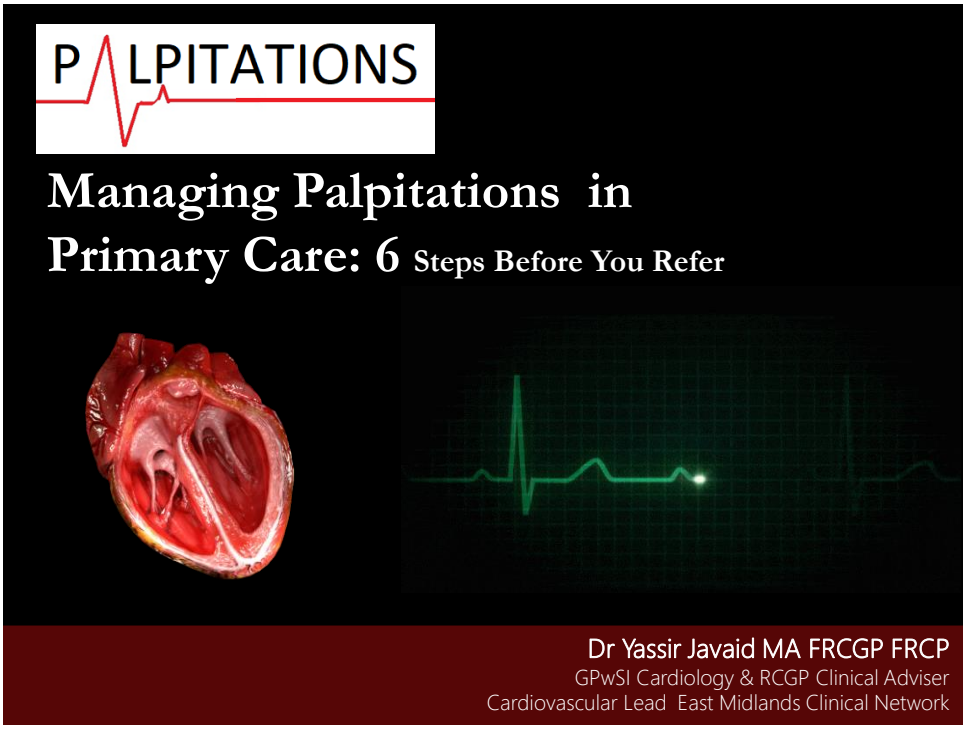


Palpitations

- **Common presentation in primary care and frequent reason for referral**
- **Often cause significant distress and anxiety**
- **Most are benign (< 50% due to arrhythmia many of which have no prognostic significance)**
- **High incidence of anxiety disorders**
- **The challenge:**
  - Identifying the patients with a significant heart abnormality or at risk of adverse outcome
  - Reassuring the others
  - Can be achieved in primary care through careful history taking and simple investigation(s)

Palpitations: The Main Causes

1. Cardiac arrhythmias:

2. Structural heart disease:

3. Psychosomatic disorders:

4. Systemic causes:

5. Drugs:

Palpitations: The Main Causes (1)

1. Cardiac arrhythmias:

- Supraventricular/ventricular extrasystoles or tachycardias (the latter can be life-threatening)
- In patients with sustained palpitations: 16% atrial fibrillation; 10% SVT; 2% VT

2. Structural heart disease:

- Valve disease: severe mitral or aortic regurgitation; mechanical valves
- Congenital heart disease with significant shunt
- Dilated or hypertrophic cardiomyopathy
- Previous MI
- Heart failure (esp if LVEF <35%)

3. Psychosomatic disorders:

- Anxiety and panic attacks
- Depression & somatisation disorders

Palpitations: The Main Causes (2)

4. Systemic causes:

- Hyperthyroidism
- Hypoglycaemia
- Menopause/Pregnancy
- Fever
- Anaemia
- Hypovolaemia
- Orthostatic hypotension
- Phaeochromocytoma

Palpitations: The Main Causes (3)

5. Drugs:

- Salbutamol / Ipratropium
- Recent withdrawal of beta-blockers
- Drugs that prolong the QT interval:
  - non-sedating antihistamines (such as terfenadine),
  - macrolide antibiotics (such as clarithromycin and erythromycin),
  - antipsychotic drugs (such as risperidone),
  - some antidepressant drugs (such as citalopram and escitalopram, tricyclics, and monoamine-oxidase inhibitors)
  - antifungals such as itraconazole
- Alcohol, caffeine, nicotine, cocaine, heroin, amphetamines, ecstasy, and cannabis.

