Polypharmacy and Herbal Medicine

Myrna Mamaril, DNP, RN, NEA-BC, CPAN, CAPA, FAAN, FASPAN

1

Introduction

2

Introduction

- Since polypharmacy is a relevant risk factor in older adults that is associated with poor postoperative outcomes, non-essential medications, including prescription drugs during the perioperative period should be discontinued.
- Long- term cardiac medications, as well as preoperative opioids should be continued to avoid rebound complications.
- Nurses should administer medications for older adults: start low and go slow, especially considering their renal and hepatic functions which alter absorption and action.
- Perianesthesia nurses must be knowledgeable about the effects of anesthesia and surgery in relation to the physiology of aging.
- Nurses must anticipate actual/potential long-range effects that extend once the older adults have been discharged home.
- Perianesthesia nurses must inquire and assess the home environment for the safe discharge preparation so that both the patients and their families know how to follow their medication discharge instructions.

3

Safety and Regulatory Concerns: Polypharmacy and Herbal Medicines

- Polypharmacy is a recognized patient safety risk among older adults
- Although standard definitions of polypharmacy do not generally include herbal medicinal products (HMPs) and dietary supplements, they increase the risk of adverse drug events through potential interactions.
- Herbal medicines and dietary supplements by older adults is common.
- Medication-related problems are higher among older adults because of comorbidities and reduced clearance of pharmacologically active compounds.

4

Pharmacology Terms

5

Pharmacology Terms

- Pharmacologic
- Pharmacogenetic
- Pharmacokinetic
- Pharmacodynamic

6

Pharmacologic

- Pharmacologic or pharmacological refers to the study of medicine concerned with the uses, effects, and modes of action of drugs
  - Example is the pharmacologic treatment for hypertension

7

Pharmacogenetic

- Pharmacogenetics is the study of how genetic differences or genetic factors react with drugs or herbal medicine
  - Variability in drug metabolism response due to heredity
  - Example patients with plasma cholinesterase deficiencies and how they react to the anesthesia agent succinylcholine

8

Pharmacokinetics

- Pharmacokinetics is the study of absorption, distribution, metabolism and elimination of medications.
- Pharmacokinetics in older adults is influenced by normal physiologic changes in aging and also to the disease process.
  - An example is in the metabolism of drugs in the liver may be reduced, as well as elimination through the kidneys may take longer to be cleared due to renal compromise. Older adults may respond differently more sensitively to medication changes.

9

Pharmacodynamics

- Pharmacodynamics is defined as how the body responds to medications.
- When the older adult's body experiences loss of cell function, the pharmacodynamics influence a greater sensitivity to certain medications, for example anti-cholinergics side effects may cause central nervous system adverse effects like confusion and mental status changes.

10

Defining Polypharmacy

- Polypharmacy simply breaks down as follows: "poly" as a prefix meaning "many" or "multiple" and "pharmacy" meaning medications.
- Perianesthesia nurses should anticipate geriatric patients taking several medications yet understand that many older adults have the potential to respond differently to medications, especially with anesthesia.

11

Polypharmacy Definitions

- Masnoon et al. [13] conducted a systematic review of polypharmacy definitions and found 138 definitions of polypharmacy and of those there were 111 "numerical only" definitions.
- These researchers found the most common definition was the **numerical definition** of **five or more** medications daily.

12

Polypharmacy Classifications

- Persistent polypharmacy greater than 5 prescribed medications for 181 days;
- Chronic polypharmacy greater than 5 prescribed medications in one month for six months (consecutive or not);
- Major polypharmacy taking greater than 10 prescribed medications on the one day;
- Hyper polypharmacy taking greater than greater that 10 prescribed medications greater than 90 days.[13]

13

Prevalence of Polypharmacy

- Shaw & Hajjar[14] estimate that chronic diseases are prevalent among older adults with 80% of this population having at least one chronic health condition and 40% having at least two chronic conditions.
- Health conditions include: arthritis, hypertension, diabetes, heart disease, lung disease, and cancer. Consequently, multiple medications are often required for optimal management.
- Researchers also noted that outpatients taking five or more medications had an 88% increase of experiencing adverse drug events compared to those taking fewer medications.

14

Adverse Drug Events

- Adverse drug events (ADE) is an injury that results from use of a medications.
- Older adults who have polypharmacy are at increased risk to experiencer ADEs due to either a drug-to-drug interaction or a drug-disease interaction.
- Older adults are more vulnerable because they take multiple medications for their chronic health conditions.
- Risk of ADEs caused by drug-to-drug interactions increases with polypharmacy.

15

Role of Cytochrome P-450 Enzyme system

- Another important role of drug interactions is the cytochrome P-450 enzyme system. P-450 is composed of many specific enzymes responsible for the metabolism as well as clearance in the liver of medications, herbal medications, nutrients, as well as nicotine. In the elderly and frail elderly this is especially a concern as the P-450 interacts with the age-related changes and can modulate adverse reactions of prescribed medications.

