# Effectiveness of cardiovascular risk assessment in Australian professional aviators a cohort study

Dr Liz Ryan – Stage B trainee
BSc (hons), MBBS, MBA, MOccMed, VGDWH, FRACGP
CASA / Careflight

Academic Supervisor – Prof Lin Fritschi, Curtin University

#### Background: Framingham



- Considers
  - Age
  - Gender
  - High density lipoproteins (HDL)
  - Total cholesterol
  - Systolic blood pressure
  - Smoking status
  - Diabetes
  - Presence of left ventricular hypertrophy (1,2)
- Not considered
  - Family history (3,4,5)
  - Socio-economic status (6)
  - Ethnicity (7,8)
  - Newer markers such as coronary artery calcium (9,10,11)

#### Current system in Australia



- Risk calculated at initial application
- 5 yearly until aged 60
- Annually from 60, or if diabetes or impaired fasting glucose
- Further investigation if considered high risk
- 1 % rule (12)

#### Current system in Australia

#### Coronary Heart Disease Risk Factor Prediction Chart (CRI)

56-60

61-67 68-74

FEMALE		MALE		HDL Cholesterol		Total Cholesterol		Systolic BP		Other	
Age	Pts	Age	Pts	HDL-C	Pts	Total-C	Pts	SBP	Pts	Others	Pts
30	-12	30	-2	0.65-0.68	7	3.60-3.99	-3	98-104	-2	Cigarettes	4
31	-11	31	-1	0.69-0.76	6	4.00-4.30	-2	105-112	-1	Diabetic (M)	3
32	-10	32-33	0	0.77-0.84	5	4.31-4.69	-1	113-120	0	Diabetic (F)	6
33	-8	34	1	0.85-0.90	4	4.70-5.19	0	121-129	1	ECG-LVH	9
34	-6	35-36	2	0.91-0.99	3	5.20-5.69	1	130-139	2	(0 points assigned for each negative answer) NOTE: IFG or IGT are counted as diabetes for this calculation	
35	-5	37-38	3	1.00-1.09	2	5.70-619	2	140-149	3		
36	-4	39	4	1.10-1.19	1	6.20-6.79	3	150-160	- 4		
37	-3	40-41	5	1.20-1.30	0	6.80-7.49	4	161-172	5		
38	-2	42-43	6	1.31-1.43	-1	7.50-8.19	5	173-185	6		
39	-1	44-45	7	1.44-1.56	-2	8.20-8.55	6				
40	0	46-47	8	1.57-1.70	-3						
41	1	48-49	9	1.71-1.89	-4						
42-43	2	50-51	10	1.90-2.07	-5						
44	3	52-54	11	2.08-2.25	-6	1					
45-46	4	55-56	12	2.26-2.49	-7	1					
47-48	5	57-59	13								
49-50	6	60-61	14	Use this profile for professional pilots 5 yearly (or private pilots, if clinically indicated) and every year for pilots over 60 years of age							
51-52	7	62-64	15								
53-55	8	65-67	16								

- Sum Points for all Risk Factors Age ( ) + HDL-C ( ) + Total-C ( ) + SBP ( ) + Smoker ( ) + Diabetes ( ) + ECG-VVH ( ) = Point Total NOTE: Minus points subtract from total
- For Stress ECG if > 14 Pts

17

18

19

68-70

71-73

74

10

11

#### Methodology



- A retrospective cohort study was conducted looking at professional pilots' cardiovascular risk index using the Framingham model, and examined to see if any were diagnosed with ischaemic heart disease (IHD) during the next five years.
- The initial selection criteria were pilots aged 55 or younger who held a class 1 medical certificate in 2011.

## Methodology – inclusion criteria



Inclusion	Exclusion
Age	Pre-existing CASA audit IHD
Gender (any)	Previous IHD
Class 1 medical certificate in 2011	Data not available up to and including December 2016
CRI calculated in 2011	
Data available for cardiac status 31st December 2016	

#### Results



- 7 had pre-existing IHD
- 945 did not renew their licence
- 1802 were included in final study group



Reason for non-renewal	Number of pilots
Did not apply for new medical certificate in 2016	926
Died	2
Medical certificate suspended / cancelled for medical reasons	17

#### Results - cohort



	Medical certificate current at 5 years	Pilots did not renew medical certificate
Number of pilots	1802	945
Age range	16-55	15-55
Average age	35.5	32.1
CRI range	-24 to +23	-21 to +22
Average CRI	3.4	1.4
Male	1676 (93%)	861 (91%)
Female	127	84

### Results



	IHD	No IHD	Total
CRI ≥ 15	4	90	94
CRI ≤ 14	2	1706	1708
Total	6	1796	1802

### Results



		95% confide Lower limit	nce interval Upper Limit	
Prevalence	0.003	0.001	0.008	
Sensitivity	0.667	0.241	0.940	
Specificity	0.95	0.938	0.959	
PPV	0.043	0.014	0.113	
NPV	0.999	0.995	1.000	

# Discussion : Limitations / future directions



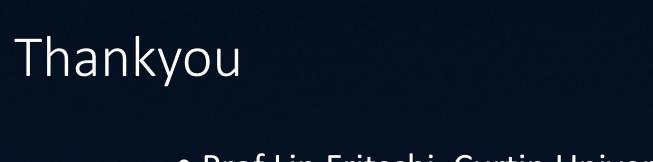
- Small number of cases with IHD
  - Prevalence 0.33% (CI 0.14 0.76)
- Sample size approximately 20 % of all ongoing pilots
- Electronic records / limitations of optical character recognition
- A prospective study could be commenced now that records are entirely electronic
- Examination of further investigations for CRI ≥ 15

#### Conclusions

 As a preliminary study, this shows the usefulness of Framingham in this setting

 None of the identified cases presented with incapacitating symptoms in any setting

 Further study with larger numbers could show true validity of Framingham model of screening for cardiovascular disease in Australian professional pilots.



- Prof Lin Fritschi, Curtin University
- CASA avmed team
- Dr Nell Gillett, AFOEM supervisor



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