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**THE PREVALENCE OF ECG  
ABNORMALITIES AND ABNORMAL  
TROPONIN T LEVELS IN PATIENTS  
WITH NON-TRAUMATIC SUB-  
ARACHNOID HAEMORRHAGE**

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Mmed

# INTRODUCTION

MMED

Supervisors: Dr J Ouma, Dr C Profyris

Prospective study

Ongoing: Start Jan 2019, completion date November 2019

Provisional results

Chris Hani Baragwanath Hospital

Proposed sample size: 50 patients



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# OBJECTIVES

To Calculate the prevalence of ECG abnormalities in patients presenting with non-traumatic SAH

To assess the prevalence of raised serum Troponin T levels in patients presenting with non-traumatic SAH

To identify if there is an association between raised Troponin T levels and ECG abnormalities in patients presenting with non-traumatic SAH

To compare the WFNS grade in patients found to have ECG abnormalities or raised serum Troponin T levels vs. Those with normal ECG and normal Troponin T levels



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# BACKGROUND

Electrocardiogram abnormalities are recognised in the literature following a SAH

ECG abnormalities resulting from a neurological cause can be misdiagnosed as myocardial ischaemia or infarction in a patient presenting with a history of collapse



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# SUMMARY OF LITERATURE REVIEW: ECG CHANGES AND NT-SAH

Sommargren et al. described 2 main categories of abnormalities seen:

- Morphological waveform changes
- Arrhythmias (Sinus bradycardia or tachycardia, supraventricular or ventricular arrhythmias)

The ECG changes associated with SAH primarily reflected repolarisation abnormalities involving ST segment, T wave, U wave and the QTC interval

Burch et al described broad, slurred, inverted T waves associated with long QTC intervals as “Cerebral”, “Neurogenic” or “Giant” T waves



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AD Harries et al : up to 50% of patients with SAH will have ECG abnormalities, most of which had no evidence of heart disease

Brouwers et al : most pronounced ECG changes occurred during first 72 hours after SAH and most of these changes resolved within 12 days

Concept of The Brain Heart axis:

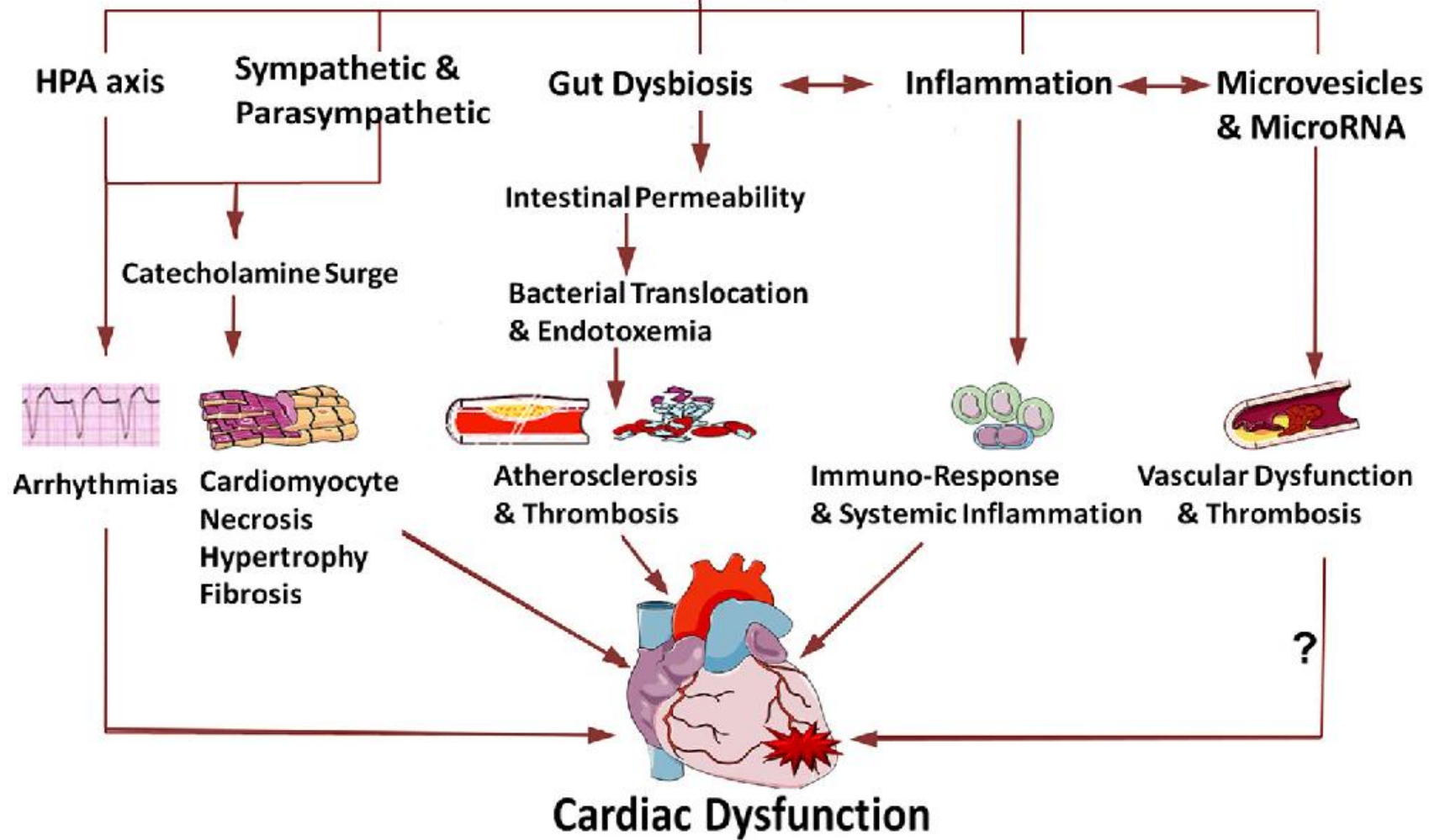
- Anterior cingulate cortex, amygdala, parabrachial nucleus, hypothalamus, periaqueductal grey matter, anterior insula and some areas of the medulla are thought to play a very important role in modulating cardiac function
- Through the sympathetic and parasympathetic nervous system, in response to stressful and emotional situations and in homeostatic reflexes, these structures are involved in cardiac activity
- The insular cortex plays a critical role in the management of the heart's chronotropic activity



