# AF UpdatED

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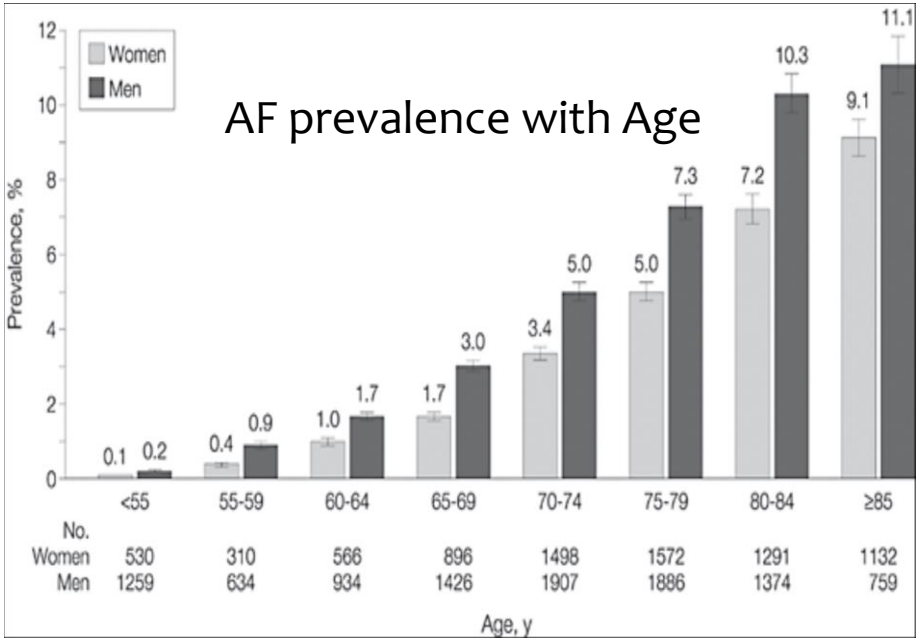
# What will we try and cover today?

* Why (is) AF important for ED?
* What do you do/ think?
* Rate vs rhythm control?
* eCV vs Drugs early vs delayed strategies?
* **Anticoagulation**
  * Which pts?
  * When?
  * By who?

# Epidemiology

Population over 18, 1-2% AF

* Over 65: 3-5% , 85+ 10% or >
* ED populations
  * Primary AF: 0.5-1%
  * Any AF in ED ?1-3%
  * 30-40% > last decade
* New cases 1-1.5% p.a >65
  * A-Coag indicated for >80%
* ED DC req AC ? 30-70%
* ED AC SoC?




| CHADS2 score | Risk of stroke each year |
|---|---|
| 0 | 1.9% (1 in 52) |
| 1 | 2.8% (1 in 35) |
| 2 | 4.0% (1 in 25) |
| 3 | 5.9% (1 in 17) |
| 4 | 8.5% (1 in 12) |
| 5 | 12.5% (1 in 8) |
| 6 | 18.2% (1 in 5) |


Atzema et al; Ann Emerg Med. 2013 Dec;62(6):570-577.e7
Rosen et al; J Am Heart Assoc; . 2018 Aug 7; 7(15): e009024
Miller et al; Canadian Journal of Cardiology, 2018-06-01, Volume 34, Issue 6, Pages 804-807

# Age and time in AF

Wasmer: European Heart Journal (2014) 35, 1439–1447
doi:10.1093/eurheartj/ehu113

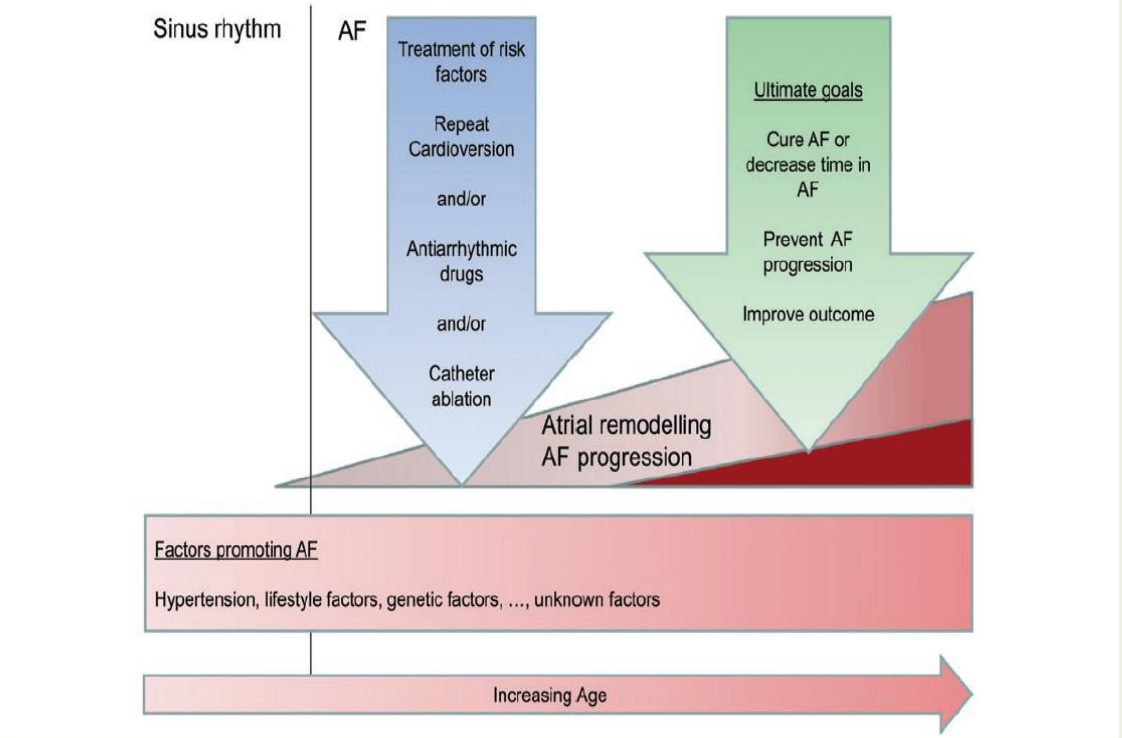



**Figure 1** Atrial fibrillation progression over time. The vertical line delineates atrial fibrillation detection which may be any time after atrial fibrillation development. The blue arrow refers to treatment options, ideally early in the course of atrial fibrillation progression. The green arrow summarizes treatment goals. The darker red triangle refers to delay in atrial fibrillation progression and atrial remodelling, and possibly cure in some, achieved by early atrial fibrillation treatment.

**AF promoters**
**AGE**
**BP**
Obesity/ sleep apnoea
Alcohol-stimulants
**Diabetes**
**Ischaemia/CCF**
**Valve inj**
TFTs / acute insults etc.

# Who agrees with the following statement about acute stable AF

* In general, for most important outcomes, patients **do better** if we revert them to **sinus rhythm**?

* Yes
* No

? Don't know

# In patients with new onset AF, rhythm control has been shown to:

* Reduce Mortality
* Reduce new CCF
* Reduce stroke events
* Reduce hospitalisations
* Improve effort tolerance
* Improve QoL
* Be more cost effective

Yes / No

## For an AF patient being discharged with a CHA2DS2-Va of 2+; Not on A-coags already AND; Without major bleeding risks (HASBLED <3)

**Which statement about who should start anticoagulants do you agree with?**

A) **Cardiology/Gen Med/Haem** to sort as OP; -not an ED job

B) **GP follow up;** no urgent need for A-coags

C) **ED sometimes;** e.g. if CVA risk v. high + low bleeding risk

D) **ED mostly**; it's our job, indefensible if CVA awaiting RV

# The big4 questions in ED AF Mx

* Unstable AF- electricity vs drugs?
* Rate vs rhythm stable acute AF?
  * ? definition (accuracy) of acute
* If rhythm ? **ECV vs drugs**
  * immediate vs delayed
* Anticoagulation by/in ED?
  * anticoagulate for CV?
  * anticoagulate after CV?
  * start long term anticoagulation in ED?

Costantino et al
Intern Emerg Med. 2017 Aug;12(5):693-703. doi: 10.1007/s11739-016-1580-x

# Rhythm vs rate control


# How could rhythm control improve outcomes?

* Potential theoretical benefits
  * Long term: <strokes/emboli
  * Long anticoagulation avoidance
  * Better heart function/ effort tolerance
  * Less atrial remodelling/ > systolic function
  * Less CHF
  * Less deaths
  * Less symptoms
  * Better QoL

# In patients with newly found AF: rhythm vs rate control ? (meta of RCTs n-2800)

- Reduces Mortality
- Reduces new CCF
- Reduces stroke events
- Reduces hospitalisations
- Improves effort tolerance
- Improves QoL
- Is more cost effective

- No: ? Slightly > (v low LoE)
- No: no good evidence
- No: ? Slightly >(low LoE)
- No: prob slightly > (low LoE)
- Variable- poor evidence
- Maybe; overall v. low LoE
- No: ? > costs (low LoE)

Stroke- Sherman 2009
https://doi.org/10.1161/01.STR.0000254719.26536.a9

# Why might CV/ rhythm control be unrewarding

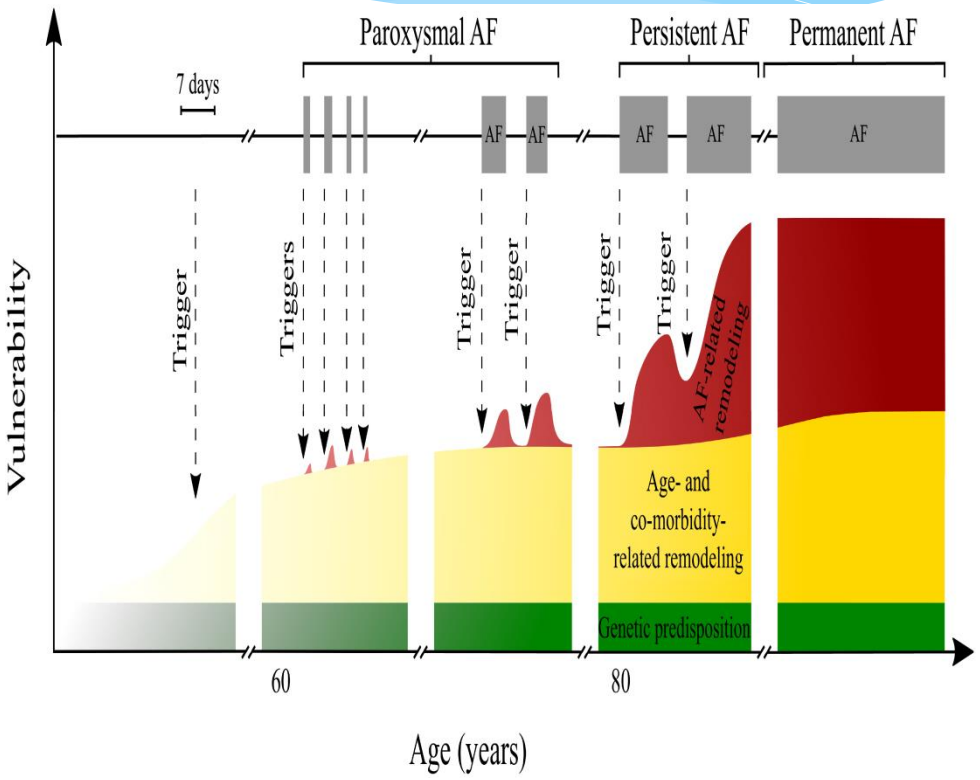
* Spont CV v. common, early
* AF recurs frequently after CV
* Many have asymp. AF
* Many pts remodelled already
* Established poor atrial function
* Poor control of AF risk factors
* QoL not driven by AF

* Low risk pts- 60-70% spont (B-b ++)
* 15-40% recurrence by 30/7
* Prolonged AF common
* Older/co-morbid/ prolonged AF
* Post CV period v high CVA risk
* Major adverse events –esp CVA
* Underlying causation unaddressed
* High rates of CVA in at risk
* Poor rates of AC in at risk
* Poor Mx in post CV period

Clin Cardiol. 2018 Jul;41(7):966-971. doi: 10.1002/clc.22986; Hellman et al
NEJM March 18, 2019 doi: 10.1056/NEJMoa1900353; Pluemaykers et al

# Why Rhythm vs Rate for younger patients?

* Younger patients (? age)
  * More active
  * More symptoms
  * Higher rates (> AV node)
  * Less comorbid
  * Less stroke with CV?
  * B-blocker intolerance
  * Longer time in AF
  * Late mortality < ??
  * Remodelling /resistant AF <?




