Aeromedical Fitness of Military Aircrew with Asymptomatic Coronary Artery Disease in the Republic of Singapore Air Force

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Scope

Introduction

- Cardiovascular disease
- Work-health interaction
- Aeromedical risk assessment

Policy Review

- Health screening in the SAF
- Impetus and considerations
- Revised policy

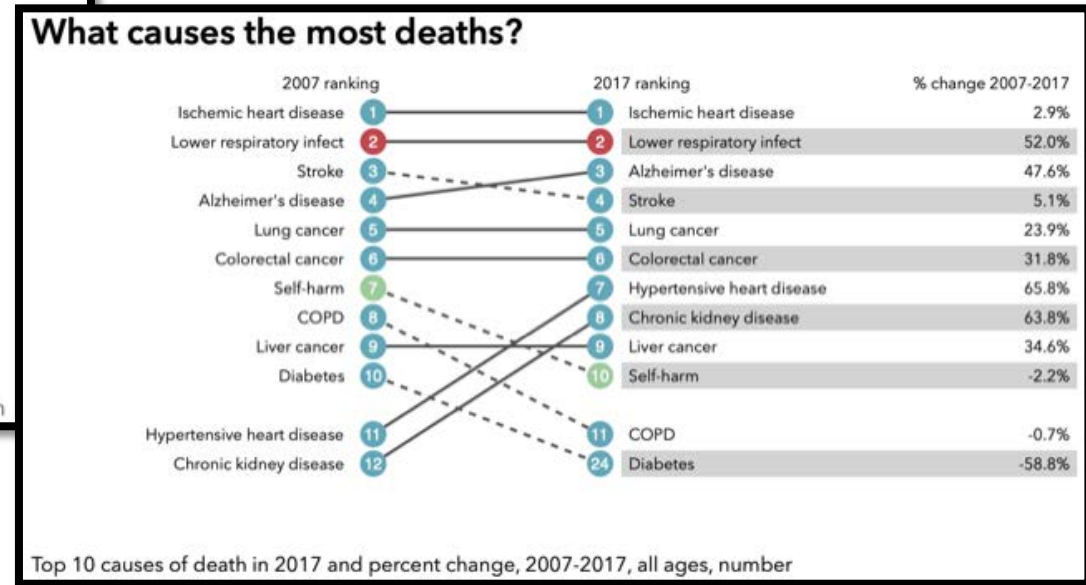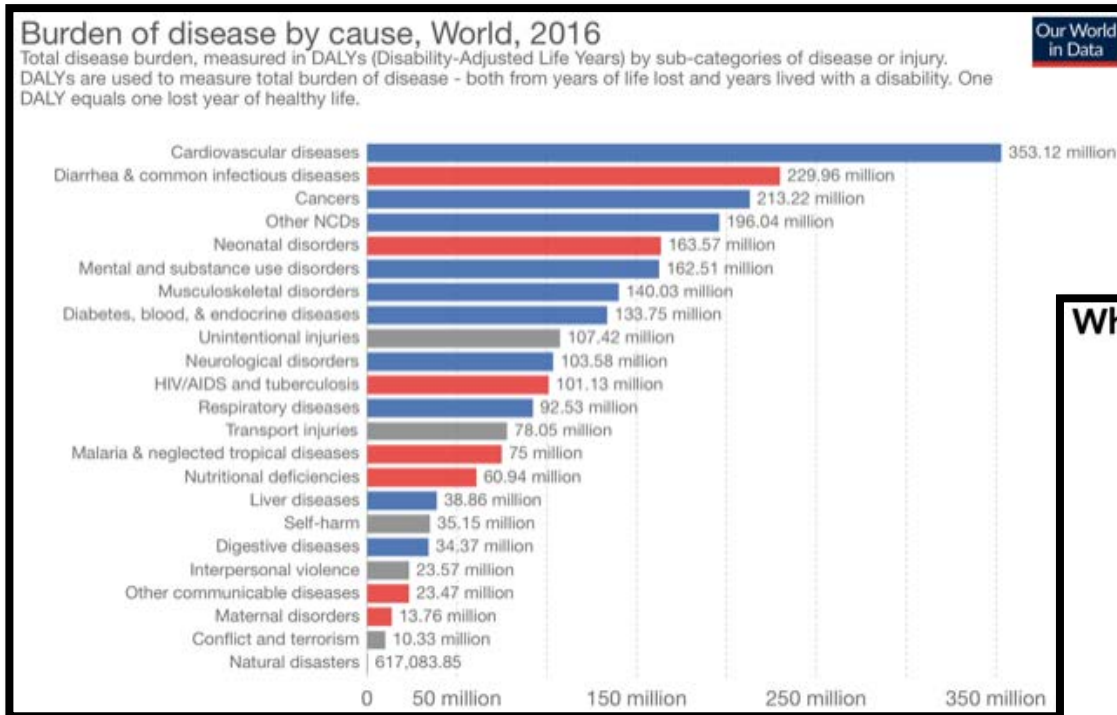## Moving Forward

