

A large, stylized star graphic is positioned in the bottom right corner of the page. It is composed of several overlapping, semi-transparent shapes in shades of gray and light red, creating a dynamic, multi-pointed star effect.

impULSE 3.0

Chest Pain Competency Series

Course Description and Outline

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Level I - Cardiac A&P

Course Description

Level I of impULSE 3.0 brings cardiac anatomy and physiology to life by providing you with a clear, concentrated review of heart function. This educational experience presents anatomical structures and functions of the heart with interactive 3D graphics and easy to understand, supporting information. Learn cardiac physiology, including the cardiac cycle, circulation, conduction, and intrinsic pacemakers with the ability to see it in action. Build and examine the normal cardiac waveform while understanding it in relation to cardiac physiology. Engaging visuals, dynamic quizzing, and interactivity used throughout the program will help you to learn more effectively and retain new information quickly!

Course Objectives

At the conclusion of this educational activity, the participant should be able to:

1. Recognize anatomical structures of the heart.
2. Explain the physiology of the heart including its structures, tissues, and cell functions.
3. Describe the cardiac cycle, heart regions, and cardiopulmonary circulation.
4. Identify the intrinsic pacemakers of the heart and its influence on heart rate.
5. Relate the physiology of cardiac conduction to the components of the normal ECG waveform.

LEVEL I
Cardiac A & P

Heart Location
Myocardial Layers
Myocardial Layers Quiz
Heart Chambers
Heart Chambers Quiz
Cardiac Valves
Cardiac Valves Quiz
Great Vessels
Great Vessels Quiz
Cardiac Cycle
Systemic Circulation
Pulmonary Circulation
Cardiopulm. Circulation
Circulation Quiz
Heart Regions
Coronary Vessels
Coronary Vessels Quiz
Cardiac Cell Properties
Automaticity
Cardiac Pacemakers

Myocardial Layers

Heart muscle is comprised of three layers:

1. The **pericardium** is a double-walled sac that protects the heart.
 - The inner layer is the visceral pericardium, or **epicardium**, which lines the external surface of the heart wall.
 - The outer layer is comprised of the fibrous pericardium fused to the **parietal pericardium**, which forms a tough external surface.
 - The **pericardial cavity** separates the two layers and is filled with 25-50 mL of pericardial fluid, which acts as a lubricant and allows for smooth cardiac contractions.
2. The **myocardium** is the middle muscular layer, which is the thickest layer, and it performs the work of the heart.
 - Myocardial muscle:
 - is only found in the heart
 - is striated like skeletal muscle
 - Contracts automatically like smooth muscle
 - The thickness of the myocardium varies from one chamber to another, proportionate to the workload of the individual chambers.
 - The muscle of the myocardium spirals around the heart causing a twisting and wringing motion when the chambers contract.
3. The **endocardium** is similar to the epicardium.
 - Is the lining of the interior heart chambers
 - Covers the valve surfaces
 - Is continuous with the endothelium of the blood vessels

Myocardium

Starling's Law

Show All Labels

Select bold blue text to identify layers and button to learn more.

Level II – Obtaining the ECG

Course Description

Level II of impULSE 3.0 is a comprehensive review of electrocardiograms starting with how an ECG is captured. In this learning experience, recall waveform and paper basics, counting methods, and waveform measuring. View anatomical landmarks, select and prep electrode sites, and interactively place leads based on current guidelines. Learn proper lead placement for diagnostic 12, 15, and 18-lead ECGs and 3, 5, and 6-lead bedside/telemetry monitoring. Understand the importance of accurate lead placement and how to competently intervene in various ECG capture and interference issues. Assess your progress as you work through the activity to reinforce knowledge and ensure confidence and competency.

Course Objectives

At the conclusion of this educational activity, the participant should be able to:

1. Relate normal cardiac waveform components to anatomy and physiology.
2. Recall ECG paper basics and methods of rate calculation.
3. Describe the procedure for obtaining an ECG with correct electrode placement.
4. Differentiate between diagnostic and bedside (telemetry) ECG options.
5. Recognize issues that may affect the ECG, such as human error and interference, and identify how to correct them.

Level III – ECG Rhythms

Course Description

Level III of imPULSE 3.0 provides an in-depth view of cardiac rhythms. This learning experience begins with basic conduction and continues with the presentation of cardiac rhythms based on their location of origination and specific characteristics. Learn a systematic method to review ECGs for improved understanding and rapid rhythm recognition. Utilize floating calipers to examine the nuances of each rhythm, and view valuable references, including possible causes, rhythm triage, and links to guidelines. The course provides you with periodic quizzes to reinforce rhythm recognition in a practice setting to ultimately improve knowledge!

