Identifying and Preventing Adverse Drug Events with Psychotropic Medications

Jolene R. Bostwick, PharmD, BCPS, BCPP
Clinical Assistant Professor of Pharmacy
University of Michigan College of Pharmacy
Clinical Pharmacist in Psychiatry
University of Michigan Health System

Disclosure Statement
I have NO actual or potential conflict of interest in relation to this educational activity or presentation

Objectives
- Identify key adverse drug events associated with psychotropic medications used to treat anxiety, depression, and attention deficit hyperactivity disorder
- Describe strategies to reduce the risk of adverse drug events

Outline
- Review prevalence of mental health problems among students
- Discuss drug interactions via case studies
- Identify key adverse drug events associated with specific medications
- Characterize misuse of stimulants and benzodiazepines
- Discuss strategies to prevent adverse drug events

Definitions
- Adverse Drug Event (ADE)
  - “an injury resulting from the use of a drug”, which includes:
    - Harm from the drug
    - e.g. adverse drug reactions (ADRs), overdoses
    - Harm from use of the drug
      - e.g. dose reductions, discontinuation of treatment
    - Prescribers fail to recognize most adverse drug events

Adverse Drug Events
- Associated with more than 770,000 injuries and deaths per year
- Cost upwards of $5.6 billion/year
- Impossible to predict what patient characteristics increase risk
- Caused frequently by medication errors
- Up to 95% of adverse drug events can be prevented

http://www.ahrq.gov/qual/aderia/aderia.htm
Prevalence

- More than 1/3 of students have a mental health problem
  - Depression 13-15%
  - Eating disorders 18-19%
  - Anxiety 5-7%
- 33-43% of students perceive need for help
- 18-25% report receiving treatment in the past 1 or 2 years, respectively
  - 11-14% of these students used medications

Diagnosed or treated in past 12 months

- Anxiety
- ADHD
- Depression
- Panic attacks
- Substance abuse or addiction

Academic Impact

- Anxiety
- Depression
- ADHD
- Sleep difficulties
- Stress

Drug Interactions

Prescription drugs
Over-the-counter drugs
Drugs of abuse
Nutritional supplements

Background

- Many psychotropic meds have a narrow therapeutic index
  - TCAs, MAOIs, lithium, other mood stabilizers
- Drug interactions may lead to:
  - Increased plasma concentrations
  - Adverse events and toxicity
  - Poor tolerability
  - Symptoms that mimic new disease
  - Decreased plasma concentrations
  - Loss of therapeutic effect/treatment failure
  - Withdrawal effects

Background

- All patients are at high risk for drug interactions
  - Polypharmacy
  - Patients on psychiatric medications are on more meds than the general population
  - Greater risk than advanced age
  - Psychiatric illnesses are common in patients with other co-morbid medical illnesses
  - Use of multiple prescribers and non-adherence contribute to risk
  - OTC meds, herbal supplements
    - Often undisclosed to health care providers

Types of Drug Interactions

- Pharmacokinetic
  - One drug alters the absorption, distribution, metabolism, or elimination (ADME) of another
- Pharmacodynamic
  - Change in the pharmacologic effect of a drug
  - Can occur in absence of changes in drug concentration
  - Additive (synergistic) or antagonistic effect
- Not always clinically significant

Case 1
GH is a 21 year old engineering student diagnosed with generalized anxiety disorder 6 months ago. At that time, she was initiated on citalopram 10mg daily. Over the past six months her dose has been increased slowly to 40mg/day. She presents to clinic today with complaints of persistent anxiety, despite dose titration, which has interfered significantly with her school performance. In addition to citalopram, she also takes a combined oral contraceptive daily and loratadine prn allergies.

