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# IMPORTANCE OF ELECTRICAL CARDIOVERSION FOR PATIENT WITH ATRIAL FIBRILLATION IN EMERGENCY DEPARTMENT

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**Abstract:**

*In this review we discuss the treatment methods for individuals in the ED with acute atrial fibrillation; in particular, electrical cardioversion, alternatives for cardioversion (chemical versus electrical) and the safety and security of these strategies when utilized in the ED. Comprehensive search through most popular database; PubMed was performed for all articles on electrical cardioversion for patient with atrial fibrillation in emergency department published in English language up to September, 2019. AF, the most common supraventricular tachyarrhythmia, can cause stroke, cardiac arrest, and heart attack if untreated. AF cardioversion is feasible in the ED. Nonetheless, as regularly occurs, decision-making in ED is accomplished with some uncertainty since perfect randomized medical tests are not offered for real-world problems. The use ED Cardioversion in patients with current start of AF is associated with reduced hospital fees. These results would support the expense performance of aggressive ED management of patients with this condition. While the management of unpredictable AF or AFL is unambiguous, there are several prospective treatment methods for secure but symptomatic AF or AFL.*

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## INTRODUCTION:

Atrial fibrillation can be found out as one of the most widespread type of arrhythmia in grownups, accounting for nearly thirty percent of hospital stays for arrhythmia [1]. The occurrence boosts from less than 1% in persons younger than 60 years of age to greater than 8% in those older than 80 years old [2]. The occurrence varies from 0.2% annually for males 30 to 39 years of age to 2.3% per year in males 80 to 89 years of age [3]. The age-adjusted incidence for females has to do with half that of males [3]. Worldwide over 33 million individuals have AF, and the occurrence is anticipated to enhance by 250% by the year 2050 [4], [5].

The cardiac problems most generally associated with atrial fibrillation are rheumatic mitral valve disorder, coronary artery illnesses, coronary infarction, and hypertension [3]. Noncardiac reasons consist of hyperthyroidism, hypoxic conditions, surgical treatment, and alcohol intoxication. A predisposing condition exists in greater than 90% of instances; the remaining instances have what is called sole atrial fibrillation [6]. Individuals with atrial fibrillation often have signs of hemodynamic compromise, varying from irregular palpitations to the extra dangerous sensation of malaise. They likewise have an enhanced risk for thromboembolism. Comparing to age-matched controls, the relative risk for stroke is boosted 2- to 7-fold in individuals with nonrheumatic atrial fibrillation, and the absolute threat for stroke is between 1% and 5% per year, depending on professional attributes [3], [5].

Quality of life is an essential consideration for patients. Paroxysmal atrial fibrillation interferes with the lives of patients; however, this perception might not be related to frequency or duration of signs and symptoms [5], [7]. Warfarin treatment affects quality of life because of constant blood screening and suggestions for restricting some activities. Gage and associates discovered that atrial fibrillation lowers utility, a quantitative evaluation of quality of life utilized in decision evaluation, by 1.3% [7].

The American College of Cardiology/American Heart Association/European Society of Cardiology Task Force on Clinical Guidelines for the Management of Atrial Fibrillation categorized atrial fibrillation right into 4 types: first detected episode, paroxysmal (ends automatically), persistent (electric or pharmacologic discontinuation required), and permanent (immune to electrical or pharmacologic conversion or approved by the medical professional) [8].

Emergency department (ED) cardioversion (EDCV) and discharge of individuals with recent onset atrial fibrillation or atrial flutter (AF) has been revealed to be a secure and efficient management technique. In this review we discuss the treatment methods for individuals in the ED with acute atrial fibrillation; in particular, electrical cardioversion, alternatives for cardioversion (chemical versus electrical) and the safety and security of these strategies when utilized in the ED.

## METHODOLOGY:

Comprehensive search through most popular database; PubMed was performed for all articles on electrical cardioversion for patient with atrial fibrillation in emergency department published in English language up to September, 2019. Relevant papers on the working urgent or clinical performance of the techniques were selected. Search strategy of this paper used the search terms “electrical cardioversion” and “atrial fibrillation”, “emergency department. Reference lists of retrieved papers were manually reviewed for additional relevant articles.

