



Body System: Cardiovascular		
Session Topic: ECG Analysis – Advanced		
Educational Format		Faculty Expertise Required
Clinical Procedural Workshop (CPW)		Expertise in the field of study. Experience teaching in the field of study is desired. Preferred experience teaching hands-on procedural workshops. The majority of the education must emphasize hands-on learning, with feedback from faculty.
OPTIONAL	Problem-Based Learning (PBL)	Expertise teaching highly interactive, small group learning environments. Case-based, with experience developing and teaching case scenarios for simulation labs preferred. Other workshop-oriented designs may be accommodated. A typical PBL room is set for 50-100 participants, with 7-8 each per round table. Please describe your interest and plan for <u>teaching a PBL on your proposal form.</u>
Professional Practice Gap	Learning Objective(s) that will close the gap and meet the need	Outcome Being Measured
<p>Data from a recent AAFP Common Medical Procedures Needs Assessment indicate that family physicians have a need for advanced training in ECG analysis.</p> <p>Data from a recent AAFP CME Needs Assessment survey indicates that family physicians have a statistically significant and meaningful gap in the knowledge and skill to effectively and efficiently analyze ECG results.</p> <p>Family practice residents have considerable deficiencies in ECG interpretation skills.</p>	<ol style="list-style-type: none"> 1. Assess the variances in ECG readings for patients of different ages using case studies. 2. Demonstrate accurate ECG diagnosis of atrial tachyarrhythmia using visual criteria rather than quantitative analysis. 3. Demonstrate accurate ECG interpretation that distinguishes normal physiological adaptations in athletes from abnormal findings suggestive of pathology. 	<p>Learners will submit written commitment to change statements on the session evaluation, indicating how they plan to implement newly acquired advanced ECG analysis skills.</p>
ACGME Core Competencies Addressed (select all that apply)		
X	Medical Knowledge	Patient Care
	Interpersonal and Communication Skills	Practice-Based Learning and Improvement
	Professionalism	Systems-Based Practice
Faculty Instructional Goals		
Faculty play a vital role in assisting the AAFP to achieve its mission by providing high-quality, innovative education for physicians, residents and medical students that will encompass the art, science, evidence and socio-economics of family medicine and to support the pursuit of lifelong learning. By achieving the instructional goals provided, faculty will		



facilitate the application of new knowledge and skills gained by learners to practice, so that they may optimize care provided to their patients.

- Provide up to 3 evidence-based recommended practice changes that can be immediately implemented, at the conclusion of the session; including SORT taxonomy & reference citations
- Facilitate learner engagement during the session
- Address related practice barriers to foster optimal patient management
- Provide recommended journal resources and tools, during the session, from the American Family Physician (AFP), Family Practice Management (FPM), and Familydoctor.org patient resources; those listed in the References section below are a good place to start
 - Visit <http://www.aafp.org/journals> for additional resources
 - Visit <http://familydoctor.org> for patient education and resources
- Provide strategies to help physician learners assess the variances in ECG readings for patients of different ages using case studies.
- Demonstrate accurate ECG diagnosis of atrial tachyarrhythmia using visual criteria rather than quantitative analysis.
- Demonstrate accurate ECG interpretation that distinguishes normal physiological adaptations in athletes from abnormal findings suggestive of pathology.
- Provide an overview and recommendations regarding the use of ECG as it relates to the preparticipation sports evaluation.

Needs Assessment

Family physicians have a unique challenge to provide comprehensive care for patients of all ages and both sexes who may present with a condition of any organ or disease state. It has been well documented in recent years that the growing rates of chronic diseases – including everything from hypertension to obesity – have placed significant stresses on our health care system.¹ Over 26 million noninstitutionalized adults have diagnosed heart disease.² In 2010, there were more than 12 million office visits in the ambulatory setting for heart disease-related care (excluding ischemic).³ Many primary care physicians are tasked with trying to find mechanisms of cost-effective and efficient care to offer patients who require ongoing treatment for a number of illnesses, particularly those resulting from cardiovascular diseases (CVD). Since family physicians treat men and women of all ages, races and ethnicities, they are uniquely prepared to address the multitude of heart problems that their patients may experience. Certain clinical procedures can help physicians to accurately diagnose, assess and treat cardiovascular conditions in their patients.

The AAFP Recommended Curriculum Guidelines for Family Medicine Residents indicates that family medicine residents should possess the following competencies related to cardiovascular medicine:⁴

- Understand basic and clinical knowledge of cardiac anatomy and pathophysiology of common cardiovascular diseases. (Medical Knowledge)
- Perform an appropriate cardiac history and physical examination, document findings, develop an appropriate differential diagnosis, and plan for further evaluation and



management. (Patient Care, Medical Knowledge, Interpersonal and Communication Skills)

- Use evidence based knowledge regarding primary and secondary prevention of cardiovascular disease. (Medical Knowledge, Patient Care)
- Review current practices regarding the care of patients with cardiovascular disease and develop plans to improve the care. (Patient Care, Medical Knowledge, Practice-based Learning and Improvement, Professionalism)
- Work with physicians, nurses, pharmacists, dieticians, and other health care professionals who care for patients with common cardiovascular diseases. (Patient Care, Medical Knowledge, Professionalism, Systems-based Practice)

