Antiarrhythmics & QT Prolongation: Avoiding Drug Interactions

MELINDA DEUBNER, PHARMD, BCCCP

A webinar for HealthTrust members
August 24, 2018

Disclosures

- The presenter has no real or perceived conflicts of interest related to this presentation
- This program contains the mention of suppliers, brands, products, services or drugs presented in a case study or comparative format using evidence-based research. Such examples are intended for educational and informational purposes and should not be perceived as an endorsement of any particular supplier, brand, product, service or drug.

Learning Objectives

1. Describe the electrophysiology of the heart and the connection between different ion channels and the electrocardiogram.
2. Identify antiarrhythmic classes and their effects on the QT interval.
3. Manage interactions between antiarrhythmic medications and other drugs which may cause QT prolongation.

Drug Induced QT Prolongation

True prevalence difficult to assess

Arrhythmias typically fatal outside the hospital

Many patients exposed to QT-prolonging agents in ICU

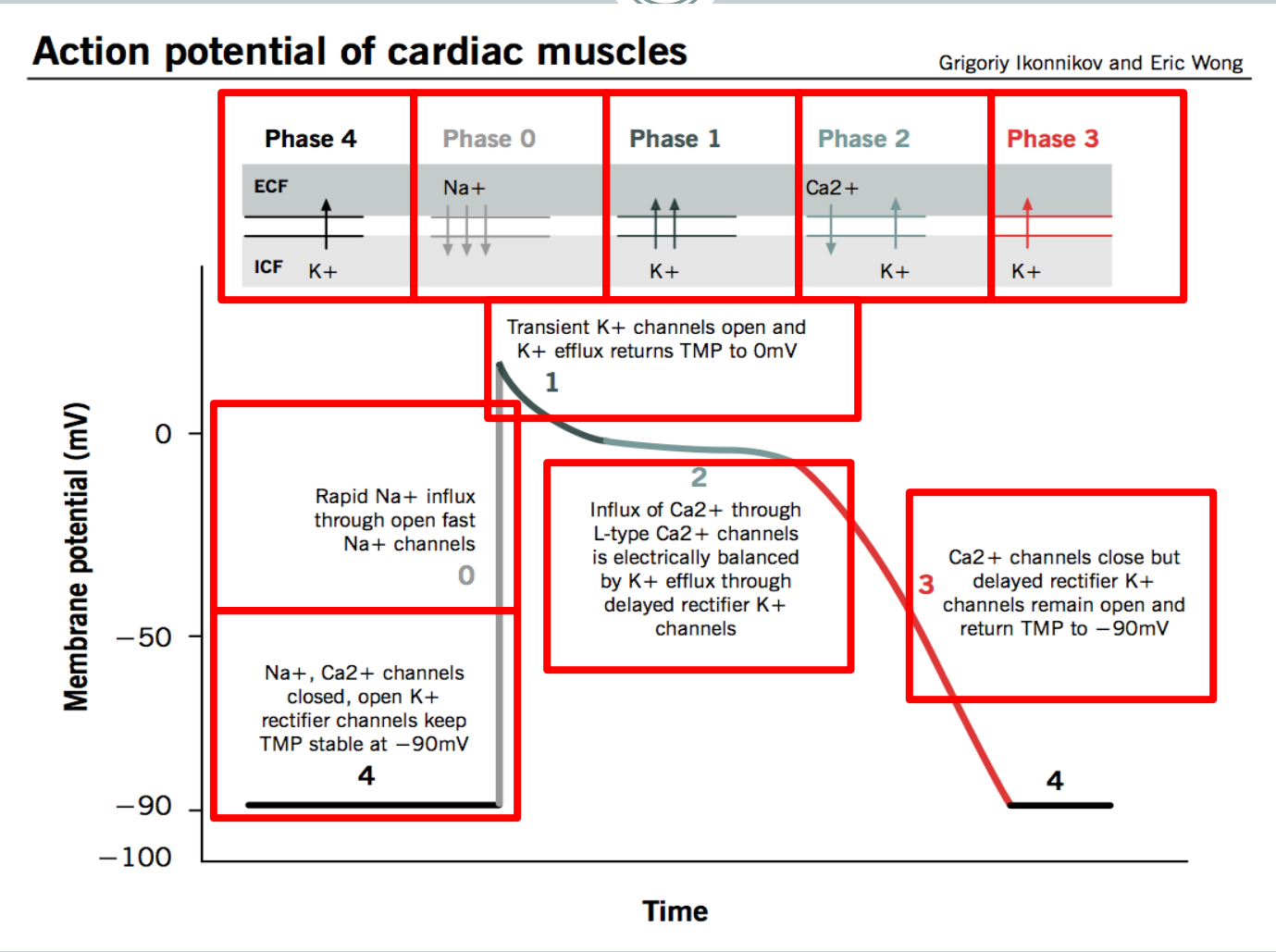
Increased drastically in cardiovascular ICU

ICU patients at high risk for drug-drug interactions

18.6% of patients on >1 QT-prolonging drug had increased mortality

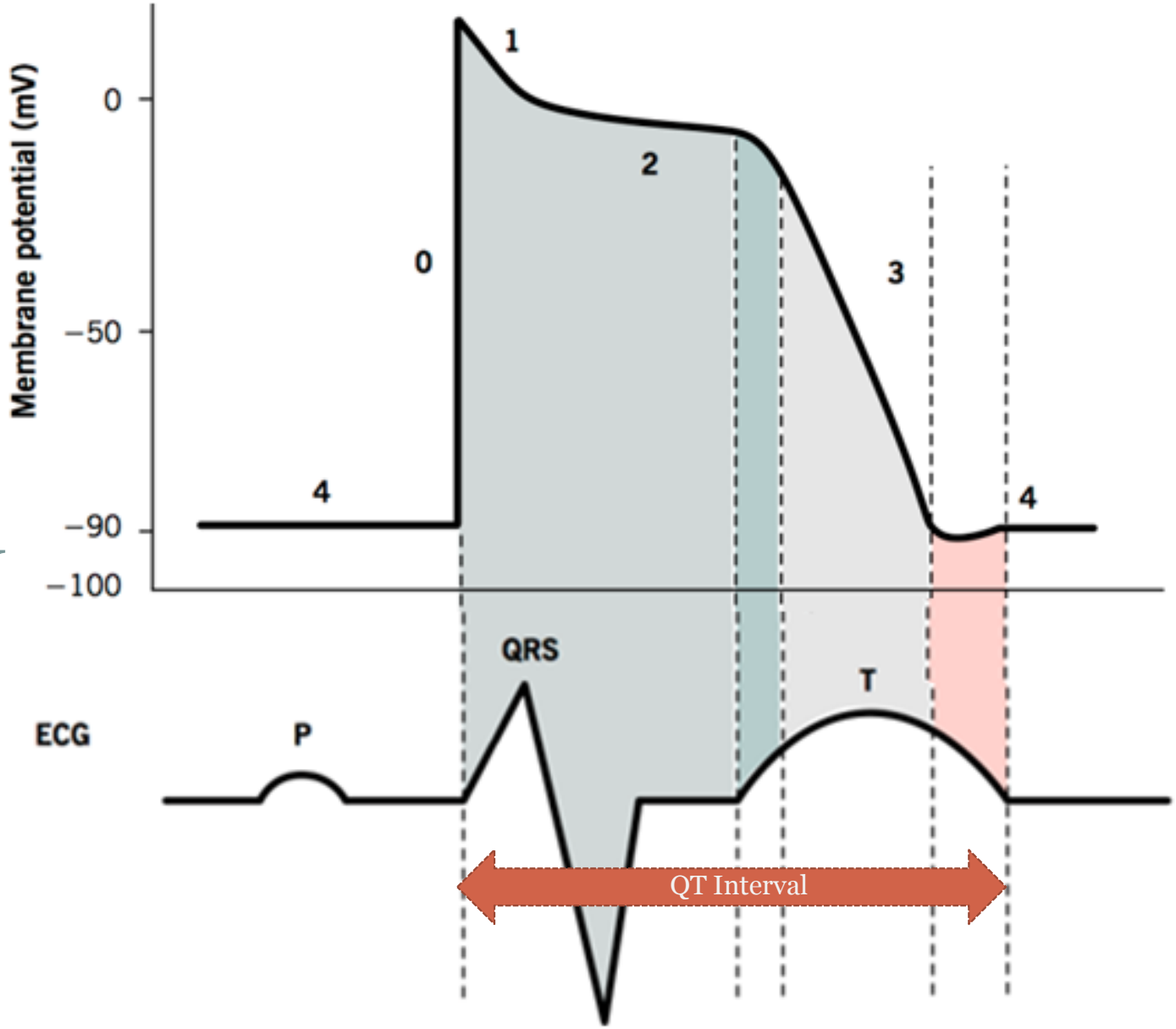
Sources: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.
Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Cardiac Action Potential



