

Atrial Fibrillation

• Author: Lawrence Rosenthal, MD, PhD, FACC, FHRS; Chief Editor: Jeffrey N Rottman, MD [more...](#)

Updated: Jan 02, 2016

Epidemiology

Atrial fibrillation is the most frequently encountered cardiac arrhythmia.^[10] It affects more than 2.2 million persons in the United States. AF is strongly age-dependent, affecting 4% of individuals older than 60 years and 8% of persons older than 80 years. Approximately 25% of individuals aged 40 years and older will develop AF during their lifetime.^[17]

The prevalence of AF is 0.1% in persons younger than 55 years, 3.8% in persons 60 years or older, and 10% in persons 80 years or older. With the projected increase in the elderly population in the United States, the prevalence of AF is expected to more than double by the year 2050. AF is uncommon in childhood except after cardiac surgery.^[18]

The incidence of AF is significantly higher in men than in women in all age groups. AF appears to be more common in whites than in blacks, with blacks have less than half the age-adjusted risk of developing AF.

In 10-15% of cases of AF, the disease occurs in the absence of comorbidities (lone atrial fibrillation). However, AF is often associated with other cardiovascular diseases, including hypertension; heart failure; diabetes-related heart disease; ischemic heart disease; and valvular, dilated, hypertrophic, restrictive, and congenital cardiomyopathies.^[17] The Atherosclerosis Risk in Communities (ARIC) Study suggests reduced kidney function and presence of albuminuria are strongly associated with AF.^[19]

The rate of **ischemic stroke** in patients with nonrheumatic AF averages 5% a year, which is somewhere between 2 and 7 times the rate of stroke in patients without AF. The risk of stroke is not due solely to AF; it increases substantially in the presence of other cardiovascular diseases.^[20] The prevalence of stroke in patients younger than 60 years is less than 0.5%; however, in those older than 70 years, the prevalence doubles with each decade.^[21] The attributable risk of stroke from AF is estimated to be 1.5% for those aged 50-59 years, and it approaches 30% for those aged 80-89 years. Women are at a higher risk of stroke due to AF than men and some have suggested this may be due to undertreatment with warfarin. However, one study of patients 65 years or older with recently diagnosed AF found warfarin use played no part in the increased risk of stroke among female patients.^[22]

Contributor Information and Disclosures

Author

Lawrence Rosenthal, MD, PhD, FACC, FHRS Associate Professor of Medicine, Director, Section of Cardiac Pacing and Electrophysiology, Director of EP Fellowship Program, Division of Cardiovascular Disease, University of Massachusetts Memorial Medical Center

Lawrence Rosenthal, MD, PhD, FACC, FHRS is a member of the following medical societies: [American College of Cardiology](#), [Massachusetts Medical Society](#), [American Heart Association](#)

Disclosure: Nothing to disclose.

Coauthor(s)

David D McManus, MD, MSc, FACC, FHRS Director, Atrial Fibrillation Program, Assistant Professor of Medicine and Quantitative Health Sciences, University of Massachusetts Medical School

Disclosure: Nothing to disclose.

Chief Editor

Jeffrey N Rottman, MD Professor of Medicine, Department of Medicine, Division of Cardiovascular Medicine, University of Maryland School of Medicine; Cardiologist/Electrophysiologist, University of Maryland Medical System and VA Maryland Health Care System

Jeffrey N Rottman, MD is a member of the following medical societies: [American Heart Association](#), [Heart Rhythm Society](#)

Disclosure: Nothing to disclose.

Acknowledgements

Pierre Borczuk, MD Assistant Professor of Medicine, Harvard Medical School; Associate in Emergency Medicine, Massachusetts General Hospital

Pierre Borczuk, MD is a member of the following medical societies: [American College of Emergency Physicians](#)

Disclosure: Nothing to disclose.

David FM Brown, MD Associate Professor, Division of Emergency Medicine, Harvard Medical School; Vice Chair, Department of Emergency Medicine, Massachusetts General Hospital

David FM Brown, MD is a member of the following medical societies: [American College of Emergency Physicians](#) and [Society for Academic Emergency Medicine](#)

Disclosure: Nothing to disclose.

Abraham G Kocheril, MD, FACC, FACP, FHRS Professor of Medicine, University of Illinois College of Medicine

Abraham G Kocheril, MD, FACC, FACP, FHRS is a member of the following medical societies: [American College of Cardiology](#), [American College of Physicians](#), [American Heart Association](#), [American Medical Association](#), [Cardiac Electrophysiology Society](#), [Central Society for Clinical Research](#), [Heart Failure Society of America](#), and [Illinois State Medical Society](#)

Disclosure: Nothing to disclose.

William Lober, MD, MS Associate Professor, Health Informatics and Global Health, Schools of Medicine, Nursing, and Public Health, University of Washington

Disclosure: Nothing to disclose.

