

Barts and The London Cardiovascular Biomedical Research Unit

The effects of cardiac rhythm problems on fitness and capacity

Richard Schilling



Hazards of deep-sea fishing¹

R. S. F. SCHILLING

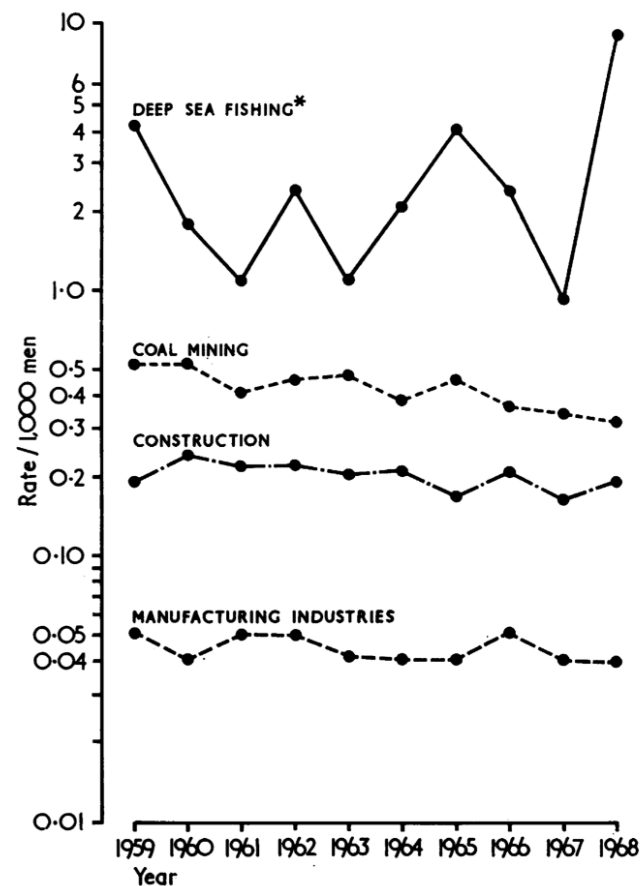
London School of Hygiene and Tropical Medicine TUC Centenary Institute of Occupational Health

Schilling, R. S. F. (1971). Brit. J. industr. Med., 28, 27-35. Hazards of deep-sea

TABLE 1

STANDARDIZED MORTALITY RATIOS FOR FISHERMEN
IN ENGLAND AND WALES AGED 15-64
Including Deaths at Sea 1959-63

Cause of death	No. of deaths		SMR
	Observed	Expected	
Accidents at work	150	9	1726
Other accidents & suicides	53	31	169
Hypertension	22	10	215
Cancer of lung or bronchus	97	51	191
Cancer of stomach	29	15	189
Bronchitis	46	31	147
Coronary heart disease	146	112	130
Other causes	229	178	77
All causes	772	437	177



Rhythm abnormalities

- Bradycardia
 - Normal - sinus
 - Symptomatic (Sinus, 2nd degree block)
 - Prognostic - complete heart block
- Tachycardia
 - Supraventricular
 - Ventricular
- Would you have flecainide/rate control?

What are the requirements?

- a) potentially hazardous, high standard of health and continuing fitness
- b) the restricted medical facilities
- c) difficulty of providing/ replacing
- d) confined nature of life on board
- e) limited crew - illness of one crew member places burden on others/ impairs safe working of ship
- f) emergencies requiring physical capability
- g) need to join and leave ships by air.