- Challenges
- Conclusion

INTRODUCTION

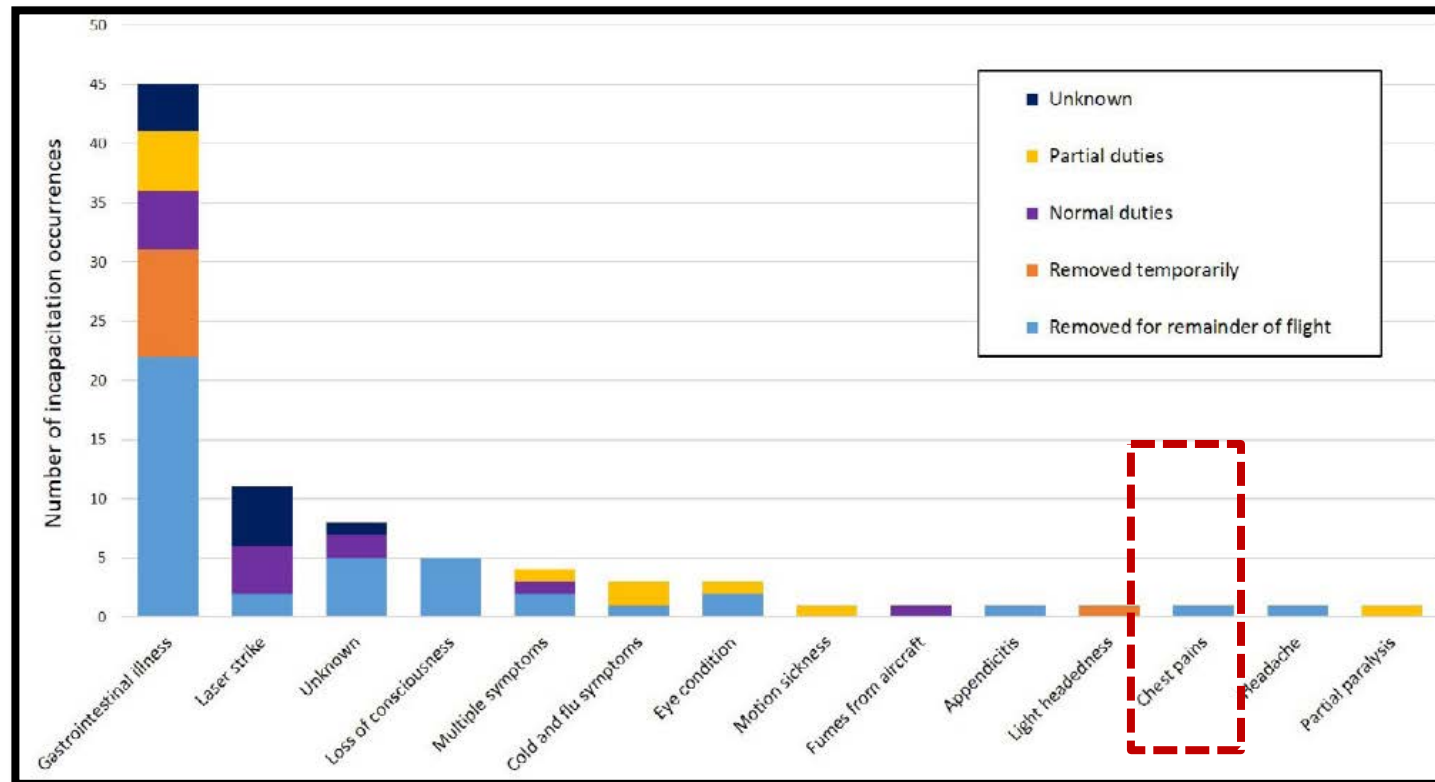# CARDIOVASCULAR CAUSES OF INCAPACITATION

BURDEN OF CARDIOVASCULAR DISEASE
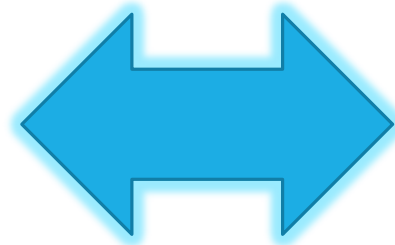
PILOT INCAPACITATION OCCURRENCES

Causes of pilot incapacitation and resultant duty restrictions in high capacity transport operations, 2010 to 2014.

