Allergic Reaction/Anaphylaxis
By Davitt Ward
Objectives

• Define an allergic/anaphylactic reaction

• List six signs and symptoms of an allergic reaction

• As a group classify the three types of reactions

• In groups, classify + treat allergic reaction patients
Group Exercise
Definitions

**Allergic Reaction:**

An allergic reaction is an abnormal immune response the body develops when the person is re-exposed to a substance or allergen.
Definitions

Anaphylaxis:

Is an acute, potentially life-threatening hypersensitive reaction.

Common Signs and Symptoms

**EYES**
- Redness
- Puffiness

**HEAD**
- Sense of impending doom

**NOSE AND MOUTH**
- Tongue swelling
- Metallic taste in mouth

**HEART**
- Weakness
- Fainting

**STOMACH**
- Feeling/being sick
- Stomach cramps

**LUNGS AND THROAT**
- Difficulty getting air in and out
- Repeated coughing
- Tight chest
- Wheezing
- Difficulty breathing
- Swelling of the throat
  (itching of the throat, hoarseness, change in voice, choking)

**SKIN**
- Flushing (redness)
- Hives (itchy red spots)

http://www.haydns-wish.co.uk/what-is-anaphylaxis
Signs + Symptoms

Mild
Urticaria and or angio oedema

Moderate
Mild symptoms + simple bronchospasm

Severe
Moderate symptoms + haemodynamically unstable and or respiratory compromise
Mild Reaction

www.angioedemapictures.com
Moderate Reaction
Severe Reaction
Routes

• Absorption - Through the skin

• Inhalation - Respiratory tract

• Ingestion - Food
Common Triggers

Food

• Nuts
• Milk
• Eggs
• Wheat
• Shellfish
• Fish
Common Triggers

Stings

• Bees
• Wasps
• Ants
• Hornets
Common Triggers

Latex

• Latex Gloves

• Medical Equipment

• Condoms
Common Triggers

Drugs

• Antibiotics
• Aspirin
• Non-Steroidal anti-inflammatory drugs
• Opioid analgesics
Common Triggers

Animals

- Dog hair
- Cat hair
- Horse hair
Pathophysiology

Anaphylactic Reaction

Antigen/Allergen → B-cell → Antigen triggers production of IgE antibodies → Subsequent exposure to the same antigen → Antigen bridges the gap between two antibody molecules, degranulation of the cell and release of histamine and other mediators → IgE bind to the surface of mast cell or basophil → Histamine increases the permeability and distension of blood capillaries.
Treatment

Mild Allergic Reaction Adult

- Airway - Clear
- Breathing - Normal
- Circulation – Normal
- Disability – Alert
- Expose and Examine – Urticaria and or angio oedema

Monitor reaction and transport
Treatment

Moderate Allergic Reaction Adult

- **Airway** – Not compromised
- **Breathing** – If bronchospasm consider Salbutamol 5mg NEB
- **Circulation** – Increase HR and BP
- **Disability** – Alert
- **Expose and Examine** – Urticaria and or angio oedema

Monitor, O2, Possible Salbutamol be aware that this condition may deteriorate rapidly
Treatment

Severe Anaphylactic Reaction Adult

- **Airway** – Maybe compromised
- **Breathing** – Expect compromised, SOB, bronchospasm / Airway occlusion
- **Circulation** – Compromised, hypotension, Tachycardia, haemodynamic status deteriorating
- **Disability** – Decreasing level of consciousness, impending doom
- **Expose and Examine** – Urticaria and or angio oedema

Use of 02, Salbutamol, Auto injector, Epinephrine 1:1000, Sodium Chloride, and Hydrocortisone
Quiz

What are the signs and symptoms for a Mild allergic reaction?

• Bronchospasm
• Hives and Swelling
• Wheezing
Incorrect

• Please try again
Correct

• Well done
Quiz

What are the signs and symptoms for a Moderate allergic reaction?

- Angio Oedema
- Mild symptoms and Bronchospasm
- Urticaria
Incorrect

• Please try again
Correct

- Well done
Quiz

What are the signs and symptoms for a Severe allergic reaction?

• Coughing and angio oedema

• Airway and or haemodynamic status deteriorating

• Bronchospasm
Incorrect

• Please try again
Correct

• Well done
Group Exercise
Group Exercise
How would you Classify and Treat this Patient?