16

Cytochrome P450 Enzyme System

- **G**roup of enzymes involved in drug metabolism and found in high levels in the liver- these enzymes ***change many drug***s, including anticancer drugs, into less toxic forms that are easier for the body to excrete.
- **Inducing agents (CC) (will INCREASE metabolism, needing to INCREASE dose)**
- **Examples:** Phenytoin, phenobarbital, carbamazepine, rifampin ☆☆
- - In**c**rease metabolism of other drugs, need to in**C**rease dose
- **Inhibiting agents (BD) (DECREASE metabolism, needing to DECREASE dose)**
- - **Examples**: Protease inhibitors, azole antifungals, cimetidine, erythromycin ☆☆
- **Decrease** metabolism of other drugs, need to **d**ecrease the dose

17

Pathophysiology of Aging Related to: Hepatobiliary System

Implications for polypharmacy and drug interactions:

- Hepatobiliary Blood Flow - Decreased
- Hepatic Cellular Activity - Decreased
- Hepatic Microsomal Enzyme Activity - Decreased
- Protein Synthesis - Albumen - Decreased
- Biotransformation & Excretion of Drugs - Impaired
- Cholinesterase Activity - Decreased

18

Polypharmacy

- Polypharmacy is a common clinical issue used to refer to as an over prescription of multiple drugs which is considered a significant risk factor associated with poor postoperative outcomes for the elderly population.
- Co-existence of two or more chronic health problems in adults may be referred to as multi-morbidity.
- Use of multiple medicines is commonly referred to as polypharmacy.
- Polypharmacy is also associated with adverse outcomes, such as geriatric syndromes, mental confusion, falls, adverse drug reactions, increased hospitalizations, and even mortality.

19

- Perianesthesia nurses must consider potential untoward interactions between the patients' usual medications and those being given in the perianesthesia period.
- Most importantly, these nurses must consider physiologic changes that occur with the aging process and adapt their medication protocol accordingly.

20

Preoperative Instructions:

- Medication use generally appears to increase with age, suggesting that the frail elderly may experience the double jeopardy of diminished ability to absorb, metabolize, distribute, and excrete drugs and yet also have increased need for their benefit because of, for example, decreasing cardiovascular function.
- Maintaining the usual medication protocol is important.
- Departments of anesthesia generally have policies regarding the use of antihypertensives, anti arrhythmics, mood elevators, aspirin, and anti coagulants before surgery and anesthesia.
- Diuretics are commonly omitted until after surgery to avoid a full bladder intraoperatively.
- Instructions to take specific medicines with a small amount of water on the morning of surgery.
- Perianesthesia nurses should reinforce these instructions during the PreOp Call and, on the day of surgery, verify and document that the instructions were followed.

21

PreOp Assessment

- Obtaining a complete medication history from the older adult can be a challenge.
- Some patients may have no idea as to the name of the medications that they take
- Instruct elderly patients to bring the medications with them if they seem unsure.
- Many elderly patients forget to mention certain medications or do not consider them important enough to list on medication histories.
  - Eye drops, inhalants, topicals, supplemental oxygen, alcohol, cough medicine, antacids, laxatives, or over-the-counter medications, such as analgesics and antihistamines, are some common examples.

22

PreOp Medications

- Cardiac meds
  - Generally instructed to take
  - Beta-blockers should be continued
- Antihypertensives
  - Generally continued - abrupt withdrawal of clonidine, angiotensin converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs) can result in rebound hypertension
  - ACE inhibitors, ARBs may be held - difficult to treat hypotension may occur during induction of anesthesia
- Diuretics
  - Probably best to continue chronic dose through perioperative period; check K^+
- Anticonvulsants
  - Generally instructed to take

23

Significant Physiologic Interactions of Herbal Medications

24

Herbal Medicine

- Herbal medications are derived from plant-based, bioactive products that are metabolized by the liver that can cause problems for older adults taking medications.
- Since many older adults take a disproportionately greater number of medications and herbal supplements than younger people, they becomes more susceptible to adverse and altered effects

25

Herbal Medicine

- Many older adults may not disclose they are taking herbal medications for several reasons.
- May perceive over the counter herbals are harmless and easily purchased like vitamins.
- Cultural/ethnic reasons may factor into the disclosure because they are part of their belief system.
- May be secretive because they may anticipate disapproval from perioperative team.
- Remember that widespread use of herbal medications may have negative outcomes on older adults who are undergoing anesthesia and surgery!