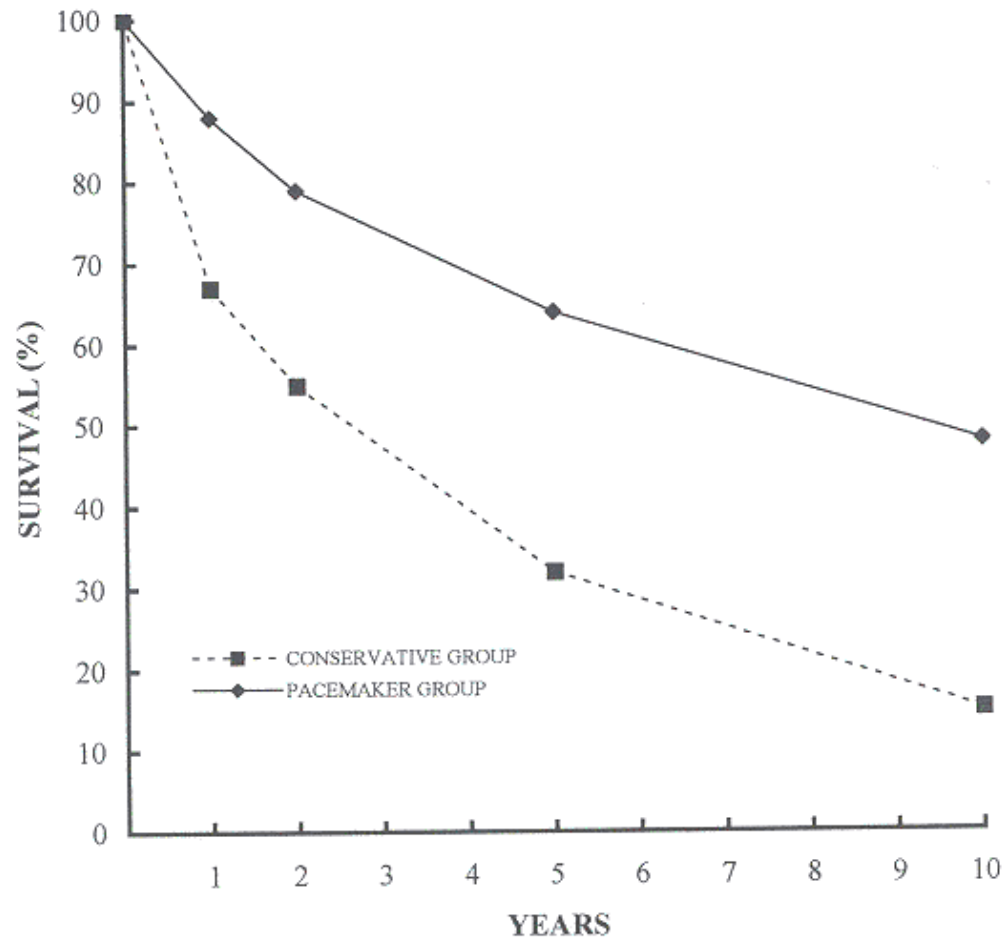
Sinus rhythm

- Normal SR varies from pt to pt
 - 25 to 110 bpm
- Pathology is determined on the basis of the symptoms
- Sinus node disease is not prognostic
- May cause syncope
 - Usually transient