Course Objectives

At the conclusion of this educational activity, the participant should be able to:

1. Recognize cardiac rhythms based on various types and locations of electrical stimulation.
2. Relate the physiology of cardiac conduction to various cardiac rhythms.
3. Interpret each component of the ECG waveform systematically.
4. Identify arrhythmias based on rate, appearance, and nuances.

The screenshot displays the imPULSE 3.0 Level III ECG Rhythms interface. The left sidebar lists the course structure, including Level III ECG Rhythms, Premature Junctional Complex, Junctional Escape Beat, Junctional Rhythm, Accelerated Junctional, Junctional Tachycardia, AV Nodal Reentrant Tachycardia, Rhythm Review, Junctional Quiz 1, Junctional Quiz 2, Ventricular Rhythms, AV Blocks, Bundle Branch Blocks, Artificial Pacemakers, Preexcitation Syndromes, Artifact - Loose Electrodes, Miscellaneous Quiz, Bibliography, and Test Out. The main content area is titled "Junctional Escape Beat" and features a yellow tag with the following text: "Junctional Escape Beat: Late beat originating in AV junction, occurring within an underlying rhythm, after SA node and atrial tissue fails to fire. RATE - Dependent on the underlying rhythm. RHYTHM - Irregular due to escape beat. P WAVES - Absent before at least one QRS if present, before, after or buried in QRS and inverted in leads II, III, eVF. PR INTERVAL - Less than 0.12 secs when measurable. QRS - Normal, < 0.12 secs". To the right of the tag is an anatomical diagram of the heart showing the AV junction. Below the tag is a "Causes" button and an "Interventions" button. A large ECG waveform is displayed, with a "Textbook Rhythm Lead I" label at the bottom left and a "Six Second View" label at the bottom right. At the bottom of the interface, a red text prompt reads: "Select each button to learn more. Open caliper and click instructions on how to use."