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# Stroke



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## The etiological theories surrounding what causes these ECG abnormalities in SAH are controversial

- Benninger et al postulated an increase in central sympathetic activity
  - this is thought to be possibly due to activation of hypothalamus resulting in a hyperdynamic cardiovascular state, leading to the ECG abnormalities that were seen in their patients. This was associated with a higher mortality and was suggested that it was a predictor of those patients that would develop vasospasm
- Yasser L Sakr et al looked at the relationship between ECG abnormalities and neurological outcome in patients with aneurysmal SAH
  - Found that ST segment abnormalities (especially depression) related to poorer prognosis and this was reflected in higher World Federation of neurological societies (WFNS) and Hunt and Hess grades
  - ?presence of ST segment depression in patients presenting with aneurysmal SAH may denote a poorer prognosis



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# STUDY DETAILS

ECG and Troponin T done within 7 days of initial symptoms

CTB (Non contrast) +/- CTA

Neurological assessment by neurosurgeon

Excluded: <18 years, Previous MI, Known arrhythmia

Limitations: Obtaining accurate cardiac history, referral to neurosurgical department, timing of when ECG done and when Trop T taken



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# DATA MANAGEMENT

Age: 18-30 years, 31-40 years, 41-50 years, 51-60 years, greater than 60 years

Race: Caucasian, African, Indian

Sex: Male or female

WFNS grade: 1, 2, 3, 4, 5

Known Hypertensive

CTB additional findings: Only SAH, Intraventricular haemorrhage, Intracerebral haemorrhage, hydrocephalus

CTA findings: Arteriovenous malformation, Aneurysm, Normal, Not done

ECG Abnormalities: YES/NO

Troponin T Elevated: YES/NO



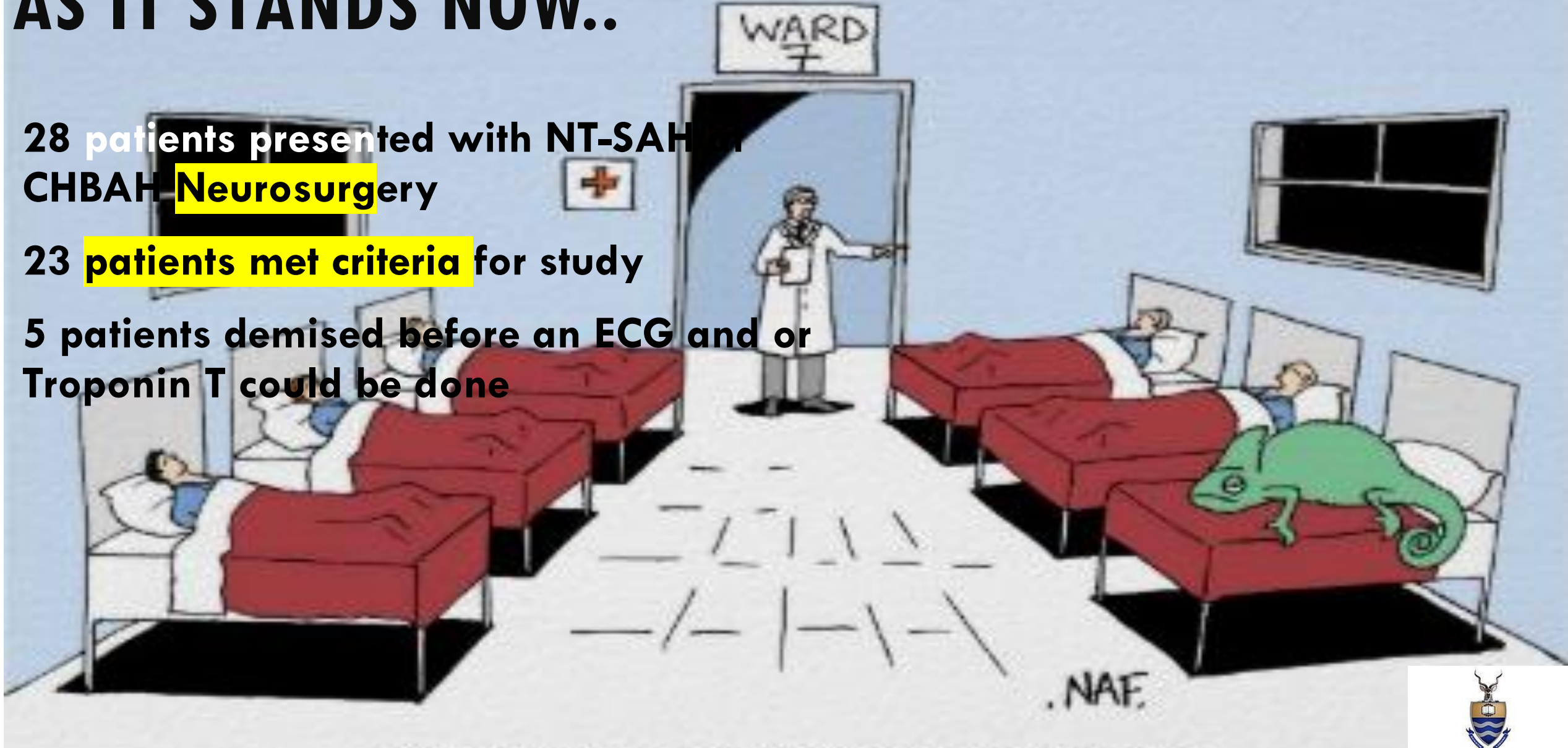
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# AS IT STANDS NOW..