Australian Transport Safety Bureau

WORK – HEALTH INTERACTION

Aeromedical Risk Assessment

1%

AEROMEDICAL RISK ASSESSMENT

Risk

Likelihood

×

Severity

AIRCREW ROLE
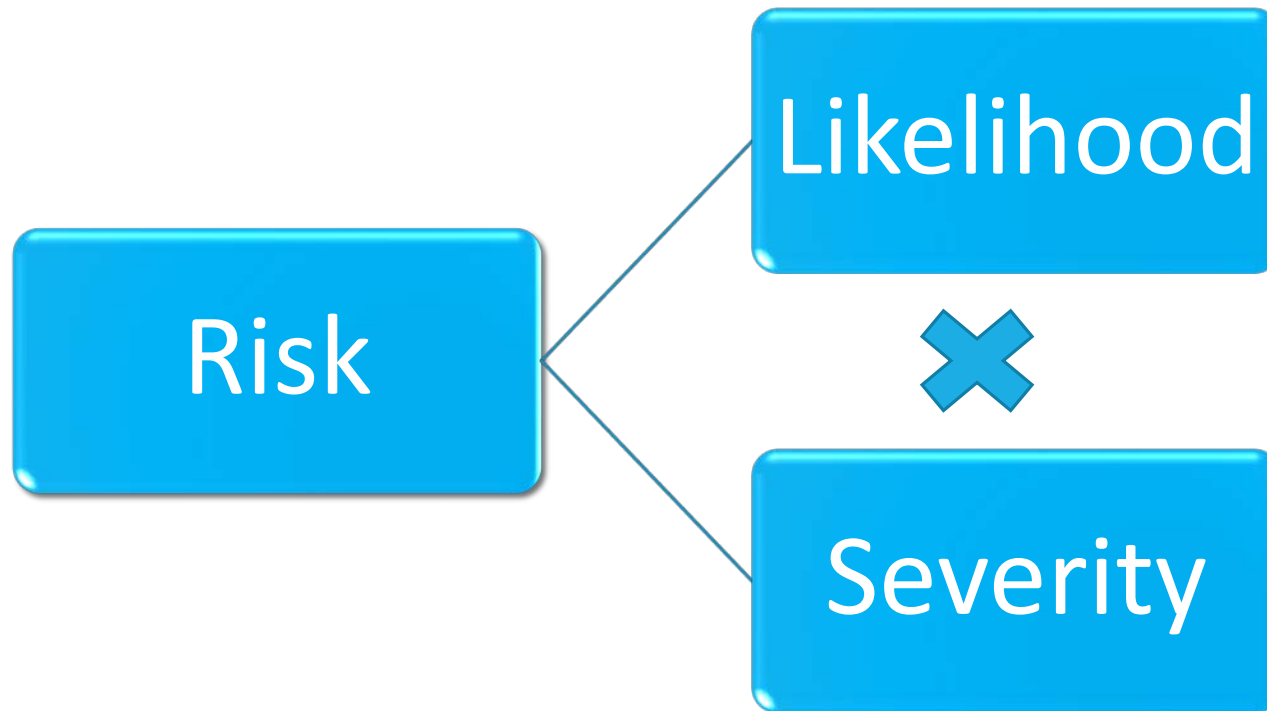
POLICY REVIEW

HISTORY OF PATHWAY DEVELOPMENT