Case 1 Question
Focusing on her pharmacologic treatment, which of the following is the best treatment strategy at this time:

a. Increase citalopram to 60mg daily  
b. Discontinue the SSRI and start clonazepam 1mg bid  
c. Change citalopram to venlafaxine

Citalopram FDA Alert
- Dose dependent QT prolongation
- Maximum dose recommended dose of 20 or 40mg/day
  - 20mg maximum dose in patients receiving CYP2C19 inhibitors...
- Use not recommended in patients taking drugs that prolong the QT interval
- Electrolyte and/or ECG monitoring may be required

http://www.fda.gov/Drugs/DrugSafety/ucm297391.htm

CYP2C19

<table>
<thead>
<tr>
<th>Strong inhibitors</th>
<th>Moderate inhibitors</th>
<th>Weak inhibitors</th>
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<tbody>
<tr>
<td>fluconazole</td>
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<td>alflec (garlic derivative)</td>
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<td>fluoxetine</td>
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<td></td>
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<td>felbamate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ketoconazole</td>
</tr>
<tr>
<td></td>
<td></td>
<td>oral contraceptives (ethinyl estradiol component)</td>
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</tbody>
</table>


Citalopram FDA Alert
- "Advise patients on citalopram to contact a healthcare professional immediately if they experience signs and symptoms of an abnormal heart rate or rhythm (e.g., dizziness, palpitations, or syncope). If patients experience symptoms, the prescriber should initiate further evaluation, including cardiac monitoring."

http://www.fda.gov/Drugs/DrugSafety/ucm297391.htm
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Case 2
ES is a 21 year old female university student presenting to the university health clinic today with complaints of a migraine. ES reports throbbing pain, sensitivity to light, nausea, vomiting, and lightheadedness. ES reports migraines have been occurring about twice per month, each lasting 1 day. Her past medical history includes depression, and she is currently treated with sertraline 100mg po daily.

Case 2 Question
What is the best treatment option for ES's migraines?

a. Add propranolol 40mg po BID for migraine prophylaxis
b. Add sumitriptan 25mg po, repeating 1 dose after 2 hours if needed
c. Discontinue sertraline, then start sumitriptan

Triptans and Serotonin Syndrome
- FDA alert in 2006 warned about the possibility for serotonin syndrome when triptans are used concomitantly with SSRIs or SNRIs
- American Headache Society 2010: Position paper citing conflicting and insufficient data to support the FDA warning
- No updates since 2006, and no case series published in peer-reviewed journals
  - Impact of combination treatment likely negligible
  - Patient education should be provided

Medications associated with Serotonin Syndrome
- Antidepressants
- Valproic acid
- Analgesics: meperidine, fentanyl, tramadol, pentazocine
- Antiemetics: Ondansetron, granisetron, metoclopramide
- Antibiotics: Linezolid, ritonavir
- Dextromethorphan
- Drugs of Abuse: MDMA/ecstasy, LSD, 5-methoxyisopropyltryptamine, Syrian Rue (contains MAOI compounds)
- Dietary/Herbal Supplements: Tryptophan, St. John’s Wort, Panax ginseng
- Lithium

Serotonin Syndrome
- Life-threatening toxicity
- Hyperthermia
- Muscular hypertonicity
- Clonus
- Altered mental status
- Tremor
- Akathisia

Severity of Symptoms

Antipsychotics

- Only 9.2% of psychiatrists surveyed consider themselves “well-informed” about oral atypical antipsychotic drug interactions
- Yet more than half report a high level of concern of drug-drug interaction risks when prescribing a new atypical antipsychotic
- 30% report under-recognition of these drug interactions is a significant problem among psychiatrists in their practice

Case 3

KL is a 19-year old WF who was diagnosed with bipolar disorder and is currently maintained on a combination of lamotrigine 100 mg twice daily and risperidone 3 mg at bedtime. She presents to the clinic with current depressive symptoms and her prescriber would like to initiate fluoxetine 20 mg daily. Four weeks after initiating this regimen, she presents to the university clinic complaining that her hands have been “shaking like crazy” and “I just can’t sit still.”

Case 3 Question

What is the most likely cause of KL’s extrapyramidal symptoms?