28 patients presented with NT-SAH or CHBAH **Neurosurgery**

23 **patients met criteria** for study

5 patients demised before an ECG and or Troponin T could be done

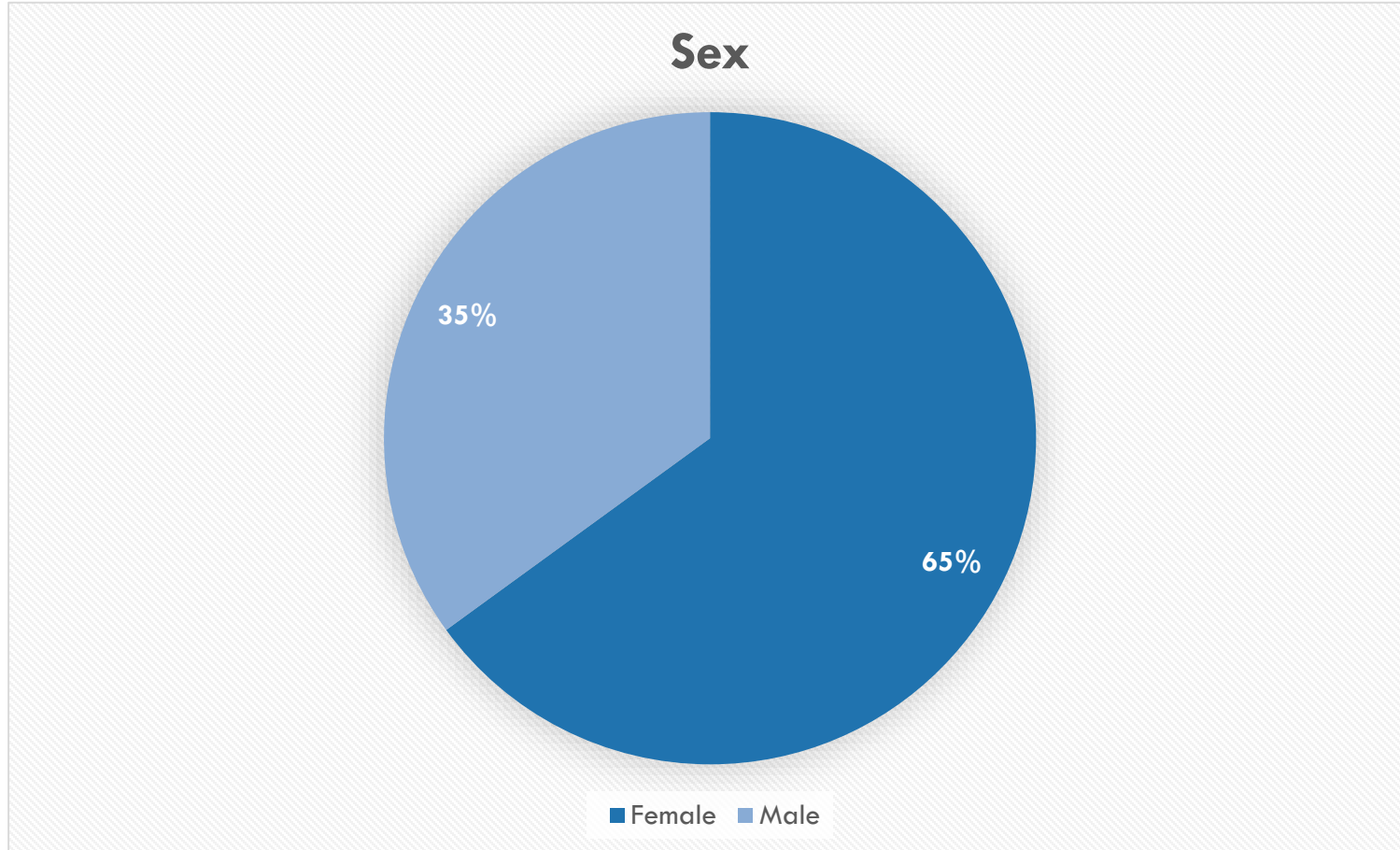


.NAF.

"Let's see. Coma. Coma. Coma. Coma. Coma. Chameleon."