Chang et al, Plos One 2016
https://doi.org/10.1371/journal.pone.0152349

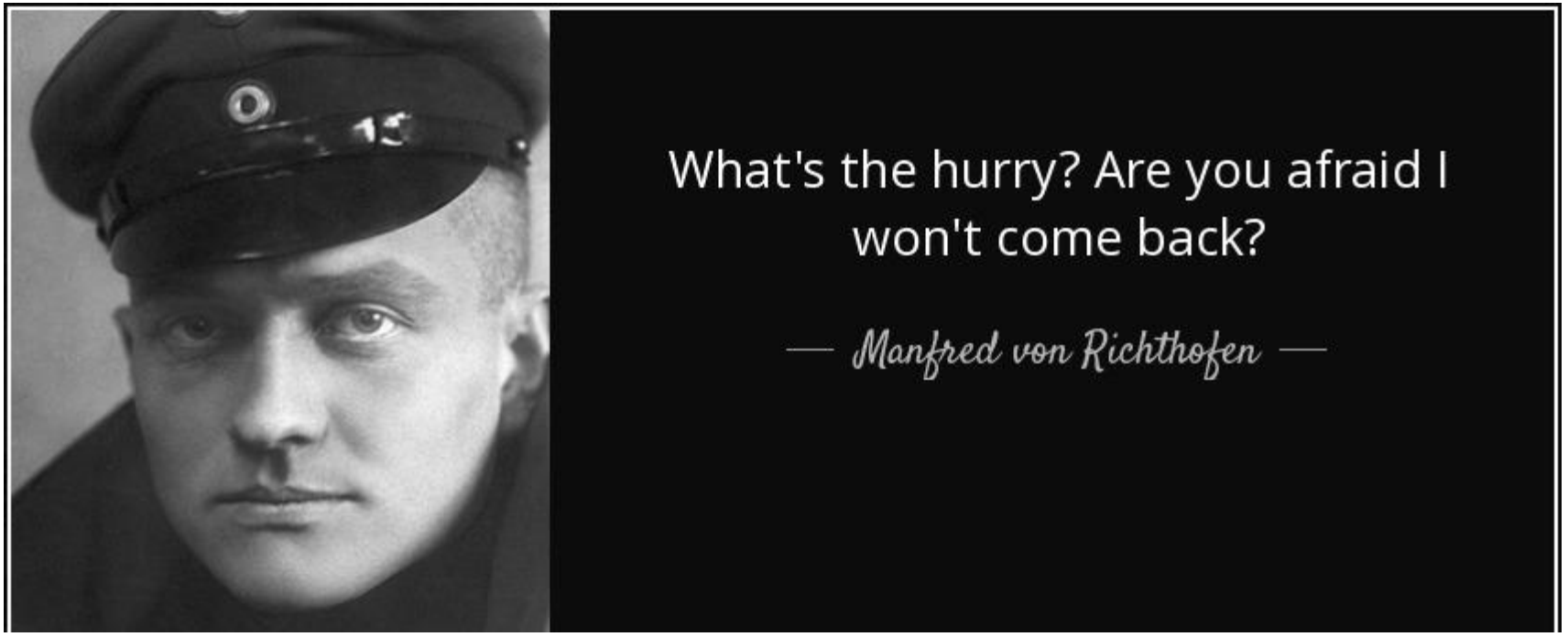
# When to Cardio-vert

* Immediate
  * Unstable OR very symptomatic
  * Already AC (or TOE –ve) 3-4/52 + pt wish/plan
  * <48 (?) hrs + CHA2DS2-Va 0 (??1) + pt wants CV, no AC
  * < 48 hrs high CVA score, anticoagulated afterwards?

* Delayed e.g. next day if still < 48 hrs + AC, or TOE –ve
  * Pluymaekers 2019
* 3-4 weeks after A/C
  * Not already A-Coag, onset unclear/ unknown or > 48 hrs
  * ECHO unavailable

DOI: 10.1056/NEJMoa1900353, Pluymaekers et al
NHF Australian guideline 2018

# Immediate CV. vs wait and treat



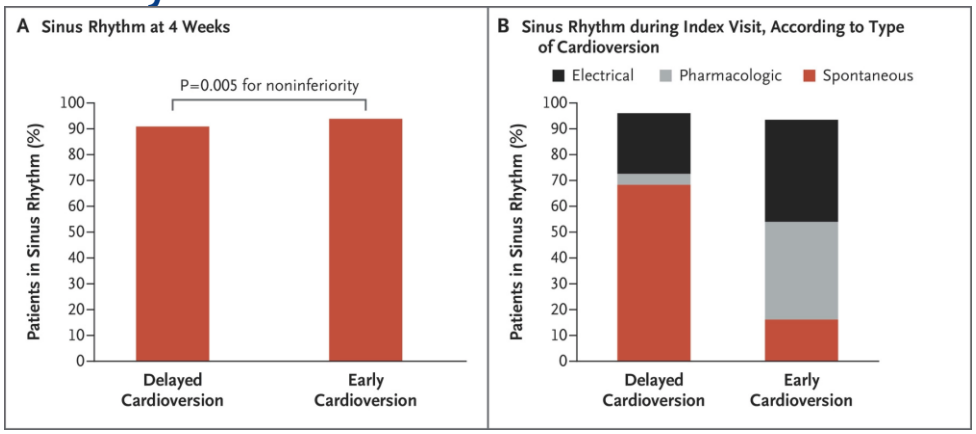
# Watch and wait vs early CV


NEJM March 18, 2019 doi: 10.1056/NEJMoa1900353; Pluemaykers et al

## Multi centre (15) RCT- Dutch

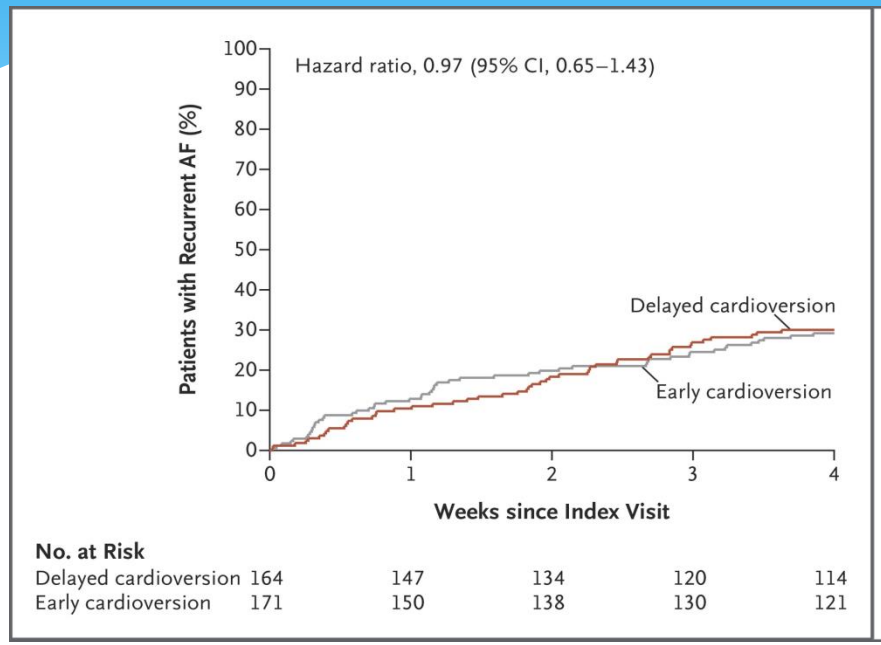
* Immed vs delayed CV (48 hrs)
* Immed CV: clinician pref
* Delayed: rate limit +/- CV
* All Cha2ds2-Vasc >1 anticoag
* 1-ary outcome SR at 30/7
* 2-ary outcomes
  * recurrent ED for AF
  * CV complications/EDLOS/ QoL

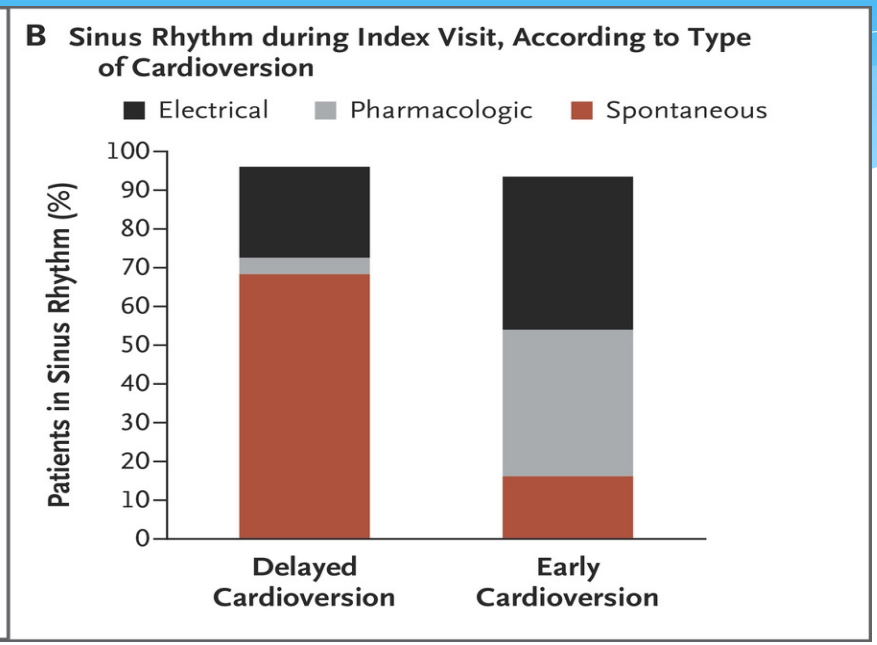
* n-417; well matched/ 65% high CVA risk
* 30% of screened eligible/ 1/6$^{th}$ entered
* Spontaneous reversion
  15% immediate vs 68% delayed
* **1ary** outcomes