- a. Supratherapeutic risperidone
- b. Subtherapeutic fluoxetine
- c. Concomitant treatment with fluoxetine + risperidone

Risperidone + fluoxetine

- Fluoxetine and norfluoxetine are potent inhibitors of CYP2D6
- Spina et al. found this combination can lead to increased plasma concentrations of risperidone and its active metabolite by an average of 75% (n=9)
- May lead to supratherapeutic or toxic levels of risperidone and lead to extrapyramidal symptoms

Case 4

NE is a 22 year old male college student presenting to the clinic today complaining of nausea, somnolence, headache, and daytime fatigue, stating he “feels groggy all day”. Two weeks ago, NE received a prescription for zolpidem 5mg po QHS for insomnia. Upon questioning about past medication trials, you find NE has tried trazodone and diphenhydramine in the past, neither of which were effective.

Case 4 Question

NE’s symptoms are likely due to adverse effects of zolpidem?

- a. True
- b. False
Use of Natural Products

- 75% of herbal use is undisclosed to healthcare providers (n=305)
  - 60% of users self-prescribe
  - 11% prescribed by medical doctor
- 13% also used prescription medications in the past year
- 20% of all St. John’s Wort users were also using a prescription drug
- Healthcare providers must inquire about herb/vitamin/supplement use

Case 4 (continued)

Upon further questioning about dietary and herbal supplements, NE reports that when his insomnia began 3 months ago, he started taking valerian root at the suggestion of his roommate. He states that he assumed an herbal medication would be safe and not cause problems with his prescription medications “because it’s natural”.

Case 4 Question

Given this new information, what is the best treatment option for NE?

a. Tell NE to discontinue valerian root due the interaction with zolpidem and its lack of efficacy when he used it alone
b. Tell NE to discontinue valerian root because herbal supplements are ineffective
c. Discontinue zolpidem and ask NE to continue valerian root alone for an adequate trial

Contraceptives and Anticonvulsants

- Reduced hormonal contraceptive effectiveness observed when used with:
  - Carbamazepine
  - Oxcarbazepine
  - Phenobarbital
  - Primidone
  - Phenytoin
  - Topiramate
  - Lamotrigine (note progestin only not affected)
- Utilize contraceptives that do not interact with anticonvulsants

Adverse drug events associated with specific medications

Antidepressants
Suicidality

- 2004 FDA black box warning
- Medication Guides and other resources available
- Close follow-up and education is critical
- Key point:

“There weren't more actual suicides, but more people under 24 were thinking or talking about it...This occurs most often within the first 30 days of an adolescent or young adult starting on an antidepressant.”

http://www.fda.gov/downloads/ForConsumers/ConsumerUpdates/ucm095990.pdf

Monitoring for Suicidality

- Thoughts about suicide or dying
- Attempts
- Worsening or new onset of depression or anxiety
- Agitation
- Restlessness
- Panic attacks
- Insomnia


Sexual Dysfunction

- Frequent problem in psychiatric patients
- Common reason for non-adherence
- May be due to:
  - Side effect of psychotropic agent impacts relapse rates by limiting dose/duration of treatment
  - Primary sexual disorder
  - Symptom of illness
  - Substance abuse
  - Psychosocial stressors
  - Other causes


Strategies

- Become skilled and comfortable discussing topic
- Patient education when treatment initiated
- Encourage reporting – inquire about concerns
- Take student concerns seriously, which may include problems with desire, excitement, or orgasm
- Consider bupropion or mirtazapine

Case 5

BK is a 20 year old political science major who presents to your walk-in clinic with complaints of dizziness, chills, nausea, feeling “on-edge”, and “electric shock-like feelings” in her arms. Three months ago she was seen in clinic for depression and anxiety. At that time an antidepressant was initiated. Upon questioning, you find that she recently stopped using her antidepressant because she was feeling better.