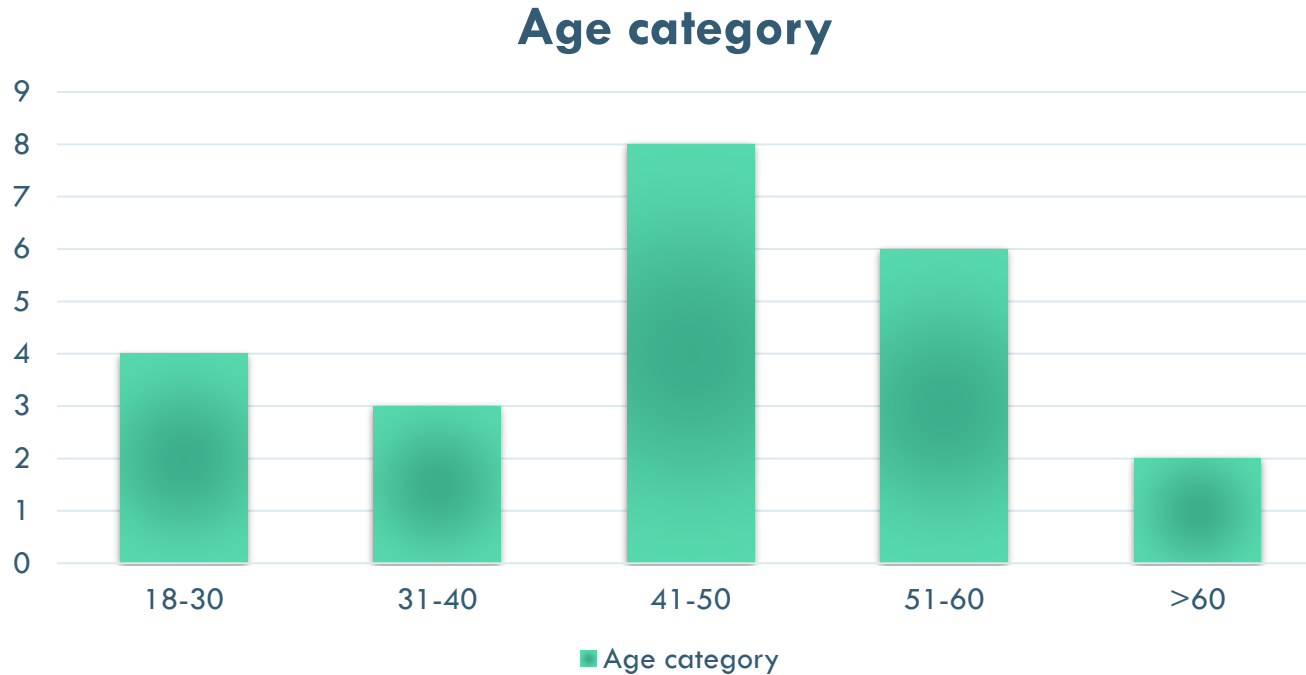


# PROVISIONAL RESULTS



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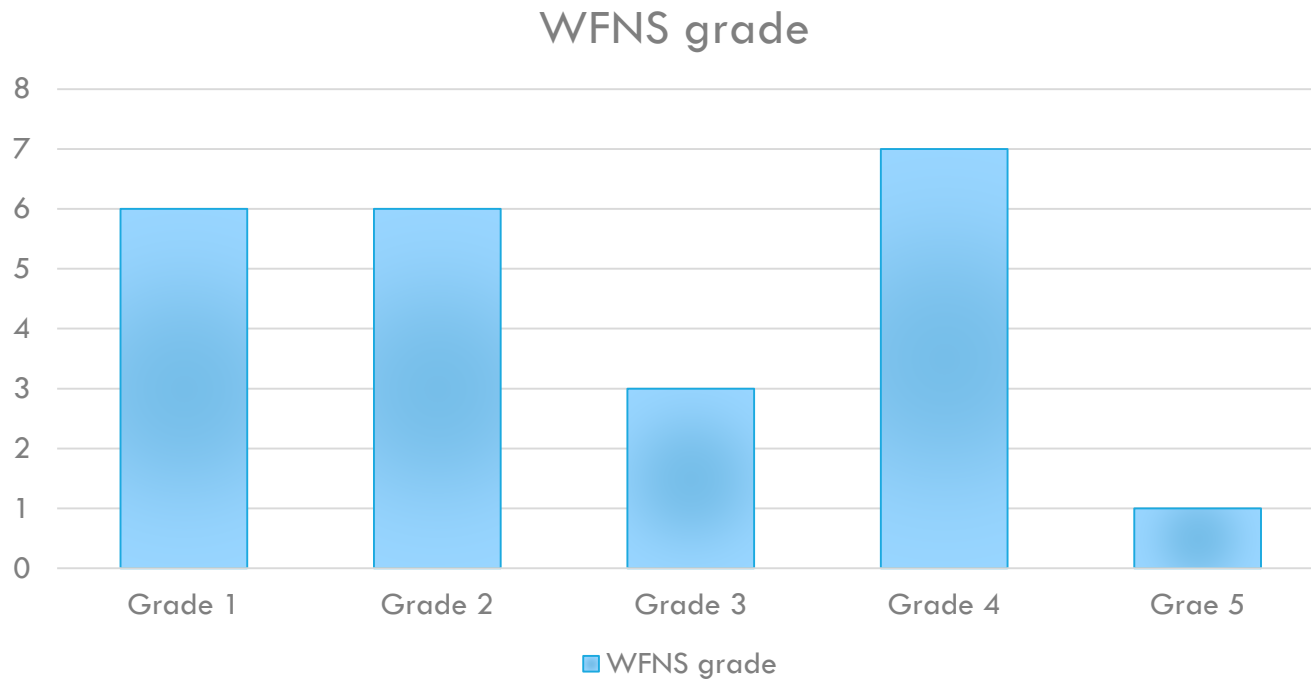