* **2 ary:** 7% ED return AF =, CVA/CCF =1%
  delayed EDLOS 30 mins > ; QoL =

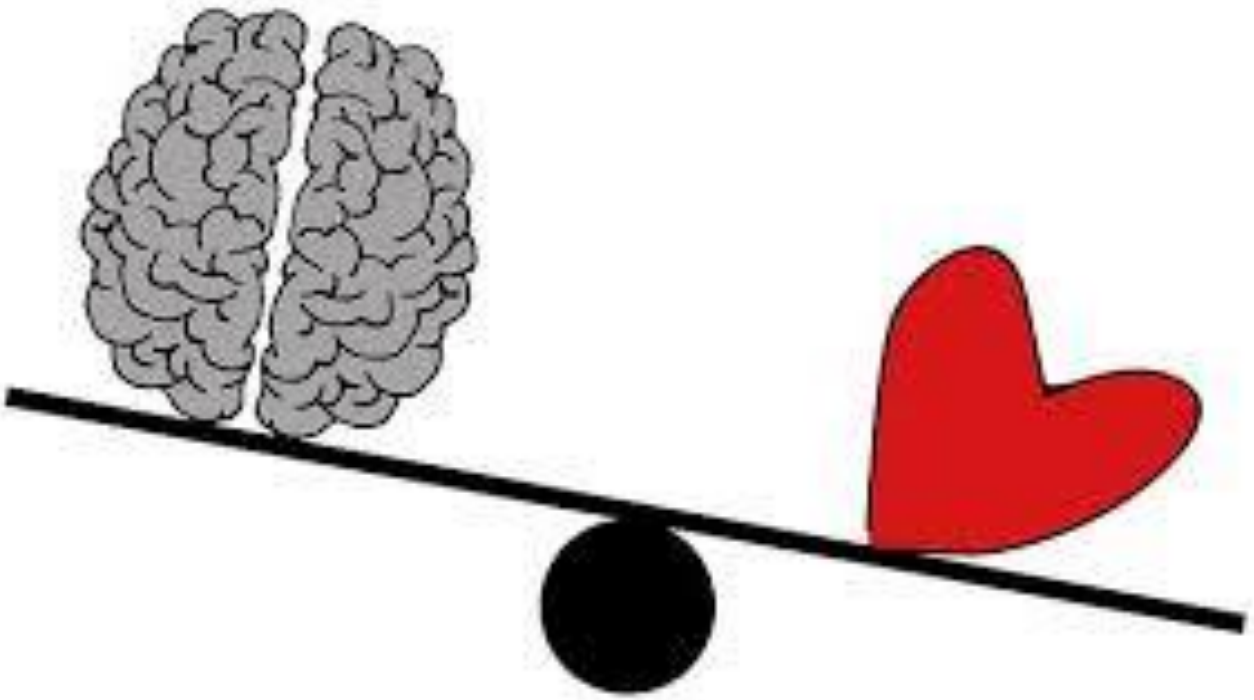
# Major outcomes




* C-vasc complications
  * **2 CVA (0.5% - CI to 2%)**
  * **3 impt arrhythmic events**
    * All post flecainide Cardio-V (1 asystole, 1 VT, 1 symptomatic brady)

# Cardioversion- CVA and A-Coags



# Australian guidelines; safe CV without AC

* Although data from RCTs are lacking, it is reasonable for patients with lone AF (without thromboembolic risk factors *(e.g. CHA2DS2-Va score 0)* and a known arrhythmia onset time within 48 hours prior, to undergo cardioversion without administering 1 month of periprocedural anticoagulation

  * NHF Australian AF guidelines Oct 2018 Atherton et al https://www.heartlungcirc.org/article/S1443-9506(18)31778-5/fulltext#sec0305

# Cardioversion risk .

Nuotio et al Time to Cardioversion for Acute Atrial Fibrillation and Thromboembolic Complications. *JAMA*. 2014;312(6):647–649. doi:10.1001/jama.2014.3824

* Initial studies without AC cover- 3-7 % CVA risk (1-12/12)
  * Unselected- high risk groups, retrospective
* Recent Finnish paper, followed up 4000 post ED CV Embolic complications (mainly CVA) by 30/7

Results

# Finnish registry: 4000ED CV 30/7 f/up - no AC

Nuotio I, Hartikainen JEK, Grönberg T, Biancari F, Airaksinen KEJ. Time to Cardioversion for Acute Atrial Fibrillation and Thromboembolic Complications. *JAMA*. 2014;312(6):647–649. doi:10.1001/jama.2014.3824

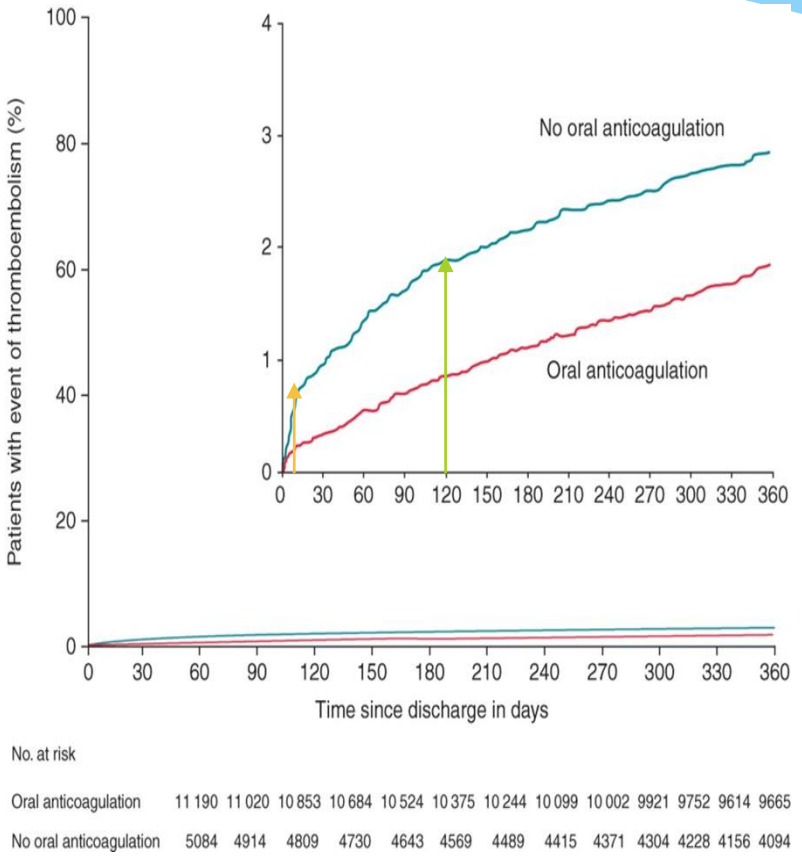
**Table 1. Time to Cardioversion for Acute Atrial Fibrillation and Thromboembolic Complications[a]**

| | Total No. of Patients | No. (%) of Patients by Time to Cardioversion[b] <12 h (n = 2440) | 12-<24 h (n = 1840) | 24-<48 h (n = 836) | *P* Value[c] |
|---|---|---|---|---|---|
| Age, mean (SD), y | 5116 | 61.0 (12.2) | 60.6 (12.7) | 61.7 (12.5) | .04 |
| Female sex | 1638 | 851 (34.9) | 551 (30.0) | 236 (28.2) | <.001 |
| Hypertension | 2324 | 1117 (45.8) | 833 (45.3) | 374 (44.7) | .86 |
| Diabetes | 409 | 207 (8.5) | 129 (7.0) | 73 (8.7) | .15 |
| Vascular disease | 1145 | 555 (22.8) | 407 (22.2) | 183 (21.9) | .83 |
| Heart failure | 184 | 78 (3.2) | 63 (3.4) | 43 (5.1) | .03 |
| History of | | | | | |
| Myocardial infarction | 329 | 171 (7.0) | 104 (5.7) | 54 (6.5) | .20 |
| Thromboembolism | 291 | 142 (5.8) | 106 (5.8) | 43 (5.1) | .76 |
| $CHADS_2$ score[d] | | | | | |
| 0-1 | 4264 | 2039 (47.8) | 1546 (36.3) | 679 (15.9) | .25 |
| 2 | 580 | 265 (45.7) | 202 (34.8) | 113 (19.5) | |
| 3-6 | 272 | 136 (50.0) | 92 (33.8) | 44 (16.2) | |
| $CHA_2DS_2$-VASc score[e] | | | | | |
| 0-1 | 2678 | 1260 (47.1) | 984 (36.7) | 434 (16.2) | .80 |
| 2 | 1030 | 486 (47.2) | 365 (35.4) | 179 (17.4) | |
| 3-5 | 1284 | 634 (49.4) | 446 (34.7) | 204 (15.9) | |
| >5 | 120 | 59 (49.2) | 42 (35.0) | 19 (15.8) | |
| | | No. (%) [95% CI] of Patients by Time to Cardioversion | | | |
| Thromboembolic complications | 38 | 8 (0.3) [0.1-0.6] | 21 (1.1) [0.7-1.6] | 9 (1.1) [0.4-1.8] | .004 |
| By sex | | | | | |
| Female | 22 | 3 (0.4) [0-0.8] | 13 (2.4) [1.1-3.6] | 6 (2.5) [0.5-4.6] | .001 |
| Male | 16 | 5 (0.3) [0-0.6] | 8 (0.6) [0.2-1.0] | 3 (0.5) [0-1.1] | .48 |
| By $CHADS_2$ score | | | | | |
| 0-1 | 25 | 4 (0.2) [0-0.4] | 15 (1.0) [0.5-1.5] | 6 (0.9) [0.2-1.6] | .006 |
| >1 | 13 | 4 (1.0) [0-2.0] | 6 (2.0) [0.4-3.7] | 3 (1.9) [0-4.1] | .50 |
| By $CHA_2DS_2$-VASc score | | | | | |
| 0-1 | 10 | 2 (0.2) [0-0.4] | 4 (0.4) [0-0.8] | 4 (0.9) [0-1.8] | .06 |
| >1 | 28 | 6 (0.5) [0.1-0.9] | 17 (2.0) [1.1-2.9] | 5 (1.2) [0.2-2.3] | .008 |
| By cardioversion | | | | | |
| First | 25 | 5 (0.4) [0.1-0.8] | 12 (1.3) [0.6-2.1] | 8 (2.0) [0.6-3.3] | .01 |
| Subsequent | 13 | 3 (0.2) [0-0.6] | 9 (0.6) [0-1.4] | 1 (0.6) [0-1.9] | .046 |

# Acceptable CVA risk (? 0.5% at 30/7)

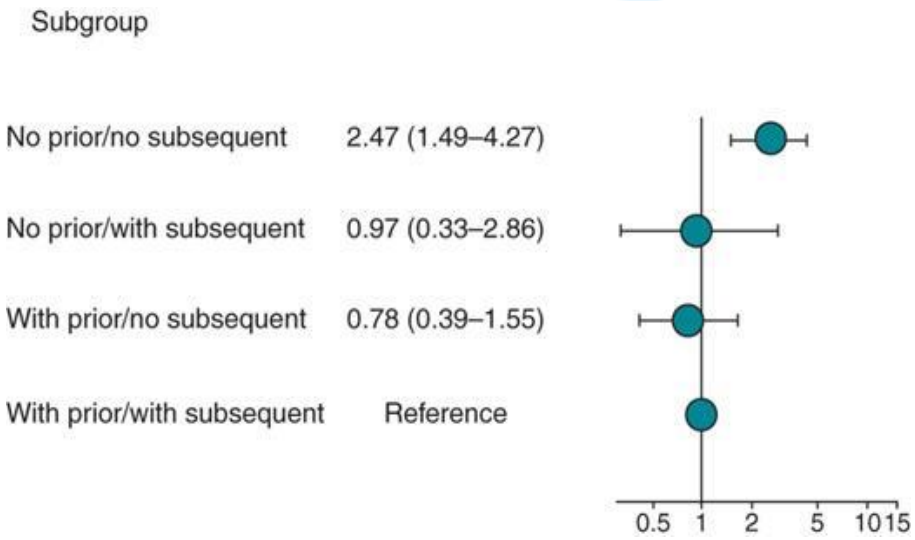
* Only group with CI below 0.6% ?
  Definite AF start < 12 hours and CHA2DS2-VASc 0-1
  * ? 0-1 up to 24 hours
  * CHA2DS2-VASc >1 if <12 hrs ??
    * See next slides
* My take;
  * LMWH for all if active CV/ expected reversion
  * F/ up AC for 3/12 **except** <12 hours + CHADS-VASC <2 ?
  * Any pt CHA2DS2-VASC >1 should have ? lifelong AC

