Overview of 2014 ESC Guidelines

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A panel of speakers provided an overview of the 2014 European Society of Cardiology (ESC) guidelines, covering updates in acute pulmonary embolism (PE), myocardial revascularization, hypertrophic cardiomyopathy (HCM), aortic diseases, and noncardiac surgery.

GUIDELINES ON THE DIAGNOSIS AND MANAGEMENT OF ACUTE PE

Stavros Konstantinides, MD, Centre for Thrombosis and Haemostasis at the University Medical Centre Mainz, Germany, and Democritus University of Thrace, Greece, discussed recommendations from the 2014 ESC guidelines on the diagnosis and management of acute PE [Konstantinides S et al. *Eur Heart J.* 2014].

In brief, initial triage requires classification of suspected PE into high-risk cases, as defined by the presence of shock or hypotension, or low- or intermediate-risk cases. For those categorized as high risk, computed tomography (CT) angiography or echocardiography remains the recommended option to assist with diagnosis and prognosis. For intermediate- or low-risk acute PE without shock or hypotension, the clinical probability of PE should be assessed to determine the diagnostic approach of choice, which includes CT angiography and D-dimer.

The 2014 guidelines include revised recommendations for the prognostic assessment of PE, taking into account the robust recent evidence in the literature. For patients not at high risk, the guidelines have been extended to include clinical indicators of disease severity, based on the PE severity index, and cardiac biomarkers.

These revised classification assessments are incorporated into an updated decision algorithm in which patients with a clinical suspicion of PE are evaluated for shock or hypotension, thereby determining risk status. High-risk patients should be treated with primary reperfusion, while low-risk patients may be discharged with a course of home-based treatment. It is recommended that patients determined to be at intermediate risk undergo further risk stratification into intermediate-high or intermediate-low risk based on the presence or absence of right ventricular dysfunction and strain, as determined by echocardiography or CT and cardiac biomarkers. In general, anticoagulation continues to be the therapeutic mainstay, with the addition of several new oral anticoagulant (OAC) options in the absence of severe renal impairment (Table 1).

For PE patients without shock or hypotension, routine use of systemic thrombolysis is not recommended. Close monitoring is necessary for the early detection of worsening cardiac symptoms and timely rescue reperfusion therapy. Treatment options in an intermediate- to high-risk patient include thrombolytic therapy when faced with hemodynamic decompensation and surgical pulmonary embolectomy or percutaneous catheter-directed treatment in cases posing a risk of bleeding during thrombolytic therapy.

Interior vena cava filters can be considered for acute PE patients who cannot receive anticoagulation therapy and for PE recurrence despite anticoagulation therapy. Otherwise, routine use of these filters is not recommended.

The recommendations concerning the optimum duration of anticoagulation treatment for PE patients remained unchanged. Anticoagulation therapy for 3 months remains the recommendation for typical cases. Concerning new OACs, recommended alternatives to vitamin K antagonist therapy for extended anticoagulation therapy are rivaroxaban (20 mg, QD), dabigatran (150 mg, BID; or 110 mg, BID, for patients ≥ 80 years of age or receiving verapamil treatment), or apixaban (5 mg, BID), except for cases of severe renal impairment. For patients not amenable to these alternatives, aspirin may be considered.

Persistent dyspnea should prompt evaluation for chronic thromboembolic pulmonary hypertension (CTEPH), but routine screening for CTEPH after PE is not recommended in the absence of symptoms. Lifelong use of anticoagulants and pulmonary endarterectomy surgery are recommended for CTEPH. Inoperable CTEPH can be treated with riociguat or possibly

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Table 1. Recommendations for Anticoagulation Acute Phase Treatment

PE without shock or hypotension (intermediate or low risk)		
Anticoagulation – new oral anticoagulants		
As an alternative to the combination of parenteral anticoagulation with a VKA, anticoagulation with rivaroxaban (15 mg twice daily for 3 weeks, followed by 20 mg once daily) is recommended.	I	B
As an alternative to the combination of parenteral anticoagulation with a VKA, anticoagulation with apixaban (10 mg twice daily for 7 days, followed by 5 mg twice daily) is recommended.	I	B
As an alternative to VKA treatment, administration of dabigatran (150 mg twice daily, or 110 mg twice daily for patients > 80 years of age or those under concomitant verapamil treatment) is recommended following acute-phase parenteral anticoagulation.	I	B
As an alternative to VKA treatment, administration of edoxaban* is recommended following acute-phase parenteral anticoagulation.	I	B
New oral anticoagulants (rivaroxaban, apixaban, dabigatran, edoxaban) are not recommended in patients with severe renal impairment.[a]	III	A

*CAUTION: Edoxaban is currently subject to regulatory review for the treatment of venous thromboembolism in the European Union; [a]Creatinine clearance <30 mL/min for rivaroxaban, dabigatran, and edoxaban; and <25 mL/min for apixaban.