61 % of patients fell within ages of 41-60 years



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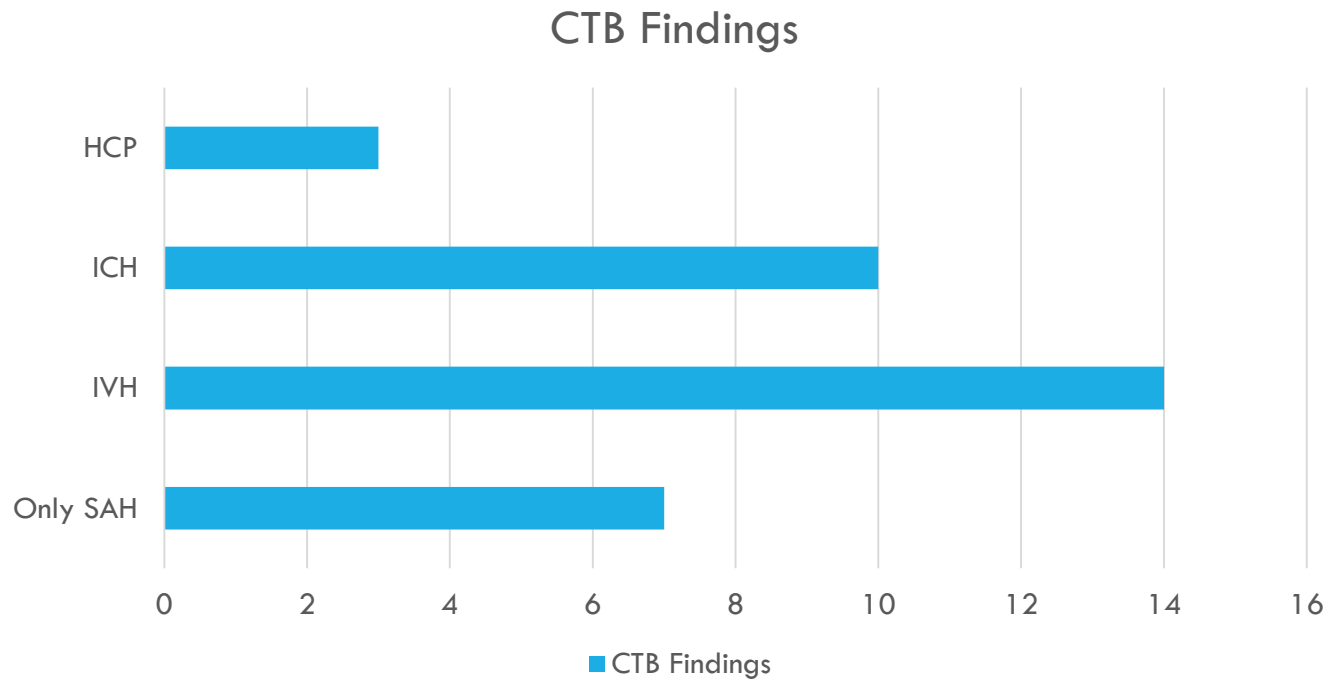
# WFNS GRADE



