MAYO CLINIC

Program Description

This online Heart Failure Board Review will provide an overview of all aspects of heart failure and transplantation. Expert faculty will provide in-depth didactics on state-of-the-art subjects in heart failure with preserved and reduced ejection fraction, causes and management of patient with HF, management of comorbidities, and evaluation and management of patients with pulmonary arterial hypertension. In addition, updates on the latest knowledge and advances in mechanical circulatory devices and heart transplantation are also integrated into the course for the practicing cardiologist wishing to review and update. The full spectrum of heart failure practice will be reviewed ranging from basic evaluation and management and device-based treatments. This includes topics reviewing advanced heart failure and cardiac transplant and immunosuppression.

This comprehensive online course will give you 365 days of access to a personalized and adaptive online learning curriculum that will save study time, most importantly enable you to integrate the most current medical knowledge into your daily practice, and give you confidence to pass the exam.

Learning Objectives:

Upon conclusion of this program, participants should be able to:

- Identify relevant features of national heart failure guidelines
- Discuss the clinical profile of heart failure and differentiate between reduced and preserved ejection fraction patients
- Describe how to utilize medical devices and surgical therapies in the care of heart failure patients
- Characterize the timing and expected outcome for surgical interventions in heart failure patients including those with ischemic heart disease and valvular heart disease

Attendance at this Mayo Clinic course does not indicate nor guarantee competence or proficiency in the performance of any procedures which may be discussed or taught in this course.

Intended Audience

This comprehensive online program is intended for cardiologists, cardiovascular fellows, internists, advance practice providers and others who commonly care for patients with heart failure. Individuals preparing for the

ABIM Advanced Heart Failure and Cardiac Transplantation certification/recertification exam will find information and format valuable.

Accreditation Statement

In support of improving patient care, Mayo Clinic College of Medicine and Science 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.

Credit Statement(s)

AMA

The Mayo Clinic College of Medicine and Science designates this enduring material for a maximum of 30 *AMA PRA Category 1 Credit(s)*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity

ABIM

Successful completion of this CME activity, which includes participation in the evaluation component, enables the participant to earn up to 30 Medical Knowledge MOC points in the American Board of Internal Medicine's (ABIM) Maintenance of Certification (MOC) program. It is the CME activity provider's responsibility to submit participant completion information to ACCME for the purpose of granting ABIM MOC credit.
Participation information will be shared with ABIM through PARS.

Program Information

Mayo Clinic Disclaimer

Participation in this Mayo Clinic enduring material does not indicate nor guarantee competence or proficiency in the performance of any procedures which may be discussed or taught in this course. You should be aware of substantive developments in the medical field covered by this recording may have occurred since the date of original release.

Prerequistes for Participation

There are no prerequisites needed prior to particiapate in this education activity.

The online board review course is delivered through an online personalized learning gateway enabling learners to take a pre-assessment to identify areas of strength and weakness and then direct their learning with a personalized study guide that concentrates solely on areas where they need reinforcement. Learners can view videos, listen to audio presentations, review learning objectives, and take notes on PowerPoint presentations, and take pre- and post-assessments.

How to Obtain Credit

To obtain credit, complete the post-test, evaluation and submit. The post-assessment questions are broke down in modules and credit can be obtained as you complete each module.

Method of Participation
Participation in the activity consists of reviewing the online lectures and completing the assessment and evaluation.

Release and Expiration Dates
This enduring material is recorded for use in this program.

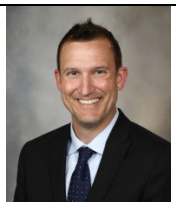
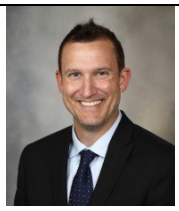
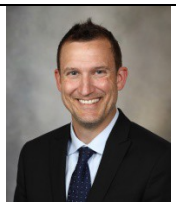
Date of Original Release: September 21, 2020
Date of Credit Expiration: September 20, 2023
Duration/Completion Time: 30 hours

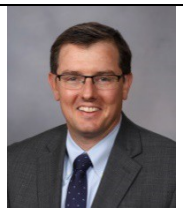
Customer Service and Return Policy
Mayo Clinic Cardiovascular Education Department will accept returns if notification of cancellation is received within **30 days** of purchase. Refunds cannot be given if you have already claimed CME credit or MOC points for the course.

