

The title "impULSE 4.0" is presented in a bold, black, sans-serif font. The word "imp" is in lowercase, while "ULSE 4.0" is in uppercase. A blue five-pointed star is positioned to the left of the "i". A thick black arc curves over the top of the text, starting from the star and ending at the top right of the "E".

**impULSE 4.0**

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**Chest Pain Competency Series**

**Course Description and Outline**

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

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# Level I - Cardiac A&P and Pathophysiology

## Course Description

Level I of impULSE 4.0 brings cardiac anatomy and physiology to life with a clear, concentrated review of basic heart structures, vascular anatomy, and heart function. Knowledge of cardiac conduction and intrinsic pacemakers, along with cardiopulmonary and systemic circulation, are key elements required to understand the impact of circulatory issues and conduction abnormalities. Pathophysiology and etiologies of acute coronary syndrome are presented to prepare the healthcare team to differentiate clinical chest pain presentation into the three ACS classifications. Engaging visuals, dynamic quizzing, and interactivity throughout promote learning and retention!

## Course Objectives

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

1. Identify the heart's anatomical structures and their functions.
2. Examine the cardiac conduction system from automaticity to impulse transmission through the conduction pathway.
3. Recall the pathophysiology and classification of ACS.

The screenshot displays the impULSE 4.0 interface. On the left is a navigation menu for 'LEVEL I Cardiac A & P and Patho'. The main content area is titled 'Acute Coronary Syndrome (ACS)' and contains the following text: 'Acute coronary syndrome (ACS) refers to a spectrum of conditions compatible with acute myocardial ischemia and infarction, due to an abrupt reduction in coronary blood flow.' Below the text is an anatomical illustration of a human heart with a circular inset showing a cross-section of a coronary artery with a blockage. The interface also features a top toolbar with various icons and a right-hand sidebar with 'Care Note', 'Teaching Tip', and 'Team Tip' buttons.

# Level II – Obtaining the ECG

## Course Description

Level II of impULSE 4.0 examines components of the electrocardiogram beginning with paper basics of time and voltage, how-to-measure waveforms, and methods for counting heart rate. Anatomical landmarks are illustrated with specific steps for proper diagnostic 12-lead and telemetry/bedside lead placement. Assess your basic ECG and lead placement progress with interactive activity quizzes throughout.

## Course Objectives

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

1. Recall basic ECG components, measurements, and counting methods.
2. Explain the procedure for obtaining an accurate ECG.
3. Differentiate between diagnostic (12 lead) and bedside (telemetry) ECG options.

The screenshot displays the 'impULSE 4.0 Chest Pain Competency Series' interface. The main content area is titled 'Normal ECG Waveform' and includes a text box explaining that the speed of electrical wave movement across the myocardium during contraction (depolarization) and relaxation (repolarization) determines the type and size of the deflection. Below the text is a diagram of a heart with lead placement points and an ECG waveform with labeled segments: Atrial Depolarization (P), Ventricular Depolarization (QRS), and Ventricular Repolarization (T). A 'Teaching Tip' icon is visible in the top right. The interface also features a navigation menu on the left, a top toolbar with icons for play, volume, zoom, search, and help, and a 'LEVELS' dropdown menu.

# Level III – Basic ECG Rhythms

## Course Description

Level III of imPULSE 4.0 introduces basic cardiac rhythms by providing foundational knowledge of rhythm origination and rhythm categories as distinguished by electrical influence, cardiac rate, rhythm, and waveform characteristics. You will learn how to systematically look at each rhythm component to carefully and quickly identify basic normal and abnormal rhythms. These need-to-know rhythms are presented in groups by origination, are followed by a rhythm review, and ECG drag-n-drop quizzes to promote competency in rhythm interpretation.

## Course Objectives

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

1. Identify basic cardiac rhythms based on origination, rate, rhythm, and appearance of waveform components.
2. Systematically examine each component of the ECG rhythm strip.
3. Analyze basic rhythm strips to determine normal and abnormal rhythms.