6 Step Approach to Palpitations in Primary Care

1. What does the patient actually mean?

- **Palpitations refer to an abnormal (usually unpleasant) perception of the heart beat. They are a symptom and not necessarily due to arrhythmia**
  - Usually refer to a fast rate
  - Can be a slow rate, irregular rate, a pounding sensation, missed beats or extra beats
  - Important to clarify this with the patient

- **Need to explore the heart rate at the time of the palpitations**
  - "Too fast to count" suggests a tachyarrhthmia
  - Ask patient to tap the heartbeat can further clarify rate and uncover regularity

- **Short-lived (ie ≤ few secs) irregularities point towards ectopy as the cause**
  - Missed beats
  - Fluttering
  - Extra beats

1. What does the patient actually mean?

- **Assess impact on patient's life by clarifying duration and frequency**
- **Onset of palpitations are usually sudden but the mode of termination gives valuable clues eg sudden termination of SVTs**
- **Assess the circumstances during which palpitations occur:**
  - At rest
  - During **exercise** is **ALARMING**
  - Brought on by swallowing cold food/drink = possible atrial flutter
  - Stopped by coughing or breath holding = suggestive of SVT
  - Abrupt onset/offset = suggestive of SVT
  - Gradual onset/offset over mins = suggestive of anxiety

2. Are there any associated symptoms?

- **Pre-syncope and syncope** are the most worrying alarm symptoms that need to be investigated
  - Serious arrhythmias often present with syncope with absent preceding symptoms ie no warning
  - Recurrent unexplained syncope or syncope with injury or during exertion need referral for specialist assessment
- **Breathlessness** usually indicates tachyarrhythmia (loss of diastolic ventricular filling time) or less commonly decompensation in the form of HF (eg Fast AF)
  - Need to distinguish from the momentary breathlessness often experienced with ectopics
- **Chest pain** can be associated with palpitations
  - Some patients may have underlying CAD
  - A very fast heart rate can cause chest discomfort even in patients with structurally normal hearts

3. Assess contributing factors

- **Explore psychological issues**
  - Anxiety, depression and somatisation disorders are common recognised causes of palpitations
- **Lifestyle issues can contribute to or be the cause of palpitations**
  - High **caffeine** and/or **alcohol** intake increase the likelihood of ectopy
  - **Alcohol** intake also reduces the threshold for AF
  - **Illicit drugs** such as ecstasy, amphetamines and cocaine commonly cause palpitations
- **Prescription medications**
  - Beta agonists, theophyllines and CCBs
- **QT prolonging drugs**
  - Antiarrhythmics, antipsychotics, antidepressants

4. Take a careful Family History

- **Assess known cardiac disease in close relatives (vast majority of inherited diseases are AD so the focus should be on 1st degree relatives)**
  - Heart muscle disease (eg HCM)
  - Early onset AF
  - Premature coronary disease
- **Use of ICD in young patients may indication a channelopathy**
- **Unexplained sudden death in < 40yrs indicates likely arrhythmic cause cf sudden deaths in older patients more likely to be due to CAD**
  - Also ask about fatal accidents or drowning which often masquerade as SCD
- **≈ 1/3 of epilepsy likely misdiagnosed**
  - Most of these are reflex seizures 2^0 arrhythmia
  - Ask about FHx of sudden unexpected death in epilepsy (SUDEP)

Summary of High Risk Factors in the History

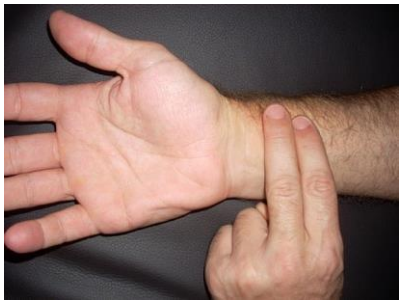
- **Pre-existing structural heart disease:**
  - **Heart Failure**
  - **Previous MI**
  - Valve disease
  - Cardiomyopathy eg DCM/HCM
  - Congenital
- **Syncope or Presyncope**
- **FHx SCD < 40 years**
- **Exertional cardiac symptoms**

5. Examination and investigation

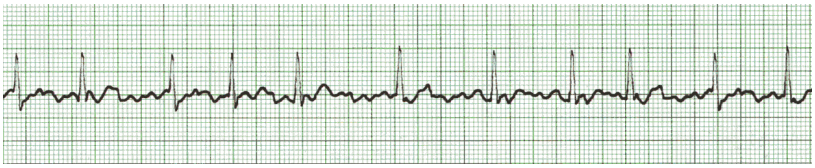
- **If symptomatic (rare) assess haemodynamic status**
- **If asymptomatic physical examination usually normal**
  - Pulse: Rate & Rhythm
  - BP
  - Signs of HF
  - Abnormal heart sounds and murmurs point towards underlying structural heart disease
  - Features of thyrotoxicosis and anaemia
- **Blood tests**
  - FBC
  - TFTs
  - U&E

Cardiac rhythm assessment

- **MANUAL pulse checking will give a strong clue to rhythm**
  - Now often ignored!
  - Is it regular?
  - Does the strength of pulse vary?
  - What is the rate?