Source: Ikonnikov G. http://www.pathophys.org/physiology-of-cardiac-conduction-and-contractility/

Action Potential & the ECG



Source: Ikonnikov G. http://www.pathophys.org/physiology-of-cardiac-conduction-and-contractility/

QT Prolongation

- Caused by blocking of potassium efflux leading to delayed ventricular repolarization
- Normal QT interval in is <440 msec* in men, <450 msec in women
- Puts patient at risk for reentry arrhythmias, particularly Torsades de Pointes (TdP)
- TdP is generally associated with a QT interval > 500 msec

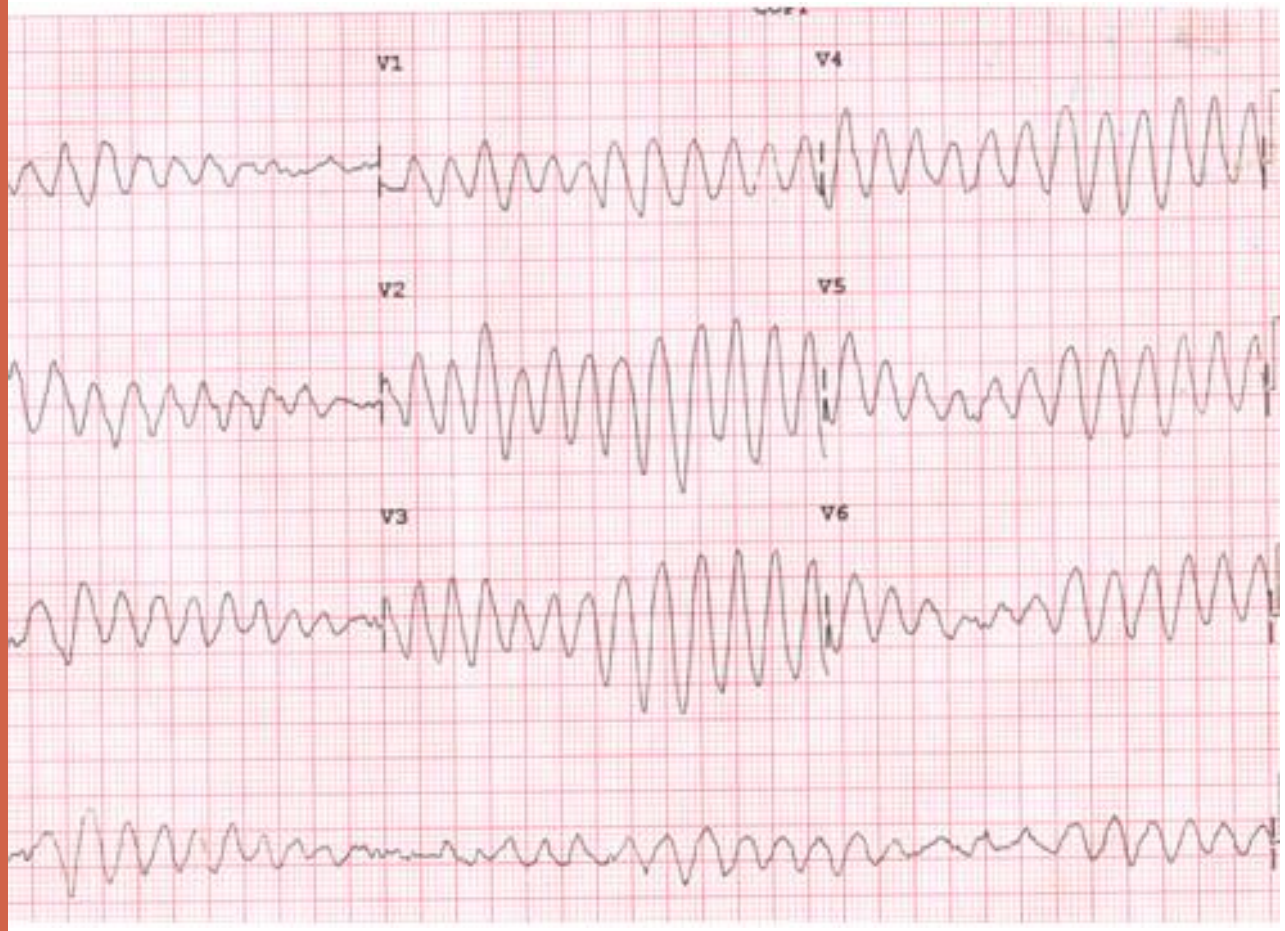
Sources: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.
Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

*msec = Millisecond

Can lead to sudden cardiac death

Treatment:

- Direct cardioversion for episodes longer than 5 seconds
- Immediate defibrillation if pulseless
- Magnesium 2g slow IV push



Torsades de Pointes

Sources: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97; Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712. Image from: http://www.heartpearls.com/2009/10/torsades-de-pointes-ecg.html

Poll: Test Your Understanding

Which ion channels would need to be affected to cause QT prolongation?

A. Sodium channels

B. Potassium channels

C. Calcium channels

D. All of the above

RESULTS

Which ion channels would need to be affected to cause QT prolongation?

A. Sodium channels

B. Potassium channels

C. Calcium channels

D. All of the above

Antiarrhythmic Drug Actions

Antagonist relative potency:

- L = Low
- M = Moderate
- H = High

ACh = Acetylcholine

Ado = Adenosine

Vaughn-Williams Class	DRUG	ECG Changes	CHANNELS Ca^{++}	CHANNELS Na^{+}	CHANNELS K^{+}	RECEPTORS α	RECEPTORS β	RECEPTORS ACh	RECEPTORS Ado
A	Quinidine	A		M	M	L		M	
A	Procainamide			M	M				
A	Disopyramide			M	M			M	
IB	Lidocaine	B		L					
IB	Mexiletine			L					
C	Propafenone	C		H			M		
C	Flecainide			H					
II	β-Adrenergic antagonists						H		
III	Dronedarone		L	L	H	M	M	M	
III	Amiodarone		L	L	H	M	M	M	
III	Sotalol				H		H		
III	Ibutilide			△	H				
III	Dofetilide				H				
IV	Verapamil		M						
IV	Diltiazem		M						
Misc	Adenosine								△

△ = Agonist

● = ECG Changes related to Ca^{++} channel block

● = ECG Changes related to Na^{+} channel block

● = ECG Changes related to K^{+} channel block

Source: Woosley RL. CredibleMeds. QTdrugs List. https://crediblemeds.org/new-drug-list/.

Class Ia Antiarrhythmics

Agents: Quinidine, Procainamide, Disopyramide

Mechanism of Action	Indication	Arrhythmia
• Moderately blocks sodium influx and potassium efflux	• Atrial fibrillation and flutter • Ventricular and supraventricular tachyarrhythmias	• Prolonged QT interval • May cause Torsades de Pointes

Sources: Woosley RL. CredibleMeds. QTdrugs List. https://crediblemeds.org/new-drug-list/.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Class Ia Antiarrhythmics

	Quinidine	Procainamide
Usual Dose Range	200-600mg PO Q 6-12 hours	Max total IV dose of 100mg (as boluses or infusion)
Kinetics	Metabolized by CYP3A4	Metabolized by CYP2D6
Risk of QT Prolongation	High	Moderate

Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Class Ib Antiarrhythmics

Agents: Lidocaine, Mexilitine

Mechanism of Action	Indication	Arrhythmia
• Weakly blocks sodium channels	• Ventricular arrhythmias	• Not associated with negative affects on cardiac rhythm • Shorten QT interval

Sources: Woosley RL. CredibleMeds. QTdrugs List. https://crediblemeds.org/new-drug-list/.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Class Ib Antiarrhythmics

	Lidocaine	Mexilitine
Usual Dose Range	1-1.5mg/kg IV bolus, with max cumulative dose of 3mg/kg	150-300 mg PO Q 8-12 hours
Kinetics	Metabolized by CYP3A4	Metabolized by CYP2D6
Risk of QT Prolongation	None	None

Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Class Ic Antiarrhythmics

Agents: Propafenone, Flecainide

Mechanism of Action	Indication	Arrhythmia
• Highly blocks sodium influx	• Ventricular and supraventricular tachyarrhythmias	• Can prolong QT • Ischemia predisposes patients to reentry tachyarrhythmias • Avoid in patients with CAD

Sources: Woosley RL. CredibleMeds. QTdrugs List. https://crediblemeds.org/new-drug-list/.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Class Ic Antiarrhythmics

	Propafenone	Flecainide
Usual Dose Range	150-300mg PO Q 8 hours	50-200mg PO Q 12 hours
Kinetics	Metabolized by CYP2D6	Metabolized by CYP2D6
Risk of QT Prolongation	Low Risk (higher in patients with CAD)	Low Risk (higher in patients with CAD)

Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Class II Antiarrhythmics

Agents: Metoprolol, Labetalol, Esmolol, etc.