Additionally, the AAFP Recommended Curriculum Guidelines for Family Medicine Residents indicates that family medicine residents should be able to perform the following skills related to cardiovascular medicine:⁴

- Diagnostic procedures
 - Performance of history taking and physical examination
 - Mechanics and interpretation of ECG
 - Interpretation of chest radiographs
 - Treadmill/bicycle stress test monitoring and interpretation
 - Ambulatory ECG monitoring and interpretation

However, data from a recent AAFP Common Medical Procedures Needs Assessment indicate that family physicians have a need for advanced training in ECG analysis.⁵ Additionally, data from a recent AAFP CME Needs Assessment survey indicates that family physicians have a statistically significant and meaningful gap in the knowledge and skill to effectively and efficiently analyzing ECG results in the optimal management of their patients.⁶ CME outcomes data from 2012-2016 AAFP FMX *ECG Analysis – Advanced* sessions suggest that physicians have knowledge and skill gaps with regard to identifying *Wellens*, *Brugada*, *long QT*, *short QT*, *WPW*, *LGL*, and *RV Stemi* syndromes in patients with recent chest pain; having more awareness of arrhythmias; and having more awareness of hyperkalemia.⁷⁻¹¹

Electrocardiogram (ECG) tests¹²⁻¹⁴

ECG tests, which measure the electrical activity of the heart, may be conducted in patients who present to a family physician's office with chest pain, dizziness, fatigue, or any heart or lung problems. The test can detect a number of conditions that may result from arterial blockage, irregularities or weakness associated with the heart muscle, or abnormalities related to the heart rate or rhythm. Standard 12-lead ECGs are conducted by the majority of family physicians; AAFP *Practice Profile* data indicates that 94% of family physicians perform the test in their office. As such, they should be prepared to interpret the ECG complex, detect ST elevations, t-wave inversions and potential or current myocardial infarctions (at which point a patient typically requires immediate emergency intervention). Some physicians, however, may choose to order an ECG for patients as part of a routine health exam – even as part of an athletic Pre-Participation Exam for pediatric patients – or preoperative evaluation. The AAFP *recommends against* routine screening with resting **electrocardiography (ECG)**, exercise treadmill test (ETT), or electron-beam computerized tomography (EBCT) scanning for coronary calcium for either the presence of severe coronary artery stenosis (CAS) or the prediction of coronary heart



disease (CHD) events in adults at low risk for CHD events; and *found insufficient evidence to recommend for or against* routine screening with **electrocardiography (ECG)**, exercise treadmill test (ETT), electron beam computerized tomography (EBCT) scanning for coronary calcium for either the presence of severe coronary artery stenosis (CAS) or the predication of coronary heart disease (CHD) events in adults at increased risk for CHD events.^{15,16}

However, studies suggest that family practice residents have considerable deficiencies in ECG interpretation skills.¹⁷ CME outcomes data from the 2012 AAFP Scientific Assembly session: Electrocardiography and Internal Monitory Devices suggests that over 57% of learners indicated a need for more advanced continuing education is the use of ECG. In practice, there is some evidence that primary care physicians have deficiencies regarding ECG interpretation that distinguishes normal physiological adaptations in athletes from abnormal findings suggestive of pathology; as well as deficiencies regarding accurate ECG diagnosis of atrial tachyarrhythmia using visual criteria rather than quantitative analysis.¹⁸⁻²⁰ Physicians also need to be familiar with recent research regarding evidence-based recommendations for ECG analysis with regard to preparticipation physical evaluation for athletes of all ages and skill levels.²¹

Family physicians should be knowledgeable about evidence-based recommendations and guidelines for the appropriate use of electrocardiography, and be familiar with evidence-based clinical considerations to make individual judgements regarding the care of their patients.

Gaps in Knowledge, Competence and/or Performance:

ECG Analysis^{17-20,22,23}*

- Family physicians need to know basic functions and elements of ECG tests, including: how to conduct an ECG to get accurate readings; how to trouble-shoot personnel or test performance; how to interpret the ECG findings and relay the appropriate information to patients; and how to bill and code for such a procedure.
- In situations where patients are referred to sub-specialists for ECG testing, family physicians should be able to interpret the results provided to them and communicate the findings to patients. They should also counsel patients on effective methods of behavior change to improve their cardiovascular health.
- Family physicians should know when to have an ECG conducted immediately. In some cases, patients need immediate referral to sub-specialists or emergency departments for treatment.
- Because ECGs may be given to patients of any age with suspected heart problems, they need to be aware of the potential differences in test readings (including sensitivity and specificity of selected tests) and their correlation to potential cardiac disease.
 - Similarly, family physicians that use an ECG in pediatric patients with suspected heart disease need to be recognized when a patient should be referred to a sub-specialist for enhanced testing or consultation.
- Family physicians should be able to compare the findings of an ECG to the clinical presentation of patients who require the test, particularly in situations where an arrhythmia may not have been present when the ECG was conducted.³
 - In other situations, patients who have experienced a heart attack or who may have heart disease likely require multiple ECGs; family physicians should explain the need to them and compare results.



* *Note: Advanced session will use case studies to reinforce fundamentals taught in the basic session.*

References

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