Case 5 Question

Based on this information, which of the following is the most likely explanation for her presentation?

a. Influenza virus  
b. Recurrence of her psychiatric condition  
c. Antidepressant discontinuation

SSRI Discontinuation Syndrome

- Symptoms include:
  - Dizziness, lethargy, headache, chills, nausea, paresthesias, numbness, electric shock-like sensations, anxiety, irritability, ataxia, lightheadedness
  - Can be uncomfortable and distressing
  - Likely occur 1 to 3 days after discontinuation or dose reduction
  - Most cases resolve within 10 days


Case 5 Question

BK was most likely treated with which of the following antidepressants:

a. Fluoxetine  
b. Bupropion  
c. Paroxetine

Antipsychotics

Case 6

NH is a 26 year old male with a history of severe and recurrent treatment resistant depression. He presents to clinic with suicidal ideation and is hospitalized for his current depressive episode. While hospitalized, his antidepressant regimen is changed and he inquires whether an antipsychotic would be a good option, as he has recently seen advertisements touting the benefits.
Case 6 Question
Which of the following parameters is most important to monitor in NH if an antipsychotic agent is added to his antidepressant regimen?

a. Renal function
b. Hepatic function
c. Lipid panel

Case 6 Question
Which of the following antipsychotics would be preferred as add-on treatment?

a. Aripiprazole
b. Olanzapine
c. Quetiapine

Metabolic Syndrome and Obesity
- Metabolic syndrome associated with development of cardiovascular disease and diabetes
- Risks for metabolic syndrome in young adults include poor diet, obesity, and physical inactivity
- Obesity rates
  - 47% in men
  - 27% in women
- Low HDL-C and high blood pressure reported in study

Metabolic Complications
- Prevalence of metabolic syndrome 2 to 3 fold greater in those with serious mental illness
- Use of atypical antipsychotics are associated with diabetes, hyperlipidemia, and weight gain
- Use expanding for new indications and off-label use
- Monitoring for metabolic complications is suboptimal

Metabolic Parameters Monitoring for Second Generation Antipsychotics

<table>
<thead>
<tr>
<th>Parameters</th>
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<tr>
<td>Weight (BMI)</td>
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<td>x</td>
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<td>Waist Circumference</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>x</td>
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<tr>
<td>Blood Pressure</td>
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<td>x</td>
<td></td>
</tr>
<tr>
<td>Fasting Plasma Glucose</td>
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<td>x</td>
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<tr>
<td>Fasting Lipid Panel</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Q 5 Years if WNL</td>
</tr>
</tbody>
</table>

Adapted from Diabetes Care 2006;29(8):1386-1391

Leukopenia, Neutropenia, and Agranulocytosis

- 8/2009 warning added to all antipsychotics
- Possible risk factors
  - Pre-existing low WBC
  - History of drug induced leukopenia/neutropenia
- Monitor for signs of infection
  - e.g. fever, CBC

Case Report

- Fatal agranulocytosis associated with psychotropic use
  - After 5 weeks of treatment with lamotrigine, mirtazapine, quetiapine, venlafaxine
  - Developed severe ocular cellulitis, severe oral thrush, febrile neutropenia
  - Led to multiorgan dysfunction and septic shock
- “Late recognition of drug-induced agranulocytosis likely contributed to her severe symptoms and ultimate death…”

Case 7

NP is a 27 year old graduate student who was recently prescribed asenapine to augment his current regimen of lithium and valproic acid to manage bipolar disorder. He presents to the ED today with swollen tongue, difficulty breathing, itching, and low blood pressure with rapid heart rate.

Case 7 Question

Of the following, which is the most likely explanation for his current presentation:

a. Food allergy
b. Drug allergy
c. Drug interaction

Asenapine

- Serious allergic reactions may occur
- 52 reports of Type I hypersensitivity reactions
  - May occur after single dose (15%)
  - 29% resolved upon drug discontinuation
  - 37% led to hospitalization or ED visit
  - 13% required therapeutic intervention
- Counsel patients on s/sx of Type I reactions
- Patients should seek medical attention immediately if s/sx apparent

Case 7 Question

How should NP’s reaction be managed?

a. Treat symptomatically with epinephrine, hydrocortisone, and diphenhydramine
b. Discontinue asenapine
c. Both a and b

Lamotrigine

Case 8
HI is a 21 year old female with a history of bipolar disorder, most recent episode depressed. She is currently treated with lithium 300mg twice daily, lamotrigine 100mg twice daily and escitalopram 20mg/day. Her bipolar disorder is well controlled with her current regimen. She presents to the ED with complaints of headache, photophobia, nausea, and vomiting. Physical exam is significant for nuchal rigidity. Gram stain and CSF cultures are negative. Her social history is significant for binge drinking and occasional marijuana use.

