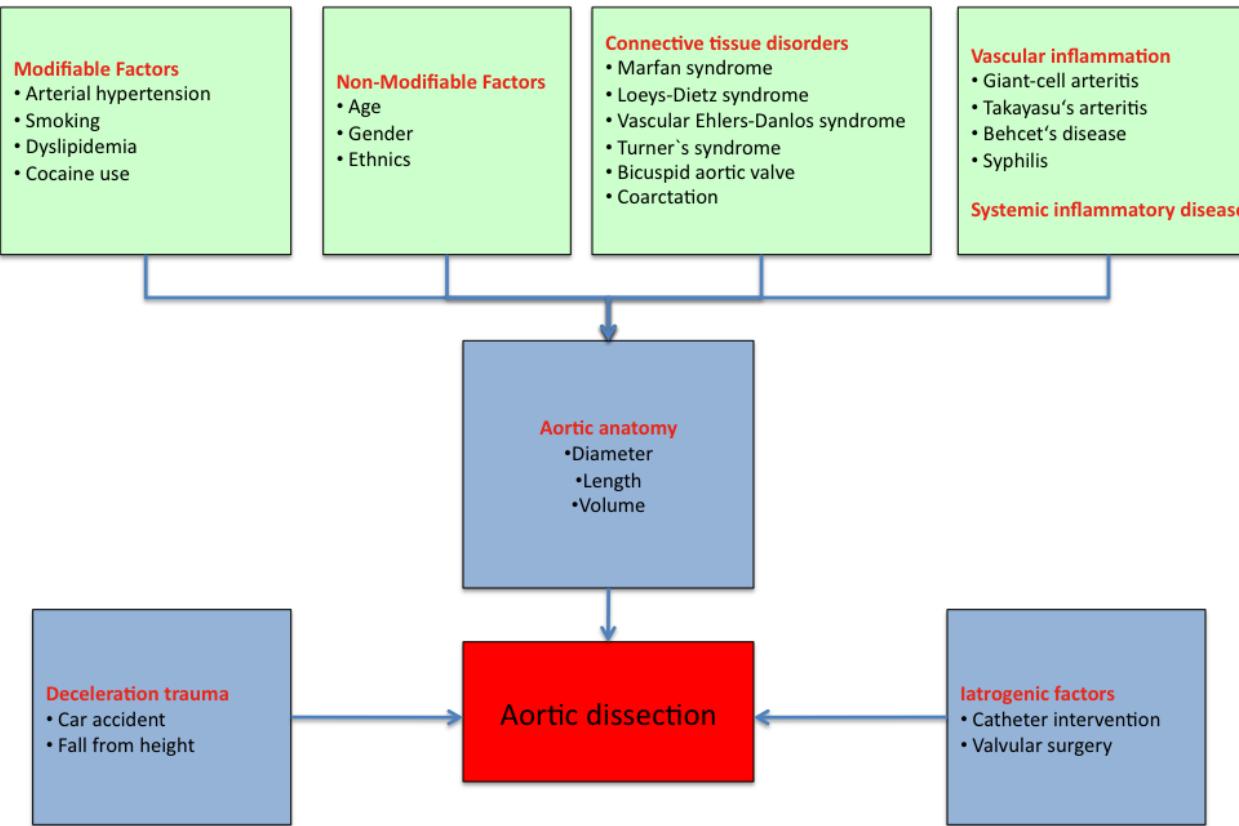
ESC Guidelines



Erbel R, et al. Eur Heart J 2014;35:2873-2926



Conclusion – Multifactorial Multidisciplinary – Aortic Team



Akin I, Nienaber CA. Heart 2020;106:870