26

Herbal Medicine

- When Lee, Moss and Yuan conducted an integrative review of herbal medicines, they identified eight of the following herbs that posed the greatest impact for surgical patients: echinacea, ephedra, garlic, ginko, ginseng, kava, St John's Wort, and valerian.
- Non-herbal supplements, such as vitamins, minerals, amino acids, and hormones may also cause undesirable effects.
- Risk of drug-drug and drug-disease interactions increases with the number of prescribed medications and even more increased risk with taking herbal medications.
- Complications, such as bleeding, stroke, myocardial infarction, coagulopathies, prolonged or inadequate anesthesia during the intraoperative or postanesthesia phases of care increase the older adults' morbidity and mortality associated with herbal medications

27

Herbal Medicine Interactions

- Herbal medicines follow modern pharmacological principles
- Herb–drug interactions are based on the same **pharmacokinetic** and **pharmacodynamic** mechanisms as drug–drug interactions.
- Herbal medicines affects:
  - Absorption,
  - Metabolism (e.g. St. John's Wort increases warfarin metabolism, causing decreased anticoagulant effect)
  - Excretion (St. John's Wort increases digoxin and renal excretion) of concurrently administered cardiovascular drugs.

28

Herbal Medicine Interactions

- Herb–drug interactions are based on the same **pharmacokinetic** and **pharmacodynamic** mechanisms as drug–drug interactions.
- Herbal medicines affects:
  - Interactions may be additive or synergetic
  - Herbal products potentiate the action of the conventional cardiovascular drug (e.g. ginkgo potentiates the antiplatelet effect of aspirin)
  - Direct antagonistic to the action of the drug (e.g. green tea antagonizes or creates anticoagulant effect of warfarin)
- Based on the evidence, interactions between herbal medicines and cardiovascular drugs exist as the likelihood patients will have adverse events when taking two drugs (i.e. herbal and conventional medicines) with the potential to interact.

29

Pathophysiology of Aging Related to: Hepatobiliary System

Implications for polypharmacy and drug interactions:

- Hepatobiliary Blood Flow - Decreased
- Hepatic Cellular Activity - Decreased
- Hepatic Microsomal Enzyme Activity - Decreased
- Protein Synthesis - Albumen - Decreased
- Biotransformation & Excretion of Drugs - **Impaired**
- Cholinesterase Activity - Decreased

30

Eight Commonly Used Medications

- Despite many uncertainties in commercial preparations, herbal medications adhere to modern pharmacological principles.
- A **single herbal medication** may adversely affect the patient during the perioperative period through the following different mechanisms:
- These effects are **direct** and cause intrinsic pharmacological effects
- Pharmacodynamic interactions **alter** the action of conventional drugs at effector sites
- Pharmacokinetic interactions **alter** the absorption, distribution, metabolism, and elimination of conventional drugs
  - Eight Common herbal medicines are: **Echinacea. Ephedra, Garlic, Ginkgo, Ginseng, Kava, St John's Wort, and Valerian**

31

Herbs / Vitamins of Concern in the Perioperative Period

- Effects on blood glucose
  - Garlic, ginseng, karela, cinnamon
- Effects on blood pressure
  - Capsicum, goldenseal, licorice, St. John's wort
- Effects on coagulation
  - Feverfew, garlic, ginger, ginkgo, ginseng, horse chestnut, red clover, vitamin E
- Sedative/hypnotic effects
  - Kava-Kava, lemon balm, valerian

32

Echinacea

- Three species of echinacea of the daisy family, are used for prophylaxis and treatment of viral, bacterial, and fungal infections, particularly those of the upper respiratory tract.
- Pharmacological activity cannot be attributed to a single compound
- Lipophilic action, which contains the alkylamides, polyacetylenes, and essential oils, appears to be more active than hydrophilic action of immunostimulatory effects
- Expert opinion generally warns against concomitant use of echinacea and immunosuppressive drugs (probability of diminished effectiveness)
- Patients who may require perioperative immunosuppression, such as those awaiting organ transplantation, should be counseled to avoid taking echinacea.

33

Echinacea

- In contrast to the immunostimulatory effects with short-term use, long-term use of longer than 8 weeks is accompanied by the potential for immunosuppression
- May increase risk of certain postsurgical complications, such as poor wound healing and opportunistic infections.
- Echinacea also has been associated with allergic reactions, including 1 reported case of anaphylaxis.
- Caution in patients with asthma, atopy, or allergic rhinitis. In addition, concerns of potential hepatoxicity have been raised
- prudent to discontinue taking echinacea as far in advance of surgery as possible when compromises in hepatic function or blood flow are anticipated. This is important for anesthetic drug administration or as an effect of surgical manipulation.

34

Ephedra

Ephedra in Chinese medicine, is a shrub native to central Asia

- Used to promote weight loss, increase energy, and treat respiratory tract conditions, such as asthma and bronchitis.
- Contains alkaloids, including ephedrine, pseudoephedrine, norephedrine, methylephedrine, and nor-pseudoephedrine.
- Commercial causes dose-dependent increases in blood pressure and heart rate.
- Predominant active compound, is a non-catecholamine sympathomimetic agent that acts directly at adrenergic receptors and by indirectly releasing endogenous norepinephrine.
- These sympathomimetic effects associated with more than 1070 reported adverse events, including fatal cardiac and central nervous system complications.
- Widely used as first-line therapy for intraoperative hypotension and bradycardia, the unsupervised preoperative use of ephedra raises certain concerns.
- Vasoconstriction and, in some cases, vasospasm of coronary and cerebral arteries causing myocardial infarction and thrombotic stroke.