The screenshot displays the imPULSE 4.0 course interface. On the left is a navigation menu for 'LEVEL III Basic ECG Rhythms', with 'Rhythm Categories' selected. The top toolbar contains icons for play, volume, zoom, search, and help. The main content area is titled 'Rhythm Categories' and includes the text: 'Rhythms can be grouped into several different categories:'. Below this is a list of categories: Sinus, Premature, Ectopic, Reentrant, Preexcitation, Conduction Blocks, Artificial Pacemakers, and Miscellaneous. An ECG strip shows two premature QRS complexes circled in pink, labeled 'Ectopic'. To the right is a diagram of the heart showing the electrical conduction system.

# Level IV – Advanced ECG Rhythms

## Course Description

Level IV of imPULSE 4.0 focuses on more advanced, less common, or complex ECG rhythms. Triaged as non-problematic, should be cautiously watched, or as volatile and potentially lethal, these categories help alert to the need for close monitoring. Rhythms are presented in groups by origination and we examine distinguishing waveform characteristics which identify specific abnormalities. Cardiac devices including various pacemaker types and pacing modes and implantable cardioverter defibrillators (ICD) are discussed in a clear, simple manner along with indications, malfunctions, interventions, and associated rhythm strips. Rhythm reviews and frequent interactive rhythm-recognition check learning activities are provided to reinforce knowledge and competence.

## Course Objectives

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

1. Identify advanced cardiac rhythms based on origination, rate, rhythm, and waveform characteristics.
2. Distinguish specific rhythm components that relate to complex cardiac arrhythmias.
3. Recall implantable devices and their indications, functions, and malfunctions.

The screenshot displays the imPULSE 4.0 interface for a Level IV course on Advanced ECG Rhythms. The main content area is titled "Multifocal Atrial Tachycardia" and features a yellow callout box with the following text:

**Multifocal Atrial Tachycardia**  
(Impulses generated from at least three atrial sites)

RATE - 160 - 250 bpm, ventricular rate may be slower  
RHYTHM - Irregular  
P WAVES - Present, varies based on different impulse locations, may be buried in preceding T or U wave, or QRS complex  
PR INTERVAL - Varies along with P-P and R-R intervals  
QRS - Normal, < 0.12 secs

To the right of the callout box is an anatomical diagram of the heart showing the atria and ventricles. Below the callout box is a rhythm strip showing an irregularly irregular rhythm with narrow QRS complexes. The interface includes a navigation menu on the left, a top toolbar with icons for play, volume, zoom, search, and help, and a bottom toolbar with buttons for "Causes", "Interventions", and playback controls.

# Level V – 12-Lead ECG Core Elements

## Course Description

Level V of impULSE 4.0 builds on basic information needed to view and understand diagnostic ECGs. We will correlate cardiac regions and coronary vessels to 12-lead layout so the origins of waveform abnormalities can be accurately identified. Precordial and contiguous leads, vectors, normal R-wave progression, and limb lead reversal issues are explored to provide meaningful insight into abnormal changes on the ECG. A systematic methodology is given to consistently analyze all components of the 12 lead, focusing on rate, rhythm, abnormal R-wave progression and waveform morphology. Zoom in to recognize relevant ECG changes associated with myocardial ischemia and injury (STEMI, NSTEMI-ACS), particularly ST-segment elevation, ST-segment depression, and T-wave inversion. Engaging check learning quizzes throughout this course will help to clarify and reinforce the complexities of 12-lead ECGs.

## Course Objectives

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

1. Summarize foundational information of the 12-lead ECG including indications, standard layout, and waveform deflections related to electrical impulse transmission.
2. Discuss 12-lead ECG regions and correlation to coronary vessels, contiguous leads, and R-wave progression.
3. Apply a systemic approach and analyze waveform morphology to accurately interpret a diagnostic ECG.