You and your partner are called to a house late one evening, A 42 year old male presents with a new onset rash on his chest, angio oedema of both lips and is struggling to breath. 
History – while sunbathing out his back garden he fell a sleep. No known allergies
Case Study

How would did Classify and Treat this Patient?

Severe Anaphylactic allergic reaction

Treat reaction as per CPG’s

Requesting ALS
Questions
Conclusion

• Anything can trigger a reaction

• Be aware that mild or moderate can become severe rapidly

• Severe is a medical emergency and life threatening

• Treat in-line with 5th edition PHECC CPG’s
• Define an allergic reaction
An allergic reaction is an abnormal immune response the body develops when the person is re-exposed to a substance or allergen.

• Define an anaphylactic reaction
Is an acute, potentially life-threatening hypersensitive reaction.

• List six signs and symptoms of an allergic reaction
Test

• List six signs and symptoms of an allergic reaction

- **EYES**
  - Redness
  - Puffiness

- **NOSE AND MOUTH**
  - Tongue swelling
  - Metallic taste in mouth

- **STOMACH**
  - Feeling/being sick
  - Stomach cramps

- **SKIN**
  - Flushing (redness)
  - Hives (itchy red spots)

- **HEAD**
  - Sense of impending doom

- **HEART**
  - Weakness
  - Fainting

- **LUNGS AND THROAT**
  - Difficulty getting air in and out
  - Repeated coughing
  - Tight chest
  - Wheezing
  - Difficulty breathing
  - Swelling of the throat (itching of the throat, hoarseness, change in voice, choking)
References

1. EAACI, European Academy of Allergy and Clinical Immunology
2. Nancy Caroline’s Emergency Care in the streets 6th edition
3. World Allergy Organization
4. Pre-Hospital Emergency Care Council, Clinical Practice Guidelines
5. Allergy Ireland.com
7. Association of Anaesthetists of Great Britain and Ireland and British Society of Allergy and Clinical Immunology. Suspected anaphylactic reactions associated with anaesthesia.
8. Anaphylaxis Ireland.org
10. HSE.ie/Treating someone with Anaphylaxis
11. Allergy chat. org/Anaphylaxis
Sepsis
Sepsis kills
Objectives

• Define SIRS, sepsis, severe sepsis and septic shock.
• Explore the pre-hospital role in screening for sepsis, identifying sepsis and communicating pre-hospital findings and pre-hospital care
• Use scenarios to learn about the pre-hospital identification of a patient with suspected sepsis
What is the problem?

- Sepsis incidence has been increasing annually at a rate of 8-13%.
- 10th leading cause of death in USA.
- 750,000 new cases of sepsis per annum in US.
- Mortality for these 28 to 50%.

http://www.cdc.gov/sepsis/basic/qa.html
What is the problem?

- More than breast and bowel cancer combined
- 37,000 deaths in UK annually
- Sepsis is the primary cause of maternal death in the ante and post natal periods (CMACE report, 2011)

www.1000livesplus.wales.nhs.uk/opendoc/196287
What is the cost of Sepsis?

- Cost $16.7 billion in US
- Cost UK NHS £2.5 billion
- Cost in Europe approximately £6 billion per year
- Survivors report reduction in quality of life, pain and suffering
Why the increase in sepsis?

- The population is aging
- People have more chronic illnesses,
- People are getting more invasive procedures
- Increasing use of high risk interventions in all age groups

http://www.cde.gov/sepsis/basic/ga.htm
Why the increase in sepsis?

• Increase in immunocompromised patients

• Use of immunosuppressive drugs, chemotherapy, and organ transplants

• Increasing antibiotic resistance

• Increasing awareness and tracking of sepsis

http://www.cdc.gov/sepsis/basic/qa.html
Sepsis mortality

Sepsis in European ICU: SOAP study. Critical Care Medicine 2006
A patient with sepsis is 5 times more likely to die than a patient who has suffered a heart attack or stroke.

So What is Sepsis
Sepsis

SIRS (Systemic inflammatory response syndrome): The clinical syndrome that results from a deregulated inflammatory response or to a non-infections insult.

Sepsis: SIRS that is secondary to infection that has been diagnosed clinically.