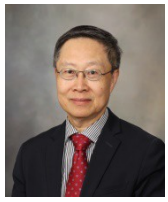
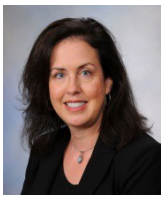
If you have questions on how to obtain credit, please phone us at 800-283-6296 or email us at cvcme@mayo.edu.

Online Program Content

Presentation	Presenter	Presentation Objectives	Lecture Length
Evaluation of Heart Failure			
The Epidemiology of Heart Failure	 ***Veronique Roger, MD*** Professor of Epidemiology & Medicine	• Recognize the determinants of the heart failure epidemic • Master the concepts and understand the factors that cause hospitalizations in heart failure • Define the clinical implications of the heart failure epidemic	37:32
Stage A and B Heart Failure, Risk Factor, and the Role of Prevention to Symptomatic HF	 ***Horng Chen, M.D.*** Professor of Medicine	• State the definition of stage A/B heart Failure • Summarize the epidemiology and natural history of stage A/B heart failure • Describe the Management of Stage A/B Heart Failure to prevent progression to stage C/D clinical heart failure	20:30

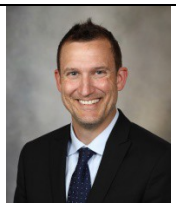
Clinical Assessment and Prognosis in Heart Failure	 ***Paul McKie, M.D.*** Assistant Professor of Medicine	• Describe the clinical assessment of heart failure • Review prognosis/prognostic tools for heart failure	31:26
Biomarkers in Heart Failure	 ***Margaret Redfield, M.D.*** Professor of Medicine	• Describe the role of natriuretic peptide assays in the evaluation and management of Heart Failure	39:45
Exercise Testing and Physiology in Heart Failure	 ***Barry Borlaug, M.D.*** Professor of Medicine	• Review the basic principles of exercise physiology at they relate to patients with HF • Review how to utilize and interpret data from CPET	33:47
Normal Cardiac Physiology	 ***Barry Borlaug, M.D.*** Professor of Medicine	• Describe the basics of normal cardiac physiology at the cellular level • Describe the basic concepts of ventricular-arterial interaction • Identify measures of normal cardiac performance and physiologic responses	37:47
Hemodynamics of Heart Failure with Reduced Ejection Fraction	 ***Barry Borlaug, M.D.*** Professor of Medicine	• Describe the hemodynamic changes that develop in HFrEF and how they contribute to morbidity and mortality • Identify mechanisms by which therapeutic interventions target these changes	35:28

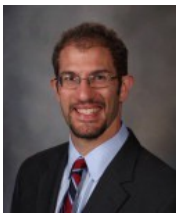
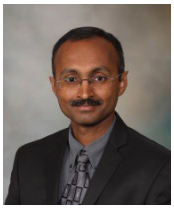
Hemodynamics of Heart Failure with Preserved Ejection Fraction	 ***Barry Borlaug, M.D.*** Professor of Medicine	• Describe the abnormalities in cardiac function that lead to HFpEF • Recognize the pathophysiology and typical hemodynamic presentations for HFpEF encountered in practice • Identify hemodynamic signatures of HFpEF mimic	39:01
Evaluation of New Onset Heart Failure Reduced Ejection Fraction	 ***Paul McKie, M.D.*** Assistant Professor of Medicine	• Develop a comprehensive approach to the clinical evaluation for patients with heart failure with reduced ejection fraction • Choose appropriate diagnostic and laboratory testing for patients with heart failure with reduced ejections fraction	31:59
Evaluation of Heart Failure Preserved Ejection Fraction (HFpEF): Pathophysiology and Diagnosis	 ***Margaret Redfield, M.D.*** Professor of Medicine	• Describe the pathophysiology of HFpEF • Recognize HFpEF phenotypes - Overtly Congested - Exertional ("Unexplained") Dyspnea • Describe how to use HFpEF diagnostic algorithms	35:16
Specific Etiologies of Heart Failure			
Cardiomyopathies	 ***Steve Ommen, M.D.*** Professor of Medicine	• Describe the etiology and pathophysiology of hypertrophic cardiomyopathy (HCM) and use this information to select appropriate testing and evaluate patients • Define the genetic makeup of HCM and properly advise patients and family members on proactive testing • Formulate a management plan for patients with HCM with symptoms, including medical, interventional, and/or surgical options as needed • Assess the potential for sudden cardiac death and implications for ICD placement in patients with non-compaction cardiomyopathy and HCM	36:53

