6.6: Antiarrhythmics

Antiarrhythmics

An arrhythmia is any deviation from the normal rate or pattern of a heartbeat. This includes heart rates that are too slow (bradycardia), too fast (tachycardia), or are irregular. The terms dysrhythmia (disturbed heart rhythm) and arrhythmia (absence of heart rhythm) are traditionally used interchangeably in clinical practice despite their difference in meaning.

The ECG is used to identify and monitor an arrhythmia. See more information about ECGs in the “Review of Basic Concepts” section and an overview of arrhythmias in the “Common Cardiac Disorders” section.

Antiarrhythmic medications regulate heart rate and rhythm by manipulating the conduction of electrical signals to change the heart rate or to attempt to revert an arrhythmia to a normal sinus rhythm. All antiarrhythmic medications have a risk of producing an arrhythmia. Some antiarrhythmic medications are used during emergency situations such as cardiac arrest, whereas others are used long-term, such as those used to control atrial fibrillation. Monitoring electrolytes and the ECG patterns are very important assessments for the nurse administering these types of medications.

Class I – Sodium Channel Blockers

Class I antidysrhythmic medications slow conduction and prolong depolarization by decreasing sodium influx into cardiac cells. There are three subgroups of sodium channel blockers: Class IA, IB, and IC. Quinidine is an example of a Class IA antidysrhythmic. Lidocaine is an example of a Class IB medication that is also used as a local anesthetic. Flecainide is an example of a class IC antidysrhythmic.

Mechanism of Action
Quinidine slows conduction and prolongs depolarization by decreasing sodium influx into cardiac cells. The conduction rate and automaticity are decreased. This medication also has alpha-antagonistic properties that cause peripheral vasodilation.

**Indications for Use**

This medication is typically used for life-threatening ventricular dysrhythmias such as ventricular tachycardia or for conversion of atrial fibrillation that has not responded to other therapy.

**Nursing Considerations Across the Lifespan**

Sodium channel blockers are contraindicated in patients who have a history of thrombocytopenia or myasthenia gravis. Use cautiously with patients who have a serious heart block rhythm and do not have an artificial pacemaker, such as a 2nd degree heart block.

There is an increased risk for toxicity with patients who have heart failure and renal or hepatic dysfunction due to drug accumulation. This medication’s safety has not been thoroughly evaluated in children and geriatric patients. Grapefruit juice should be avoided by patients taking this medication.

**Adverse/Side Effects**

Quinidine may prolong QT interval leading to ventricular arrhythmias, such as ventricular tachycardia or torsades de pointes.

Quinidine may induce thrombocytopenia. Routine lab work may be evaluated by a patient’s health care provider. Common side effects of this medication are nausea, vomiting, diarrhea, fever, chills, abnormal ECG/arrhythmias, and headache.

In many research trials, use of antiarrhythmic therapy for non-life-threatening arrhythmias actually resulted in increased risk of death compared to placebo.\[footnote\]This work is a derivative of Daily Med by U.S. National Library of Medicine in the public domain.\[/footnote\]

**Patient Teaching & Education**

Patients should be instructed regarding the significance of compliance with therapeutic drug regimen and take medications as prescribed, even if not symptomatic. Patients or family members may need instruction on how to take pulse rate and parameters regarding reporting to their healthcare provider.

Some antiarrhythmic medications may cause dizziness and may increase sensitivity to light.\[1\]

Now let’s take a closer look at the medication grid for quinidine in Table 6.6a.\[2\] Medication grids are intended to assist students to learn key points about each medication class. Basic information related to a common generic medication in this class is outlined, including administration considerations, therapeutic effects, and side effects/adverse effects. Prototype/generic medication listed in the medication grid is also hyperlinked directly to a free resource from the U.S. National Library of Medicine called Daily Med. Because information about medication is constantly changing, nurses
should always consult evidence-based resources to review current recommendations before administering specific medication.

