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Course Description

This course is designed for nurses working in the perianesthesia setting who plan to take the CPAN/CAPA Exam. The course will focus on core concepts defined by ASPAN™ for caring for all populations.

Program Learning Outcomes

This program prepares the learner to:

- Describe the CPAN/CAPA Exam, test plan and the practice requirements to sit for the exam.
- Construct a study plan for the exam based on understanding the blueprint and domains of practice covered.
- Identify common mistakes and pitfalls that are made during studying and testing for the exam.
- Recall the core components covered in the exam through didactic supplementation and test questions.

Agenda

Sign-in begins at 7:30 am. Each day includes a one-hour lunch (on your own), as well as a morning and afternoon break of 15 minutes each. The order of lectures presented and break times may vary according to speaker preference.

Day 1, 8:00 am to 4:00 pm

- 0800 **The Test**
CPAN and CAPA Test | Certification Preparation | Test-Taking Strategies
- 0900 **Practice Standards**
The Professional Nurse | Overview of Perianesthesia Nursing and ASPAN Standards
- 1000 **Break**
- 1015 **Legal, Regulatory and Professional Issues**
Legal Terms, Regulatory Bodies and Professional Issues
- 1100 **Assessment of the Perianesthesia Patient**
Nursing Process in the Perianesthesia Setting | Perianesthesia Nursing Assessment
- 1200 **Lunch**
- 1300 **Age Specific Care**
Age Specific Care in the Perianesthesia Setting
- 1330 **Patient Clinical Data Related to Perianesthesia Nursing**
Fluid and Electrolyte Balance | Chemistry Labs | Hematology and Blood Transfusions
- 1500 **Break**
- 1515 **ABG Interpretation**
- 1600 **Adjourn**

Agenda

Day 2, 8:00 am to 4:45 pm

- 0800 **Anesthesia**
Anesthetic Techniques and Blocks | Anesthetic Agents, Drugs and Adjuncts
- 1000 **Break**
- 1015 **Herbal Drugs and Homeopathic Treatments Related to Anesthesia Outcomes**
- 1045 **Medications in the Perianesthesia Setting**
Common Medications Used in Perianesthesia Nursing | Pain Management
- 1200 **Lunch**
- 1300 **Education**
Patient and Family Education
- 1330 **Perianesthesia Complications**
Airway Emergencies | Cardiovascular Emergencies | Hemodynamics | Neurologic Complications
- 1530 **Break**
- 1545 **Perianesthesia Complications (cont.)**
Post-Op Nausea and Vomiting | Malignant Hyperthermia | Management of Hypothermia
- 1645 **Adjourn**

Accreditation

RN/LPN/LVN/Other: 13.75 Contact Hours

MED-ED, Inc is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation.

MED-ED, Inc. is an approved provider by the following State Boards of Nursing: **Florida**/FBN 50-1286, **Iowa**/296, **California** #CEP10453.

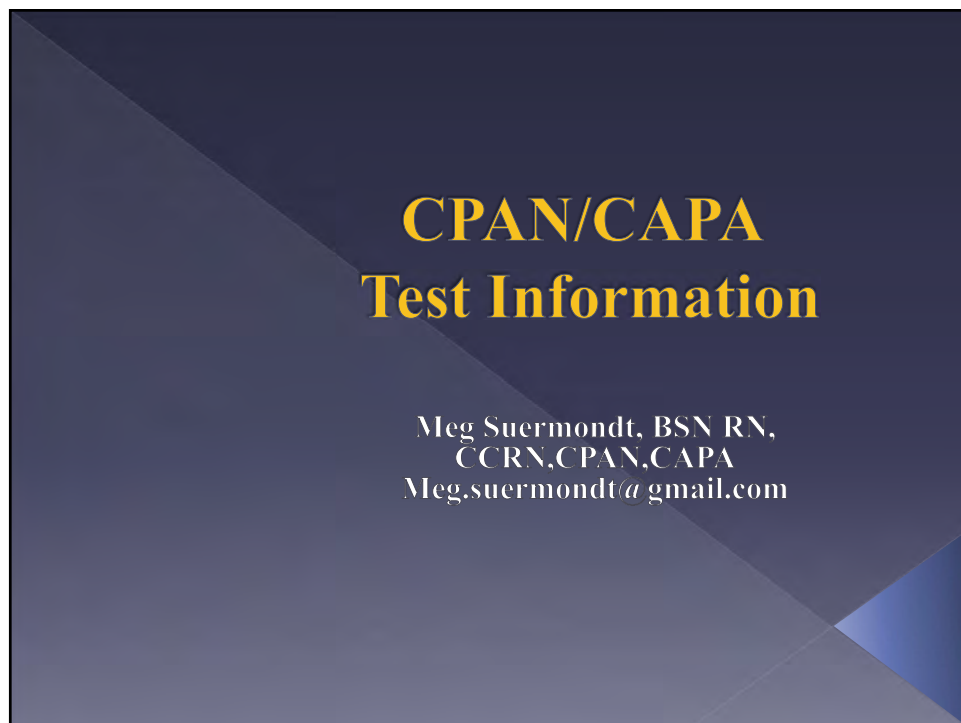
If your profession is not listed, we suggest contacting your board to determine your continuing education requirements and ask about reciprocal approval. Many boards will approve this seminar based on the accreditation of the boards listed here.

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Objective

Identify common test taking practices for achievement of the CPAN/ CAPA examination

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ASPAN www.aspan.org



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Rewards of Certification

- Research has proven that patients have better outcomes when the nurses caring for them are certified
- Certification has to be a personal, professional choice for an individual
- Marketability
- Over 12,000 nurses hold CPAN & CAPA certification

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CPAN/ CAPA Certification

- ◉ American Board of PeriAnesthesia Nursing Certification, Inc



- > CPAN
- > (Certified Post Anesthesia Nurse)
- > CAPA
- > (Certified Ambulatory PeriAnesthesia Nurse)

◉ www.cpancapa.org

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Eligibility Requirements

- ◉ Current, unrestricted Registered Nurse license in the US
- ◉ 1200 hours of direct care for perianesthesia patients in the two years prior to application
 - > staff nurse, manager, teacher, or researcher are eligible
- ◉ Submission of application, eligibility requirements and payment of fees

BSN is not required

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EXAM INFORMATION

Testing is done twice a year,

Spring and Fall.

If you sign up for this fall and you find out you are not ready, you can roll over to the spring.

•9

SPRING 2018

Registration: Jan 8- April 2,

Testing April 2 – May 29

•10

Fall 2018

Registration: July 9 – Sept 24,

Testing: Sept 24-Nov 20

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Fees

- ◉ ASPAN Members \$314

Non Members \$424

- ◉ ASPAN Membership about \$115.00
(\$80 plus affiliate fee)

- ◉ Early bird saves \$15-20

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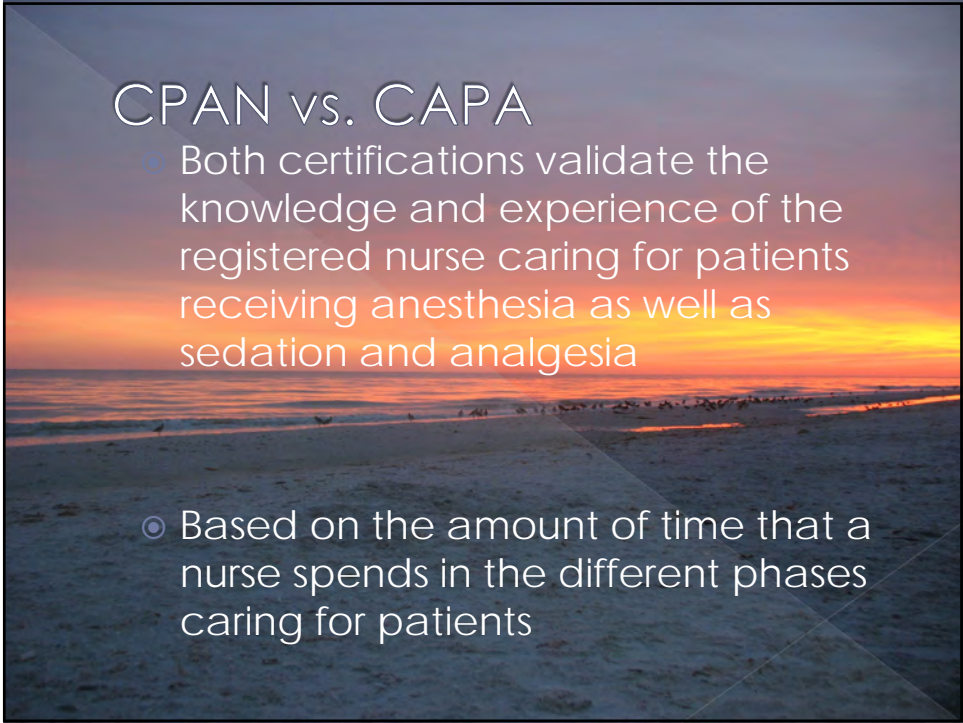
Testing Timelines and Fees

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Registration

- ◉ Get ASPAN membership first
- ◉ Go to
 - › Cpancapa.Learningbuilder.com
 - › Or take the link on cpancapa.org
- ◉ Get the ATT letter
- ◉ Go to psiexams.com

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A background image of a sunset over a beach. The sky is a mix of orange, yellow, and blue, with the sun low on the horizon. The beach is visible in the foreground, with some birds or people in the distance.

CPAN vs. CAPA

- Both certifications validate the knowledge and experience of the registered nurse caring for patients receiving anesthesia as well as sedation and analgesia
- Based on the amount of time that a nurse spends in the different phases caring for patients

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Test differences

- Knowledge base is the same
- Context is different
- 3 domains, percent of questions differ.
 - › Safety
 - › Physiological
 - › Cognitive/Behavioral

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Domain	CPAN	CAPA
Physiological	57%	50%
Behavioral Health and Cognitive	18%	21%
Safety	25%	29%

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Exam Information

- PSI administers the test
- 185 Multiple Choice questions (40 questions do NOT count towards score)
- Three hours allotted to complete the exam

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Exam Locations

• www.psiexams.com

- Gives a list of dates and times per location

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Exam Locations

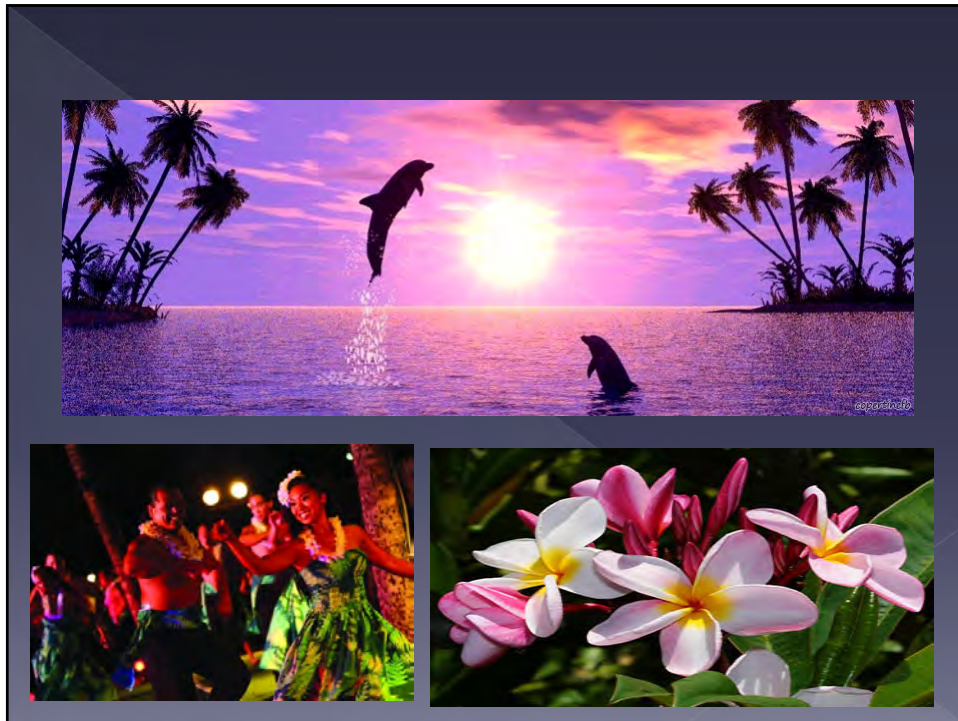
• www.psiexams.com

Find a local Spot

BUT.....

You can go anywhere to
take this....Honolulu?

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Passing the CPAN/ CAPA Exam

- 1.Requires a sound foundation of skills and knowledge regarding periAnesthesia nursing
- 2.Expert clinical practice
- 3.Understanding of the test taking process

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Should I study for the Exam?

- ◉ Conduct a self-assessment
- ◉ Review the study references and assess your knowledge

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Preparing for the Exam

- ◉ Online Practice Exams purchased through ABPANC
 - > www.cpancapa.org
 - > Choose "Online Practice Exam" (get CEUs!)

CPANCAPA.org question of the week

Mobile Apps one free for registration and handbook, one for \$9.99 gives you 100 questions to practice on-the-go

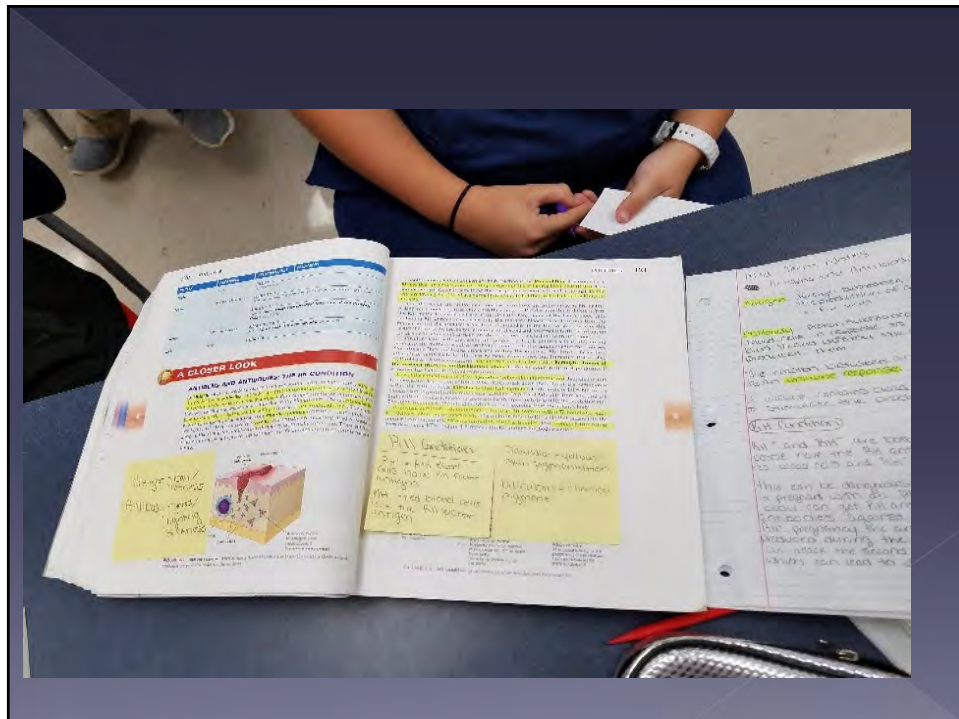
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The challenges of studying...
time, quality, quantity

When am I going to study
What should I study
How much should I study

????????????????

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Finding Study Time

- ◉ First, get your Maslow in order!
- ◉ Make flash-cards and carry them with you.
- ◉ Develop a note-taking system.
- ◉ Color code your notes relative to importance.
- ◉ What kind of learner are you?

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Use your resources....

- ◉ Make work your learning arena!
- ◉ Ask the docs, ask your peers
- ◉ Engage everyone, let them help!

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Getting in Gear for the Test

- ◉ Organize a Timeline
- ◉ Take Practice Exams
- ◉ Create a Study Group
- ◉ Identify Valuable Resources- local ASPAN Chapter, peers, JOPAN
- ◉ Use Current References

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Day of the Exam

- ◉ SELF CARE!!! Nutrition and sleep
- ◉ Arrive at the testing site at least 30 minutes prior to your test appointment
- ◉ Bring few personal items with you- NO
 - › handbags, wallets, books, cellular phones, laptops, or any other personal belongings into the testing room

•30

Identification

- Make sure to take...
 - › Picture identification with signature
 - › 2nd form of identification with your typed name and signature
 - › Call/visit test site prior to date

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After Achieving Certification

- Awarded for three years
- To renew one must have
 - › 1200 hours of experience during the three years
 - › Hold current RN licensure
 - › Earn 90 contact hours of continued lifelong learning
 - OR
 - › Retake the exam!

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**•Physiological Need: Stability of Respiratory System
(Cognitive Level 1) CPAN**

•1 Postoperatively, a carotid endarterectomy patient with a history of COPD and coronary angioplasty undergoes routine post anesthesia assessment which begins with the assessment of the patient's:

- 1 cardiac status.**
- 2 level of consciousness.**
- 3 operative site.**
- 4 ventilatory status.**

•33

**•Physiological Need: Stability of Respiratory
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- 4 ventilatory status.**

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Behavioral/Cognitive Need: Communication (Cognitive Level 2) CPAN

An example of an appropriate PACU outcome indicator for a radical neck patient who required a tracheostomy is:

- 1. patient able to communicate need for suctioning.**
- 2. suctioning equipment available at bedside.**
- 3. tracheostomy dressing appearance charted upon discharge.**
- 4. lung sounds assessed every 15 minutes for first hour after PACU admission.**

•35

•Behavioral/Cognitive Need: Communication (Cognitive Level 2) CPAN

•2 An example of an appropriate PACU outcome indicator for a radical neck patient who required a tracheostomy is:

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Safety Need: Delivery of Care Based on Accepted Standards of Practice (Cognitive Level 2) CPAN

The PACU nurse manager is informed of an acute shortage of RNs in the delivery room. The available PACU nurse can be floated when:

1. the nursing supervisor requests it.
2. there are no patients in the PACU.
3. the PACU nurse agrees to float.
4. competency is evidenced for that area.

•37

Safety Need: Delivery of Care Based on Accepted Standards of Practice (Cognitive Level 2) CPAN

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•Physiological Need: Appropriate medication interactions (Cognitive Level 3) CAPA

One hour following nasal surgery, a healthy 19-year-old patient with a negative cardiac history develops tachycardia, hypertension, and occasional dysrhythmias. The patient remains awake, alert and in no apparent distress.

While a co-worker notifies the anesthesiologist, the ambulatory surgery nurse:

1. reviews intraoperative medications.
2. notifies the surgeon to inspect for hemorrhage.
3. obtains a 12-lead EKG.
4. initiates oxygen at 3L.

•39

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•40

Behavioral/Cognitive Need: Patient education related to discharge procedures (Cognitive Level 2)

The best way for the ambulatory nurse to determine if the patient understands discharge instructions related to Foley catheter care is to ask the patient to:

- 1. sign the discharge instructions after questions are answered.**
- 2. explain the procedure to a family member.**
- 3. demonstrate the procedure to empty the Foley bag.**
- 4. explain the answers to a written post test.**

•41

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- 3. demonstrate the procedure to empty the Foley bag.**
- 4. explain the answers to a written post test.**

•42

Safety Need: Effective multidisciplinary discharge planning (Cognitive Level 2) (CAPA)

A patient who received IV sedation for carpal tunnel syndrome repair is awake, alert and meets the criteria for discharge.

Unable to find a designated driver, the patient insists on driving home unaccompanied. The priority nursing action is to:

1. allow the patient to drive unaccompanied, since discharge criteria have been met.
2. have the patient stay an additional 2 hours before driving unaccompanied.
3. assist the patient in finding a ride home.
4. notify the physician of the patient's situation.

•43

Safety Need: Effective multidisciplinary discharge planning (Cognitive Level 2) (CAPA)

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•44

PHYSIOLOGICAL NEEDS: CPAN

Stability of Renal System (Cognitive Level 3)

The PACU nurse evaluates the patient's urine amount and color, intravenous fluid types and amounts, and pulmonary secretion characteristics after a major abdominal surgery in order to assess the patient for:

1. third spacing.
2. hyponatremia.
3. abdominal distention.
4. atelectasis.

•45

PHYSIOLOGICAL NEEDS: CPAN

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•46

BEHAVIORAL HEALTH AND COGNITIVE NEEDS (Cognitive Level 1) CPAN

In providing preoperative teaching to a patient requesting spinal anesthesia, the perianesthesia nurse is aware that an absolute contraindication for spinal anesthesia is:

1. patient refusal.
2. chronic back pain.
3. sickle cell anemia.
4. multiple sclerosis.

•47

BEHAVIORAL HEALTH AND COGNITIVE NEEDS (Cognitive Level 1) CPAN

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2. chronic back pain.
3. sickle cell anemia.
4. multiple sclerosis.

•48

CPAN SAFETY NEEDS: Protect patient from harm and take preventive measures related to exposure to infections and diseases (Cognitive Level 1)

OSHA mandates that when inserting an intravenous fluid access in a patient, the PACU nurse must:

1. wash hands.
2. wear gloves.
3. use an antibacterial gel.
4. wear eye goggles.

•49

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OSHA mandates that when inserting an intravenous fluid access in a patient, the PACU nurse must:

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3. use an antibacterial gel.
4. wear eye goggles.

•50

CAPA PHYSIOLOGICAL NEEDS: Cognitive Level 3)

The perianesthesia nurse learns that the patient takes MAO inhibitor routinely. This information is documented because of the potential lethal interaction with:

1. midazolam.
2. meperidine.
3. succinylcholine.
4. morphine

•51

CAPA PHYSIOLOGICAL NEEDS: Cognitive Level 3)

The perianesthesia nurse learns that the patient takes MAO inhibitor routinely. This information is documented because of the potential lethal interaction with:

1. midazolam.
2. ~~meperidine.~~
3. succinylcholine.
4. morphine

•52

BEHAVIORAL HEALTH AND COGNITIVE NEEDS:

CAPA (Cognitive Level 2)

A patient calls the preoperative center asking whether to continue taking his daily dose of beta-blocker. The perianesthesia nurse is aware that beta blockers should be:

1. held on day of surgery.
2. stopped at least 3 days preoperatively.
3. taken daily as prescribed.
4. stopped at least 5 days preoperatively

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BEHAVIORAL HEALTH AND COGNITIVE NEEDS:

CAPA (Cognitive Level 2)

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3. **taken daily as prescribed.**
4. stopped at least 5 days preoperatively

•54

CAPA SAFETY NEEDS:(Cognitive Level 2)

A preoperative patient asks the perianesthesia nurse what the facility is doing to prevent postoperative surgical site infections. With knowledge of the surgical care improvement project (SCIP), the nurse informs the patient that preoperatively antibiotics should be administered:

1. within 60 minutes of incision time.
2. within 90 minutes of incision time.
3. prior to leaving the holding area.
4. upon arrival to the facility.

•55

CAPA SAFETY NEEDS:(Cognitive Level 2)

A preoperative patient asks the perianesthesia nurse what the facility is doing to prevent postoperative surgical site infections. With knowledge of the surgical care improvement project (SCIP), the nurse informs the patient that preoperatively antibiotics should be administered:

1. within 60 minutes of incision time.
2. within 90 minutes of incision time.
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4. upon arrival to the facility.

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The Professional Nurse, Standards, and PeriAnesthesia Nursing Practice

Meg Suermondt, BSN RN, CCRN, CPAN, CAPA

1

Objectives

Discuss practice standards of the professional registered nurse as applied to the PeriAnesthesia setting.

2

Nursing as a Profession



3

The Profession of Nursing



4

Standards of Nursing Care

- What is expected and received
- Established measurement
- Agreed upon level or degree

5

What is a Standard

- Authoritative statement
- Provides direction
- Established by authority, custom or general consent as the model of example for measuring quality
- Same for all



6

What is the Value of a Standard?

- Describes the responsibilities for which you are accountable
- Reflect values and priorities
- Provide direction and framework
- Define accountability to the public



7

Where do they come from?

- **Started with Florence Nightingale**
- **Court cases**
- **ANA**
- **State Boards of Nursing**
- **Specialty organizations**
- **Accreditation organizations**
- **Healthcare Institutions**



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Policies and Procedures, part of standards of care...

- Hospital specific
- CPAN/CAPA exam is a National Exam
- Think global rather than local when answering questions about P&Ps
- Regulatory agencies
 - TJC, State agency, CMS

9

Policy

- Guideline to assist in decision making
- Means to ensure practice is in compliance with standards
- Define responsibility
- Describe actions
- Establish a consistent level of expectation for staff

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Procedure

- Instructions that detail steps necessary to complete a task
- Helpful when tasks are performed infrequently
- May be an orientation resource
- Helps with cost containment
- Increases productivity

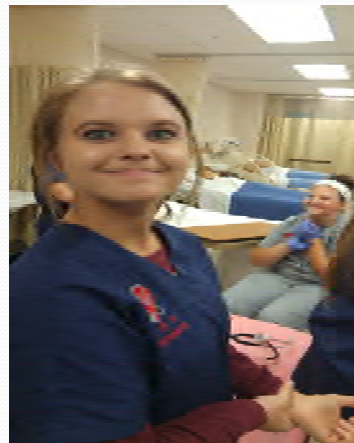
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Standards: two types

1. Standards of Care

The Nursing Process!

- Assessment
- Diagnosis
- Outcome identification
- Planning
- Implementation
- Evaluation



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2. Standard of Professional Practice

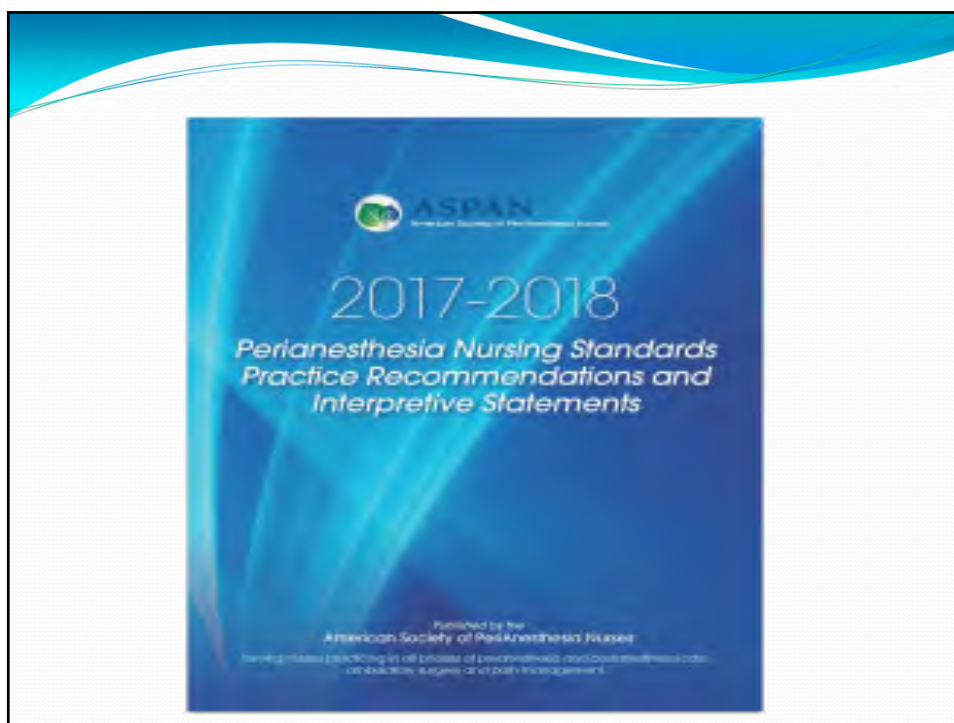
- Quality of Care
- Coordination of care
- Collaboration of Care
- Safeguarding patients
- Performance Appraisal (self and “boss”)
- Education : Our own...Maintaining current knowledge and competency
- Collegiality- interact and contribute to professional development of ourselves, peers and others

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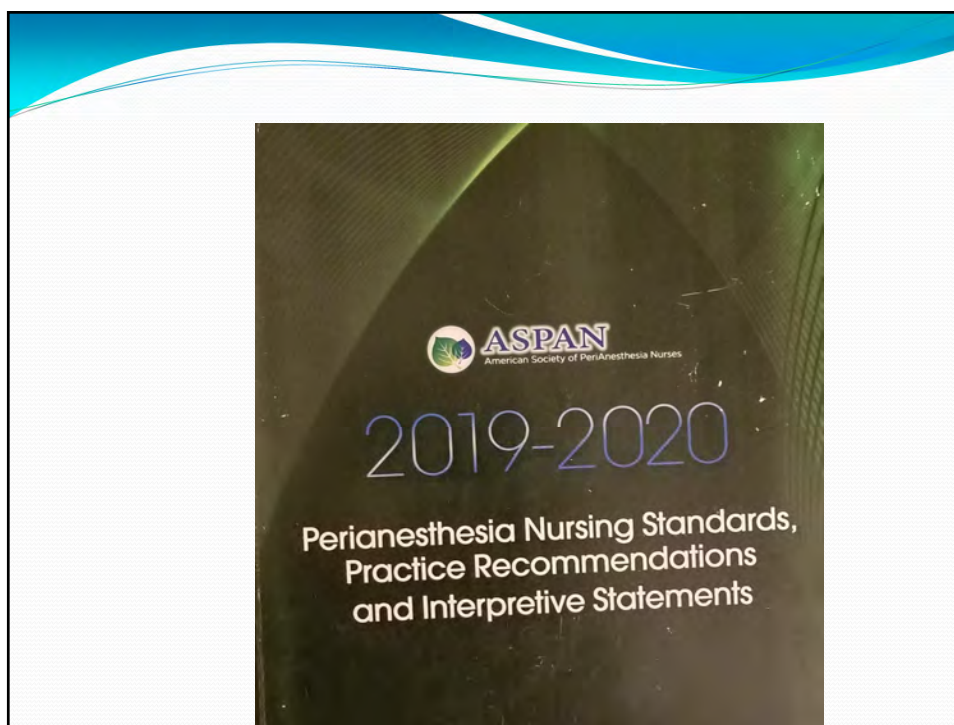
And more professional practice standards....