35

Ephedra

Ephedra in Chinese medicine, is a shrub native to central Asia

- Used to promote weight loss, increase energy, and treat respiratory tract conditions, such as asthma and bronchitis.
- Contains alkaloids, including ephedrine, pseudoephedrine, norephedrine, methylephedrine, and norpseudoephedrine.
- Commercial causes dose-dependent increases in blood pressure and heart rate.
- Predominant active compound, is a non-catecholamine sympathomimetic agent that acts directly at adrenergic receptors and by indirectly releasing endogenous norepinephrine.
- These sympathomimetic effects associated with more than 1070 reported adverse events, including fatal cardiac and central nervous system complications.
- Widely used as first-line therapy for intraoperative hypotension and bradycardia, the unsupervised preoperative use of ephedra raises certain concerns.
- Vasoconstriction and, in some cases, vasospasm of coronary and cerebral arteries causing myocardial infarction and thrombotic stroke.

36

Ephedra

Ephedra in Chinese medicine, is a shrub native to central Asia

- **Patients who have consumed ephedra and are later anesthetized with halothane may be at risk of developing intraoperative ventricular arrhythmias** because halothane sensitizes the myocardium to ventricular arrhythmias caused by exogenous catecholamines.
- Ephedra affects cardiovascular function by causing hypersensitivity myocarditis, characterized by cardiomyopathy
- Long-term use results in **tachyphylaxis** from depletion of endogenous catecholamine stores and may contribute to perioperative hemodynamic instability (intraoperative hypotension and bradycardia)
- Concomitant use of ephedra and monoamine oxidase inhibitors can result in life-threatening hyperpyrexia, hypertension, and coma.
- Ephedrine's half-life of 5.2 hours with 70% to 80% of the compound excreted unchanged in urine. Based on the pharmacokinetic data and the known cardiovascular risks of ephedra, including myocardial infarction, stroke, and cardiovascular collapse from catecholamine depletion,
- **Should discontinue use at least 24 hours prior to surgery!**

37

Garlic

Garlic is one of the most extensively researched medicinal plants.

- Potential to modify the risk of developing atherosclerosis by reducing blood pressure and thrombus formation and lowering serum lipid and cholesterol levels.
- These effects are primarily attributed to the sulfur-containing compounds, particularly alliin and allicin.
- Garlic inhibits platelet aggregation in a dose-dependent fashion. The effect appears to be irreversible and may potentiate the effect of other platelet inhibitors, such as prostacyclin, forskolin, indomethacin, and dipyridamole.
- In one case study a spontaneous epidural hematoma was attributed to heavy use of garlic.
- Garlic cause bleeding and has the potential to lower blood pressure.
- In laboratory animals, allicin decreased systemic and pulmonary vascular resistance and lowered blood pressure.
- In humans, antihypertensive effect of garlic is marginal.
- There is potential for irreversible inhibition of platelet function may warrant patients to discontinue use of garlic at least 7 days prior to surgery, especially if postoperative bleeding is a particular concern or other platelet inhibitors are given.

38

Ginkgo

Ginkgo is derived from the leaf of Ginkgo biloba

- Used for cognitive disorders, peripheral vascular disease, age-related macular degeneration, vertigo, tinnitus, erectile dysfunction, and altitude sickness.
- Studies suggest Ginkgo may stabilize or improve cognitive performance in patients with Alzheimer disease and multi-infarct dementia.
- Compounds believed to be responsible for its pharmacological effects are the terpenoids and flavonoids.
- Two ginkgo extracts used in clinical trials are standardized to ginkgo-flavone glycosides and terpenoids.

39

Ginkgo

Ginkgo is derived from the leaf of Ginkgo biloba

- Ginkgo appears to alter vasoregulation; acts as an antioxidant, modulates neurotransmitter and receptor activity, and inhibit platelet-activating factor.
- These effects, the **inhibition of platelet-activating factor raises the greatest concern for the perioperative period since platelet function may be altered**.
- Small clinical trials reported complications from bleeding (spontaneous intracranial bleeding, spontaneous hyphema, postoperative bleeding following laparoscopic cholecystectomy have been attributed to ginkgo use.
- **Discontinue taking ginkgo at least 36 hours prior to surgery!**

40

Ginseng

Asian Ginseng and American Ginseng are the most commonly described

- Ginseng has been labeled as an "adaptogen," since it reputedly protects the body against stress and restores homeostasis.
- Most pharmacological actions are attributed to the ginsenosides that belong to a group of compounds known as steroidal saponins.
- Commercially available ginseng preparations may be standardized to ginsenoside content.
- Ginseng has a broad but incompletely understood pharmacological profile because of the many heterogeneous and sometimes opposing effects of different ginsenosides.
- Similar to steroid hormones.