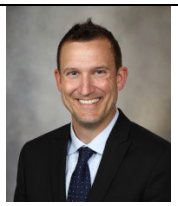
Cardiac Amyloid	 ***Martha Grogan, M.D.*** Associate Professor of Medicine	• Identify the patient with potential amyloid and perform diagnostic evaluation • Describe the different types of amyloid and their natural history • Manage the patient with documented amyloid	32:01
Constrictive Pericarditis	 ***Jae Oh, M.D.*** Professor of Medicine	• Recognize the presentation and select appropriate testing and management strategies for patients with pericardial constriction, including differentiation between constrictive pericarditis and restrictive cardiomyopathy • Review diagnosis and treatment of constriction	49:01
Adult Congenital Heart Disease: What the Heart Failure Specialist Needs to Know	 ***Alexander Egbe, M.B.B.S.*** Associate Professor of Medicine & Assistant Professor of Pediatrics	• Recognize the key pathophysiologic mechanisms for heart failure in the CHD population • Formulate appropriate management plan for CHD patients with heart failure • Identify the risks factors for mortality in CHD patients referred for heart transplant evaluation.	32:09
Peripartum Cardiomyopathy	 ***Sabrina Phillips, M.D.*** Associate Professor of Medicine	• Describe pathophysiology of peripartum cardiomyopathy • Differentiate peripartum cardiomyopathy from other causes of heart failure in women • Describe appropriate treatment strategies for women with peripartum cardiomyopathy	28:41

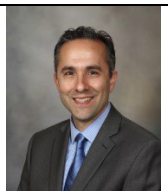
Stress Induced Cardiomyopathy	 ***Abhiram Prasad, M.D.*** Professor of Medicine	• List variety of nomenclature used to identify stress cardiomyopathy • Discuss typical case, variants, and pathophysiology • Recognize clinical characteristics and complications of stress cardiomyopathy • Discuss the diagnosis and differential diagnosis of stress cardiomyopathy • Describe treatment and prognosis for stress cardiomyopathy	19:32
Myocarditis and Sarcoid: Evaluation and Management	 ***Leslie Cooper, M.D.*** Professor of Medicine	• Describe the clinical significance of major causes of and clinical clues to suspect myocarditis. • Compare the use cardiac magnetic resonance and positron emission tomography to distinguish forms of myocarditis and refine prognosis in cardiac sarcoidosis. • Restate the 2016 American Heart Association scientific statement on the management of specific cardiomyopathies' recommendations for the use of endomyocardial biopsy	30:05
Cardio-Oncology: What the Heart Failure Specialist Needs to Know	 ***Joerg Herrmann, M.D.*** Professor of Medicine	• Review the cardiotoxicity presentations of cancer therapies • Recognize underlying mechanisms • Develop a management grid	41:54
Nonischemic Dilated Cardiomyopathy: Evolving Genetics	 ***Richard Rodeheffer, M.D.*** Professor of Medicine	• Identify the prevalence of hereditary causes of nonischemic dilated cardiomyopathy (NIDCM) • Recognize phenotypic and genotypic heterogeneity • Describe how to interpret genetic reports	30:03

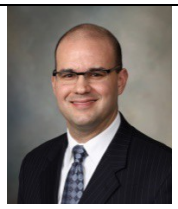
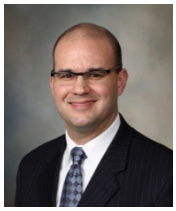
Imaging in Heart Failure			
Echocardiography in Heart Failure	 ***Barry Karon, M.D.*** Assistant Professor of Medicine	• Determine the clinical abnormalities, limitations, and characteristics of patients with heart failure and cardiomyopathies and how the results and use of echocardiography help determine the course of patient care and therapy. • Recognize proper use of echocardiography to help manage and develop therapies for patients presenting with heart failure	42:28
Pathologic Atlas of Heart Failure	 ***Brooks Edwards, M.D.*** Professor of Medicine	• Summarize common pathologic findings in patients with heart failure • Identify common pathologic findings in patients with both HFrEF and HFpEF. • Describe the common peripheral manifestations of heart failure.	34:28
MRI and CT Imaging in Heart Failure	 ***Nandan Anavekar, M.B., B.Ch.*** Professor of Medicine	• Identify imaging modalities utilized in the evaluation of cardiovascular disease and their technical considerations • Enumerate the goals of imaging in patients with heart failure • Review role of imaging in ischemic heart disease • Review role of imaging in nonischemic heart disease	44:26
Nuclear Imaging in Heart Failure	 ***Omar Abou Ezzeddine, M.D., C.M., M.S.*** Assistant Professor of Medicine	• Define role of nuclear imaging in assessment of myocardial viability • Define role of ^{99m}Tc-based scintigraphy in diagnostic workup of TTR cardiac amyloidosis (TTR-CA) • Define role of cardiac PET imaging in evaluating patients with suspected cardiac sarcoidosis	45:46