- Ethics
 - Veracity-truth telling
 - Confidentiality- HIPAA- proper protection of the record and limit release of info
 - Advocacy-supports the best interests of the patient
 - Accountability answerable for your own actions
 - Fidelity- obligation to be faithful to commitments to self and others
 - Beneficence- primary goal is doing good
 - Nonmaleficence- preventing harm or doing no harm
 - Autonomy-freedom of action as chosen by an individual
 - Justice- the duty to be fair to all people
 - Research and evidence based practice


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Has 6 parts

- Scope of practice
- Principles of Practice (ethics, safety)
- Standards
- Practice Recommendations
- Position Statements
- Resources

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PART I : Scope of Practice

Assessment, diagnosis, intervention and evaluation of people within the perianesthesia continuum: patients who will have or have had sedation or analgesia or anesthesia for **surgical, diagnostic or therapeutic procedures**

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Scope, continued

- Our practice...
- Systematic, uses the nursing process
- Cultural
- Developmental and age specific
- Systematic, holistic, integrated
- Critical thinking and decisionmaking
- “quality Care among a diverse population within a multidisciplinary healthcare team”

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The Perianesthesia Environment..all our phases

Pre-Anesthesia

Preadmission

Day of Surgery/Preop

Post Anesthesia

Phase I

Phase II

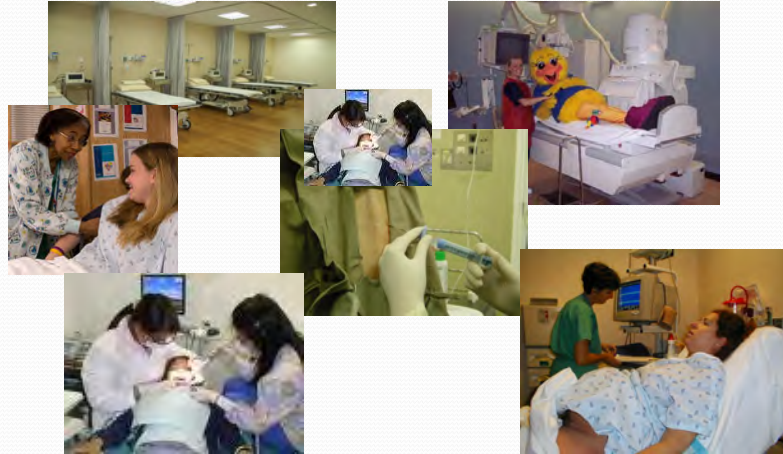
Extended Care

We mainly think of hospitals
and Surgery centers



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but many more! Anywhere there is
procedural sedation/analgesia



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With whom do we practice?

- ASA AACN ENA
- AORN ARIN NACNS
- SAMBA SGNA ABPANC
- NOA NLN PAINS
- AONE BARNA SOBA
- ACS We Work with the Alphabet!!!!

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We are in many rolls....

- Patient Care
- Research
- Administration
- Management
- Education
- Consultation
- Advocacy

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And own professional behaviors

- Acquisition of specialized knowledge
- Accountability
- Responsibility
- Communication
- Autonomy
- Collaboration

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Part II: Principles of Perianesthesia Practice

1. Ethical Practice
Moral commitment and Ethical obligations
2. Safe Practice
commitment to a core culture of safety

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Traditional Ethical Responsibilities of Nursing

- Promote Health
- Prevent Illness
- Restore Health
- Alleviate suffering

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Ethical Principles

- Beneficence- doing good for patients
- Nonmaleficence- do no harm
- Autonomy- freedom of action as chosen by an individual
- Justice- to be fair to all people

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Standards for Ethical Practice

- Competency
- Responsibility to Patients
- Professional Responsibility
- Collegiality
- Research
- Advocacy

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Competency

Consistent High Standards of care

Accountability for self and perianesthesia practice

Continuing education

Competency based orientation

Performance reviews

Keeps current with new products, procedures and equipment

Incorporates research into practice

nurse *nurses, nursed, nursing*. 1. A trained person who works in a hospital or home taking care of the sick, of babies, or of old people.



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Responsibility

Sometimes it feels like this:



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I'm a Nurse, what's your superpower?



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Responsibilities to Patients

- Provide quality care
- Displays compassion
- engages patient and family
- ensures safety, maintains confidentiality
- participates in patient teaching
- respects decisions,
- communicates effectively,
- delegates tasks appropriately, much more, includes veracity...
- advocate, respect, quality and safety are words that appear a lot

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Professional responsibilities

- Adheres to national and state regulations, laws, to protect patients
- comparable level of care regardless of setting,
- maintains accurate records,
- promotes certification,
- acts as a mentor
- reports unethical practice
- recognizes a need to care for oneself. NOTE THIS work-life balance

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Collegiality



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Duty of Advocacy

Nurse supports the best interest of the individual patient and for the profession



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Accountability

Answerable to others for one's actions



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Rule of Confidentiality

A duty to control disclosure of personal information about patients to others



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HIPAA

PATIENT PRIVACY IS
YOUR RESPONSIBILITY



HIPAA
IT'S THE LAW

- Comply with federal regulations
- Portability standards
- Accountability standards
- Privacy standards

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Duty of Fidelity

Obligation to be faithful to commitments to self and others



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2. Safe Perianesthesia Practice

Lots of core values (3 slides worth!)

Active leadership

leads members to activities that enhance performance and outcomes

Psychological safety

Staff believe concerns/opinions/suggestions will be treated with respect

Accountability

Individuals are accountable but treated fairly in diverse situations

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More Culture of safety characteristics

Teamwork & Communication

Time management, structured handoffs, interdisciplinary risk management

Negotiation and conflict management

Collaboration to resolve conflicts and identify solutions

Transparency

Patient safety problems are examined as opportunities to learn and improve systems.

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And the third slide of safe culture characteristics

Reliability

System supports to optimize strengths and support weaknesses.

Improvement and measurement

Quality improvement by systematic means, seek best practices

Continuous learning.

Nurse should be proactive in continuing learning, and that should be supported

43

A few points...

• Efficacy/Timeliness

- checklists are evidence based to save time and decrease errors of omission, is there a plan in place for unplanned events, accountable care. And, Structured handoffs decrease errors of omission by 80% !

• Teamwork

- collaboration, trust and respect, culture of safety

A culture of safety is also known as a “Just Culture”, where incident reports and investigation is not to point fingers but to find the source of the error, and one in which nurses are empowered to report mistakes, help find solutions and make safe choices, including following policy and procedure.

44

Part III The Standards



45

Standard I Patient Rights

Perianesthesia nursing practice is based on philosophical and ethical concepts that recognize and maintain the autonomy, confidentiality, privacy, dignity, and worth of individuals

46

Standard II

Environment of Care

Perianesthesia nursing practice promotes and maintains a safe, comfortable and therapeutic environment for patients, staff and visitors



47

Not just equipment and trained staff...

- Policies for all sorts of physical emergencies
- Separate peds from adults if possible
- Separate patients in different phases if possible
- Separate staff for separate phases (should not take care of a preop patient while taking care of a post op one)

48

Standard III Staffing and Personnel Management

An appropriate number of professional nursing staff with demonstrated competence is available to meet the individual needs of patients and families in each level of perianesthesia care based on patient acuity, census, and physical facility

49

Staffing and Personnel Management

- Staffing patterns
- Staff function
- Performance appraisals
- Staffing based on patient acuity, census, and physical facility
 - Facilities that do not take care of peds, PALS would not be required
- Written staffing policy, orientation plan



50

Standard IV Quality Improvement

The perianesthesia registered nurse monitors and evaluates perianesthesia care on an ongoing basis. Identified problems are resolved through a collaborative multidisciplinary approach in order to ensure the quality and appropriateness of patient care.

51

Quality Improvement

- Definition: Systematic analysis of the structure, processes and outcomes within systems for the purpose of improving the delivery of care
- Purpose: To determine if care provided makes a difference or improves outcomes

52

Why do we have to do this?

- What do we do that is “nurse sensitive” the outcome depends on our care,.
- What are we doing well, and how do we know it?
- What needs some work?
- What do others say about our quality ?
- These are all quality indicators at the bedside, but there are more:

53

Quality Improvement Activity

Operational	Quality	Satisfaction
<ul style="list-style-type: none"> • RN turnover • RN filled positions • RN traveler usage • RN HPPD • Total HPPD • Patient:RN ratio • Skill mix • Overtime usage • Timely performance evaluations • RN hours per case • Supply charges 	<ul style="list-style-type: none"> • Falls • Falls with injury • Medication errors • Pressure ulcers • Vascular access device incidents • POCT QC testing • Narcotics wastage • Admission weights • Assessment within 24 hours • Initial pain assessment • Restraint documentation • Pediatric assessment • Extubations • OR incorrect counts 	<ul style="list-style-type: none"> • Overall satisfaction with nursing care • Likelihood of recommending hospital • Satisfaction with pain control • Overall rating of unit • Penop – informed about delays

54

Quality

- Many definitions depending on
 - Who answers the question: “What is quality care?”
 - How quality is measured
 - What is important to those defining the term
 - Consumers, health care professionals, regulatory bodies, reimbursers
 - Reimbursement tied to satisfaction re-defines

“Quality”



55

Benchmarking

- A continuous and collaborative discipline that involves measuring and comparing the results of key processes with the best performers
- Allows the consumer to make informed choices
- We start here and with evidence based practice- literature search!

56

Quality Improvement Process

- Identify indicators
 - Things you can measure
- Determine desirable outcome
 - End product or result of process
- Establish thresholds
- Collect data
- Organize data

57

Quality Improvement Process (cont.)

- Evaluate the results
 - Detailed analysis of identified patterns or trends
- Develop a plan to improve
 - Who or what is expected to change
- Documentation
 - Conclusions, recommendations, actions taken with results, and reports

58

Standard V Research

Perianesthesia nurses participate in research by reviewing literature, designing studies, conducting studies, analyzing results compiling and ranking the evidence and/or incorporating findings into practice

59

Research: Flo did it



60

Evidence-Based Practice

- Conscientious and judicious use of current best evidence to guide health care decisions
- Levels of evidence range from randomized clinical trials to case reports and expert opinion

Involves development of standards of care, policies, procedures, clinical pathways, guidelines and/or protocols and developing documentation formats as well as data repositories for tracking

12 to 17 years to get to the bedside!

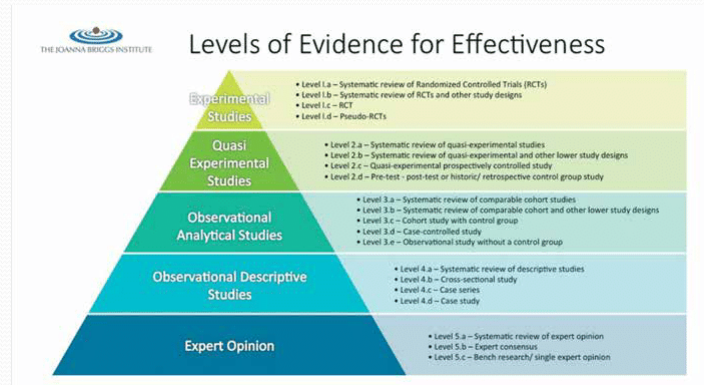
61

Rational for EBP

- Increased availability and accessibility of research reports
- Refined criteria for appraising research findings
- Increased potential for better outcomes
- Decreased risk when approach is used with research support
- Increased competitive edge
- Increased professional satisfaction
- Shows the value of professional nursing

62

Joanna Briggs Levels of evidence



63

Standard VI Nursing Process



The perianesthesia registered nurse applies the nursing process to each patient

64

Things are written!

Admission and discharge criteria, assessment components and frequency, and such



65

Part IV Practice recommendations 11 of them!

- Staffing and acuity
- Assessment of our patients
- Equipment
- Competencies for RNs and Support Staff
- Safe transfer of care (ISBAR!)
- Moderate sedation
- Fast tracking
- Family presence in the units
- Obstructive Sleep Apnea
- Prevention of unwanted sedation

66

Practice Recommendation 1: Patient Classification/ Recommended Staffing Guidelines

- Staffing is based on patient acuity, census, patient flow processes and physical facility
- The nurse uses prudent judgment in determining nurse to patient ratios, patient mix and staffing mix that reflect patient acuity and nursing intensity

67

Preanesthesia Staffing

Performed by a competent RN in the Preanesthesia nursing

68

Preanesthesia Phase

- Preadmission- assess and develop plan of care, prepare patient for experience through interviewing and assessment techniques
- Day of surgery/procedure- validate existing information and completion of preparation of the patient

69

Preanesthesia Phase (cont.)

- Staffing is dependent on patient volume, patient health status and required support for preanesthesia interventions.
 - Moderate sedation
 - helping with blocks?
 - Cultural considerations

70

Post Anesthesia Phase I Level of Care

Focus on providing postanesthesia nursing care in the immediate postanesthesia period, and transitioning them to Phase II level of care, the inpatient setting, or to an intensive care setting for continued care

71

Phase I Staffing

Two registered nurses, one of whom is an RN competent in Phase I postanesthesia nursing, are in the same room/unit where the patient is receiving Phase I level of care

72

Critical Elements of Phase I

- 1. Patient has a stable, secure airway.**
- 2. Initial assessment is complete.**
- 3. Patient is hemodynamically stable.**
- 4. Report has been received from the anesthesia care provider, questions answered, and the transfer of care has taken place.**
- 5. Free from restlessness or agitation**

73



74

Postanesthesia- Phase I Class 2:1



75

PACU- Phase I Class 1:1

- At the time of admission, until the critical elements are met.
- Unstable airway (jaw lift, obstruction, respiratory distress).
- Any unconscious patient 8 years of age and under.
- Transmission Based Precautions



A second nurse must be available to assist as necessary

76

Postanesthesia- Phase I

Class 1:2

- One unconscious, stable, with stable airway and over the age of 8; and one conscious, stable and free of complications
- Two conscious, stable and free of complications
- Two conscious, stable, 8 yrs or under, with family or competent support staff present

77

Phase II Level of Care

Focus on preparing the patient/family/significant other for care in the home, extended observation level of care or the extended care environment

78

Phase II Staffing

Two competent personnel,
one (1) an RN competent in
Phase II, in the same
room/unit as the patient
receiving Phase II care

79

Postanesthesia- Phase II Class 1:1

1. Unstable patient of any age
requiring transfer

80

Postanesthesia- Phase II

Class 1:2

- 8 years of age and under without family or support staff present
- Initial admission of a patient post procedure

81

Postanesthesia- Phase II

Class 1:3

- Over 8 years of age.
- 8 years of age and under with family present.



82

Extended Observation

Two competent personnel, one
(1) an RN competent in
appropriate patient population
receiving
Extended Observation
level of care

83

Extended Observation

Class 1:3/5

- Patients awaiting transportation home
- Patients with no care giver
- Patients who have had procedures requiring extended observation/interventions (i.e., potential risk for bleeding, pain management, PONV, etc.)
- Patients being held for an inpatient bed



84

Practice Recommendation 2- Components of Assessment and Management

- Preadmission
 - Day of Surgery
 - Phase I- Initial, ongoing and discharge
 - Phase II- Initial, ongoing and discharge
 - Extended Care
- This one details what we should be doing in each phase.

85

Practice Recommendation 3- Equipment

- Preanesthesia
- Phase I
- Phase II
- Extended Observation

86

Practice Recommendation 4- Competencies

- BLS
- ACLS
- PALS and/or PEARS (Pediatric Emergency Assessment Recognition and Stabilization)
- Malignant hyperthermia
- Unit-based
- Moving toward competencies in all areas

87

Practice Recommendation 5- Competencies of Support Staff

- BLS
- Airway support
- Suctioning
- Blood draw, urine specimen
- VS
- Oral intake, N&V
- Thermoregulatory

88

Practice Recommendation 6- Safe Transfer of Care

- Communication hand-off
- RN determines mode, number and competency level of accompanying personnel based on patient's needs
- A plan exists if patient does not have an adult or reliable transportation
- Equipment and supplies for transfer

89

Handoff...SBAR

- 80% of errors involve miscommunication during handoff
- Use of a structured process does this:
 - Reduces rate of errors
 - Reduces omission of information
 - Improves inclusion of pertinent
 - Increases effectiveness of handoff of care

90

Safe transport

- “The perianesthesia nurse determines the mode, number and competency level ...based on patient needs”
 - RN should accompany those who require evaluation, treatment, or are at risk for cardiopulmonary compromise or require a higher level of care
 - Blood, cardiac monitoring, drips(per policy)
 - Stay with patient till receiving people are in the room

91

Practice Recommendation 7- Management of Patients Undergoing Sedation

- Minimal to general anesthesia including regional or spinal
- Management and monitoring
 - RN should have no other responsibilities that would leave the patient unattended or compromise monitoring
 - Most places have a competency

92

Practice Recommendation 8- Fast Tracking

- Patient bypasses Phase I level of care and goes directly to Phase II level of care
- Patient must meet Phase I discharge criteria

93

Practice Recommendation 9- Visitation (NOW CALLED FAMILY PRESENCE)

- Overview: be responsive to patient wants and needs
- Family is who the patient says they are
- Parents during induction? 40% allow this
- Most patients prefer family to visit immediately postop in PACU
- Patient safety is primary concern
- No guideline is able to incorporate every circumstance
- CONVERSATION SHOULD BE HELD IN PREOP!

94

Recommendation 10: Obstructive Sleep Apnea

- Most common sleep disorder up to 26% of people
- Up to 62% of people over 60 have it.
- Little evidence yet
 - Early nippv (non invasive positive pressure ventilation)
 - Even in pre-op!
 - Capnography
 - Multimodal pain med not just narc
 - Longer Stay 2-6 hours / outpts 3 hours longer than non-OSA counterparts
 - No evidence of hypoxia/desat if undisturbed for 30 minutes

95

More osa interventions

- Avoid supine, think later, lateral recumbent or sitting
- Maybe hold off on that oxygen...it prolongs apnea and masks desaturation events, and may lead to hypercarbia
- Advocate for regional anesthesia (blocks)
- No basal PCA
- Multimodal should include not only multimodal drug class but non pharm as well (get the ice!)
- Oxygen stat should be at baseline for 2 hours before discharge!

96

Practice recommendation 11: Prevention of Unwanted Sedation

- Pasero Opioid-induced Sedation Scale (POSS)
Assesses wakefulness and advises actions
- Richmond Agitation and Sedation Scale (RASS)
Defines drowsiness and sedation by assessment

97

POSS

Pasero Opioid-induced Sedation Scale (POSS)

- 5 = Sleep, easy to arouse
Acceptable; no action necessary; may increase opioid dose if needed
- 1 = Awake and alert
Acceptable; no action necessary; may increase opioid dose if needed
- 2 = Slightly drowsy; easily aroused
Acceptable; no action necessary; may increase opioid dose if needed
- 3 = Frequently drowsy, arousable, drifts off to sleep during conversation
Unacceptable; monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory; decrease opioid dose 25% to 50% or notify prescriber or anesthesiologist for orders; consider administering a non-sedating, opioid-sparing nonopioid, such as acetaminophen or a NSAID, if not contraindicated.
- 4 = Somnolent, minimal or no response to verbal and physical stimulation
Unacceptable; stop opioid; consider administering naloxone; notify prescriber or anesthesiologist; monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory.

98

RASS

Richmond Agitation and Sedation Scale (RASS)		
+4	Combative	violent, immediate danger to staff
+3	Very Agitated	Pulls or removes tube(s) or catheter(s); aggressive
+2	Agitated	Frequent non-purposeful movement, fights ventilator
+1	Restless	Anxious, apprehensive but movements not aggressive or vigorous
0	Alert & calm	
-1	Drowsy	Not fully alert, but has sustained awakening to voice (eye opening & contact ≥ 10 sec)
-2	Light sedation	Briefly awakens to voice (eye opening & contact < 10 sec)
-3	Moderate sedation	Movement or eye-opening to voice (but no eye contact)
-4	Deep sedation	No response to voice, but movement or eye opening to physical stimulation
-5	Unarousable	No response to voice or physical stimulation

99

Position Statements

- DNR Advance Directive
- Acuity-based staffing
- On Call/ Work Schedule
- Overflow Patients
- Safe Medication Administration
- BSN Requirement
- Perinatal Patient
- Nursing Shortage
- Visitation in Phase I
- Perianesthesia Safety
- Geriatric Patient
- Pediatric Patient
- Perinatal patient
- Workplace Violence
- Substance Abuse
- Social Media

100

Three New Ones

- Opioid Stewardship
 - SAFETY IS FOCUS...EDUCATE!
- Gender Diversity
 - OUR CARE IS “GENDER NEUTRAL” terms ever changing...some say transgender is old term, non-binary is one of the new terms
- Marijuana
 - Educate ourselves, support the research, be aware of the stigma, state laws/nurse practice act guides our use

101

RESOURCES

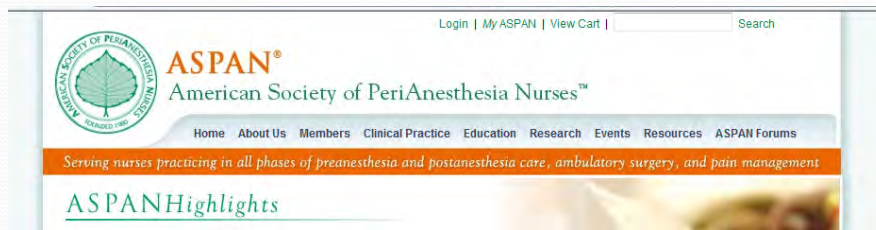
- Help with understanding evidence
 - Know what's good!
- Standards for Anesthesiologists regarding the care of our patients
 - Their standards inform our practice
- Clinical practice guideline from ARIN for handoff communications
 - Careplans for various procedures
- Orientation timeline
 - new nurse versus experienced nurse new to perianesthesia

102

Knowledge/Resources

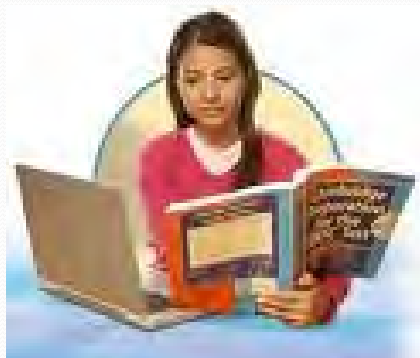
ASPAN's website

www.aspan.org



103

Practice Questions



104

According to the ASPAN Standards of PeriAnesthesia Nursing Practice, the number of cardiac monitors available in Phase 1 recovery should be based on the number of :

- A. ORs
- B. ICU patients
- C. PACU beds
- D. cases per day

C

105

According to the ASPAN Standards of Perianesthesia Nursing Practice, a 9 year old patient who is unconscious but stable condition without complications would require which nurse-patient ratio?

- a. 1:1
- b. 1:2
- c. 1:3
- d. 2:1

B

106

According to ASPAN Standards, how many nurses are required in the PACU for the following patients – Stable intubated AAA; 6 y/o unconscious T&A; post mastectomy patient; a 5 y/o and an 8 y/o stable adenectomies with parents present:

- a. 4
- b. 5
- c. 6
- d. 7

A

107

Practice Question

When functioning as a patient advocate, the Perianesthesia nurse:

- A. Follows all physician orders as given
- B. Allows patients to choose course of care
- C. May need to disobey physician orders
- D. Involves the family in all decision-making

C

108

Practice Question

The recommended number of nurses to care for two conscious, stable six year olds with family present in phase II is?

One

109

Practice Question

In phase I, the recommended nurse/patient ration for critically ill, unstable, complicated patients is:

2 nurses/ 1 patient

110

Practice Question

According to the ASPAN Standards, the staffing plan for the PACU includes:

- A. At least two licensed staff nurses at all times
- B. A nurse/patient ratio of 1:1 general surgical patients
- C. A nurse/patient ratio of 1:3 for ambulatory surgical patients
- D. At least one nurse for each OR

A

111

Break Time



I think I
may need
a BATHroom
break?
Is this possible?

112

Legal, Regulatory, and Professional Topics Related to Perianesthesia Nursing

Molly McBrayer, MSN, RN-BC, CNOR, NE-BC
Meg Suermondt, RN, CCRN, CPAN



1

Legal Terms



2

Accountability

- The state of being answerable to self, patient, profession, and agency for nursing care



3

Standard of Care

- The “norm” for practice
- Standards drive from federal and state law, professional associations and policies of employing agencies
- Standards may also arise from usual and customary practices
- Does not change based on the credentials of the nurse, institution, age or category of patient



4

Assault

- A threat to harm another person physically, or an unsuccessful attempt to do so
- Differs from battery in that no physical contact is made

Battery

- An offensive, intentional, unconsented-to-touching of a person



5

Captain-of-the-Ship Doctrine

- A doctrine by which the person in charge, the one who makes the final decision, may be held responsible for the acts of those under his or her supervision

Abandonment

- A knowing relinquishment of the patient-provider relationship which may be adverse to the patient



6

Good Faith

- Being faithful to one's duty or obligation
- An honest and sincere intention to fulfill one's responsibility, contract, or agreement

Good Samaritan Law

- A state law that provides civil immunity from negligence lawsuits for individuals who stop and render care in an emergency
- This doctrine is not recognized in all states



7

Certification

- A credential awarded by a professional society of a person, e.g. a registered nurse upon meeting certain requirements such as an examination and a specified number of years in practice

Competency

- Determination of the ability to give a level of care according to a predetermined set of standards or law



8

Consent

- A voluntary act by which one person agrees to allow someone else to do something
- For medical liability purposes, consents should be in writing with an explanation of the procedures to be performed



9

Informed Consent

- Based on the premise that every competent patient has a right to determine what will be done to his/her body
- A doctrine that states that before a patient is asked to consent to any treatment, he or she is entitled to receive certain information including:



10

- (a) a description or the nature of the procedure
- (b) any alternatives of treatment to the procedure and related risks
- (c) possible risks involved with the procedure
- (d) the probable results of the procedure, including any problems of recuperation and time of recuperation anticipated
- (e) consequences associated with refusing treatment



11

Consent Question:

- Ms. Girl shares with you after signing a consent for a Total Abdominal Hysterectomy for metromenorrhagia that she hopes to heal quickly so she can start a family. The nurse would:
 - a. Assume she is joking
 - b. Ask Girl's partner if he understands any better
 - c. Call the surgeon
 - d. Proceed as the consent is signed and matches the order.



12

Exceptions to Informed Consent

- Immediate care is required in an emergency
- Exceptions may vary among states



13

Liability

- The obligation of one party to another
- Finding is usually imposed by a court and generally results from negligence
- Four separate but related criteria must be present for liability to be established
 - Duty
 - Breach of duty
 - Causation
 - Damages



14

Duty

- The professional relationship that is established between the healthcare provider and the healthcare recipient
- Begins when the patient or proxy agrees to the admission agreement



15

Breach of Duty

- Breach of the Standard of Care
 - Conduct that falls below the standard of care established for patient's protection against reasonable risk of harm



16

Causation (Proximate Cause)

- The breach of duty must be the cause of an issue or injury



17

Damages or Injury

- There has be to actual injury



18

Negligence

- Failure to act as a reasonable, prudent person in the protection or care of another
- Failure to meet the standard of care



19

Contributory Negligence

- The act or failure to act by a person that contributes to the injury of another
- For example, if a hospitalized patient were to injure himself or herself because the attending nurse failed to apply appropriate restraints, the nurse could be held accountable for having contributed to the injury



20

Malpractice

- Professional negligence
- Liability arising from improper practice of a profession
- Usually imposed when one has not met the standards of care required in that profession, resulting in harm to another



21

Malpractice

- For a malpractice claim to go forward, all of the elements must be present:
- 1. Duty
- 2. Breach of duty
- 3. the breach must be the proximate cause of the injury (causation)
- 4. actual injury



22

Common Nursing Allegations

- Failure to ensure patient safety
- Improper treatment
- Improper performance of treatment
- Failure to monitor
- Failure to report significant findings
- Medication errors and reactions



23

National Practitioner Data Bank

- A data bank created by the U.S. Congress for the collection of information on medical malpractice awards, adverse licensure actions, adverse clinical privilege actions and adverse professional society membership actions



24

Beneficence

- First principle of morality
“do good and avoid evil”
- Depends on how one defines the concepts of “good and goodness”
- Is not a specific moral rule
- Cannot tell us what concrete actions constitute doing good and avoiding evil



25

Nonmaleficence

- First-Do No Harm
- If one cannot do good without also causing harm, then one should not act at all



26

“The difficulty with this rigorist interpretation, however, is that it makes action almost impossible in a world where even the best actions may have some harmful results.”

www.ascensionhealth.org/ethics/public/key_principles/beneficence.asp



27

Regulatory



28

Centers for Medicare & Medicaid Services (CMS)

- Signed into law on 7/30/65
- Part of Social Security Act
- President Truman enacted
- Formally known as the Health Care Financing Administration (HCFA)
- The *Medicare* Prescription Drug, Improvement, and Modernization Act (MMA)



29

OSHA

- Federal government agency
- Division of US Dept of Labor
- Sets standards
- Investigates proper physical conditions of working environments
- Mission is to ensure safe and healthful workplaces



30

State Health Department

- State specific
- **Mission:** To protect the health of the people of the state
- Every state has a health department that is the administrative branch to oversee the statutory laws that are made by the state legislature



31

Healthcare Insurance Portability & Accountability Act

- Legislation passed in 1996
- Addresses various aspects of patients' medical information
- Confidentiality of patient information
- Consent processes for access to health information
- Right to sue health plan provider



32

Food and Drug Administration

- Mission is to protect the health of Americans
- Nations oldest consumer protection agency
- FDA regulates over \$1 trillion worth of products, which account for 25 cents of every dollar spent annually by American consumers



33

Centers for Disease Control & Prevention (CDC)

- Federal government agency
- Dedicated to monitoring disease, mortality, and morbidity of patients
- Sets guidelines on dealing with known or suspected diseases
- Serves as national focus for developing and applying prevention and control, environmental health, health promotion and education



34

Joint Commission

- Independent accrediting organization
- Designates acceptable patient care
- Evaluates facilities' abilities to adhere to specific guidelines (documentation, processes, policies, procedures)
- Participation is voluntary



35

1997 Joint Commission Definition of Sentinel Event

- “Unexpected occurrence involving death or serious physical or psychological injury, or risk thereof.”