The screenshot displays the impULSE 4.0 course interface. The top navigation bar includes a 'LEVELS' dropdown, a search icon, and other utility icons. The left sidebar shows the course structure, with 'LEVEL V 12-Lead ECG Core Elements' selected. The main content area is titled 'R-Wave Progression' and contains the following text:

R-wave progression provides a panoramic view of the heart's electrical activity as impulses travel horizontally into the right and the left ventricle.

- **Normal progression** - R wave deflections (V1 to V6) change from negative, to **biphasic**, to **positive**
- **Abnormal progression** - when R-wave *normal progression* is not seen; can indicate ventricular enlargement, MI, or other myocardial issues

Below the text is a diagram of the heart with ECG leads V1 through V6 overlaid. The diagram shows the R-wave morphology for each lead: V1 (Negative), V2 (Biphasic), V3 (Slightly taller Biphasic), V4 (Positive), V5 (Tallest R wave), and V6 (Positive). A 'Care Note' icon is visible in the top right corner of the content area.



# Level VI – 12-Lead ECG Interpretation

## Course Description

Level VI of imPULSE 4.0 applies foundational information in viewing and interpreting specific waveform changes seen on the 12-lead ECG as a result of clinical conditions. Changes associated with new or previous ST-elevation myocardial infarction (STEMI), acute coronary syndrome (ACS) and bundle branch block (BBB) are clearly discussed and colorfully illustrated. Abnormal 12-lead ECGs with key information are examined for conditions resulting from electrical and structural issues, and other external factors. Various check learning quizzes help to reinforce 12-lead analysis with the use of interactive zoom and caliper tools.

## Course Objectives

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

1. Evaluate ST segment, T wave, and Q wave changes in relation to ischemia and injury and differentiate STEMI with left and right BBB.
2. Identify abnormal ECG waveforms and key clinical observations for clinical conditions related to electrolyte imbalances, conduction, or circulation issues.
3. Differentiate various physical conditions or injuries and specific findings that affect heart physiology and ECG waveform patterns.

The screenshot displays the imPULSE 4.0 interface for Level VI, 12-Lead ECG Interpretation. The main content area is titled "Hyperkalemia" and includes a text description: "Hyperkalemia, increased levels of potassium, may cause progressive ECG changes, which include conduction abnormalities and arrhythmias that may be life-threatening." Below the text is a 12-lead ECG strip. The ECG strip shows a 12-lead recording with a zoomed-in view of the T wave in lead V1, which is peaked. The zoomed-in view is labeled "Mild Hyperkalemia (5.5 - 6.5 mEq/L)" and lists "Peaked T wave" as a finding. The interface also includes a navigation menu on the left, a top toolbar with icons for play, volume, zoom, search, and help, and a "Discussion" button.



# Level VII – Rapid Response to Chest Pain & ACS

## Course Description

Level VII of impULSE 4.0 follows established standard-of-care pathways to meet time goals for ACS patients, from prehospital recognition through emergency department management and disposition. The initial focus is on rapid recognition of cardiac and noncardiac presentations, prehospital assessment, interventions, and destination protocols. Best-practices for ACS emphasize the importance of triage and diagnostic protocols, risk stratification, differential diagnosis, acute management, and reperfusion strategies. Treatment pathways for management of ST-elevated myocardial infarction (STEMI), non-ST-elevated acute coronary syndrome (NSTEMI-ACS), and stable ischemic heart disease (SIHD) provide guidance for expert care to achieve optimal patient outcomes. Interactive check learning activities engage learners and reinforce presented information. This course concludes with ACS case studies to assess your ability to recognize STEMI, NSTEMI-ACS, and unstable angina.

## Course Objectives

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

1. Recognize unique chest pain presentations and differentiate between cardiac and noncardiac.
2. Apply best-practice guidelines for assessment and initial management of chest pain and ACS in the prehospital and emergency department settings.
3. Describe ED assessments, diagnostics, treatment strategies, and established time goals for optimal outcomes in chest pain and ACS care.