Level IV – 12-Lead ECGs

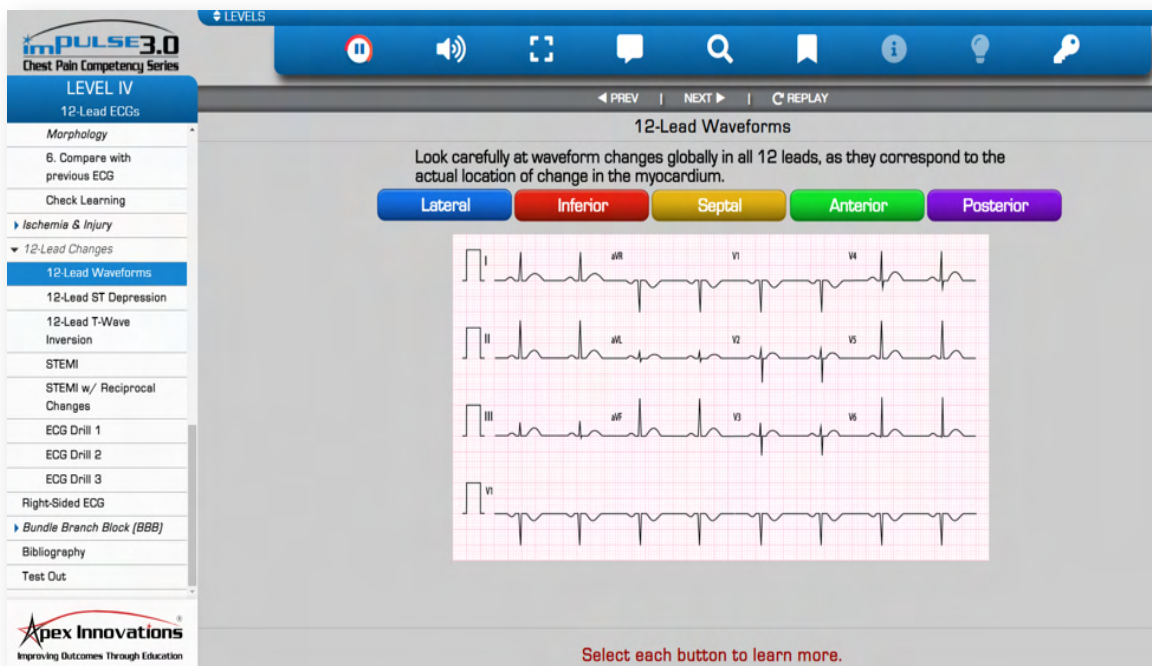
Course Description

Level IV of imPULSE 3.0 takes the mystery out of the 12-lead ECG. In this interactive experience, learn a systematic method for interpretation of the 12-lead ECG to give you increased confidence in your evaluation skills. Learn about normal layout, axis, deflection, and R-wave progression. Recognize ST-segment changes, including STEMI in the presence of bundle branch blocks. Zoom in on areas of cardiac ischemia and injury, as reflected on the 12-lead ECG, using the dynamic interface. Intelligent interactivity and practice quizzes are used throughout the course to enhance your learning, reinforce presented information, and allow you to assess your new knowledge.

Course Objectives

At the conclusion of this educational activity, the participant should be able to:

1. Summarize indications, normal layout, and capture of a 12-lead ECG.
2. Identify vectors, axis, deflection, and R-wave progression.
3. Apply a systematic approach for 12-lead ECG interpretation.
4. Recognize 12-lead waveform changes in relation to ischemia and injury.
5. Distinguish between old and new myocardial infarction.



Level V – Acute Coronary Syndrome

Course Description

Level V of impULSE 3.0 raises awareness of the standards of care for patients with acute coronary syndrome (ACS). This educational experience reviews pathophysiology, risk factors, symptom presentation, the triage process, and current ACC/AHA treatment guidelines. Learn the importance of subtle waveform changes in the 12-lead ECG, including waveform progression, ST-segment monitoring, and the differences between old and new MI. Understand the use of cardiac troponin, reperfusion strategies, and time goals related to ACS care. Assess your ability to recognize ST elevation in the provided ACS case studies. Early symptom recognition, along with rapid diagnosis and treatment, are critical skills for emergency professionals to provide expert care and optimal outcomes for ACS patients.

Course Objectives

At the conclusion of this educational activity, the participant should be able to:

1. Recognize risk factors associated with the pathophysiology of ACS and prevention strategies.
2. Differentiate between typical and atypical symptoms indicative of ACS.
3. Apply current guidelines from ACC/AHA for risk stratification and treatment of ACS.
4. Recall distinguishing features for STEMI and NSTEMI myocardial infarction.
5. Describe time goals, decision pathways, and treatment strategies in ACS care.

impULSE 3.0
Chest Pain Competency Series

LEVEL V
Acute Coronary Syndrome
ACS Case Study 4

Telemetry/Observation Unit Admission

Overview

Admission

Protocol and Plan

Serial Testing

ST Segment Monitoring

Stress Testing

Diagnostic Options

Disposition

Check Learning

New Technologies

ACS Drug Therapies

Anti-Ischemic Agents

Antithrombotic/Fibrinolytic Agents

Preventative Agents

Bibliography

Test Out

ST-Segment Monitoring

During the observation phase, special attention should be given to the ST segment as subtle changes may suggest myocardial ischemia or injury.

The ST segment:

- provides an electrical representation of the cardiac cycle from the end of ventricular depolarization to the beginning of ventricular repolarization
- begins at the end of the QRS complex and ends at the beginning of the T wave

Normal **ST-Depression Ischemia** **ST-Elevation Injury**

Lead monitoring of an ST segment is suggested for:

- Initial presentation of ACS
- STEMI, NSTEMI, UA
- Chest pain observation units
- Post PCI

Lead Monitoring

Considerations

Select each button for more information.

Apex Innovations
Improving Outcomes Through Education

Level VI – Advanced and Special Situations

Course Description

Level VI of imPULSE 3.0 presents advanced, special situations, which may occur in clinical practice and affect the ECG. In this learning experience, review specific conditions, including heart disease, electrolyte imbalance, drug use, conduction disorders, and more, along with expected ECG changes, possible causes, and clinical findings. Increase your knowledge by examining the 12-lead ECG depicting these situations and comparing them to normal. Use interactive tools to measure waveforms. Better patient outcomes are achievable through improved knowledge and competency.

Course Objectives

At the conclusion of this educational activity, the participant should be able to:

1. Explain how changes in a patient's condition can affect the physiology of the heart and change the appearance of the QRS waveform.
2. Recognize abnormal ECG waveforms and key clinical observations related to drug use, electrolyte imbalance, and conduction disorders.
3. Identify various conditions affecting heart function such as heart disease, congenital anomaly, and other special situations.
4. Describe physical conditions or injuries which may affect heart physiology and the ECG waveform patterns.