- ECG to monitor or confirm rhythm

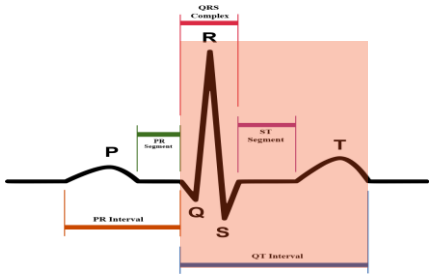


5. Examination and investigation

- **12 lead ECG is usually the most important investigation**
  - AF
  - 2nd or 3rd Degree AV block
  - Previous MI
  - LVH and strain patterns
  - LBBB
  - Repolarisation abnormalities: abnormal T wave inversion and ST segment changes
  - Pre-excitation (Delta wave and short PR)
  - Abnormal QTc interval and T wave morphology

The QT interval

- Section between beginning of QRS and end of T wave:

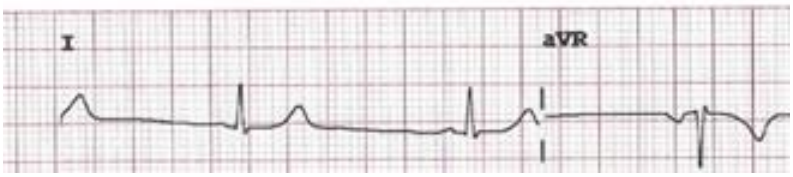


- At normal heart rates, QT is abnormal if greater than:
  - 450ms for males
  - 470ms for females

  - QT interval shortens with increasing heart rate
  - **QTc corrects for this**

```
Rate      52    . Age not entered, assumed to be
                . Sinus rhythm.....
PR       141    . Probable left atrial enlargement.
QRSD      92    . Anterior infarct, possibly acute.
QT       437
QTc      407

--AXIS--
P         72
QRS       40
T         43
12 Lead; Standard Placement
```



Normal QTc by Age and Gender

QT_c (ms)	1-15 years	Males	Females
Normal	< 440	< 430	< 450
Borderline	441-460	431-450	451-470
Prolonged	**> 460**	**> 450**	**> 470**

Note absence of gender difference until early adolescence

Bazzet formula adapted from Goldenberg et al, 2006

Causes of a Prolonged QT Interval

- Hypokalaemia
- Hypomagnesaemia
- Hypocalcaemia
- Hypothermia
- Myocardial ischaemia
- Post-cardiac arrest
- Raised intracranial pressure
- Congenital long QT syndrome
- **DRUGS**

Antimicrobials

Erythromycin
Clarithromycin
Moxifloxacin
Fluconazole
Ketoconazole

Antiarrhythmics

Dronedarone
Sotalol
Quinidine
Amiodarone
Flecainide
Sotalol

Others

Some antimalarials
Some antiretrovirals
Boceprevir
Telaprevir
Methadone

Antipsychotics (all have some risk)

Risperidone
Fluphenazine
Haloperidol
Pimozide
Chlorpromazine
Quetiapine
Clozapine

Antidepressants

Citalopram/escitalopram
Amitriptyline
Clomipramine
Lofepramine
Dosulepin
Doxepin
Imipramine

Antiemetics

Ondansetron/Granisetron
Droperidol
Domperidone

Psychiatric drugs and risk of QTc prolongation at therapeutic doses (usually seen within several days)

Drug Class	High risk	Lower risk
Typical Antipsychotics	Haloperidol Chlorpromazine	
Atypical Antipsychotics	Quetapine	Olanzapine Risperidone Aripiprazole Clozapine
SSRIs	Citalopram Escitalopram	Fluoxetine Sertraline
TCAs	Amitriptyline Imipramine	
SNRIs	Venlafaxine	Duloxetine
Other antidepressants	Mirtazapine	Trazodone

Orally administered drugs and QTc prolongation

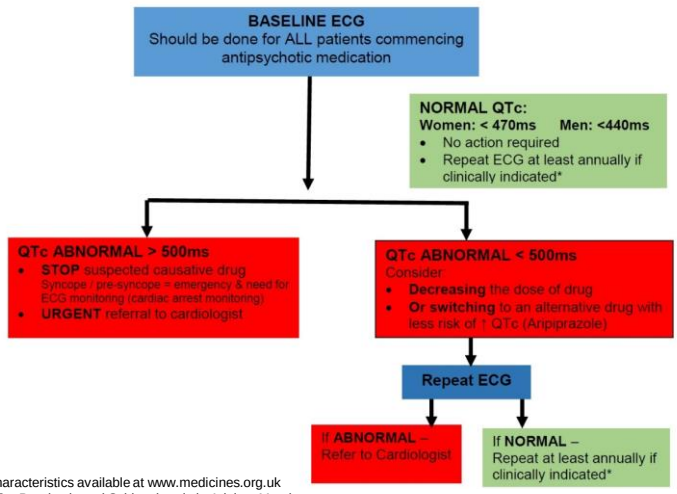
Medscation	Mean increase in QTc (ms)	% patients with > 60ms mean increase
Quetapine	14.5	11.1
Risperidone	11.6	4.0
Olanzapine	6.8	4.0
Haloperidol	4.7	3.7