Case 8 Question
Which of the following may explain HI’s presentation to the ED?
- a. Bacterial meningitis
- b. Neuroleptic malignant syndrome
- c. Adverse effect of lamotrigine

Aseptic Meningitis with Lamotrigine
- 40 cases reported in an estimated 46 million prescriptions dispensed
  - Mean onset 16 days (range 1-42 days) after initiation
  - Symptoms typically resolve a few days after discontinuing the offending agent
  - Drug-induced meningitis is a diagnosis of exclusion
  - Must evaluate for other causes of meningitis
  - Rapid recognition is critical


Psychotropic Misuse

Prevalence
- One study (n=14,175) found 13.7% of students take a psychotropic medication, mostly antidepressants
  - 14.7% take these medications without a prescription, most commonly:
    - Stimulants 52.6%
    - Anxiolytics 38.4%
    - Antidepressants 17.4%
- Another study reported more than 10% of students misused at least one class of prescription psychotropic medications
  - More likely to report symptoms of drug and alcohol abuse


Report taking drugs not prescribed within last 2 months

National College Health Assessment available at:
http://www.acha-ncha.org/reports_acha-nchaii.html
### Reasons for Personal Misuse

<table>
<thead>
<tr>
<th>Reason</th>
<th>Drug Class(es)</th>
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<tbody>
<tr>
<td>Help study or focus</td>
<td>Stimulants</td>
</tr>
<tr>
<td>Experimentation</td>
<td>Stimulants, Benzodiazepines</td>
</tr>
<tr>
<td>To get high or “party”</td>
<td>Stimulants, Benzodiazepines</td>
</tr>
<tr>
<td>Self-medication</td>
<td>Stimulants, Benzodiazepines</td>
</tr>
<tr>
<td>To relax or “zone out”</td>
<td>Benzodiazepines</td>
</tr>
<tr>
<td>To manage stress</td>
<td>Benzodiazepines, Antidepressants</td>
</tr>
</tbody>
</table>

[McCabe et al., 2011;72:134-9.]

### Nonmedical Prescription Drug Misuse

- 20% lifetime prevalence in one study focusing on pain, sedative/anxiety, sleeping, and stimulant medications (McCabe et al.).
- Another study reports 39% lifetime use (Peralta & Steele).
- These classes of medications were used (McCabe et al.):
  - Recreationally among 13% of students
  - For self-treatment among 39%
  - With mixed intentions among 48%
- Over 1/3 respondents reported misuse of more than one category of medication
- Differences in gender and race were highlighted

[Drug Alcohol Depend. 2009;102(1-3):63-70; Subst Use Misuse 2010;45:865-87.]

### Sharing and Selling of Prescription Drugs

- Among 483 students with a prescribed medication, 36% diverted a medication at least one time
  - 34% of students shared medication
  - 9% reported selling a medication
- Diversion rates highest among:
  - ADHD medications (62%)
  - Pain medications (35%)
  - Other psychotropic medication (14%)

[McCabe et al., 2010;71(3):262-9.]