## DISCUSSION:

### Classification and Pathophysiology:

AF is a supraventricular tachyarrhythmia identified by a fast, uneven heart rate and ineffective atrial contractions. AF typically is categorized as paroxysmal, permanent, or resistent [10]. Paroxysmal AF is specified by atrial fibrillation that converts to sinus rhythm, either spontaneously or within a week after intervention. Persistent AF lasts longer than a week and normally calls for cardioversion to transform to sinus rhythm. Long-term AF describes people with persistent AF either refractory to cardioversion or where a choice has been made to no longer effort to transform to sinus rhythm. New-onset AF refers to first-diagnosed or first-detected AF, and recent-onset describes symptomatic AF that began within the last 48 hours. Ultimately, the term nonvalvular AF describes atrial fibrillation in the lack of rheumatic ailment, mitral stenosis, a prosthetic valve, or mitral shutoff repair work.

Numerous occasions may incite AF, consisting of autonomic nerves excitement, bradycardia, atrial premature beats, atrial tachycardia, accessory AV pathways, acute atrial stretch, and ectopic foci in atrial tissue [10], [11]. Repetitive prompting events can cause remodeling of the atria and the creation of multifocal reentrant loopholes, typically in the left room near the pulmonary capillaries [11]. As provoking occasions accumulate and renovating proceeds, automatically going back to sinus rhythm,

keeping sinus rhythm, and effective cardioversion end up being more difficult [11].

**Clinical Features:**

AF is identified on the ECG by an irregularly irregular ventricular rate and a lack of discernable P waves (Figures 1). There additionally might be fine or coarse fibrillation waves that might be mistaken for P waves. Usually, symptomatic individuals existing with an RVR, specified by a rate > 100 beats per min (bpm) [10]. Signs and symptoms generally consist of palpitations, lack of breath, lightheadedness, fatigue, anxiety, and breast pain. Indicators typically include an irregular heartbeat on auscultation and an uneven pulse on palpation.