36

Reportable Events

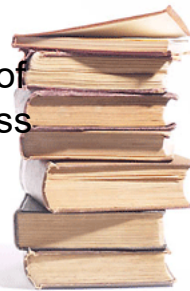
- Suicide in a setting where the patient receives around the clock care
- Unanticipated death of a full-term infant
- Abduction of any person receiving care or treatment
- Infant discharge to the wrong family
- Rape
- Hemolytic transfusion reaction
- Surgery on the wrong patient or wrong body part



37

Root-Cause Analysis

- When a sentinel event has occurred, the facility must perform a root-cause analysis and submit an action plan to the Joint Commission
- Round table discussion with all parties involved to find the root of the problem involving the process not pointing fingers at the sharp end



38

Sentinel Event Alerts

- Ongoing recommendations
- Institutions are often assessed on knowledge of alerts
- Institutions must have plans for implementation



39

National Patient Safety Goals

- Drawn from Sentinel Event Alerts
- Began with six goals
- One to two recommendations per goal
- Continues to grow-some have been retired



40

Responsibility

- It is the responsibility of the nurse to report any incident or situation where he/she feels there is a problem to determine the cause and prevent it's recurrence



41

Incident Reports

- Unusual occurrence that has potential for patient injury
- Should be submitted to persons responsible for review and follow up
- Often is Risk Management
- Not part of medical record



42

Incident Report Information

- Brief narrative of event details
- Should be objective description
- Quotes where applicable
- Names of witnesses
- Patient assessment
- Actions taken



43

Laws



44

Sources of Law

- Statutory Law
- Administrative Law
- Common Law and Equity



45

Statutory Law

- Law passed by the legislature
 - Federal
 - Laws passed by Congress
 - State
 - Laws enacted by state legislature
 - Not uniform in the fifty states
- Publications containing statutes are called codes



46

Administrative Law

- Federal and state legislature establish administrative agencies to make enforceable rules and regulations
 - FDA
 - CDC
 - OSHA
 - State Health Department



47

Common Law

- Derived from court decisions previously made
- Deals with issues outside the scope of statutory laws
- Based on the unwritten laws England and later applied to the United States



48

Common Law (cont.)

- Broad principles, not rules that adhere to fairness, reason, and common sense
- Flexible and adapt to changes in society
- States recognize common law principles today
i.e. common law marriage



49

Equity

- Historically developed in England to provide an adequate remedy to an injured party when common law failed to do so
- Acts according to the spirit, not the letter, of the law
- Principles used in courts today



50

Types of Law

- Criminal
- Civil
 - Tort



51

Criminal Law

- Statutes- Provide protection to society
- Two types of offenses
 - Misdemeanor and felonies
- Punishment- community service to prison or death
- Nursing Examples
 - Practicing without a license
 - Illegal diversion of drugs
 - Death of a patient
 - Assisted suicide



52

Civil Law

- Nurses often become involved in civil rather than criminal cases
- Violations of individual rights
- Disputes resolved by judge or jury
- Areas of civil law
 - Contract, tax, labor and tort



53

Tort Law

- Type of civil law
- Defined as a wrong or injury to an individual caused by another who had a legal duty to that individual
- Can be unintentional, intentional, or quasi-intentional



54

Tort Law (cont.)

- Unintentional- negligence
- Intentional- assault, battery
- Quasi-intentional
 - defamation of character such as slander (speech) or libel (written or picture)
 - invasion of privacy
 - breach of confidentiality



55

Professional Issues



56

Professional Issues

- Nursing Ethics
- Evidence-Based Practice
- Performance Improvement
- Safety
- Policies and Procedures
- Personnel Selection



57



58

Traditional Ethical Responsibilities of Nursing

- Promote Health
- Prevent Illness
- Restore Health
- Alleviate suffering



59

Evidence-Based Practice

- Conscientious and judicious use of current best evidence to guide health care decisions
- Levels of evidence range from randomized clinical trials to case reports and expert opinion

Involves development of standards of care, policies, procedures, clinical pathways, guidelines and/or protocols and developing documentation formats as well as data repositories for tracking



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Rational for EBP

- Increased availability and accessibility of research reports
- Refined criteria for appraising research findings
- Increased potential for better outcomes
- Decreased risk when approach is used with research support
- Increased competitive edge
- Increased professional satisfaction
- Shows the value of professional nursing



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Performance Improvement

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62

Performance Improvement

- Ongoing activities designed to evaluate the quality of patient care and services
- Pursue opportunities to improve patient care and services
- Resolve identified problems



63

Quality

- Many definitions depending on
 - Who answers the question: “What is quality care?”
 - How quality is measured
 - What is important to those defining the term
 - Consumers, health care professionals, regulatory bodies, reimbursers
 - Reimbursement tied to satisfaction re-defines

“Quality”



64

Dimensions of Quality

- Effectiveness
- Efficacy
- Accessibility
- Appropriateness
- Continuity
- Patient perspective issues
- Safety of care environment
- Timeliness



65

Performance Improvement Process

- Identify indicators
 - Things you can measure
- Determine desirable outcome
 - End product or result of process
- Establish thresholds
- Collect data
- Organize data



66

Performance Improvement Process (cont.)

- Evaluate the results
 - Detailed analysis of identified patterns or trends
- Develop a plan to improve
 - Who or what is expected to change
- Documentation
 - Conclusions, recommendations, actions taken with results, and reports



67

Benchmarking

- A continuous and collaborative discipline that involves measuring and comparing the results of key processes with the best performers
- Used to improve practice
- Allows the consumer to make informed choices



68

Safety: A Culture, Not just Actions

- Environment
- Identification of Patient
- Protection of personal property
- Observation of patient
- Prevent the spread of infectious diseases
- Equipment used appropriately
- Safe transfer of patient



69

Policies and Procedures

- Hospital specific
- CPAN/CAPA exam is a National Exam
- Think global rather than local when answering questions about P&Ps
- Regulatory agencies
 - TJC, State agency, CMS



70

Policy

- Guideline to assist in decision making
- Means to ensure practice is in compliance with standards
- Define responsibility
- Describe actions
- Establish a consistent level of expectation for staff



71

Procedure

- Instructions that detail steps necessary to complete a task
- Helpful when tasks are performed infrequently
- May be an orientation resource
- Helps with cost containment
- Increases productivity



72

Personnel Selection

- Qualifications
 - Goal oriented, organized, independent thinker, positive, flexible, able to set priorities, able to make quick and accurate assessments
- Interview process
 - Opportunity to obtain and provide info
- Applicant cautions
 - History of job hopping, concern regarding work hours, inability to be flexible, not asking any questions



73

Practice Question #1

A

A nurse overhears a terminal patient discussing with his family that he does not want to be resuscitated if he dies. Postoperatively the patient develops asystole. The nurse cannot find a DNR order on the chart. The nurse's duty is to:

- a. initiate CPR until a physician's order can be obtained
- b. document the patient/family discussion and not initiate CPR
- c. provide pharmacological interventions but not CPR
- d. have a coworker consult the ethics committee



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Practice Question #2

C

The PACU nurse may reduce the risk of liability by:

- A. Discussing untoward events with risk management
- B. Providing complete and accurate documentation
- C. Establishing a good nurse-patient relationship
- D. Ensuring that witnesses are present when delivering care



75

Practice Question

- Medical Malpractice is a type of
- A. Criminal Law
- B. Enforceable Law
- C. Common Law
- D. Civil Law



76

Practice Question

- The nurse who practices wellness advocacy for the patient is exhibiting the ethical principle of:
 - a. Autonomy
 - b. Maleficence
 - c. Fidelity
 - d. Beneficence



77

Practice Question

- The nurse who practices wellness advocacy for the patient is exhibiting the ethical principle of:
 - a. Autonomy
 - b. Maleficence
 - c. Fidelity
 - d. **Beneficence**



78

Practice Question

When is duty established?

- a. When a patient signs the admission agreement
- b. When the case is scheduled
- c. When the armband is applied
- d. With the first actions of the nurse



79

Practice Question

Mr. Kohlhoefer had surgery but the consent wasn't signed. In a medical malpractice suite, the court assigns responsibility for informed consent to rest

- 1. Only with the patient
- 2. Only with the doctor
- 3. The nurse and the doctor
- 4. The hospital and the doctor.



80

Assessment of the Perianesthesia Patient

Meg Suermondt, BSN RN, CCRN, CPAN, CAPA

1

Objective

- Summarize nursing process activities related to the Perianesthesia setting.
- Describe assessment of the perianesthesia patient.
- Discuss discharge criteria as related to post anesthesia phase

2

Nursing Process

A systematic, rational method of providing individualized nursing care

3

Five Phases of the Nursing Process

- Assessment
- Diagnosis
- Planning
- Implementation
- Outcome Evaluation



4

Assessment

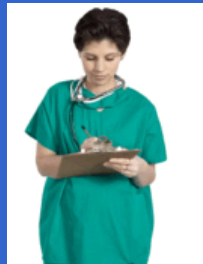
- Information gathering phase
 - Information is collected, organized and documented



5

Diagnosis

A clinical judgement about the patient's response to actual or potential health problems



6

Planning



Includes setting goals and
outcomes of care

7

Implementation

Activities or interventions
performed by the nurse or
delegated to UAP



8

Evaluation



Determination
of the achievement of
nurse-sensitive patient
outcomes

9

Perianesthesia

Nursing Assessments

10

Assessments



- PreAnesthesia
 - Pre-Procedure
 - Day of Surgery
- PostAnesthesia
- Phases I, II and Extended

11

Goals of PreAnesthesia Assessment

- Optimize patient care, satisfaction and comfort
- Minimize perioperative morbidity and mortality
- Assess factors that affect the risk of anesthesia or alter the anesthesia care plan
- PREVENT UNNECESSARY CANCELATIONS

12

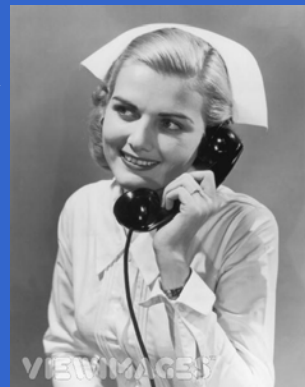
Goals of PreOperative Assessment(cont.)

- Minimize surgical delays or cancellations
- Ensure accurate communication between patient and healthcare providers
- Evaluate the patient's health status
- Determine specific pre-operative testing and consultations that may be needed

13

Components of Preanesthesia Assessment

- Questionnaire
- Interview
- History & Physical Exam
- Testing
- Teaching/Education
- Evaluation



14

Components of Preanesthesia Assess (cont.)

- Review of systems to detect abnormalities of major organ systems
- Previous anesthesia history
 - Including sedation history
- Alcohol and substance abuse



15

Components of Preanesthesia Assess (cont.)

- Allergies
- Current medications
- Psychosocial history/support
- NPO status
- Labs
- VS



16

History and Physical

- A medical history and physical examination must be present on a patient's chart before a surgical or invasive procedure- Joint Commission 30 days
- Review should be done immediately prior to the procedure and any changes documented- Joint Commission 24 hours



17

Patient Identification

- Verification of patient's identity using two identifiers neither being patient location or diagnosis
 - Patient's Name
 - Date of Birth
 - Social Security Number
 - Assigned identification number (medical record number or account number)



18

Testing Requirements

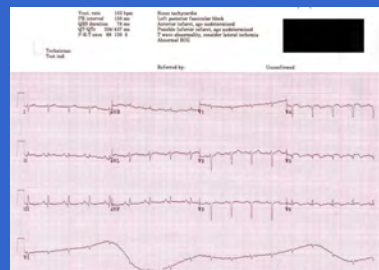
- Necessary vs Unnecessary
 - Benefit vs Risk
- Who orders the testing?
- What is the cost?



19

Common Diagnostic Tests

- Chest X-ray
- EKG
- Pregnancy test
- Glucose
- Hgb/ Hct
- Na, K⁺
- Pt, Ptt, INR



20

Fasting Requirements

- ASA Guidelines for Fasting and Antacid Prophylaxis
 - Solids- NPO for 6 hours
 - Breast milk- 4 hours
 - Clear liquids- 2 hours
 - No chewing gum or candy!
- Current Practice?
- <http://www.asahq.org/publicationsAndServices/NPO.pdf>



21

Smoking

- Negative effect on cardiac function
- Increased post-op hypoxemia
- Increased airway irritability (bronchospasm)
- Increased risk of post-op pneumonia
- Less incidence of PONV

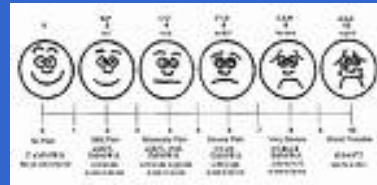


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Pain Assessment

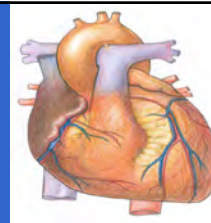


- PreOp education related to pain scale
- Assess current pain, location of pain, rate intensity
- Education related to post-op expectation of pain, pain relief and current modality of pain medication



23

Cardiovascular Assessment



- Implantable devices
- Preexisting disease- HTN, Angina, CAD, MI, Valvular dysfunction, dysrhythmias, conduction problems
- Disease severity, prior treatment
- Signs & Symptoms- fatigue, angina or pressure, palpitations, syncope, or dyspnea

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Pulmonary Assessment



- Asthma, COPD
- Recent URI, bronchitis, pneumonia
- Rescue medication- frequency of use
- Cough: type, severity, frequency
- Sputum production: color, consistency, bloody

25

Pulmonary Assessment (cont.)

- Exercise tolerance
 - Flight of stairs?
- Dyspnea, SOB
 - How many pillows do they sleep with?
 - Do they sleep in a recliner?
- Respiratory attacks
 - What triggers, how often, and how severe?

26



Pulmonary, continued

- OBSTRUCTIVE SLEEP APNEA
 - Screening tools like a STOP-BANG or Epworth
 - CPAP? Bring it
 - Co-morbidities: Many of them
 - Men 2x more likely
 - 80% of men, 95% of women are undiagnosed

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OSA continued

- Pharynx loses tone, NIF not enough to open the pharyngeal lumen
- Hypoxia and hypercarbia occur,
- Patient rouses enough to breathe, then sinks back down. Happens 100s x a night.
- HALLMARK IS DAYTIME SOMNOLENCE

28

OSA continued

Screening tools

Definitive test is Polysomnography

Bottom Line for us: People with OSA have a 24% increase in serious postoperative respiratory complication rates.

29

Focused Physical Exam

- Vital signs
- Heart and Lung Sounds
- Mouth and airway assessment
- Operative site
- Indication of disease



30

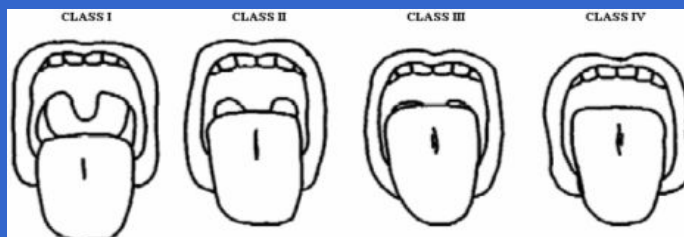
Airway Assessment



- Stridor, snoring or sleep apnea
- Dysmorphic facial features
- Advanced arthritis
- Significantly obese
- Short neck, limited extension, receding chin
- Mouth opening small, loose teeth, nonvisible uvula

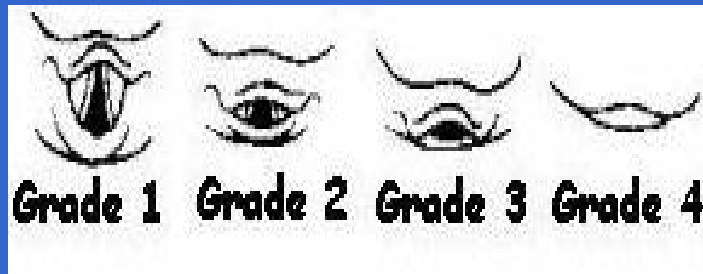
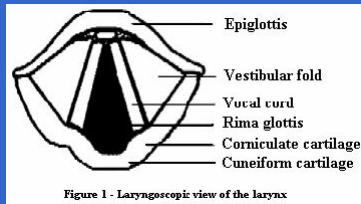
31

Mallampati Airway Classification



32

Mallampati Airway Classification



33

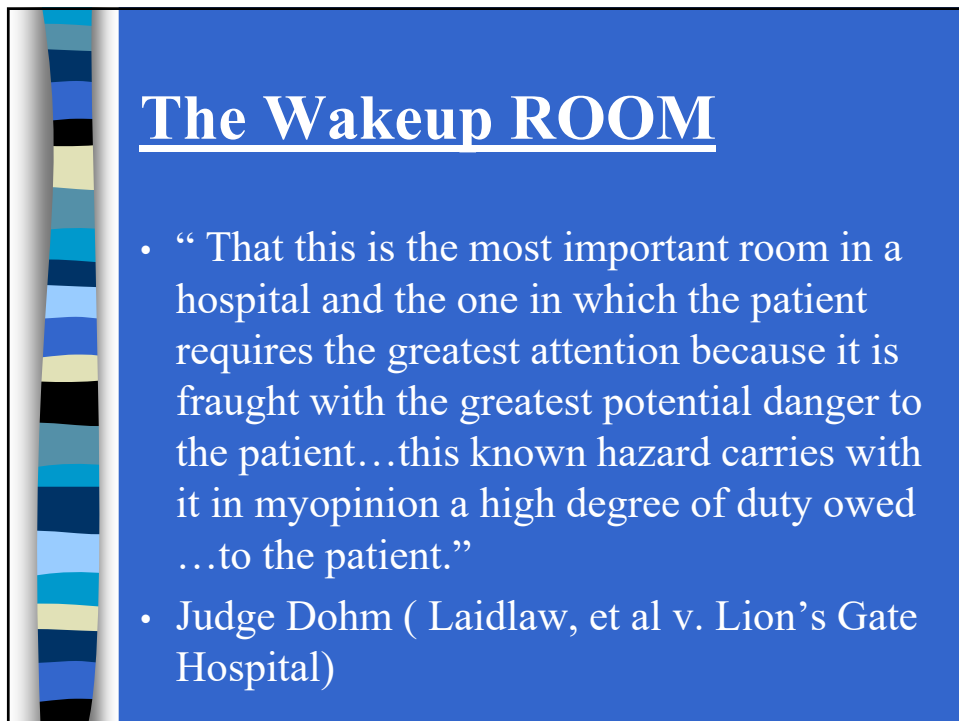
Transitioning out of PreOp

- The Preanesthesia Phase should end with a hand off to the circulator and anesthesia care provider.
- Family care is important, and part of the PostAnesthesia assessment begins preop with the support person's phone number and location.

34



35



36

Transfer to PACU, Cont

- Equipment
- Anesthesia report
- Circulating nurse report
- Medical record



37

Emphasis on Identifying Priority Nursing Diagnosis PACU

- Airway related
- Breathing related
- Circulation related
- Disturbing symptoms
 - Pain, nausea, urinary retention
- Knowledge deficits



38

Phase I Goals

- Return to baseline
- No complications
- Encourage self care
- Move forward
- Maintain dignity
- Patient satisfaction



39

Respiratory



40

Body's O₂ Demand Increases with....

- Shivering (by 400% or more)
- Pain
- Anxiety
- Hypotension
- Hypertension
- Dysrhythmias
 - Tachydysrhythmias
 - Bradydysrhythmias
- Rapid fluctuations in intravascular volume
- Thromboembolic events
- Left ventricular failure
- Catecholamine release

41

Nursing Care of Intubated Patient

- Constant nursing observation
- Administration of humidified oxygen
- Protect patient from aspiration
 - Maintain cuff inflation, position patient properly, suction as appropriate
- Ensure proper position of ET tube
- Provide emotional support
- Evaluate for signs of recovery for extubation



42



Extubation Criteria



- Return of muscle strength
 - Equal hand grasps, head lift & sustain 5 sec
- Respiratory parameters
 - TV at least 5ml/kg, Vital Capacity at least 15-20ml/kg, Neg. Inspiratory force of 20-25 cm, regular respiratory pattern > 10 breaths/min
- Responding appropriately
 - Head movements, protrude tongue, open eyes
- Swallow and cough reflexes present

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Pediatric and Adult Airway Differences

- Proportionately larger head and tongue
- More anterior and cephalad larynx
- Long, sometimes floppy epiglottis
- Short trachea and neck
- **THE NARROWEST POINT IN THE PEDIATRIC AIRWAY IS THE CRICOID CARTILAGE**

44



Pediatric Airway Complications

- **Postintubation Croup**

- Result of an endotracheal tube that is too tight, or is moved a great deal
- Result of swelling of the tracheal mucosa, and may be treated with racemic epinephrine and humidified mist

45



Pediatric Anesth. Complications

- **Laryngospasm**

- Fairly common complication
- Forceful closure of the vocal cords which prevents respiration
- Occurs during Stage II (Delirium) of anesthesia when the airway is unprotected
- The initial treatment is constant positive pressure in order to reestablish ventilation
- If not successful, succinylcholine is administered, along with atropine to prevent bradycardia

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Pediatric Airway Complications

- **Stridor and other signs of respiratory obstruction**
 - Due to subglottic edema
 - Clinical signs generally appear within 30 min of extubation
 - Respond well to treatment with nebulized epinephrine and IV dexamethasone
 - Day case patients treated for postintubation croup should be observed in hospital for at least 2 hours before discharge, as signs of respiratory obstruction may recur
 - Persistent or recurrent signs of airway obstruction are an indication for admission to hospital

47

Assess Pulse Rate, Rhythm and Amplitude

- Weak, absent, or irregular
 - Hypovolemia
 - Decreased CO
 - Myocardial ischemia
 - Acute MI
 - Cardiac dysrhythmias
- Bounding
 - Excitement, hypertension, fluid overload



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Fluid and Electrolytes



- Average adult requires 2200ml of fluid daily
- Those who cannot maintain homeostatic balance are
 - Small children
 - Adults with renal, GI, Endocrine, or CV issues
 - Elderly
 - Thin or emaciated
- Other factors related to disturbances
 - Stress including fear and anxiety
 - GI including N&V, NG suctioning, bowel prep

49



Oral Intake and Urinary Status

- Oral intake
 - Once protective reflexes are present
 - No nausea
 - Avoid citrus juice, coffee
- Urinary status
 - Daily output of 600ml is necessary to excrete waste of metabolism
 - Optimal amount is 30ml/hr
 - Production can decrease d/t hypovolemia, hypothermia, and reaction to stress



50

Urinary Retention

- Spinal and Epidural anesthesia
- Surgical manipulation
- Assess for bladder distention after
 - Urinary procedures, Inguinal herniorrhaphy, GYN procedures
- Symptoms of bladder distention
 - Restlessness, lower abdominal pain, hypertension, tachycardia, anxiety, tachypnea, diaphoresis
- Discharge from Phase I & II if not uncomfortable or distended



51

LOC

- Unconscious patients should never be left unattended
- Hearing is the first sense to return
 - Speak to patient in calm, low tones to help arouse and orient semiconscious patient
- Emergence delirium



52

Positioning



- Proper body alignment
- Comfort and safety
 - Lateral position for prevention of aspiration
 - Reposition frequently for unconscious patient
- Promote cardiovascular and respiratory homeostasis by positioning slowly
- Special post-operative positioning
 - Extremities, plastic surgery, ophthalmology

53

Assess Wounds and Dressing

- Bleeding, drains filling, bruising, skin discoloration, swelling
- Intra-abdominal and laparoscopic
 - Apprehension, hypotension, tachycardia, splinting, pain, rigidity, pallor, diaphoresis
- Treatment
 - Manual pressure, elevation of site, ice or cool compresses, IV infusion rate, sedation, pressure agents, blood replacement, O₂, resuturing, return to OR



54

PONV

- Goal is to prevent rather than treat
- Prophylactic- antiemetics and histamine blockers
- Nausea is subjective
 - Difficult to describe
 - Unpleasant
 - May or may not result in retching or vomiting

55

Predisposing Factors for Nausea in Adults

- Obesity
- Female
- Non smoker
- Hiatal hernia
- Type of surgery
- Anesthetic technique
- History of PONV



56

Predisposing Factors for Nausea in Children

- Surgery lasting longer than 30 minutes
- 3 years of age or older
- Strabismus surgery
- History of PONV in relatives



57

Vomiting

- Involves skeletal muscles and autonomic nervous system
- Stimulation of vomiting center
- Chemoreceptor Trigger Zone (CTZ)
Three afferent nerve pathways
 - Cortical- Emotional, organic, sensory
 - Visceral- Viscera and vagal nerve
 - Vestibular- Tremors, motion, otitis media, ENT procedures, anesthetics and narcotics



58



PONV TREATMENT

- Metoclopramide (Reglan)
- Prochlorperazine (Compazine)
- Promethazine (Phenergan)
- Scopolamine (Transderm)

59



PONV TREATMENT

- Serotonin Antagonists
 - Ondansetron (Zofran)
 - Dolasetron (Anzemet)
 - Granisetron (Kytril)

60



Other PONV Treatment

- Droperidol
- Propofol
- Dexamethasone

Discussed in detail on Day 2

61



Discharge from PACU

- Anesthesiologist (usually) responsible for discharge from Phase I
- Written criteria should address parameters of physical and cognitive recovery

62



Discharge from PACU

Numeric scoring systems provide objective methods with which to evaluate and describe patient's condition

Limited and does not address some aspects of patient condition i.e. PONV, pain, emotional status, chills and shivering, fluid and urinary status, peripheral circulation, temperature

63



Aldrete Scoring System

- Measures five parameters with score ranges from 0-2
 - Activity
 - Respiration
 - Circulation
 - Consciousness
 - Temperature
- Score of 9 or 10 is generally required for phase I discharge

64

Modified Aldrete Scoring System ¹		
Activity: able to move, voluntarily or on command		
• Four extremities		2
• Two extremities		1
• No extremities		0
Respiration		
• Able to breathe deeply and cough freely		2
• Dyspnoea, shallow or limited breathing		1
• Apnoea		0
Circulation		
• Blood pressure within 20 mm Hg of preoperative level		2
• Blood pressure within 20–50 mm Hg of preoperative level		1
• Blood pressure \pm 50 mm Hg of preoperative level		0
Consciousness		
• Fully awake		2
• Arousable on calling		1
• Unresponsive		0
Oxygen saturation		
• Saturation > 92%		2
• Needs oxygen to maintain saturation > 90%		1
• Saturation < 90% with oxygen		0
¹ Nine or more points are required for recovery to be confirmed.		

65

Postanesthesia Assessment

- Rapid postanesthesia care unit progression (RPP)
 - Patient moves very rapidly through Phase I
- PACU phase I bypass- Fast-tracking

66

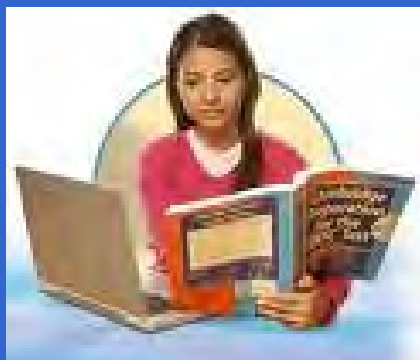
Phase II Assessment

- Vital signs
- LOC
- Patient position
- Patient safety needs
- Condition and color of skin
- Neurovascular
- Condition of dressing, drains and tubes
- Muscular strength and movement
- Fluid therapy
- Comfort level
- Respiratory status
- Temperature
- PONV

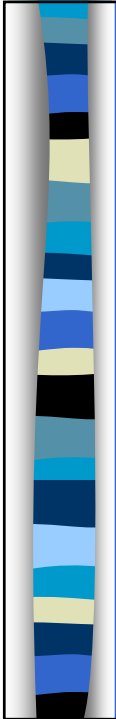


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Practice Questions



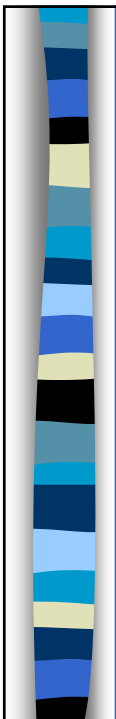
68



4 year old patient has vomited twice since her strabismus surgery ended 1 hour ago. She received small amount of halothane, fentanyl and atracurium intraop. The PACU nurse administers droperidol and observes her for:

- a. Hyperventilation**
- b. Increased sedation**
- c. Hypertension**
- d. Emergence Delirium**

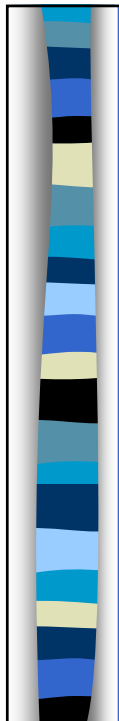
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After blepharoplasty, effective management of PONV is essential to prevent:

- a. Intractable pain**
- b. Subdermal infection**
- c. Disrupted sutures**
- d. Metabolic acidosis**

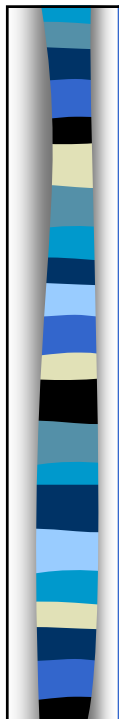
70



Following aorto-bifem surgery with in situ graft, the PACU nurse best promotes a 79 y/o woman's vascular patency by:

- a. Reporting the new loud bruit near the knee**
- b. Preventing fluid volume deficit**
- c. Assuring a high Fowler's position**
- d. Maintaining slight hypercarbia**

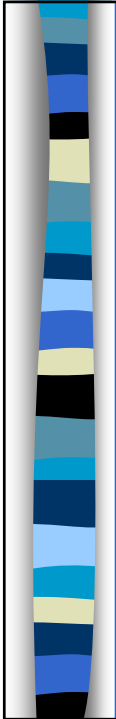
71



3 hours after extubation, a 2 year old child post extensive oropharyngeal surgery experiences HR =150; O2 Sat = 92%; bilateral clear breath sound and stridorous sound. The nurse should immediately:

- a. Reintubate orally, then reapply dental bands**
- b. Lavages oropharynx with racemic epinephrine**
- c. Reposition head, then continues misted oxygen**
- d. Stimulates breathing and hyperextends the head**

72



A post-operative tonsillectomy patient is diaphoretic and complaining of feeling queasy. The most appropriate intervention is:

- a. Minimize movement**
- b. Encourage large amounts of clear liquids**
- c. Avoid the use of NSAIDS**
- d. Encourage patient to interact with family**

73



A major rationale for preoperative nursing assessment includes all of the following except:

- a. Evaluating risk for anesthesia and surgery**
- b. Reducing perioperative morbidity and mortality**
- c. Establishing patient's baseline functions**
- d. Ordering laboratory tests**

74

Lunch



75

AGE SPECIFIC CARE IN THE PERIANESTHESIA SETTING

Meg Suermondt, RN, CCRN, CPAN

1

Objective

- ▣ Outline age specific interventions in the perianesthesia setting



2

Erikson's Stages of Development:

Stage I- Trust vs. Mistrust

Stage II- Autonomy vs. Shame and Doubt

Stage III- Initiative vs. Guilt

Stage IV- Industry vs. Inferiority

Stage V- Identity vs. Role Confusion

Stage VI- Intimacy vs. Isolation

Stage VII- Generativity vs. Stagnation

Stage VIII- Ego Integrity vs. Despair



3

Stage I

- ▣ Trust vs. Mistrust (0-1 year)
 - Consider growth & development- very rapid
 - Very high anxiety and stranger anxiety
 - Spend time getting acquainted
 - Encourage use of familiar play objects
 - Allow child to use transitional objects (blanket, pacifier)

4

Stage II

- ▣ Autonomy vs. Shame & Doubt (1-3 years)
 - Development centered on ability to control environment
 - Strong fear of abandonment
 - Psychosocial skills are developing
 - Achieves autonomy through imitation
 - Toddlers need to play with medical equipment
 - Explain in brief, nonthreatening terms
 - Sit at child's level
 - Invite parents to join in play
 - Use words child understands

5

Stage III

- ▣ Initiative vs. Guilt (3-5 years)
 - Strives for sense of control, purpose and independence
 - Body integrity is major issue
 - Child may develop fear of bodily harm & mutilation
 - Imagination consumes child's thinking
 - Magical thinking (reality and fantasy are the same, child can magically influence)

6

Stage III (cont.)

