MA-1600: EKG - ELECTROCARDIOGRAM FUNDAMENTALS

Cuyahoga Community College

Viewing: MA-1600 : EKG - Electrocardiogram Fundamentals

Board of Trustees:
January 2022

Academic Term:
Fall 2022

Subject Code
MA - Medical Assisting

Course Number:
1600

Title:
EKG - Electrocardiogram Fundamentals

Catalog Description:
Theory and practice of 12-lead EKG that allows certification as an EKG Technician by the National Health Career Association upon completion of the course. Emphasis placed on identifying normal rhythm strips and assessing for artifacts, definitions of medical terminology of the cardiovascular system, application of universal precautions and patient safety

Credit Hour(s):
1

Lecture Hour(s):
0

Lab Hour(s):
2

Requisites

Prerequisite and Corequisite
Departmental approval.

Outcomes

Course Outcome(s):
Apply fundamental knowledge of the cardiovascular system to explain homeostasis in order to succeed as an entry level EKG technician.

Objective(s):
1. Describe the functions of the heart.
2. Describe the basic anatomy of the heart.
3. Outline the flow of blood through the heart.
4. Explain the structures and functions of the electrical conductivity pathway of the heart.

Course Outcome(s):
Evaluate proper EKG 12 Lead placement in order to succeed as an entry level EKG technician.

Objective(s):
1. Compare and contrast Bipolar Leads, Augmented Leads and Precordial leads.
2. Identify normal QRS deflections.
3. Identify proper locations for lead placement.
4. Correctly perform EKG procedure.

Course Outcome(s):
Describe normal EKG tracings in order to succeed as an entry level EKG technician.

Objective(s):

1. Explain the common heart sounds of “lup-dup” and relate their timing to an EKG tracing.
2. Relate the mechanical function of the heart to the EKG tracing.

Course Outcome(s):

Evaluate legitimate rhythm and artifact on an EKG tracing in order to succeed as an entry level EKG technician.

Objective(s):

1. Troubleshoot interferences with positive outcomes.
2. Identify electrical interference, somatic tremor, wandering baseline, and broken recording on an EKG rhythm strip.

Course Outcome(s):

Estimate heart rate based on an EKG rhythm strip.

Essential Learning Outcome Mapping:

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):

1. Calculate the heart rate using the 6-second strip method, the memory method, and the little block method.
2. Calculate the heart rate for regular rhythms, irregular rhythms, and interrupted rhythms.

Course Outcome(s):

Analyze EKG Rhythm strips to identify basic arrhythmias

Objective(s):

1. Identify rhythms originating in the sinus node.
2. Identify rhythms originating in the atria.
3. Identify rhythms originating in the AV junction.
4. Identify rhythms originating in the ventricles.
5. Identify AV blocks.

Course Outcome(s):

Assess the similarities and differences of other modes of diagnostic electrocardiography including stress testing, Holter monitoring, and event monitoring.

Objective(s):

1. Describe the purpose of Holter monitoring.
2. Describe the purpose of stress testing.
3. Describe the purpose of event monitoring.

Course Outcome(s):

Discuss the physiological changes of the heart and EKG tracings in patients with a myocardial infarction.

Objective(s):

1. Define myocardial infarction (MI).
2. State the symptoms of an MI.
3. Describe the EKG changes associated with the evolution of an MI and the timeline associated with each change.

Methods of Evaluation:

1. Quizzes
2. Examinations
3. Laboratory Practicals
4. Case study analysis
5. Class participation

Course Content Outline:

1. Coronary Anatomy and Physiology
    a. Layers of the heart
    b. Walls
    c. Chambers
    d. Valves
    e. Vessels
    f. Coronary Circulation
        i. Systemic circulation
        ii. Pulmonary circulation
    g. Conduction System
    h. Cardiac Cycle
2. Electrophysiology
    a. Depolarization vs repolarization
    b. EKG waves and complexes
        i. P Wave
        ii. T Wave
        iii. QRS Complex
        iv. U Wave
    c. QRS nomenclature
        i. Q Wave
        ii. R Wave
        iii. S Wave
        iv. QS Wave
    d. EKG paper
        i. Small squares
        ii. Large squares
        iii. Time
        iv. Voltage
    e. Intervals
        i. PR Interval
        ii. QRS Interval
        iii. QT Interval
3. Lead Morphology and Placement
    a. Bipolar leads
    b. Augmented leads
    c. Precordial Leads
    d. Normal Deflections
    e. Lead placement
4. Technical Aspects of the EKG
    a. Safety
    b. Artifacts
        i. Electrical interference
        ii. Somatic tremor
        iii. Wandering baseline
        iv. Broken recording
    c. Troubleshooting
5. Calculating Heart Rate
    a. Methods for calculations
        i. 6-second strip
        ii. Memory method
        iii. Little block method
    b. Regularity Types
        i. Regular
        ii. Regular but interrupted
        iii. Irregular
        iv. Calculations depending on regularity types
6. Interpreting a Rhythm Strip

a. Five steps to rhythm interpretation
    i. Locate QRS Complexes
    ii. Note regularity
    iii. Note heart rate
    iv. Locate P Waves
    v. Notate PR and QRS intervals
b. Normal Sinus Rhythm

7. Arrhythmias
    a. Sinus Node
        i. Bradycardia
        ii. Tachycardia
        iii. Arrhythmia
        iv. Arrest
        v. Block
    b. Atrial
        i. Atrial Tachycardia
        ii. Pacemaker Tachycardia
        iii. Premature Atrial Contraction
        iv. Paroxysmal Atrial Tachycardia
        v. Atrial Flutter
        vi. Atrial Fibrillation
        vii. Supraventricular Tachycardia
    c. AV Junction
        i. Premature Junctional Complexes
        ii. Junctional Bradycardia
        iii. Accelerated Junctional Rhythm
        iv. Junctional Tachycardia
    d. Ventricular
        i. Premature Ventricular Contractions
        ii. Agonal Rhythm (Dying heart)
        iii. Idioventricular Rhythm
        iv. Accelerated Idioventricular Rhythm
        v. Ventricular Tachycardia
        vi. Wolff-Parkinson-White Syndrome
        vii. Torsades de Pointes
        viii. Ventricular Fibrillation
        ix. Asystole
        x. Pacemaker Rhythm
    e. AV Blocks
        i. Degrees of Block
            1. First Degree
            2. Mobitz I Second Degree- Wenckebach
            3. Mobitz II Second Degree 2:1 AV Block
            4. Third Degree AV Block- Complete Heart Block
    f. Myocardial Infarction
        i. Definition of MI
        ii. Symptoms of MI
        iii. Changes in EKG with MI
        iv. Areas of Infarct
        v. EKG Complications of MI

Resources

Deb Procter and Alexandra Adams. (2019) *Kinn's The Medical Assistant*, St. Louis: Elsevier.

Karen M Ellis. (2016) *EKG Plain and Simple*, Upper Saddle River: Pearson.

Malcolm Thalor. (2018) *The Only EKG Book You'll Ever Need*, Philadelphia: Lippincott Williams and Wilkins.

NEDU LLC, NurseEdu.com. *EKG ECG Interpretation Made Easy: An Illustrated Guide for Students to Easily Learn How to read & Interpret ECG Strips*. NEDU LLC, NurseEdu.com, 2021.

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