### Benzodiazepine Misuse

- Contributes significantly to prescription drug abuse
- Often co-occurs with abuse of other medications
- Most abusers are young and male
- Overdose in monotherapy is rare; yet risk increases in conjunction with alcohol or other respiratory depressants

Adverse Effects of Stimulant Misuse

- Similar to cocaine
  - Include hypertension, vasospasm, tachycardia, dysrhythmia
  - Neurologic and psychiatric effects including serotonin syndrome, hallucinations, anxiety, paranoia, seizures, tics, hyperthermia, tremor
  - Memory loss, worsening academic performance

Risk Factors for Abuse/Misuse of Stimulants

- White
- Male
- Low GPA
- Upperclassmen
- Heavy alcohol use
- Fraternity/sorority member
- Previous illicit drug use
- Competitive school
- Untreated ADHD symptoms

Statistics on Stimulant Misuse

- In the past 6 months...
  - 17% of students took their ADHD medication with marijuana
  - 30% of students took their ADHD medication with alcohol
  - 8% of students had snorted their ADHD medication
  - 56% of students with a prescription for ADHD medications were approached to divert their meds
    - 26% did

Statistics on Stimulant Misuse

- 43% of students with ADHD abused their medication
  - 22% overused
  - 11% diverted
  - 10% used to “get high”
- 18% of students without an ADHD diagnosis had used stimulants at least once

Strategies to minimize stimulant misuse

- Be aware of the prevalence of stimulant abuse in students with or without ADHD
  - Overdosing
  - Sharing or selling
  - Combining with alcohol or other drugs
- Ask your patients how they are taking their stimulants and reevaluate their need for stimulants over time
- Encourage patients to seek out non-pharmacologic methods of dealing with stress and school

Case 10

MR is a 21-year-old WM who is currently a junior. He was diagnosed with ADHD at the age of 7 and has been treated with methylphenidate since this time. He comes to you after watching a news report on the cardiovascular risks of prescription stimulants. He is incredibly concerned about this and is considering ‘just dealing’ with his ADHD without medication. He doesn’t want to have a heart attack, since this is how his grandfather died.
Case 10

Where does the concern that stimulants increase the risk of cardiovascular events stem from?

a. Increase SBP  
b. Increase DBP  
c. Increase HR  
d. All of the above

Is there a cardiovascular risk?

- Current or new use of stimulants compared to nonuse or previous use was **not** associated with increased risk of serious cardiovascular events (Habel & Cooper)
- Initiation of methylphenidate **may** be associated with a 1.8-fold increase of ventricular arrhythmia or sudden death (Schelleman)


Recommendations

- Before prescribing a stimulant to treat ADHD:
  - Take a good history, especially of cardiovascular disease in the patient and their family
  - Perform a physical exam, paying close attention to the cardiovascular system
  - If the history and/or physical exam suggests an underlying risk or presence of heart disease, consider additional testing (e.g. ECG)


Alcohol and Illicit Drugs

Background

- 70% of students in one survey combined psychotropic medications with alcohol or illicit drugs
  - >80% fail to report use to prescriber
  - 35% met criteria for substance dependence


Case 11

DP is a 20 year old male university student presenting to the psychiatric emergency room after his friends found him in his apartment disconnected from reality and paranoid. DP's friends report increased paranoia over the past week, with symptoms including: auditory and visual hallucinations, belief that neighbors were conspiring against him, cough and chest discomfort, and agitation. DP reports that over the past two weeks he has slept little, perhaps only 1 hour per night.
Case 11 (continued)

- Family history: Mother with bipolar disorder
- Substance abuse history: DP’s agitation prevented him from participating in the interview, but past substance abuse history is positive for: alcohol, cannabis, amphetamines, cocaine
- Urine drug screen negative
- Physical exam: remarkable for blood pressure of 168/92 mmHg

Case 11 Question

Which of the following is most likely causing DP’s symptoms?

a. Bipolar disorder  
b. Psychosis  
c. Intoxication/withdrawal from bath salts (MDPV)

Designer Drugs

- Difficult to identify in lab
- Chemicals change rapidly
- Bath salt intoxication/withdrawal can present similarly to mania and psychosis
- Bath salt withdrawal management and duration (Winder et al. case report)

K2

- Rapidly increasing prevalence
- Symptoms of intoxication: hallucinations, agitation, autonomic instability, and suicidal thoughts and behaviors
- Dependence is possible
- Greater prevalence among young, male college students