Sinus node disease

- Rare
- In young people usually vagal
- Can be ignored if asymptomatic

3rd degree heart block survival with and without pacing

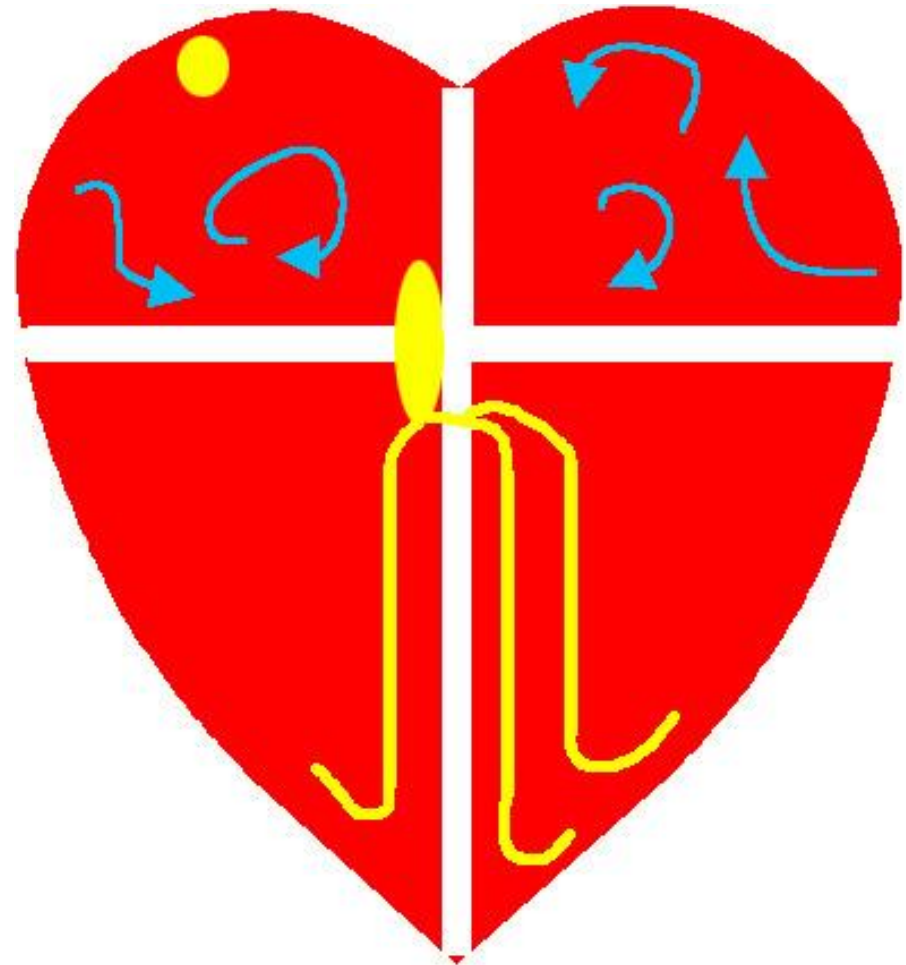


Pacemaker

- Failure very rare
- Usually requires follow up once a year
- Well shielded with environmental interference very rare
- Unlikely to interfere with maritime duties

Supraventricular tachycardia

- Narrow complex QRS on ECG
- If regular - benign unless incessant
- If irregular the AF and may be associated with stroke
- Very very rarely cause disabling symptoms
- Will usually terminate spontaneously



AF and stroke

- Risk predicted by:
 - **Congestive heart failure**
 - **Hypertension**
 - **Age > 65**
 - **Diabetes**
 - **Stroke (2 points)**
 - **Vascular disease**
 - **Female if > 65**
- Each point = 1% risk per year
