*Appendix 1: Definitions for acute underlying medical causes*

The study purpose was to include patients in whom it was (or could have been) apparent to the emergency physician that atrial fibrillation or flutter was confounded by another serious acute medical condition. Note that all physical examination findings, laboratory, ECG, or radiologic investigations MUST have been available in the emergency department. (The exceptions were blood, urine, or sputum cultures as these take 24-48 hours to return. However, if the treating emergency physician was ordering such tests, an infectious process was most likely considered in the ED setting.) All physical examination information would be located on the emergency physician’s chart or the consulting physician admission note. (At our institutions, the admission note is dictated while the patient is still in the ED.) Results of any tests must have been available during the patient’s emergency department stay. For example, a patient with atrial fibrillation who was admitted with weakness and had no objective criteria of underlying disease while in the ED, but developed a fever and pulmonary infiltrate on post-admission day 4, would NOT be included as a patient with sepsis.

1. Acute coronary syndrome: ECG findings of new left bundle branch block; ST segment elevation of 2 mm in precordial or 1 mm in limb leads; elevated cardiac troponin T (Roche Elecsys, Hoffman LaRoche, Laval, Quebec, Canada; 99th percentile reference limit > 0.01 nanograms / mL, lower limit of detection 0.01 nanograms / mL, 10% coefficient of variation 0.03 nanograms / mL; with a change of at least 20% on sequential testing) with no other cause evident; coronary artery revascularization by percutaneous coronary intervention or bypass grafting; admission and treatment for acute coronary syndrome. (1)

2. Acute heart failure: documented findings on physical examination (S3 gallop, lung crackles, jugular vein distension, positive abdominojugular test) or documented new findings on chest radiography (cardiomegaly or pulmonary edema) or brain natriuretic peptic levels (Siemens ADVIA Centaur, Burlington, ON, Canada) > 400 picograms / mL; or diuretic use in the ED with documented improvement of respiratory status; or admission and treatment for heart failure. (2,3)

3. Hypothermia: Documented body temperature < 32 C in the ED.

4. Sepsis: Meeting at least two of systemic inflammatory response syndrome criteria (T < 36 C or T > 38 C; white blood cell count < 4 000 or > 12 000 / mL; heart rate > 90 beats / minute; respiratory rate > 20 breaths / minutes or PCO2 < 32 mm Hg) with evidence of new infection (new infiltrate on chest radiograph; positive blood, urine, or wound cultures; white blood cells in the cerebrospinal fluid) (4)

5. Exacerbation of chronic obstructive pulmonary disease: documented increase in cough, dyspnea, and sputum production, or documented improvement in respiratory function after administration of bronchodilators, or admission and treatment for COPD, (5) and no other cause evident.

5. Thyrotoxicosis: Thyroid-stimulating hormone (Siemens ADVIA Centaur Ultra Low (TSH3UL) reagents, Burlington, ON, Canada) < 0.02 nanograms / mL or admission and treatment for thyrotoxicosis.

6. Overdose of medicinal agents: documented overdose of medicinal agents and treatment for overdose of medicinal agents, with other cause evident.

7. Pulmonary embolism: proven on CT or pulmonary angiography.

8. Acute valve disease: Echocardiographic evidence of acute valve injury.

9. Hypertensive emergency: Blood pressure > 220 / 100 with evidence of new end-organ injury (acutely altered vision with documented grade III / IV papilledema; documented acute aortic dissection; documented new neurologic deficit; acute renal failure; or blood smear demonstrating microangiopathic hemolytic anemia) (6)

10. Acute kidney injury: rise in baseline creatinine (Roche enzymatic creatinine [Roche Elecsys, Laval, PQ, Canada] run on a Siemens ADVIA 1800 analyzer [Burlington, ON, Canada]) of > 26 micromoles / L, and no other cause evident. Baseline creatinine was the most recent value in the within 3 months. (7, 8, 9)

11. Stroke or transient ischemic attack: acute neurologic deficit, whether reversible or not.

12. Acute bleeding: admission and treatment for bleeding, such as gastrointestinal, and no other cause evident.

If the two emergency physician reviewers independently arrived at the same diagnosis, the patient was considered appropriately diagnosed. However, the two reviewers reached different conclusion, two independent specialists adjudicated the patient and determined a diagnosis; if the diagnoses were discordant, the principal investigator made the final diagnosis.