41

Ginseng

Asian ginseng and American ginseng are the most commonly described

- Ability to lower postprandial blood glucose in both patients with type 2 diabetes mellitus and without diabetes, but this effect may create unintended hypoglycemia, particularly in patients who have fasted before surgery.
- Concern about the effect of ginseng on coagulation pathways.
- Ginsenosides inhibit platelet aggregation, prolongs both coagulation time of thrombin and activated partial thromboplastin.
- Studies suggests that the antiplatelet activity of panaxynol, a constituent of ginseng, may be irreversible in humans.
- Ginseng may inhibit the coagulation cascade, associated with significant decrease in warfarin anticoagulation (may be irreversible)
- **Discontinue ginseng use at least 7 days prior to surgery**

42

Kava

Kava is derived from the dried root of the pepper plant Piper methysticum

- Kava has gained widespread popularity as an anxiolytic and sedative.
- Psychomotor effects - first herbal medications expected to interact with anesthetics system, also has antiepileptic, neuroprotective, and local anesthetic properties.
- Kava may act as a sedative-hypnotic by potentiating-aminobutyric acid (GABA) inhibitory neurotransmission.
- Kavalactones increased barbiturate-induced sleep time, may explain the mechanism underlying the report of a case of coma attributed to an alprazolam-kava interaction.
- Kava has abuse potential, whether long-term use can result in addiction, tolerance, and acute withdrawal after abstinence
- Heavy use, kava produces a condition called kava dermopathy, characterized by reversible scaly cutaneous eruptions.
- Peak plasma levels occur 1.8 hours after an oral dose; elimination half-life is 9 hours.
- Their metabolites are eliminated through urine The pharmacokinetic data and possibility for the potentiation of the sedative effects of anesthetics
- **Discontinue use at least 24 hours prior to surgery**

43

Valerian

Valerian is an herb native to the temperate areas of the Americas, Europe, and Asia

- It is used as a sedative, particularly in the treatment of insomnia, and virtually all herbal sleep aids contain valerian.
- Valerian contains many compounds acting synergistically, but the sesquiterpenes are the primary source of the pharmacological effects of valerian.
- Valerian produces dose-dependent sedation/hypnosis and should be expected to potentiate the sedative effects of anesthetics and adjuvants, such as midazolam, that act at the GABA receptor.
- These effects appear to be mediated through modulation of GABA neurotransmission and receptor function. patient, valerian withdrawal appeared to mimic an acute benzodiazepine withdrawal syndrome after the patient presented with delirium and cardiac complications following surgery and the patient's symptoms were attenuated by benzodiazepines

44

Valerian

Valerian is an herb native to the temperate areas of the Americas, Europe, and Asia.

- Valerian potentiates the sedative effects of anesthetics and adjuvants, such as midazolam, that act at the GABA receptor.
- Pharmacokinetics of valerian are thought to be short-lived. Caution should be taken with abrupt discontinuation of use in patients who may be physically dependent on valerian because of the risk of benzodiazepine-like withdrawal. In these individuals, with close medical supervision, it may be prudent to taper the dose of valerian during several weeks before surgery.
- If not feasible, physicians can advise patients to continue taking valerian up until the day of surgery. Based on the mechanism of action and a reported case of efficacy, benzodiazepines can be used to treat withdrawal symptoms should they develop during the postoperative period.

45

St John's Wort

St John's wort is the common name for Hypericum perforatum.

- Short-term treatment of mild-to-moderate depression; not effective in the treatment of major depression. In Germany, St John's Wort is number one prescription for depression!
- Compounds believed to be responsible for pharmacological activity are hypericin and hyperforin.
- St John's wort exerts its effects by inhibiting serotonin, norepinephrine, and dopamine reuptake by neurons; use of this herb with or without serotonin-reuptake inhibitors may create a syndrome of central serotonin excess.
- St John's Wort can significantly increase the metabolism of many concomitantly administered drugs, some of which are vital to the perioperative care.

46

St John's Wort

St John's wort is the common name for Hypericum perforatum

- **Cytochrome is of P450 induced**, approximately **doubling its metabolic activity**.
- In one research study: 1 series of 45 organ transplant recipients, St John's wort was associated with a mean decrease of 49% in blood cyclosporine levels.
- Other study reported 2 cases of acute heart transplant rejection associated with this particular pharmacokinetic interaction.
- Other substrates commonly used in the perioperative period include alfentanil, midazolam, lidocaine, calcium channel blockers, and serotonin receptor

47

St John's Wort

St John's wort is the common name for Hypericum perforatum

- Short-term treatment of mild-to-moderate depression
- Not effective in the treatment of major depression
  - In Germany, St John's Wort is number one prescription for depression!
- Compounds believed to be responsible for pharmacological activity are hypericin and hyperforin and may be more pronounced when other enzyme inducers, which include other herbal medications, are taken concomitantly.
- St John's Wort also affects digoxin pharmacokinetics, possibly by inducing the P-glycoprotein transporter.
- Single-dose and steady-state pharmacokinetics of hypericin, pseudohypericin, and hyperforin have been determined.