Mechanism of Action	Indication	Arrhythmia
• Blocks beta adrenergic receptors	• Hypertension, angina, MI, heart failure (varies by agent)	• Low risk • May cause some AV block

Sources: Woosley RL. CredibleMeds. QTdrugs List. https://crediblemeds.org/new-drug-list/.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Class II Antiarrhythmics

	Metoprolol	Labetalol	Esmolol
Usual Dose Range	25-200mg PO Q 12-24 hours	10-80mg IV Q 20 min (max 300mg/day)	500-1000mcg/kg IV bolus, then 50-300 mcg/kg/min
Kinetics	Metabolized by CYP2D6	Metabolized by glucuronide conjugation	Metabolized by red blood cell esterases
Risk of QT Prolongation	None	None	None

Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Class III Antiarrhythmics

Agents: Amiodarone, Dofetilide, Sotalol, Dronedarone, etc.

Mechanism of Action	Indication	Arrhythmia
• Highly block potassium channels • Can also have affects on Na and Ca channels as well as adrenergic receptors	• Atrial and ventricular tachyarrhythmias	• Low to high risk depending on agent • QT prolongation • May cause Torsades de Pointes

Sources: Woosley RL. CredibleMeds. QTdrugs List. https://crediblemeds.org/new-drug-list/.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Class III Antiarrhythmics

	Amiodarone	Dofetilide	Sotalol
Usual Dose Range	200-400mg PO Q 8-24 hours	250-500mcg PO Q 12 hours	80-160mg PO Q 12 hours
Kinetics	Metabolized by CYP3A4 and CYP2C8	Metabolized by CYP3A4	Excreted in urine as unchanged drug
Risk of QT Prolongation	Low	High	High

Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018

Class IV Antiarrhythmics

Agents: Verapamil, Diltiazem

Mechanism of Action

- Moderately blocks calcium channels

Indication

- Atrial fibrillation, supraventricular tachycardias, hypertension, angina

Arrhythmia

- Low risk
- May cause some AV block

Sources: Woosley RL. CredibleMeds. QTdrugs List. https://crediblemeds.org/new-drug-list/.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Class IV Antiarrhythmics

	Verapamil	Diltiazem
Usual Dose Range	80-160mg PO Q 8 hours	15-20mg IV, then 5-15 mg/hour
Kinetics	Metabolized by CYP3A4	Metabolized by CYP3A4
Risk of QT Prolongation	None	None

Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Antiarrhythmics and QT Prolongation

May Prolong QT

- Class Ic (Propafenone, Flecainide)

Associated with TdP

- Class Ia (Quinidine, Procainamide, Disopyramide)
- Class III (Amiodarone, Dofetilide, Sotalol, Dronedarone, Ibutilide)

Sources: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.
Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Other Risk Factors for Drug-induced Arrhythmias

- Preexisting cardiac disease
- Shock and vasopressor use
- Organ failure and impaired kinetics
- Electrolyte imbalances
- Drug-drug interactions

Source: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Electrolyte Imbalances

Hypo/Hyperkalemia

Hypomagnesemia

Hypocalcemia

Sources: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.
Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Poll: Test Your Understanding

Which one of these drugs could cause an arrhythmia through electrolyte disturbances?

A. Nitrofurantoin

B. Acetaminophen

C. Ceftriaxone

D. Albuterol

RESULTS

Which one of these drugs could cause an arrhythmia through electrolyte disturbances?

A. Nitrofurantoin

B. Acetaminophen

C. Ceftriaxone

D. Albuterol

Drugs Causing Electrolyte Imbalances

- Hypokalemia
  - Beta agonists
  - Catecholamines
  - Insulin
  - Diuretics (loop and thiazide)
  - Aminoglycosides
  - Amphotericin B
  - Steroids
- Hypomagnesemia
  - Diuretics (loop and thiazide)
  - Aminoglycosides
  - Amphotericin B
  - Cisplatin
  - Cyclosporine
  - Digoxin
  - Mannitol
  - Methotrexate
  - Citrate-containing products
  - Laxatives
- Hyperkalemia
  - Potassium-sparing diuretics
  - ACE inhibitors
  - NSAIDs
  - Succinylcholine
  - Beta antagonists
  - Digoxin
  - SMX/TMP

Source: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.

Drug-Drug Interactions Causing QT Prolongation

CNS

Methadone
Antipsychotics
Antidepressants

Source: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Drug-Drug Interactions Causing QT Prolongation

CNS

Methadone
Antipsychotics
Antidepressants

Antimicrobial

Macrolides
Fluoroquinolones
Azole Antifungals

Source: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Drug-Drug Interactions Causing QT Prolongation

CNS

Methadone
Antipsychotics
Antidepressants

Antimicrobial

Macrolides
Fluoroquinolones
Azole Antifungals

Gastrointestinal

Antiemetics
Promotility

Source: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Anesthetics/Analgesics

Volatile anesthetics: sevoflurane, halothane, isoflurane, enflurane

Methadone – QT prolonging

Fentanyl and Morphine – Not QT prolonging

Sources: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.
Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Methadone

Indications: Chronic pain and opioid addiction

Usual dose range: 20 to 120mg

Kinetics: Levels increased by CYP 3A4 inhibitors, Cleared renally

Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Antipsychotics

Most problematic agents:

Haloperidol, Droperidol, Thioridazine

Causing QT prolongation but rarely >500 msec:
Ziprasidone, Quetiapine, Olanzapine, Risperidone

Source: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Haloperidol

Indications: Behavioral and psychotic disorders, schizophrenia, hyperactivity

Usual dose range: 0.5 to 100mg IV or PO, doses >35mg/day increase risk of QT prolongation

Kinetics: Levels increased by CYP 3A4 inhibitors

Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Antidepressants

Selective Serotonin Reuptake Inhibitors

More concerning when used in combination with other QT prolonging agents

Source: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

SSRI

Indications: Generalized anxiety disorder, major depressive disorder, etc.

Commonly used agents: Citalopram, Escitalopram, Fluoxetine

Kinetics: Levels increased by CYP 3A4 inhibitors

Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Macrolides

Azithromycin – Commonly used inpatient and outpatient antibiotic

Clarithromycin

Erythromycin – Commonly used as promotility agent

Source: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Azithromycin

Indications: Community-acquired pneumonia, COPD exacerbations, etc.

Usual dose range: 250-500mg IV/PO daily

Kinetics: Levels increased by CYP3A4 inhibitors

Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Fluoroquinolones

Levofloxacin, Moxifloxacin, Ciprofloxacin

Source: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Levofloxacin

Indications: Community-acquired pneumonia

Usual dose range: 250-750mg IV/PO Q 24-48 hours

Kinetics: Mostly excreted as unchanged drug in the urine, minimal CYP metabolism

Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Azole Antifungals

Fluconazole, Itraconazole, Ketoconazole, Voriconazole

More concerning when used in combination with other QT prolonging agents, especially those requiring metabolism by CYP 3A4

Source: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Fluconazole

Indications: Treatment of yeast infections, including candidiasis

Usual dose range: 200-800mg PO/IV Q 24 hours

Kinetics: Moderate inhibitor of CYP3A4, CYP2c9, Strong inhibitor of CYP2C19

Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Voriconazole

Indications: Treatment of yeast and mold infections, including aspergillus

Usual dose range: 4-6mg/kg IV Q 12 hours; 100-400mg PO Q 12 hours

Kinetics: Strong CYP3A4 inhibitor, moderate CYP2C19 inhibitor, weak CYP2C9 inhibitor

Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Antiemetics

High Risk for TdP: Droperidol, Chlorpromazine

Lower Risk: Ondansetron, Dolasetron

Sources: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.
Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Ondansetron

Indications: Post-operative, chemo/radiation-induced nausea and vomiting

Usual dose range: 4-8mg Q 8-12 hours (doses >16mg not recommended)

Kinetics: Levels increased by CYP3A4 inhibitors

Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Promotility Agent

Erythromycin – macrolide antibiotic which binds motilin receptors in GI tract causing increased motility

Sources: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.
Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Erythromycin

Indications: Bacterial infections, Gastroparesis (off-label)

Usual dose range: 250-500 mg IV/PO Q 6-12 hours

Kinetics: More risk of TdP with IV administration; Levels increased by CYP3A4 inhibitors