Brian Olshansky, MD Professor of Medicine, Department of Internal Medicine, University of Iowa College of Medicine

Brian Olshansky, MD is a member of the following medical societies: [American College of Cardiology](#), [American Heart Association](#), [Cardiac Electrophysiology Society](#), and [Heart Rhythm Society](#)

Disclosure: Guidant/Boston Scientific Honoraria Speaking and teaching; Medtronic Honoraria Speaking and teaching; Guidant/Boston Scientific Consulting fee Consulting

Gary Setnik, MD Chair, Department of Emergency Medicine, Mount Auburn Hospital; Assistant Professor, Division of Emergency Medicine, Harvard Medical School

Gary Setnik, MD is a member of the following medical societies: [American College of Emergency Physicians](#), [National Association of EMS Physicians](#), and [Society for Academic Emergency Medicine](#)

Disclosure: SironaHealth Salary Management position; South Middlesex EMS Consortium Salary Management position; ProceduresConsult.com Royalty Other

Ali A Sovari, MD, FACP Clinical and Research Fellow in Cardiovascular Medicine, Section of Cardiology, University of Illinois College of Medicine; Staff Physician and Hospitalist, St John Regional Medical Center, Cogent Healthcare, Inc

Ali A Sovari, MD, FACP is a member of the following medical societies: [American College of Cardiology](#), [American College of Physicians](#), [American Heart Association](#), [American Medical Association](#), [American Physiological Society](#), and [Heart Rhythm Society](#)

Disclosure: Nothing to disclose.

Francisco Talavera, PharmD, PhD Adjunct Assistant Professor, University of Nebraska Medical Center College of Pharmacy; Editor-in-Chief, Medscape Drug Reference

Disclosure: Medscape Salary Employment

References

1. Zimetbaum P, Reynolds MR, Ho KK, et al. Impact of a practice guideline for patients with atrial fibrillation on medical resource utilization and costs. *Am J Cardiol*. 2003 Sep 15. 92(6):677-81. [\[Medline\]](#).
2. Fuster V, Rydn LE, Cannom DS, et al. ACC/AHA/ESC 2006 Guidelines for the Management of Patients with Atrial Fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Revise the 2001 Guidelines for the Management of Patients With Atrial Fibrillation): developed in collaboration with the European Heart Rhythm Association and the Heart Rhythm Society. *Circulation*. 2006 Aug 15. 114(7):e257-354. [\[Medline\]](#). [\[Full Text\]](#).
3. [Guideline] Wann LS, Curtis AB, January CT, et al. 2011 ACCF/AHA/HRS focused update on the management of patients with atrial fibrillation (updating the 2006 guideline): a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2011 Jan 4. 123(1):104-23. [\[Medline\]](#).
4. [Guideline] Wann LS, Curtis AB, Ellenbogen KA, et al. 2011 ACCF/AHA/HRS Focused Update on the Management of Patients With Atrial Fibrillation (Update on Dabigatran): A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2011 Feb 14. [\[Medline\]](#).
5. Singh BN, Singh SN, Reda DJ, Tang XC, Lopez B, Harris CL, et al. Amiodarone versus sotalol for atrial fibrillation. *N Engl J Med*. 2005 May 5. 352(18):1861-72. [\[Medline\]](#).
6. Fuster V, Rydn LE, Asinger RW, et al. ACC/AHA/ESC Guidelines for the Management of Patients With Atrial Fibrillation: Executive Summary A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the European Society of Cardiology Committee for Practice Guidelines and Policy Conferences (Committee to Develop Guidelines for the Management of Patients With Atrial Fibrillation) Developed in Collaboration With the North American Society of Pacing and Electrophysiology. *Circulation*. 2001 Oct 23. 104(17):2118-50. [\[Full Text\]](#).
7. [Guideline] Fuster V, Rydn LE, Cannom DS, et al. ACC/AHA/ESC 2006 guidelines for the management of patients with atrial fibrillation-executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Revise the 2001 Guidelines for the Management of Patients with Atrial Fibrillation). *Eur Heart J*. 2006 Aug. 27(16):1979-2030. [\[Medline\]](#). [\[Full Text\]](#).
8. Kannel WB, Wolf PA, Benjamin EJ, Levy D. Prevalence, incidence, prognosis, and predisposing conditions for atrial fibrillation: population-based estimates. *Am J Cardiol*. 1998 Oct 16. 82(8A):2N-9N. [\[Medline\]](#).