48

St John's Wort

St John's wort is the common name for Hypericum perforatum

- After oral administration, peak plasma levels of hypericin and hyperforin were obtained, their median elimination half-lives of were 43.1 and 9.0 hours, respectively.
- Long half-life and alterations in metabolism of many drugs make concomitant use of St John's Wort a particular risk in the perioperative setting. The pharmacokinetic data suggest that patients taking this herbal medication should **discontinue use 5-10 days prior to surgery**.
- Discontinuation is especially important for patients waiting for organ transplantation or in those who may require oral anticoagulation postoperatively; thus, **these patients should be counseled to avoid taking St John's Wort postoperatively**

49

St John's Wort

- Studies agreed St. John's Wort activates enzymes of the cytochrome P450 enzyme system, including CYP 1A2 which is responsible of the metabolization of warfarin in the liver.
- This mechanism of St. John's Wort **increased the metabolism of warfarin** that explained the decrease of the seven cases of INR associated with concomitant use of warfarin and St. John's Wort reported by the Swedish Medical Product Agency.
- Notably, a clinical study [52] showed that St. John's wort **decreased the plasma concentration of phenprocoumon, an anticoagulant chemically related to warfarin** .

50

Anticoagulant Agents

- Many elderly patients take dipyridamole, warfarin (Coumadin), heparin, or other medications to prevent thrombosis or thromboembolism, particularly in the pulmonary and cerebral circulation.
- The surgeon or anesthesiologist often directs the patient to discontinue these types of drugs before surgery.
- High-risk patients with complex medical histories, the patient's primary physician/cardiologist may be consulted about preoperative discontinuation of these medications.
- Bleeding and clotting studies are often required just before surgery after the drug has been stopped to ensure adequacy of the clotting mechanism.
- Patients should be observed for bleeding and must receive adequate physician instructions about when to resume those medications at home.
- Patients need to know about the possible bleeding that could occur after discharge and to report these to the physician in charge of their care.

51

Anti-Inflammatory Agents

- Aspirin and other anti-inflammatory agents that can interfere with blood coagulation are often taken for arthritis, bursitis, and other types of inflammatory processes.
- Most physicians recommend that patients discontinue such medications before the day of surgery.
- Seven to 10 days of abstinence from aspirin is suggested for effective platelet regeneration,
- Many physicians **do not recommend** discontinuation of the drug long before surgery because exacerbation of the patient's chronic inflammatory disease may be more debilitating than the adverse consequences of continuation of the therapy.

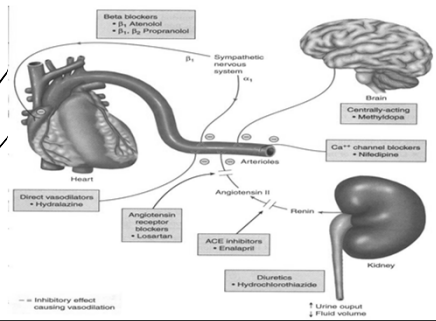
52

Beta Blocking Agents

- Many Elderly patients routinely take beta-blocking agents.
- Prescribed for everything ranging from hypertension to glaucoma.
- Researchers are urge caution; Side effects tend more pronounced and potentially harmful in the older adult.
- Primary effects of beta-blockade include: reduced myocardial contractility, conductivity, automaticity, and excitability, resulting in less workload for the heart-good news after, for example, a heart attack.
- Postural hypotension associated with beta-blockers may be more common in older people, resulting in dizziness, fainting, gait difficulties, and impaired vision, problems easily dismissed as the normal consequences of aging.
- Depressing the contractility of the myocardium, place patients at risk for pre-existing heart failure.
- Hypoglycemia may be poorly detected because the beta-blocker also masks the onset of tachycardia that is a frequent danger signal of impending hypoglycemia

53

Antihypertensive Properties



54

Beta Blocking Agents

- Propranolol (beta-blocking agent) with the administration of epinephrine can initiate a marked hypertensive episode, followed quickly by reflex bradycardia. [2]
- Hypertension occurs when the beta-blocking drug blocks the peripheral beta-effects of the epinephrine, which usually would be vasodilation and increased heart rate.
- Vasoconstriction and increased arterial resistance, the alpha-effects of epinephrine, are accentuated
- Followed by reflex bradycardia or other type of arrhythmias during which time propranolol can prevent the cardiovascular system from responding appropriately to the alpha-induced peripheral resistance.
- Myocardium, beta-blocked, is unable to respond to those increased demands, and further reflex bradycardia ensues.
- Treatment is initiated with direct-acting drugs. Intravenous nitroglycerin and nitroprusside are used to decrease blood pressure. Atropine may be effective in treating associated bradycardia. Ultimately, cardiac arrest or hypertensive stroke can occur if symptoms are left untreated.