Alcohol and Antidepressants

- May cause increased depressive symptoms; decreased coordination, judgment, and reaction time; and increased sedation
- In combination with MAOIs, some alcoholic beverages (wine, beer) may increase the risk of hypertensive crisis
- Individuals with depression are an increased risk of alcoholism compared to the general population

Alcohol and Benzodiazepines

- Alcohol and benzodiazepines can produce additive effects
- Patients with anxiety may self-medicate with alcohol
- Alcohol may result in increased sedation and depression in combination with benzodiazepines; risk for respiratory depression


Substance Abuse Treatment, Prevention, and Policy 2011;6(16).

Summary of Strategies to Prevent Adverse Drug Events

Psychiatric Pharmacists
- Teach patients about mental illnesses
- Identify and manage target symptoms
- Assess medication safety and efficacy
- Evaluate and utilize evidence-based medicine to provide treatment recommendations
- Research drug information questions
- May serve as consultants or prescribe via collaborative practice agreements
- Provide direct patient education and staff education
- Medication histories
- Drug therapy assessment and monitoring
- Others…

Communication
- Empower patients/caregivers
- Health care providers
- Interdisciplinary collaboration
- Thorough medication histories
  - Include any supplements, OTC products, illicit drugs, etc.
- Medication reconciliation

Patient Education
- Appropriate use of psychiatric medications
- Potential adverse effects
- Risks of concomitant use of alcohol or other drugs
- Do not share with friends or family
- Providing information about campus resources

Patient Assessment
- Regular depression and suicide screenings
- Collecting information on how student is using prescribed medications
- Substance use
- Non-adherence
- Medication efficacy
  - Discontinue ineffective meds or those no longer needed

Personal Formulary
- Knowledge of key drug properties including dosing, adverse effects, interactions, appearance of drug
- Be skeptical of “new and improved” drugs
  - Practice evidence-based medicine
  - Consider the unknown long-term risks versus benefits
  - “Fewer and more time tested is best”
Recognition of Drug Interactions
- Drug-drug, herb, supplement, disease, food, lab, pregnancy, lactation
- Databases
- Identifying clinical significance
- Consider medication changes
  - Start, stop, switch, adherence
- Half-lives
  - Parent drug and any active metabolites
- Routine monitoring

Preventing Adverse Drug Events
- Awareness of potential adverse drug reactions
- Monitor for common and uncommon side effects
  - Including hematologic abnormalities
- Recognize any change in symptoms or new complaint may be a side effect
- Verify allergies and reactions

Safe Prescribing
- Be aware of black box and other warnings
- Use extra caution if narrow therapeutic index
- Minimize polypharmacy
- Keep up-to-date with drug alerts
- Limit quantities
- Check drug concentrations, if appropriate
- Drug information databases
- Evaluation of risk for abuse by prescribers
- Utilize pharmacists

Conservative Prescribing
- Maximize use of non-drug options
- Have a target symptom for every drug prescribed
- Select agents with low likelihood of drug interactions (e.g. mirtazapine, azithromycin)

Vigilance regarding Drug Diversion
- Monitor high-risk students, including those:
  - Prescribed ADHD medications
  - With conduct problems
  - Nonmedical users of prescription drugs
- Consider urine drug screens
- Utilize alternatives to amphetamine/dextroamphetamine
- Instruct students to take meds as directed and dispose of unused pills
- Reduce amount of “extra” meds available

Discourage Nonmedical Use
- Highlight dangers including:
  - Problems in drug recipient
  - Combining drugs
  - Use with alcohol
  - Sharing drugs
  - Selling drugs
  - Using social settings to consume drugs
- Utilize prescriber agreements
Prescription Drug Monitoring Programs

- Most states have a program in place
- Search your state at: http://www.nascsa.org/rxmonitoringnascsa.htm
- Purpose to reduce prescription drug abuse and diversion

Reporting Adverse Drug Events

- Track allergies and adverse drug reactions

Questions