9. Fontes JD, Lyass A, Massaro JM, et al. Insulin Resistance and Atrial Fibrillation (from the Framingham Heart Study). *Am J Cardiol*. 2012 Jan 1. 109(1):87-90. [Medline]. [Full Text].
10. Ferrari R, Bertini M, Blomstrom-Lundqvist C, et al. An update on atrial fibrillation in 2014: From pathophysiology to treatment. *Int J Cardiol*. 2016 Jan 15. 203:22-9. [Medline].
11. Nakao K, Seto S, Ueyama C, Matsuo K, Komiya N, Isomoto S, et al. Extended distribution of prolonged and fractionated right atrial electrograms predicts development of chronic atrial fibrillation in patients with idiopathic paroxysmal atrial fibrillation. *J Cardiovasc Electrophysiol*. 2002 Oct. 13(10):996-1002. [Medline].
12. Akyürek O, Sayin T, Diñer I, Karaoguz R, Güldal M, Oral D. Lengthening of intraatrial conduction time in atrial fibrillation and its relation with early recurrence of atrial fibrillation. *Jpn Heart J*. 2001 Sep. 42(5):575-84. [Medline].
13. Fox CS, Parise H, D'Agostino RB Sr, Lloyd-Jones DM, Vasani RS, Wang TJ, et al. Parental atrial fibrillation as a risk factor for atrial fibrillation in offspring. *JAMA*. 2004 Jun 16. 291(23):2851-5. [Medline].
14. Lubitz SA, Yin X, Fontes JD, Magnani JW, Rienstra M, Pai M, et al. Association between familial atrial fibrillation and risk of new-onset atrial fibrillation. *JAMA*. 2010 Nov 24. 304(20):2263-9. [Medline].
15. Xu DZ, Murakoshi N, Sairenchi T, et al. Anemia and reduced kidney function as risk factors for new onset of atrial fibrillation (from the Ibaraki Prefectural Health Study) [abstract]. *Am J Cardiol*. Nov 11, 2014. [Full Text].
16. Harrison P. Anemia and CKD associated with new-onset AF. *Heartwire*. November 17, 2014. [Full Text].
17. Lloyd-Jones DM, Wang TJ, Leip EP, Larson MG, Levy D, Vasani RS, et al. Lifetime risk for development of atrial fibrillation: the Framingham Heart Study. *Circulation*. 2004 Aug 31. 110(9):1042-6. [Medline].
18. Abdel Latif A, Messinger-Rapport BJ. Should nursing home residents with atrial fibrillation be anticoagulated?. *Cleve Clin J Med*. 2004 Jan. 71(1):40-4. [Medline].
19. Alonso A, Lopez FL, Matsushita K, et al. Chronic Kidney Disease Is Associated With the Incidence of Atrial Fibrillation: The Atherosclerosis Risk in Communities (ARIC) Study. *Circulation*. 2011 Jun 28. 123(25):2946-53. [Medline].
20. Stöllerberger C, Chnupa P, Abzieher C, Länger T, Finsterer J, Klem I, et al. Mortality and rate of stroke or embolism in atrial fibrillation during long-term follow-up in the embolism in left atrial thrombi (ELAT) study. *Clin Cardiol*. 2004 Jan. 27(1):40-6. [Medline].
21. Rathore SS, Berger AK, Weinfurt KP, Schulman KA, Oetgen WJ, Gersh BJ, et al. Acute myocardial infarction complicated by atrial fibrillation in the elderly: prevalence and outcomes. *Circulation*. 2000 Mar 7. 101(9):969-74. [Medline].
22. Avgil Tsadok M, Jackevicius CA, Rahme E, Humphries KH, Behloul H, Pilote L. Sex differences in stroke risk among older patients with recently diagnosed atrial fibrillation. *JAMA*. 2012 May 9. 307(18):1952-8. [Medline].