# AC for Cardioversion- Danish national registry 16000 patients




No. at risk

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oral anticoagulation | 11 190 | 11 020 | 10 853 | 10 684 | 10 524 | 10 375 | 10 244 | 10 099 | 10 002 | 9921 | 9752 | 9614 | 9665 |
| No oral anticoagulation | 5084 | 4914 | 4809 | 4730 | 4643 | 4569 | 4489 | 4415 | 4371 | 4304 | 4228 | 4156 | 4094 |



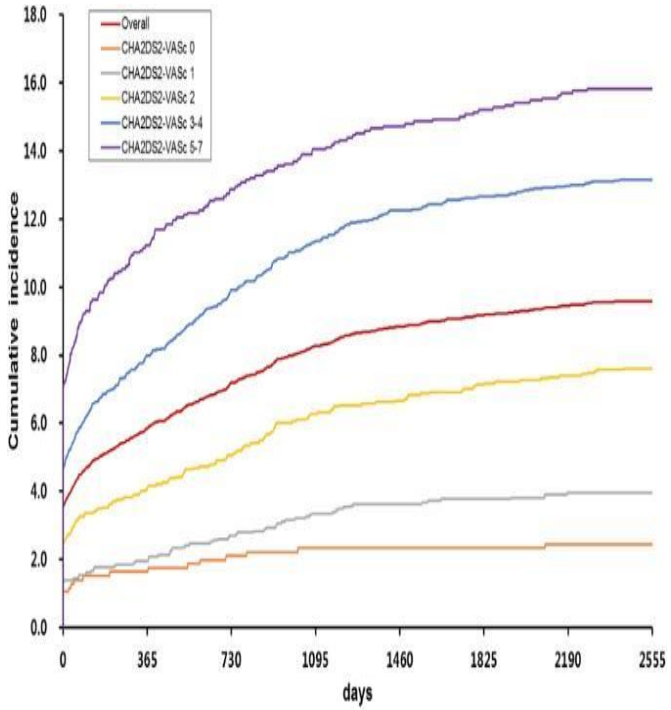

* *Hansen et al EP Europace*, Volume 17, Issue 1, January 2015, Pages 18–23,https://doi.org/10.1093/europace/euu189

# Anticoagulation: An ED job?

# Does it matter if delays to starting A/Coagulation (Korean registry)

PLoS One. 2017; 12(6): e0179687.

Incidence of CVA after AF diagnosis




* The > CVA risk the > risk of v. early CVA
* 50-60% of all CVA occurred in 1st 6/12
* Risk around 5 % in 1st 6/12
* Only 15% anticoagulated

# Reasons for ED to prescribe AC

* Follow up/ anticoag/scripts often delayed +++
* Appointments not kept/ missed
* If ED prescribes more likely to take-continue ACs
* Post Cardio-V (spont or induced)- v high CVA risk (1-3% at 30/7)

Atzema https://doi.org/10.1016/j.annemergmed.2015.03.024

# Age and time in AF

Wasmer: European Heart Journal (2014) 35, 1439–1447
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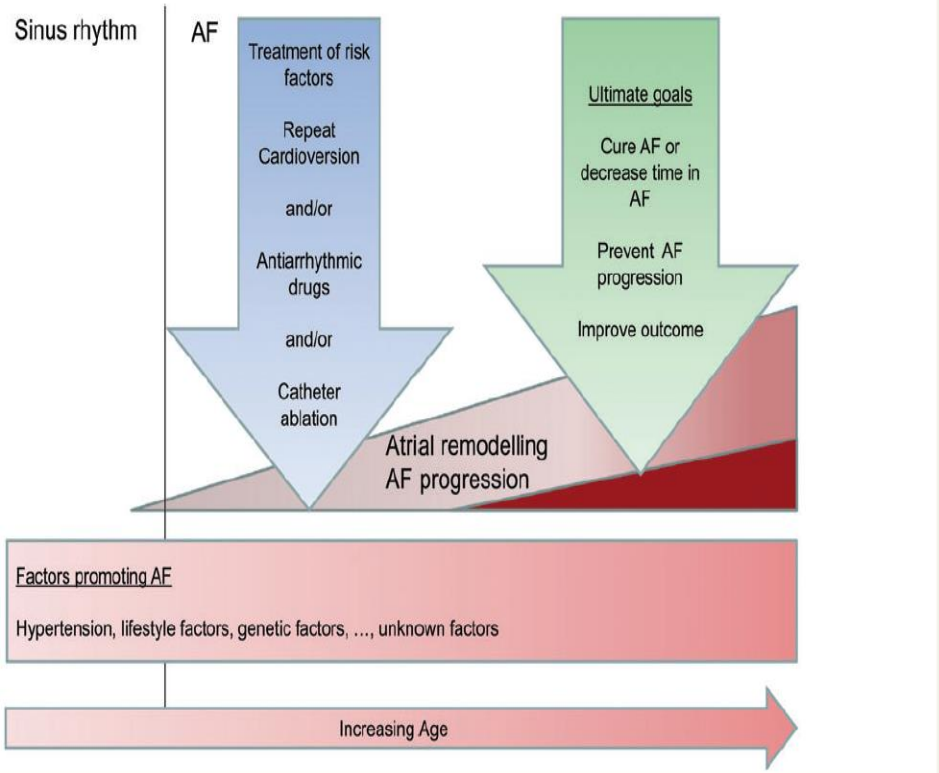



**Figure 1** Atrial fibrillation progression over time. The vertical line delineates atrial fibrillation detection which may be any time after atrial fibrillation development. The blue arrow refers to treatment options, ideally early in the course of atrial fibrillation progression. The green arrow summarizes treatment goals. The darker red triangle refers to delay in atrial fibrillation progression and atrial remodelling, and possibly cure in some, achieved by early atrial fibrillation treatment.

# Paraxoysmal vs Permanent AF

* Time in AF seems important
* Permanent AF 30-40%> risk of CVA (multivariate)
* Independent risk factors
* Stopping permanent AF may be important?
* The descent into permanent AF is a dangerous period
  * AE 4 x > than Paroxys; 2 x > than established perm AF

European Heart Journal, Volume 37, Issue 20, 21 May 2016, Pages 1591–1602, https://doi.org/10.1093/eurheartj/ehw007

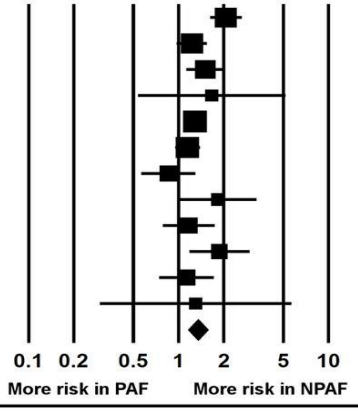
Ogawa H et al https://doi.org/10.1161/STROKEAHA.118.021396
Stroke. 2018;49:2301–2308

**Figure 2** Stroke or systemic embolism. Stroke and systemic embolism data were reported for non-paroxysmal atrial ...

A

**Stroke or Systemic Embolism (unadjusted)**

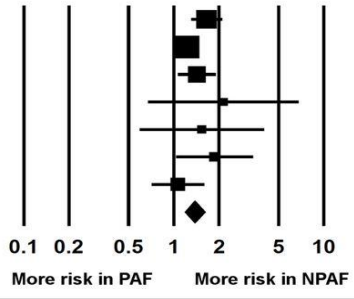
| Study name | Risk ratio | Lower limit | Upper limit | p-Value |
|---|---|---|---|---|
| AVERROES and Active A | 2.071 | 1.631 | 2.630 | 0.000 |
| ROCKET-AF | 1.229 | 0.980 | 1.542 | 0.074 |
| ARISTOTLE | 1.510 | 1.133 | 2.013 | 0.005 |
| GISSI-AF | 1.665 | 0.540 | 5.133 | 0.375 |
| ENGAGE AF | 1.290 | 1.094 | 1.520 | 0.002 |
| RE-LY | 1.148 | 0.955 | 1.381 | 0.141 |
| Euro Heart Survey | 0.855 | 0.566 | 1.291 | 0.455 |
| SPORTIF | 1.845 | 1.033 | 3.299 | 0.039 |
| Active W | 1.169 | 0.790 | 1.730 | 0.434 |
| ELAT | 1.878 | 1.193 | 2.954 | 0.006 |
| SPAF | 1.131 | 0.750 | 1.705 | 0.558 |
| BAATAF | 1.300 | 0.300 | 5.634 | 0.726 |
| OVERALL | 1.355 | 1.169 | 1.571 | 0.000 |




B

**Stroke or Systemic Embolism (adjusted)**

| Study name | Hazard ratio | Lower limit | Upper limit | p-Value |
|---|---|---|---|---|
| ACTIVE A/AVERROES | 1.658 | 1.316 | 2.089 | 0.000 |
| ROCKET-AF | 1.220 | 1.060 | 1.403 | 0.006 |
| ARISTOTLE | 1.429 | 1.072 | 1.904 | 0.015 |
| GISSI-AF | 2.141 | 0.677 | 6.774 | 0.195 |
| Euro Heart Survey | 1.538 | 0.595 | 3.980 | 0.374 |
| SPORTIF | 1.870 | 1.041 | 3.359 | 0.036 |
| Active W | 1.064 | 0.714 | 1.586 | 0.761 |
| OVERALL | 1.384 | 1.191 | 1.608 | 0.000 |




European Heart Journal, Volume 37, Issue 20, 21 May 2016, Pages 1591–1602, https://doi.org/10.1093/eurheartj/ehw007

# Is CHA2D2S-VASc the best way to stratify for CVA

https://academic.oup.com/europace/article/17/1/18/503751Eur Heart J. 2016 May 21;37(20):1591-602. doi: 10.1093/eurheartj/ehw007. Epub 2016 Feb 16.

Yaghi-Kamel Stroke. 2017;48(10):2665-2670.