Introduction of asymptomatic coronary artery disease (CAD) aeromedical assessment pathway

Review and update of pathway

2010

2017

2018

Use of CT Coronary Angiogram as surrogate to invasive coronary angiography
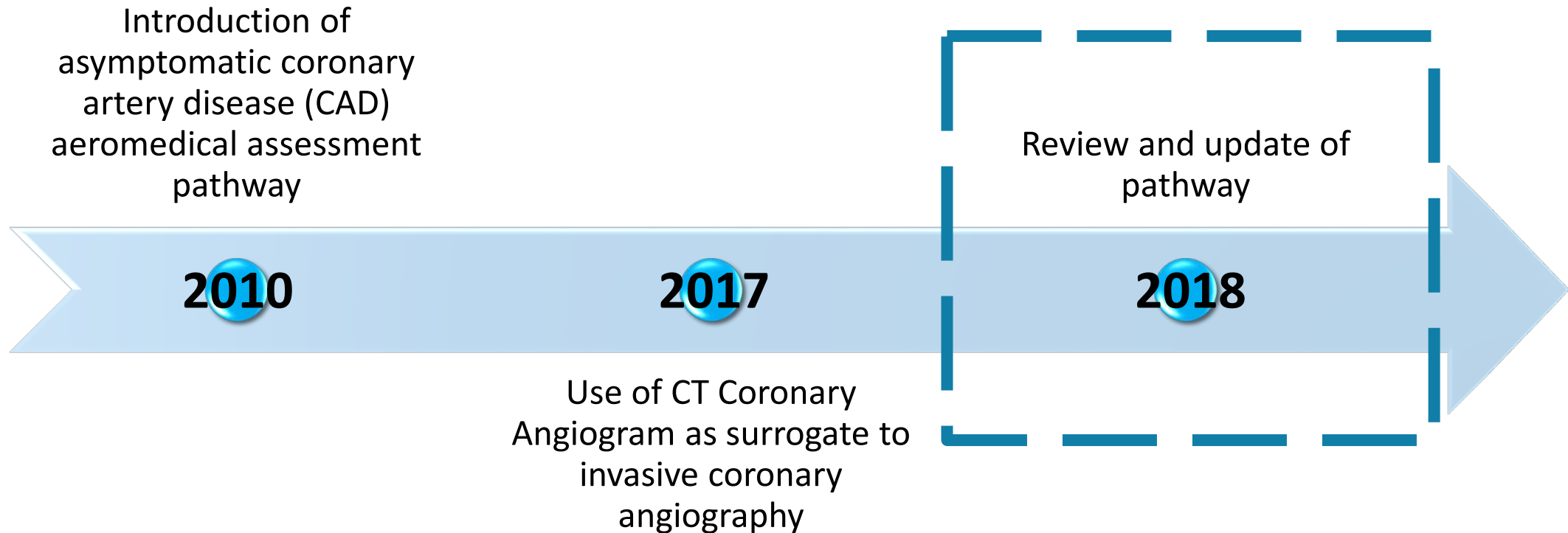
HEALTH SCREENING PROGRAMME