Table 6.6a Quinidine Medication Grid

<table>
<thead>
<tr>
<th>Class/Subclass</th>
<th>Prototype/Generic</th>
<th>Administration Considerations</th>
<th>Therapeutic Effects</th>
<th>Adverse/Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antiarrhythmic Class I</td>
<td>quinidine</td>
<td>Monitor blood pressure, heart rate, and QT with administration</td>
<td>Control supraventricular arrhythmias</td>
<td>Lengthen the QT interval, arrhythmia, dizziness, and headache</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Avoid grapefruit juice</td>
<td></td>
<td>Thrombocytopenia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintain consistent sodium intake</td>
<td></td>
<td>GI: Nausea, diarrhea, and vomiting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Health care provider should review medications, as this medication may interact with many medications</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Class II – Beta Blockers**

Class II medications are beta blockers that are used to decrease conduction velocity, automaticity, and the refractory period of the cardiac conduction cycle. Sotalol is a Beta-1 and Beta-2 blocker that also has Class III antiarrhythmic properties. Recall that other types of beta blockers, such as metoprolol, are also used to treat hypertension. See the “Antihypertensives” section later in this chapter for more information about the use of beta blockers to treat hypertension.

**Mechanism of Action**

Sotalol is a non-selective beta-adrenergic blocker that prolongs the cardiac action potential.

**Indications for Use**

Sotalol is given to patients for life-threatening arrhythmias, such as ventricular arrhythmias or supraventricular arrhythmias. It is not recommended for patients with less than severe arrhythmias.

**Nursing Considerations Across the Lifespan**

Titration of this medication is done by evaluating renal function and monitoring QTc on the ECG 2-4 hours after each medication upon initiation. Patients with decreased renal function require dosage adjustment. Sotalol is contraindicated for patients with decreased serum potassium, bradycardia, 2nd or 3rd degree heart block, heart failure, and conditions leading to bronchospasm.

**Adverse/Side Effects**

Black Box Warning: This drug can cause arrhythmias. This medication lengthens a patient’s QTc interval. Initiation of this medication requires a patient to be in a facility to determine baseline QT and intermittent QT interval checks. QT
interval checks are done 2-4 hours after each dose. If the QT corrected interval is greater than 500 msec, the dosing must be changed.

Common side effects for sotalol are arrhythmias, chest pain, palpitations, fatigue, dizziness, hypotension, bradycardia, heart failure, cardiac ischemia, bronchospasm, thyroid abnormalities, and hypoglycemia.\(^3\)

**Patient Teaching & Education**

Patients should be instructed regarding the significance of compliance with therapeutic drug regimen and take medications as prescribed, even if not symptomatic. Patients or family members may need instruction on how to take pulse rate and blood pressure. They should receive parameters regarding reporting to their healthcare provider. They should report any pulse rate less than 50 bpm and significant changes in blood pressure.

Patients should also be advised that these medications may cause dizziness and visual changes. Patients may also notice orthostatic blood pressure decrease with position changes and should be advised to change positions slowly. If the patient notices irregular, fast heart rate or experiences any fainting episodes, they should notify their healthcare provider immediately.

Additionally, these medications may also mask the signs of hypoglycemia, so diabetic patients must use extra caution to monitor for low blood sugar. They may also increase cold sensitivity.\(^3\)

**Now let’s take a closer look at the medication grid for sotalol in Table 6.6b.**\(^4\)

<table>
<thead>
<tr>
<th>Class/Subclass</th>
<th>Prototype/Generic</th>
<th>Administration Considerations</th>
<th>Therapeutic Effects</th>
<th>Adverse/Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antiarrhythmic Class 2</td>
<td>sotalol</td>
<td>Black Box Warning: Drug induced arrhythmias</td>
<td>Treatment of life threatening arrhythmias</td>
<td>Arrhythmias due to lengthening QTc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strict QTc monitoring with initiation of therapy</td>
<td></td>
<td>Chest pain, palpitations, dizziness, fatigue, hypotension, heart failure, cardiac ischemia, and bradycardia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do not double dose</td>
<td></td>
<td>Bronchospasm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitor blood pressure and heart rate</td>
<td></td>
<td>Thyroid abnormalities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hypoglycemia</td>
</tr>
</tbody>
</table>
Critical Thinking Activity 6.6a

1. What should a nurse assess before and after administration of sotalol?

Class III – Potassium Channel Blockers

Class III medications prolong repolarization by blocking the potassium channels in cardiac cells that are responsible for repolarization. They are used for emergency treatment of ventricular dysrhythmias. Amiodarone is an example of an antidysrhythmic that has predominantly Class III properties.