**LEVEL VII**  
Rapid Response to Chest Pain

Course Objectives

- Intro to Rapid Response
- Acute Coronary Syndrome (ACS)
- ▶ Chest Pain Presentation
- ▶ Prehospital Care (EMS)
- ▼ Emergency Department
  - ED Triage
  - ED Assessment
    - Heart and Lung Sounds
    - Cardiac Biomarkers
    - Chest Pain & ACS Distinguishing Features
    - Check Learning - ED
    - ▶ Risk Stratification - ACS
    - ▶ ED Management - ACS
    - ▶ Reperfusion
  - Disposition From ED
  - ▶ ACS Case Studies
  - Bibliography

ED Triage

Each facility should have established ACS triage protocols. Only nurses who have successfully completed formal triage training, including ACS-specific training, should be allowed to triage patients.

Care Note

Upon Arrival → ACS Recognition → Consider STEMI → Special Populations → Rapid ECG Criteria → Best Practices

**ACS Recognition**

- Assess for symptoms associated with myocardial ischemia or injury immediately
- Initiate time-sensitive ACS protocols for patients with the following signs and symptoms:
  - Chest or substernal pain, pressure, tightness, heaviness, aching or crushing
  - Radiating to neck, jaw, shoulders, back, or one or both arms
  - Epigastric discomfort/pain, unexplained indigestion, cramping, or heartburn
  - Weakness, dizziness, lightheadedness, loss of consciousness

# Level VIII – Ongoing Cardiac Management

## Course Description

Level VIII of imPULSE 4.0 addresses ongoing care needs of the chest pain patient in the observation, inpatient, and outpatient settings. Guideline-based strategies are provided to identify an appropriate chest pain or ACS treatment plan in observation status. Ongoing management for the inpatient focuses on post-revascularization care, guideline directed drug therapies, and interventions to reduce complications and prevent recurrent ischemia. Specific cardiac care for patients managed in the outpatient setting or via telemedicine is discussed. Check learning activities throughout will reinforce relevant information.

## Course Objectives

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

1. Define criteria and cardiac care strategies for observation, inpatient, and outpatient chest pain and ACS patients.
2. Discuss diagnostic testing, cardiac imaging, and technology used to provide ongoing cardiac monitoring and care.
3. Differentiate interventions and complication management for post-reperfusion / revascularization care and guideline-directed drug therapies used to treat myocardial ischemia or injury.

The screenshot displays the imPULSE 4.0 interface for Level VIII, Ongoing Cardiac Management. The main content area is titled "Post-Procedure Care" and features a central image of a heart with four callout boxes: "Monitor" (heart icon), "Interventions" (stethoscope icon), "Medications" (pill icon), and "Activity" (person walking icon). A text box above the heart states: "Intense monitoring and screening, after percutaneous or surgical reperfusion/ revascularization, may detect issues that can be promptly addressed to prevent further myocardial damage and other complications." To the right, an "Activity" box provides guidance: "Activity levels will be guided by physician and/ or cardiac rehab team based on reperfusion / revascularization strategy." It lists two categories: "Post PCI" (No straining, lifting, strenuous activity for up to 7 days) and "Post CABG" (Early ambulation and range of motion exercise is recommended; No heavy lifting or extreme shoulder movement or activity for approximately 6-8 weeks). The left sidebar shows a table of contents with "Post-Procedure Care" selected.