Health Screening Programme

- Basic Review
- Multiphasic Screen
- Advanced Cardiac Investigations
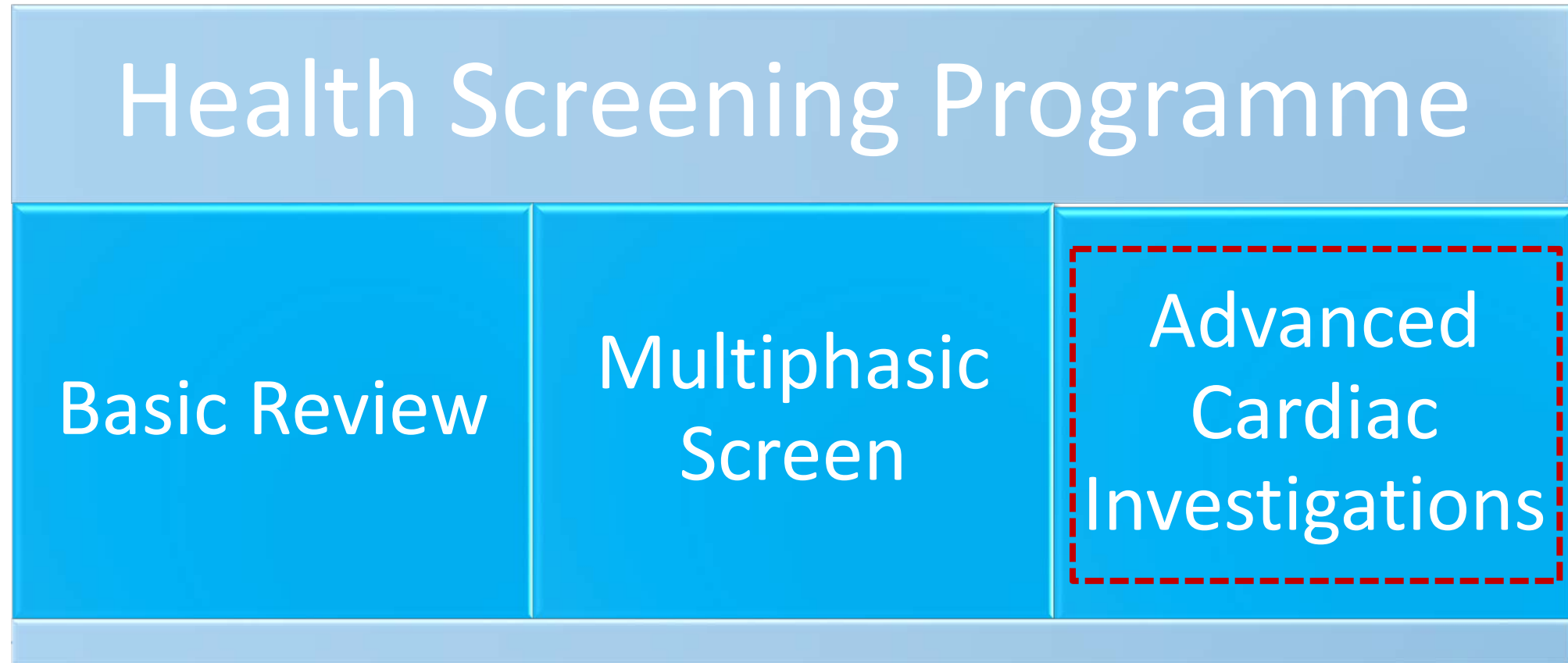
HEALTH SCREENING PROGRAMME