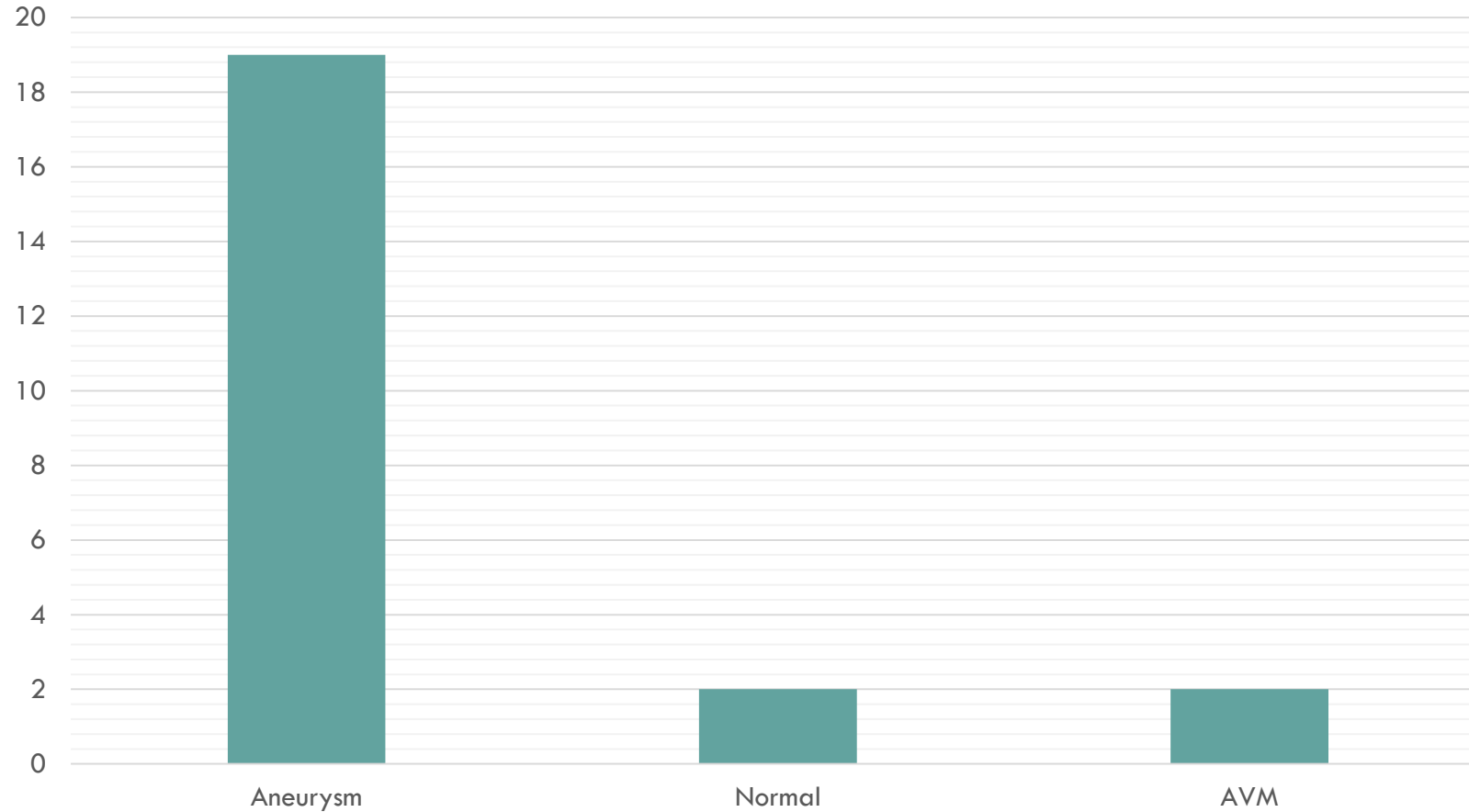
Average WFNS grade: 2.6



# CTB FINDINGS: OTHER



# CTA FINDINGS

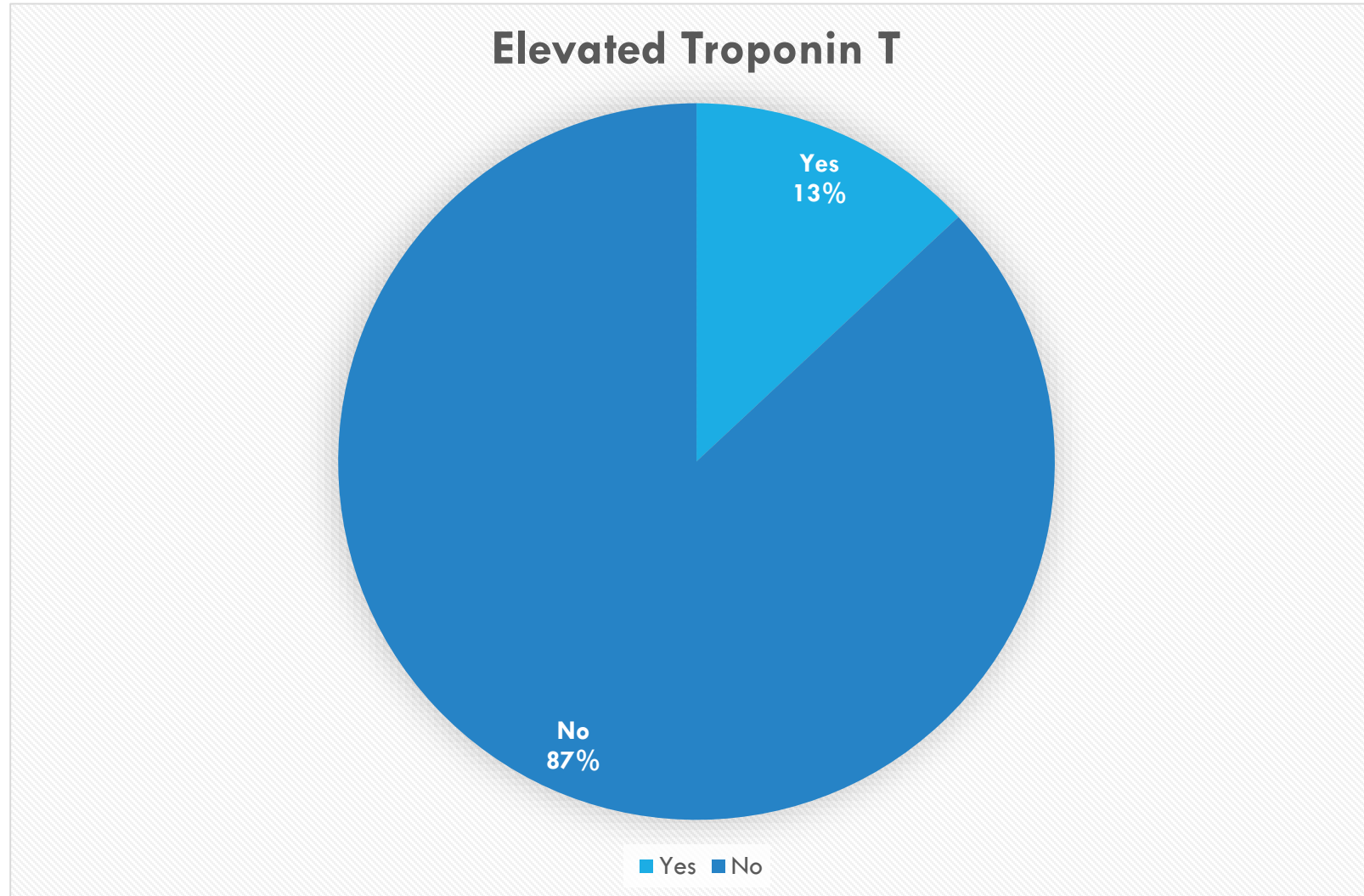


83% of patients found to have aneurysm