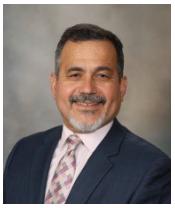
Treatment of Heart Failure			
Decompensated Heart Failure: Pathophysiology and Treatment	 ***Barry Karon, M.D.*** Assistant Professor of Medicine	• Recognize the varying clinical presentations of decompensated heart failure • Describe appropriate decision making steps that help determine the optimum treatment approach	52:43
Chronic Drug Therapy for Heart Failure Reduced Ejection Fraction (HFrEF) I	 ***Grace Lin, M.D.*** Associate Professor of Medicine	• Cite the guideline directed medical therapies (GDMT) for HFrEF ○ Drug classes • Interpret rationale for GDMT • Summarize initiation and titration of GDMT	35:56
Chronic Drug Therapy for Heart Failure Reduced Ejection Fraction (HFrEF) II	 ***Grace Lin, M.D.*** Associate Professor of Medicine	• Apply diuretic therapy for heart failure • Recognize new drug therapies for HFrEF	35:42
Implantable Cardioverter Defibrillator (ICD) and Cardiac Resynchronization Therapy(CRT) in Heart Failure	 ***Samuel Asirvatham, M.D.*** Professor of Medicine & Pediatrics	• List the indications for ICD implantation for primary prevention and select appropriate patients for this intervention • List the indications for CRT implantation and select appropriate patients for this intervention • Interpret pacemaker electrocardiography accurately and use the findings to guide patient management	35:49
Treatment of Garden Variety HFpEF and Identification of Common Masqueraders	 ***Barry Borlaug, M.D.*** Professor of Medicine	• Recognize how to evaluate & diagnose patient with suspected HFpEF • Describe how to treat HFpEF	37:40

Critical Care in HF and Cardiogenic Shock	 ***Jacob Jentzer, M.D.*** Assistant Professor of Medicine	• Describe pathophysiology and hemodynamic management of cardiogenic shock • Recognize beneficial evidence-based therapies for cardiogenic shock • Implement evidence-based best practices for sepsis and ARDS	43:10
Remote Monitoring in Heart Failure	 ***Margaret Redfield, M.D.*** Professor of Medicine	• Describe how to use remote monitoring in HF management	35:01
Comorbidities of Heart Failure			
Sleep Disordered Breathing in Heart Failure	 ***Virend Somers, M.D., Ph.D.*** Professor of Medicine	• Describe the prevalence and implications of sleep apnea in patients with heart failure • List the available data regarding benefits of treating OSA in heart failure • Identify the risks/benefit of treating CSA in heart failure	26:13
Diabetes in Heart Failure	 ***Vinaya Simha, M.B.B.S.*** Associate Professor of Medicine	• Recognize the increased risk for heart failure in patients with Diabetes Mellitus • Describe the multiple pathophysiological processes contributing to heart failure in patients with Diabetes Mellitus • Review the effect of different glucose lowering therapies on heart failure • Recognize the benefits and risks of SGLT2 inhibitor therapy in patients with heart failure	34:36

Obesity in Heart Failure	 ***Barry Borlaug, M.D.*** Professor of Medicine	• Describe recent epidemiologic trends in Obesity and HF • Recognize the pathophysiology and potential treatments for patients with obesity and HF	25:51
Coronary Disease and Revascularization in Heart Failure	 ***Bernard Gersh, M.B., Ch.B., D. Phil.*** Professor of Medicine	• Clarify different substrates causing left ventricular dysfunction in patients with chronic ischemic syndromes. • Summarize issues related to the difference in outcomes after revascularization in patients with viability in the STICH trial. • Formulate a clinical strategy in which viability testing may be of help in selecting patients with severe left ventricular dysfunction and heart failure for revascularization.	47:39
Cardiorenal Syndrome	 ***John Burnett, Jr., M.D.*** Professor of Medicine & Physiology	• Describe the natriuretic peptide/renin-angiotensin-aldosterone axis in physiologic homeostasis • State definition of worsening renal function in heart failure in Cardiorenal Syndrome • Summarize mechanisms of Cardiorenal Syndrome • List biomarkers for acute kidney injury (AKI) in Cardiorenal Syndrome • Describe standard therapies for Cardiorenal Syndrome • Identify novel new therapies for AKI in heart failure	33:15