VKA, vitamin K antagonist.

Adapted from Konstantinides SV et al. *Eur Heart J.* 2014.

off-label drugs at the discretion of a multidisciplinary treatment team.

Recommendations for PE in pregnancy, characterized by the lack of randomized clinical trial data, include the necessity for formal diagnostic assessment, which can include D-dimer measurement or venous compression ultrasonography. Perfusion scintigraphy may be considered instead of CT. A weight-adjusted dose of low molecular weight heparin (LMWH) is recommended for pregnant patients with no shock or hypotension.

Incidental PE in patients with cancer should probably be managed the same as that for symptomatic PE. Subcutaneous LMWH should be used for the first 3 to 6 months, with extended anticoagulation beyond 6 months until the cancer is considered cured.

GUIDELINES ON MYOCARDIAL REVASCULARIZATION

Stephan Windecker, MD, Bern University Hospital, Bern, Switzerland, and Philippe Kolh, MD, University Hospital of Liège, Liège, Belgium, discussed the joint 2014 ESC/European Association for Cardio-Thoracic Surgery guidelines on myocardial revascularization [Windecker S et al. *EuroIntervention*. 2014; Kolh P et al. *Eur J Cardiothorac Surg.* 2014]. With stable angina or silent ischemia, revascularization for prognosis or symptoms requires documented ischemia or fractional flow reserve <0.80 for angiographic diameter stenosis of 50% to 90%.

The Synergy Between Percutaneous Coronary Intervention With Taxus and Cardiac Surgery trial [SYNTAX; Mohr FW et al. *Lancet.* 2013] documented the prognostic relevance of a scoring system grading the anatomic complexity of coronary lesions on 5-year adverse outcomes, with death or myocardial infarction (MI) being increasingly more likely in patients having low, intermediate, and high scores in the 5 years following percutaneous coronary intervention (PCI) or coronary artery bypass graft (CABG). A meta-analysis of randomized clinical data involving >1600 patients that reported no appreciable difference between PCI and CABG in terms of outcomes of death or MI [Capodanno D et al. *J Am Coll Cardiol.* 2011] also informed the 2014 ESC guidelines (Table 2).

The guidelines provide specific recommendations for treatment of diabetic patients according to the presence of STEMI (primary PCI recommended over fibrinolysis), non–ST elevation acute coronary syndrome (NSTE-ACS;

Table 2. Recommendations for Revascularization Type in Stable Coronary Artery Disease

Recommendations according to extent of CAD	CABG		PCI	
	Class	Level	Class	Level
One- or two-vessel disease without proximal LAD stenosis.	IIb	C	I	C
One-vessel disease with proximal LAD stenosis.	I	A	I	A
Two-vessel disease with proximal LAD stenosis.	I	B	I	C
Left main disease with a SYNTAX score ≤22.	I	B	I	B
Left main disease with a SYNTAX score 23–32.	I	B	IIa	B
Left main disease with a SYNTAX score >32.	I	B	III	B
Three-vessel disease with a SYNTAX score ≤22.	I	A	I	B
Three-vessel disease with a SYNTAX score 23–32.	I	A	III	B
Three-vessel disease with a SYNTAX score >32.	I	A	III	B

CABG, coronary artery bypass graft; CAD, coronary artery disease; LAD, left anterior descending; PCI, percutaneous coronary intervention; SCAD, stable coronary artery disease.

Adapted from Windecker S et al. 2014 ESC/EACTS Guidelines on myocardial revascularization. *Eur Heart J.* 2013;34:2725-30. Published online ahead of print September 10, 2014. *Eur Heart J.* doi:10.1093/eurheartj/ehu278.With permission from Oxford University Press.

early invasive treatment recommended over noninvasive management), and stable multivessel coronary artery disease (CAD; revascularization with CABG recommended over PCI, except for low risk based on SYNTAX score). As well, new-generation drug-eluting stents are recommended over bare-metal stents.

Antithrombotic treatment in patients with stable CAD undergoing PCI carries a long list of recommendations. Briefly, dual antiplatelet therapy is indicated for at least 1 or 6 months after bare-metal stent implantation; <6 months of therapy can be considered following implantation of drug-eluting stents in patients with a high risk of bleeding. Regarding recommendations for P2Y12 inhibitor therapy in NSTE-ACS, prasugrel and ticagrelor are preferred over clopidogrel if clinically indicated. Duration of treatment should be at least 12 months after the acute event and potentially longer if well tolerated. In cases where these new agents are not available or contraindicated, doubling the dose of clopidogrel may be reasonable. STEMI patients undergoing primary PCI can receive a bivalirudin bolus, followed by intravenous infusion for up to 4 hours. Another series of recommendations specifically address patients who require an OAC.