Severe Sepsis: Sepsis plus at least one sign of hypoperfusion or organ dysfunction that is new and not explained by other known etiology of organ dysfunction.

Septic Shock: Severe sepsis associated with refractory hypotension (BP < 90/60 mmHg) despite adequate fluid resuscitation and/or serum lactate level ≥ 4.0 mmol/L.
THE SEPSIS CONTINUUM

SIRS  
Sepsis  
Severe Sepsis  
Septic Shock

- A clinical response arising from a nonspecific insult, with ≥2 of the following:
  - T >38°C or <36°C
  - HR >90 beats/min
  - RR >20/min
  - WBC >12,000/mm³ or <4,000/mm³ or >10% bands

SIRS with a presumed or confirmed infectious process

Sepsis with organ failure

Refractory hypotension

SIRS = systemic inflammatory response syndrome

Infection: Part of a bigger picture

- Infection:
  - Presence of organisms in a closed space or location where not normally found

SIRS: Systemic Inflammatory Response Syndrome

- SIRS: A clinical response arising from a nonspecific insult manifested by ≥2 of the following:
  - Temperature ≥38°C or ≤36°C
  - HR ≥90 beats/min
  - Respiration ≥20/min
  - WBC count ≥12,000/mL or ≤4,000/mL or >10% immature neutrophils

Sepsis: More Than Just Inflammation

- Sepsis:
  - Known or suspected infection
  - SIRS criteria

Severe Sepsis: Acute Organ Dysfunction

• Severe Sepsis = Sepsis with signs of acute organ dysfunction in any of the following systems:
  – Cardiovascular (septic shock)
  – Renal
  – Respiratory
  – Hepatic
  – Hemostasis
  – CNS
  – Unexplained metabolic acidosis

Sepsis: A Complex Disease

Relationship of Infection, SIRS, Sepsis, Severe Sepsis and Septic Shock

Bone et al. Chest 1992; 101:1644
Sepsis Simplified
Early Goal Directed therapy

RESULTS: 260 patients enrolled into the study. Mortality 30.5 (EGDT) vs 46.5

CONCLUSION: Early goal directed therapy provides significant benefits with respect to outcome in patients with severe sepsis and septic shock
Trials examining EGDT

- USA (ProCESS: protocolized care for early septic shock)
- Australasia (ARISE: Australasian resuscitation in sepsis evaluation)
- UK (ProMISE: protocolised management in sepsis)
For each hour’s delay in administering antibiotics in septic shock, mortality increases by 7.6%

(Kumar et al. 2006. Duration of hypotension before initiation of effective antimicrobial therapy is the critical determinant of survival in human septic shock. Crit. Care Med. 34(6) pp 1589-1596)
Time Sensitive

Out of hospital cardiac arrest
Acute myocardial infarction
Stroke

Golden Hour
Polytrauma

R. Phillip Dellinger, MD; Mitchell M. Levy, MD; Andrew Rhodes, MB BS; Djillali Annane, MD; Herwig Gerlach, MD, PhD; Steven M. Opal, MD; Jonathan E. Sevransky, MD; Charles L. Sprung, MD; Ivor S. Douglas, MD; Roman Jaeschke, MD; Tiffany M. Osborn, MD, MPH; Mark E. Nunnally, MD; Sean R. Townsend, MD; Konrad Reinhart, MD; Ruth M. Kleinpell, PhD, RN-CS; Derek C. Angus, MD, MPH; Clifford S. Deutschman, MD, MS; Flavia R. Machado, MD, PhD; Gordon D. Rubenfeld, MD; Steven A. Webb, MB BS, PhD; Richard J. Beale, MB BS; Jean-Louis Vincent, MD, PhD; Rui Moreno, MD, PhD; and the Surviving Sepsis Campaign Guidelines Committee including the Pediatric Subgroup*
SURVIVING SEPSIS CAMPAIGN BUNDLES

TO BE COMPLETED WITHIN 3 HOURS:
1) Measure lactate level
2) Obtain blood cultures prior to administration of antibiotics
3) Administer broad spectrum antibiotics
4) Administer 30 mL/kg crystalloid for hypotension or lactate ≥4 mmol/L