- ▣ Initiative vs. Guilt (3-5 years, cont.)
 - Information must be factual, nonthreatening, direct and related in simple terms
 - Child masters experience through
 - Use of imagination
 - Role modeling
 - Opportunities to make choices in play

7

Stage IV

- ▣ Industry vs. Inferiority (6-12 years)
 - Skill acquisition characterizes this developmental stage
 - Choices- allow child measure of control
 - Thinking is concrete- children tend to be quite literal
 - “Put to sleep” may be associated with pet euthanasia

8

Carter's pockets

Wash day at April's House



9

Stage V

- ▣ Identity vs. Role Confusion (12-18 years)
 - Adolescents seek identity in midst of physical and emotional changes
 - Feelings of low self esteem and self-consciousness typical
 - Provide privacy
 - Personal questions should be done in absence of parents
 - Encourage patient to express concerns especially related to body image
 - Use books, diagrams

10

Stage VI

- ▣ Intimacy vs. Isolation (Early Adulthood)
 - Capacity to develop an intimate relationship
 - Socializing agents include lover, spouse, close friend
 - Develops affiliation and love

11

Stage VII

- ▣ Generativity vs. Stagnation (Young and Middle Adulthood)
 - Creation and care of next generation
 - Essential element to nourish and nurture
 - Socializing agents are spouse, children and cultural norms

12

Stage VIII

- ▣ Ego Integrity vs. Despair (Old age)
 - Results from satisfaction with life and results of what has been
 - Despair is a result of remorse for what might have been
 - Concern with life in the face of death
 - Introspection is important
 - Characterized by wisdom

13

Different Care for Different Sizes

- ▣ Pediatrics
- ▣ Geriatrics
- ▣ Pregnant



14

SIZE MATTERS

- ▣ Use the right sized equipment
- ▣ Know the norms, and get a chart if you don't.

15

Reference: Rosen's Emergency Medicine: Concepts and Clinical Practice 5th Edition

PEDIATRICS

Age (yr)	Respiratory Rate (breaths/min)	Heart Rate (beats/min)
<1	30-60	100-160
1-2	24-40	90-150
2-5	22-34	80-140
6-12	18-30	70-120
>12	12-16	60-100
Lower limits of systolic pressure†		
0-28 days: 60 mmHg		
1-12 months: 70 mm Hg		
1-10 years: 70 mm Hg + (2 times the age in years)		

16

Pediatrics

- ▣ Intubation- more difficult because subglottic stenosis
- ▣ Respiratory- small mandible and nares, large tongue, short neck, upper airway lymphoid tissue, chest wall compliance, muscles poorly developed, periods of apnea common
- ▣ Cardiovascular- Cardiac output 30-50% higher, normotensive until 25% blood volume is lost, HR is first sign of dysfunction

17

Pediatrics

- ▣ Thermoregulation- immature temp regulation, small amt of subcutaneous fat, will not shiver to produce heat
- ▣ Metabolic- increased O₂ demand resulting from increase metabolism
- ▣ GI- increased salivation and gastric secretions, esophageal sphincter immature
- ▣ Pain
 - Infant- crying, flailing arms and legs
 - Toddler- screaming, clinging, total body resistance
 - Preschool- crying, hitting, kicking, withdrawing, cling

18

Geriatrics

- ▣ Cardiovascular- arteriosclerosis, myocardial irritability, decreased contractility, increase systolic BP, dysrhythmias↓, CO and reserve
- ▣ Respiratory- chest wall rigidity↓, alveolar surface, muscle tone/strength↓, diminished response to hypoxia and hypercapnia
- ▣ Renal-↓renal function and clearance of medications and metabolites↓, response time to correct fluid and electrolytes↓
- ▣ Other changes- loss of fat, visual, auditory and tactile changes

19

Pregnancy

- ▣ Cardiovascular- blood volume↑ 30-40%, RBC 20%, body water is ↑6-8 liters, HR increases 10-15 beats/min in 2nd trimester, returns to normal 6 wks. postpartum
- ▣ Pulmonary- O₂ consumption ↑15-25%, resp. rate↑ 15%, tidal volume ↑40%, state of compensatory resp alkalosis
- ▣ GI- regurgitation, active vomiting, pulmonary aspiration, considered full stomach

20

Practice Question

A young adult with Down's Syndrome is in the Perianesthesia Unit. The patient becomes frightened and combative, and attempts to get out of bed. The Perianesthesia nurse's best response is to:

- A. Gently restrain the patient's arm
- B. Get an order to medicate the patient
- C. Play relaxing music
- D. Bring a family member or significant other into the room

D

21

Practice Question

Separation anxiety is a problem in the:

1-3 year age range

22

Practice Question

- ▣ An infant is admitted to PACU after a Nissen Fundoplication. HR is 175, blood pressure is 70/38, temp axillary is 36.6 (97.9) Sats 97%. Admission assessment also reveals periorbital edema, grunting respirations and adventitious lung sounds. The PACU nurse is most concerned about
 - A. Hypothermia
 - B. Pain
 - C. Respiratory distress
 - D. Hypervolemia

23

- ▣ An infant is admitted to PACU after a Nissen Fundoplication. HR is 175, blood pressure is 50/38, temp axillary is 36.6 (97.9) Admission assessment also reveals periorbital edema, grunting respirations and adventitious lung sounds. The PACU nurse is most concerned about
 - D. Hypervolemia

24

Practice Question

- ▣ A 92 year old woman has been in PACU for an hour after general anesthesia for a bowel resection. BP is 110/70, HR 62 with normal sinus rhythm, Sats are 97% on 2 liters NC. Temp on admission was 34.6 (94.3) Orally. Which of the following could the nurse consider to help this patient awaken?
- A. Cool cloth to the face
 - B. Administer a low dose of naloxone
 - C. Administer a warmed fluid bolus
 - D. Apply warm blankets

25

A 92 year old woman has been in PACU for an hour after general anesthesia for a bowel resection. BP is 110/70, HR 62 with normal sinus rhythm, Sates are 97% on 2 liters NC. Temp on admission was 34.6 (94.3) Orally. Which of the following could the nurse consider to help this patient awaken?

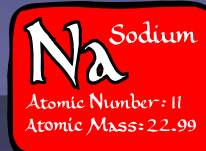
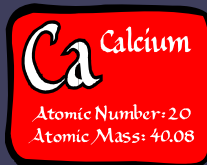
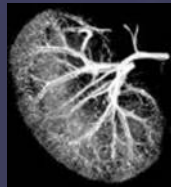
D. Apply warm blankets

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Patient Clinical Data Related to Perianesthesia Nursing



Meg Suermondt, RN, CCRN, CPAN



1

Fluid & Electrolyte Balance

2

Fluid Distribution

- Intracellular (about 50-60% of body mass)
 - Fluid inside of cells
 - High in K^+ , low in Na^+ and Cl^-
- Extracellular (about 40% of body mass)
 - Intravascular: fluid within blood cells (plasma)
 - Interstitial: fluid between cells
 - Transcellular: nonfunctioning fluid present in viscera i.e. gastric juices, intraocular fluid, cerebrospinal fluid
 - High in Na^+ and Cl^- , low in K^+

3

Composition of Fluid

- Electrolytes
 - Cations (positive ions) i.e. potassium, magnesium, sodium
 - Anions (negative ions) i.e. phosphorus, phosphate, chloride, bicarbonate
- Acids, bases, salts, buffers
 - Acid: hydrogen ion donor
 - Base: hydrogen ion acceptor
 - pH: hydrogen ion concentration of ECF
 - Buffer mechanism: regulates pH by maintaining bicarbonate/carbonic acid ratio of 20:1

4

Functions of Fluids

- Help to regulate body temperature
- Transport nutrients and gases
- Carry wastes to excretion
- Maintain cell shape
- Thirst center is in the Hypothalamus

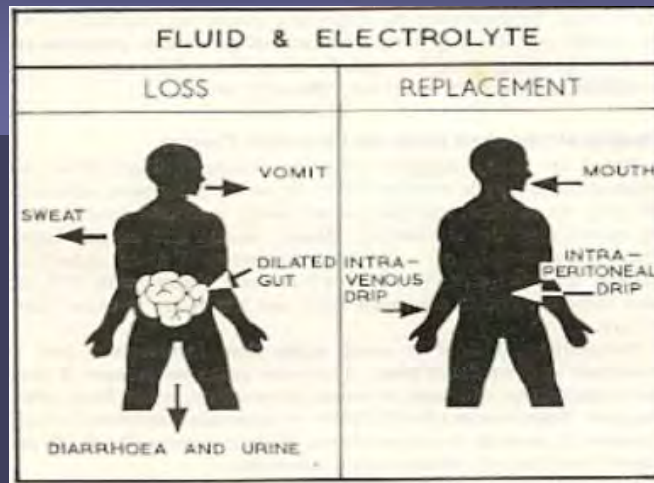
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Movement of Fluids

- In: fluids, food, IV, enteral
 - Exogenous 1000ml
 - Endogenous 1500ml
- Out :
 - Kidneys: 1500ml
 - Skin: 250ml
 - Insensible loss 250
 - Lungs: 300-400ml
 - GI: 100-200ml

6

Loss and Replacement



7

Dynamics of Water and Electrolytes

- Diffusion: molecules move from a region of higher to lower concentration (gas or liquid)
- Osmosis: movement of water through a semipermeable membrane from area of low to area of higher concentration of solute
 - Osmotic pressure: pressure exerted during process of osmosis

8

Fluids

- Isotonic
- Hypertonic
- Hypotonic

9

Isotonic

- Iso-osmolar
- Concentration of dissolved particles in ECF equals that of ICF
 - IV solutions with osmolality of 275-310
 - Examples
 - 0.9 NS
 - L/R

10

Hypertonic

- Hyper-osmolar
- Extracellular concentration $>$ intracellular
 - Causes water to move out of cell
 - Cell dehydrates, ECF volume expands
 - Osmolarity greater than 340
 - 3% Saline
 - Dextrans 40 and 70
 - D₁₀W
 - 25% Albumin, Hetastarch.

11

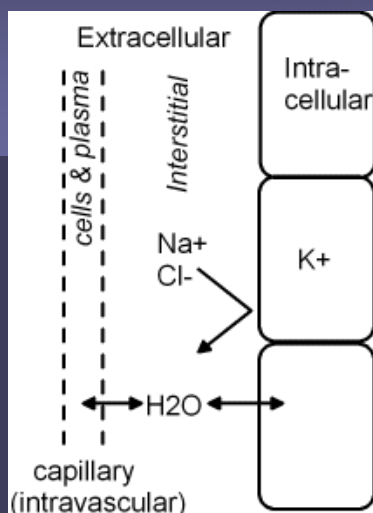
Hypotonic

- Hypo-osmolar
- Extracellular concentration $<$ intracellular
- Water moves into cells
- Osmolality less than 240
- Example: 0.45NS
- Should not be used with cerebral edema or increased ICP



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Regulation



- Most cells are very permeable to water
- Extracellular fluid volume is determined by Na⁺; water “follows” sodium
- Movement between intracellular and extracellular fluid is determined by osmolar concentration

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Table 1: Principal Electrolytes of the Body Fluids

extracellular fluid*		intracellular fluid†	
Cations (+ electrical charge)			
Sodium (Na ⁺)	142 mEq/l ‡	sodium (Na ⁺)	10 mEq/l
Potassium (K ⁺)	4 mEq/l	potassium (K ⁺)	160 mEq/l
Calcium (Ca ²⁺)	5 mEq/l	magnesium (Mg ²⁺)	35 mEq/l
Magnesium (Mg ²⁺)	3 mEq/l		
Total	154 mEq/l	total	205 mEq/l
Anions (– electrical charge)			
Chloride (Cl [–])	103 mEq/l	chloride (Cl [–])	2 mEq/l
Bicarbonate (HCO ₃ [–])	27 mEq/l	bicarbonate (HCO ₃ [–])	8 mEq/l
Phosphate (PO ₄ ^{3–})	2 mEq/l	phosphate (PO ₄ ^{3–})	140 mEq/l
Sulfate (SO ₄ ^{2–})	1 mEq/l		
Protein	16 mEq/l		
Organic acid	5 mEq/l	protein	55 mEq/l
Total	154 mEq/l	total	205 mEq/l

*Approximate values in the blood plasma. †Approximate values for the muscle cells. ‡mEq/l = milliequivalents per litre.

14

Volume Imbalances

- ECF volume deficit: hypovolemia
- ECF volume excess: hypervolemia
- Fluid spacing: body water distribution
- Third spacing

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Hypovolemia

- Water and electrolytes are lost in an isotonic manner
- Dehydration = loss of water, leaving excess sodium
- Causes: GI fluids, urine, fever, sweating, decreased intake, third space shift
- Signs: Output > Intake, weight loss of > 0.5kg/day, postural hypotension, tachy, weak pulse, flat veins, decreased CO
- Treatment: Replacement of fluids, prompt treatment to prevent acute tubular necrosis, use caution in replacement as not to overload

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Hypervolemia

- Abnormal retention of water and sodium in ECF
- Secondary to an increase in the total body sodium content = increase in total body water
- Causes: overloading fluids, diminished fx of homeostatic functions, renal/liver failure, CHF, steroid use, ingestion of sodium
- Signs: weight gain, peripheral edema, JVC/distended veins, crackles/rales, decreased BUN and Hct, pulmonary edema
- Treatment: Diuretics, restriction of fluid, stop infusion of sodium. Cautious fluid replacement in very young and old.

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Third Spacing

- Third spaces are extracellular body spaces in which fluid is not present normally in large amounts.
- Fluid is physiologically useless
- Locations:
 - Tissue spaces- edema
 - Abdomen – ascites
 - Pleural spaces
 - Pericardial space
- Causes:
 - Injury / inflammation –ex. trauma, burns, cancer, intestinal obstruction
 - Malnutrition and liver impairment
 - High vascular hydrostatic pressure – ex. heart failure, renal failure

18

Fluid replacement

- Crystalloids –solutions that restore circulating blood volume and electrolytes. Ex. NS, L/R
 - Operative replacement – 1-2L. To rehydrate after NPO, and replace surgical and insensible losses.
- Colloids- solutions that raise oncotic pressure in the ECF.
 - Synthetic fluids-Hetastarch, Dextran
 - Albumin
 - Blood products

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Labs

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Sodium

- Na^+ - Normal 135-145 mEq/l
- Reflects osmolality of blood



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Hyponatremia

- Hyponatremia < 135 mEq/l
- Causes: excess water, loss of Na^+ , adrenal insufficiency, tap water enemas, NG suction
- Signs: N&V, malaise, confusion, cramps, weakness SIADH, TURP, trans cervical resection
- Treatment: restrict fluids, diuretics, use saline or hypertonic fluid as replacement

22

Hypernatremia

- $\text{Na}^+ > 145 \text{ mEq/l}$
- Excess salt, increase blood osmolarity
- Causes: water loss, hyperaldosteronism, diabetes insipidus, renal concentration disorders, fever
- Signs: Neuromuscular changes, thirst, lethargy, confusion
- Treatment: Monitor sodium, osmolality, I&O, neuro assessment, replace volume

23



Potassium

- Normal $\text{K}^+ = 3.5 - 5.0 \text{ mEq/l}$
- Potassium is primarily intracellular
 - Maintains osmotic pressure inside cell, electrical potential, acid/base balance, and participates in metabolism
- Serum values do not reflect body stores
- Insulin promotes entry of K^+ into cells
- Acquired in diet, excreted in urine



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Hypokalemia

- Hypokalemia < 3.5 mEq/L
- Causes: decreased intake, diuretic use, increased loss, corticosteroid use, vomiting, laxative abuse, excessive insulin use for DKA, alkalosis
- Signs: EKG- depressed ST, flat or inverted T, PVC's, flaccid muscles, hypoventilation
- Treatment: replace potassium (oral best) and consider potassium sparing diuretic. Never administer IV more than 60mEq/l or 10mEq/hr. Infuse replacement with IV pump.

25

Hyperkalemia

- Hyperkalemia > 5.0 mEq/L create acidosis
- Affects buffer system and glycogen, muscle contractility, and normal kidney function
- Causes: renal failure, potassium intake, rapid infusion, stored blood product, cellular breakdown including trauma, burns, starvation, rhabdomyolysis, acidosis, sepsis
- Signs: abdominal distension, ileus, flaccid paralysis, bradycardia, N&V, peaked T wave, flattened P wave
- Treatment: dialysis, kayexalate, insulin and glucose

26

Calcium

- Calcium plays a role in:
 - Blood coagulation
 - Activation of clotting
 - Strong bones and teeth
 - Transmission of nerve impulses
 - Contractility of cardiac muscle- pacemaker
 - Integrity of cell membrane

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Calcium (cont.)

- Parathyroid hormone promotes transfer of calcium from bone to plasma
- Calcitonin promotes transfer of calcium from plasma to bone
- Vit D deficiency will lead to hypocalcemia

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Hypocalcemia

- Hypocalcemia < 8.5 mg/dl
- Causes: diarrhea, diuretics, hyperphosphatemia, malabsorption, Vit D deficiency, hypoparathyroidism, pancreatitis, administration of banked blood
- Signs: lethargy, muscle tremors, bronchospasm, laryngeal spasm, dysrhythmias, tetany, prolonged QT interval, Chvostek's sign (tap over ear and watch side of face for tremor, twitch of the lip or nose), Trousseau's sign (inflate BP cuff on arm above patient's BP and watch their hand or fingers tremble)

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Hypocalcemia (cont.)

- Treatment: Cardiac monitoring, correction of calcium level (oral better than IV), seizure precautions, Vit D, monitor EKG during tx
- Tip: Alkalosis can lead to hypocalcemia

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Hypercalcemia

- Hypercalcemia > 10.5 mg/dl
- Causes: hyperparathyroidism, Paget's disease, excessive Vit D intake, bedrest, alkalosis
- Signs: anorexia, N&V, coma, flaccid muscles, ventricular arrhythmias and cardiac arrest
- Treatment: Fluids and lasix, oral and IV phosphate, infusion of diuretics or corticosteroids

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Magnesium

- Magnesium is in abundance in ICF
- Plays a major role in cell integrity
- Important in protein and carbohydrate metabolism- all cells need energy to work!
- May stabilize irritable cardiac cells, ↑ cardiac tone
- Vasodilating effect: improve coronary blood flow
- Facilitates Na and K transport across cell
- Influences Ca levels: affects parathyroid secretion

32

Hypomagnesium

- Hypomagnesium < 1.5 mEq/l
- Causes: Insufficient intake-starvation, malabsorption-Crohn's, GI losses; increased secretion- diuretics; ICF movement of Mg^{+2} -hyperglycemia, insulin administration, sepsis, alkalosis. Also hypocalcemia
- Signs: muscle weakness, increased reflexes, anorexia, confusion, seizures, +Chvostek's sign, + Trousseau's sign, tachycardia, enhanced digitalis effect

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Hypomagnesium (cont.)

- Treatment: dietary magnesium replacement, consider calcium replacement, correct hypomagnesium first, then hypokalemia (if low potassium also)
- *IV magnesium acts as a vasodilator (expect flushing and hypotension) Replacement IVPB of Mg^{+2} 2gms in 50 cc NS, on pump over one hour.



Bottled water has the magnesium removed!

34

Hypermagnesium

- Hypermagnesium > 2.5 mEq/l
- Causes: renal failure, adrenal insufficiency, excess intake of magnesium containing meds (laxatives, antacids), acidotic conditions, hypercalcemia
- Signs: lethargy, coma, depressed respirations, bradycardia, decreased deep tendon reflexes
- Treatment: volume and diuretics, dialysis, mechanical ventilation, temporary pacemaker

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Phosphate

- Phosphorus is important part of all body tissue
- Marked diurnal variation- single measurement are of little use- draw at same time each day
- Stored intracellularly
- Cleared by the kidney

36

Hypophosphatemia

- Causes: refeeding after severe malnutrition, calcium and magnesium deficiency, acute respiratory disorders, alcoholism, DKA, insulin administration
- Signs: hemolysis, bleeding, anemia, muscle pain and weakness, respiratory muscle weakness, LOC and paresthesias
- Treatment: treat primary disorder, nutrition, oral or IV replacement

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Hyperphosphatemia

- Causes: renal failure, high PO_4 intake, chemotherapy, lactic acidosis
- Signs: most often asymptomatic, numbness, tingling of hands or mouth, muscle spasms
- Treatment: treat underlying disorder, amphogel (phosphate-binding agent), IV fluids, D50 and insulin, dialysis

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SODIUM SLIDE

- Changes in sodium usually mean a change in water balance.
- Associated with neuromuscular disturbances, confusion
- The answer will probably be volume related
- Treatment depends on severity
- Be careful with hypertonic (3%) Saline

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Calcium Clues:

- Calcium think clotting cascade
- Calcium think Chvostek-Trousseau
- Calcium think central, like hypoparathyroidism, liver, renal, as opposed to heart for k and neuro for NA.
- Calcium think cardiac pacemaker

40

Potassium Pearls

- Know that **low K** causes depressed ST, flat or inverted T waves
- Know that **low K** causes ventricular ectopy (PVCs) and increases risk of digoxin toxicity
- Know that **high K** causes High peaked t waves and flattened p waves
- Know that **High K** treatment is dialysis, kayexalate, insulin and glucose (any or all these)

41

Hematology Components

- WBC
- RBC
- Hemoglobin
- Hematocrit
- Platelets
- Reticulocyte Count

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Normal Lab Values

- WBC: 5000 to 10,000/ul
- RBC:
 - Male: 4.5 to 6.2 million per microliter
 - Female: 4 to 5.5 million per microliter
- Hemoglobin (Hg):
 - Male: 14 to 18 g/dl
 - Female: 12 to 16 g/dl

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Normal Lab Values (cont.)

- Hematocrit (Hct):
 - Male: 40% to 52%
 - Female: 37% to 47%
- Platelet Count: 100,000 to 400,000/ul
- Reticulocyte Count: 0.2% to 2%

44

WBC Elevations

- Basophils: Chronic inflammatory states
- Eosinophils: Allergic reactions
- Monocytes: Phagocytosis, chronic inflammation
- Lymphocytes: Viral infection
- Neutrophils: Bacterial infection- shift to the left which means that more bands than segs

45

RBC

- Rule of threes:
 - $\text{RBC} \times 3 = \text{Hb}$
 - $\text{Hb} \times 3 = \text{Hct}$
- Anemia:
 - Insufficient production of RBCs
 - Destruction of RBCs
- $\text{Hb} \times 3 > \text{Hct} =$ overhydration
- $\text{Hb} \times 3 < \text{Hct} =$ dehydration

46

Polycythemia

- Affects males more often
- Signs: Headache, visual disturbances, dizziness, weakness, fatigue, angina, hypertension
- Risks:
 - Dehydration
 - Overproduction: smoking, lung disease, high altitude, renal or liver cancer
 - Produces sluggish blood flow and clotting

47

Thrombocytopenia

- Too many platelets removed from blood or too low of platelet production in the bone marrow
- Causes: Autoimmune, alcoholism, DIC, hypothermia, anemia, leukemia
- Diagnostics: Gross bleeding (GI, IV sites, petechiae) Occult bleeding
- Treatment: correct the underlying cause of bleeding, corticosteroid therapy, platelet transfusion

48

Anemia

- Acute causes: Surgery, trauma, GI bleed
- Chronic causes: Menorrhagia, GI hemorrhage, Endocrine disorders (Addison's disease, myxedema, hypothyroidism) Renal disease, Hepatic disorders (alcohol cirrhosis, drug-induced liver disease) cancer, chronic infection, inflammatory states

49

Aplastic and Hypoplastic Anemia

- Causes: Radiation exposure, infection (viral and bacterial), metabolic (pregnancy, pancreatitis), drugs/chemicals (benzene, chloramphenicol, phenylbutazone)
- Signs: Gradual onset occurring at any age, weakness and fatigue, dyspnea on exertion, abnormal skin and mucosal bleeding, pallor of skin and mucous membranes

50

Other Anemias

- Vitamin B12 deficiency
- Folic Acid deficiency
- Iron deficiency
- Hereditary spherocytosis
- Sickle cell anemia

51

Postanesthesia Nursing Care of the Anemic Patient

- Acute loss may cause more hemodynamic instability than chronic anemia – hgb 9-10 is desired
- Provide O2 to maximize oxygenation
- Elevate HOB and provided pain meds to ensure lung expansion
- Change position slowly to decrease orthostatic hypotension
- Monitor lab results
- Maintain IV-administer crystalloid, colloid if necessary
- Transfuse as per hospital protocol
- Avoid hypothermia

52

Disseminated Intravascular Coagulation (DIC)

- Acquired pathologic bleeding syndrome
- Spontaneous activation of coagulation cascade
- Always a response to an underlying problem:
 - Obstetric, surgery, cancer, disease states, infection, shock states

53

DIC (cont.)

- Signs: diffuse bleeding from multiple sites, oozing from venipuncture, mucosal bleeding (nose and gums), petechiae, hematuria
- Labs: Platelet $<100,000$, bleeding time normal to \downarrow , PT and PTT \uparrow , fibrinogen decreased, fibrinopeptide A increased

54

Nursing Care for the Patient With DIC

- Maintain patent IV line (at least a 20g) for blood or blood products
- Administer all meds via IV route
- Avoid unnecessary repeated venipunctures
- Provide adequate pressure to puncture sites
- Pad side rails
- Monitor labs

55

Blood Transfusion Therapy

- Four major blood groups:
 - A, B, AB, and O
- Two Rh types: Rh antigen carried on red cell surface
 - D antigen present: Rh+ (85% people)
 - D antigen absent: Rh- (15% people)

56

Recipient and Donors

- A: A or O packed cells
- B: B or O packed cells
- AB: AB or A, B, O packed cells
- O: O only

57

Common Transfusion Errors

- Improper identification of recipient blood sample
- Transfusion of blood into wrong recipient
- Cultural / Religious Considerations

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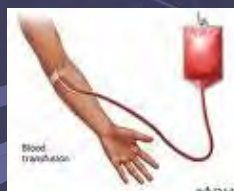
Indications for Transfusion

- Restore circulating volume
- Increase oxygen transport to tissues
- Replace coagulation factors
- Replace platelets to correct bleeding
- Replace granulocytes or treat sepsis

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Blood and Blood Components

- Whole Blood for profound bleeding –500ml. with hematocrit of 36-40%
- Packed Red Blood Cells-RBC's without plasma-250-300 ml. With hematocrit of 70-80%(restores oxygen carrying capacity)
- Washed Red Blood Cells – less chance of blood reaction
- Platelet Concentrates to restore clotting ability



60

Transfusion Reactions

- Hemolytic transfusion reaction
- Febrile transfusion reaction
- Allergic transfusion reaction
- Anaphylactic type of allergic reaction
- Circulatory overload
- Hypothermia
- Transfusion related acute lung injury(ffp, plt)

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Hemolytic Transfusion Reaction

- Causes:
 - ABO incompatibility: immediate hemolysis after first few ml of blood are infused
 - Human clerical error or pt's blood not ID
- Signs:
 - Burning sensation, temperature increases, chills, patient becomes restless, anxious, dyspneic, blood pressure decreases, pulse increases, palpitations, DIC

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Hemolytic Transfusion Reaction (cont.)