- Risk > halved by anticoagulant (NOACs)

Practical management of SVT for maritime workers

- Regular SVT - catheter ablation if frequent
- Paroxysmal AF - catheter ablation if frequent
- Persistent AF - rate control and stroke prevention with NOAC if asymptomatic

SVT and maritime certification

- If SVT symptomatic enough or frequent enough to interfere with duties then treatment should be recommended
- Anticoagulation not likely to be common (>65 years)
- Should not be a barrier to certification if taking aspirin is not a barrier

Broad complex regular tachycardias

- Ventricular until proven otherwise
- If patient's heart is normal - benign
- If:
 - abnormal ECG in SR
 - strong family history of SCD
 - structurally abnormal heart
- Then may be malignant

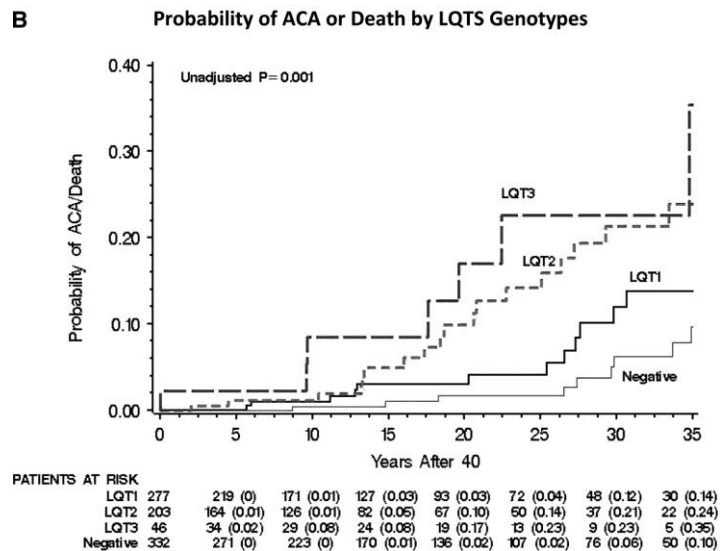
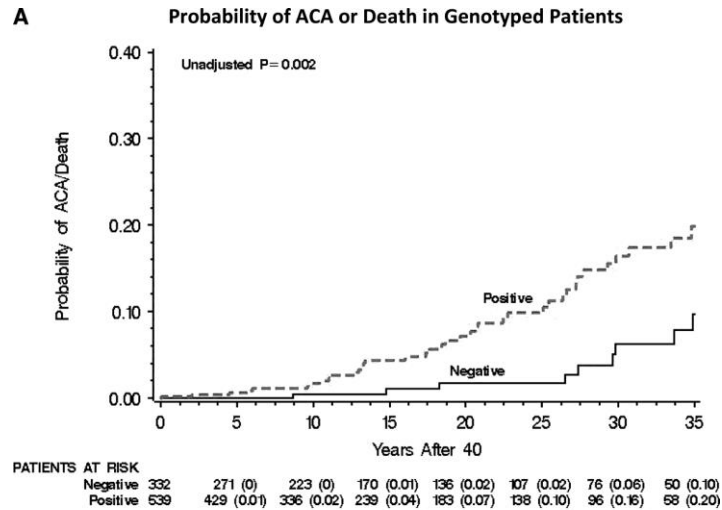
Normal heart VT