The screenshot displays the imPULSE 3.0 Level VI interface. On the left, a sidebar lists various ECG conditions under the 'Electrical' category, with 'Brugada Syndrome' selected. The main content area features a title 'Brugada Syndrome' and a descriptive text: 'Brugada syndrome is one of the main causes of sudden death in young adults without structural heart disease. This is caused by a right ventricular (electrical-sodium channel) conduction delay, which may cause malignant arrhythmias, including ventricular fibrillation.' Below this, a 12-lead ECG is shown, comparing a 'Normal' trace with an 'Abnormal' trace. The 'Abnormal' trace shows ST-segment depression in leads V1-V3, characteristic of Brugada Syndrome. To the right of the ECG, a box titled 'Brugada Syndrome' lists 'ECG Findings' (ST elevation in Leads V1-V3, Right bundle branch block (RBBB)) and 'Clinical Findings' (Symptoms include sudden death or syncope; Cardiac biomarkers from lab results are negative, and treatment is placement of an internal cardiac defibrillator). The interface includes a top navigation bar with icons for play, volume, zoom, search, and other functions. The bottom of the screen features the Apex Innovations logo and the tagline 'Improving Outcomes Through Education'.

Use tabs, ruler, and zoom tools to learn more.

Level VII – Excellence in ACS Care

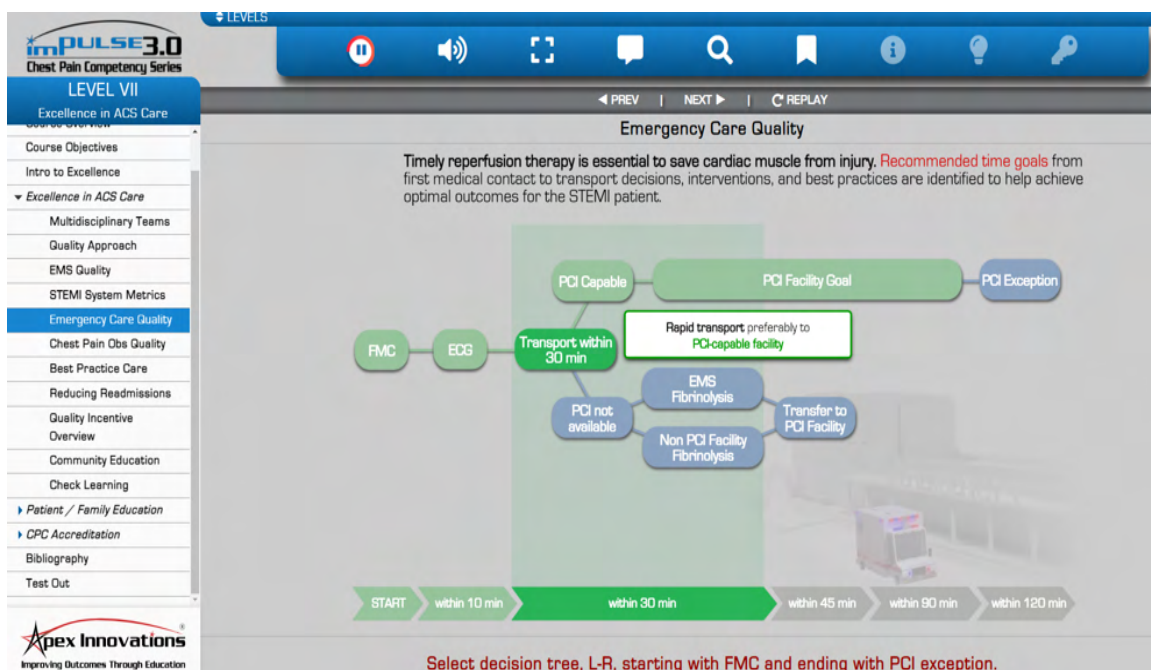
Course Description

Level VII of impULSE 3.0 highlights individual and organizational excellence. This learning experience introduces quality initiatives and metrics to consider when planning care for acute coronary syndrome (ACS). Learn how multidisciplinary team collaboration is critical to promote efficient, effective, and optimal response times to save cardiac muscle and improve outcomes. Additional best practice information will assist with post-discharge care to help your patients stay healthy, regain their quality of life, and reduce their chance of readmission. A review of community education through Early Heart Attack Care education (EHAC) is presented to help you prepare families and neighbors to make the initial call for help.