- Treatment:
 - Stop transfusion
 - Aggressive fluid management
 - IV furosemide for diuresis
 - Renal dose of dopamine to improve blood flow

63

Febrile Transfusion Reaction

- Causes: WBC or platelet antibodies, contaminating pyrogenic bacteria, pregnancy or previous transfusion
- Signs: Chills, fever, flushing, headache, tachycardia, reaction begins about 1 hr after start and may last for 8-10 hours
- Treatment: Stop transfusion, antipyretics, administer blood with microaggregate filter (traps WBC's). Give leukocyte reduced blood

64

Allergic Transfusion Reaction

- Causes: Antibodies to donor blood foreign proteins (pt often has allergy history)
- Signs: Itching, urticaria (hives)
- Treatment: Stop transfusion, assess for glottal edema, give IV antihistamine

65

Anaphylactic Type of Allergic Reaction

- Causes: Associated with transfusion of IgA to IgA-deficient recipient, occurs after a few ml of blood administration, massive histamine release
- Signs: Dyspnea, hypotension, chest pain, shock, flushing, edema, bronchospasm
- Treatment: Stop transfusion, combat hypotension, laryngeal edema, and bronchiolar constriction

66

Circulatory Overload

- Causes: Giving too much blood or too rapid an infusion rate
- Patients at risk: elderly, cardiac hx., chronic anemia, and infants
- Signs: Dry cough, chest tightness, PVCs, dyspnea, rales, tachycardia, JVD
- Treatment: Slow transfusion rate, elevate HOB 30*, furosemide, transfuse with packed cells

67

Transmission of Disease

- Hepatitis(A, B, and C)
- Bacteria
- Syphilis
- Cytomegalovirus (CMV)
- Malaria
- AIDS

68

Synthetic Solutions

- Dextran
 - Plasma expander that remains in circulation for 2-6 hours
- Hetastarch (Hespan, Hextend)
 - Plasma volume expander
 - 6% solution of starch in NS
 - Lasts about 24 hours, excreted in urine

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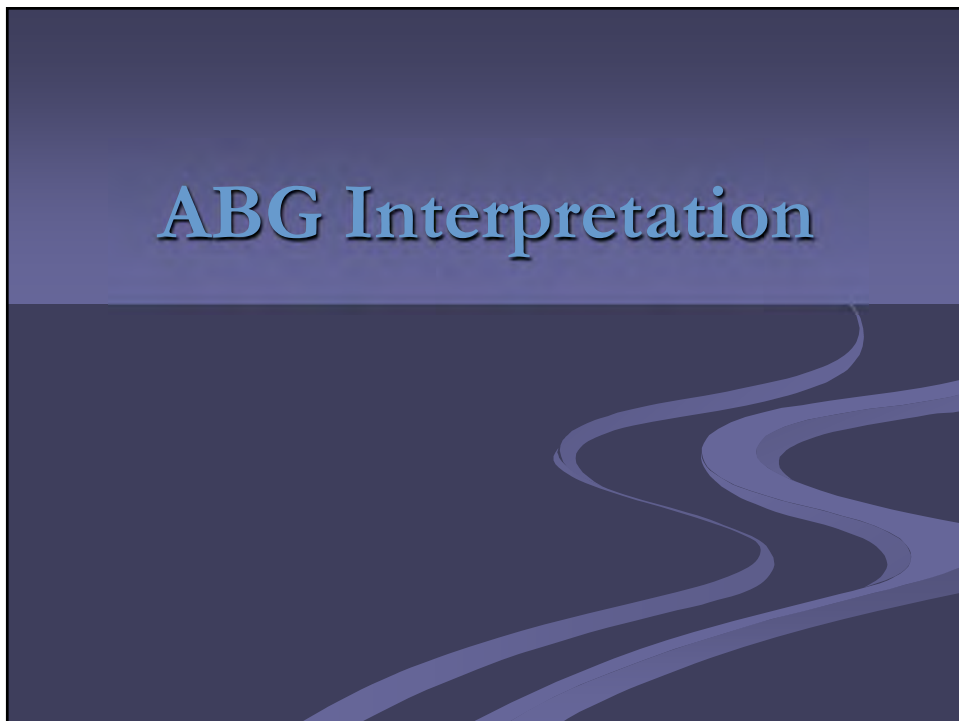
Nursing Considerations- Best Practice

- Assess lab values- hgb, hct.
- Verify order
- Assess V.S., skin color, U/O, hx. Transfusion reaction
- Use #20 Jelco at the minimum
- With another nurse, verify patient by ID bracelet, MR number, check blood product –ABO, RH donor and recipient, expiration date.
- Administer primary IV of .9% NS; never Dextrose- hemolysis of RBC.
- Remain with patient first 15-30 min. of initiation of product. Start slowly. Infuse 2-4 hours.
- Change filter every 2 units.
- Review institutional policy.

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Arterial Blood Gas

- Blood drawn from artery- radial, brachial, femoral
- It is an invasive procedure- aseptic technique
- Caution must be taken with patient on anticoagulants

73

Arterial Blood Gas Analysis

Provides information about the patient's acid-base balance, metabolic status, and respiratory status.

74

ABG Values

- pH 7.35-7.45
- PaCO₂ 35- 45 mmHg
 - Value indicates whether it is a respiratory disturbance
 - ^ PaCO₂ –acidosis
 - v PaCO₂ –alkalosis
- HCO₃ 22-26 mEq/L
 - Value indicates whether it is a metabolic disturbance
 - vHCO₃ –acidosis
 - ^HCO₃ – alkalosis
- PaO₂ 80- 100 mm.Hg.

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ABG's

- Definitions:
 - Acid- substance that releases H⁺ ion when dissolved in water
 - Base-substance that will bind to a H⁺ when dissolved in water
 - Buffer- prevents major changes in the ECF by releasing or accepting H⁺ ions
 - Chemical buffers act within seconds to neutralize acids or bases
 - Carbonic acid – bicarbonate buffer system
 - H₂CO₃ : NaHCO₃
 - 20 : 1 ratio
 - Ratio is changed if pH goes up or down

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ABG's

■ Buffer system cont

- Linked to the respiratory and renal systems
 - H_2CO_3 is respiratory component
 - $\text{H}_2\text{CO}_3 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
 - HCO_3 is the renal compensatory component; excreted by the kidneys

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ABG's

- Acidosis - pH below 7.35
 - Respiratory /Metabolic
- Alkalosis -pH is above 7.45
 - Respiratory/Metabolic
- Compensation- system not affected will compensate
 - Respiratory acidosis- kidneys – H^+ ions excreted, HCO_3 reabsorbed
 - Respiratory alkalosis – kidneys – HCO_3 excreted
 - Metabolic acidosis – lungs- hyperventilation (decrease PaCO_2)
 - Metabolic alkalosis – lungs – hypoventilate and retain CO_2

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ABG's

■ Respiratory Acidosis

■ Causes:

- COPD
- Sedation or barbiturate overdose
- Pneumonia, atelectasis
- Underventilation – anesthesia

■ ABG- pH below 7.35

- -CO₂ retained- ↑ PaCO₂
- HCO₃ ↑ with compensation

■ Compensation – kidneys excrete H⁺ or retain HCO₃

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ABG's

■ Respiratory Alkalosis

■ Causes:

- Hyperventilation – caused by hypoxia, fever, pain, anxiety, exercise
- Stimulated respiratory center – septicemia, brain injury, salicylate OD

■ Values:

- pH greater than 7.45
- ↓ PaCO₂
- ↓ HCO₃ with compensation

■ Compensation – kidneys conserve H⁺ and excrete HCO₃

80

ABG's

- Metabolic Acidosis
- Causes:
 - Diabetic ketoacidosis
 - Lactic acidosis
 - Starvation
 - Severe diarrhea
 - Renal failure
 - Shock
- Values:
 - pH - below 7.35
 - PaCO₂ – less than 35 with compensation
 - HCO₃ - less than 22
- Compensation:
 - Lungs eliminate CO₂
 - Kidneys conserve HCO₃

81

ABG's

- Metabolic Alkalosis
- Causes:
 - Severe vomiting, excessive NG suctioning
 - Diuretic therapy (loss of H⁺ ions)
 - Ingestion of antacids – NaHCO₃
- Values:
 - pH - greater than 7.45
 - PaCO₂ - greater than 45 with compensation
 - HCO₃ - greater than 26
- Compensation:
 - Lungs retain CO₂
 - Kidneys excrete HCO₃

82

ABG's

- Interpretation: Step process
- Rule:
 - Respiratory A/B disturbance- pH and pCO₂ move in opposite directions
 - Metabolic A/B disturbance- pH and HCO₃ move in same direction.

83

ABG's

- Step 1: Look at the pH
 - Below 7.35 – acidosis
 - Above 7.45 –alkalosis
- Step 2: Look at the PaCO₂ and HCO₃
 - PCO₂ below 35 – respiratory alkalosis
 - PCO₂ above 45 – respiratory acidosis
 - HCO₃ Less than 22- metabolic acidosis
 - HCO₃ Above 26 metabolic alkalosis
- Step 3: Look at the PO₂ value

84

Case study # 1

67 y/o female who had closed reduction of leg fx without incident. Four days later she experienced a sudden onset of severe chest pain and SOB. Room air ABG drawn. Pulse 100, BP 130/90, RR 25.

pH	7.36	PCO ₂	33	PO ₂	55
HCO ₃ ⁻	18	BE	-5	SaO ₂	88%

ABG interpretation: Compensated metabolic acidosis with moderate hypoxemia. Dx PE

85

Take Home Message:

- Valuable information can be gained from a ABG as to the patients physiologic condition
- Remember that ABG analysis is only part of the patient assessment
- Be systematic with your analysis, start with ABC's as always look for hypoxia (which you can usually treat quickly), then follow the 4 steps
- A quick assessment of patient oxygenation can be achieved with a pulse oximeter

86

Practice ABG's

■ pH 7.48 PCO₂ 32 PO₂ 78
 HCO₃⁻ 24 SaO₂ 85%

■ Interpretation: Respiratory Alkalosis

■ pH 7.32 PCO₂ 38 PO₂ 95
 HCO₃⁻ 19 SaO₂ 95%

■ Interpretation: Metabolic Acidosis

87

Practice ABG's

■ pH 7.30 PCO₂ 40 PO₂ 95
 HCO₃⁻ 18 SaO₂ 100%

■ Interpretation: Metabolic Acidosis

■ pH 7.36 PCO₂ 48 PO₂ 87
 HCO₃⁻ 27 SaO₂ 94%

■ Interpretation: Compensated Respiratory Acidosis

88

More Practice

1. pH 7.49 PCO₂ 40 PO₂ 99 HCO₃⁻ 30 SaO₂ 99%
2. pH 7.35 PCO₂ 48 PO₂ 91 HCO₃⁻ 27 SaO₂ 91%
3. pH 7.45 PCO₂ 46 PO₂ 62 HCO₃⁻ 29 SaO₂ 97%
4. pH 7.31 PCO₂ 38 PO₂ 93 HCO₃⁻ 15 SaO₂ 99%
5. pH 7.30 PCO₂ 46 PO₂ 95 HCO₃⁻ 24 SaO₂ 89%
6. pH 7.48 PCO₂ 40 PO₂ 110 HCO₃⁻ 30 SaO₂ 100%

89

Answers

1. 7.49 PCO₂ 40 PO₂ 99 HCO₃⁻ 30 SaO₂ 99%
Metabolic alkalosis
2. pH 7.35 PCO₂ 48 PO₂ 91 HCO₃⁻ 27 SaO₂ 91%
compensated respiratory acidosis
3. pH 7.45 PCO₂ 46 PO₂ 62 HCO₃⁻ 29 SaO₂ 97%
compensated metabolic alkalosis
4. pH 7.31 PCO₂ 38 PO₂ 93 HCO₃⁻ 15 SaO₂ 99%
metabolic acidosis
5. pH 7.30 PCO₂ 46 PO₂ 95 HCO₃⁻ 24 SaO₂ 89%
respiratory acidosis
6. pH 7.48 PCO₂ 40 PO₂ 110 HCO₃⁻ 30 SaO₂ **100%**
metabolic alkalosis

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Practice Question #1

The following ABG values are reported within 10 minutes of a patient's arrival in the PACU:

pH 7.3 pCO₂ 50 HCO₃⁻ 24 pO₂ 92:

The findings indicate

- A. Respiratory alkalosis
- B. Respiratory acidosis
- C. Metabolic alkalosis
- D. Metabolic acidosis

91

Practice Question #2

The most common cause of the ABG value is:

- A. Prerenal congestion
- B. Nasogastric suctioning
- C. Sedative hypoventilation
- D. Pulmonary edema

92

THAT'S

ALL

FOLKS

See you tomorrow at 0730!!

We will start promptly at 0800.

AN OVERVIEW OF ANESTHESIA TECHNIQUES AND BLOCKS

Meg Suermondt, RN, CCRN, CPAN

1

Objective

- ▣ Describe anesthetic techniques and blocks related to patient care in the PeriAnesthesia Setting

2

Types of Anesthesia Blocks



- ▣ Local
- ▣ Nerve block
- ▣ Bier block
- ▣ Spinal
- ▣ Epidural
- ▣ Caudal

3

Regional Anesthesia

- ▣ Goal- to produce a loss of sensation and/or motor function in a specific extremity or area of the body
- ▣ Routes of administration:
 - Topical
 - Local infiltration
 - IV regional block (Bier)
 - Peripheral nerve block
 - Central nerve block

4

Local Anesthetics

- ▣ Mechanism of action:
 - Impairs conduction of nerve impulses along nerve fibers
 - Alters cell membrane permeability to Na^+ ions
 - Drug diffuses into cell, attaches to site near sodium channel
 - Sodium channel maintained in a closed position: slows depolarization, blocks conduction

5

Local Anesthesia (cont.)

- | | |
|--|---|
| <ul style="list-style-type: none">▣ Advantages<ul style="list-style-type: none">▪ Post op analgesia at site▪ Safe for patients with systemic disease▪ Fewer side effects (PONV, sedation, resp depression) | <ul style="list-style-type: none">▣ Disadvantages<ul style="list-style-type: none">▪ Toxicity▪ Allergic reaction▪ Injection hurts▪ Inadvertent IV infiltration |
|--|---|

6

Complications

- ▣ Three Major types
 - Local Anesthetic toxicity
 - Allergic reaction
 - Methemoglobinemia

7

Toxicity

- ▣ Causes: excessive dose or injection into very vascular area
- ▣ Most common with interscalene, Axillary and epidurals, more in women, 45% of incidences are in folks less than 16 or older than 60
- ▣ Reactions:
 - CV: mild to severe
 - ▣ HTN, tachycardia
 - ▣ Decreased CO, mild hypotension
 - ▣ Peripheral vasodilation, hypotension, bradycardia, circulatory collapse

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Toxicity (cont.)

- ▣ CNS: mild progressing to severe
 - Tingling around mouth, cannot feel tongue
 - Dizziness, drowsiness, confusion, tinnitus
 - Tremors of face, extremities, tonic-clonic seizures
 - Unconsciousness, respiratory arrest

Most occur in 5 minutes, but can occur 30 minutes after injection, or longer if it's an epidural or peripheral nerve catheter.

9

Toxicity, continued

- ▣ Treatment:
 - Support ABCs, CPR and ACLS
 - Benzodiazepine for Seizures
 - Lipid Emulsion Therapy:
 - ▣ Initial bolus of 20% Lipids in a dose of 1.5ml/kg rapidly over 1 minute followed by a continuous infusion of 0.25ml/kg/min, can be increased to 0.5ml/kg/min. Continue for at least 10 minutes after stabilization.

10

Allergic reactions

- ▣ Allergy to esters more than Amides (PABA)
- ▣ May be related to preservatives
- ▣ Cross sensitivity of PABA with Sulfa

- ▣ Signs: rash, pruritus, laryngeal edema, hypotension, bronchospasm, shock and collapse

- ▣ Treatment: Epinephrine, antihistamines, oxygen, fluids support

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Local Anesthesia (cont.)

- ▣ Amides
 - Prilocaine, lidocaine, mepivacaine, bupivacaine, etidocaine, ropivacaine
 - Metabolized in liver
- ▣ Esters
 - Procaine (Novacaine), cocaine, chlorprocaine, tetracaine
 - Hydrolyzed by plasma cholinesterase
 - Metabolite- PABA- more common allergic reactions
 - ▣ Sulfonamides...similar to PABA, methyl- and propyl-paraben preservatives

12

Methemoglobinemia

- ▣ Occurs most commonly with Benzocaine, can occur with prilocaine, lidocaine and tetracaine.
 - ▣ Altered form of hemoglobin .. can't carry O₂
 - ▣ Cooximetry is diagnostic
 - ▣ Signs:
 - Pulse ox persistent 0-85%, cyanosis, headache, chocolate colored blood, tachycardia, dyspnea, seizures
- Treatment: support, plus methylene blue 1-2mg/kg over 5 minutes repeated hourly up to 7ml/kg

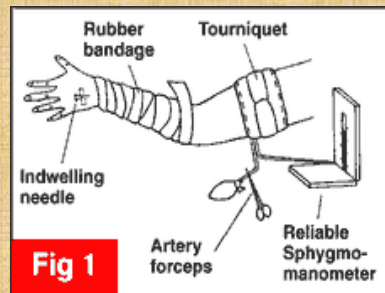
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Altering Local Anesthetics

- ▣ Adding epinephrine can increase duration by 50%
- ▣ Sodium bicarb alters the pH, decreasing pain at injection site but it can reduce the onset of action
- ▣ Watch for HR or BP changes

14

Bier Block



15

Bier Block

- ❑ Injection of large volumes of dilute local anesthesia
- ❑ Indicated for procedures of forearm or hand
- ❑ Complication: premature deflation of tourniquet cuff

16

Pain Management

- ▣ Nerve blocks
 - plexus, trunk, blocks of upper and lower extremities, head, neck, and airway
- ▣ Epidural
- ▣ Spinal

17

Retrobulbar Block

- ▣ Blocks sensation of eye and motor movement of eye
- ▣ Complications:
 - Ruptured globe
 - Inadvertent infiltration
 - Ruptured artery

18

Peripheral Nerve Block

- ▣ Cervical plexus
- ▣ Brachial plexus:
 - Interscalene
 - Supraclavicular
 - Axillary
- ▣ Intercostal
- ▣ Femoral

19

Equipment Needed



20

Cervical Plexus

- ▣ Blocks area around the neck
- ▣ Common use in carotid endarterectomy
- ▣ Complications:
 - Injury to vertebral artery
 - Paralysis of diaphragm due to phrenic nerve block
 - Hoarseness from laryngeal nerve block
 - Inadvertent subarachnoid or epidural block

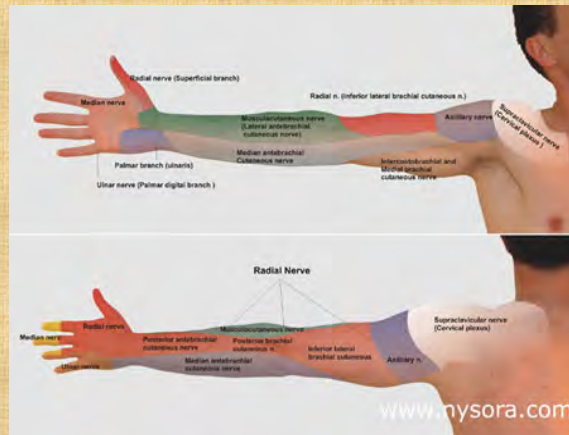
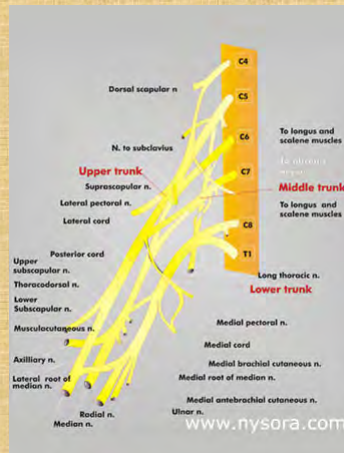
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Brachial Plexus Blocks

- ▣ Blocks arm from shoulder down
- ▣ Used for upper extremity surgery
- ▣ Complications:
 - Horner's syndrome: (nerve damage) ptosis, miosis, nasal congestion, vasodilation, increased skin temp
 - Unilateral phrenic and laryngeal nerve block
 - Vertebral artery injection
 - High spinal or epidural

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Brachial Plexus Blocks



24

Supraclavicular Block

- Provides anesthesia for the whole arm up to the shoulder, except the inside of the upper third of the upper arm
- Complications:
 - Pneumothorax
 - Subclavian artery puncture

25

Supraclavicular Block



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Axillary Block

- ▣ Blocks median, radial and ulnar nerves
- ▣ Used for hand, forearm and elbow procedures
- ▣ Complications:
 - Intravenous injection
 - Hematoma if artery punctured
 - Contraindicated if patient has infected glands or if the arm cannot be abducted to 90° at the shoulder joint

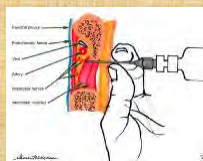
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Intercostal Block

- ▣ Indicated for some thoracic surgery, fractured ribs, and for neurolytic blocks for cancer
- ▣ Complications:
 - Pneumothorax
 - Intravenous injection
 - Toxicity related to rapid uptake by intercostals

28

Intercostal Block



29

Other blocks

- ▣ sciatic
- ▣ Femoral (put a sign on the bed!)
- ▣ Popliteal
- ▣ Ankle
- ▣ TAP block (transversus Abdominus plane)
 - T6-L1, anterior abd wall, useful for many abd and gyn procedures

30

Neuroaxial blocks

- ▣ Come to term with terms:
 - Neuroaxial block is a catch all term for epidurals, spinals and caudal blocks
 - Tuffier's Line : an imaginary line drawn across the iliac crests approximates L3-L4 interspace
 - High spinal: excessive spread of local anesthetic which leads to apnea, loss of consciousness and hypotension
 - Dermatome levels: horizontal 1-2 inch bands of innervation by the spinal roots, used to assess levels of neuroaxial blockade.

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Spinal or Subarachnoid Block

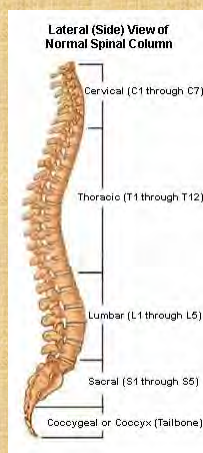
- ▣ Suitable for abdominal, pelvic, or lower limb surgery
- ▣ Order of block:
 - Autonomic (hypotension)
 - Sense of temperature
 - Pain
 - Touch
 - Movement
 - Proprioception (sense of body location)

Block resolves in reverse , starting with proprioception



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Spinal Block Landmarks



- ▣ T4: Nipple line
- ▣ T6: Xyphoid
- ▣ T10: Umbilicus
- ▣ T12: Top of iliac crest
- ▣ L1: Groin
- ▣ L4: Knees

33

Spinal Block

- ▣ Injected at L2-L3 interspace
- ▣ Intrathecal or Subarachnoid space
- ▣ Drug mixes with CSF, acts on nerve roots and part of spinal cord
- ▣ Block height can be manipulated
 - Baricity..hypo, iso, or hyper

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Spinal Solutions

- ▣ Hypobaric
 - Lighter than CSF
 - Mixed with sterile distilled water
 - Often used in total hip, perineal, rectal procedures
- ▣ Isobaric
 - Stays in specific area (useful for specif area like lower extrem or fx hip)
 - Mixed with CSF
 - S/G (same as CSF) 1.003-1.009
- ▣ Hyperbaric
 - Heavier than csf
 - Most frequently used
 - Mixed with dextrose
 - settles in dependent aspect of subarachnoid space

35

Altering spinal solutions

- ▣ Lidocaine: Rapid onset, duration 1-2 hours
- ▣ Bupivacaine: Slow onset, duration 2-4 hours
- ▣ Ropivacaine: Rapid onset, duration 4-6 hours
- ▣ Tetracaine: Slow onset, duration 2-4 hours

36

Dermatome Assessment

- ▣ Phase I for symptom management
- ▣ Phase II for DC criteria
- ▣ Like surface to like surface

37

Assessing Spinal Blocks

- ▣ Total Spinal: respiratory arrest
- ▣ T3: Carotid bodies in aortic arch- unable to compensate by changing HR to augment BP
- ▣ T4: Intercostal muscles

- ▣ Caution! Hematoma! Recovery is poor if evacuation is delayed. Must get to the point of neuro exam of legs!

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Spinal Complications

- ▣ Hematoma
- ▣ Infection
- ▣ Cardiac arrest
- ▣ Urinary retention
- ▣ Spinal headache
 - Blood patch is treatment of choice
 - Immediate relief

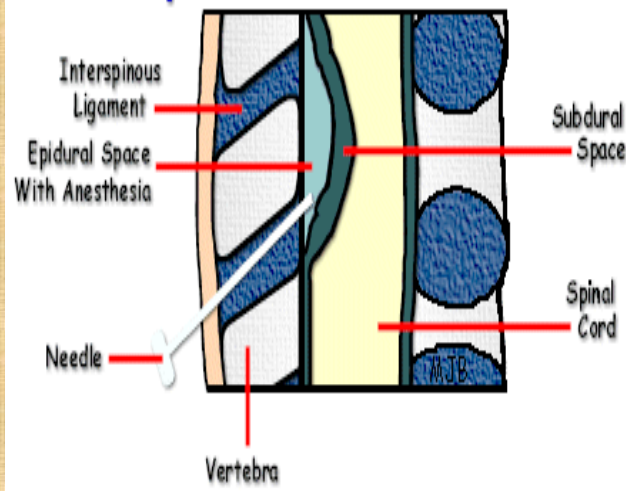
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Epidural

- ▣ Types:
 - Single injection
 - Repetitive bolus injections
 - Continuous infusion
- ▣ Anesthesia Produced:
 - Nerve root
 - Spinal cord
 - Paravertebral nerve

40

Epidural Anesthesia



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Epidural Solutions

- ▣ Anesthetic such as ropivacaine, and an opioid, typically morphine
- ▣ Precautions: after single narcotic injection, make sure there are spinal precautions. Most don't want any narcotic given except by anesthesia.

42

Spinal v. Epidural

SPINAL

- ▣ Injected in subarachnoid space
- ▣ Nerve roots are blocked as they pass thru csf
- ▣ Site is lower lumbar below the termination of spinal cord
- ▣ Dose is small
- ▣ Given by needle
- ▣ Can't repeat dose

EPIDURAL

- ▣ Catheter placed in epidural space
- ▣ Nerve roots are blocked outside the csf
- ▣ Site is lumbar or thoracic area
- ▣ Dose is large
- ▣ Given thru catheter
- ▣ Dose is repeatable, pain management (PCA)

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Caudal Anesthesia

- ▣ Injected into sacral canal below dural sac
- ▣ Useful for procedures of the groin, perineum, lower extremity
- ▣ More popular use in pediatrics and during labor

Anesthesia Agents, Drugs and Adjuncts

Meg Suermondt, RN, CCRN, CPAN, CAPA

1

Objective

- Discuss anesthetic agents, drugs, and adjuncts used pre-, intra-, and postoperatively

2

American Society of Anesthesiologists (ASA) Physical Status Classes

- Developed by the ASA and an indication of the overall complexity of the patient's medical condition
- Assigned by the anesthesiologist prior to the procedure after completing the H&P
- Tied directly to reimbursement

3

ASA Classes

- ASA 1- Normal, healthy patient
- ASA 2- Mild, systemic disease
 - Chronic bronchitis, moderate obesity, mild HTN
- ASA 3- Severe, systemic disease that limits activity but is not incapacitating
 - Coronary artery disease with angina

4

ASA Classes (cont.)

- ASA 4- Incapacitating systemic disease that is a constant threat to life
 - Organic heart disease with marked cardiac insufficiency, persistent angina, advanced pulmonary, renal, hepatic or endocrine insufficiency
- ASA 5- Patient is not expected to survive within 24 hours without surgery

5

ASA Classes (cont.)

- ASA 6- Patient meeting brain death criteria and is an organ donor
- "E"- Emergency patient

6

Factors in Selecting the Type of Anesthesia

- Age
- Physical status
- Type of surgery
- Skill and requirement of the surgeon
- Past surgical and medical history
- Patient's wish/desire/knowledge
- Teaching purposes
- Presence of fire and explosive dangers
- Emergency/ trauma
- Site of surgery/body position

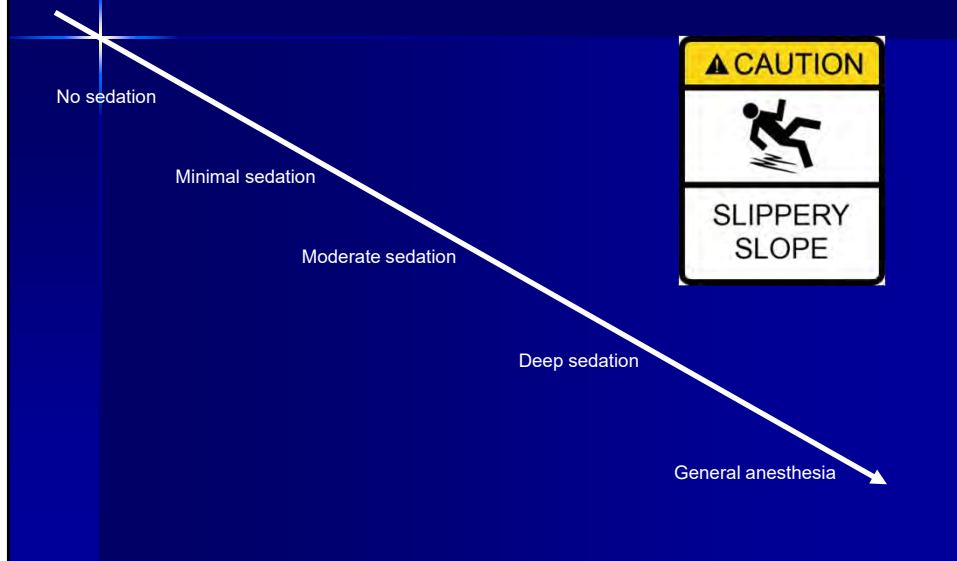
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Anesthesia Consciousness

- Consider anesthesia as a continuum from an awake conscious state to an unconscious state

8

Levels of Sedation



9

Sedation Levels

- No sedation
 - Patient is awake
- Minimal sedation
 - Patient remains conscious
 - Responds normally to verbal commands
 - Ventilatory and CV functions unaffected

10

Sedation Levels (cont.)

- Moderate sedation and analgesia or MAC
 - Depressed LOC
 - Patient maintains patent airway
 - CV function maintained
- Deep sedation and analgesia
 - Patient is asleep
 - Responds to repeated and painful stimuli
 - Assistance required for patent airway
 - CV function is usually maintained

11

Sedation Levels (cont.)

- General anesthesia
 - Patient is not arousable
 - Impaired ability to maintain ventilatory fx
 - Assistance needed to maintain patent airway
 - CV function may be impaired

12

Types of Anesthesia

- General
 - State of unconsciousness where protective reflexes are lost, and muscle relaxation, amnesia and analgesia are obtained
- Monitored Anesthesia Care (MAC)
 - Relaxed, non-paralyzed state of analgesia and sedation



13

Types of Anesthesia (cont.)

- Regional
 - Injecting local anesthetic into a specific region using special techniques in order to block pain receptors
 - Anesthesiologist usually administers/ places regional anesthesia
- Local
 - Surgeon usually injects local

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Stages of General Anesthesia

- Stage I: Anesthesia and Amnesia
- Stage II: Delirium
- Stage III: Surgical Anesthesia
- Stage IV: Cessation of Respiration to Circulatory Collapse

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Stage I: Anesthesia and Amnesia

- Begins with initiation of anesthesia
- Ends with loss of consciousness
- Patient can follow simple commands
- Protective reflexes remain intact

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Stage II: Delirium

- Begins with loss of consciousness
- Ends with disappearance of lid reflex
- Respirations irregular
- May be passed through quickly with newer anesthetic agents
- High risk of aspiration, laryngospasm, bronchospasm

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Stage III: Surgical Anesthesia

- Cessation of spontaneous respirations
- Absence of eyelash response, blink, and swallowing reflexes
- Airway management essential

18

Stage IV: Cessation of Respiration to Circulatory Collapse

- Considered overdose of anesthetic



19

Recovery and Emergence

- Occurs in reverse order of induction
 - Surgical Anesthesia
 - Delirium
 - Anesthesia and Amnesia
- Influenced by
 - Duration of anesthesia
 - Use of other drugs
 - Physical status of patient

20

The Perfect Agent

- Rapid onset of action
- Controllable duration of action
- Identifiable levels or depths
- Ease of administration
- No untoward effects on VS
- No toxic metabolites
- Predictable elimination
- High specificity of action
- High margin of safety
- Useful with all ages

21

General Anesthesia Common Anesthetic Agents

- Preanesthesia sedation
- Induction agents
- Inhalation agents
- Muscle relaxants
- Reversal agents
- Opioids
- Adjuncts



22

Preanesthesia Sedation

23

Benzodiazepines

- Commonly used:
 - Midazolam (Versed), Diazepam (Valium), lorazepam (Ativan)
- Uses:
 - Pre-medication for surgery, induction of general anesthesia, sedation during local and regional anesthesia, post op anxiety and agitation, no analgesic properties
- Antagonist: flumazenil (Romazicon)

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Midazolam (VERSED)

- 3 times as potent as diazepam
- Onset: Rapid, peak in 10-30 min
- Duration: 1-4 hr
- Used as premed, endo, induction, intraop as adjunct to inhalation
- Sedation with regional anesthesia
- Reduction in anxiety and profound amnesia

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Midazolam (cont.)