Mechanism of Action

Class III medications prolong repolarization by blocking the potassium channels in cardiac cells that are responsible for repolarization. Amiodarone also antagonizes alpha and beta receptors.

Indications for Use

Amiodarone is indicated only for the treatment of life-threatening recurrent ventricular arrhythmias when these have not responded to documented adequate doses of other available antiarrhythmics or when alternative agents could not be tolerated.

Nursing Considerations Across the Lifespan

Amiodarone can cause fetal injury when administered to a pregnant patient. Use cautiously with the geriatric population who may have decreased hepatic, cardiac, or renal function. Read drug label information carefully due to several potential drug interactions.

Adverse/Side Effects

Black Box Warnings: Amiodarone has several fatal toxicities such as pulmonary toxicity, exacerbation of arrhythmia, liver injury, and heart block. Patients who require initiation of this therapy should be hospitalized and monitored closely. Neurological impairments (such as fatigue, tremors, involuntary movements, poor coordination, and gait) and GI disturbances are common adverse effects. Vision changes/loss of vision and photosensitivity may also occur.
Patient Teaching & Education

Patients should be advised to closely follow the recommended dosing regimen. If one dose of medication is missed, the patient should follow the normal dosing schedule and resume with the next dose. If more than one dose of medication is missed, the patient should call the healthcare provider for guidance. Patients should be compliant with all follow-up appointments and monitoring.

Patients should avoid drinking grapefruit juice during medication therapy. Some patients may experience photosensitivity and protective measures should be taken.\[6\]

Now let’s take a closer look at the medication grid for amiodarone in Table 6.6c.\[6\]

<table>
<thead>
<tr>
<th>Class/Subclass</th>
<th>Prototype/Generic</th>
<th>Administration Considerations</th>
<th>Therapeutic Effects</th>
<th>Adverse/Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antiarrhythmic Class 3</td>
<td>amiodarone</td>
<td>Black Box Warning: Fatal toxicities</td>
<td>Treatment of life-threatening ventricular arrhythmia</td>
<td>Fatal toxicities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Read drug label information due to several drug interactions</td>
<td></td>
<td>Neurological impairments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitor blood pressure and heart rate for profound hypotension and bradycardia</td>
<td></td>
<td>GI upset</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Initiation of therapy typically requires patients to be hospitalized to receive a loading dose</td>
<td></td>
<td>Worsening arrhythmia, bradycardia, hypotension</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Thyroid abnormalities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Vision changes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Photosensitivity</td>
</tr>
</tbody>
</table>

Class IV – Calcium Channel Blockers

Class IV medications include the calcium channel blockers verapamil and diltiazem. These medications increase the refractory period of the AV node by slowing the influx of calcium ions, thus decreasing the ventricular response and decreasing the heart rate. This medication may be used to control heart rate associated with supraventricular tachycardias. Calcium channel blockers are also used to treat hypertension because they relax smooth muscle and cause vasodilation. See the “Antihypertensives” section later in this chapter for more information about their use in treating hypertension.

Mechanism of Action

https://med.libretexts.org/Bookshelves/Nursing/Book%3A_Nursing_Parmacology_(Ernstmeyer_and_Christman)/06%3A_Car… Updated: Wed, 02 Sep 2020 02:59:23 GMT Powered by
Diltiazem inhibits calcium during depolarization to decrease the workload of the heart and increase oxygen supply to the myocardium. This medication will relax smooth muscle and decrease peripheral resistance.

**Indications for Use**

Diltiazem is used to treat angina, hypertension, and supraventricular tachycardias.

**Nursing Considerations Across the Lifespan**

This medication is not given to hypotensive patients, patients with acute myocardial infarction, or patients with 2nd or 3rd degree heart block or sick sinus syndrome.

**Adverse/Side Effects**

Diltiazem can potentially worsen signs and symptoms of heart failure due to the negative inotropic effect. Patients may experience bradycardia, worsening 1st degree AV block, syncope, edema, hypotension, headache, dizziness, or hepatic injury. 