TO BE COMPLETED WITHIN 6 HOURS:
5) Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥ 65 mm Hg
6) In the event of persistent arterial hypotension despite volume resuscitation (septic shock) or initial lactate ≥4 mmol/L (36 mg/dL):
   - Measure central venous pressure (CVP)*
   - Measure central venous oxygen saturation (SvO₂)*
7) Remeasure lactate if initial lactate was elevated*

*Targets for quantitative resuscitation included in the guidelines are CVP of ≥8 mm Hg, SvO₂ of ≥70%, and normalization of lactate.
UHL Sepsis pathway

ADULT SEPSIS PATHWAY
Department of Emergency Medicine
University Hospital Limerick

Does the patient have sepsis?

* SIRS? (2 or more)
  - Temperature > 38°C or < 36°C
  - RR > 20 or pCO₂ < 4.7 kPa
  - Heart rate > 90 bpm
  - WCC > 12 or < 4

+ Infection source

= **SEPSIS**

Management Checklist
- Inform registrar or consultant. Move patient to resus room.
- Manage ABC, Disability
- Glucose
- 2 IV lines
- Blood test: FBC, U&E, LFT, Bone Profile, Coagulation screen, Troponin, Group & Screen
- Venous blood gas and **LACTATE**. AEG indicated only if hypoxia.
- 2 Blood Cultures from 2 different sites (if possible, before antibiotics are given)
- Search for source of infection and control infection.
- Urinalysis
- CXR
- ECG
- IV antibiotics given within 30 min. Use antibiotic guideline below. Give antibiotic empirically if source unknown.
Three things you can do

- Screen for sepsis
- Identify sepsis
- Communicate results to colleagues and escalate treatment if necessary
Three Things You Can Do

Screen
Identify
Communicate
Sepsis identification tool

Could this be a severe infection?
For example
- Pneumonia
- Meningitis/meningococcal disease
- UTI
- Abdominal pain or distension
- Indwelling medical device
- Cellulitis/septic arthritis/infected wound
- Chemotherapy < 6 weeks
- Recent organ transplant

Yes →

Signs of SIRS
- Temperature < 36 or > 38.3°C
- Heart rate > 90
- Respiratory rate > 20
- Acutely confused
- Glucose > 7.7 (not diabetic)

Has the patient two or more signs (SIRS)

Yes →

Is there a suggestion of shock?
- Mottled/cold peripheries
- Central capillary refill > 2 sec
- Systolic BP < 90 mmHg
- Purpuric rash
- Absent radial pulse

Yes →

Septic shock
- Emergency transport to ED
- Pre alert ED
- Benzylpenicillin
- NaCl

No →

Not septic
Discontinue screening tool

No →

Sepsis Possible
Transport to ED
Clinical Practice Guidelines

ADVANCED PARAMEDIC

SECTION 4
MEDICAL EMERGENCIES

Sepsis – Adult

Patient unwell

If temperature > 38°C consider
Paracetamol, 1 g PO

Signs of Systemic Inflammatory Response Syndrome (SIRS)
- Temperature < 36 or > 38.3°C
- Heart rate > 90
- Respiratory rate > 20
- Acutely confused
- Glucose > 7.7 (not diabetic)
- Has the patient two or more signs (SIRS)

EMT
P
AP

4/6/6.4.24
Version 3, 02/14

Could this be a severe infection?
For example

If meningococcal sepsis suspect
Suspicion and treatment of severe sepsis. An overview of the prehospital chain of care

Johan Herlitz¹, Angela Bång¹, Birgitta Wireklint-Sundström¹, Christer Axelsson¹, Anders Bremer¹, Magnus Hagiwara¹, Anders Jonsson¹, Lars Lundberg¹, Björn-Ove Suserud¹ and Lars Ljungström²
Radio Report for Emergency Dept.

When patients require urgent medical attention on arrival at the ED it is essential that an appropriate patient report precedes their arrival.

The report needs to be clear and concise yet transfer all relevant information.

It is good practice to identify your clinical level when communicating with the ED.

The recommended format is ASHICE.