23. Wolf PA, Abbott RD, Kannel WB. Atrial fibrillation as an independent risk factor for stroke: the Framingham Study. *Stroke*. 1991 Aug. 22(8):983-8. [Medline].
24. Wyse DG, Waldo AL, DiMarco JP, Domanski MJ, Rosenberg Y, Schron EB, et al. A comparison of rate control and rhythm control in patients with atrial fibrillation. *N Engl J Med*. 2002 Dec 5. 347(23):1825-33. [Medline].
25. Kotecha D, Chudasama R, Lane DA, Kirchhof P, Lip GY. Atrial fibrillation and heart failure due to reduced versus preserved ejection fraction: A systematic review and meta-analysis of death and adverse outcomes. *Int J Cardiol*. 2016 Jan 15. 203:660-6. [Medline].
26. Hobbs FD, Roalke AK, Lip GY, et al. Performance of stroke risk scores in older people with atrial fibrillation not taking warfarin: comparative cohort study from BAFTA trial. *BMJ*. 2011 Jun 23. 342:d3653. [Medline].
27. Welles CC, Whooley MA, Na B, et al. The CHADS(2) score predicts ischemic stroke in the absence of atrial fibrillation among subjects with coronary heart disease: Data from the Heart and Soul Study. *Am Heart J*. 2011 Sep. 162(3):555-61. [Medline].
28. Gerth A, Nabauer M, Oeff M, et al. Stroke events in patients with CHADS2 scores 0 and 1 in a contemporary population of patients with atrial fibrillation: results from the German AFNET registry [abstract 4381]. Presented at: European Society of Cardiology (ESC) Congress 2013; September 3, 2013; Amsterdam, The Netherlands. *Eur Heart J*. 2013. 34 (suppl):808. [Full Text].
29. Hughes S. CHA2DS2-VASc score best for stroke risk assessment in AF. *Medscape Medical News*. September 19, 2013. [Full Text].
30. Marzona I, O'Donnell M, Teo K, Gao P, Anderson C, Bosch J, et al. Increased risk of cognitive and functional decline in patients with atrial fibrillation: results of the ONTARGET and TRANSCEND studies. *CMAJ*. 2012 Feb 27. [Medline].
31. Jabre P, Roger VL, Murad MH, et al. Mortality associated with atrial fibrillation in patients with myocardial infarction: a systematic review and meta-analysis. *Circulation*. 2011 Apr 19. 123(15):1587-93. [Medline].
32. van Diepen S, Bakal JA, McAlister FA, Ezekowitz JA. Mortality and readmission of patients with heart failure, atrial fibrillation, or coronary artery disease undergoing noncardiac surgery: an analysis of 38 047 patients. *Circulation*. 2011 Jul 19. 124(3):289-96. [Medline].
33. Michael JA, Stiell IG, Agarwal S, Mandavia DP. Cardioversion of paroxysmal atrial fibrillation in the emergency department. *Ann Emerg Med*. 1999 Apr. 33(4):379-87. [Medline].
34. Page RL, Wilkinson WE, Clair WK, McCarthy EA, Pritchett EL. Asymptomatic arrhythmias in patients with symptomatic paroxysmal atrial fibrillation and paroxysmal supraventricular tachycardia. *Circulation*. 1994 Jan. 89(1):224-7. [Medline].
35. van den Bos EJ, Constantinescu AA, van Domburg RT, Akin S, Jordaens LJ, Kofflard MJ. Minor elevations in troponin I are associated with mortality and adverse cardiac events in patients with atrial fibrillation. *Eur Heart J*. 2011 Mar. 32(5):611-7. [Medline].