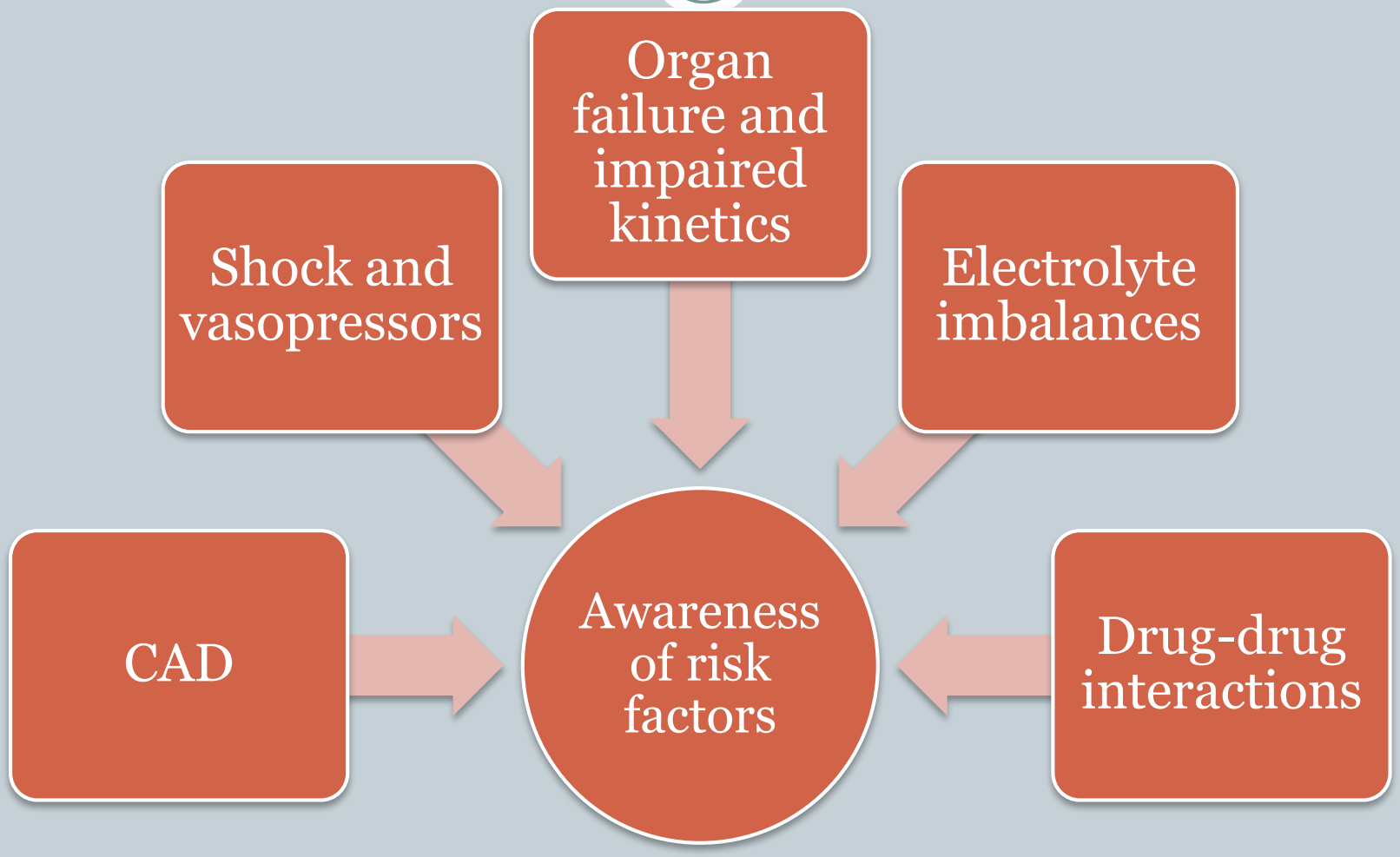
Sources: Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Preventative Strategies for Drug Interactions

Awareness of risk factors

Sources: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.
Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Preventative Strategies for Drug Interactions

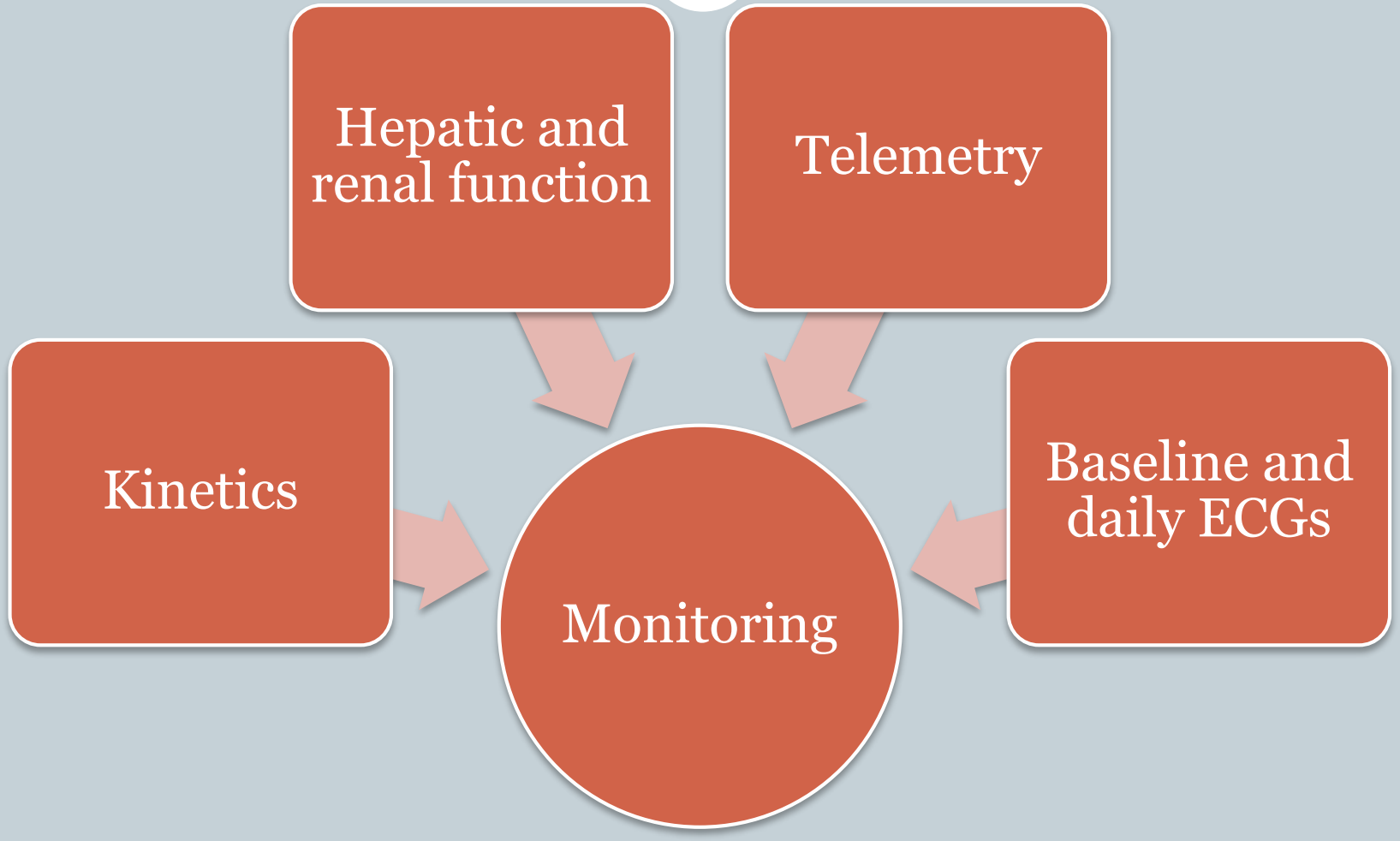


Sources: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.
Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Preventative Strategies for Drug Interactions, *continued*

Sources: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.
Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Preventative Strategies for Drug Interactions, *continued*