* Other markers likely add more discrimination
  * Permanent AF vs paroxysmal 1.3 x RR
  * Trop/ BNP increased CVA/death– risk by 1.7-2.3

* Other new markers
  * L atrial enlargement-low flow/ echo "smoke"
  * Fibrosis on MRI
  * ECG changes - P-wave terminal force in lead $V_1$
  * Hx of VTE

CRF does not seem to add value
Adding female sex is contentious and unproven

# Conclusions

* The major issue in AF is anticoagulation not Cardioversion
* Rhythm control ? urgent- only if unstable/ severe symptoms/WPW
* <12 hours of AF window for urgent CV
* Changes in AF, e.g. CV are v high risk for CVA
* Electricity better than drugs for most of our pts if CV
* All pts other than CHA2DS2-Va O <24 hrs should be AC for CV
* All pts other than CHA2DS2-Va O <48 hrs should be AC by ED if home
* CVA post CV/ new AF is a time dependent phenomena
* AC is an ED job, because it will change outcomes + ↑ compliance

* Is lifelong anticoagulation really correct?

# Does frequency/intensity of AF make a difference

# Emerg-AF

## Coll-vinent, Stroke 2017

* Spanish study: 1062patients (62 centres/ consec AF)
* Few exclusions
* ≈60% already AC
* 429 not on AC, 60% started in ED,
  * Inc 35 (8%) with CHADS-VASC < 2
  * 133/335 CHADS vasc>1, home without AC, 29 started at F/up

Yes (probably) in first symptomatic episodes + low risk or AC or ToE –ve

No-according to some Cardiologists

Yes -if already anticoagulated

Yes- if unstable/ new CCF due to AF

Yes-if prev cardioversion relieves symptomatic AF/ patient plan +safe

Yes if reversible cause for AF

# AF burden

## Previous

* Paroxysmal
* (<7/7 +/- Cardioversion)
* Persistent (>7/7)
* Permanent (>7/7 – no rhythm option)
* Valvular (17 x risk)

## ? New

* Paroxysmal;
  * Provoked, short lived, occasional
  * Recurrent; reversible intermittent
  * Recurrent- frequent, many episodes
* Persistent (>7/7)
* Permanent (>7/7 – no rhythm option)
* Valvular (17 x risk)

# Does AF burden matter?

# What we think we know now?

* Rhythm better than rate control?
* Rate control better than rhythm?
  * Depends on who?
  * Depends on what outcomes measured / preferred
  * Depends on LoE wanted/ required

# Key issues

* Epidemiology
* Management of the AF ; Ix
  * rate vs rhythm control; drugs/ CardioVersion
  * Stable vs unstable
* Management w Anticoagulation
  * Anticoagulation, who doesn't need AC
    * CHADS vs $CHA_2DS_2$ VASc
    * Which drugs,
  * AC for Cardioversion
    * who/ how long/ which drugs
* Follow up?
  * Echo, ablation, Cardiology review

# Popn epidemiology

* 1-2% overall popn prev
* 5-10% in older populations
* Rapidly increasing
* Unrecognised, untreated – high rates of CVA
* At least 20% of CVA are AF related
* 1.5 per 1000 ED visits -1ary diag. AF (USA)
* AF is seen in ED ? 2-4% of all patients
* Admission rates for AF: 10-20% Canada vs 65% USA

# Why cardiovert?

* Unstable AF
* Symptomatic AF
* Reduced ht function/ exercise tolerance
* Worsening ht failure
* Underlying cause reversible (e.g. TFTs, aIHD etc)
* New onset AF, structurally normal ht

# Outcomes for AF post cardioversion in RCT of DOACs vs Warfarin

* A-coags used
  * 0- 0.5% stroke rates with DOACS at 30/7
  * 0-1% Stroke with Warfarin

NB all had AC for 3/12

Most studies had high rates of LA imaging

# Meta-analysis of DOACS vs Warf for Af cardioversion;

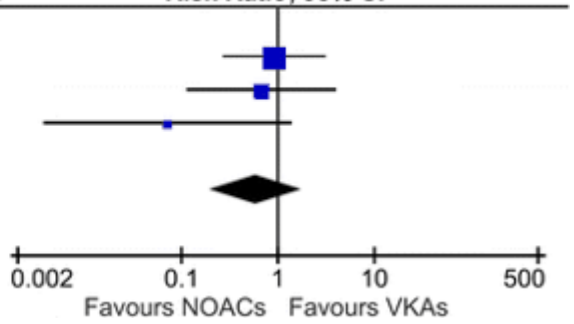
Caldeira, D., Costa, J., Ferreira, J.J. et al. Clin Res Cardiol (2015) 104: 582. https://doi.org/10.1007/s00392-015-0821-8/

Ezekowitz MD, Pollack CV, Halperin JL, et al. Apixaban compared to heparin/vitamin K antagonist in patients with atrial fibrillation scheduled for cardioversion: the EMANATE trial. *Eur Heart J*. 2018;39(32):2959-2971.

| | NOACs | | VKAs | | | IS/SE | IS/SE |
|---|---|---|---|---|---|---|---|
| Study or Subgroup | Events | Total | Events | Total | Weight | Risk Ratio, 95% CI | Risk Ratio, 95% CI |
| ARISTOTLE | 0 | 228 | 0 | 223 | | Not estimable | |
| RE-LY | 7 | 834 | 4 | 436 | 55.4% | 0.91 [0.27, 3.11] | |
| ROCKET-AF | 2 | 160 | 3 | 161 | 31.7% | 0.67 [0.11, 3.96] | |
| X-VeRT | 0 | 978 | 3 | 492 | 12.9% | 0.07 [0.00, 1.39] | |
| **Total (95% CI)** | | **2200** | | **1312** | **100.0%** | **0.60 [0.20, 1.81]** | |
| Total events | 9 | | 10 | | | | |

Heterogeneity: Tau² = 0.19; Chi² = 2.42, df = 2 (P = 0.30); I² = 17%

Test for overall effect: Z = 0.91 (P = 0.36)

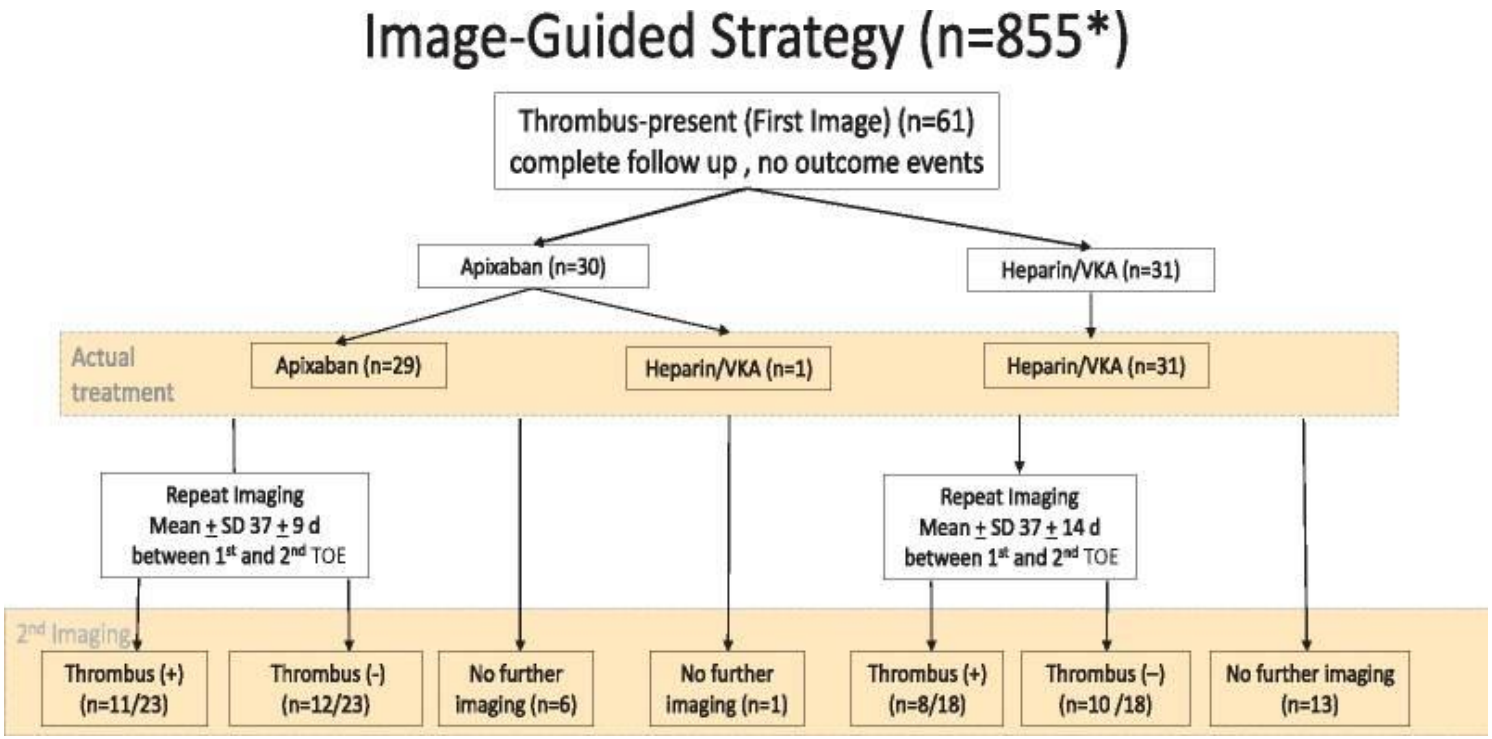



Emanate, 6/750 TE events Warf vs 0/750 Apixaban.

Suggests that overall less TE events with NOACS, ?

1:1000 to 6:1000 .

# Emanate- L atrial thrombus rates (7%)
# No CVA/ embolic events at 90/7 with therapy.
# No CV performed



# Barriers to A-Coag use

* Fear of bleeding
* Unfamiliarity with
  * evidence
  * drugs
  * pathways
* Lack of knowledge
* Lack of follow up
* Not our job
* Inertia

# Epidemiology

* Main reason for attendance
* Incidental
* New vs prev episodic or persistent
* If known on AC if not CI?

# AF- major problems

* Stroke- 0.5-6% p.a. if not A/C.
* Peri CV stroke risk
* CHF- untreated or inad tx ; high rates of CHF
* Symptomatic / poor exercise tolerance
* Anticoagulation / bleeding
* Underlying causes/. comorbidity common

# Guidelines- what they agree on and what they don't in non Valv. AF

## Agreed

* Unstable AF- electrically cardiovert (+++/ low QoE)
* Unstable WPW- E-CV (+++/low QoE)
* Stable WPW – Pharm CV (Ibu/Proc) (+++low QoE)
  * No BB/CCB/dig/adenosine ?? Amiodarone
* Drug-CV <48,Ht OK ? Drug (Flec/Propaf) (+/- /low)
* Pill in pocket Mx OK (+/- / low)
* Stable-AF ? Rate drugs (b-B or CCB) (+++/ low)
* Acute-AF +CCF/Hypo- rate cont Dig (+++/ low)
* A-Cgn b4 CV AF <48, if CHA2DS2-VaSC >1 OR prolonged AF before CV (4 weeks) (+++/low)
* A-Cgn post CV <48, stable AF + CHA2DS2-V >1 (+++/low)

**No A-Coag post CV for stable <48** CHA2DS2-VASC 0-1

* Pre CV A-Cgn for all AF >48 3-4 weeks (+++/mod)