Atrial Arrhythmias in Heart Failure	 ***Douglas Packer, M.D.*** Professor of Medicine	• Describe the classification and mechanisms of atrial fibrillation/flutter and its diagnosis • Describe and choose among pharmacologic agents for rate control for specific types of patients with atrial fibrillation • Describe and choose among treatment options for rhythm control in atrial fibrillation, including medications, cardioversion, and ablation, for specific types of patients	32:56
Ventricular Arrhythmias, Intracardiac Electrograms and Implantable Monitors in Heart Failure	 ***Abhishek Deshmukh, M.B.B.S.*** Assistant Professor of Medicine	• Identify ventricular arrhythmia syndromes that cause heart failure • Review approach to ventricular arrhythmias in inflammatory cardiomyopathies • Recognize treatment for ventricular arrhythmias in LVAD patients • Demonstrate how to interpret key ICD electrogram findings	36:36
Valve Disease in Heart Failure: What the HF Specialist Needs to Know	 ***Mackram Eleid, M.D.*** Associate Professor of Medicine	• Identify indications for intervention of aortic stenosis • Select candidates for TAVR vs. SAVR • Discuss interventional management of mitral regurgitation • Discuss interventional approach to tricuspid regurgitation	33:22
Mechanical Circulatory Support			
Patient Selection and Evaluation for Ventricular Assist Device	 ***Richard Rodeheffer, M.D.*** Professor of Medicine	• Describe the role of long term left ventricular mechanical circulatory support in management of end stage heart failure • Identify appropriate candidates for LVAD support	22:47

Postoperative Management of Mechanical Circulatory Device and Transplant	 ***Andrew Rosenbaum, M.D.*** Instructor in Medicine	• List risk factors and management strategies for post-transplant medical complications • Evaluate approaches to induction and early immunosuppression • Describe appropriate early post-operative infectious prophylaxis • Recognize early post-operative LVAD-specific considerations, including post-operative RV failure	40:42
Temporary mechanical circulatory support and ECMO: Devices, Complications, and Management	 ***John Stulak, M.D.*** Professor of Surgery	• List current options for ventricular support • Review indications for use • Examine strategies for short and long-term support	31:59
Durable Ventricular Assist Devices	 ***Andrew Rosenbaum, M.D.*** Instructor in Medicine	• Describe the technical aspects of contemporary centrifugal flow LVADS • Evaluate criteria for LVAD implantation • Compare results of clinical investigations of contemporary LVADs • Recognize and manage the common complications seen after LVAD implant	36:04
Mechanical Circulatory Support: Intra-operative Complications and Post Implant Management	 ***John Stulak, M.D.*** Professor of Surgery	• Review the device options for temporary mechanical circulatory support and ECMO in the setting of cardiogenic shock • Review the indications and complications associated which each approach • Discuss ongoing management and consideration during temporary hemodynamic support with each device	27:59

Heart Transplantation			
The Patient with Advanced Heart Failure: Left Ventricular Assist Device vs. Transplant	 ***Alfredo Clavell, M.D.*** Assistant Professor of Medicine	• Recognize the advanced heart failure patient • Recognize the advantages and limitations of cardiac transplantation • Recognize the advantage and limitations of mechanical circulatory support that affect the selection process	36:11
Transplant: Patient Selection, Listing Criteria, and Evaluation	 ***Barry Boilson, M.D.*** Assistant Professor of Medicine	• Review how to approach the assessment of patient referred for advanced heart failure therapies • Describe the selection process, and data driving indications and contraindications • Summarize key components of the transplant evaluation process • Identify currently UNOS listing criteria	38:48
Rejection Surveillance	 ***Brooks Edwards, M.D.*** Professor of Medicine	• Identify the standard and evolving methods to diagnose cardiac allograft rejection	23:07
Transplant Immunology	 ***Mark Stegall, M.D.*** Professor of Surgery	• Describe all aspects of the immune system that can attack an allograft • Recognize acute cellular rejection • Discuss new treatments for anti-HLA antibody	29:54