55

Insulin

- Diabetes is a common ailment affecting the elderly population.
- Insulin-dependent diabetic patients need to be able to rely on a consistent and planned approach to their day to effectively manage their insulin requirements.
- All healthcare team members must communicate consistent and clear patient instructions regarding drug/food regimens on the day of surgery.
- Maintaining both dietary and insulin schedules as close to normal as possible is beneficial to the patient both physically and emotionally.
- Before the day of surgery, it is helpful to tell diabetic patients of the foods and beverages that will be available at the surgery unit.
- Patients often have options of bringing their own food if they are on a particularly strict dietary regimen.

56

Anti-Depressants

- Depression is a common and highly treatable illness in the elderly population.
- Estimates of 1% to 25% of older people experience symptoms of depression, such as low mood, sadness, pessimism, self-criticism, and difficulty sleeping, concentrating, or eating.
- What is generally not known is that older people have the highest rate of suicide of all age groups that are two to three times higher than that of the general population.
- Those at greatest risk usually meet the following criteria:
  - Male; white;
  - Aged 75 years or older;
  - Low income; association with alcohol or drug abuse; single (e.g., widowed, divorced);
  - Suffering from chronic disease, especially chronic pain;
  - Prior suicide attempt.

57

Anti-Depressants

- The treatment for depression can include medications, psychotherapy, or a combination of both.
- Electro convulsive therapy (ECT) is less commonly used, but equally effective for depression that is unresponsive to medication or for cases in which the use of antidepressant medications are contraindicated.
- Antidepressant medications appear to work by altering how specific neurotransmitters, such as dopamine, serotonin, and norepinephrine, act on receptors in the brain.
- Main categories of antidepressants include:
  - Tricyclic antidepressants (eg. amitriptyline)
  - Serotonin reuptake inhibitors (e.g., fluoxetine, paroxetine)
  - Monoamine oxidase inhibitors
  - Atypical antidepressants (lithium, trazodone)

58

Anti-Depressants

Guiding Principles in Administering Anti-Depressants

- All of these medications carry a wide range of side effects that can be particularly serious in elderly patients.
- The general rule of thumb in prescribing an antidepressant to a senior and for the nurse administering the medication is to "start low and go slow."
- This may help to minimize side effects, such as hypotension, anticholinergic effects, sedation, and gastrointestinal (GI) symptoms.

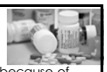
59

Anti-Depressants

- Orthostatic hypotension may be a problem associated with the antidepressants that have a moderate-to-strong ability to decrease blood pressure.
- Treatment with these drugs has been associated with an increased number of falls and fractures in the elderly patient.
- Those at greatest risk for developing orthostatic hypotension while taking antidepressants include the frail elderly, patients with cardiovascular disease, patients with diabetes, and those taking other medications that affect blood pressure.
- Symptoms that should alert the nurse to a problem include dizziness on standing, lightheadness, vertigo, increased number of falls, and complaints of palpitations or racing or pounding heart.
- Standing and lying blood pressure monitoring should be performed on patients known to be taking any of these medications.

60

Anti-Depressants



- Anticholinergic effects are similar to effects of atropine administration, occurring because of the antidepressant drug's ability to block specific receptors in the brain and elsewhere in the body.
- Common symptoms include dry mouth, dry eyes, blurred vision, constipation, and urinary retention.
- Less common are fatigue, memory loss, confusion, hallucinations, and delirium.
- Sedation can occur early in treatment or at each dosage increase and may be compounded by the addition of new medications or new illnesses.
- Combinations of drugs such as anti-anxiety medications, sleeping pills, antihistamines, and antipsychotic drugs with antidepressants can increase the sedative side effects.
- Mild sedative effects may actually be helpful in relieving the sleep disturbances that occur in some depressed patients. Mild daytime sedation may also help the agitated patient.
- Older adults taking antidepressants who present to the ASC with fatigue, difficulty in rousing early in the morning, late morning wakening, slurred speech, confusion, daytime sleepiness, or night time incontinence should be referred for further investigation of their antidepressant therapy.
- Difficulty in determining the difference between some normal patterns of aging and the dangerous side effects of drug therapy is challenging to the preoperative nurse

61

Anti-Depressants

- Perianesthesia nurses should have a working knowledge of the various types of antidepressant medications commonly prescribed for the elderly population for providing optimum perioperative patient care!.
- Recognizing these anti-depressant medications may influence the patient's ability to receive an anesthetic agent (as in the case of monoamine oxidase inhibitors) or may even cause dangerous side effects, such as postural hypotension
- Serotonin reuptake inhibitors have been reported to cause gastrointestinal upset, including nausea, vomiting, stomach pain, or a bloated feeling, in 20% to 40% of patients receiving them.
- Severity can range from self-limited to severe.
- GI side effects are particularly significant where operative procedures and medications may cause further gastrointestinal upset will be administered or performed.