36. Klein AL, Grimm RA, Murray RD, Apperson-Hansen C, Asinger RW, Black IW, et al. Use of transesophageal echocardiography to guide cardioversion in patients with atrial fibrillation. *N Engl J Med*. 2001 May 10. 344(19):1411-20. [Medline].
37. Marrouche N. Delayed Enhancement - MRI determinant of successful Catheter Ablation of Atrial Fibrillation (DECAAF): analysis of post ablation scar and outcome. Presented at: The European Society of Cardiology (ESC) Congress 2013; September 1, 2013; Amsterdam, The Netherlands. [Full Text].
38. O'Riordan M. DECAAF: Targeting MRI-identified fibrosis during ablation improves outcomes. *Heartwire*. September 1, 2013. [Full Text].
39. Fang MC, Go AS, Chang Y, Borowsky LH, Pomernacki NK, Udaltsova N, et al. Thirty-Day Mortality After Ischemic Stroke and Intracranial Hemorrhage in Patients With Atrial Fibrillation On and Off Anticoagulants. *Stroke*. 2012 Apr 26. [Medline].
40. Steinberg BA, Kim S, Piccini JP, Fonarow GC, Lopes RD, Thomas L, et al. Use and Associated Risks of Concomitant Aspirin Therapy with Oral Anticoagulation in Patients with Atrial Fibrillation: Insights from the ORBIT-AF Registry. *Circulation*. 2013 Jul 16. [Medline].
41. Sjalander S, Sjalander A, Svensson PJ, Friberg L. Atrial fibrillation patients do not benefit from acetylsalicylic acid. *Europace*. 2014 May. 16(5):631-8. [Medline]. [Full Text].
42. van Walraven C, Hart RG, Wells GA, Petersen P, Koudstaal PJ, Gullov AL. A clinical prediction rule to identify patients with atrial fibrillation and a low risk for stroke while taking aspirin. *Arch Intern Med*. 2003 Apr 28. 163(8):936-43. [Medline].
43. Olesen JB, Lip GY, Hansen ML, Hansen PR, Tolstrup JS, Lindhardsen J, et al. Validation of risk stratification schemes for predicting stroke and thromboembolism in patients with atrial fibrillation: nationwide cohort study. *BMJ*. 2011 Jan 31. 342:d124. [Medline]. [Full Text].
44. January CT, Wann LS, Alpert JS, et al. 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. 2014 Mar 28. [Medline].
45. [Guideline] Busko M. New AF Guideline Includes Four Key Changes. *Heartwire*. March 28 2014. [Full Text].
46. [Guideline] Camm AJ, Lip GY, De Caterina R, et al. 2012 focused update of the ESC Guidelines for the management of atrial fibrillation: an update of the 2010 ESC Guidelines for the management of atrial fibrillation. Developed with the special contribution of the European Heart Rhythm Association. *Eur Heart J*. 2012 Nov. 33(21):2719-47. [Medline]. [Full Text].
47. Hagens VE, Rancho AV, Van Sonderen E, Bosker HA, Kamp O, Tijssen JG, et al. Effect of rate or rhythm control on quality of life in persistent atrial fibrillation. Results from the Rate Control Versus Electrical Cardioversion (RACE) Study. *J Am Coll Cardiol*. 2004 Jan 21. 43(2):241-7. [Medline].
48. Busko M. Fatal Foxglove: Digoxin in Early AF Ups Mortality Risk. *Medscape*. Aug 11 2014. [Full Text].
49. Turakhia MP, Santangeli P, Winkelmayr WC, et al. Increased Mortality Associated With Digoxin in Contemporary Patients With Atrial Fibrillation: Findings From the TREAT-AF Study. *J Am Coll Cardiol*. 2014 Aug 19. 64(7):660-8. [Medline].
50. McNamara RL, Tamariz LJ, Segal JB, Bass EB. Management of atrial fibrillation: review of the evidence for the role of pharmacologic therapy, electrical cardioversion, and echocardiography. *Ann Intern Med*. 2003 Dec 16. 139(12):1018-33. [Medline].
51. Fang MC, Go AS, Chang Y, et al. A New Risk Scheme to Predict Warfarin-Associated Hemorrhage The ATRIA (Anticoagulation and Risk Factors in Atrial Fibrillation) Study. *J Am Coll Cardiol*. 2011 Jul 19. 58(4):395-401. [Medline].
52. FDA. FDA approves Xarelto to prevent stroke in people with common type of abnormal heart rhythm. US Food and Drug Administration. Available at <http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm278646.htm>. Accessed: November 4, 2011.
53. Bayer Schering Pharma AG. Xarelto: Summary of Product Characteristics. Available at http://www.xarelto.com/scripts/pages/en/information-on-xarelto/summary_of_product_characteristics/index.php. Accessed: 2008.
54. Patel MR, Mahaffey KW, Garg J, Pan G, Singer DE, Hacke W, et al. Rivaroxaban versus warfarin in nonvalvular atrial fibrillation. *N Engl J Med*. 2011 Sep 8. 365(10):883-91. [Medline].
55. Wallentin L, Yusuf S, Ezekowitz MD, Alings M, Flather M, Franzosi MG, et al. Efficacy and safety of dabigatran compared with warfarin at different levels of international normalized ratio control for stroke prevention in atrial fibrillation: an analysis of the RE-LY trial. *Lancet*. 2010 Sep 18. 376(9745):975-83. [Medline].
56. O'Riordan M. Consistent benefit of apixaban, even in patients at highest risk of bleeding: ARISTOTLE. *Medscape Medical News*. Available at <http://www.medscape.com/viewarticle/772080>. Accessed: October 15, 2012.
57. Lopes RD, Al-Khatib SM, Wallentin L, et al. Efficacy and safety of apixaban compared with warfarin according to patient risk of stroke and of bleeding in atrial fibrillation: a secondary analysis of a randomised controlled trial. *Lancet*. 2012 Oct 1. [Medline].
58. Granger CB, Alexander JH, McMurray JJ, et al. Apixaban versus warfarin in patients with atrial fibrillation. *N Engl J Med*. 2011 Sep 15. 365(11):981-92. [Medline]. [Full Text].
59. Connolly SJ, Eikelboom J, Joyner C, Diener HC, Hart R, Golitsyn S, et al. Apixaban in patients with atrial fibrillation. *N Engl J Med*. 2011 Mar 3. 364(9):806-17. [Medline]. [Full Text].
60. O'Riordan M. FDA approves apixaban to prevent stroke in nonvalvular AF. *Medscape Medical News*. Dec 28, 2012. [Full Text].
61. Lowes R. FDA Okays Kcentra to Reverse Anticoagulation, Stop Bleeding. *Medscape Medical News*. Available at <http://www.medscape.com/viewarticle/803321>. Accessed: May 8, 2013.