- Use with caution in MI and COPD
- Increases uptake of CO₂
- No effect on ICP
- Decrease dose in elderly
- Hypnotic, anticonvulsant, muscle relaxant properties

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Diazepam (VALIUM)

- Premed, adjunct, induction agent
- Sedation for local or regional anesthesia
- Amnesia up to 48 hours
- Degree of respiratory depression increases with use of opioids
- Muscle relaxant properties

27

Diazepam (cont.)

- Antagonist to depolarizing muscle relaxant (succinylcholine) and non-depolarizing such as pancuronium, gallamine
- Useful for psychomotor and petit mal seizures
- Painful IM or IV injection
- Don't mix or dilute
- Long half-life

28

Lorazepam (ATIVAN)

- Long-acting (ventilator protocol)
- Onset: 20-40 minutes
- Duration: 8 hours
- Profound amnesia, reduction in anxiety
- Good CV & respiratory stability

29

Benzodiazepine Antagonist

- Flumazenil (ROMAZICON)

Wake Up!



30

Flumazenil (ROMAZICON)

- Dose: 0.1mg increments to max of 1mg
- Reverses
 - Sedation, muscle relaxant, amnesia, anxiolytic action, anticonvulsant effects, ataxia
- Antagonizes effects of benzodiazepines
- Does not reverse barbiturates, opioids and ethanol

31

Flumazenil (ROMAZICON) (cont.)

- Caution with history of seizure or chronic benzodiazepine use
- Not effective for hypoventilation and respiratory failure
- Shorter duration than benzodiazepines; watch for resedation

32

Induction Agents

33

Induction Agents

- Given to obtund sensorium
- Quick onset, brief duration
- Laryngeal reflexes lost
- No analgesia

34

Nursing Implications of Induction Agents

- Ventilation must be supported
- Risk of aspiration
- Suction immediately available
- Rapid emergence may hasten pain awareness

35

Induction Agents: Hypnotics (Barbiturates)

- Indication for use
 - Anesthetic induction, sedation, MAC, maintenance of anesthesia
- Therapeutic effect
 - Produce rapid, pleasant induction to Stage III level for 3-7 minutes
- Commonly used
 - Sodium thiopental (PENTOTHAL)
 - methohexital (BREVITAL)

36

Barbiturates (cont.)

- Cause myocardial suppression
- Cause respiratory depression due to sensitivity to ↑ CO₂ levels= apnea
- Depth of respiration is depressed more than rate
- Laryngospasm due to laryngeal reflexes not being depressed until deep level of anesthesia is reached
- Intubation is attempted after barbiturate and muscle relaxant given

37

Thiopental (PENTOTHAL)

- Penetrates all tissues of the body without delay
- Unconsciousness happens quickly
- Recovery prolonged if induction dose excessive
- Histamine release → Vasodilation → Hypotension
 - Should not be used in patients with CV stability problems or impaired liver fx

38

Methohexital (BREVITAL)

- 2 times more potent than PENTOTHAL
- Ultra short acting
 - Quick induction and recovery
- Amnesic effects
- No analgesia
- Less effect on respiratory depression than PENTOTHAL
- Burns with IV administration, hiccups

40

Induction Agents: Non-Barbiturates

- Etomidate (AMIDATE)
- Propofol (DIPRIVAN)



41

Etomidate (AMIDATE)

- Agent of choice in CV patients
- HR and CO remain constant
- Slight ↓ in BP d/t slight PVR
- N&V common
- Potent hypnotic, no analgesia
- Less respiratory depression than thiopental, rapid return of spont. resp.

42

Etomidate (cont.)

- Decreases cerebral blood flow and cerebral oxygen consumption without decreasing BP
- Dose related reduction of TV and rate of respirations (apnea)
- Laryngospasm, cough, hiccups may occur but less with opioid use
- Inhibits steroid synthesis (adrenocortical suppression) for as long as 4 days

43

Propofol (DIPRIVAN)

- No analgesia or cumulative effects
- Less N&V
- Dose dependent respiratory and circulatory depression
- Incidence of apnea greater than thiopental
- Avoid in patients with allergy to eggs and soybeans

44

Propofol (cont.)

- Non-barbituate, hypnotic
- Midazolam acts synergistically; may reduce propofol by 50%
- Alert and rapid emergence
- Pain on IV injection- 2% Lidocaine (best) used to decrease pain
- No preservative- cannot be stored after opening ampule

45

Propofol (cont.)

- Low incidence of PONV
- Decreases cerebral perfusion, cerebral blood flow
- Reduction in BP, CO, SVR
- Depressant of respiratory rate & depth
- Does not interfere with or alter the effects of succinylcholine because of rapid plasma clearance
- No analgesia
- May be given as continuous IV drip (TIVA)

46

Disassociative Anesthetic

- Ketamine (KETALAR)

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Ketamine (KETALAR)

- Produces excellent analgesia
- Related to phencyclidine, PCP and LSD; vivid hallucinations are possible during and after surgery
- Produces disassociate anesthesia
 - No recollection of surgery
 - Patient appears to be awake
 - Minimal respiratory depression

48

Ketamine (cont.)

- Indications for use
 - Selectively blocks pain conduction and perception
 - Produces profound state of analgesia and unconsciousness
 - Respiratory function- nearly normal
 - Protective reflexes intact
 - Cardiovascular
 - Increases HR, BP, and CO

49

Ketamine (cont.)

- CNS effect
 - Increases cerebral blood flow
 - Delirium emergence (greater in adults)
 - Recurrent illusions or flashbacks- 2 wks.
- Liver
 - When broken down produces norketamine
 - Norketamine has 1/3 the analgesic potency of ketamine

50

Research Related to Ketamine

- Sub-anesthetic doses in the treatment of acute post op pain
 - Useful adjunct to PeriOp analgesia
- Use in epidural anesthesia for same reason

51

Inhalation Agents

52

Inhalation Agents

- Used to produce unconsciousness and amnesia
- Usually used for maintenance
- No residual analgesia



53

Inhalation Agents

- Gaseous Inhalation Anesthetic
 - Nitrous Oxide
- Volatile Inhalation Anesthetic
 - Halothane
 - Enflurane
 - Isoflurane
 - Desflurane
 - Sevoflurane

54

Gaseous Inhalation Agent

55

Nitrous Oxide

- May use with MH suspect or +
- Odorless to sweet smelling
- Reduces amount of volatile agents
- Not potent enough to provide anesthesia
- Minimal muscle relaxant properties
- Very good analgesia effects
- Increased PONV

56

Volatile Inhalation Agents

57

Halothane

- Sweet, non-irritating
- Mask inductions
- Great bronchodilator
- Very hard on liver especially with multiple surgeries
- Children- keeps them from coughing and also they have good livers
- Respiratory depression can be pronounced

58

Enflurane (ETHRANE)

- Irritating and pungent odor
- Lingering CNS effects in recovery
- Vasodilator- may be used for intentional hypotension (ortho, plastic)
- Little effect on HR
- Motor hyperactivity in 2% of patients- may see EEG seizure patterns progressing to tonic-clonic seizures

59

Enflurane (ETHRANE) (cont.)

- Hemodynamically more stable than halothane
- Hypotension possible
- Promotes and potentiates neuromuscular blockade although it is not a true nondepolarizing or depolarizing muscle relaxant

60

Isoflurane (FORANE)

- Irritating and strong pungent odor
- May cause laryngospasm and breath holding
- Promotes and potentiates neuromuscular blockade
- No CNS excitatory effects
- Rarely toxic
- Postoperative shivering

61

Isoflurane (cont.)

- Most widely used
- Good for neonates, geriatrics, critically ill
- Stabilizing effect on CV- few dysrhythmias
- Increase HR without compromising CO
- Minimal after effects

62

Sevoflurane (ULTANE)

- Newest inhalation agent
- Rapid-acting with faster emergence
- Nonirritating- mask induction
- Less soluble than desflurane
- Hypotension, dysrhythmias, respiratory depression
- No lingering analgesia
- Not used in hepatic and renal insufficiency

63

Desflurane (SUPRANE)

- Pungent, irritating odor
- Not useful for mask inductions
 - breath holding, coughing and laryngospasm
- Used for maintenance anesthesia
- Fast onset and recovery
- No lingering anesthesia

64

Desflurane (cont.)

- Solubility in blood extremely low, similar to nitrous
- Eliminated primarily by exhalation as an intact molecule
- High incidence of laryngospasm

65

Nursing Implications for Inhalation Agents

- Monitor arrhythmias and respirations
- Decreased Renal blood flow- I&O
- Depression of laryngeal and pharyngeal reflexes- risk for aspiration
- No residual analgesia- medicate for pain
- Shivering- all agents have depressant effect

66

Distribution of Inhalation Agent

- Distribution directly proportional to the amount of blood region receives
- Highly perfused regions
 - Brain, heart, kidney, liver
- Moderately perfused regions
 - Muscle, skin
- Mildly perfused regions
 - Fat, bone marrow
- Poorly perfused regions
 - Tendons, ligaments, bone

67

Elimination of Inhalation Agents

- Reverse order of induction
- Primarily pulmonary
- Blood flowing to lungs distributes agent: inhale and exhale
- Mildly and poorly perfused organs slow to bring agent back
- Obese patients have larger storage capacity than slender patients

68

Potentiated Effects of Inhaled Agents

- Acute ETOH
- Ketamine
- Nitrous Oxide
- Narcotics and Sedatives
- Marijuana

69

Antagonized Effects of Inhaled Agents

- Amphetamines
- Cocaine
- Chronic ETOH
- Narcan
- Chronic marijuana use

70

Cardiovascular Effects of Inhaled Agents

- Cardiac Depression
- Hypotension
- Vascular dilation
- Sensitization of myocardium to catecholamines- dysrhythmias
- Ventricular ectopy and tachycardia
- Little change in HR

71

Respiratory Effects of Inhaled Agents

- Bronchodilation- good for COPD patient
- Obtunds laryngeal and pharyngeal reflexes
 - Halothane and sevoflurane can facilitate intubation but increased risk of aspiration
- Increased apnea threshold (CO₂ that initiates breathing is increased)
 - Normal CO₂= 35-45 (need to breathe)
 - No compulsion to breathe until level is 50+

72

CNS Effects of Inhaled Agents

- Decreases cerebral metabolism
- Increases cerebral blood flow
 - Effect occurs within minutes

73

Renal and Hepatic Effects of Inhaled Agents

- Renal
 - Decrease blood flow
 - May offset with adequate hydration
- GI
 - Relaxes smooth muscle and motility
- Hepatic
 - Decrease in hepatic function

74

Muscle Relaxants

75

Muscle Relaxants

- Given to facilitate intubation by relaxing jaw and larynx
- Easier to assist breathing
- Skeletal muscle relaxation for surgery

76

Muscle Relaxants-General

- Given IV
- Do not cross blood-brain barrier
 - No CNS effect
 - Patient can be paralyzed and not speaking but be fully awake and alert!
- Hypothermia and obesity prolongs block

77

Non-Depolarizing Muscle Relaxants (NDMR)

78

Mivacurium (MIVACRON)

- Short acting
 - Onset: 2-3 minutes
 - Duration: 12-20 minutes
- Metabolism: Plasma cholinesterase
- Minimal CV effects
- Does not accumulate- ideally suited for continuous infusion
- Some histamine-related effects possible

79

Rocuronium (ZEMURON)

- Short acting
 - Onset: 1 minute
 - Duration: 15-20 minutes
- No histamine release
- No significant cumulative effects
- No CV effects

80

Vecuronium (NORCURON)

- Intermediate acting
 - Onset: 3-5 minutes
 - Duration: 20-35 minutes
- No histamine release (even at high doses)
- No CV effects, useful in cardiac surgery
- Prolonged effect with severe liver disease
- Very inexpensive

81

Antracurium (TRACRIUM)

- Intermediate acting
 - Onset: 3-5 minutes
 - Duration: 40-60 minutes
- Histamine releases may cause hypotension and tachycardia
- Hypothermia and acidemia prolong paralysis and weakness
- Tolerated well in peds and elderly
- Easily reversed

82

Cisatracurium (NIMBEX)

- Intermediate acting
 - Onset: 1-2 minutes
 - Duration: 50-60 minutes
- Histamine release is less of a concern
- 3x more potent than atracurium (old drug)
- Hypothermia and acidemia prolong paralysis and weakness

83

Pancuronium (PAVULON)

- Long acting
 - Onset: 3-5 minutes
 - Duration: 60-90 minutes
- Anticholinergic and vagolytic action may cause tachycardia(15% rise)
- Despite that, one of the safest in terms of cv stability

84

Potentiates of NDMR (Paralysis Enhanced)

- | | |
|----------------------------|------------------------|
| ■ Aminoglycosides | ■ Respiratory acidosis |
| ■ Calcium channel blockers | ■ Dehydration |
| ■ Clindamycin | ■ Hypercapnia |
| ■ Lithium | ■ Hypokalemia |
| ■ Magnesium | ■ Hyponatremia |
| ■ Tetracyclines | ■ Hypermagnesemia |
| ■ Volatile anesthetics | ■ Hypothermia |

85

Antagonists of NDMR (Paralysis Reduced)

- NDMR reversal agents (return of paralysis may occur if inadequate amounts of reversal agent given)
- Caffeine
- Epinephrine
- Norepinephrine
- Theophylline
- Respiratory alkalosis and hypokalemia

86

Depolarizing Muscle Relaxant

Succinylcholine

NON REVERSABLE~

87

Depolarizing Muscle Relaxant

- Metabolized by pseudocholinesterase (plasma cholinesterase)
- Pseudocholinesterase deficiency= prolonged block
 - Younger women more likely to be effected
- NOT reversible
- Administer 1-1.5mg/kg

88

Sequence of Paralysis

- Fine to gross with recovery in reverse order
- Eyes, jaws, hands, limbs, neck, intercostal muscles, diaphragm

89

Succinylcholine

- Ultra short acting
 - Onset: about 1 minute
 - Duration: 5 minutes
- Post op myalgia (muscle pain) from fasciculation
- Use in children is potentially dangerous
- Side effects:
 - Bradycardia, ↑ potassium levels, MH trigger

90

Succinylcholine (cont.)

- Contraindicated in patients in the acute phase of certain neuromuscular injury as well as patients with chronic illnesses, due to potential release of potassium:
 - Upper and lower motor neuron injury
 - Prolonged immobilization
 - Major burns
 - CVA
 - Severe infection

91

Nursing Considerations of Muscle Relaxants

- Never assume a paralyzed patient is asleep
- Hypothermia can prolong recovery
- Watch for "re-paralysis"
- Inquire as to how much and when a nondepolarizing muscle relaxant was given
- Ensure adequate recovery before extubating- Train of Four and sustained head lift for 5 seconds

92

Reversal Agents

93

Reversal Agents

- Provide a means of reversing effects of nondepolarizing muscle relaxants
 - anticholinesterases
- Must have some spontaneous recovery
 - Train of four testing is utilized to assess patient's level of spontaneous recovery

94

Reversal of Muscle Relaxant

- Anticholinesterase drugs: Displace neuromuscular blockade, binds with acetylcholinesterase & prevents hydrolysis of acetylcholine
 - **neostigmine, edrophonium, pyridostigmine**
- Anticholinergic drugs: Prevent bradycardia, excessive salivation and bronchoconstriction caused by anticholinesterase- given along with anticholinesterase
 - **atropine, glycopyrralate (robinul)**

95

Neostigmine (PROSTIGMINE)

- Peak: 7 minutes
- Duration: 60 minutes
- Dose: 0.05mg/kg
- Given with glycopyrrolate dose: 0.01mg/kg
- Prevents AChE from breaking down ACh
- Potential bradycardia and hypotension caused by peripheral vasodilation

96

Endrophonium (ENLON)

- Peak: 1 minute
- Duration: 60 minutes
- Dose: 0.5-1mg/kg
- Give with atropine dose: 7-14mcg/kg to minimize increase in vagal tone on the heart (ENLON PLUS- premixed with atropine)

97

Analgesics

98

Opioids

- Indications for use:
 - Sedation, analgesia, induction and maintenance of general anesthesia, regional anesthesia, moderate sedation/analgesia, post op pain management
- Common drugs:
 - Morphine, hydromorphone, fentanyl, sufentanil, alfentanil, and remifentanyl
- Lesser used: Meperidine (d/t normeperidine)

99

Morphine sulfate (ASTROMORPH)

- Titrated to effect
- Alteration in pain perception and emotional response
- Myocardial function is preserved
- Histamine release-hypotension, puritis, wheezing
- Onset: 1-3 minutes
- Duration: 1-2 hrs
- Dose: 2-15 mg titrated
- Watch for hypersensitivity

100

Hydromorphone (DILAUDID)

- Onset: <1 minute
- Duration: 2-4 hours
- 6 times more potent than morphine so 10mg of morphine= 1.5mg DILAUDID
- Good for pain and sedation
- Do not use if patient has increased ICP or decreased respiratory function

101

Hydromorphone (cont.)

- Alters perception and emotional response to pain
- Short half-life
- No metabolites
- Good in renal insufficiency
- Do not use in children
- Less side effects of N&V and itching when used in epidural

102

Meperidine (DEMEROL)

- No longer recommended for acute pain management
- Useful in low doses for post op shivering (12.5-25 mg)
- Problem with active metabolite (normeperidine)
- Contraindicated in patients on MAO inhibitors

103

Fentanyl citrate (SUBLIMAZE)

- Short acting effects
- 100 times more potent than morphine
- Stored in fat and muscle tissue
- Potential delayed respiratory depression when released from tissue
- Duration: 30-60 minutes
- Dose: 0.05-2ug/kg titrated
- Watch for apnea and chest wall rigidity

104

Sufentanil (SUFENTA)

- Analgesic and anesthetic adjunct
- Used for major surgical procedures
- Synthetic narcotic analgesic
- 500-1000 times more potent than morphine; 5-10 times more potent than fentanyl
- Dose: 1-3mcg/kg

105

Alfentanil (ALFENTA)

- Analgesic and anesthetic adjunct
- Synthetic: 10 times more potent than morphine, 1/10th as potent as fentanyl
- Dose: 10-25 mcg/kg (titrate to effect)

106

Remifentanil (ULTIVA)

- Analgesic and anesthetic adjunct
- Extremely short half life
- After loading dose anesthesia will use continuous infusion
- Extreme pain with sudden discontinuation
- No spinal or epidural use because of its glycine vehicle
- Dose: 0.5-2mcg/kg loading dose and 0.25-0.5kg/minute continuous
- Not administered by nursing personnel

107

Antagonist

- Naloxone (NARCAN)
 - Rapid reversal of opioids only
 - Onset: 1-2 minutes
 - Duration: dependent on dose and route
 - Dilute: 0.5mg with 9ml of NS (0.04mg per ml)
 - Give 1/2 cc at a time
 - Smaller doses to reverse side effects of nausea and itching

108

Non-opioid Analgesic

- Ketorolac (TORADOL)
 - NSAID exhibits analgesic, antiinflammatory, antipyretic activity
 - Inhibits synthesis of prostaglandins
 - 30mg IM ketorolac is = to 9mg morphine
 - Side effects: inhibits platelet aggregation, may precipitate renal failure in patients with renal, liver or heart dysfunction and in the elderly

109

Anesthesia Adjuncts

110

Droperidol (INAPSINE)

- Antipsychotic agent widely used for its antiemetic properties
- Can produce vasodilation and mild to moderate hypotension
- Elevates threshold for myocardial dysrhythmias (may prolong QT interval)
- Anticonvulsant action
- Slight respiratory depression

111

Anticholinergics

- Atropine
- Glycopyrrolate (ROBINUL)
- Scopolamine

112

Atropine

- 0.5 -1 mg IM or IV
- Inhibits salivary and respiratory tract secretions
- Causes bronchodilation
- Counteracts bradycardia and related dysrhythmias
- May cause restlessness, irritability, disorientation, delirium, postop dysphoria- give physostigmine

113

Glycopyrrolate (ROBINUL)

- 0.1- 0.2 mg IM or IV
- Longer acting than atropine
- More potent inhibitor of gastric acid secretion and more rapid postoperative awakening than atropine
- Does not produce sedation
- Prevents bradycardia and less likely to cause tachycardia than atropine

114

Scopolamine

- 0.3 - 0.6 mg IM or IV
- Causes CNS depression, drowsiness, amnesia, euphoria, fatigue
- Less effective at preventing bradycardia
- Higher incidence of dysphoria and delirium
- May cause short-term amnesia when given with morphine

115

Reversal Agent

116

Physostigmine (ANTILIRIUM)

- Used for the reversal of scopolamin and atropine
- Anticholinesterase that crosses the blood-brain barrier quickly
- Inhibits acetylcholinesterase with increases available acetylcholine at the receptors in the CNS

117

Physostigmine (cont.)

- Many side effects including
 - Nausea
 - Vomiting
 - Salivation
 - Bradycardia
 - Bronchospasm
 - Seizures

118

Trade Name Vs. Generic Name

- Many practice test questions provide generic name
- Speak among yourselves and quiz each other on a daily basis

119

Practice Question

Which of the following narcotics is effective for alleviating shivering?

- A. sublimaze
- B. meperidine
- C. codeine
- D. morphine

B

120

Practice Question

Which of the following anesthetic agents inhibits the body's ability to regenerate heat?

- A. halothane
- B. sevoflourane
- C. diprivan
- D. succinylcholine

D

121

Practice Question

The most common cause of delayed awakening in the PACU patient is:

- a. Hypothermia
- b. Prolonged drug effects
- c. Neuro issues
- d. obesity

Prolonged drug effects

122

Practice Question

The cause of emergence delirium should be considered to be _____ until proven otherwise.

hypoxemia

123

Practice Question

Systemic toxicity resulting from regional anesthesia includes all the following except:

- A. Cardiovascular depression
- B. Gastrointestinal hyperirritability
- C. Depressed respiratory system
- D. Excitation of the CNS

B

Herbals and Homeopathics



Meg Suermondt, RN, CCRN, CPAN

1

Objective

- Relate how herbal preparations and/or homeopathic treatments can alter anesthesia outcomes.

Let food be thy medicine, and medicine be thy food....

— Hippocrates

2



Conventional Medicine

- Practiced by MDs, DOs, and other allied health care practitioners
- Is taught at US medical schools and provided at US hospitals
- Commonly referred to as Western medicine
- Based on biology and pathology

3



Complementary Therapies

- Group of diverse medical and health care systems, practices and products that are not presently considered to be a part of conventional medicine
- Are used in conjunction with conventional medicine
- Are based on Eastern philosophy (balance and harmony)

4



Alternative Therapies

- Same group of diverse medical and health care systems, practices and products that are not presently considered to be a part of conventional medicine
- Are used in place of conventional medicine and/or in conjunction with conventional medicine

5



Complementary and Alternative Therapies

- | | |
|-----------------------------|-------------------------|
| □ Acupuncture | □ Homeopathy |
| □ Aromatherapy | □ Magnetic therapy |
| □ Ayurveda | □ Massage |
| □ Chiropractic | □ Meditation |
| □ Dietary supplements | □ Naturopathy |
| □ Energy healing | □ Osteopathic |
| □ Herbal therapies | □ Prayer |
| □ High-dose vitamin therapy | □ Relaxation techniques |
| | □ Therapeutic touch |
| | □ Yoga |

6

Complimentary Alternative Medicine (CAM)



7

Recent Trends

□ Use of CAM is higher among:

- female
- middle aged or younger
- White
- Married
- Employed
- More affluent
- Better educated
- Have more insurance

8



CAM Used Most For..

- Chronic pain
- Anxiety and/or depression
- Urinary tract problems
- Back problems
- Headaches
- Allergies
- Arthritis
- Digestive Problems
- Cancer
- Diabetes
- AIDS
- Prevention of future illness
- To maintain health and vitality

9



Preoperative Assessment

- In one study, 57% of ambulatory patients made no mention of their use of CAM
- Many people do not view herbals as “medicine”
- People may be reluctant to disclose their use of CAM
- 24 million people use at least one herbal product
- Industry has annual sales of \$12 Billion

10



Herbals

- Plant-derived products used for medicinal and health reasons
- 30% of all modern drugs are derived from plants
- May have allergic reactions as well as interactions with prescription drugs

11



Potential Interactions with Anesthetic Drugs

- Coagulation disturbances
- Prolongation of anesthetic sedation
- Adverse cardiovascular effects
- ASA recommends patients discontinue herbal medicines 2 weeks prior to surgery

12



Complimentary Therapies in PACU

- Some State Boards have permitted the practice of CAM for nurses including:
 - Aromatherapy- essential oils
 - Massage
 - Music
 - Relaxation
 - Therapeutic touch

13



Herbal Therapies (cont.)

- Aristolochia
 - Aphrodisiac and anticonvulsant
 - Can be nephrotoxic and cardiogenic
- Ephedra
 - Weight loss, stimulant and ergogenic
 - Adrenergic stimulant, may cause hypertension and bronchodilation, diuresis and tachycardia

14



Herbal Therapies (cont.)

□ Chamomile

- Mild sedative and has antispasmodic activity
- May potentiate sedation and has anticoagulant effects due to platelet inhibition

□ Echinacea

- Antiinflammatory, immunostimulating effects
- Causes inhibition of hepatic enzymes
- May affect many anesthetic agents

15



Herbal Therapies (cont.)

□ Evening primrose oil

- Antiinflammatory properties
- Inhibits platelet aggregation
- May interact with anticonvulsant drugs

□ Garlic

- Lower risk of arterosclerosis through antihypertensive and anticholesterolemic effects
- Anticoagulant effects and significant CV effects including hypotension

16



Herbal Therapies (cont.)

❑ Garlic (Cont)

- ❑ Used to reduce blood pressure and cholesterol
- ❑ Postop bleeding a major concern

❑ Feverfew

- ❑ Used for fever reduction, migraine prophylaxis and treatment of rheumatoid arthritis
- ❑ Risk of bleeding, insomnia, and may produce anxiety

17



Herbal Therapies (cont.)

❑ Ginger

- ❑ Antiemetic, antispasmodic and antiinflammatory properties
- ❑ Anticoagulant effects and may cause hypotension and bradycardia

❑ Gingko biloba

- ❑ Alters vasoregulation, neurotransmitter and receptor activity and inhibits platelet activating factor
- ❑ Anticoagulant effects

18



Herbal Therapies (cont.)

□ Ginseng

- Protects body against stress and restores hemostasis-similar to steroids, has anticancer properties
- Anticoagulant effects, significant CV effects including hypertension or tachycardia, may potentiate sedation and cause hypoglycemia, insomnia, irritability and mania

□ Goldenseal

- Has antibacterial properties. May reduce gastric inflammation. Used as a laxative and antiemetic
- Use cautiously with heparin and may augment or diminish effects of antihypertensives
- May cause seizures and respiratory depression as well as electrolyte imbalances

19



Herbal Therapies (cont.)

□ Kava-kava

- Acts as a sedative-hypnotic
- Has mild analgesia and muscle-relaxing effects
- Excessive sedation so anesthetics are potentiated and anticoagulant effects

□ Ma huang (ephedra)

- Increases heart rate and blood pressure, bronchodilates and has antiinflammatory properties
- May cause significant CV effects including hypertension, tachycardia or arrhythmias
- With Halothane, may cause ventricular arrhythmias

20



Herbal Therapies (cont.)

□ Peppermint

- Relaxes the lower esophageal sphincter
- Antispasmodic and smooth muscle relaxant
- No known anesthesia implications

□ St. John's Wort

- Inhibits serotonin, norepinephrine and dopamine reuptake by neurons (MAO Inhibitor)
- May potentiate anesthetic effects and affect blood pressure

21



Herbal Therapies (cont.)

□ Valerian

- Muscle relaxant properties
- Dose dependent sedation and hypnosis
- May potentiate sedation caused by anesthesia

22



Dietary Supplements

- Chondroitin
 - Forms cartilage in the joints
 - No anesthetic implications
- Fish oil
 - Antiinflammatory and antiembolus effects
 - Promotes vasodilation and reduce cholesterol production
 - Anticoagulant effects and may augment the hypotensive effects of anesthesia

23



Dietary Supplements (cont.)

- Glucosamine
 - Simulates the production of glycosaminoglycans
 - No anesthetic implications
- Melatonin
 - Hormone produced by the pineal gland during sleep
 - May potentiate sedation

24



Dietary Supplements (cont.)

□ Vitamin C

- Nutrient needed for collagen and tissue formation, hormone production, carbohydrate metabolism and immune system function
- May decrease effects of heparin or warfarin

□ Vitamin E

- Fat-soluble vitamin, acts as an antioxidant, promotes normal clotting
- Anticoagulant effects, may augment hypotension

25



Dietary Supplements (cont.)


□ Zinc

- Immunostimulant
- No anesthesia implications

26

Medications in the PACU Setting

Meg Suermondt, RN, CCRN, CPAN



The logo is a yellow triangle with a black checkmark inside. The words "PATIENT SAFETY" are written in a blue, stylized font along the top edge of the triangle, and the word "FIRST" is written in blue below the triangle.

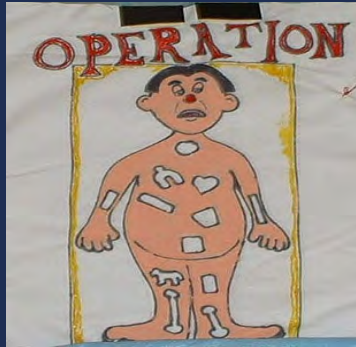
1

Objective

- Discuss medications that are used in the PeriAnesthesia setting

2

If it was only this simple...