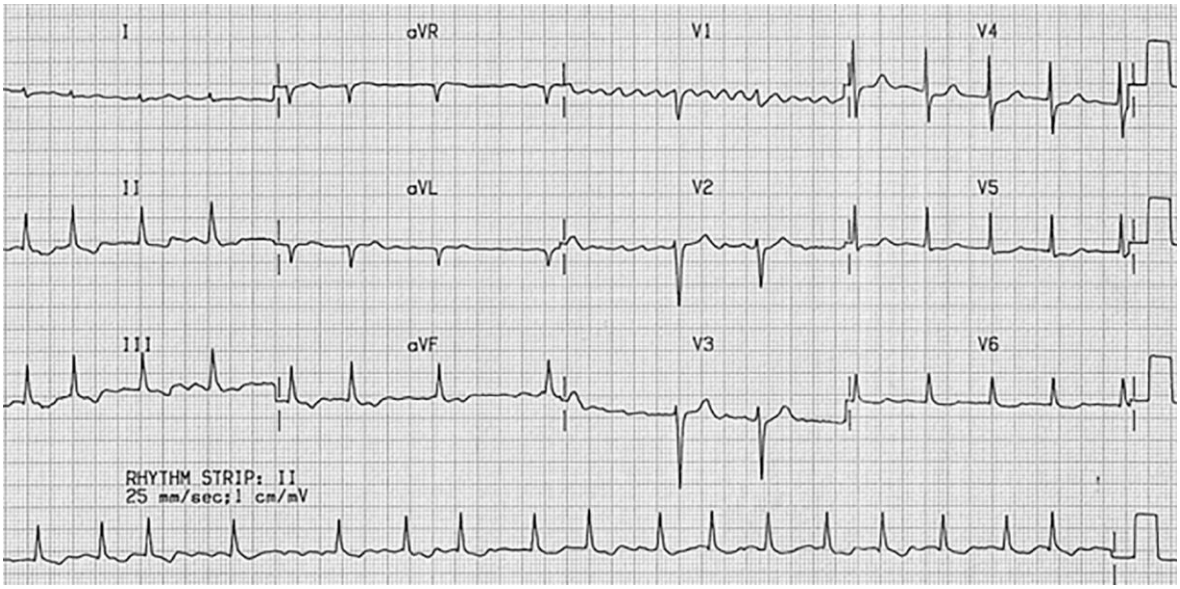


**Figure 1.** Atrial Fibrillation with coarse Atrial Fibrillation waves in Lead V1 [9].

**Echocardiography in the ED:**

Transesophageal echocardiography (TEE) permits evaluation for intracardiac thrombus prior to cardioversion and cardiac function. TEE should be carried out if symptom duration is > 48 h or unidentified prior to cardioversion to examine for thrombus [12], [13]. Nonetheless, if needed for circumstances such as hemodynamic instability, cardioversion can be performed emergently without TEE. In more youthful, healthy and balanced patients with known time of beginning b48 h, transthoracic echocardiography (TTE) is low return and most likely not helpful in the ED, though older patients with higher chance of cardiac abnormality might gain from echocardiography. The American and European guidelines suggest TTE for patients with AF as part of the first examination to evaluate for structural cardiovascular disease, cardiac function (right and left heart), and atrial size, which can happen as outpatient [12], [13].

**Acute rhythm control:**

Standards suggest rhythm control might be helpful for younger patients with greater life expectancy [12], [13]. Elderly patients likely warrant rate control before rhythm control is thought about, though preliminary rhythm control is a valid alternative in details circumstances consisting of known beginning of AF (< 48 h), TEE without any intracardiac thrombus, or on anticoagulation at healing degrees for 3 - 4 weeks [14], [15]. Rate control is the first option for several situations before rhythm control is thought about (Table 1). Rhythm control involves cardioversion, whether by pharmacologic or electric ways. ED studies show electric cardioversion to be 90% reliable and pharmacologic cardioversion to be 60% effective [17-19]. Some patients with new beginning AF may hidden to sinus rhythm within a couple of hours, negating the need for medical or electric cardioversion.

Electrically cardioverted patients frequently go home an hour or two immediately after initiation of cardioversion; nonetheless, the procedure needs a step-by-step sedation, a monitored bed, and a specialized nurse. Contraindications to electric cardioversion include digoxin poisoning and serious hypokalemia [16]. If time permits, an antiarrhythmic (eg, sotalol, ibutilide) may be provided 30 mins in advance of cardioversion, in order to decrease the

defibrillation threshold and promote acute maintenance of sinus rhythm [16].

**Table 1.** Rhythm control/cardioversion contraindications [12],[13].

| **Contraindications to ED cardioversion (electrical or medication)** |
|---|
| – Unknown duration of AF |
| – AF duration ≥48 h |
| – Patient is high risk for stroke: mechanical heart valve, rheumatic heart disease, or recent stroke or transient ischemic attack |
| – Patient is high risk for ventricular dysrhythmia: electrolyte abnormality such as severe hypomagnesemia or hypokalemia, digoxin toxicity |

Conversely, medicine can be used to transform the patient to sinus rhythm. In Canada, where pharmacologic cardioversion prevails in the emergency situation setup (particularly compared to the United States), mostly all emergency physicians have made use of intravenous procainamide considering that the 1990s, for which problems are uncommon and conveniently managed [20]. Nevertheless, cardiovascular standards have actually not included this evidence and do not list procainamide as an option (with the exception of preexcitation) [16]. Rather they suggest flecainide, dofetilide, propafenone (class I), and intravenous ibutilide (class I by American Heart Association [AHA], IIa by European Society of Cardiology [ESC] for pharmacologic cardioversion, which are a lot less often used in the emergency department (Table 2).

**Table 2.** Approach to pharmacologic cardioversion [17-20].

| Medication | Pretreatment | First Dose | Follow-up Dose | Risks |
|---|---|---|---|---|
| ***Procainamide***[a] | — | 15 mg/kg IV over 30– 60 min, maximum rate 20 mg/min (stop or slow rate if hypotension develops, QRS lengthens by >50%, or runs of PVCs) | NA | Hypotension QT and QRS prolongation<br>Nonsustained ventricular arrhythmias |
| ***Flecainide*** | Diltiazem 30 mg PO or metoprolol 25 mg PO | 200–300 mg PO | NA | Hypotension<br>1:1 flutter<br>Bradycardia<br>Avoid in IHD or significant structural heart disease<br>Delayed time to conversion |
| ***Propafenone*** | Diltiazem 30 mg PO or metoprolol 25 mg PO | 450–600 mg PO | NA | |
| ***Amiodarone*** | — | 5–7 mg/kg over 1–2 h | 50 mg/h, max 1.0 g over 24 h | Hypotension, bradycardia bradycardia/AV block<br>Phlebitis<br>Delayed time to conversion (8–12 h) |
| ***Ibutilide*** | MgSO4 2–4 g IV | 1 mg IV over 10 min | Minimum of 10 min later, repeat 1 mg over 10 min if necessary | 2%–3% torsades de pointes<br>Avoid if K< 4.0 mEq/L, severe LVH, low EF<br>Postinfusion 4-h monitoring |
| ***Vernakalant*** | — | 3 mg/kg over 10 min | 2 mg/kg over 10 min after waiting for 15 min | Hypotension<br>QT and QRS prolongation<br>Nonsustained ventricular arrhythmias<br>Avoid if SBP<100 mm Hg, recent ACS, NYHA class III/IV heart failure, QT prolongation |