62. O'Shea SI, Arcasoy MO, Samsa G, Cummings SE, Thames EH, Surwit RS, et al. Direct-to-patient expert system and home INR monitoring improves control of oral anticoagulation. *J Thromb Thrombolysis*. 2008 Aug. 26(1):14-21. [Medline].
63. van Walraven C, Hart RG, Connolly S, Austin PC, Mant J, Hobbs FD, et al. Effect of age on stroke prevention therapy in patients with atrial fibrillation: the atrial fibrillation investigators. *Stroke*. 2009 Apr. 40(4):1410-6. [Medline].
64. Gage BF, Yan Y, Milligan PE, Waterman AD, Culverhouse R, Rich MW, et al. Clinical classification schemes for predicting hemorrhage: results from the National Registry of Atrial Fibrillation (NRAF). *Am Heart J*. 2006 Mar. 151(3):713-9. [Medline].
65. Larsen TB, Lip GY. Warfarin or novel oral anticoagulants for atrial fibrillation?. *Lancet*. 2013 Dec 3. [Medline].
66. Giugliano RP, Ruff CT, Braunwald E, Murphy SA, Wiviott SD, Halperin JL, et al. Edoxaban versus warfarin in patients with atrial fibrillation. *N Engl J Med*. 2013 Nov 28. 369(22):2093-104. [Medline].
67. Stiles S. New Oral Anticoagulant Stroke-Protection Benefits in AF Cut Across Subgroups in Meta-Analysis. *Medscape Medical News*. Available at <http://www.medscape.com/viewarticle/815453>. Accessed: December 17, 2013.
68. Ruff CT, Giugliano RP, Braunwald E, Hoffman EB, Deenadayalu N, Ezekowitz MD, et al. Comparison of the efficacy and safety of new oral anticoagulants with warfarin in patients with atrial fibrillation: a meta-analysis of randomised trials. *Lancet*. 2013 Dec 3. [Medline].
69. Connolly SJ, Ezekowitz MD, Yusuf S, Eikelboom J, Oldgren J, Parekh A, et al. Dabigatran versus warfarin in patients with atrial fibrillation. *N Engl J Med*. 2009 Sep 17. 361(12):1139-51. [Medline].
70. Uchino K, Hernandez AV. Dabigatran Association With Higher Risk of Acute Coronary Events: Meta-analysis of Noninferiority Randomized Controlled Trials. *Arch Intern Med*. 2012 Jan 9. [Medline].
71. Stiles S. Major Bleeds Less Daunting With Dabigatran Than Warfarin in Meta-Analysis. *Medscape*. Oct 4 2013. [Full Text].
72. Majeed A, Hwang HG, Connolly SJ, Eikelboom JW, Ezekowitz MD, Wallentin L, et al. Management and outcomes of major bleeding during treatment with dabigatran or warfarin. *Circulation*. 2013 Sep 30. [Medline].
73. Imazio M, Brucato A, Ferrazzi P, Rovere ME, Gandino A, Cemin R, et al. Colchicine Reduces Postoperative Atrial Fibrillation: Results of the Colchicine for the Prevention of the Postpericardiotomy Syndrome (COPPS) Atrial Fibrillation Substudy. *Circulation*. 2011 Nov 22. 124(21):2290-2295. [Medline].
74. O'Riordan M. Colchicine postablation reduces early AF recurrences. *Medscape Medical News*. Available at <http://www.medscape.com/viewarticle/772079>. Accessed: October 15, 2012.
75. Deffereos S, Giannopoulos G, Kossyvakis C, et al. Colchicine for prevention of early atrial fibrillation recurrence after pulmonary vein isolation: a randomized controlled study. *J Am Coll Cardiol*. 2012 Sep 22. [Medline]. [Full Text].
76. Hansen ML, Sørensen R, Clausen MT, Fog-Petersen ML, Raunso J, Gadsbøll N, et al. Risk of bleeding with single, dual, or triple therapy with warfarin, aspirin, and clopidogrel in patients with atrial fibrillation. *Arch Intern Med*. 2010 Sep 13. 170(16):1433-41. [Medline].
77. [Guideline] Hughes S. New AAN Guidelines on Stroke Prevention in AF. *Medscape Medical News*. Feb 24 2014. [Full Text].
78. [Guideline] Culebras A, Messe SR, Chaturvedi S, et al. Summary of evidence-based guideline update: Prevention of stroke in nonvalvular atrial fibrillation: Report of the Guideline Development Subcommittee of the American Academy of Neurology. *Neurology*. 2014 Feb 25. 82(8):716-24. [Medline].
79. Kowey PR, Reiffel JA, Ellenbogen KA, Naccarelli GV, Pratt CM. Efficacy and safety of prescription omega-3 fatty acids for the prevention of recurrent symptomatic atrial fibrillation: a randomized controlled trial. *JAMA*. 2010 Dec 1. 304(21):2363-72. [Medline].
80. Liu T, Korantzopoulos P, Shehata M, Li G, Wang X, Kaul S. Prevention of atrial fibrillation with omega-3 fatty acids: a meta-analysis of randomised clinical trials. *Heart*. 2011 Jul. 97(13):1034-40. [Medline].
81. Shi y, Li D, Tardif JC, Nattel S. Enalapril effects on atrial remodeling and atrial fibrillation in experimental congestive heart failure. *Cardiovasc Res*. 2002. 54:456-61.
82. Moreno I, Caballero R, Gonzalez T et al. Effects of irbesartan on cloned potassium channels involved in human cardiac repolarization. *J Pharmacol Exp Ther*. 2003. 304:862-873.
83. Gerds E, Wachtell K, Omvik, P et al. Left atrial size and risk of major cardiovascular events during antihypertensive treatment: Losartan Intervention for Endpoint Reduction in Hypertension trial. *Hypertension*. 2007. 49:311-316.
84. Yusuf S, Healey JS, Pogue J, Chrolavicius S, Flather M, Hart RG, et al. Irbesartan in patients with atrial fibrillation. *N Engl J Med*. 2011 Mar 10. 364(10):928-38. [Medline].
85. Doyle JF, Ho KM. Benefits and risks of long-term amiodarone therapy for persistent atrial fibrillation: a meta-analysis. *Mayo Clin Proc*. 2009 Mar. 84(3):234-42. [Medline]. [Full Text].
86. Roy D, Talajic M, Dorian P, Connolly S, Eisenberg MJ, Green M, et al. Amiodarone to prevent recurrence of atrial fibrillation. Canadian Trial of Atrial Fibrillation Investigators. *N Engl J Med*. 2000 Mar 30. 342(13):913-20. [Medline].
87. FDA drug safety communication: Multaq (dronedarone) and increased risk of death and serious cardiovascular adverse events. July 21, 2011. U.S. Food and Drug Administration. Available at <http://www.fda.gov/Drugs/DrugSafety/ucm264059.htm>. Accessed: July 26, 2011.
88. Connolly SJ, Camm AJ, Halperin JL, et al. Dronedarone in High-Risk Permanent Atrial Fibrillation. *N Engl J Med*. 2011 Nov 14. [Medline].