A — Age of patient
S — Sex of patient
H — History of event
I — Illness / injury
C — Condition (vital signs & reason for pre-alerting)
E — Estimated time of arrival
Handover

• Vulnerable point of care
• Busy, overcrowded and distracting environment
• Inter-professional involvement in patient care
• Time pressures
Handover susceptible to

- Information loss
- Misinformation
- High rates of error
## IMIST-AMBO Handover Protocol

<table>
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<tr>
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<tr>
<td>M</td>
<td>Mechanism of injury or medical complaint</td>
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<td>Signs</td>
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<td>T</td>
<td>Treatment and trends</td>
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### Signs
- Pulse: ___________
- BP: __________/________ mmHg
- Resps: __________
- Sets: _______
- GCS: E __ V __ M __
- BN: _______
- Mnls
- Temp: __________ °C

### Pause for Questions

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<td>Other Information</td>
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### Any Further Questions

**Ambulance practitioners are asked to:**
1. Review handover details pre-arrival
2. Maintain a 20-30 second period where the patient remains on the stretcher and deliver IMIST information uninterrupted
3. Encourage questions on completion of IMIST and again at the end of AMBO
4. Treat practitioner to remain with the patient during handover

**ED clinicians are asked to:**
1. Ensure the handover remains uninterrupted
2. Ask questions during the two provided opportunities, between IMIST and AMBO and upon completion of IMIST-AMBO
3. Observe "Heads off, Eyes on", a 20-30 second period provided when the patient stays on the ambulance trolley until the IMIST information is delivered
4. Identify team leaders
Handover tools mnemonics

- SBAR/ISBAR
- ASHICE
- SAMPLE
- IMIST-AMBO
| I | Identify | Identify: You, Doctor, Patient  
Is this Dr. ________?  
This is ________________  
(e.g. Mary, I am team leader on 7A)  
I am calling about ________________  
(e.g. Mr. David Jones) |
|---|---------|---|
| S | Situation | Situation: Why are you calling?  
I am calling because ________________  
(e.g. Total EWS of 6 or 3 in a single parameter)  
Resp Rate ________ Sats ________  
O₂ Delivery ________ Temp ________  
Heart Rate ________ BP ________ Urinary Output ________  
LOC ________ (only use abnormal reading initially) |
| B | Background | Background: What is relevant background?  
They are ________ years old  
Admitted for ________________  
Recent surgery or procedures ________________  
Relevant past medical/surgical history ________________  
They currently have ________________  
(e.g. IV fluids, Urinary Catheter, PCA) |
| A | Assessment | Assessment: What do you think is the problem?  
I think ________________  
(e.g. they are hypovolaemic)  
(you can skip this if they don’t know what is wrong) |
| R | Recommendation | Recommendation: What do you want them to do?  
I would like you to ________________  
(e.g. come and review him please)  
Is there anything you would like me to do before you get here? |
### Appendix F Patient Observation Scores

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**RESP (write rate in box)**
- 09 - 20: 26
- 0 - 08: 26

**O2 Saturations**
- 95 - 100%
- <95%

**O2 %**
- 40%
- 02

**Temp**
- 37.5 - 37.9
- 36 - 37.4
- < 35.9

**Maternal Heart Rate**
- = or >120
- 100 - 119
- 90 - 99
- 0 - 49

**Systolic Blood Pressure**
- = or >160
- 140 - 159
- 100 - 139

**Diastolic Blood Pressure**
- = or >100
- 80 - 99
- 50 - 79
- 0 - 49
Scenarios
International Resources

• Surviving Sepsis Campaign: www.survivingsepsis.org
• The UK Sepsis Trust: www.sepsistrust.org
• Global Sepsis Alliance: www.globalsepsisalliance.com
• 1000 Lives Plus (Wales): www.1000livesplus.wales.nhs.uk
Thank you for listening. Questions?
References

- Heath Information and Quality Authority. (2013) Investigation into the safety, quality and standards of services provided by the Health Service Executive to patients, including pregnant women, at risk of clinical deterioration, including those provided in University Hospital Galway, and as reflected in the care and treatment provided to Savita Halappanavar. Dublin: HIQA.
References

- http://sepsistrust.org/
- http://survivesepsis.org/
References

• International trials of early goal-directed
  Epub 2013 Aug 30. Harmonizing resuscitation
  for severe sepsis and septic shock:
  methodology of ProCESS, ARISE, and ProMISe.
  ProCESS/ARISE/ProMISe Methodology Writing
  Committee
ECG
Rhythm Recognition
Irish Statistics