Abbreviations: EF, ejection fraction; IHD, ischemic heart disease; IV, intravenous; LVH, left ventricular hypertrophy; NA, not available; NYHA, New York Heart Association; PO, by mouth; PVCs, premature ventricular contractions; SBP, systolic blood pressure.

[a] The medication used most frequently for pharmacologic cardioversion in the emergency department in the last 20 years.

**Complications:**
Cardioversion is usually elective and can follow two approaches: pharmacological and electrical. There is no proof that the risk of embolism is higher with one or the various other. For that reason, the exact same suggestions referring to anticoagulation ought to be followed for both [8]. A risk of embolism has been shown in atrial flutter; the very same therapeutic method as in AF is as a result recommended [8].

Airakinsen et al. assessed grown-up patients age > 18 with acute start AF (<48 h) treated with cardioversion in the ED [21]. The primary study outcome was thromboembolic event within 30 days after cardioversion. A number of 7660 cardioversions were involved, however the analysis for embolic problems included 2481 patients without peri-procedural or post-procedural anticoagulation. At 30 days, the authors kept in mind 38 thromboembolic occasions: 31 strokes, 4 TIAs, 2 lung emboli, and 1 incorporated stroke and a systemic embolism. Average time to a thromboembolic occasion was 2 days. Further evaluation disclosed cardiac arrest, diabetes, and age > 60 years were related to thromboembolic occasions [21]. The authors wrap up that while overall embolic events are reduced (1.5 % of patients), risk rises in patients with older age, women sex, cardiac arrest, and diabetic issues. While some patients may plainly present with AF in less than a 48-h duration, they need risk stratification [21].

**Which method of emergency cardioversion (electrical or chemical) is optimal?**
Atrial fibrillation and AF prevail emergency department (ED) cardiac arrhythmias [1]. Cardioversion ought to be tried just after adequate anticoagulation. Nevertheless, when acute atrial fibrillation creates haemodynamic instability as of angina pectoris, myocardial infarction, shock or pulmonary oedema, prompt cardioversion should not be delayed achieving restorative anticoagulation. In this situation, intravenous heparin or reduced molecular weight heparin must be initiated before cardioversion [8].

Cardioversion is accomplished electrically (synchronous straight present countershock) or chemically (oral or intravenous antiarrhythmic medications). The development of new antiarrhythmic medicines has increased the popularity of chemical (pharmacological) cardioversion, nevertheless some negative aspects linger, especially the proarrhythmic effect of much of these medications. On the other hand, spontaneous conversion to sinus rhythm within 1 day after the start of atrial fibrillation prevails, occurring in as much as two thirds of patients [23]. Once the period of atrial fibrillation surpasses 1 day, the chance of conversion decreases. After one week of consistent atrial fibrillation, spontaneous conversion is rare [23].

The option of chemical or electrical cardioversion relies on the patient. For instance, in patients with hypertension electric cardioversion might be thrombogenic [22]. Thus, in these patients, chemical cardioversion may be the method of selection for remediation of sinus rhythm. Available facilities and expertise (physician experience) in the emergency department additionally establishes which method of cardioversion can be utilized. For instance, it is preferable to have facilities with emergency exterior cardiac pacing readily available whenever electrical cardioversion is attempted since sinus asystole might happen after cardioversion [24].