Course Objectives

At the conclusion of this educational activity, the participant should be able to:

1. Recognize the indicators of a quality cardiac response program.
2. Identify the critical time goals in the STEMI system of care.
3. Describe multidisciplinary best practices of care for STEMI patients.
4. Explain appropriate patient and family education goals to prevent readmissions.



Level VIII – ECG Library

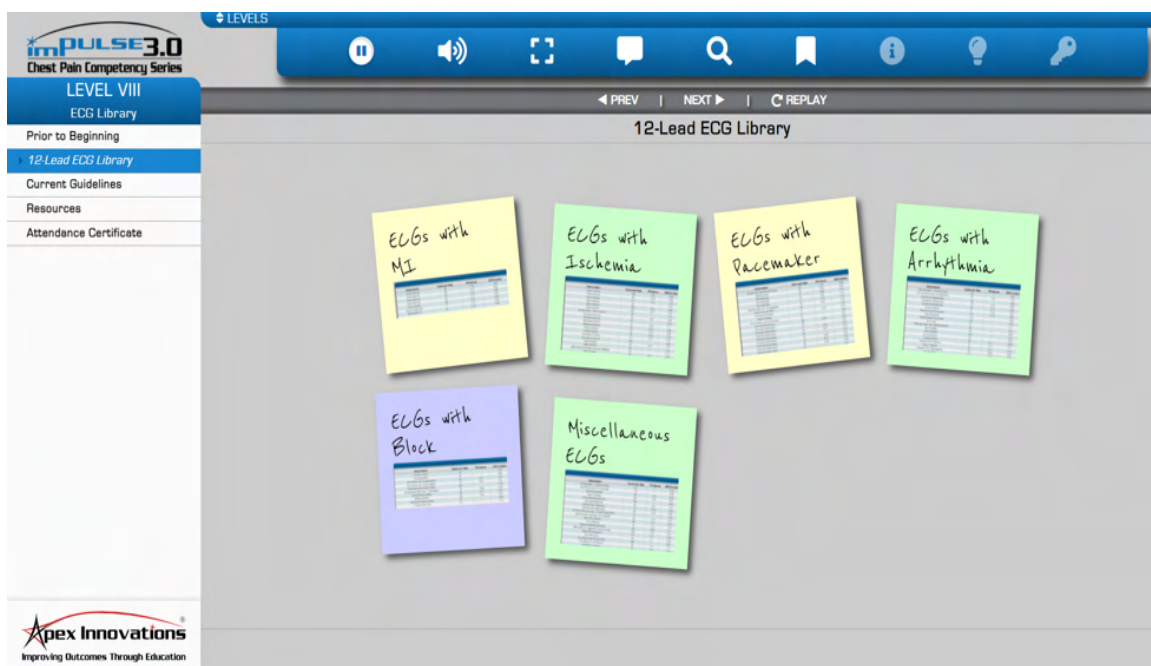
Course Description

Level VIII of impULSE 3.0 is a non-CE awarded course that includes the reference library, filled with over 100 12-lead ECG's, current guidelines, and relevant information.

Course Objectives

At the conclusion of this educational activity, the participant should be able to:

1. Understand nuances associated with different types of ECG rhythms.
2. Review appropriate guidelines and relevant best practices for emergency care.



Level IX – Early Heart Attack Care

Course Description

The **Early Heart Attack Care** course delivers the signs, symptoms and symbols of early heart attack care. This free educational program is authored by Dr. Raymond Bahr and promoted by the ACC Accreditation Services (formerly Society of Cardiovascular Patient Care). EHAC stresses the message that heart attacks have beginnings and the public can help with recognition and response as well as pledge to act to save a life.