89. Goodier R. Dofetilide cardioversion may increase proarrhythmia risk. *Medscape Medical News*. June 3, 2013. [Full Text].
90. Brumberg G, Gera N, Pray C, Adelstein E, Barrington W, Bazaz R, et al. Frequency of Toxicity With Chemical Conversion of Atrial Fibrillation With Dofetilide. *Am J Cardiol*. 2013 May 22. [Medline].
91. Echt DS, Liebson PR, Mitchell LB, Peters RW, Obias-Manno D, Barker AH, et al. Mortality and morbidity in patients receiving encainide, flecainide, or placebo. The Cardiac Arrhythmia Suppression Trial. *N Engl J Med*. 1991 Mar 21. 324(12):781-8. [Medline].
92. Hoyt H, Bhonsale A, Chilukuri K, Alhumaid F, Needleman M, Edwards D, et al. Complications arising from catheter ablation of atrial fibrillation: Temporal trends and predictors. *Heart Rhythm*. 2011 Dec. 8(12):1869-74. [Medline].
93. Boersma LV, Castella M, van Boven W, et al. Atrial Fibrillation Catheter Ablation Versus Surgical Ablation Treatment (FAST): A 2-Center Randomized Clinical Trial. *Circulation*. 2012 Jan 3. 125(1):23-30. [Medline].
94. Healey JS, Baranchuk A, Crystal E, Morillo CA, Garfinkle M, Yusuf S, et al. Prevention of atrial fibrillation with angiotensin-converting enzyme inhibitors and angiotensin receptor blockers: a meta-analysis. *J Am Coll Cardiol*. 2005 Jun 7. 45(11):1832-9. [Medline].
95. Fauchier L, Pierre B, de Labriolle A, Grimard C, Zannad N, Babuty D. Antiarrhythmic effect of statin therapy and atrial fibrillation a meta-analysis of randomized controlled trials. *J Am Coll Cardiol*. 2008 Feb 26. 51(8):828-35. [Medline].
96. Vermes E, Tardif JC, Bourassa MG, Racine N, Levesque S, White M, et al. Enalapril decreases the incidence of atrial fibrillation in patients with left ventricular dysfunction: insight from the Studies Of Left Ventricular Dysfunction (SOLVD) trials. *Circulation*. 2003 Jun 17. 107(23):2926-31. [Medline].
97. Pedersen OD, Bagger H, Kober L, Torp-Pedersen C. Trandolapril reduces the incidence of atrial fibrillation after acute myocardial infarction in patients with left ventricular dysfunction. *Circulation*. 1999 Jul 27. 100(4):376-80. [Medline].
98. Alboni P, Botto GL, Baldi N, Luzi M, Russo V, Gianfranchi L, et al. Outpatient treatment of recent-onset atrial fibrillation with the "pill-in-the-pocket" approach. *N Engl J Med*. 2004 Dec 2. 351(23):2384-91. [Medline].
99. Fuster V, Rydén LE, Cannom DS, Crijns HJ, Curtis AB, Ellenbogen KA, et al. [ACC/AHA/ESC 2006 guidelines for the management of patients with atrial fibrillation--executive summary]. *Rev Port Cardiol*. 2007 Apr. 26(4):383-446. [Medline].
100. [Guideline] Goldstein LB, Bushnell CD, Adams RJ, Appel LJ, Braun LT, Chaturvedi S, et al. Guidelines for the Primary Prevention of Stroke. A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke*. 2010 Dec 6. [Medline].
101. Bradley D, Creswell LL, Hogue CW Jr, Epstein AE, Prystowsky EN, Daoud EG. Pharmacologic prophylaxis: American College of Chest Physicians guidelines for the prevention and management of postoperative atrial fibrillation after cardiac surgery. *Chest*. 2005 Aug. 128(2 Suppl):39S-47S. [Medline].
102. Sezai A, Minami K, Nakai T, et al. Landiolol hydrochloride for prevention of atrial fibrillation after coronary artery bypass grafting: New evidence from the PASCAL trial. *J Thorac Cardiovasc Surg*. 2011 Jun. 141(6):1478-87. [Medline].
103. Anselme F, Saoudi N, Cribier A. Pacing in prevention of atrial fibrillation: the PIPAF studies. *J Interv Card Electrophysiol*. 2000 Jan. 4 Suppl 1:177-84. [Medline].
104. Roux JF, Zado E, Callans DJ, Garcia F, Lin D, Marchlinski FE, et al. Antiarrhythmics After Ablation of Atrial Fibrillation (5A Study). *Circulation*. 2009 Sep 22. 120(12):1036-40. [Medline].
105. Hussein AA, Wazni OM, Harb S, et al. Radiofrequency ablation of atrial fibrillation in patients with mechanical mitral valve prostheses safety, feasibility, electrophysiologic findings, and outcomes. *J Am Coll Cardiol*. 2011 Aug 2. 58(6):596-602. [Medline].
106. Onorati F, Mariscalco G, Rubino AS, Serraino F, Santini F, Musazzi A, et al. Impact of lesion sets on mid-term results of surgical ablation procedure for atrial fibrillation. *J Am Coll Cardiol*. 2011 Feb 22. 57(8):931-40. [Medline].
107. Haïssaguerre M, Shah DC, Jaïs P, Hocini M, Yamane T, Deisenhofer I, et al. Electrophysiological breakthroughs from the left atrium to the pulmonary veins. *Circulation*. 2000 Nov 14. 102(20):2463-5. [Medline].
108. Jaïs P, Shah DC, Haïssaguerre M, Hocini M, Garrigue S, Clémenty J. Atrial fibrillation: role of arrhythmogenic foci. *J Interv Card Electrophysiol*. 2000 Jan. 4 Suppl 1:29-37. [Medline].
109. Santangeli P, Di Biase L, Santoro F, et al. Pulmonary Vein Antrum Isolation in Patients With Paroxysmal Atrial Fibrillation: A Decade of Follow-Up. Nov 18 2013. [Full Text].
110. Soga Y, Okabayashi H, Arai Y, et al. Up to 6-year follow-up after pulmonary vein isolation for persistent/permanent atrial fibrillation: Importance of sinus node function. *J Thorac Cardiovasc Surg*. 2011 Jun. 141(6):1455-60. [Medline].
111. O'Neill MD, Jaïs P, Hocini M, Sacher F, Klein GJ, Clémenty J, et al. Catheter ablation for atrial fibrillation. *Circulation*. 2007 Sep 25. 116(13):1515-23. [Medline].
112. Winkle RA, Mead RH, Engel G, Patrawala RA. Long-term results of atrial fibrillation ablation: The importance of all initial ablation failures undergoing a repeat ablation. *Am Heart J*. 2011 Jul. 162(1):193-200. [Medline].
113. Stiles S. Repeat Ablation Wins Out Over Antiarrhythmic Agents for Recurrent Paroxysmal. *Medscape*. May 13 2013. [Full Text].
114. Progression of Atrial Fibrillation After a Failed Initial Ablation Procedure in Patients With Paroxysmal Atrial Fibrillation: A Randomized Comparison of the Drug Therapy Versus Re-Ablation. *ClinicalTrials.gov*. [Full Text].