- If rare should not be an occupational barrier
- If frequent then can be treated with:
 - Verapamil
 - Catheter ablation
- If symptoms controlled then should not be an occupational barrier

Ventricular rhythm in inherited disease

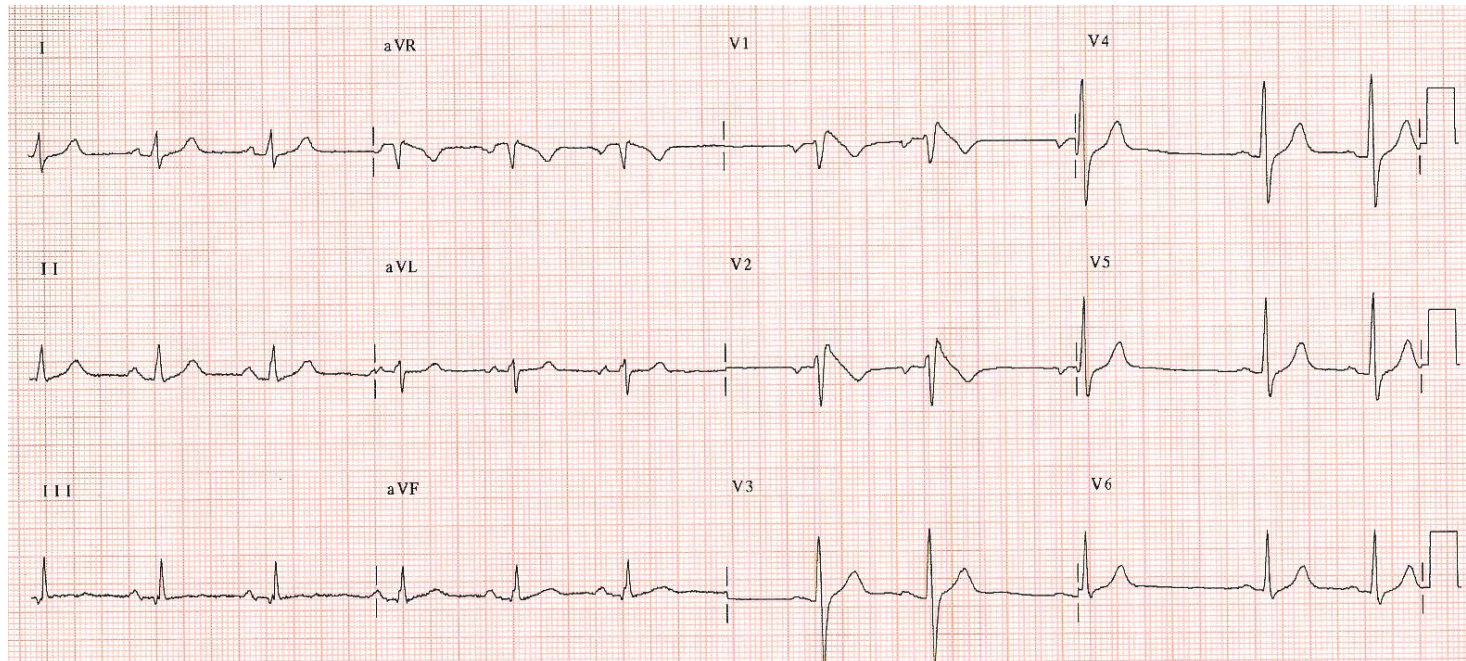
- Rare
- Wildly different levels of risk
 - Long QT 1 annual SCD risk $<1\%$
 - Long QT 2 SCD risk $>2\%$
- Beware misdiagnosis - e.g. Brugada syndrome