# Troponin T Results

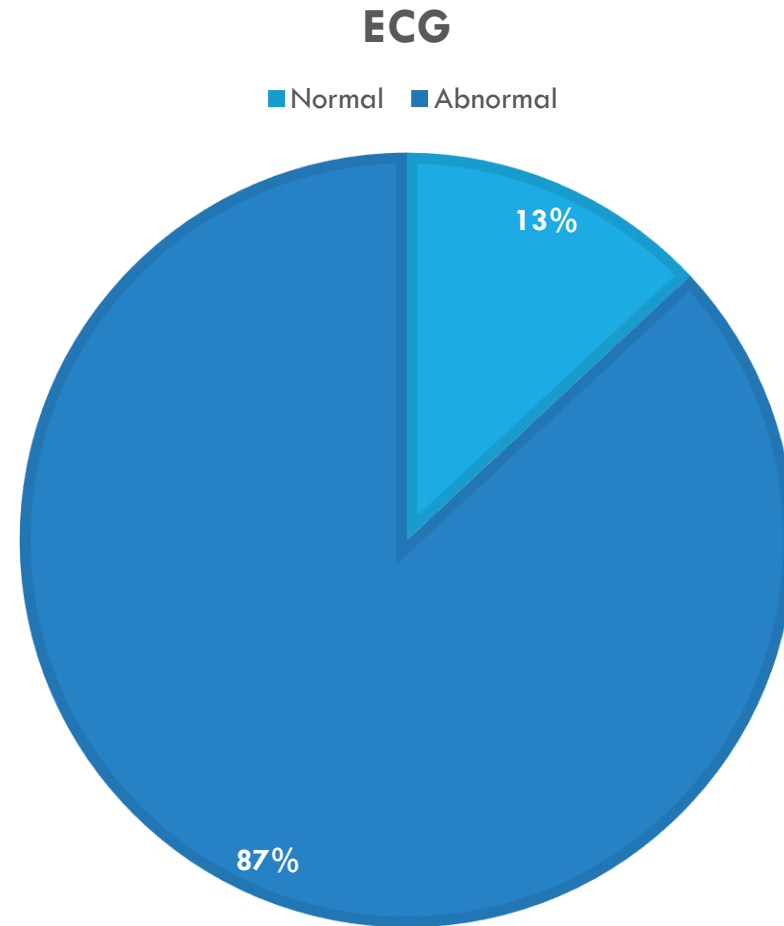


3 Patients had elevated Trop T



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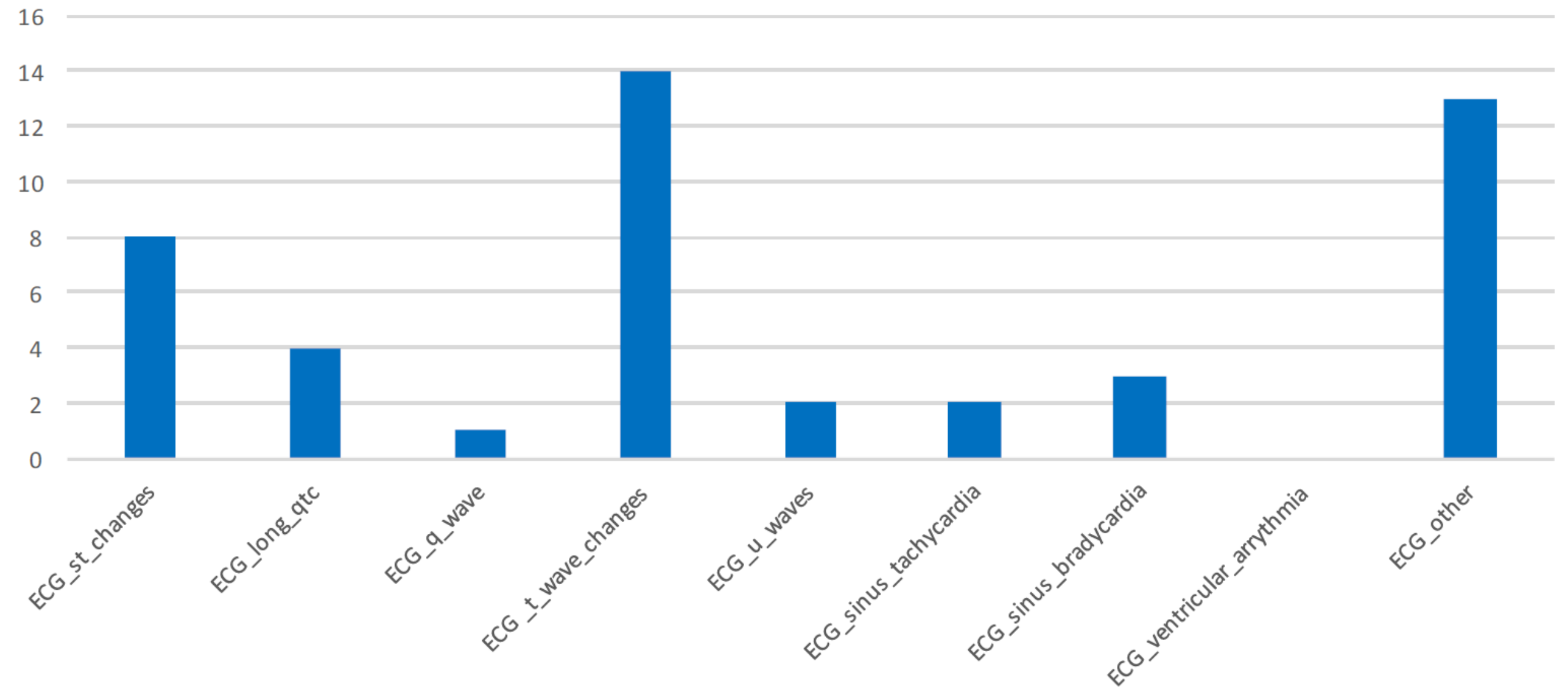
# ECG CHANGES