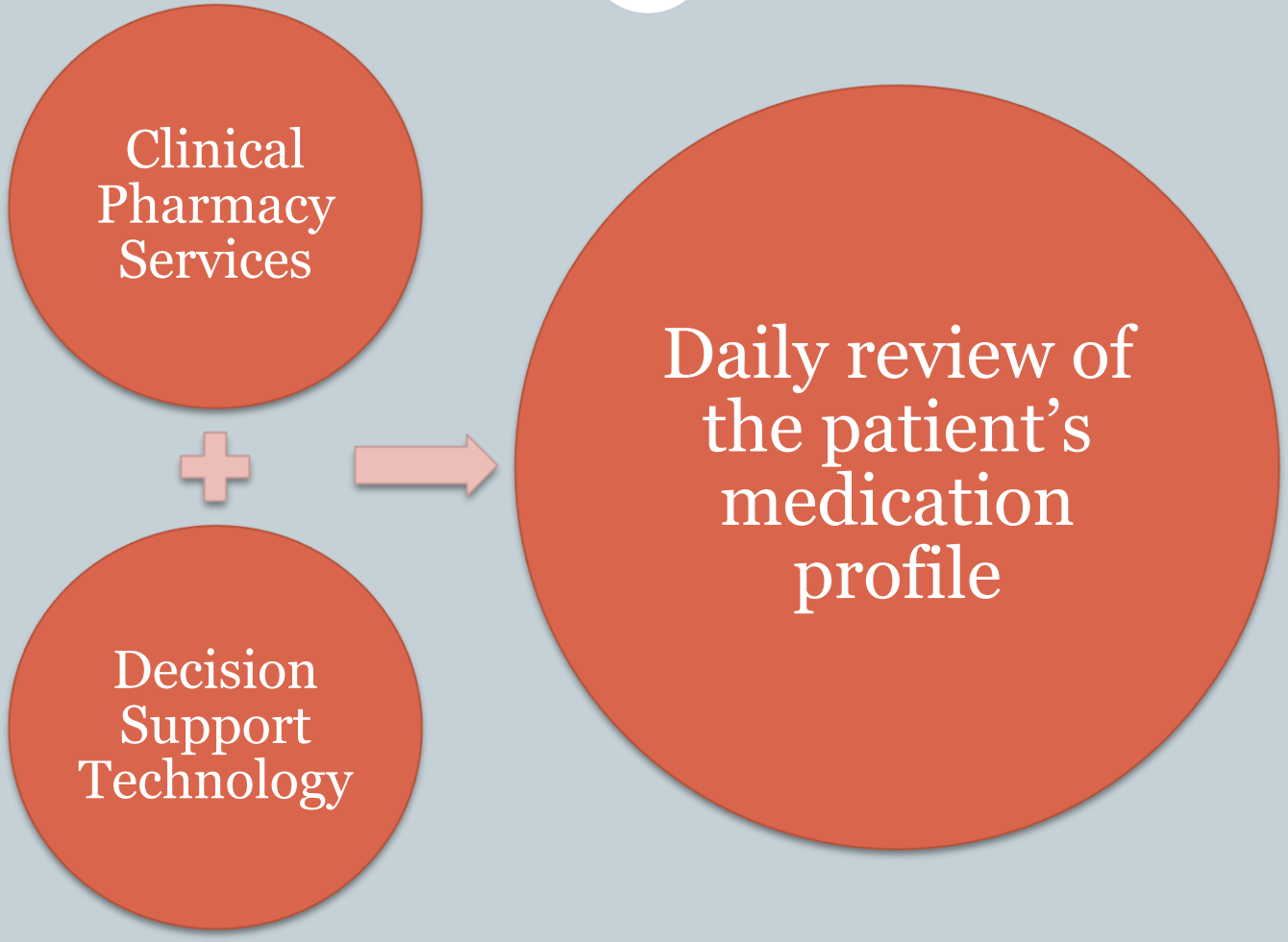
Sources: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.
Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Preventative Strategies for Drug Interactions, *continued*

Daily review of the patient's medication profile

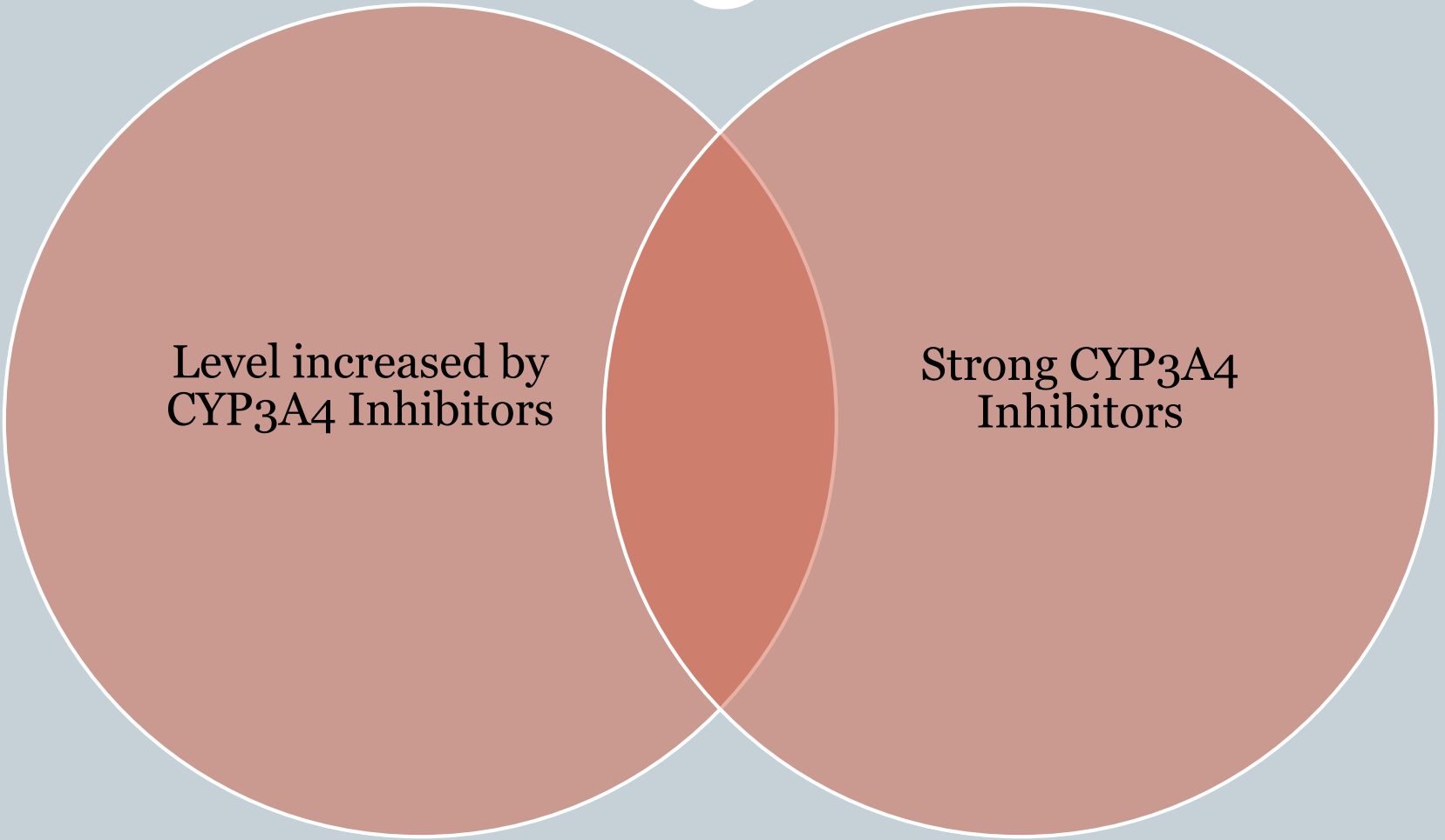
Sources: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.
Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Preventative Strategies for Drug Interactions, *continued*