Journal of psychiatric practice 2014

Risk Factors for QTc Prolongation

- Hx of heart disease ie arrhythmias or LVH
- Age > 65
- Female
- > 1 QTc prolonging drug
- Increased concentration of offending drug (high dose, drug interactions, reduced renal clearance)
- Electrolyte abnormalities ($\downarrow K^{+}$ $\downarrow Mg^{++}$ $\downarrow Ca^{++}$)
- Genetics (prolonged QT syndrome)

NHS Tees, Esk and Wear Valleys NHS Foundation Trust
NHS Northumberland, Tyne and Wear NHS Foundation Trust
NHS Cumbria Partnership NHS Foundation Trust
NHS Northern England Clinical Networks



- Summary of Product Characteristics available at www.medicines.org.uk
- NICE Guidelines CG178 – Psychosis and Schizophrenia in Adults - March 2014
- Lester UK Adaptation Positive Cardiometabolic Health Resource 2016
- Psychotropic Drug Directory 2016

Summary Abnormal Results : ECG

Abnormal	Urgent Abnormality
• Rhythm other than sinus (eg AF) • PR interval >220ms • Heart rate <50 bpm (patient well) • T wave inversion (other than V1, AVR & 3) • Left axis deviation • Voltage criteria for LVH • ST segment depression • QTc > 460msecs • Sinus pauses > 3 secs • Ectopy (other than isolated SVE) • Evidence of pre-excitation (delta wave) • LBBB • RBBB if symptoms or LAD	• ST depression (>2mm) or elevation in ≥ 2 concordant leads • ST or T wave changes in association with chest pain • Broad complex tachycardia (≥ 3 beats) • Narrow complex tachycardia > 150 bpm or with symptoms • Complete heart block • Second degree heart block with symptoms (syncope or Presyncope) • QTc > 500msecs • Ventricular standstill > 2 secs

6. Risk stratification

• Skipped beats • Thumping beats • Short fluttering • Slow pounding AND • Normal ECG AND • No family history AND • No structural heart disease	• History suggests recurrent tachyarrhythmia • Palpitations with associated symptoms AND / OR • Abnormal ECG AND / OR • Structural heart disease	• Palpitation during exercise • Palpitations with syncope / near syncope • High risk structural heart disease • Family history of inheritable heart disease / SADS • High degree atrioventricular block
Low risk: manage in Primary Care	Refer to cardiology / arrhythmia care co-ordinator	Refer to cardiology with urgency

6. Risk stratification

- **Significant ECG abnormalities require further investigation**
  - A normal resting ECG does not exclude significant arrhythmia but makes a life threatening arrhythmia highly unlikely
  - A normal echocardiogram and a normal resting ECG is HIGHLY reassuring

Summary Abnormal Results: ARM

Abnormal	Urgent Abnormality
• Arrythmias other than asymptomatic isolated ectopy • > 500 ventricular ectopics • Any degree of heart block • ST segment changes • Daytime pauses > 3secs • Nightime pauses > 4 secs • Prolonged QTc (> 460msecs)	• Broad complex tachycardia (sustained or <30 seconds with symptoms) • Sustained narrow complex tachycardia > 150bpm (or with symptoms) • Complete heart block • Second degree heart block with symptoms • Any symptomatic bradycardia (syncope or presyncope)

Occupational and Driving Advice

- Only a small number of patients with palpitations will have an arrhythmia that disqualifies them from flying
- DVLA: If arrhythmia has caused or likely to cause incapacity driving must cease (this includes patients with suspected arrhythmia awaiting investigation)
- Common sense advice to patients who work at height or operate heavy machinery

Ventricular Ectopics

- Everyone has some ectopics, not everyone feels any symptoms with them, others can be highly symptomatic
- With a structurally normal heart, were believed to be benign
- Are benign if burden is low, so assessment with a 24hr tape is essential
- Outflow tract ectopics worsen with exercise
- >10000 ectopics/24hrs can be associated with the development of heart failure
- Can be successfully ablated

Summary of Learning Points

- Take a good history, 12 lead ECG and bloods
- Risk stratify
- A normal ECG and normal echocardiogram puts you in low risk
- Syncope/presyncope are red flags and warrant prompt specialist investigation