GUIDELINES ON HCM

Perry M. Elliott, University College, London, United Kingdom, discussed the clinically practical, evidence-based 2014 ESC guidelines on diagnosis and management of HCM (increased left ventricular [LV] wall thickness of ≥15 mm in adults and more than 2 standard deviations above the predicted mean, which cannot be explained by abnormal loading) [Elliott PM et al. *Eur Heart J.* 2014]. HCM is not a diagnosis but rather represents a family of diseases with genetic and nongenetic causes. History taking should be tailored to the patient and should seek age, family history, and noncardiac symptoms or signs. Echocardiography findings and genetic testing can drive the diagnoses of specific genetic or acquired disorders.

Attention should be paid to the echocardiographic evidence, since different features are suggestive of different diseases. The guidelines strongly recommend a systematic approach to echocardiography, with all LV segments from the base to the apex examined to ensure that the wall thickness throughout is recorded.

LV outflow tract obstruction (LVOTO) due to systolic anterior motion is important in HCM, but there are other reasons for the outflow obstruction that need to be ruled out to fruitfully direct therapy. Echocardiography is important in this detection.

Cardiac magnetic resonance imaging (MRI) yields valuable information on LV morphology and function and myocardial fibrosis, thereby aiding with the differential diagnosis. The guidelines recommend that MRI be considered for baseline assessment of all HCM patients, if resources and expertise allow. Current evidence does not support recommending cardiac MRI in prediction of the risk of sudden cardiac death.

The guidelines recommend nuclear scintigraphy for diagnosis of amyloidosis. A battery of laboratory tests is also recommended. Considering the genetic basis of HCM, the guidelines also recommend genetic counseling in the absence of a nongenetic cause, with genetic screening of other family members if a definite genetic mutation is identified in the patient.

Heart failure symptoms should be investigated in a defined order, with history and physical examination, followed by electrocardiogram or echocardiography, laboratory tests, and cardiac positron emission tomography. Management of LVOTO should avoid arterial and venous dilators, with sinus rhythm restoration or rate control considered before invasive treatment in new-onset or poorly controlled atrial fibrillation. Digoxin is not recommended; guidance is provided concerning first- and second-line drug treatment of LVOTO and cautions pertaining to drug use. If necessary, invasive treatments are done ideally on a case-by-case basis and only by an experienced multidisciplinary team.

Nonobstructive treatment of HCM is triggered by LV ejection fraction <50% versus ≥50%. Stroke risk determination based on the CHA_2DS_2-VASc score is not recommended in the presence of atrial fibrillation. Rather, lifelong therapy with OACs is recommended, even following restoration of sinus rhythm. In certain cases, 48-hour ambulatory electrocardiogram is recommended.

Risk factors of sudden cardiac death are known and have been incorporated into an individualized clinical risk prediction model in HCM [O'Mahony C et al. *Eur Heart J.* 2013]. The guidelines present risk categories and associated recommendations. The guidelines also address reproduction and contraception in women with HCM, stressing that consideration of HCM complications prior to labor is prudent.

GUIDELINES ON THE DIAGNOSIS AND TREATMENT OF AORTIC DISEASES

Raimund Erbel, MD, West-German Heart Center, Essen, Germany, and Victor Aboyans, MD, Dupuytren University Hospital, Limoges, France, discussed the 2014 ESC guidelines pertaining to aortic diseases [Erbel R et al. *Eur Heart J.* 2014]. The need for new guidelines was driven by advances in imaging of the aorta, which in turn spurred new treatment options.

Recommendations for treatment of aortic dissection include pain relief and medical therapy, with urgent surgery or a hybrid approach for type A aortic dissection and with medical therapy and thoracic endovascular aortic repair (TEVAR) recommended depending on whether type B aortic dissection is uncomplicated or complicated. TEVAR should also be considered for intramural hematoma, penetrating aortic ulcer, and traumatic aortic injury, along with surgery. Recommendations concerning diagnostic workup of thoracic aortic aneurysm and screening for abdominal aortic aneurysm are also included in the guidelines.