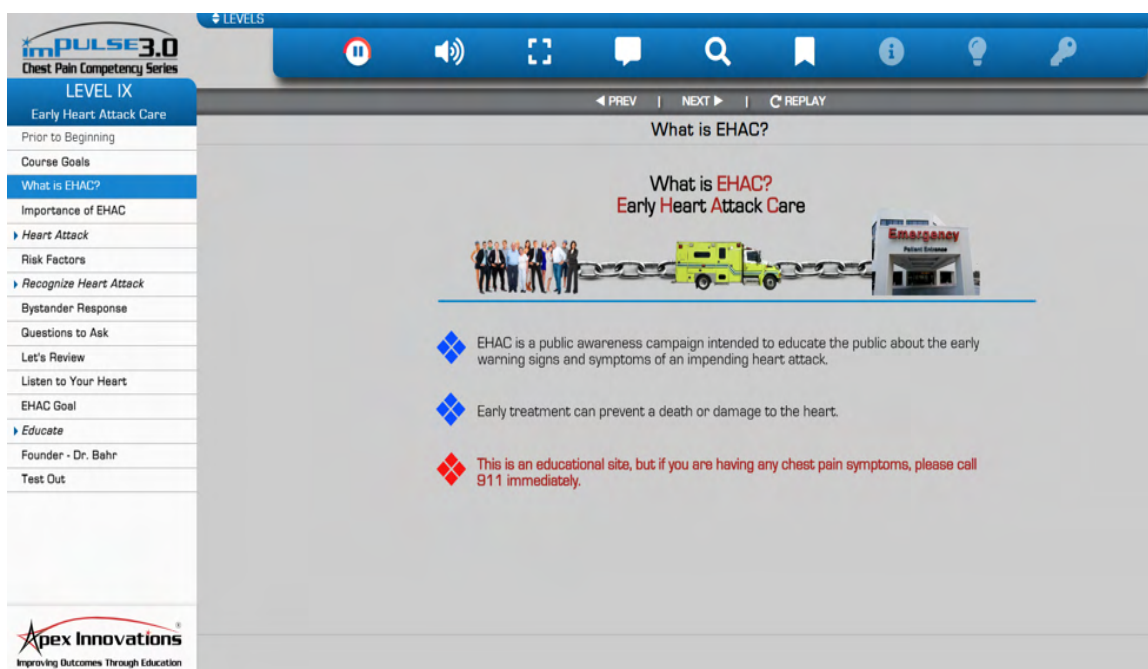
Course Goals

Primary Goals:

- Learn that heart attacks have beginnings.
- Focus on interventions during the beginning of a heart attack.

Secondary Goals:

- Teach the public that early intervention is required to save lives of patients having a heart attack.
 - Call 911: this starts the treatment earlier and supports timely response by hospital staff
 - Bystander support: insist the patient get medical attention
 - Impact of delay: loss of time is equated to loss of heart muscle
- Encourage hospitals to teach EHAC along with CPR.
- Encourage hospitals to establish a comprehensive plan for patients with chest pain with emphasis on early heart attack care.



Continuing Education Information

	Levels	Testing Min.	CNE	CME	CPE	CEH	FL CEH	PT CCH*/CE
I	Cardiac Anatomy & Physiology	45	2.50	2.00	2.00	2.50	2.50	2.50
II	Obtaining the ECG	45	3.00	2.00	2.00	2.50	2.50	3.00
III	ECG Rhythms	45	4.00	3.00	3.00	3.50	3.50	4.00
IV	12-Lead ECG	60	4.50	4.00	4.00	4.00	4.00	4.50
V	Acute Coronary Syndrome	45	3.50	3.00	3.00	3.00	3.00	3.50
VI	Advance & Special Situations	60	4.50	4.00	4.00	4.00	4.00	4.50
VII	Excellence in ACS Care	45	2.00	2.00	2.00	2.00	2.00	2.00
VIII	ECG Library	Untimed	--	--	--	--	--	--
IX	EHAC	Untimed	--	--	--	--	--	--
	TOTAL	345	24.00	20.00	20.00	21.50	21.50	24.00

JA. In support of improving patient care, Apex Innovations is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC) to provide continuing education for the healthcare team.

24 CNE. Apex Innovations designates this enduring material for 24 ANCC contact hours for nurse.

20 CME. Apex Innovations designates this enduring material activity for a maximum of 20 AMA PRA Category 1 Credits™. Physicians should claim only credit commensurate with the extent of their participation in the activity.

20 CPE. Apex Innovations designates this knowledge-based enduring material for 20 ACPE contact hours for pharmacists.

21.5 CEH. This CE activity is accredited for 21.5 CEH by Apex Innovations, an organization accredited by the Commission on Accreditation for Pre-Hospital Continuing Education (CAPCE).

21.5 FLCEH. Apex Innovations has been approved by the Florida Emergency Medical Services as an educational provider for EMS and Paramedics continuing education hours and have course completion roster and tracking number available on the CE Broker website.

24 CCH. Apex Innovations is recognized by the Physical Therapy Board of California as an approved reviewer and provider of continuing competency courses for The State of California.