Compared to electric cardioversion, chemical cardioversion is simpler however less effective, succeeding in about 50% of emergency division patients [22]. Nonetheless, no sedation or anesthesia backup is needed for successful chemical conversion. Emergency division electric cardioversion achieves success in roughly 80% to 89% of situations however needs intravenous sedation [22]. Hereof, short acting intravenous anesthetic representatives generating aware sedation are preferable because rapid recovery post- cardioversion may avoid hospital admission [24]. Patients who go through an unsuccessful effort at chemical cardioversion can consequently go through effective electrical cardioversion [22].
Immediate electrical cardioversion is suggested in patients with acute atrial fibrillation and a quick ventricular feedback associated with acute myocardial infarction, symptomatic hypertension, angina, or cardiac arrest that does not react without delay to medicinal steps [8].

**Electrical Cardioversion-Based Protocols:**
Seven of the articles largely assessed the safety and effectiveness of electrical cardioversion as a way to efficiently discharge patients' home from the ED [25-29]. Conversion rates for electrical were as high as 97% in the possible associate study by Jacoby et alia, and no less than 78%, which was the rate observed by Dankner et alia [26]. In each of these research studies, mostly all the patients who converted to regular sinus rhythm (NSR) were released residence from the ED. Numerous of the research studies noted a small number of minor ED difficulties with electric, largely

associated with step-by-step sedation [25-29]. No significant unfavorable occasions were observed within 3 months of discharge after ED electric in any one of the included research studies. Especially, hemodynamic instability was an exemption criterion for every one of these researches, so electrical was done simply on an elective basis. In addition, 3 of the 7 research studies called for the beginning of AF/AFL to be less than 48 hours prior to ED presentation for study inclusion [25], [27]. The various other 4 studies allowed an earlier onset of signs, however the big majority of patients still just had signs and symptoms for 48 hrs or much less, no fewer than 68% of the accomplice in the AFL research done by Scheuermeyer et al [25], [27].

## CONCLUSION:

AF, the most common supraventricular tachyarrhythmia, can cause stroke, cardiac arrest, and heart attack if untreated. AF cardioversion is feasible in the ED. Nonetheless, as regularly occurs, decision-making in ED is accomplished with some uncertainty since perfect randomized medical tests are not offered for real-world problems. The use ED Cardioversion in patients with current start of AF is associated with reduced hospital fees. These results would support the expense performance of aggressive ED management of patients with this condition. While the management of unpredictable AF or AFL is unambiguous, there are several prospective treatment methods for secure but symptomatic AF or AFL.

Electrical cardioversion seems more efficient than medicinal cardioversion for patients with acute AF and AFL and lugs a reduced risk for negative impacts. Medicinal cardioversion is helpful over electrical because it does not call for step-by-step sedation. If this is chosen over electric, procainamide, ibutilide or a class IC antiarrhythmic need to be utilized. If medicinal cardioversion is unsuccessful, use electrical needs to be taken into consideration if there are no contraindications.

## REFERENCE:


1. Bialy D, Lehmann MH, Schumacher DN, Steinman RT, Meissner MD. Hospitalization for arrhythmias in the United States: importance of atrial fibrillation [Abstract]J Am Coll Cardiol. 1992;19;41A.
2. Ostrander LD Jr, Brandt RL, Kjelsberg MO, Epstein FH. Electrocardiographic Findings among the Adult Population of a Total Natural Community, Tecumseh, MichiganCirculation.1965;31;888-98.
3. Wolf PA, Abbott RD, Kannel WB. Atrial fibrillation: a major contributor to stroke in the elderly. The Framingham StudyArch Intern Med.1987;147;1561-4.
4. Chugh SS, Havmoeller R, Narayanan K, et al. Worldwide epidemiology of atrial fibrillation: a global burden of disease 2010 study. Circulation 2014; 129(8):837–47.
5. Go AS, Hylek EM, Phillips KA, et al. Prevalence of diagnosed atrial fibrillation in adults: national implications for rhythm management and stroke prevention: the AnTicoagulation and Risk Factors in Atrial Fibrillation (ATRIA) Study. JAMA 2001;285(18): 2370–5.
6. Kopecky SL, Gersh BJ, McGoon MD, Whisnant JP, Holmes DR Jr, Ilstrup DM, . The natural history of lone atrial fibrillation. A population-based study over three decades. N Engl J Med.1987;317;669-74.
7. Gage BF, Cardinalli AB, Owens DK. The effect of stroke and stroke prophylaxis with aspirin or warfarin on quality of life Arch Intern Med.1996;156-1829-36.
8. Fuster V, Ryden LE, Asinger RW, Cannom DS, Crijns HJ, Frye RL, . 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 Am Coll Cardiol.2001;38;1231-66. www.lifeinthefastlane.com.
9. January CT, Wann LS, Alpert JS, et al. 2014 AHA/ACC/HRS guideline 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 Heart Rhythm Society. J Am Coll Cardiol 2014;64: e1-76.
10. Allessie MA, Boyden PA, Camm AJ, et al. Pathophysiology and prevention of atrial fibrillation. Circulation 2001; 103:769-777.
11. January C, Wann S, Joseph S, et al. AHA/ACC/HRS guidelines for the management