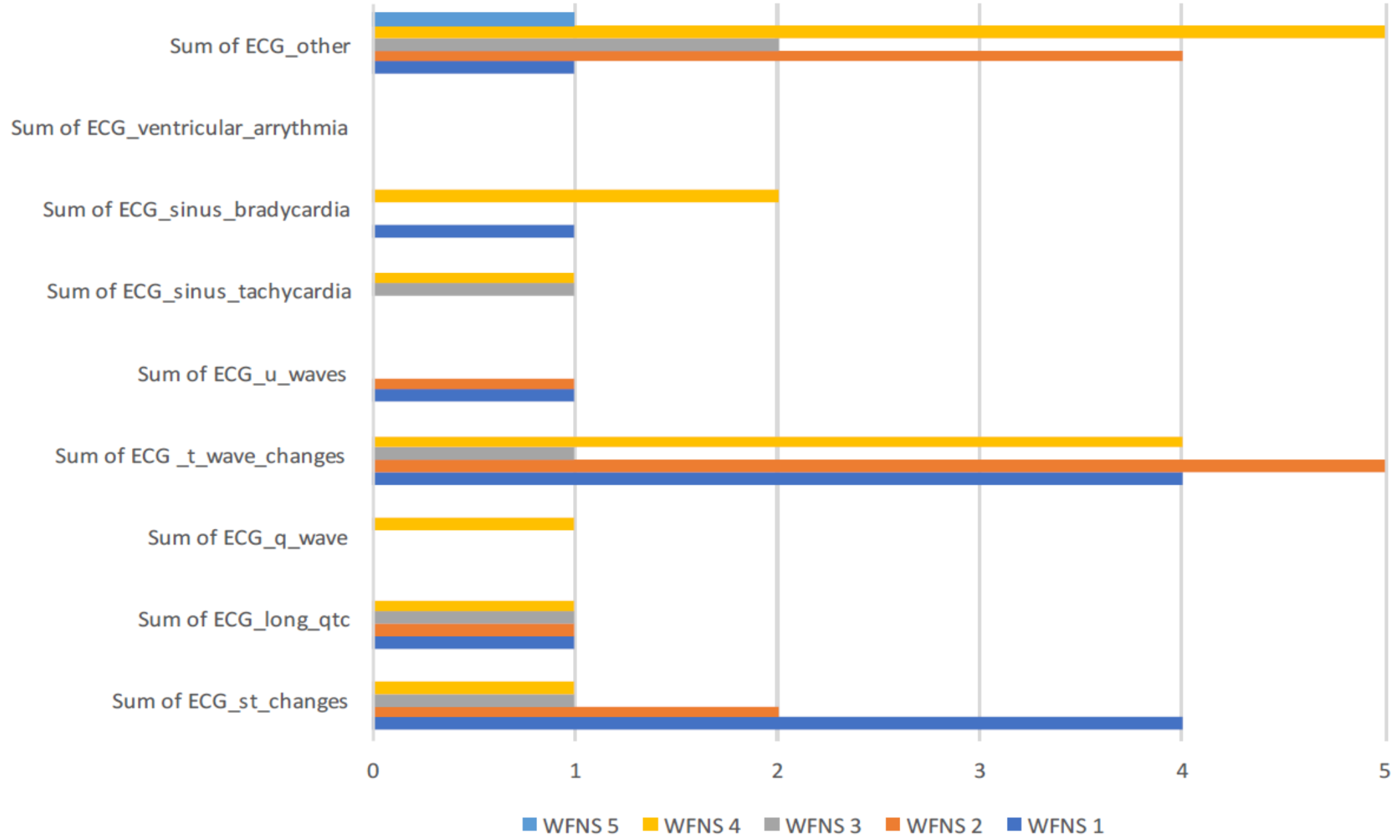
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20 patients found to have abnormal ECG's  
7/23 (30%) patients were known Hypertensives

## ECG Changes



# ECG Changes by WFNS Category



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