*References for appendix 1:*

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*Appendix 2: Vignettes of ED AFF patients who were missed by the rule (temperature and oxygen level, as well as other physical examination maneouvers and investigations are normal unless stated)*

1. 75 year old female with fatigue for a few days, CHA₂DS₂-VASc 2, chest XR showed extensive interstitial infiltrates, brain natriuretic peptide 800 ng / mL; diagnosis of acute heart failure.
2. 85 year old male with weakness for a week, CHA₂DS₂-VASc 2, all labs normal except serum creatinine 154 and digoxin level 6.5; diagnosis of acute kidney injury and digoxin overdose.
3. 84 year old male with bright red blood per rectum for one day, CHA₂DS₂-VASc 2, hemoglobin 122 mg / dL and international normalized ratio 4.4; diagnosis of lower gastrointestinal bleed.
4. 79 year old male with shortness of breath for 3 days, CHA₂DS₂-VASc 2, oxygen saturation 91% on room air; chest XR showed extensive interstitial infiltrates, brain natriuretic peptide 4500 ng / mL; diagnosis of acute heart failure.
5. 69 year old female with melena stool for 2 days, CHA₂DS₂-VASc 2, hemoglobin 66; diagnosis of upper gastrointestinal bleeding.
6. 83 year old male with dizziness for 1 day, CHA₂DS₂-VASc 2, chest XR with extensive interstitial infiltrates; diagnosis of acute heart failure.
7. 70 year old female with 1 week bright red blood per rectum; CHA₂DS₂-VASc 2; hemoglobin 65; diagnosis of lower gastrointestinal bleeding.
8. 82 year old male with 1 day of bright red blood per rectum; CHA₂DS₂-VASc 2; hemoglobin 92; diagnosis of lower gastrointestinal bleeding.
9. 74 year old female with 2 days of dizziness; CHA₂DS₂-VASc 2; hemoglobin of 51; diagnosis of gastrointestinal bleeding.
10. 42 year old female with human immunodeficiency virus and short of breath for 3 days; CHA₂DS₂-VASc 1; temperature 37.7 degrees, all labs normal but chest XR showed bilateral pulmonary infiltrates; diagnosis of pneumonia.
11. 70 year old female with 3 days of chest pain and dyspnea; CHA₂DS₂-VASc 2; D-dimer > 4000; diagnosis of pulmonary embolus proven on computed tomography.
12. 77 year old male with one week worsening shortness of breath; CHA₂DS₂-VASc 2; chest XR showed extensive right pulmonary infiltrate; diagnosis of pneumonia.
13. 56 year old female with dyspnea for 1 days; CHA₂DS₂-VASc 1; white blood cell count 27.1; diagnosis of sepsis, likely from urinary cause.
14. 45 year old female with history of injection drug use, short of breath for 4 days with knee pain, CHA₂DS₂-VASc 1, temperature of 39.9 degrees Celsius; chest XR showed multiple small infiltrates; diagnosis of sepsis, likely from endocarditis.
15. 49 year old male with one month of increasing dyspnea, CHA₂DS₂-VASc 0; oxygen level 92% on room air; chest XR showed bilateral effusions with interstitial infiltrates; diagnosis of heart failure.
16. 60 year old female with 1 week of increasing dyspnea, CHA₂DS₂-VASc 1; chest XR showed interstitial infiltrates; diagnosis of heart failure.
17. 52 year old female with weakness and weight loss over past few months, CHA₂DS₂-VASc 1; thyroid stimulating hormone undetectable; diagnosis of hyperthyroidism.
18. 72 year old female short of breath for 3 days; CHA₂DS₂-VASc 2; serum creatinine 450; diagnosis of acute kidney injury.
19. 55 year old male with chest pain during dialysis run; CHA₂DS₂-VASc 1; new ST depressions and rising serum troponin levels; diagnosis of acute coronary syndrome.
20. 50 year old female with palpitations for 3 hours; CHA₂DS₂-VASc 1; thyroid stimulating hormone undetectable; diagnosis of hyperthyroidism.
21. 40 year old male with black stool during dialysis run; CHA₂DS₂-VASc 0; hemoglobin normal but INR > 9.0; diagnosis of upper gastrointestinal bleeding.
22. 64 year old female with cough and shortness of breath for 2 days, CHA₂DS₂-VASc 1, temperature 38.1 degrees, white blood cell count 21.8 and right-sided pulmonary infiltrate; diagnosis of pneumonia.
23. 82 year old male with dizziness for 2 days; CHA₂DS₂-VASc 2, chest XR showed left-sided pulmonary infiltrate; diagnosis of pneumonia.
24. 54 year old female with weakness for 2 days; CHA₂DS₂-VASc 1; hemoccult strongly positive for blood; hemoglobin 89; diagnosis of upper gastrointestinal bleeding.
25. 77 year old male with cough for one week; CHA₂DS₂-VASc 2; chest XR showed bilateral pulmonary infiltrate; diagnosis of pneumonia.
26. 74 year old female with chest pain for a few hours; CHA₂DS₂-VASc 2; rising troponin; diagnosis of acute coronary syndrome.
27. 80 year old male with weakness for a few days; CHA₂DS₂-VASc 2; oxygen levels 91% on room air; chest XR showed left-sided infiltrate; diagnosis of pneumonia.
28. 66 year old male short of breath for one day; CHA₂DS₂-VASc 1; chest XR showed bilateral interstitial infiltrates; diagnosis of heart failure.