• 131,000 adults in Ireland with Coronary Artery Disease (CAD)
• 10,000 deaths per year
• 5000 from Heart Attack (MI)
• On average half of all deaths from MI are Pre-Hospital or in the Emergency Department
Objectives

• AS per PHECC Paramedic Education and Training Standards 2014 a Paramedic must be able to identify the following rhythms from ECG lead 2:
Objectives

• PQRST on rhythm strip
• Normal Sinus Rhythm (NSR)
• Sinus Bradycardia (SB)
• Sinus Tachycardia (ST)
• Premature Ventricular Contractions (PVC’s)
• Ventricular Fibrillation (VF)
• Ventricular Tachycardia (VT)
• Pulseless Electrical Activity (PEA)
• Asystole
The Mechanics
The Electrics
Automaticity

Spontaneous initiation of depolarising electric impulses by pacemaker sites within the electric conduction system of the heart
Depolarisation

The process of discharging resting cardiac muscle fibres by an electrical impulse that causes them to contract
Repolarisation

The return of the Ions to their previous resting state, which corresponds with relaxation of the myocardial muscle.
Pacemaker sites

- SA node 60 to 100
- AV node 40 to 60
- Purkinje fibres 20 to 40
ECG

• Monitoring Lead 1, 2 and 3
• Standard graph paper 25mm/s
• One small square = 0.04sec
• One large square = 0.20sec
Lead 2
PQRST

- PR Segment
- QRS Complex
- ST Segment
- QT Interval

Wednesday, 07 January 2015
P wave

• Depolarisation of the Atria
• Small
• Upright
• Uniform
PR interval

• Includes Atrial Depolarisation and passage through AV node
• Between 3 and 5 small boxes
QRS

- Depolarisation of both Ventricles
- Less than 3 small squares
ST segment

Repolarisation of the Ventricles
Isoelectric
Elevated Injury / Infarction
Depressed Ischaemia
T Wave

- Upright
- Smaller than QRS
QT interval

• Ventricular depolarisation to repolarisation
• Long QT Extended refractory period
• Vulnerable to Arrhythmia's
PQRST
ECG interpretation

• Rate
• Rhythm
• P waves
• P/QRS
• QRS/P
• QRS complex narrow or wide
Normal Sinus Rhythm

- Rate 60 to 100
- Regular
- Normal P waves
- PR interval < 5 small squares
- P/QRS and QRS/P
- Narrow QRS < 3 small boxes
Sinus Tachycardia
Sinus Tachycardia

- Rate > 100
- Regular
- Normal P waves
- PR interval < 5 small boxes
- P/QRS and QRS/P
- Narrow QRS < 3 small boxes
Sinus Bradycardia
Sinus Bradycardia

- Rate < 60
- Rhythm Regular
- P waves normal
- PR interval < 5 small boxes
- P/QRS and QRS/P
- Narrow QRS < 3 small boxes
PVC’s

• Premature Ventricular Complex
• A complex within a rhythm
• Coming from the Ventricles
• Makes rhythm irregular
• Unifocal
• Multifocal
PVC’s
Ventricular Fibrillation
Ventricular Fibrillation

• Rate ?
• Rhythm ?
• No P waves
• No QRS
• NO PULSE
Ventricular Tachycardia
Ventricular Tachycardia

- Rate > 100
- Rhythm Regular
- P absent
- No PR interval
- Wide QRS > 3 small boxes
Asystole
Pulses Electrical Activity

The term PEA refers to an organised cardiac rhythm (other than VT) on the monitor that is not accompanied by a detectable pulse.
Name that Rhythm
Name that Rhythm
Reference’s

• Nancy Caroline’s Emergency Care in the Streets 6th Edition
• Irish Heart Foundation
• ECG Interpretation Dr Richard Lynch
• Changing Cardiovascular Health Policy: National Cardiovascular Health Strategy 2010 – 2019
• PHECC Education and Training Standards 2014
• Handbook of Emergency Cardiovascular Care 2010 American Heart Association
Summary

• Remember ECG shows only electrical activity
• Always check vital signs and patients condition
• Use systematic approach
• Fail to prepare, prepare to fail