115. Doshi RN, Daoud EG, Fellows C, Turk K, Duran A, Hamdan MH, et al. Left ventricular-based cardiac stimulation post AV nodal ablation evaluation (the PAVE study). *J Cardiovasc Electrophysiol*. 2005 Nov. 16 (11):1160-5. [Medline].
116. Natale A, Zimmerman L, Tomassoni G, Newby K, Leonelli F, Fanelli R, et al. AV node ablation and pacemaker implantation after withdrawal of effective rate-control medications for chronic atrial fibrillation: effect on quality of life and exercise performance. *Pacing Clin Electrophysiol*. 1999 Nov. 22(11):1634-9. [Medline].
117. Holmes DR, Reddy VY, Turi ZG, Doshi SK, Sievert H, Buchbinder M, et al. Percutaneous closure of the left atrial appendage versus warfarin therapy for prevention of stroke in patients with atrial fibrillation: a randomised non-inferiority trial. *Lancet*. 2009 Aug 15. 374(9689):534-42. [Medline].
118. Pappone C, Rosanio S, Oreto G, Tocchi M, Gugliotta F, Vicedomini G, et al. Circumferential radiofrequency ablation of pulmonary vein ostia: A new anatomic approach for curing atrial fibrillation. *Circulation*. 2000 Nov 21. 102(21):2619-28. [Medline].
119. Damiano RJ Jr, Lawrance CP, Saint LL, et al. Detection of atrial fibrillation after surgical ablation: conventional versus continuous monitoring. *Ann Thorac Surg*. 2016 Jan. 101 (1):42-8. [Medline].
120. Schillig J, Kaatz S, Hudson M, et al. Clinical and safety impact of an inpatient Pharmacist-Directed anticoagulation service. *J Hosp Med*. 2011 Jul. 6(6):322-8. [Medline].
121. Connolly SJ, Pogue J, Hart RG, Hohnloser SH, Pfeffer M, Chrolavicius S, et al. Effect of clopidogrel added to aspirin in patients with atrial fibrillation. *N Engl J Med*. 2009 May 14. 360(20):2066-78. [Medline].
122. Paré G, Mehta SR, Yusuf S, Anand SS, Connolly SJ, Hirsh J, et al. Effects of CYP2C19 genotype on outcomes of clopidogrel treatment. *N Engl J Med*. 2010 Oct 28. 363(18):1704-14. [Medline].
123. Stiell IG, Dickinson G, Butterfield NN, Clement CM, Perry JJ, Vaillancourt C, et al. Vernakalant Hydrochloride: A Novel Atrial-selective Agent for the Cardioversion of Recent-onset Atrial Fibrillation in the Emergency Department. *Acad Emerg Med*. Nov 2, 2010. 17(11):1175-1182.
124. Schmidt M, Christiansen CF, Mehnert F, Rothman KJ, Sorensen HT. Non-steroidal anti-inflammatory drug use and risk of atrial fibrillation or flutter: population based case-control study. *BMJ*. 2011 Jul 4. 343:d3450. [Medline].
125. Everett BM, Cook NR, Conen D, Chasman DI, Ridker PM, Albert CM. Novel genetic markers improve measures of atrial fibrillation risk prediction. *Eur Heart J*. 2013 Feb 26. [Medline].
126. Hughes S. CRYSTAL-AF: Monitor Detects AF in Cryptogenic Stroke. Medscape [serial online]. Available at <http://www.medscape.com/viewarticle/820686>. Accessed: February 24, 2014.
127. Nagy-Baló E, Tint D, Clemens M, Beke I, Kovács KR, Csiba L, et al. Transcranial Measurement of Cerebral Microembolic Signals during Pulmonary Vein Isolation: A Comparison of Two Ablation Techniques. *Circ Arrhythm Electrophysiol*. 2013 Apr 11. [Medline].
128. Vassiliou VS, Flynn PD. Apixaban in atrial fibrillation: does predicted risk matter?. *Lancet*. 2012 Oct 1. [Medline].
129. Verberk WJ, Omboni S, Kollias A, Stergiou GS. Screening for atrial fibrillation with automated blood pressure measurement: Research evidence and practice recommendations. *Int J Cardiol*. 2016 Jan 15. 203:465-73. [Medline].

Medscape Reference © 2011 WebMD, LLC