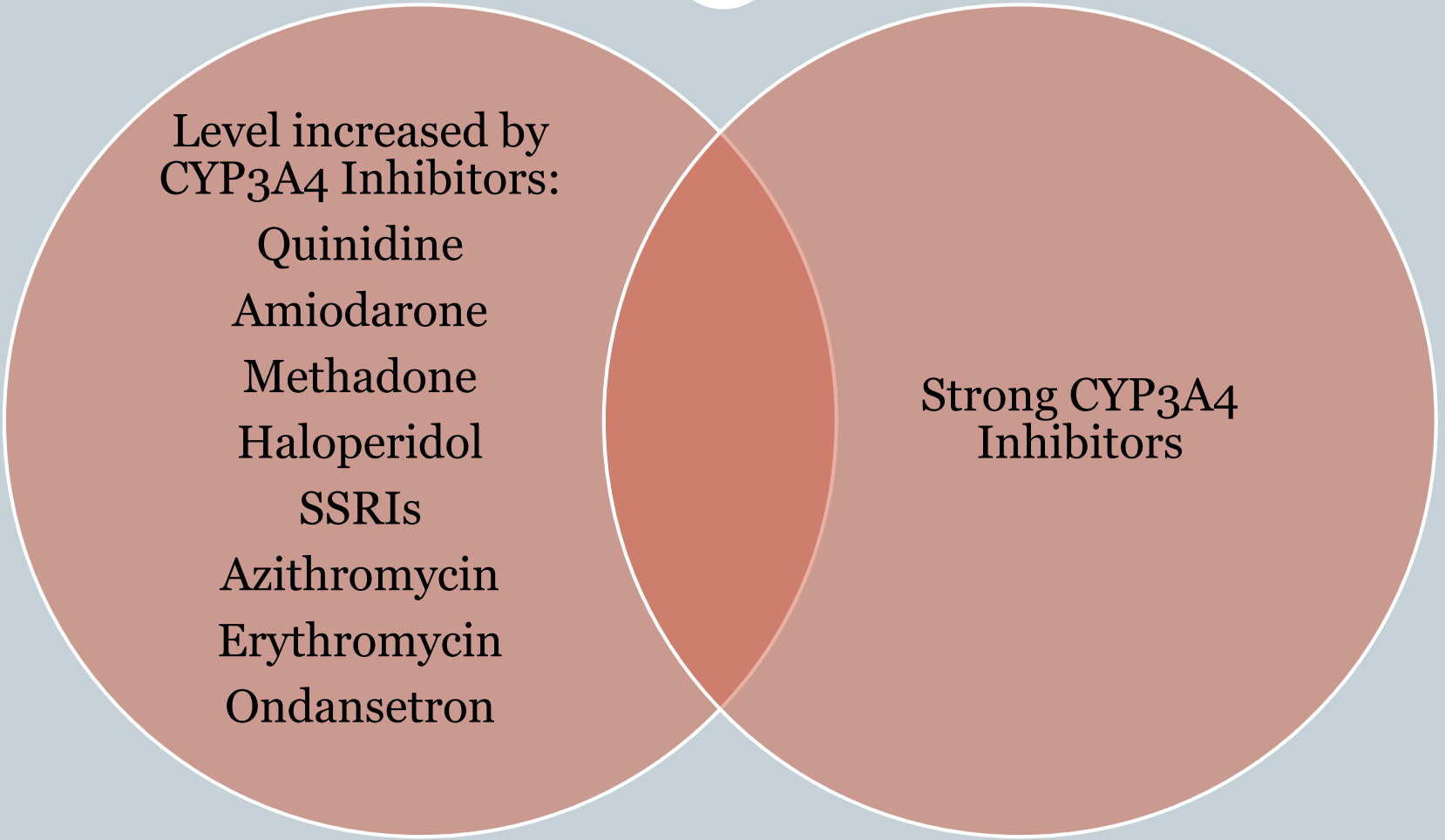
Sources: Barnes BJ et al. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.
Smithburger PL et al. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.

Metabolic Interactions of QT Prolonging Agents



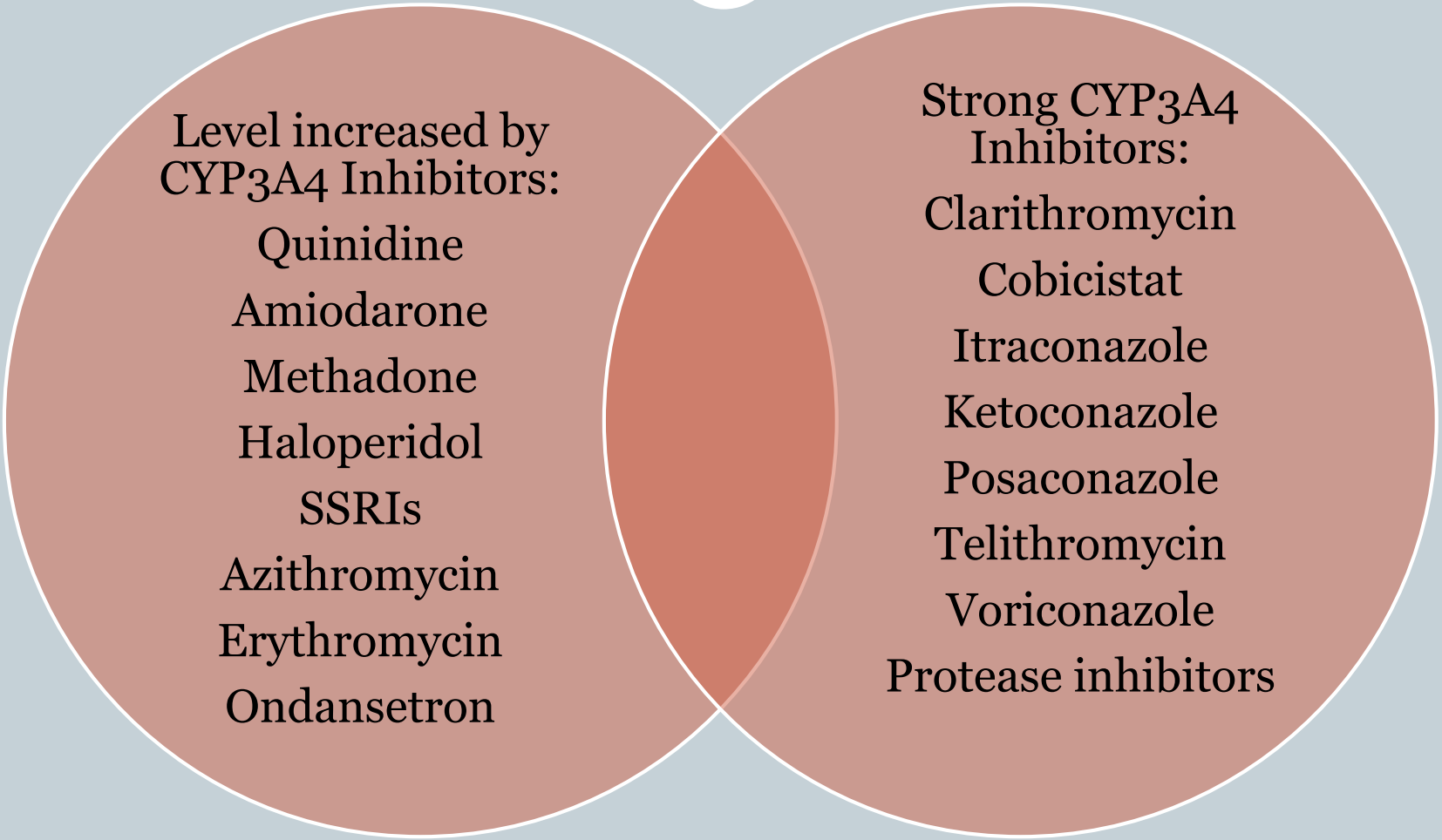
Source: Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Metabolic Interactions of QT Prolonging Agents



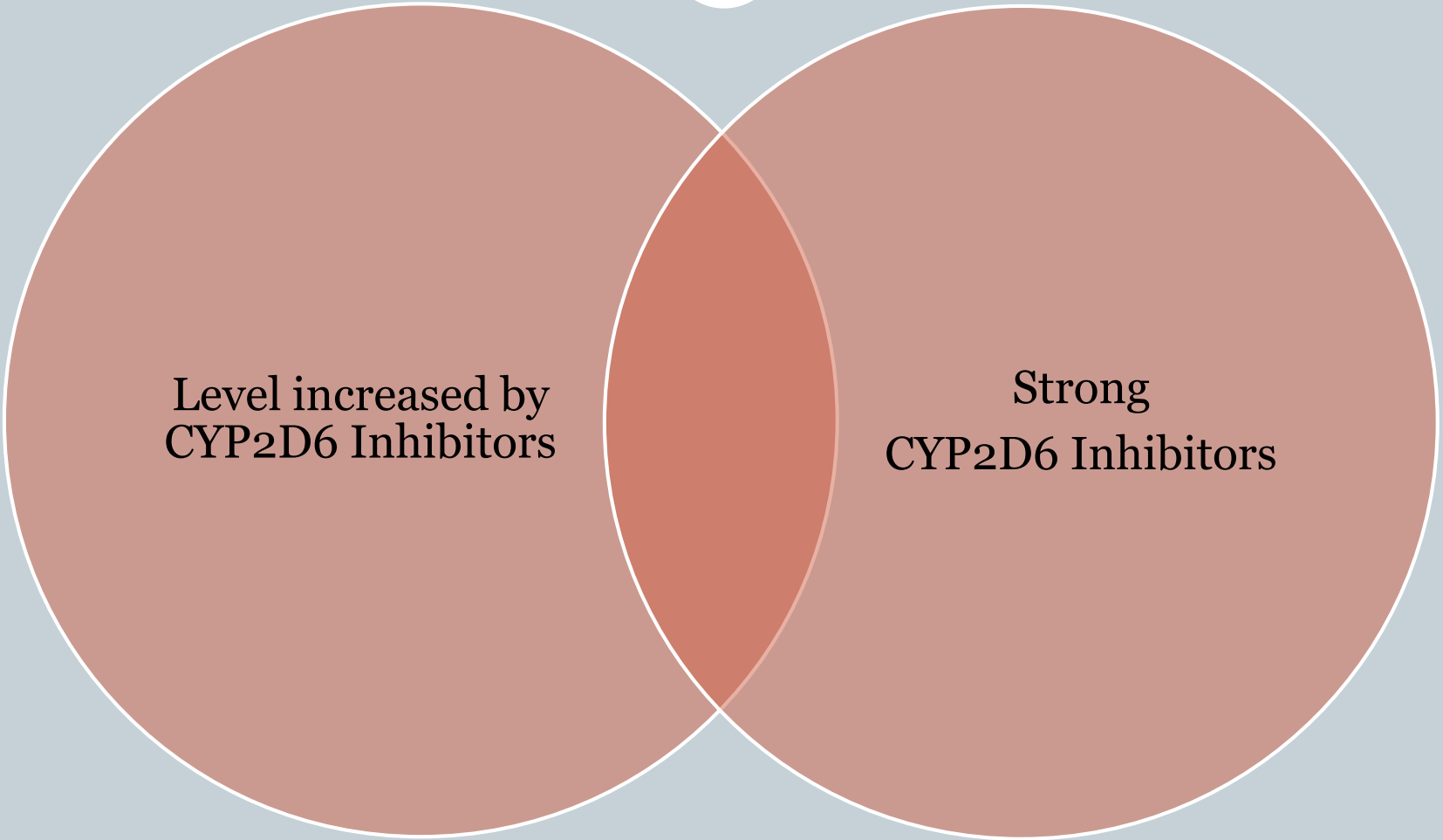
Source: Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Metabolic Interactions of QT Prolonging Agents