of patients with atrial fibrillation: executive summary. J Am Coll Cardiol 2014;2014.
12. Camm AJ, Kirchhof P, Lip GY, et al. Guidelines for the management of atrial fibrillation. Eur Heart J 2010 Oct;31(19):2369–429.
13. Wyse DG, Waldo AL, DiMarco JP, et al. A comparison of rate control and rhythm control in patients with atrial fibrillation. N Engl J Med 2002;347(23):1825–33.
14. AFFIRM investigators. Clinical factors that influence response to treatment strategies in atrial fibrillation: the atrial fibrillation follow-up investigation of rhythm management (AFFIRM) study. Am Heart J 2005;149(4):645–9.
15. January CT, Wann LS, Alpert JS, et al. 2014 AHA/ ACC/HRS guideline for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines Acute Management of Atrial Fibrillation 17 and the Heart Rhythm Society. Circulation 2014; 64(21):e1–76.
16. Kirchhof P, Benussi S, Kotecha D, et al. 2016 ESC guidelines for the management of atrial fibrillation developed in collaboration with EACTS. Eur Heart J 2016;37(38):2893–962.
17. Roy D, Talajic M, Nattel S, et al. Rhythm control versus rate control for atrial fibrillation and heart failure. N Engl J Med 2008;358(25):2667–77.
18. Frick M, Frykman V, Jensen-Urstad M, et al. Factors predicting success rate and recurrence of atrial fibrillation after first electrical cardioversion in patients with persistent atrial fibrillation. Clin Cardiol 2001;24(3):238–44.
19. Michael JA, Stiell IG, Agarwal S, et al. Cardioversion of paroxysmal atrial fibrillation in the emergency department. Ann Emerg Med 1999;33(4):379–87.
20. Airaksinen KE, Gronberg T, Nuotio I, et al. Thromboembolic complications after cardioversion of acute atrial fibrillation: the FinCV (FinnishCardioVersion) study. J Am Coll Cardiol 2013;62(13):1187–92.
21. Michael JA, Steill IG, Agarwal S, et al. Cardioversion of paroxysmal atrial fibrillation in the emergency department. Ann Emerg Med1999; 33:379–87.
22. Danias PG, Caulfield TA, Weigner MJ, et al. Likelihood of spontaneous conversion of atrial fibrillation to sinus rhythm. J Am Coll Cardiol1998; 31:588–92.
23. Lesser MF. Safety and efficacy of in-office cardioversion for treatment of supraventricular arrhythmias. Am J Cardiol1990; 66:1267–8.
24. Burton John H, Vinson David R, Drummond Kate, Strout Tania D, Thode Henry C, McInturff Jeff J. Electrical cardioversion of emergency department patients with atrial fibrillation. Ann Emerg Med. 2004 Jul;44 (1):20–30.
25. Jacoby Jeanne L, Cesta Mark, Heller Michael B, Salen Philip, Reed James. Synchronized emergency department cardioversion of atrial dysrhythmias saves time, money and resources. J Emerg Med. 2005 Jan;28 (1):27–30.
26. Lo G K, Fatovich D M, Haig A D. Biphasic cardioversion of acute atrial fibrillation in the emergency department. Emerg Med J. 2006 Jan;23 (1):51–3.
27. Dankner Rachel, Shahar Amir, Novikov Ilya, Agmon Uri, Ziv Arnona, Hod Hanoch. Treatment of stable atrial fibrillation in the emergency department: a population-based comparison of electrical direct-current versus pharmacological cardioversion or conservative management. Cardiology. 2009;112 (4):270–8.