Panel III: Advanced Cardiac Investigations

Stress ECG

➤ First line cardiac screening investigation

Functional Imaging Tests

➤ Servicemen with abnormal stress ECG

CT Coronary Artery Calcium (CAC) Scan

➤ Servicemen aged ≥ 40 years old with an abnormal stress ECG and normal functional imaging tests
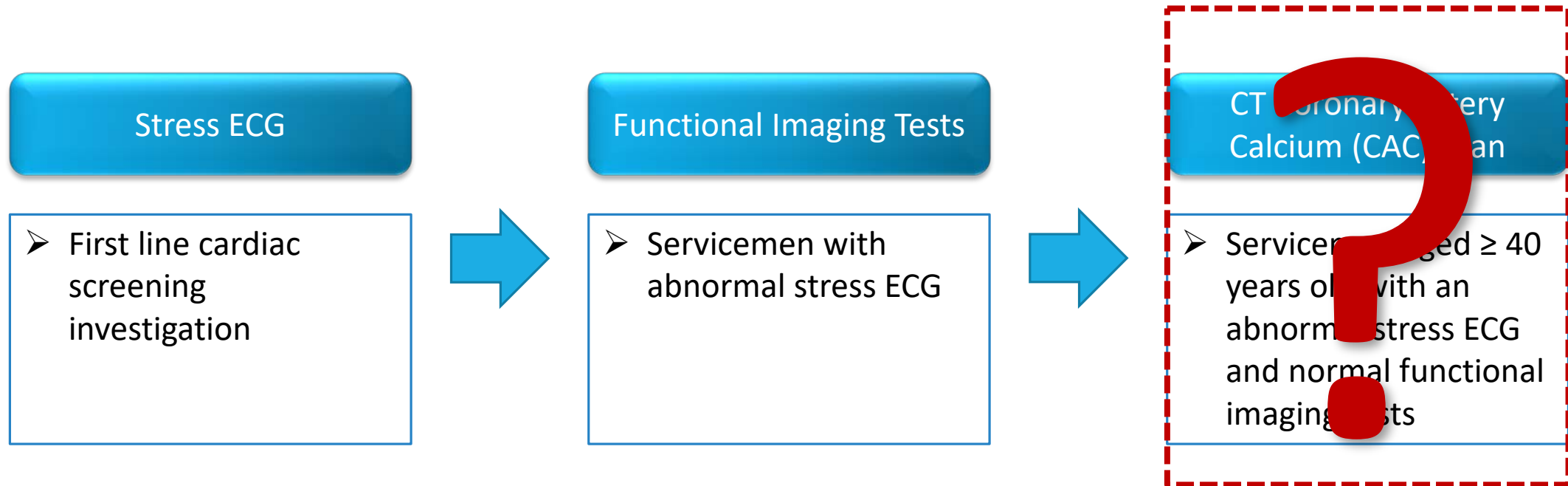
IMPETUS FOR REVIEW

Increasing use of advanced cardiac investigation modalities such as CT CA

Availability of additional information on cardiovascular health

Potential flaws in utilising aggregated stenoses severity to classify CAD severity

EXISTING AEROMEDICAL STANDARDS

REPUBLIC OF SINGAPORE AIR FORCE

➤ Use of CT CAC to determine cardiac event risk and aeromedical disposition

➤ Invasive angiogram to be done only if recommended by cardiologist

➤ Use of aggregated lesion score to grade severity of CAD

INTERNATIONAL STANDARDS

➤ Risk stratification based on risk calculator KIV CT CAC

➤ Use of treadmill ECG or CT CAC as first line investigation for suspected CAD

➤ Use of aggregated lesion score to grade severity of CAD

CONSIDERATIONS

➢ Minimise medical attrition without risk to flight safety

➢ Use of CT Coronary Artery Calcium (CT CAC)
   ➢ Guide further evaluation
   ➢ Only applicable to individuals aged 40 or older
   ➢ No role for repeat CT CAC

➢ Risk Prediction
   ➢ 3 categories

Risk Category	CT CAC Score	Implication
Low risk (< 1%)	0 – 10	Unrestricted duties unless there are ≥ 2 cardiac risk factors
Intermediate risk	11 – 399	Proceed to CT coronary angiogram (CT CA)
High risk (> 3%)	≥ 400	Permanent restriction from duties

INTERMEDIATE RISK CATEGORY

USE OF CT CA

Pros

➤ Additional layer of screening for aircrew

➤ Increase the sensitivity of pathway in picking up silent stenosis

Cons

➤ False positives may lead to increased referrals for cardiac catheterisations

BASED ON CT CAC

Pros

➤ No risks from cardiac catheterisations

Cons

➤ Unknown prevalence of silent obstructive CAD in aircrew with an abnormal treadmill exercise test and CT CAC score of 11 – 399