LEVEL VIII
Ongoing Cardiac Management
Course Objectives
Introduction to Ongoing Cardiac Management
▶ Observation Status
▼ Inpatient Care
Inpatient Admission
Continuous ECG Monitoring
- Check Learning - Inpatient
▶ Ongoing Diagnostics & Drug Therapies
Post-Procedure Care
Complication Management - PCI
Complication Management - CABG
- Check Learning - Post-Procedure Care
▶ Outpatient Management
Ongoing Care Goal Summary
Bibliography

# Level IX – Discharge & Prevention in ACS

## Course Description

Level IX of imPULSE 4.0 provides important discharge and risk prevention information which allows the healthcare team to formulate a successful, individualized patient discharge plan. Physical needs for rehabilitation and dietary changes, medication adjustments, psychosocial challenges, referrals and many other needs are considered. Guideline-based ACS risk prevention recommendations promote awareness and wellness. This education helps the team prepare ACS patients and caregivers for discharge with an overall goal of preventing recurrence, reducing readmissions, and improving outcomes.

## Course Goals

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

1. Identify discharge considerations to support successful transitioning of patients to post-acute care.
2. Evaluate strategies to address challenges and barriers to patient and caregiver education.
3. Recall guideline-based ACS risk prevention recommendations based on atherosclerotic cardiovascular disease (ASCVD) and other specific risk factors.

The screenshot shows the imPULSE 4.0 interface. The top navigation bar includes a 'LEVELS' dropdown, a play button, a speaker icon, a full-screen icon, a chat icon, a search icon, a bookmark icon, an information icon, a lightbulb icon, a key icon, and a question mark icon. Below the navigation bar is a 'Discharge & Prevention in ACS' section with a table of contents. The main content area is titled 'Discharge Strategies' and contains the text: 'Plans for discharge should be individualized and provide education to ensure the patient and family/caregiver have an understanding of and the skills to support their recommended treatment plan.' Below this text is a section titled 'Strategies for successful discharge planning:' which features a circular diagram with ten colored segments, each containing an icon representing a different strategy. A callout box points to one of the segments with the text: 'Follow up and evaluate post discharge for ongoing medical care needs, home care equipment needs, and community services'. On the right side of the main content area, there are two callout boxes: a 'Teaching Tip' and a 'Team Tip'.

# Level X – Excellence in ACS Care

## Course Description

Level X of impULSE 4.0 focuses on the healthcare teams and practices required to provide ACS care excellence and achieve or maintain a chest pain or heart attack center designation. An overview of collaborative practice by the multidisciplinary team, emphasizes key roles, characteristics, and responsibilities. For appropriate STEMI care coordination within a regional system of care, specific capabilities of each chest pain or heart attack center are clearly outlined. Data-driven quality improvement techniques are provided to assist facilities in meeting quality care objectives to reduce care delays, improve organizational performance, and successfully meet certification and accreditation requirements.

## Course Goals

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

1. Identify ACS program best practices, ACS program team member roles, characteristics, and responsibilities.
2. Illustrate the capabilities of various chest pain and heart attack center designations and the advantages of alignment with regional ACS systems of care.
3. Outline useful strategies for reducing care delays and improving performance related to quality measures.

The screenshot displays the impULSE 4.0 course interface. At the top, there is a navigation bar with icons for play, volume, full screen, chat, search, bookmark, info, lightbulb, key, and help. Below this is a 'LEVELS' dropdown menu. The main content area is titled 'ACS Best Practice Care' and features a text box with the following text: 'Time is a driving factor in successfully managing chest pain and ACS patients. Standardizing processes, reducing barriers to emergency care, and providing timely treatment at an appropriate chest pain or heart attack center is critical to improved patient outcomes.' To the right of the text is a vertical timeline with seven steps: 1. Prehospital Care, 2. EMS Prenotification, 3. Standardized ED Care, 4. ACS Team Notification, 5. Direct to Cath Lab, 6. Primary PCI, and 7. Performance. A cartoon illustration of a female healthcare professional in a white coat and glasses holding a clipboard is positioned in the lower-left corner of the content area. The left sidebar contains a table of contents with the following items: LEVEL X Excellence in ACS Care, Prior to Beginning, Course Overview, Course Objectives, Intro to Excellence, Collaborative Practice (ACS Team, Interprofessional Collaboration), ACS Best Practice Care (Rapid Response Teamwork, Team Characteristics, Check Learning), STEMI Systems of Care (Community Education, Check Learning), CP & Heart Attack Center Certifications/Accreditations, Quality of Care, Bibliography, and Test Out.