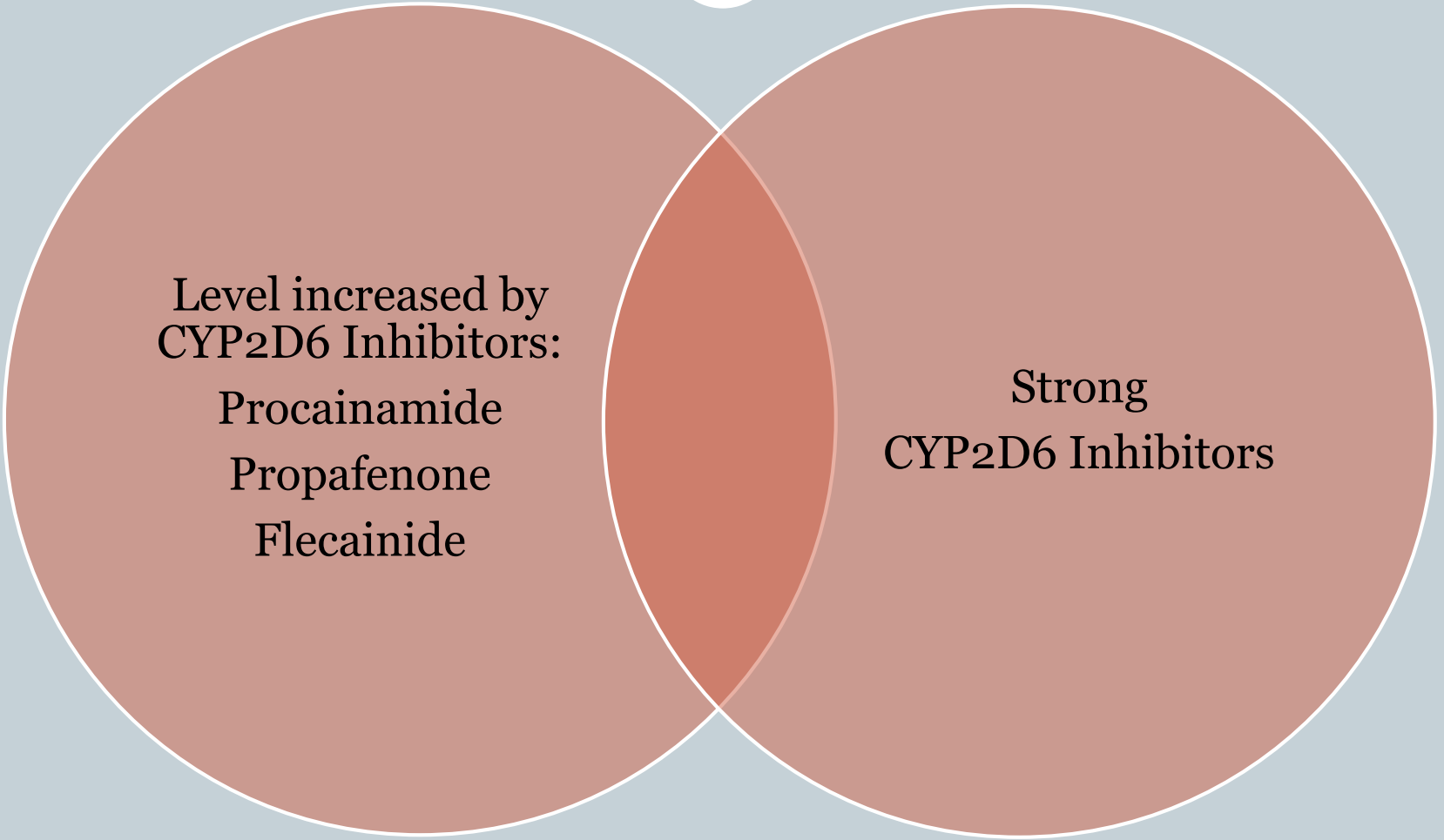
Source: Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Metabolic Interactions of QT Prolonging Agents, *continued*



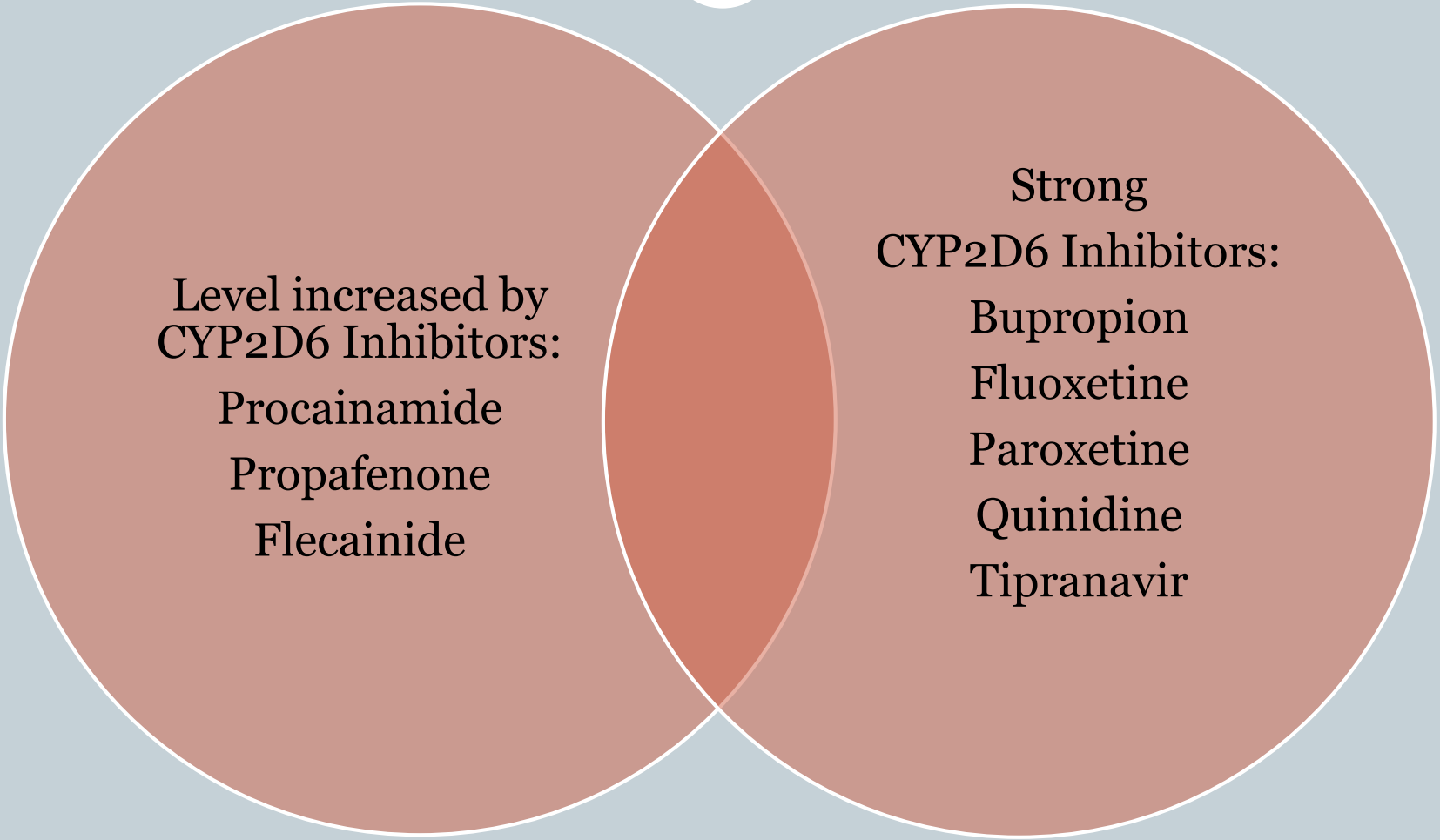
Source: Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Metabolic Interactions of QT Prolonging Agents, *continued*



Source: Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Metabolic Interactions of QT Prolonging Agents, *continued*



Source: Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Poll: Test Your Understanding

You are reviewing the chart of a patient being treated for opioid addiction with methadone. Which concurrent medication raises your concern for a drug interaction that could lead to an increased risk of QT prolongation?