# CLASSIFICATION OF CAD SEVERITY

AGGREGATED LESION SCORES **VS** DEGREE OF WORST LESION

CLASSIFICATION OF CAD SEVERITY

Risk Category	Invasive Angiogram Findings	Implication
No risk	No evidence of coronary artery disease	Unrestricted duties
Low risk	Single vessel disease, worst lesion not more than 50%	Unrestricted duties
Medium risk	Multi-vessel disease, worst lesion not more than 70%; Single vessel disease, worst lesion 50-70%; Any left main lesion up to 30%	Restricted to non-high G_z platforms and "as-or-with qualified co-pilot" status, or "non-critical control" duties
High risk	Any lesion more than 70%; Left main lesion more than 30%	Permanent restriction from flying duties unless stented
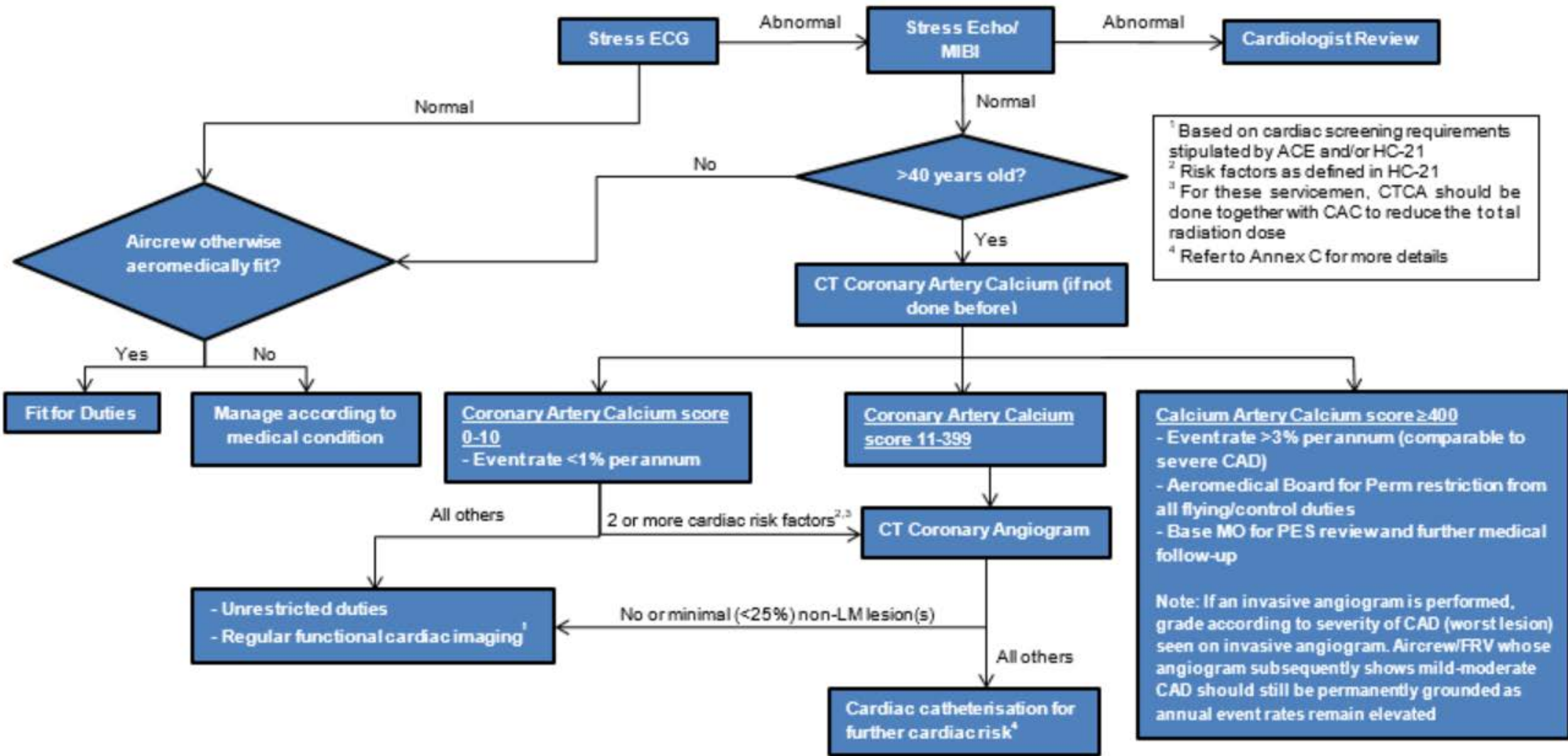
MOVING FORWARD
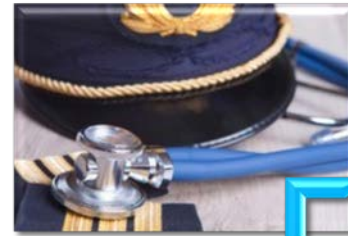
CHALLENGES