3

Health System Errors

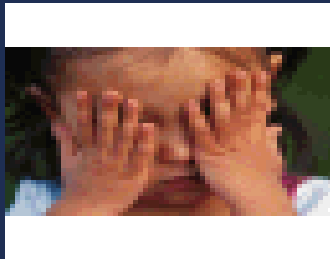


- Medication errors
- Surgical mistakes
- Surgical complications

Doing the right thing the first time means never having to say you are sorry.

4

Medical Errors



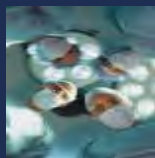
Medical errors do not occur as a result of “bad people.”

Medical errors are usually a result of improper systems processes.



5

Any one of us can make a mistake...



6

Five “Rights” of Medication Administration

- Right patient
- Right medication
- Right dose
- Right time
- Right route



7

Sixth Right to Medication Administration

- Documentation!



8



Patient Identifiers

Correctly identify patient
using two identifiers

- Patient/ family to state full name
- Date of birth

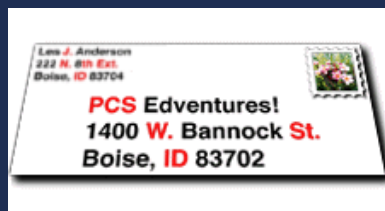


2012 TJC Patient Safety Goal



9

Abbreviations



- We use abbreviations in everyday life
- It is essential that everyone understands the meaning of the abbreviation

2012 TJC Patient Safety Goal

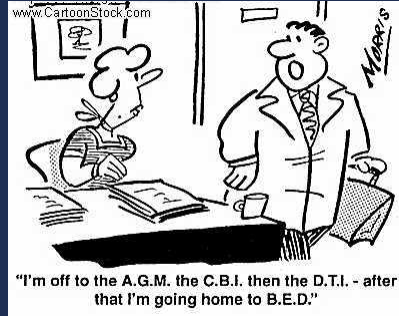


10

Unacceptable Abbreviations

- Reduction of errors
- Communication of unacceptable abbreviations

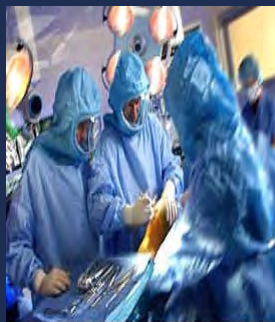
See TJC's official "Do Not Use" List in handouts



11

Barriers to Communication

Noise



Rushing



Too many



12

Verbal and Written Orders

- Miscommunication
- Contribute greatly to medical errors
- Write down, read back and verify all verbal orders



2012 TJC National
Patient Safety Goal



13

Labeling Medication

- Label medication on and off the sterile field even if only one medication/solution is used
- Label medications/solutions anytime it is removed from original container
- Label should include medication name, strength, and dosage along with initials
- If medication expires in less than 24 hours the date and time must be on the label




14



Medications


15

PreOP Considerations

- Premedication in PreOp varies from facility to facility
 - Good history can dictate what meds/when
 - Beta blockade for heart surgery (SCIP)
 - Anxiolytics
 - Pain Meds
 - Preventative NV agents
 - Antibiotics!
 - Histamine (H2) Blockade
- 


16

Histamine Blockers (H₂)/ Antacids

- Treatment of pathologic hypersecretory states and prophylaxis against acid pulmonary aspiration and stress ulcers
 - Cimetidine (TAGAMET)
 - Rantitide (ZANTAC)
 - Famotidine (PEPSID)
 - Sodium Citrate (BICITRA)
- 


17

PACU Medications

- Benzodiazepines-
 - Analgesics-
 - Anticholinergics-
 - Antiemetics-
 - Histamine blockers
 - WHAT ELSE??!!!
- 


18

Thromoblytics

- Also referred to as fibrinolytics
 - Agents that dissolve blood clots
 - Streptokinase (Streptase)
 - Urokinase (Abbokinase)
 - Antistreptase (Eminase)
 - Alteplase (Activase)
- 

19

Anticoagulants

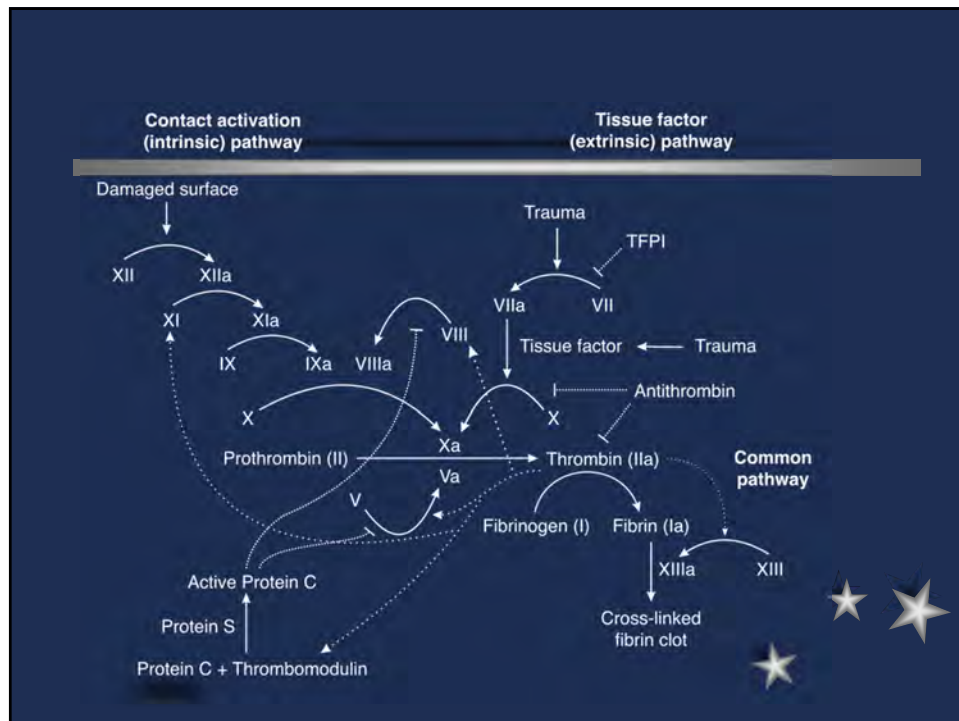
- Agents that inhibit blood clotting
 - Parenteral- Heparin Sodium
 - Antidote is Protamine Sulfate
 - Oral
 - Warfarin Sodium (Coumadin)
 - Acetylsalicylic Acid (Aspirin, ASA)
- 

20

Coagulants


- Agents that promote, accelerate, or make possible blood coagulation
- Desmopressin(DDAVP) (stimulates von Willebrand factor (VII)
- Calcium chloride
- Vitamin K
- Blood coagulation factors
- Factor IX complex (Steven Christmas)

21




22

Diagnostic Agents

- **Contrast media**
 - Radiopaque chemicals
 - Contain iodine- Omnipaque, Hypaque
 - **Dyes**
 - Methylene blue, Indigo carmine, Gentian violet
 - **Staining agents**
 - Lugol's solution- strong iodine mixture
 - Acetic acid- vinegar
- 


23

Diuretics

- **Loop diuretics**
 - Bumex, Edecrin, Lasix
 - **Thiazide diuretics**
 - Naturin, Diuril, Esidrix, HydroDIURIL, Oretic
 - **Potassium-sparing diuretics**
 - Midamor, Aldactone, Dyrenium
 - **Carbonic anhydrase inhibitor**
 - Diamox
 - **Osmotic diuretics**
 - Osmitol, Mannitol
- 


24

Steroids

- Cortisone- (Cortisone and Cortone)
 - Hydrocortisone- (Cortef, Solu-cortef)
 - Prednisone- (Detasone, Deltra)
 - Prednisolone- (Delta-cortef)
 - Methylprednisolone- (Medrol, Dep-medrol, Solu-medrol)
 - Triamcinolone- (Artistocort, Kenacort, Kenalog 40)
 - Dexamethasone- (Decadron)
 - Betamethasone- (Celestone)
- 


25

Hormones

- A chemical made by glands in the body
 - Hormones circulate in the bloodstream and control the actions of certain cells or organs
 - Oxytocin (PITOCIN)
 - Insulin
 - Glucagon
- 


26

Inotropic Agents

- Strengthen the heartbeat
 - Epinephrine
 - Norepinephrine (NOT PHENYLEPHRINE)
 - Dobutamine
 - Milrinone (PRIMACOR)
 - Dopamine
 - Digitalis
- 


27

Beta-Blocking Agents

- Treat hypertension, relieve angina and in heart attack patients to help prevent additional heart attacks
 - Also used to correct irregular heartbeat, prevent migraine headaches, and treat tremors
 - Metoprolol (LOPRESSOR)
 - Atenolol (TENORMIN)
 - Propranolol (INDERAL)
 - Esmolol (BREVIBLOC)
 - Labetalol (NORMADYNE)
- 


28

Calcium Channel Blockers

- Decrease the heart's pumping strength and relax blood vessels
 - May be used to treat high blood pressure, angina and some arrhythmias
 - Diltiazem
 - Nifedipine
 - Verapamil
- 

29

Antidysrhythmic Agents

- Lidocaine
 - Amiodarone
 - Procainamide
 - Magnesium Sulfate
 - Adenosine
- 

30

Vagolytic agents

- A therapeutic or chemical agent that has inhibitory effects on the vagus nerve
- Atropine
- Glycopyrrolate



31

Vasodilators

- Act as blood vessel dilator
- Open vessels by relaxing their muscular walls
- Nitroglycerin
- Sodium Nitroprusside



32

Vasopressors

- Used to constrict the arteries and increase blood pressure
- Most commonly used in intensive-care and PACU for patients with critical hypotension
- Phenylephrine
- Epinephrine
- Dopamine
- Dobutamine
- Norepinephrine
- Vasopressin



33

Antihypertensives

Drugs used to treat high blood pressure

- Atenolol (TENORMIN)
- Captopril (CAPOTEN)
- Clonidine (CATAPRES)
- Enalaprilat(VASOTEC)
- Hydralazine (APRESOLINE)
- Labetalol (NORMODYNE)
- Methyldopa (ALDOMET)
- Metoprolol (LOPRESSOR)
- Nifedipine (PROCARDIA)
- Propranolol (INDERAL)
- Nitroprusside (NIPRIDE)

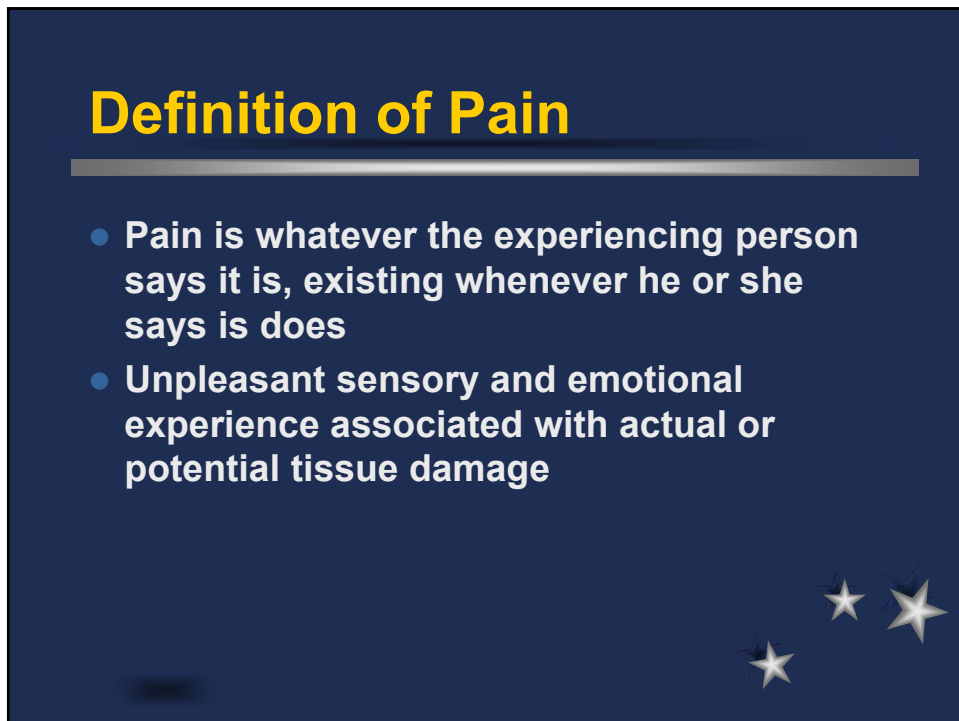


34



Pain and Comfort Management

35




Definition of Pain

- Pain is whatever the experiencing person says it is, existing whenever he or she says is does
- Unpleasant sensory and emotional experience associated with actual or potential tissue damage


36

Harmful effects of Pain

- Increase in Adrenocorticotrophic Hormone
 - Increase in Cortisol
 - Increase in Antidiuretic Hormone
 - Increase in Catecholamines (epi, norepi)
 - Increase in renin-angiotensin
 - Increase in Aldosterone
 - Increase in Glucagons
 - Increase in Interleukin-1
- 

37

Harmful effects of Pain

- Decrease in insulin
 - Decrease in testosterone
 - Metabolic changes including muscle catabolism
 - Depressed immune response
 - Resp depression
 - Urinary retention
- 

38

Types of Pain

- **Nociceptive**
 - Somatic- usually aching or throbbing in quality as is well localized
 - Arises from bone, joint, muscle, skin and connective tissue
 - Visceral- arises from visceral tissue such as the GI tract and pancreas



39


Types of Pain (cont.)

- **Neuropathic- abnormal processing of sensory input by the peripheral or central nervous system**
 - Treat with analgesics




40

Definitions

- Acute pain- injury of body tissues and activation of nociceptive transducers at the site
 - Chronic pain- usually elicited by an injury but may be perpetuated by factors that are both pathogenetically and physically remove. Lasts beyond expected period of healing (3-6 months)
- 

41

Definitions (cont.)

- Recurrent pain- episodic or intermittent occurrences of pain that occur over an extended period of time
 - Addiction- a behavioral pattern of psychoactive substance abuse
 - Analgesia- absence of the spontaneous report of pain
 - Pain relief- report of reduced pain after a treatment
- 

42

Acute Pain Management Goals

- Reduce incidence and severity
- Educate patient to communicate pain
- Enhance patient comfort and satisfaction
- Contribute to fewer postoperative complications



43


Pain Assessment

- Behavior used as indicator when patient is unable to verbalize
- Pain behaviors are highly individualized and the absence of any specific behavior does not mean the absence of pain (facial expression, body movement)




44

Interventions

- **Pharmacological**
 - Analgesics- mu-agonist opioid, nonopioid (IV or oral)
 - Adjuncts-anticonvulsants, tricyclic antidepressants, corticosteroids, antianxiety, local anesthetics, cox 2 inhibitors
 - Multi modal pharmacology
 - **Nonpharmacological**
 - Stimulation-induced analgesia- cold therapy, massage
 - Cognitive strategies- music therapy, distraction
 - Behavioral techniques- turning, positioning
- 

45

Invasive Interventions

- Local infiltration in OR
 - Nerve blocks- preop v. postop
 - PCA
 - Pain pumps
 - Epidurals
- 

46

Pain Intensity

- **Mild to Moderate Pain- Non opioid**
 - Acetaminophen
 - NSAIDs
 - Cox-2 Inhibitors
 - May consider opioids
- **Moderate to Severe Pain**
 - Combine nonopioid and opioids



47


Site Specific Surgery

- **Dental**
 - NSAID- ASA or ibuprofen
 - Opioid- Codeine with acetaminaphen or oxycodone
- **Neurosurgery**
 - Opioids may interfere with neurological monitoring
 - Ketorolac may be considered




48

Site Specific Surgery (cont.)

- **Thoracic**
 - Aggressive pain control- epidural or nerve block
 - PCA opioid use
 - **Abdominal surgery**
 - Opioid use but will be withheld if side effects such as resp. depression, nausea and vomiting arise
- 


49

Site Specific Surgery (cont.)

- **Back surgery**
 - Chronic pain is common
 - Limited use of spinal or epidural
 - Paraspinal muscle spasms common
 - **Surgery on extremities**
 - Early ambulation and movement may limit pain control therapy
 - Epidural anesthesia may be appropriate
- 


50

Obstetric Patient

- Types of pain related to pregnancy include headache, back, heartburn, Braxton Hicks contractions, round ligament pain
 - Postpartum pain management should be directed toward maximizing patient's mobility
 - Approximately 1-2% of the maternal dose of a drug is received by neonate when breast-feeding
- 

51

Patient Education

- Expectations
 - Precautions
 - After discharge
- 

52

Practice Question

During the preadmission interview, a patient states he is an alcoholic and has cardiomyopathy. The preadmission chest x-ray denotes an enlarged heart and cloudy lung field. The nurse will expect the patient to require:

- A. Diuretics, digitalis
- B. Chlordiazepoxide, Enoxaparin
- C. Nubain, Eptifibatide
- D. Volume expanders, multivitamins



53

Practice Question

The perianesthesia nurse is aware that the best indicator of pain in a 16 month old is:

- A. Behavior
- B. Vital signs
- C. Respiratory status
- D. Level of consciousness

A



54

Practice Question

A patient arrives in the Perianesthesia unit following a right inguinal hernia repair complaining of pain. The nurse gives 2mg of morphine IV. The nurse's next action is to:

- A. Give an additional 8mg IV morphine 10 minutes after the first dose
- B. Elevate the head of bed to 90 degrees
- C. Distract the patient with soothing music
- D. Apply an ice pack to the surgical site

 D

55

Practice Question

Fentanyl is _____ times more potent than morphine:

100



56

Practice Question

Metoprolol, Labetolol and Esmolol are in the class of drugs known as _____:

Beta blockers



57

Practice Question

- Understanding equianalgesic dosing means that the nurse understands that
- 10mg of morphine sulfate IV is equivalent to which dose of hydromorphone?
 - A. 0.5 mg
 - B. 1 mg
 - C. 10mg
 - D. 1.5mg



58

Education In the Perianesthesia Setting

Meg Suermondt, RN, CCRN, CPAN

1

Objective

- Discuss the key components of education in the PACU



2

Health Education

- A combination of learning experiences designed to facilitate voluntary adaptation of behavior conducive to health (Green, 1978)
- Voluntary behavior change is key



3

Basic Premises Regarding Learners

- Well-intended
- Try their best and want to do the right thing
- Want to succeed
- Arrive with their own set of skills, experiences, and awareness

4

Child Learner

- Does not assume responsibility for learning
- Totally dependent on adults
- Less experience-transmittal method of learning
- Open to new concepts
- Subject centered

Adult Learner

- Self-directing, self-governing
- Resource of experience-experiential techniques useful
- Difficulty accepting new concepts
- Problem centered

5

Teaching the Child

- Parents begin at home, age dependent
- Parent preparation essential
- The younger the child, the closer to the actual use of the skill/knowledge
- Play and role modeling are effective for children
- Tours can be helpful

6

Infant

- Teach parents to participate in care
 - Handle the infant gently and speak in a soft, friendly tone of voice
 - Use a security toy or pacifier
-

7

Toddler

- Teach parents to participate in care
 - Give child simple, direct and honest explanations
 - Use puppets or coloring books to explain procedures
 - Let child play with equipment to reduce anxiety
 - Let child make appropriate choices
-

8

Preschooler

- Teach parents to participate in care
- Use simple, neutral words to describe procedures
- Encourage the child to fantasize to help plan his/her response to situations
- Use body outlines or dolls to show anatomic sites and procedures
- Let the child handle equipment before a procedure
- Use play therapy as an emotional outlet

9

School-Age

- Use body outlines and models to explain body mechanisms and procedures
- Explain logically why a procedure is necessary
- Describe the sensations to anticipate
- Encourage the child's active participation
- Praise the child for cooperating with a procedure

10

Adolescent

- Ask the patient if he wants his/her parents present during teaching sessions
- Give scientific explanations, using diagrams, models or videotapes
- Encourage the parents to verbalize feelings or express them through artwork or writing
- Offer praise as appropriate

11

The Adult Learner

- Goal oriented
- Reduced flexibility
- Requires longer time in the performance of learning
- Less patient in the pursuit of objectives
- Finds little use for isolated facts
- Strives for recognition and success



12

The Elderly Learner

- Less formal education
- Gear reading levels to comprehension level
- Sensory deficits can interfere with ability to learn

13

Limitation Impacting Learning

- Vision- large lettering, high contrast
- Hearing- high pitch tones are normal aging loss
- Speech/ language
- Mobility/ manual dexterity
- Confusion/ mental status
- What is realistic?



14

Learning Theory

- Facilitated when the patient feels a need to know what is being taught
 - Must be connected to what the learner already knows
 - Is improved when what is being taught is personally relevant or solves a problem
 - Must have confidence in their ability to actually perform the behavior being taught
-

15

Goals of Patient Education

- Increase patient's sense of self-worth
 - Decrease anxiety
 - Reduce facility and provider liability
-

16

Benefits of Learning

- Decreased fear and anxiety
- Decreased postoperative complications
- Increased compliance
- Increased coping mechanisms
- Decreased recovery times
- Decreased postoperative pain
- Increased patient satisfaction

17

The Process of Client Education

- Uses a consistent and systematic process similar to the nursing process
- Identifies specifically the “Education Aspect” of the intervention
- Components include:
 - Educational Assessment
 - Planning
 - Implementation
 - Evaluation



18

TJC Standards for Learner Assessment

- Learning needs
- Abilities
- Readiness to learn
- Preferences



19

Considerations of Assessment

- Cultural and religious practices
- Emotional barriers
- Desire and motivation to learn
- Physical limitation
- Cognitive limitation
- Language barriers
- Financial implication of care choices

20

Assessment Questions

- What does the patient already know?
- What does change in status or condition mean to the patient?
- How susceptible to the disease does the patient view self?
- What are the patient's perceptions of the consequences?
- What are the patient's goals?
- Reading abilities?
- What does the patient want to learn first?



21

Other Ways to Identify Learning Needs

- Open ended questions
- Direct observation
- Verbal/nonverbal cues
- Questionnaire
- Interviews
- Focus group

22

Learning Styles

- Visual- learn through seeing
- Auditory- learn through hearing
- Kinesthetic- learn through physical activity and through direct involvement

23

Prioritize Needs

- Maslow's hierarchy of needs
 - Physiological
 - Safety and security
 - Belonging and love
 - Esteem
 - Self-actualization

24

Dimensions of Patient Education

- The patient should be educated about the following
 - The injury, illness or disability
 - Safe and effective use of medication and/or medical equipment
 - Potential food-drug interactions
 - Nutrition and modified diets
 - Rehabilitation techniques to adapt or function more independently
 - Pain management

25

TJC Standards Educational Strategies and Methods

- Patient education is interactive
- The educational process is collaborative and interdisciplinary, and is appropriate to the plan of care
- The methods used (including materials given to the patient) should be documented

26

Client Education- Planning

- Set Goals & Objectives
 - Measurable
 - Positive
 - Time limited
 - Evaluated
- Individualized learning

27

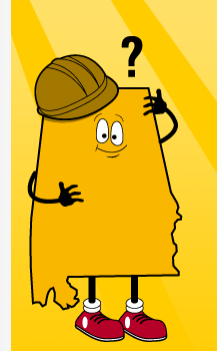
Educational Tips

- Logical sequence of steps
- Is there any information that the learner should know before the learner can perform the skill?
- Rethink- may seem basic to you but not to the learner
- Accurate information
- Importance of individualizing teaching

28

We remember...

- 10% of what we read
- 20% of what we hear
- 30% of what we see
- 50% of what we hear and see
- 70% of what we say
- 90% of what we say as we do (demonstration)



29

The Learning Environment

- Conducive to learning
- Quiet, private
- Decrease anxiety
- Facilitate learning
- Family oriented
- Lack of physical/mental barriers

30

Barriers to Learning

- Physiological, emotional, cultural, religious, and environmental barriers hinder the learning process
- Language barriers decrease ability to understand
- Inadequate or poor teaching

31

Consideration for Printed Materials

- Target group
- Reading level/language
- Socio-cultural characteristics
- Methods of communication
- Age considerations
- Design
- Content
- Word Choices



32

Using Printed Materials

- Read instructions along with the patient
- Highlight or underline the important message with patient
- Written at 5th grade level.
- Have patient read and underline statements that are not clear
- Ask patient to write down questions and bring the next time or call for clarification

PeriAnesthesia Related Complications

Meg Suermondt, RN, CCRN, CPAN

1

Objective

- Discuss perianesthesia complications that occur in the PACU

2

Anesthesia Related Complications

- Respiratory Emergencies
- Cardiovascular Complications
- Hemodynamics
- Neurological Complications
- PostOperative Nausea and Vomiting
- Malignant Hyperthermia
- Hypothermia

3

Respiratory Emergencies

4

Respiratory Emergencies

Over 70% of PACU issues are Respiratory

- Airway obstruction
- Aspiration
- Apnea/hypoventilation
- Hypoxemia
- Pulmonary embolism
- Pulmonary edema
- Noncardiogenic pulmonary edema
- Pneumothorax

5

Comparison of Lungs



6

Laryngeal Anatomy

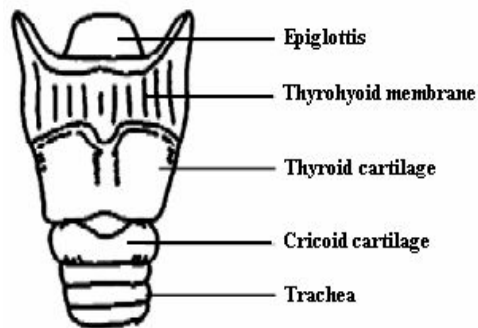
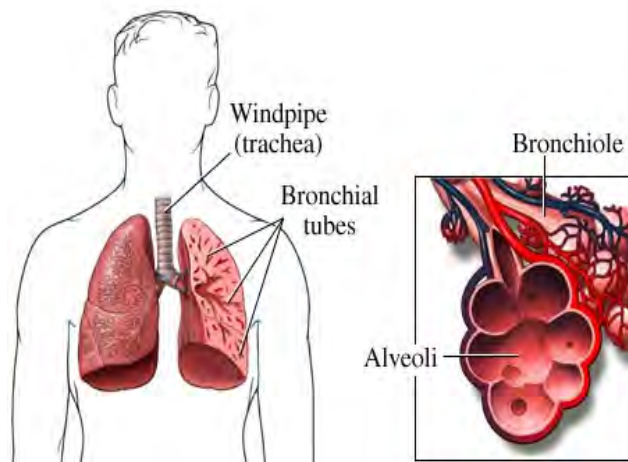


Figure 2 - Anterior view of laryngeal anatomy.

7

Major Anatomy of Lungs



8

Airway Obstruction

- Soft tissue- tongue relaxed is most common reason
- Swelling- edema
- Airway injury
- Bleeding- hemorrhage
- Treat: Stimulating patient, chin lift/jaw thrust, airway adjunct, positive pressure, intubation if unable to maintain patent airway

9

Airway Obstruction Signs and Symptoms

- | | | |
|----------------------------|------------------------------|-----------|
| ■ Snoring | ■ Restlessness | |
| ■ Nasal flaring | ■ Anxiety | |
| ■ Sternal retractions | ■ Confusion | ➤ Hypoxia |
| ■ Stridor | ■ Cyanosis | |
| ■ Diminished breath sounds | ■ Decreased PaO ₂ | |
| ■ Lethargy | ■ Increased PCO ₂ | |

10

Airway Obstruction Treatment/ Intervention

- Cough and deep breathe
- Provide O₂ therapy (40% face shield or mask)
- Chin lift/ jaw thrust
- Oral or nasal airway
- Reverse sedatives, narcotics, muscle relaxants



11

Causes of Upper Airway Edema

- Multiple attempts at intubation
- Endoscopies with/without biopsies
- Surgical procedures of face, head, neck
- Positioning in the OR
 - Prone
 - Trendelenburg- Vaginal Hysterectomy, Portacath placement, Robotics, laparoscopic cases

12

Treatment for Upper Airway Edema

- Raise HOB
- Humidified oxygen
- Racemic epinephrine
- IV steroids
- Reintubate

13

Laryngospasm

- A partial or complete spasm of the vocal cords
- Patients at risk- known typically through hand-off report
 - History of smoking
 - Difficult intubation
 - COPD
 - Surgery around the vocal cords
 - Irritation to or around the vocal cords

14

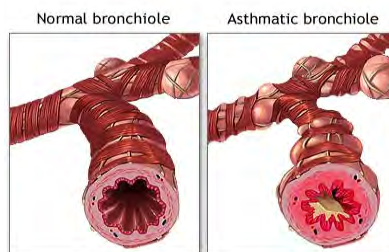
Laryngospasm Treatment

- Positive pressure ventilation
- Humidified Oxygen
- Reintubation
- May need sub-paralytic dose of muscle relaxant to break spasm

15

Bronchospasm

- Lower airway obstruction
- Smooth muscles of bronchioles constrict, obstruct airway, cause inflammation along airway
- May be generalized (asthma) or local response



16

Patients at Risk for Bronchospasm

- Smokers
- Chronic bronchitis
- Asthma
- Emphysema
- Pulmonary fibrosis
- Radiation
- Pneumonitis
- Recent URTI
- Surgical stimulation
- Drugs
 - Physostigmine
 - neostigmine
 - edrophonium
 - barbitutes
 - histamine releasing drugs
- Secretions, blood, vomitus

17

Bronchospasm Signs and Symptoms

- Wheezing
- Noisy, shallow respirations
- Chest retractions
- Use of accessory muscles
- Hypertension
- Tachycardia
- Anxiety vs lethargy
- Poor to absent breath sounds

18

Treatment for Bronchospasm

- Remove irritants or drugs
- Positive pressure
- Bronchodilators
 - Albuterol
 - Isoetharine
 - Metaproterenol
- Steroids
 - Decrease inflammation

19

Subglottic Edema

- Usually affects peds 1-4 years
- Traumatic intubation
- Too large of an ET tube
- Coughing with tube in place
- Surgical position change after ET tube placed
- Surgery of head and neck
- Surgery > 1 hr duration

20

Subglottic Edema

- Treat
 - Humidified O₂
 - Racemic epi treatment
 - Helium/oxygen mixture
 - dexamethasone
 - Calm with narcotics and/or parents
 - Reintubate

21

Aspiration

- Gastric contents most commonly aspirated
- Occurs most often when protective airway reflexes are diminished
- May occur when ET tube/airway is manipulated

22

Additional Risk Factors for Aspiration

- Loose teeth
- Surgical manipulation
- Hiatal hernia
- Peptic Ulcer
- Trauma
- Obese
- DM
- Pregnant
- Full stomach (GERD)
- History of swallowing problems

23

Signs and Symptoms of Aspiration

- Tachycardia
- Tachypnea
- Hypoxia
- Infiltrates on x-ray
- Wheezing
- Coughing
- Obstruction
- Dyspnea
- Apnea
- Hypotention
- Bradycardia
- Foreign body on x-ray
- Bronchospasm

24

Aspiration Treatment

- Position patient for greatest comfort
- Prepare for bronch if large particles
- Oxygen
- Ventilate as needed
- Antibiotics
- Antiemetics
- Steroid use is controversial

25

Apnea/Hypoventilation

- Usually due to residual anesthetic agents, opioids, muscle relaxants, inadequate reversal, thoracic or abdominal procedures, neuromuscular diseases
- Symptoms: hypercarbia, decreased RR, shallow respirations, increased ETCO_2 , increased $\text{PACO}_2 > 45\text{mmHg}$
- Treat: Underlying cause, O_2 , stimulate patient, cautious use of analgesics/sedatives, reposition, oximetry/capnography

26

Hypoxemia

- Reduced risk with pulse oximetry
- Causes: Low inspired concentration of O₂, hypovolemia, low ventilation to perfusion ratios, increased intrapulmonary right to left shunt, pneumothorax, diffuse airway collapse, pulmonary edema, pulmonary embolism
- Treat: Correct cause, O₂, stimulate, tracheal intubation and mechanical ventilation, PEEP

27

Three Concepts of Respiration

- Ventilation: movement of air in and out of lungs
- Diffusion: movement of gases between alveoli, plasma and red blood cells (CO₂ and O₂)
- Perfusion: movement of blood through pulmonary capillaries

28

Distribution of ventilation

- Configuration of thorax(atomy, surgical changes)
- Effects of gravity on intra pleural pressure
- Alveolar health. Enlarged are less compliant
 - Upright vs. supine positioning...GRAVITY!