62

Herbal Medicine: The Marijuana Plant

63

Screening – Identifying Those on Marijuana

Screening Questions:

1. Are you using Marijuana at the current time?
2. When did you last use Marijuana?
3. Are you using it for medical or recreational purposes?
4. What form of Marijuana are you using (inhaled, tablet, liquid, or oil)?
5. Do you have a current prescription for medical marijuana?
6. Are you currently using any other controlled substance?

64

Medical Marijuana Uses

- Pain relief
- Nausea
- Spasticity
- Glaucoma
- Movement D/O
- Appetite Stimulant
- May protect the body against some types of malignant tumor
- Neuro protectives (serving to protect nerve cells against damage, degeneration, and impairment function).

65

Fast Facts

- The hemp plants, for w/c cannabis is the generic name.
- Cannabis contains 537 compounds
- 107 is considered cannabinoids
- Tetrahydrocannabinol (THC) is the most active
- Each MJ cigarettes contains approximately 0.005% of THC
- The cannabinoid are threefold more potent when inhaled than ingested
- Peak effects in 1 hour for as long as 3 hours

66

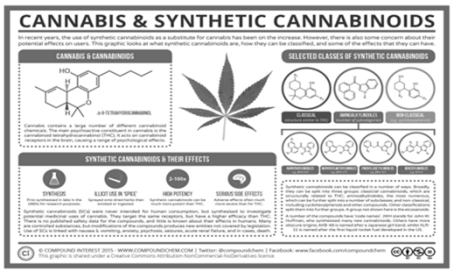
Important Considerations

- The hemp plants, for w/c cannabis is the generic name.
- Cannabis contains 537 compounds
- 107 is considered cannabinoids
- Tetrahydrocannabinol (THC) is the most active
- Each MJ cigarettes contains approximately 0.005% of THC
- The cannabinoid are threefold more potent when inhaled than ingested
- Peak effects in 1 hour for as long as 3 hours

Rollie Asperin, BSN, RN, CPAN, CAPA, Weinberg PACU July 2019

67

Chemical Composition



68

The Endocannabinoid System (ECS)

CB1 Receptors

- CB1 receptors exist in the brain and spinal cord.
- Lungs, vascular system, muscles, GI and reproductive organs.
- They work to regulate appetite, memory, and to reduce pain.

CB2 Receptors

- CB2 receptors are most prominent in the immune system, but exist through many other areas of the body.
- Spleen, bones and skin.
- The CB2 Receptors primary role is reducing inflammation throughout the body.

Rollie Asperin, BSN, RN, CPAN, CAPA, Weinberg PACU July 2019

69

Comparison of CBD to THC

- Cannabidiol (CBD)
  - Anxiety
  - Depression
  - Acne
  - Heart disease
  - Natural alternative for pain symptoms relief for CA pts
  - Chronic pain
- Tetrahydrocannabinol (THC)
  - Addictive
  - Causes euphoria
  - Stimulates appetite
  - Psychoactive (enhanced sensory perception, tachycardia, antinociception, difficulties in concentration and impairment of memory

Rollie Asperin, BSN, RN, CPAN, CAPA, Weinberg PACU July 2019

70

Brain's Chemical Anandamide and THC

- **THC's** chemical structure is similar to the brain chemical anandamide.
- The Brain allows drugs to be recognized by the body and to alter normal brain communication.
- Endogenous cannabinoids such as anandamide function as neurotransmitters: sending chemical messages between nerve cells (neurons) throughout the Nervous System.
- *__Acute effects__ of ***cannabinoids*** as well as the development of tolerance are mediated by
- ***G-protein-coupled cannabinoid receptors***

71

THC Patient in PACU: What to watch for…

- The peripheral effects of THC on the autonomic nervous system includes vagal blockade and beta-adrenergic stimulation.
- The person that is dependent on marijuana has tachycardia, peripheral vascular dilation, bronchodilation, conjunctival congestion, and a dry mouth.
- Chronic dependence should be monitored for chronic bronchitis.

Rollie Asperin, BSN, RN, CPAN, CAPA, Weinberg PACU July 2019

72

In Conclusion

- Interactions between herbal medicine and cardiovascular drugs is a potentially important safety issue.
- Patients under anticoagulant pharmacotherapy are at the highest risk.
- Perianesthesia nurses need to be aware of potential herb–drug (polypharmacy) interactions when preparing patients for surgery and in their recovery.
- Remember to always seek the best evidence to advance our nursing practice and in understanding of this widespread problem.

73

QUESTIONS?

74

Question 1

- Which of the following are pharmacology terms?
  - A. Pharmacogenetic
  - B. Pharmacokinetic
  - C. Pharmacodynamic
  - D. All of the Above

75

Question 2

- PreOp instructions recommend discontinuing aspirin for 7 to 10 days before surgery for effective platelet regeneration,
- True or false

76

Question 3

- St. Johns Wort should be stopped:
  - A. One day prior to surgery
  - B. The morning of surgery
  - C. 5-10 days prior to surgery
  - D. One month prior to surgery

77