## Not agreed

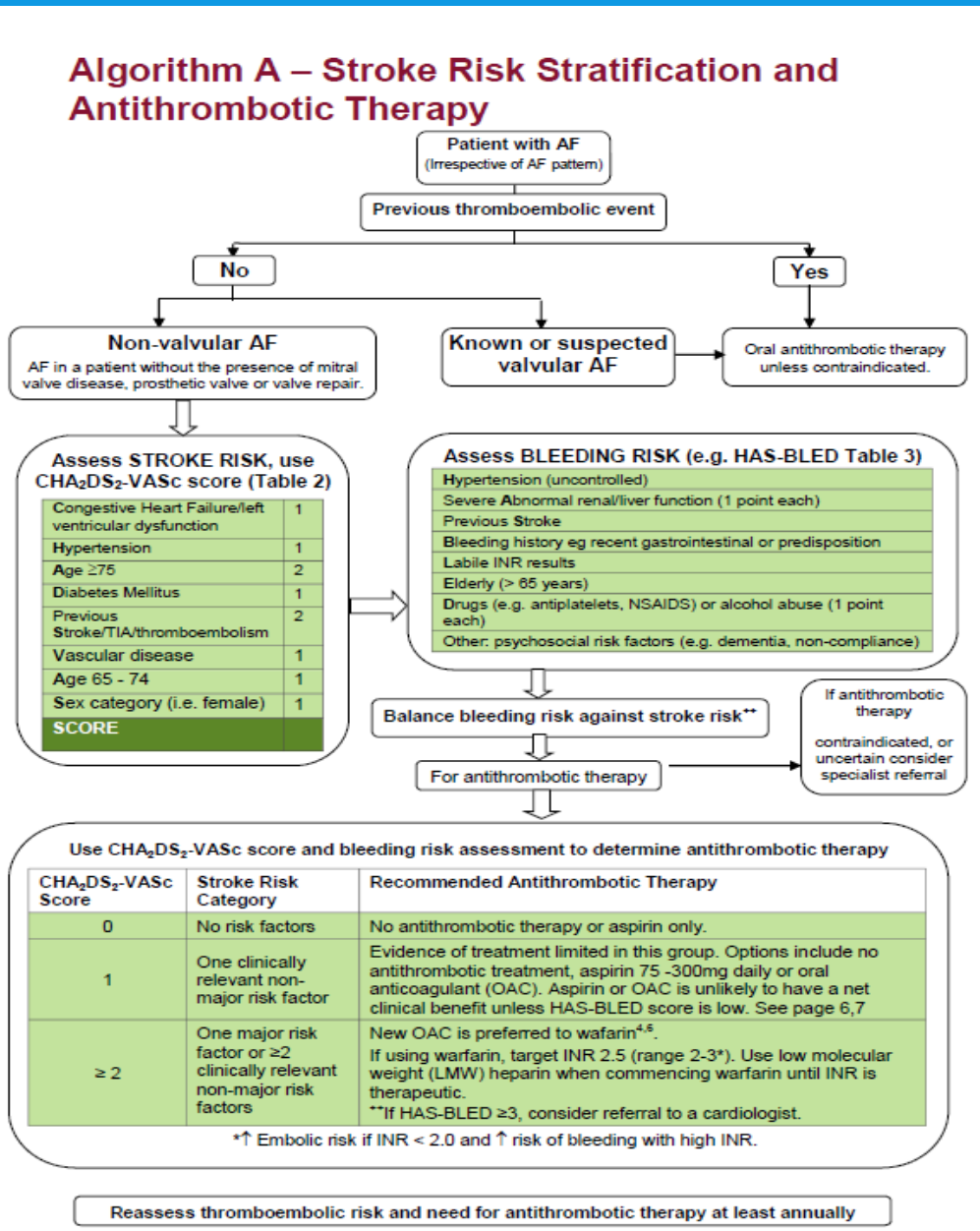
* Stable ; rhythm vs rate (pt/Dr decide) (low)
* Stable <48 hrs; e-CV vs pharm (low)
* Drug CV <48, damaged ht; ? Ibu/Ami/Proc (low)
* A-Cgn b4 CV in unstable
* A-Cgn b4 CV in stable <48 hrs (prob Y if > CVA risk)
  * NB 2 recommend peri CV hep/DOAC
* Duration of A-Coag not agreed (but 2/3 say lifelong)

Costantino et al
Intern Emerg Med. 2017 Aug;12(5):693-703. doi: 10.1007/s11739-016-1580-x

# Why $CHA_2DS_2$-VASc score >1 and AC for cardioversion

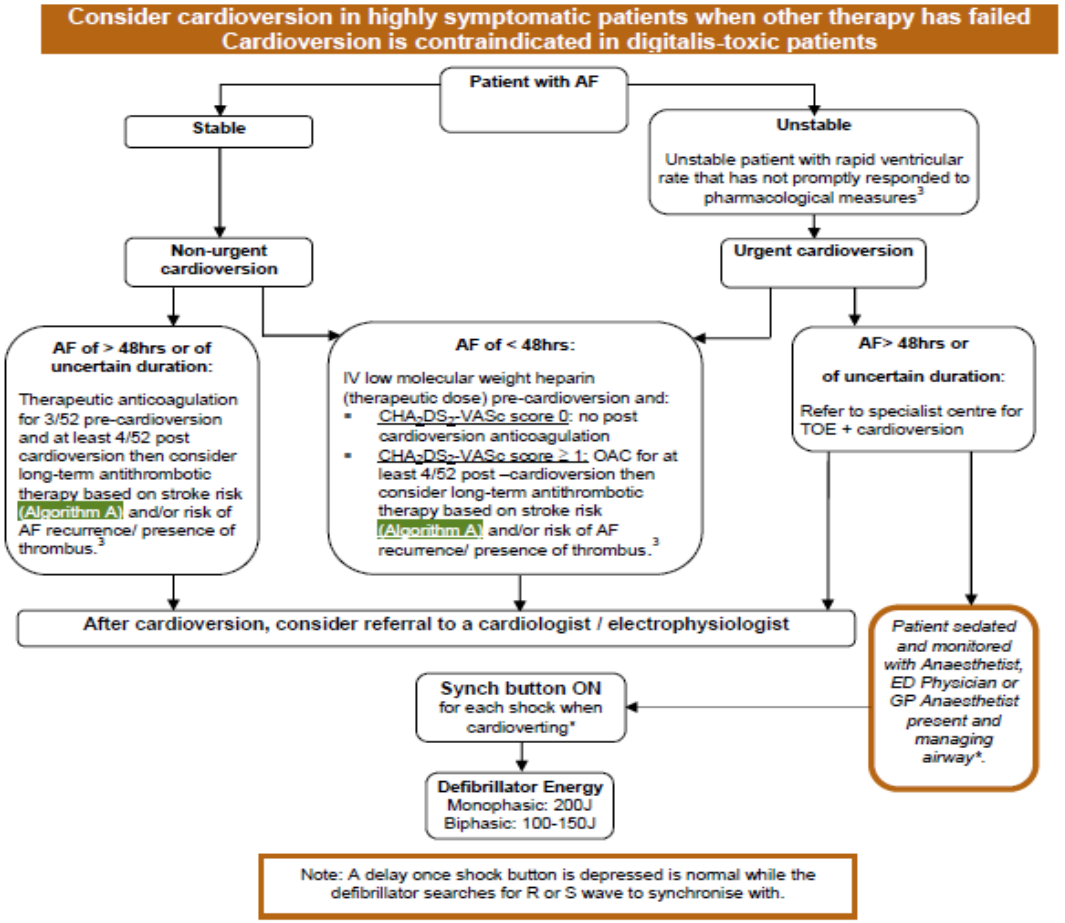
* Any episode of AF and $CHA_2DS_2$-VASc > 1 is recommended for lifelong AC as ongoing risk of CVA per annum is > 1%.
* If going on AC may as well AC for CV
* NB rate in first 30/7 was 0.5% Strokes post CV even for < 12 hours of documented AF in $CHA_2DS_2$-VASc >1
* NB current WA guidelines for CV suggest 4/52 of OAC cover all

# WA DoH guidelines



# WA DoH guidelines

## Algorithm C – DC Cardioversion Guidelines




*Equipment required:

- IV access
- Monitoring equipment
- Airway management equipment
- Emergency drugs on hand

*Anaesthetic agents required, :

- Short acting sedation (propofol or midazolam)
- Opioid (e.g. fentanyl)
- Reversal agents (e.g. flumazenil/ naloxone) available

**Pharmacological cardioversion can be considered if AF is of short duration since onset. In the absence of structural heart disease flecainide is recommended. Amiodarone does not achieve cardioversion in the short-medium term.[3,4] Use amiodarone or flecainide only after expert advice.**

# Stiell et. Al

Annals of Emergency Medicine
Volume 69, Issue 5, May 2017, Pages 562-571.e2

* CV of AF in ED, n 1091 (AF and flutter(15%))- 2400 excluded
* Excluded,
  * >2/7 onset; unless Echo -ve/A-coag –then <7/7 e.g. persistent/ perm AF
  * Asymptomatic AF
  * AF not primary issue or secondary to other cause
  * Unstable/ new CCF
  * Prev inclusion in this study
* Included patients who reverted spontaneously in ED
* Followed up for 30/7 for AE
* Population
  * CHADS –VASC2 > 1 in 58%, **70% not on Warfarin**
  * Onset <12 hours ? 60% ? 15-20% already on AC
  * 91% DC home

# Outcomes at DC and 30-7

**C-version /SR and ED tx**

Drugs – 204/390 (54%)
E-CV - 514/ 571 (90%)
Spont CV around 14%
DC with SR 80%
Card RV in ED 15%
**Heparin in only 5%**
**New Warf 5%**
New aspirin 11%
New cardiac meds 9-10%
Admission 9%

**Outcomes 30/7**

F-Up:
Return ED visits 28%
- AF related 15/28%
- Admitted 7/28%

ECG (80% SR)-sim to DC
Card/Phys saw 50%
Echo in 25% - 0 LA thrombi
New warfarin 5%
AF related AE 4-5%
- CVA 1 (0.1% CI up to 1.4%)
- Rpt C-V majority
- CCF 1%

# Short term (30/7)outcomes after ED Cardioversions

* CVA/TIA at 30/7
  * 0/400 had a CVA/TIA (retro study, linked); 2 centres
  * 16% on Warfarin, only 2% CHADS >1 (66% -0)
    * Scheuermeyer 2010 Acad Emerg Med
  * 2/206 (1%) had embolic events,

# Performing C-Version

* Initial Joules
* Biphasic clearly better than monophasic
* Pad positioning
  * Some evidence that ? AL better than AP But
  * Poor qual, not in acute AF, not with adeqaute Joules

# Drugs to maintain SR after AF:CV

* Major groups are
* 1A, 1C, II (b-blockers), III Amiodarone etc.
* 1A/ sotalol ; clearly associated with > death
* Most are clearly  pro-arrhythmic, and > ventric arryth **except**
  * Amiodarone/ dodandrenone
  * B-blockers cause bradyarrythmic issues (as expected)
* Amiodarone >er efficacy, SR rates BUT long term S/E

https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD005049.pub4/full?highlightAbstract=withdrawn%7Cfibril%7Catrial%7Cfibrillation