NATURE OF DISEASE

AEROMEDICAL SIGNIFICANCE

OBJECTIVE RISK ASSESSMENT

AVAILABILITY OF MEDICAL FACILITIES

CONCLUSION

Emerging
Clinical
Evidence

Overseas Best
Practices

Observation of
Aeromedical
Cases

Identification
of Gaps

Robust
Aeromedical
Management
of Aircrew
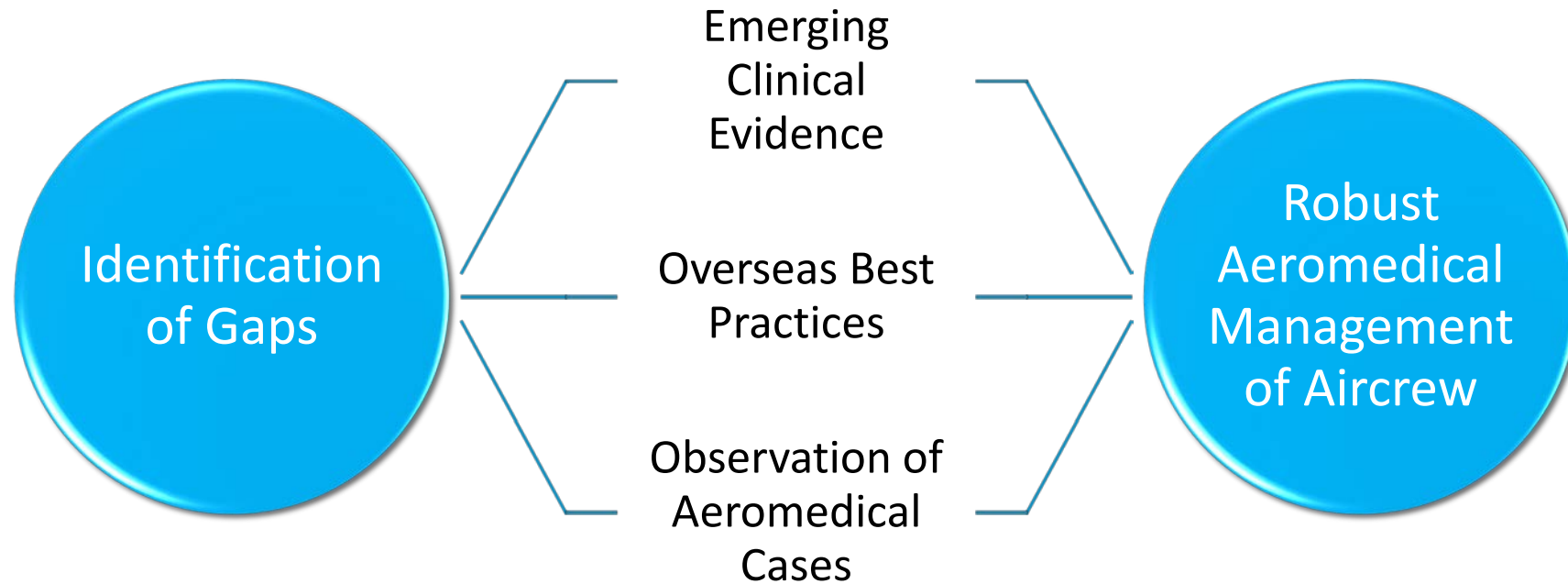
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THANK YOU
Questions