Immunosuppressive Therapy and Post Transplant Considerations	 ***Sudhir Kushwaha, M.D.*** Professor of Medicine	• Describe immunosuppressive strategies following heart transplantation • Identify immunosuppressive drugs used both early and late following heart transplantation • Summarize long term complications and limitations to survival post-transplantation • Describe strategies to mitigate complications following heart transplantation	42:44
Palliative Care	 ***F. Andrew Bock, D.O.*** Assistant Professor of Family Medicine	• Review heart failure prognostication tools and prognostication issues specific to heart failure • Review symptom management issues specific to heart failure. • Review palliative care timing, transitions of care and hospice issues specific to heart failure and devices.	31:22

Pulmonary Hypertension			
Pulmonary Arterial Hypertension: Essential Knowledge	 ***Robert Frantz, M.D.*** Professor of Medicine	• Describe Definition and Classification of Pulmonary Arterial Hypertension • Recognize appropriate patients for calcium channel blocker therapy • Describe risk stratification in PAH • Recognize appropriate patients for parenteral prostanoid therapy	31:21
Pulmonary Hypertension: Systematic and Efficient Evaluation	 ***Robert Frantz, M.D.*** Professor of Medicine	• Describe definition and classification of Pulmonary Hypertension • Recognize appropriate evaluation of pulmonary hypertension • Define fundamentals of therapy for Group 2, 3, and 4 pulmonary hypertension	26:16

Terms of Use

Disclaimer

The material presented in this enduring material is made available by Mayo Clinic College of Medicine and Science for educational purposes only. This material is not intended to represent the only, or necessarily the best, methods or procedures appropriate for the medical situation discussed, but rather is intended to present an approach, view, statement or opinion of the authors or presenters that may be helpful or of interest to other practitioners. As an attendee, you agree to participate in this enduring material sponsored by the Mayo Clinic College of Medicine and Science with full knowledge and awareness that you waive any claim you may have against the Mayo Clinic College of Medicine and Science or Mayo Clinic for reliance on any information presented in this enduring material. The approval of the U.S. Food and Drug Administration is required for procedures and drugs that are considered experimental. Instrumentation systems discussed and/or demonstrated in or at this program may not yet have received FDA approval.

All of the proceedings of this program, including the presentation of scientific papers, are intended for limited publication only, and all property rights in the material presented, including common-law copyright, are expressly reserved by the speaker, the Mayo Clinic College of Medicine and Science or Mayo Clinic. No statement or presentation made is to be regarded as dedicated to the public domain. Any sound reproduction, transcript, or other use of the material presented at this course without the permission of the Mayo Clinic College of Medicine and Science is prohibited to the full extent of common- law copyright in such material.

Viewing this Mayo Clinic course does not indicate nor guarantee competence or proficiency in the performance of any procedures which may be discussed or taught in this course.

No Warranties

You understand and agree that the content or information contained or provided herein is provided on an "as is" basis. Mayo Clinic College of Medicine and Science, does not make any express or implied warranties, representations or endorsements whatsoever (including without limitation warranties of title or non-infringement, or the implied warranties of merchantability or fitness for a particular purpose) with regard to the information, content or service provided herein. In addition, Mayo Clinic College of Medicine and Science does not guarantee this product will be free from technological difficulties and you understand that you are responsible for implementing sufficient procedures and checkpoints to satisfy your particular system requirements for accuracy of data input and output.

Limitation of Liability

The use of this service is entirely at your own risk and in no event shall Mayo Clinic be liable for any direct, indirect, incidental, consequential, special, exemplary, punitive, or any other monetary or other damages, fees, fines, penalties, or liabilities arising out of or relating in any way to content, information, or service provided herein.

User Agreements

By accepting these materials, you agree that you will not:

- Transmit any communications or content of any type that may infringe or violate any rights of any party.
- Use this course material for any purpose in violation of local, state, national or international laws.

- Use this course material as a means to distribute advertising or other unsolicited material to any third party.
- Use this course material in connection with any material that is unlawful, obscene, defamatory, threatening, harassing, abusive, slanderous, hateful or embarrassing to any other person or entity.

Copyright and Trademark Information