# Catheter ablation ? benefits/ referral

* Symptomatic- recurrent or persistent? Consider
* Evidence ltd

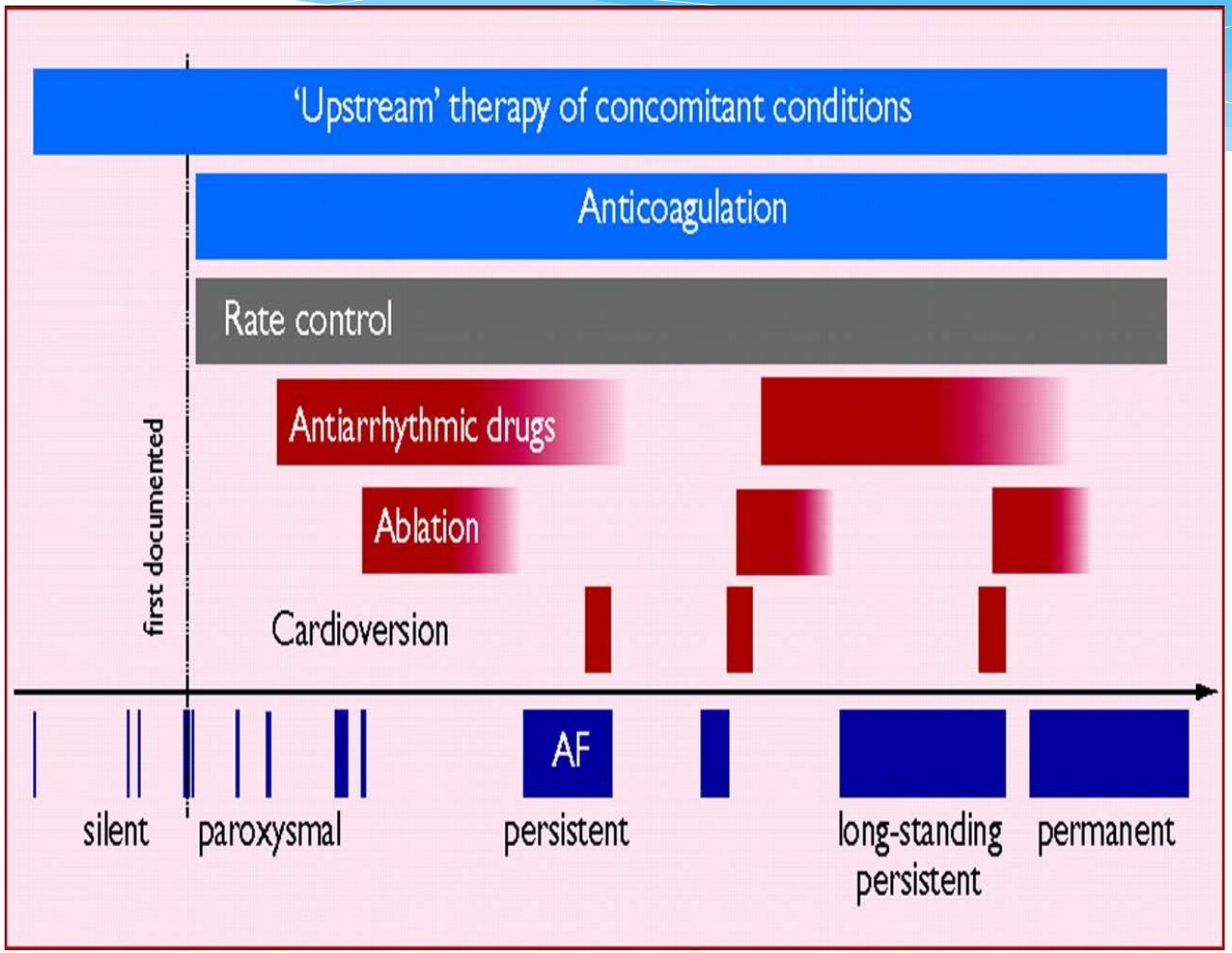
  CCF; Improved LVEF by 7% and  CCF symptoms

  Non CCF;  less CV- hospitalisations

Chen, C., Zhou, X., Zhu, M. et al. J Interv Card Electrophysiol (2018) 52: 9. https://doi.org/10.1007/s10840-018-0349-8

# AF in the ED

# Natural history of AF ?



# RCT evidence

* 4 RCTs- 2800 patients (rhythm control –meds)
* No mortality benefit (signal to >)
* Same CVA rate (signal to more?)
* Symptoms– no <
* Hospitalisations/ED visits - >
* QoL- no different

???

Stroke- Sherman 2009
https://doi.org/10.1161/01.STR.0000254719.26536.a9

# Any reasons why?

* < 60% rhythm controlled at DC
* AF commonly seen at follow up
* Asymptomatic AF prob v. common
* Don't modify atrial dysfunction/ AF provokers
* Anticoagulation stopped too early for Rhythm?
* QoL - ? not driven by having AF-partic older
* NB most AF is subclinical/ unnoticed
* Mortality drivers are mainly CVA/ emboli, not AF

# Rates of appropriate AC after ED d/c for pts with AF

International ED

* Canadian-16% pre vs 45-50% post

Annals of Emergency Medicine
Volume 73, Issue 4, April 2019, Pages 382-392

# 30/7 CVA and anticoagulation after early C-Version (<48 hrs);

Retrospective –single Cleveland EP lab- early (<48hrs) CV for AF

898 INR>2 **vs.** 567 no AC cover **vs.** 116 INR 1.5-2.0

Volume 2, Issue 4, August 2016 DOI: 10.1016/j.jacep.2016.01.018; Garg etal JACC; EP

## On OACs

**2/1014** CVA by 30/7

Both CVA when INR <1.5

* 1 for a procedure;
* 1 ? non-compliant,

## Without OACs

**6/ 567 (1.1%)** CVA by 30/7

0/188 with CHA2DS2-VaSc <2

**6/379 (1.6%) CVA if CHA2DS2-VaSc >1**

**Key findings: difference in CVA p 0.017**

NB No stratification for <12 or <24 hrs of symptoms

# Delayed vs immed C-Version in ED

March 18, 2019
DOI: 10.1056/NEJMoa1900353, Pluymaekers et al

Dutch study- 15 EDs

* 18 or older/ HR > 70
* New or recurrent AF <36 hours
* No hx of prolonged prev AF
* No Ischaemia/ instability/AHF
* No WPW/ re-entry

**Intervention**

Wait and see vs. immed CV No TOE

**CV:** flec +/- other +/- ECV if failed
AC if CVA risk (CHA2DS2-V) high + d/c
**Wait and see;** rate drugs + 12-36 hour RV +CV if not spont reverted

AC: All patients CHADS2Vas >1 had AC

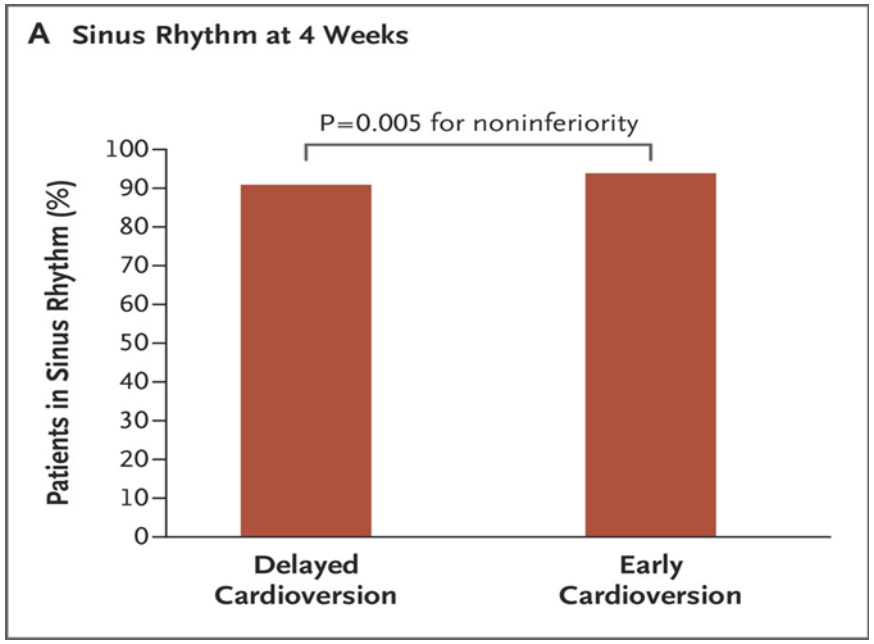
Follow up; most had 3x daily ECG + if symp + ED if serious

* **1ary end pt;**
  * **4/52 AF on final ECG**
* **Secondary end pts**
  * **Time to 1st AF recurrence (sub gp)**
  * **CV complications**
  * **Need for rpt ED CV/ admission**

* **420 patients enrolled**
* **30% of ED AF were eligible**
* **Enrolled 15% of eligible)**
  * **e.g. 6% of all AF**
* **98% d/c to home**

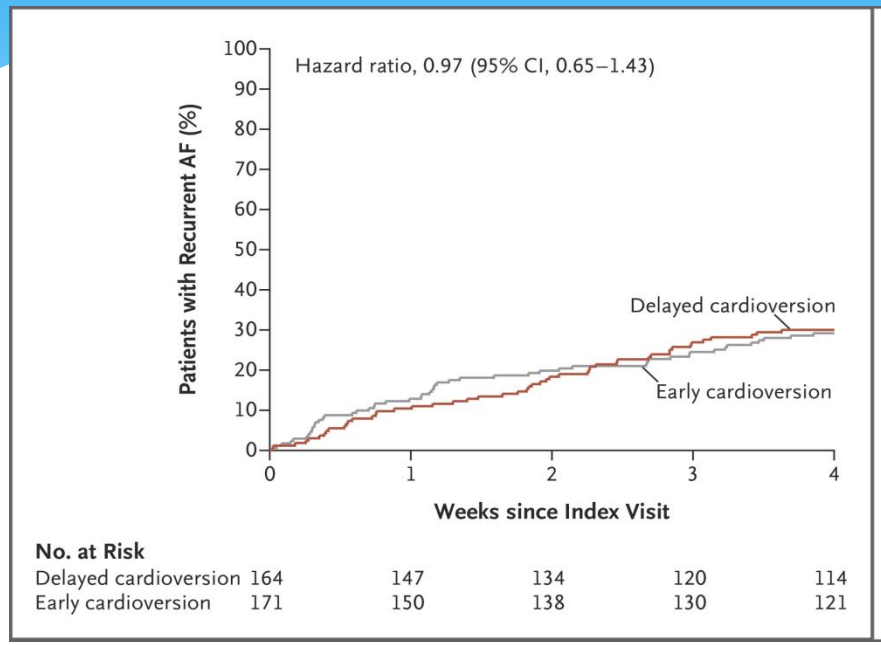
**7% ED return for AF**

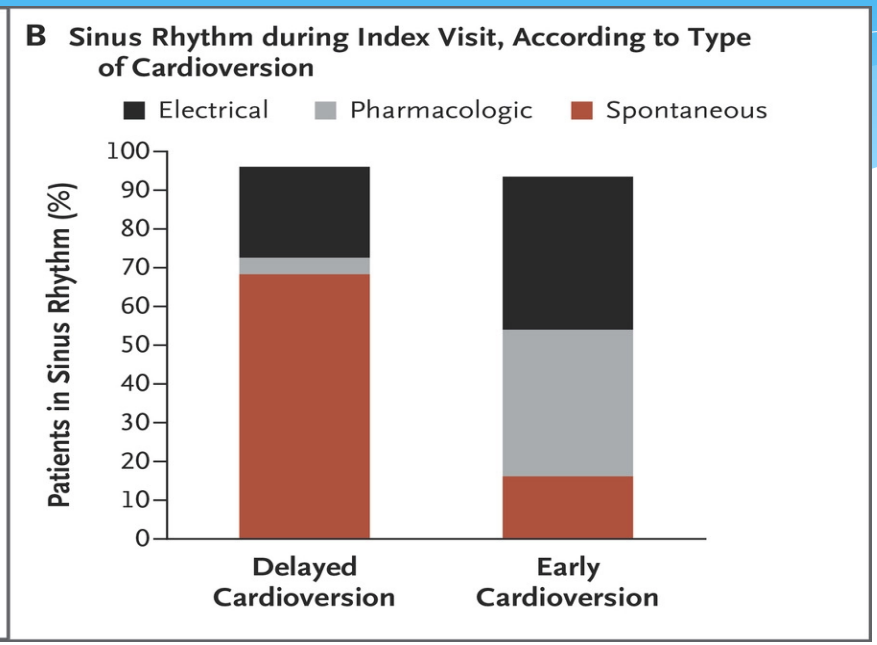
# 4/52 outcomes




* Impt popn features
  * 15% of eligible agreed
  * Chads 2 or more 65%
  * 40% AC already
  * 20% already on AF tx