**Patient Teaching & Education**

Patients should be advised to closely follow the recommended dosing regimen. Patients or family members may need instruction on how to take a pulse rate and should report any pulse less than 50 bpm. Patients should also be advised that this medication may cause dizziness and visual changes. Patients may also notice orthostatic blood pressure decrease with position changes and should be advised to change positions slowly.

Patients should be advised to avoid grapefruit juice during medication therapy. They should also monitor for gingival sensitivity and be sure to maintain good oral hygiene. Patients may also notice increased photosensitivity and should take protective measures. 

Now let’s take a closer look at the medication grid for diltiazem in Table 6.6.

<table>
<thead>
<tr>
<th>Class/Subclass</th>
<th>Prototype/Generic</th>
<th>Administration Considerations</th>
<th>Therapeutic Effects</th>
<th>Adverse/Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antiarrhythmic Class 4</td>
<td>diltiazem</td>
<td>Monitor blood pressure and heart rate</td>
<td>Reduce workload of the heart, increase oxygen to myocardium, and control heart rate</td>
<td>Worsening heart failure, hypotension, bradycardia, lower extremity edema, syncope, and worsening 1st degree block</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Headache and dizziness</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hepatic injury</td>
</tr>
</tbody>
</table>

[8] https://med.libretexts.org/Bookshelves/Nursing/Book%3A_Nursing_Pharmacology_(Ernstmeyer_and_Christman)/06%3A_Car...
Adenosine

Adenosine is a unique medication given to patients who are experiencing paroxysmal supraventricular tachycardia. It is given all at once as a bolus in either a 6 or 12 mg dose to slow electrical conduction to restore a normal sinus rhythm.

**Mechanism of Action**

Adenosine will slow conduction through the AV node to restore normal sinus rhythm.

**Indications for Use**

Adenosine is used to treat paroxysmal supraventricular tachycardia.

**Nursing Considerations Across the Lifespan**

This medication is an emergent type of medication. Use cautiously with geriatric patients with decreased cardiac function.

This medication is contraindicated with patients who have 2nd or 3rd degree AV block, sinus node disease, or any known hypersensitivity.

At time of administration, a nurse may see no electrical activity on an ECG for a brief few seconds before normal sinus rhythm is restored. It is important to warn the patient about an extremely uncomfortable feeling during this short period of time.

**Adverse/Side Effects**

Patients receiving adenosine may experience prolonged asystole, arrhythmias, palpitations, facial flushing, hypotension, bronchospasm, shortness of breath, dizziness, seizures, loss of consciousness, numbness and tingling to upper extremities, and nausea.[9]

**Patient Teaching & Education**

Patients should be advised to closely follow the recommended dosing regimen. Patients or family members may need instruction on how to take a pulse rate and should report any abnormalities. Patients should also be advised that this medication may cause dizziness and visual changes. Patients may also notice orthostatic blood pressure decrease with position changes and should be advised to change positions slowly.

Patients should be advised to avoid grapefruit juice during medication therapy. They should also monitor for gingival sensitivity and be sure to maintain good oral hygiene. Patients may also notice increased photosensitivity and should take protective measures.[10]

Now let’s take a closer look at the medication grid for adenosine in Table 6.6e.[11]
<table>
<thead>
<tr>
<th>Subclass</th>
<th>Generic</th>
<th>Considerations</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antiarrhythmic</td>
<td>adenosine</td>
<td>Place the patient in a supine position and inject medication rapidly followed by saline flush</td>
<td>Prolonged asystole, arrhythmias, palpitations, facial flushing, hypotension, bronchospasm, shortness of breath, and dizziness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restore normal sinus rhythm</td>
<td>Seizures, loss of consciousness, numbness, and tingling to upper extremities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Nausea</td>
</tr>
</tbody>
</table>

1. uCentral from Unbound Medicine. [https://www.unboundmedicine.com/ucentral-](https://www.unboundmedicine.com/ucentral-)
2. This work is a derivative of [Daily Med](https://www.unboundmedicine.com/ucentral-) by U.S. National Library of Medicine in the public domain. [↩]
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