An aneurysm anywhere in the aorta should prompt an assessment of the entire aorta. Because patients with aortic aneurysm have a heightened risk of cardiovascular disease, general principles of cardiovascular prevention are prudent. Among the recommendations for ascending and arch aortic aneurysms, surgery is recommended for a maximum aortic diameter ≥ 50 mm in patients with Marfan syndrome. For descending aortic aneurysms, TEVAR can be considered, with surgery as the second-line option in select conditions.

Concerning abdominal aortic aneurysms, ultrasound screening is recommended for all men aged > 65 years and can be considered in tobacco-smoking women of the same age. Screening is not recommended in female nonsmokers with no family history of aneurysm. Management recommendations include smoking cessation, use of statins and acetylcholinesterase inhibitors, abdominal endovascular aneurysm repair (EVAR), and best medical treatment. For asymptomatic patients, follow-up ultrasound imaging at defined times depending on aneurysm diameter is recommended. For symptomatic patients, immediate ultrasound for suspected rupture and emergency repair of rupture or symptomatic nonrupture are recommended. Chronic aortic dissections can be candidates for elective surgery.

Follow-up timing and recommendations are also provided.

GUIDELINES ON NONCARDIAC SURGERY

A description of the joint 2014 ESC/European Society of Anaesthesiology guidelines pertaining to noncardiac surgery was provided by Steen Dalby Kristensen, MD, Aarhus University, Aarhus, Denmark, and Juhani Knuuti, MD, PhD, University of Turku, Turku, Finland [Kristensen SD et al. *Eur Heart J.* 2014; *Eur J Anaesthesiol*. 2014].

Noncardiac surgery involving patients with cardiac conditions requires evaluation of surgical risk, functional capacity, and cardiac risk factors. Further cardiac testing can be done, except when surgery is urgent. In absence of the need for urgent surgery, unstable cardiac conditions should result in postponement of surgery until all treatment options are considered. Different noncardiac surgeries have different risks of 30-day death or MI (Table 3).

Table 3. Risks of 30-Day Death or Myocardial Infarction for Different Noncardiac Surgeries

Low-risk: < 1%	Intermediate-risk: 1–5%	High-risk: > 5%
▪ Superficial surgery ▪ Breast ▪ Dental ▪ Endocrine: thyroid ▪ Eye ▪ Reconstructive ▪ Carotid asymptomatic (CEA or CAS) ▪ Gynecology: minor ▪ Orthopaedic: minor (meniscectomy) ▪ Urological: minor (transurethral resection of the prostate)	▪ Intraperitoneal: splenectomy, hiatal hernia repair, cholecystectomy ▪ Carotid symptomatic (CEA or CAS) ▪ Peripheral arterial angioplasty ▪ Endovascular aneurysm repair ▪ Head and neck surgery ▪ Neurological or orthopaedic: major (hip and spine surgery) ▪ Urological or gynaecological: major ▪ Renal transplant ▪ Intra-thoracic: non-major	▪ Aortic and major vascular surgery ▪ Open lower limb revascularization or amputation or thromboembolectomy ▪ Duodeno-pancreatic surgery ▪ Liver resection, bile duct surgery ▪ Oesophagectomy ▪ Repair of perforated bowel ▪ Adrenal resection ▪ Total cystectomy ▪ Pneumonectomy ▪ Pulmonary or liver transplant

CAS, carotid artery stenting, CEA, carotid endarterectomy; CV, cardiovascular; MI, myocardial infarction.

Adapted from Kristensen SD et al. 2014 ESC/ESA Guidelines on non-cardiac surgery: cardiovascular assessment and management. The Joint Task Force on non-cardiac surgery: cardiovascular assessment and management of the European Society of Cardiology (ESC) and the European Society of Anaesthesiology (ESA). *Eur Heart J.* 2014;35:2342–3. With permission from Oxford University Press.

Guideline recommendations are provided for low-, intermediate-, and high-risk noncardiac surgeries, and they involve a patient's functional capacity and, in the case of high-risk surgery, various cardiac risk factors. In the setting of low functional capacity (≤ 4 metabolic equivalents) and high- or intermediate-risk surgery, patients with cardiac risk factors can be considered for noninvasive testing. These results can be used to guide consideration of preoperative revascularization (high-risk surgery with multiple cardiac risk factors and extensive stress-induced ischemia) and perioperative medical management.

Evidence-based recommendations for perioperative use of β-blockers are provided in the guidelines. If patients are on β-blockers, their continued use is recommended; use in others may be considered. Initiation of β-blockers prior to low-risk surgery is not recommended.

Continuation of statin therapy is recommended. Initiation of statin therapy should be at least 2 weeks prior to surgery. Aspirin use should include consideration of risks of bleeding and thrombosis, and discontinuation should be considered if control of hemostasis is anticipated to be difficult.