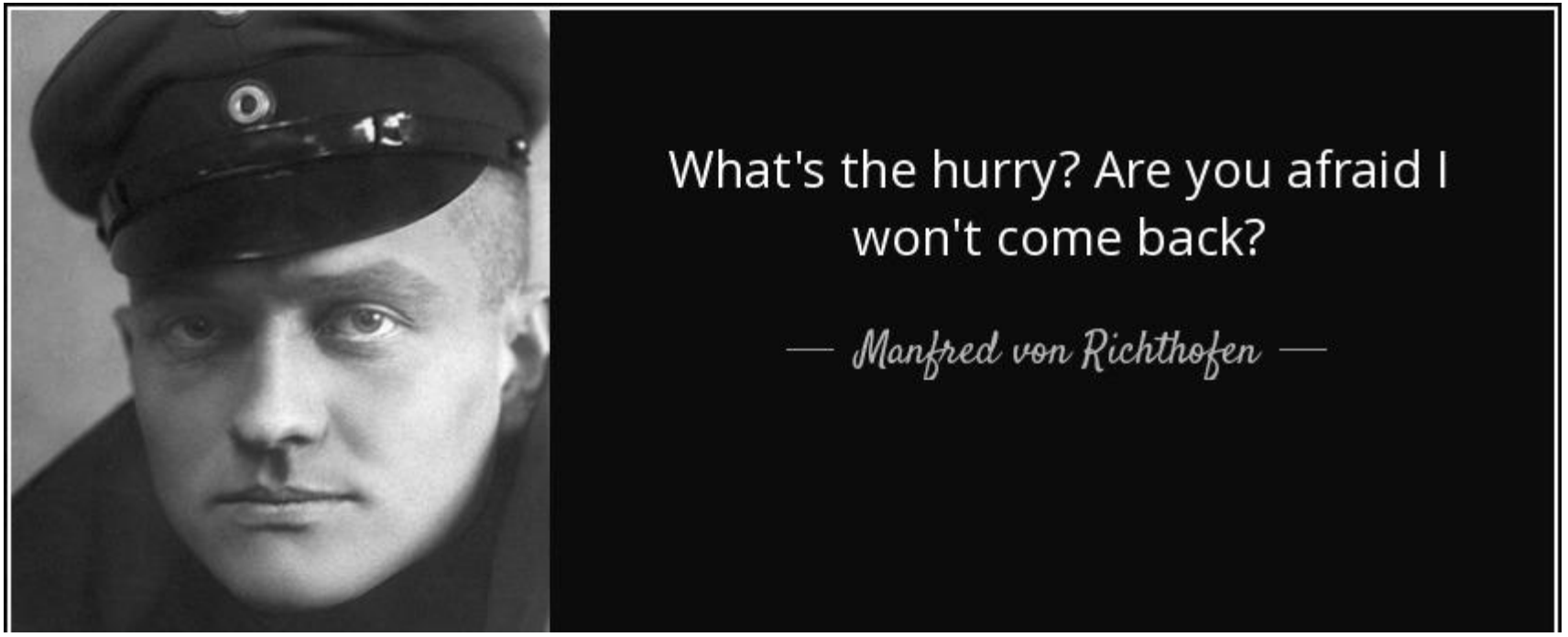
# Major outcomes




* C-vasc complications
  * 2 CVA; (0.5%)
  * **3 impt arrhythmic events**
    * All post drug (flec) C-V (1 asystole, 1 VT, 1 symptomatic brady)

# Immediate CV. vs wait and treat



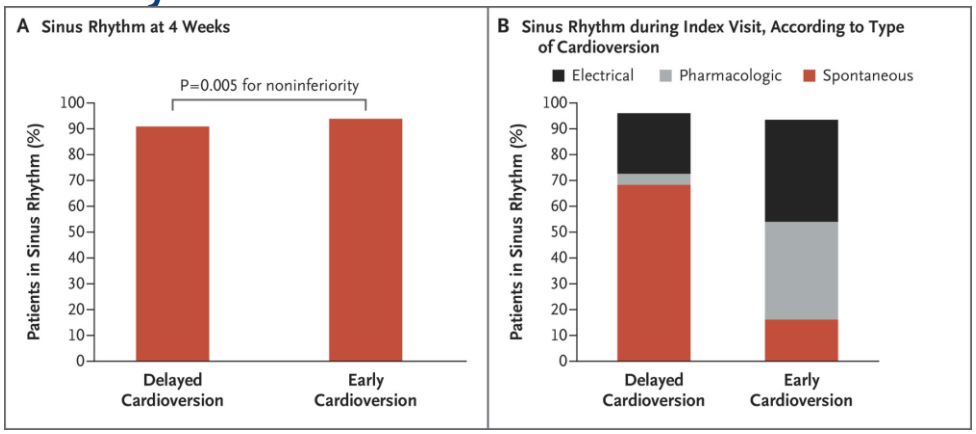
# Watch and wait vs early CV


NEJM March 18, 2019 doi: 10.1056/NEJMoa1900353; Pluemaykers et al

## Multi centre (15) RCT- Dutch

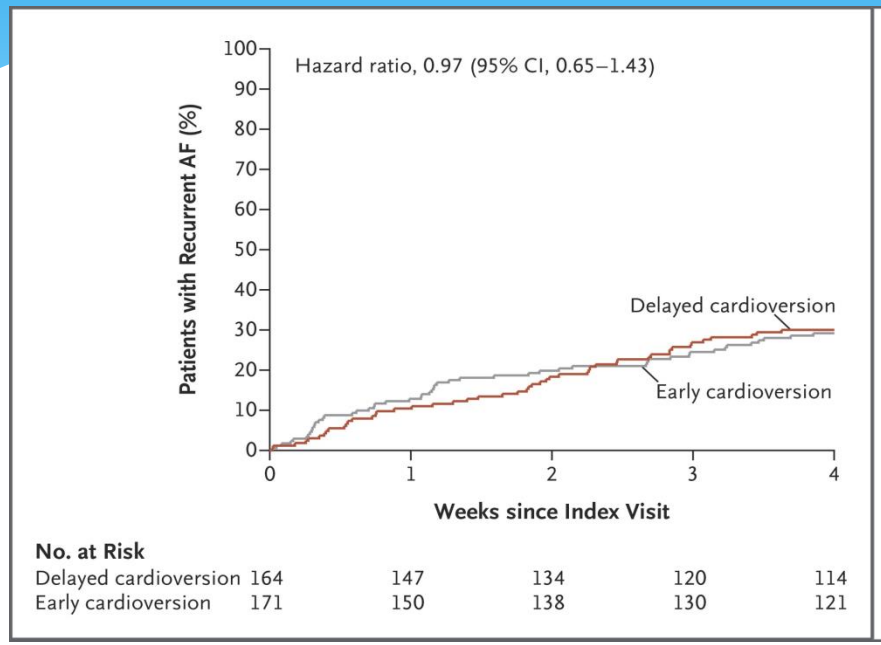
* Immed vs delayed CV (48 hrs)
* Immed CV: clinician pref
* Delayed: rate limit +/- CV
* All Cha2ds2-Vasc >1 anticoag
* 1-ary outcome SR at 30/7
* 2-ary outcomes
  * recurrent ED for AF
  * CV complications/EDLOS/ QoL

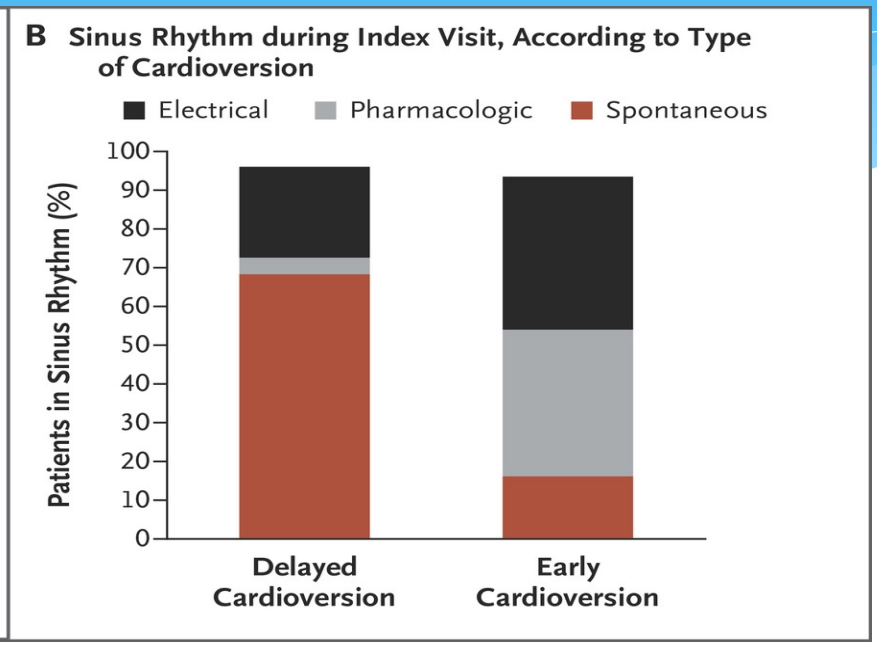
* n-417; well matched/ 65% high CVA risk
* 30% of screened eligible/ 1/6$^{th}$ entered
* Spontaneous reversion
  15% immediate vs 68% delayed
* **1ary** outcomes




* **2 ary:** 7% ED return AF =, CVA/CCF 1%
  delayed EDLOS 30 mins >; QoL =

# Major outcomes




* C-vasc complications
  * **2 CVA (0.5% - CI to 2%)**
  * **3 impt arrhythmic events**
    * All post drug (flec) C-V (1 asystole, 1 VT, 1 symptomatic brady)

# Important findings

* Delayed strategy equivalent
* Low recurrence (<15% at 1/12)
* 65% spontaneous CV
* C-Version success > 95% (e-cv > drugs)
  * NB; Flecainide safety?
* CVA safety after C-Version?

2/400 CVA at 4/52 (0.5%)

But

40% Acoag-ed b4 + 33% were CHA2D2S-Va < 2

All CHA2D2S-Va >1 anticoagulated post CV

? 1.4 % CVA risk at 1/12 in "at risk" group (CI up to 4%)

?? 1 year risk

March 18, 2019
DOI: 10.1056/**NEJM**oa1900353, Pluymaekers et al