Risk of inherited conditions often overestimated



Brugada type ECG

- Very common in Asians
- Syndrome is this combined with another risk factor for arrhythmia
- Always seek arrhythmia specialist opinion before changing people's career
- Consider second opinion if doubt

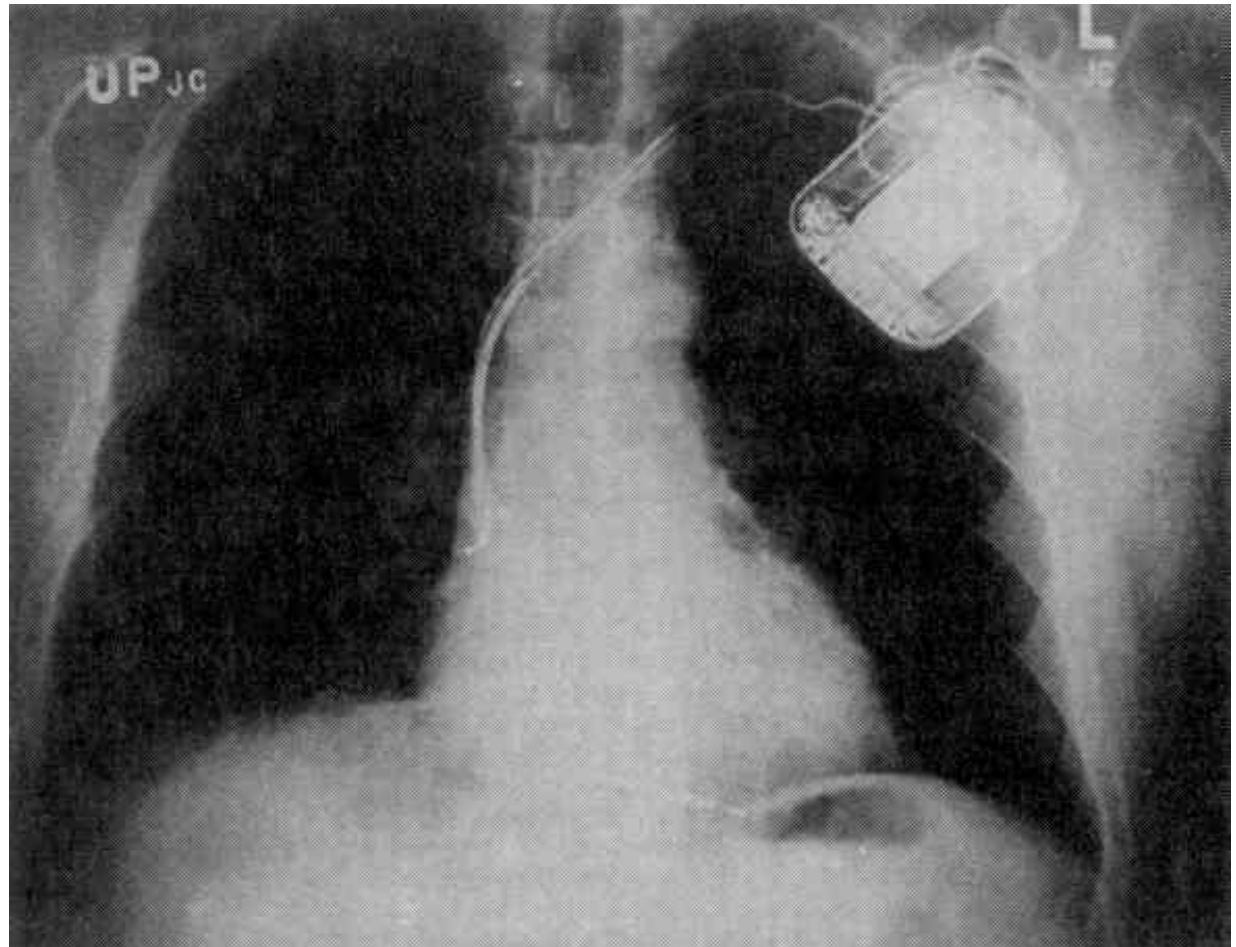


VT in ischaemic heart disease

- VT remote from MI is strongest marker of future risk
- Secondary prevention ICD strongly indicated
- Patients should not be at sea without this

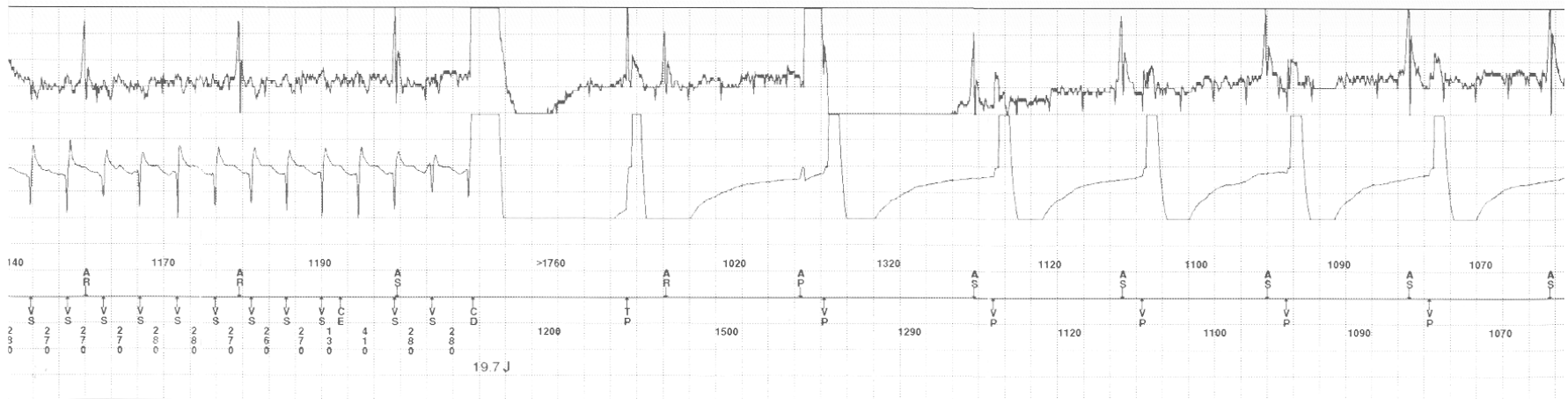
What is an ICD?

- Computer and battery/capacitor
- Connected to the heart by lead
- Determines presence of arrhythmia on basis of heart rate



ICDs

- Mean ICD life 4 to 4.7 years
- shock rates 35% (inappropriate 25%)



Devices and maritime occupations

- What happens when patients have a shock?
 - Usually an instantaneous sudden "kick in the chest"
 - Often not associated with LOC even when appropriate
 - Usually therefore only transiently disabling