# Level XI – Early Heart Attack Care (EHAC) for Support Staff

## Course Description

Level XI of imPULSE 4.0 (EHAC course) seeks to educate non-clinical, support staff and the community to recognize the early signs and symptoms which warn of a heart attack and the importance of seeking immediate medical care. Basic information regarding barriers to seeking medical care and tips to overcome resistance are discussed. Risk factors and prevention strategies are presented. Engaging visuals, interactivity, and dynamic quizzing throughout makes learning fun!

## Course Goals

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

1. State causes and risk factors of heart attacks and actions to prevent.
2. Recognize signs and symptoms of a heart attack and the importance of early heart attack care.
3. Explain actions to take in responding to heart attack symptoms and barriers to seeking medical care immediately.

**imPULSE 3.0**  
Chest Pain Competency Series

**LEVEL IX**  
Early Heart Attack Care

Prior to Beginning  
Course Goals  
**What is EHAC?**  
Importance of EHAC  
▶ Heart Attack  
Risk Factors  
▶ Recognize Heart Attack  
Bystander Response  
Questions to Ask  
Let's Review  
Listen to Your Heart  
EHAC Goal  
▶ Educate  
Founder - Dr. Bahr  
Test Out

**What is EHAC?**  
Early Heart Attack Care

**EHAC is a public awareness campaign intended to educate the public about the early warning signs and symptoms of an impending heart attack.**

**Early treatment can prevent a death or damage to the heart.**

**This is an educational site, but if you are having any chest pain symptoms, please call 911 immediately.**

**Apex Innovations**  
Improving Outcomes Through Education

# imPULSE 4.0

## Continuing Education Information

	Levels	Testing Min.	CNE	CME	CPE	CEH	FL CEH
I	Cardiac A& P and Patho	45	2.50	2.50	2.50	2.00	2.50
II	Obtaining the ECG	45	2.50	2.50	--	2.00	2.50
III	Basic ECG Rhythms	60	3.50	3.50	--	3.50	3.50
IV	Advanced ECG Rhythms	60	3.50	3.50	--	3.00	3.50
V	12-Lead ECG Core Elements	60	4.00	4.00	--	3.50	4.00
VI	12-Lead ECG Interpretation	60	4.00	4.00	--	4.00	4.00
VII	Rapid Response to Chest Pain	45	4.00	4.00	4.00	4.00	4.00
VIII	Ongoing Cardiac Management	45	2.50	2.50	2.50	2.00	2.50
IX	Discharge & Prevention in ACS	45	2.50	2.50	2.50	2.00	2.50
X	Excellence in ACS Care	45	2.50	2.50	2.50	2.00	2.50
XI	EHAC (Support Staff)	Unlimited	--	--	--	--	--
	<b>TOTAL</b>	<b>510</b>	<b>31.50</b>	<b>31.50</b>	<b>14.00</b>	<b>28.00</b>	<b>31.50</b>

**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.

**31.5 CNE.** Apex Innovations designates this enduring material for 31.5 ANCC contact hours for nurse.

**31.5 CME.** Apex Innovations designates this enduring material activity for a maximum of 31.5 *AMA PRA Category 1 Credits™*. Physicians should claim only credit commensurate with the extent of their participation in the activity.

**14 CPE.** Apex Innovations designates this knowledge-based enduring material for 14 ACPE contact hours for pharmacists.

**28 CEH.** This CE activity is accredited for 28 CEH by Apex Innovations, an organization accredited by the Commission on Accreditation for Prehospital Continuing Education (CAPCE).

**31.50 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.