A. Famotidine

B. Losartan

C. Boceprevir

D. Gabapentin

RESULTS

You are reviewing the chart of a patient being treated for opioid addiction with methadone. Which concurrent medication raises your concern for a drug interaction that could lead to an increased risk of QT prolongation?

A. Famotidine

B. Losartan

C. Boceprevir

D. Gabapentin

Poll: Test Your Understanding

In the previous patient being treated with both boceprevir and methadone, what monitoring would you recommend to prevent serious morbidity?

A. Daily chemistries including potassium and magnesium levels
B. Frequent ECG while the dose of methadone is being titrated
C. Monitoring for additional QT prolonging agents through daily chart review
D. Renal function monitoring through daily serum creatinine measurement

RESULTS

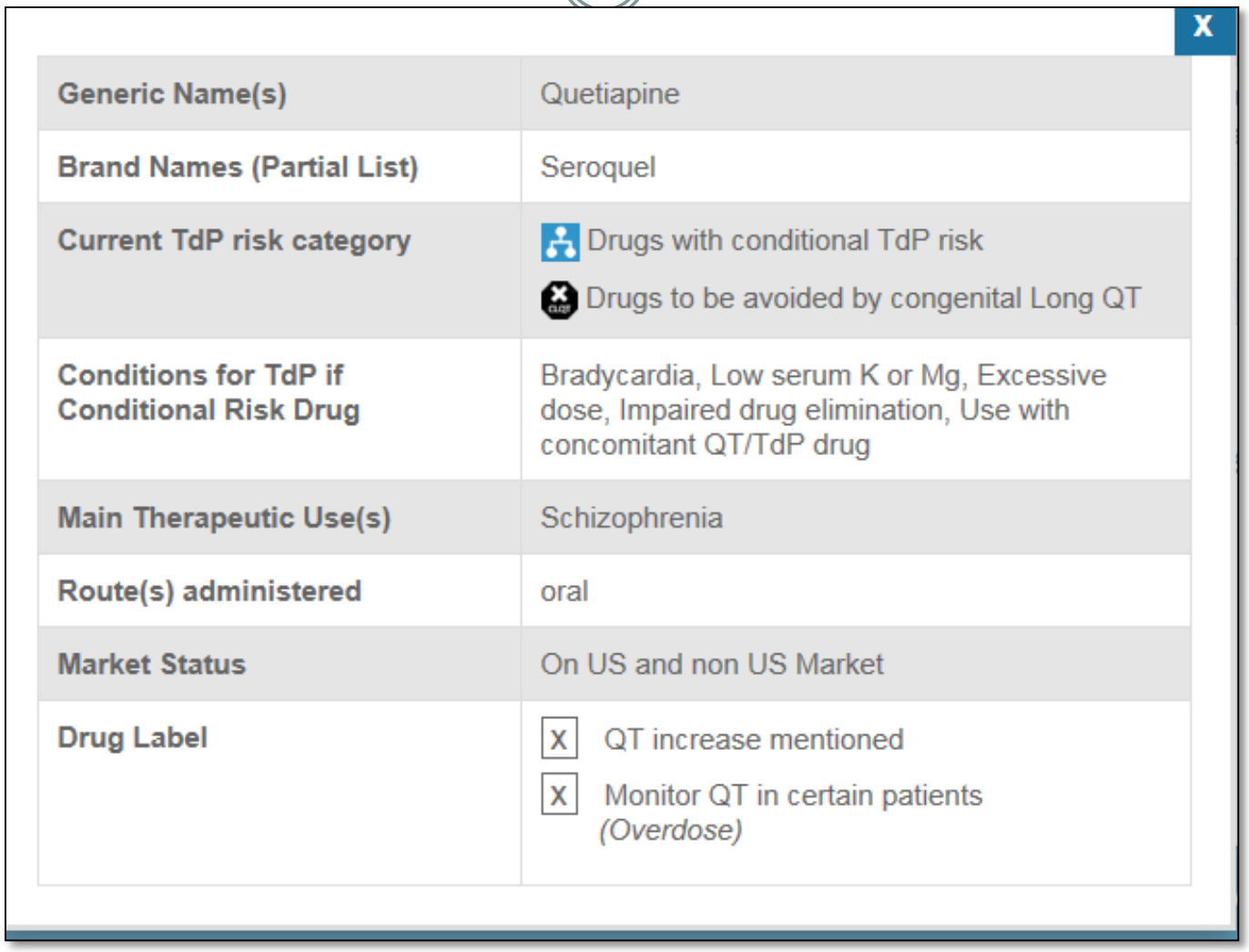
In the previous patient being treated with both boceprevir and methadone, what monitoring would you recommend to prevent serious morbidity?

A. Daily chemistries including potassium and magnesium levels
B. Frequent ECG while the dose of methadone is being titrated
C. Monitoring for additional QT prolonging agents through daily chart review
D. Renal function monitoring through daily serum creatinine measurement

Information Resource: https://crediblemeds.org/healthcare-providers/

Source: Woosley RL. CredibleMeds. QTdrugs List. https://crediblemeds.org/new-drug-list/.

Information Resource: https://crediblemeds.org/healthcare-providers/



Generic Name(s)	Quetiapine
Brand Names (Partial List)	Seroquel
Current TdP risk category	Drugs with conditional TdP risk Drugs to be avoided by congenital Long QT
Conditions for TdP if Conditional Risk Drug	Bradycardia, Low serum K or Mg, Excessive dose, Impaired drug elimination, Use with concomitant QT/TdP drug
Main Therapeutic Use(s)	Schizophrenia
Route(s) administered	oral
Market Status	On US and non US Market
Drug Label	X QT increase mentioned X Monitor QT in certain patients *(Overdose)*

Source: Woosley RL. CredibleMeds. QTdrugs List. https://crediblemeds.org/new-drug-list/.

Poll: Test Your Understanding

You are reviewing the chart of a 49-year old female patient with no allergies, who was admitted for community-acquired pneumonia. She has been started on levofloxacin and you note that she is also taking her home medication of quetiapine. Upon researching the QT prolongation risk of quetiapine you decide to intervene to prevent morbidity in this patient. What course of action do you decide to recommend?

A. Discontinue levofloxacin and treat instead with azithromycin and ceftriaxone
B. Discontinue quetiapine during this patient's inpatient stay
C. Monitor the ECG daily and transfer the patient to a telemetry monitoring unit
D. Discontinue the levofloxacin and treat instead with doxycycline

RESULTS

You are reviewing the chart of a 49 year old female patient with no allergies, who was admitted for community-acquired pneumonia. She has been started on levofloxacin and you note that she is also taking her home medication of quetiapine. Upon researching the QT prolongation risk of quetiapine you decide to intervene to prevent morbidity in this patient. What course of action do you decide to recommend?

A. Discontinue levofloxacin and treat instead with azithromycin and ceftriaxone
B. Discontinue quetiapine during this patient's inpatient stay
C. Monitor the ECG daily and transfer the patient to a telemetry monitoring unit
D. Discontinue the levofloxacin and treat instead with doxycycline

References

1. Barnes BJ, Hollands JM. Drug-induced arrhythmias. Crit Care Med. 2010 Jun;38(6 Suppl):S188-97.
2. Smithburger PL, Seybert AL, Armahizer MJ, et. al. QT prolongation in the intensive care unit: commonly used medications and the impact of drug–drug interactions. Expert Opin Drug Saf. 2010 Sep;9(5):699-712.
3. Ikonnikov G and Yelle D. Physiology of cardiac conduction and contractility. McMaster Pathophysiology Review. http://www.pathophys.org/physiology-of-cardiac-conduction-and-contractility/. Accessed July 27, 2018.
4. Woosley RL, Heise CW and Romero KA. CredibleMeds. QTdrugs List. https://crediblemeds.org/new-drug-list/. Accessed May 23, 2018.
5. Lexicomp Online, Lexi-Drugs, Hudson, Ohio: Lexi-Comp, Inc.; 2018; July 17, 2018.

Antiarrhythmics and QT Prolongation: Avoiding Drug Interactions

THANK YOU

for attending today's webinar.

If you have further questions,
Melinda Deubner can be reached via email at:
mdeubner@beaconhealthsystem.org