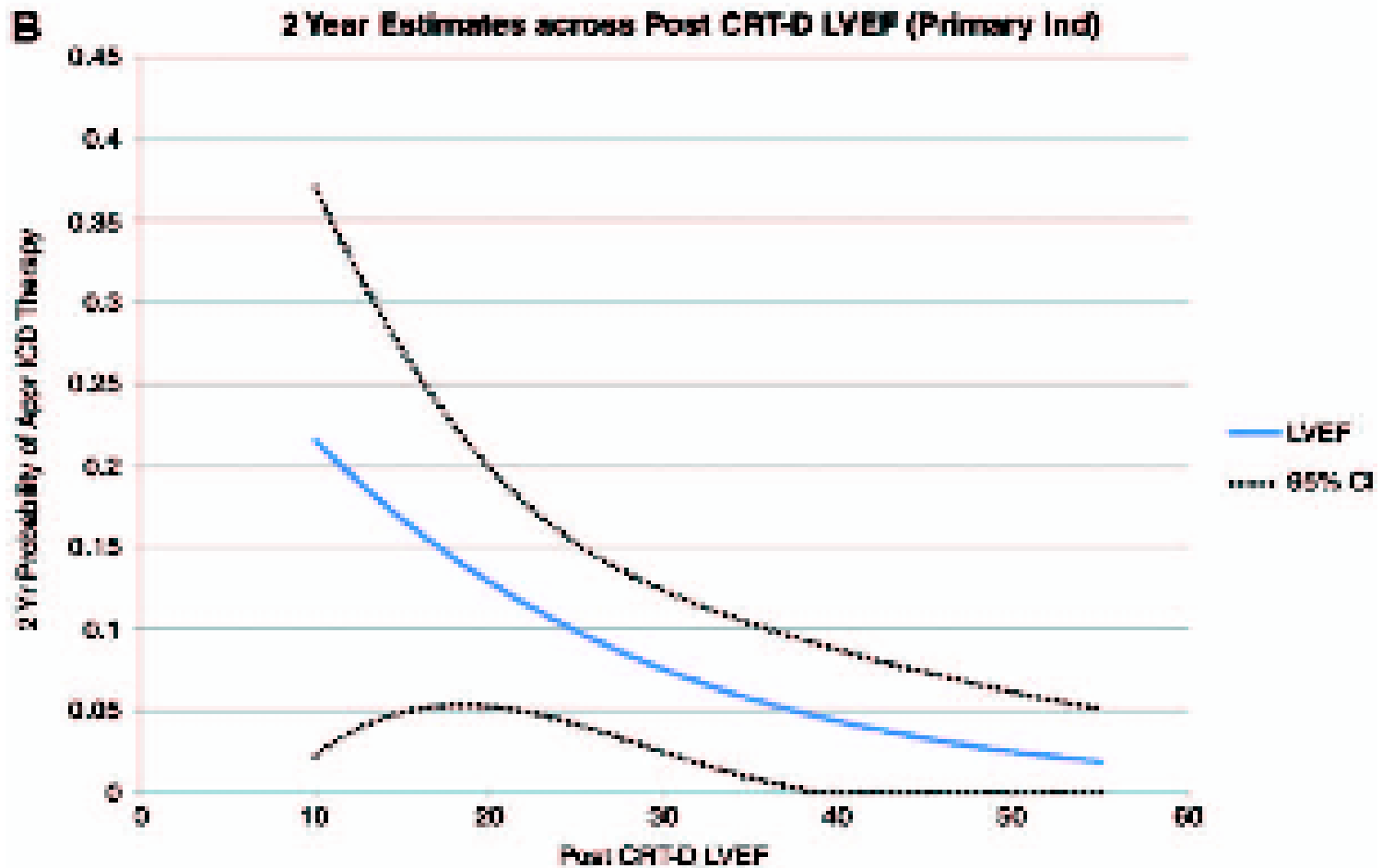
Multiple shocks

- Multiple shocks in succession may occur
 - Appropriate
 - Inappropriate (problems with leads, other rhythms - AF)
 - These will be disabling - primarily psychologically
 - Device can be temporarily disabled but pt then exposed to risk

Risk of shock

- For ischaemic heart disease - 30% over 5 years
- Varies from nation to nation (threshold for implantation)
- For inherited disease very much lower

2 year estimate of shock in 1° ICD



Practical aspects of ICD management for maritime agencies

- If transient incapacity is not a problem then continuing role is probably ok if pt otherwise fit
- If transient incapacity is an issue then this is a concern (e.g, heavy machinery, work at height, single pilot in close proximity work)

Summary of ICD DVLA rules

- Group 2 (VOC/HGV/LGV) banned
- Group 1 - 6/12 if therapy, 2 years if cardiac arrest

Conclusions

- Arrhythmia may result in risk to patient but these may be mitigated if appropriately detected and treated
- Even treated arrhythmia may result in distraction and transient disability which represent a unique risk in the work place which needs to be considered