29

Distribution of perfusion

- Also related to gravity and alveolar pressure
- Pressure in capillaries greater at base, alveolar pressures lower in the base
- Positioning (like for hypotension)

30

Ventilation/ Perfusion Relationship

- Ventilation and perfusion should be equally matched, but because of normal regional variations, this is not the case
- Normally alveolar ventilation is approximately 4L/min and pulmonary capillary perfusion is 5L/min
- Normal V/Q ration is 4:5 or 0.8

31

Ventilation-Perfusion Imbalance (V-Q)

- Occurs when:
 - Inadequate ventilation
 - Inadequate perfusion
 - Both

32

Ventilation/ Perfusion Problems

- Pulmonary Edema
- Pulmonary Embolism
- Aspiration
- Bronchospasm
- Pneumothorax

33

Pulmonary Embolism

- Predisposed patients: obese, CHF, immobile, malignancy, pelvic/long bone procedures
- Symptoms: Tachypnea, pleuritic chest pain, hemoptysis, C/O breathlessness
- Treat: Correct hypoxemia and hemodynamic instability, IV heparin
- Diagnosis: VQ Scan

34

Pulmonary Edema

- Caused by: Fluid overload, CHF, pulmonary injury
- Symptoms: Hypoxemia, rales, decreased pulmonary compliance, CXR shows pulmonary infiltrates
- Treat: Underlying cause, diuretics, fluid restriction to decrease afterload, O₂, mechanical ventilation, PEEP

35

Noncardiogenic Pulmonary Edema

- Cause: Upper airway obstruction, laryngospasm, bolus dosing with naloxone, incomplete reversal of neuromuscular blockade, significant period of hypoxia
- Symptoms: Hypoxemia, frothy sputum, same as pulmonary edema
- Treat: Reintubate, ventilate, O₂, PEEP, ?diuretics and fluid restriction, hemodynamic support

36

Pneumothorax

- Cause: Percutaneous internal jugular and subclavian cannulation attempts, line placement, blocks, surgical chest procedures
- Symptoms: Sharp ipsilateral chest pain, dyspnea, decreased breath sounds, hyperresonance of affected side
- Treat: O₂, CXR: <20% pneumo- observe, > 20% pneumo or cardiac compromised then chest tube

37

Cardiovascular Complications



38

Anesthesia and the Heart

- General Anesthesia ↓ lowers dysrhythmia threshold
- Inhalation agents- interfere with conduction by depressing SA and AV node functions
- Ketamine- tachycardia, HTN
- Succinylcholine: sinus bradycardia or junctional escape rhythms
- Opioids: bradycardia

39

PostAnesthesia Dysrhythmias

Caused by many things:

- Circulatory instability
- Preexisting heart disease
- Increase in vagal tone
- Drugs
- Pain
- Electrolyte imbalances
- Acid/Base imbalance
- Oxygen and ventilation issues



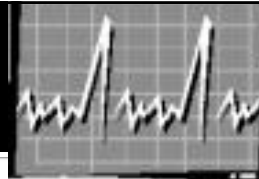
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New York Heart Classification of Cardiovascular Disease

NEW YORK HEART ASSOCIATION (NYHA) CLASSES			
NYHA class I	NYHA class II	NYHA class III	NYHA class IV
<ul style="list-style-type: none"> • No limitation on physical activity • No overt symptoms 	<ul style="list-style-type: none"> • Slight limitation on physical activities • Comfortable at rest, but ordinary physical activity causes symptoms of heart failure 	<ul style="list-style-type: none"> • Marked limitation on physical activities • Comfortable at rest, but less than ordinary activity causes symptoms of heart failure 	<ul style="list-style-type: none"> • Inability to carry on any activity without symptoms • Presence of symptoms even at rest

41

Dysrhythmias

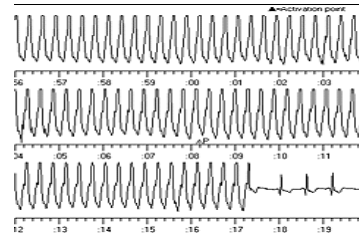


- **Sinus tachycardia:** hypoxia, hypercapnia, sepsis, hyperthermia, heart failure, pain, hypoxemia, drugs, hypovolemia, anxiety, medications
- **Sinus bradycardia:** hypoxia, drugs, increased ICP, distended bladder, hypoxemia, high spinal, hypothermia, vagal stimulation
- **PVCs:** hypoxia, hypercarbia, electrolyte abnormalities, acid-base alterations, MI, drugs, pain, hypothermia

42

Supraventricular Dysrhythmias

- SVT, PAT, or PSVT
- Regular rhythm
- HR is 150-200
- Causes:
 - Anesthetic agents
 - Stress
 - Surgical stimulation
 - Electrolyte imbalance



43

Ventricular Dysrhythmias

- | | |
|---------------------|-------------------------|
| ■ Cardiac disease | ■ Electrolyte imbalance |
| ■ HTN | ■ Pain |
| ■ Drug interactions | ■ Hypoxia |
| ■ Anesthetic agents | ■ Hypercarbia |

44

Hypotension

- 25-30% decrease in systolic BP from baseline
- Causes:
 - Incorrect cuff size
 - Anesthesia- vasodilating effect
 - Regional anesthesia- sympathetic blockade
 - Cardiac dysrhythmias/failure
 - Shock
 - Hypoglycemia
 - Hypovolemia
 - Fluid shifts, dehydration

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Hypotension Treatment

- Treat underlying cause
- Fluid challenge- bolus
- Oxygen
- Pressor drugs
- Vasoconstrictive drugs
- Elevate legs



46

Hypertension



- 25-30% increase in systolic BP from baseline
- Causes:
 - Inappropriate sized cuff
 - Pain
 - Hypoxemia
 - Fluid overload
 - Hypothermia
 - Distended bladder, bowel, stomach
 - Hypothermia/shivering

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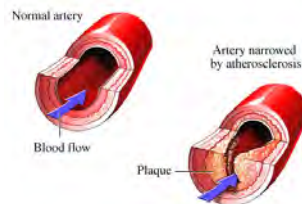
Hypertension Treatment

- Treat underlying cause
- Analgesia
- Straight/foley cath for bladder distension
- Warm patient
- Provide O₂ for hypoxemia, assist ventilation
- Diuretics for fluid overload
- Resume medication schedule

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Acute Myocardial Infarction

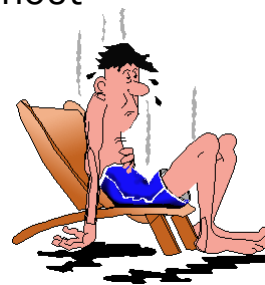
- Patients at risk:
 - Pre-existing coronary artery disease
 - Diabetes
 - Obesity
 - Debilitated state
 - Erratic medical care evaluation



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Signs and Symptoms of a MI

- Chest pain or pressure with or without radiation to neck/back/jaw/arm
- ECG changes
- Nausea/vomiting
- Diaphoresis
- SOB
- Bradycardia, tachycardia, hypotension



50

Treatment for AMI

- Relieve chest pain: NTG, Morphine, oxygen
- Decrease workload of heart
- Maintain stable cardiac rhythm
- O₂
- Morphine
- Nitro
- ASA

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Hemodynamics

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Goal of Hemodynamics

- Optimize the balance between oxygen supply and demand
- When oxygen demand is not met, cellular ischemia occurs and then death of tissue occurs
- Risk of myocardial ischemia

53

Determinants of Myocardial Oxygen Consumption

- Heart rate
- Contractility
- Afterload
- Myocardial wall tension

54

Physiologic Principle

- Blood pressure = cardiac output (CO) x systemic vascular resistance (SVR)



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Cardiac Output

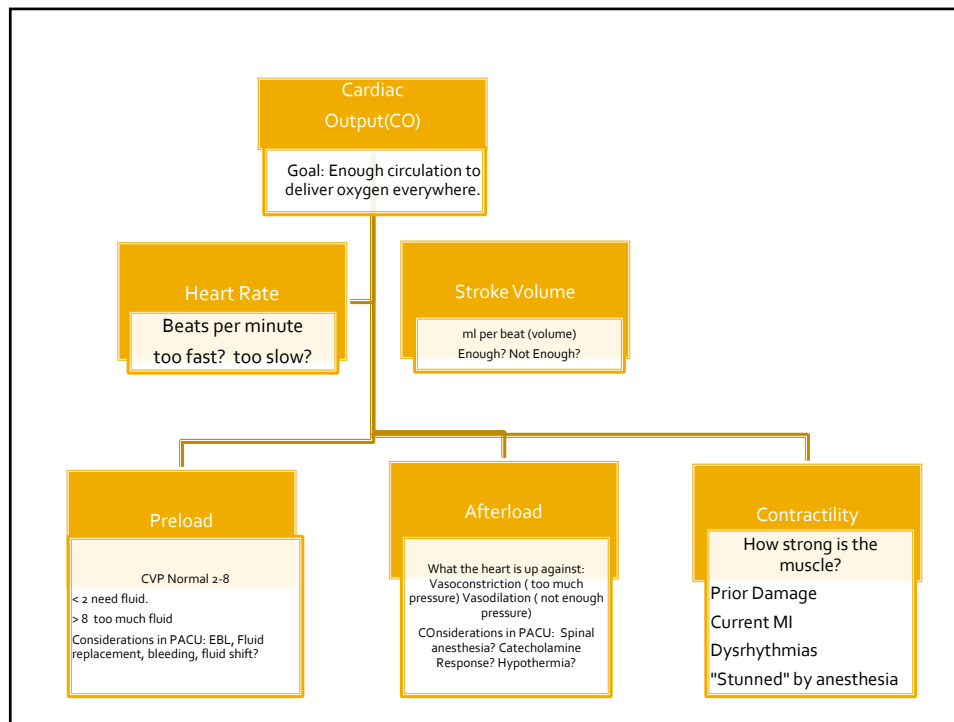
- Oxygen delivery and tissue perfusion are the result of cardiac output

Cardiac Output = Stroke Volume x Heart Rate

Cardiac output is thought of as per minute, so 6.8 litres per minute, for example.

Normal vital signs are a good indicator of cardiac output.

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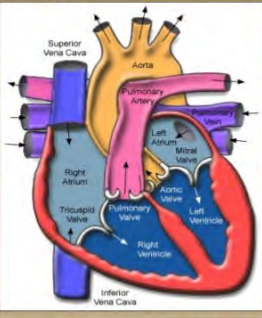


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Leveling cardiac output

1. PRELOAD venous blood return to the heart
Controlled by;
v. Blood Volume
↑ PRBC's
Albumin
Normal Saline
↓ Diuretics-
lasix, bumex
Thiazides
↓ Ace inhibitors
v. Venous Dilation
↑ Nitroglycerine
↑ Ca⁺ channel blockers
clonidine
(Catapres)
methyldopa
trimethaphan
(arfonad)
↓ Dobutamine
↑ Morphine

Drugs of Hemodynamics



2. CONTRACTILITY forcefulness of contractility
↓ Ca⁺ channel blockers
↑ Digoxin
↑ Dopamine/Dobutamine
↑ Milrinone/amrinone

3. AFTERLOAD - work required to open aortic valve and eject blood - resistance to flow in arteries
° Dopamine (at higher doses)
↓ Ace inhibitors
↓ Nipride/lesser extent Nitro
↓ Calcium channel blockers
↓ Labetalol

4. HEART RATE -
↓ Beta blockers
↓ Calcium channel blockers
↓ Atropine
↑ Dopamine
↑ Dobutamine

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Definitions

- Cardiac Output- amount of blood ejected from the heart over one minute (liters/min)
- Stroke Volume- amount of blood ejected from ventricles with each beat
- Heart Rate- number of times the heart beats in one minute

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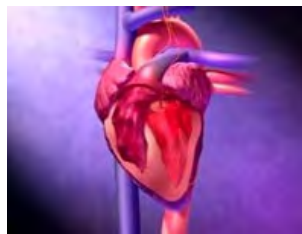
Leveling CO

- Improving either SV or HR can improve CO, tissue perfusion and oxygenation
- Example: high level sympathetic block from spinal: ↓ HR, ↓ BP (reflection of CO)
- Treat with Atropine to ↑ HR which ↑ BP
- Pediatrics- Use epinephrine to ↑ HR

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Components of Stroke Volume

- Preload (filling pressures)
- Afterload (impedence to ejection or ventricular wall tension)
- Contractility



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Preload

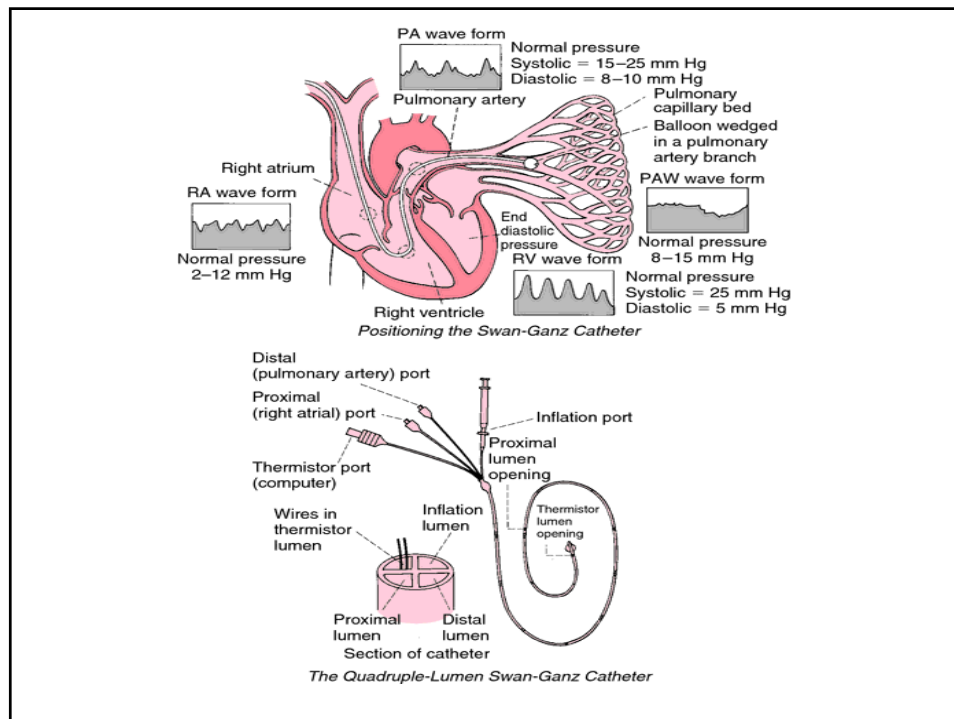
- End-diastolic volume present in the ventricle just before its contraction
- Called filling pressures
- Diastole is filling stage of cardiac cycle
- Volume in ventricle at end-diastole (filling) represents volume available for cardiac cycle

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Measuring Preload

- Tip of PA catheter in a large branch of the pulmonary artery
- Mitral valve is between the PA catheter and left ventricle
- In diastole, mitral valve opens: no obstruction between PA catheter and left ventricle

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Mitral Valve



65

Measuring Preload (cont.)

- Right Sided Preload- CVP or Right Atrial Pressure (RA)
- Influences on Right sided preload
 - myocardial pumping
 - vascular tone
 - blood volume
 - increased intrathoracic pressure (PEEP)
 - Tricuspid valve stenosis

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Measuring Preload (cont.)

- Left Sided Preload- Left Atrial Pressure (LAP), *Pulmonary Artery Diastole Pressure (PAD)*, Pulmonary Artery Occlusion Pressure (PAOP), *Pulmonary Capillary Wedge Pressure (PCWP)*
- Influences on left sided preload
 - Compliance on left ventricle
 - myocardial pumping action
 - blood volume

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CVP and PCWP

- CVP = right-sided venous pressure and end-diastolic volume
 - Normal = 2-6cm H₂O
- PCWP- accurately reflects left-sided filling pressures by measuring the pressure in a static-free column of blood extending from the catheter tip to the left atrium
 - Normal = 5-12cm H₂O

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Factors Influencing Preload

- Affected by **volume** returning to ventricle
- Conditions that increase blood return to heart or decrease ejection of blood from heart (vasoconstriction, HTNao
- Anything that influences compliance- ability to fill ventricle is affected by the ability of the muscle to stretch

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Volume

- Venous return, total blood volume, atrial kick (atrial contraction)
- Example:
 - Hypovolemic patient- too little preload, not enough volume= decreased CO

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Increased Blood Volume or Decreased Ejection

- Any condition that increases blood volume to heart or decreases ejection of blood from heart
- Example: Pulmonary HTN- decreased ability of RV to pump which results in decreased ejection of blood from RV which increases RV preload
- Volume overload- increases circulating volume which increases R and L sided preload

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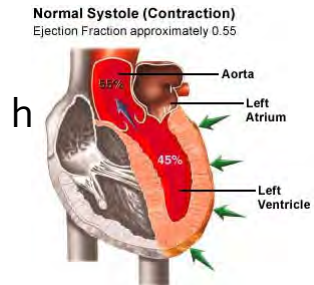
Compliance

- Stiffness or thickness of wall muscle
- Cannot stretch muscle to increase volume or over stretch of muscle reduces contractility
- Example: CHF- too much volume, too much preload, overstretch of muscle does not allow for complete emptying of ventricle- decreased CO

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Ejection Fraction

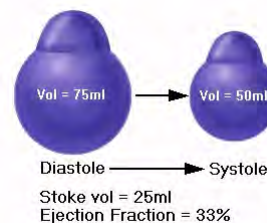
- Percent of Preload volume ejected from left ventricle per beat
- Not all preload volume with every



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Measurement of Ejection Fraction

- Measured during cardiac catheterization
- Normal EF is 70%
- Low EF reflects damage to myocardium i.e. MI, ischemia, chemotherapy



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Afterload

- The resistance, impedance or pressure the ventricle must overcome after semilunar valves are open to eject blood
- Affected by volume and mass of blood, size and thickness of ventricles, tone of vascular beds
- Measured by-
 - Right side- Pulmonary Vascular Resistance (PVR)
 - Left side- Systemic Vascular Resistance (SVR)

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Influences on Afterload

- Any condition that increases the pressure required for the ventricle to eject volume
 - Valve function problems
 - Vascular tone (peripheral vasoconstriction)
 - Blood viscosity (decreased Hct)
 - Obstruction of flow- (valvular stenosis, pulmonary embolus)

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Afterload Goal

- Decreased afterload to decrease workload of heart and decrease myocardial oxygen demand
- Example- Vasodilators relax vascular beds increasing vessel diameter and decreasing pressure required for ventricles to eject blood

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Contractility

- Inherent ability of myocardial muscle fibers to shorten and contract regardless of preload or afterload
- Myocardial muscle's contractile force
- Inotropy= ino (strength) tropy (enhancing)

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Decreased Contractility

- Hypoxia
- Hypothermia
- Electrolyte imbalance (hyponatremia, hypocalcemia, hypomagnesemia, hypokalemia)
- Beta Blockers
- Acidosis
- Cellular changes that affect stretch (CHF, cardiomyopathy)

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Increased Contractility

- Positive inotropic meds
- Increase in HR
- Sympathetic nervous system stimulation (epinephrine released)
- Hyperthyroidism
- Hypocalcemia

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Cardiac Output

- The amount of blood ejected from the heart over one minute
 - Normal is 5-6 liters/minute
- Influences on CO (all that we just talked on)
 - Preload (right sided and left sided)
 - Afterload
 - Contractility
 - Heart Rate
 - Atrioventricular synchrony

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Atrioventricular Synchrony

- Coordinated contraction pattern between atria and ventricles
- Influences
 - Ischemia
 - Infarction
 - Conduction deficits
 - Dysrhythmias
 - Artificial pacemakers

82

Significance of CO in Surgical Patients

- Low CO- Increase or decrease in preload
- Example- hypovolemia or hypervolemia, hemorrhage, tamponade

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CO in Surgical Patients

- Decreased myocardial contractility
- Examples- medications, MI, LV failure, dysrhythmias
 - Bradycardia- decreased CO due to HR
 - Tachycardia- decrease filling time which decreases CO

84

CO in Surgical Patients (cont.)

- Increased or Decreased Afterload
 - Body temperature
 - Valvular dysfunction
 - Vasoconstriction or dilation
 - Vasoactive drugs
 - Loss of neural control- spinal anesthesia

85

Increased Cardiac Output

- Hypervolemia
- Decreased afterload (vasodilation, sepsis)
- High metabolic states (hyperthyroid states, pregnancy)

86

Arterial Pressure Monitoring

- Indications
 - Cardiopulmonary bypass
 - Strict blood pressure control mandated
 - Multiple arterial blood gases or labs
 - Titration of vasoactive medication
 - Potential wide variation in blood pressure
 - carotid endarterectomy
 - aortic aneurysm resection
 - craniotomy

87

Arterial Line Placement

- Radial artery
 - Allen test should be performed before insertion
- Femoral artery
- Brachial artery

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Arterial Line Risks and Complications

- Vascular compromise i.e. thrombus, spasms
- Disconnection leading to hemorrhage
- Accidental injection of drugs or air
- Infection
- Nerve damage

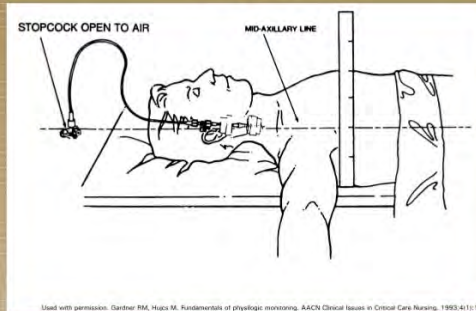
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Arterial Line Nursing Interventions

- Dampened Waveform
 - Loose connection
 - Catheter kink
 - Air
 - Clots
 - Equipment malfunction
 - Transducer not zeroed/ leveled
 - Monitor set to wrong scale

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PHLEBOSTATIC REFERENCE POINT



4th intercostal space, mid axillary line

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CVP Monitoring

- Indications for a central line
 - Rapid infusion of fluid or blood
 - Inability to cannulate peripheral veins
 - Administration of drugs that may cause peripheral sclerosis i.e. potassium, epinephrine, chemotherapeutic agents, aminoglycosides
 - Administration of hyperalimentation
 - Access site for temporary pacemaker
 - Assessment of fluid status

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CVP Measurement

- Placed in major vein leading to superior vena cava
- Intermittent readings by means of water manometer
- Continuous readings by means of pressure transducer
- Must be leveled at 4TH intercostal space (right atrium) for accurate readings

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CVP Readings

- RAP- Right Atrial Pressure
Normal- 2 to 6 mm Hg
- CVP- Mean Right Atrial Pressure
Normal- 2 to 6 mm Hg

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CVP Nursing Interventions

- Poor waveform-
 - Loose connection
 - Catheter kink
 - Air
 - Clots
 - Equipment malfunction
 - Transducer not zeroed/leveled
 - Monitor set to wrong scale

95

(Pulmonary Artery Pressure) PAP Monitoring

- | | |
|---|----------------------------------|
| ■ Renal failure | ■ Cardiac disease |
| ■ Obesity | ■ GI bleed |
| ■ Abdominal or head trauma | ■ COPD |
| ■ Thoracic or abdominal aortic aneurysm | ■ Prolonged orthopedic procedure |
| ■ Extensive intraabdominal resection | ■ Titration of vasoactive drugs |
| | ■ Sepsis |

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PAP Catheter

- Many types of catheters including multiple infusion ports, transvenous pacer, and cooximetric catheters
- Air interface port must be leveled at 4TH intercostal space for accurate reading

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PAP Measurement

- Measure PAP and PAOP through distal port
 - Systolic: 20 to 30 mm Hg
 - Diastolic: < 10 to 20 mm Hg
 - Mean PAP: < 20 mm Hg
 - PAOP (PCWP): MEAN = 4 to 12 mm Hg
 - To obtain, inflate balloon with air and allow syringe to passively refill
 - Balloon must not be inflated for more than 15 seconds- risk of pulmonary artery infarction

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Elevated Systolic PAP

- Pulmonary hypertension
- LV failure or mitral stenosis
- Constrictive pericarditis
- Cardiac tamponade
- Congestive heart failure
- Atrial or ventricular septal defects

99

Elevated Diastolic PAP

- LV failure
- Mitral stenosis
- Pulmonary hypertension
- Left-to-right shunts

100

Elevated PAOP (Pulmonary Artery Occlusion Pressure)

- Constrictive pericarditis
- LV failure
- Mitral valve dysfunction
- Fluid overload
- Ischemia

101

Decreased PAP and PAOP

- Hypotension
- Hypovolemia
- Vasodilating drugs causing decreased afterload

102

PA Risks and Complications

- Carotid artery puncture with insertion
- Infection
- Pulmonary artery rupture
- Thrombus or embolic event
- Air embolism
- Perforation of right ventricle
- Dysrhythmias
- Pneumothorax

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Neurologic Problems



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Neurologic Problems

- Delayed arousal
 - Anesthesia related
 - Metabolic related
 - Neurologic injury related
- Emergence delirium



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Neuro Pearls

- Hypoglossal Nerve: CN 12...controls majority of the tongue. To test it, ask them to stick it out.
- Mean Arterial Pressure (MAP): what the organs need to be perfused. Generally 60 is the lowest you want to see, many references say 65-100 for normal. Formula: Systolic plus 2 times the diastolic, divided by 3. $SBP + (2(DBP))/3$.

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More pearls

- Cerebral Perfusion Pressure (CPP)
 $CPP = MAP - ICP$. Should be above 70.
- For rising ICP (should be less than 20), or high end CPP, they will tell you to hyperventilate the patient to blow off CO_2 .

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Anesthesia Delayed Arousal

- Residual general anesthetic
- Hypoventilation- high concentrations of agents limits exhalation of agent
- Hypothermia

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Metabolic Delayed Arousal

- Severe electrolyte disturbance
- Thyroid dysfunction
- Hypocalcemia after parathyroid surgery
- Renal disease
- Hepatic dysfunction
- Diabetic ketoacidosis
- Malignant Hyperthermia

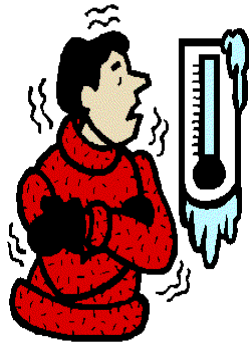
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Neurologic Injury: Delayed Arousal

- CVA
- Intracranial hemorrhage from HTN
- Air emboli from heart (patent foramen ovale), cardiac valves, intra-cardiac thrombi or atherosclerotic vessels
- Fat emboli

110

Delayed Arousal Treatment



- Assess oxygenation needs
- Reverse narcotics and benzodiazepines
- Warm patient if cold
- Treat electrolyte disturbances
- Identify and treat underlying cause

111

Emergence Delirium Causes

- Suspect hypoxia first!
- Anesthetic agents
 - ketamine, lidocaine, atropine, droperidol (skin crawling), scopolamine, neuromuscular blockers and inhalation agents
- Pain
- Urinary bladder distension
- Anxiety
- Sepsis

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Emergence Delirium (cont.)

Causes

- Substance abuse withdrawal
- Metabolic or endocrine problems
- Hypoglycemia
- Hyponatremia
- Hypo/Hyperthyroidism
- Hypercarbia
- Hypoadrenalism
- Cerebral hypoxia
- Post Traumatic Stress Syndrome

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Signs and Symptoms of Emergence Delirium

- Over-responsive to agitation
- Unable to follow commands
- Irrational talking/screaming/shouting
- Low saturation levels
- Restlessness
- Crying
- Disorientation/confusion
- Tachycardia



114

Treatment for Emergence Delirium

- Treat underlying causes
- Oxygen
- Narcotics or sedation
- Reversal agents
- Provide a quiet environment
- Speak softly and directly to patient
- Maintain patient safety

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Break Time



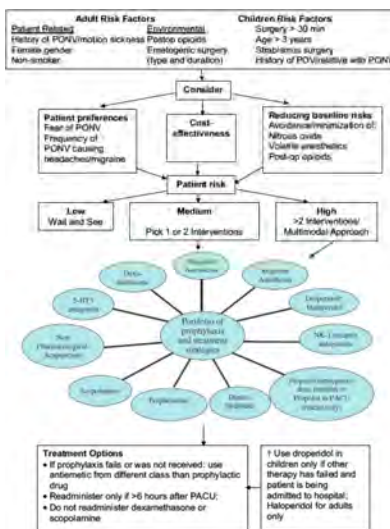
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PostOperative Nausea and Vomiting



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PONV...YUCK!!!



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Medical Consequences of PONV

- Patient discomfort (mild to severe)
- Wound dehiscence/delayed healing
- Aspiration
- Electrolyte imbalance and dehydration
- Interruption in or delay of
 - Oral drug therapy
 - Fluid intake
 - Eating

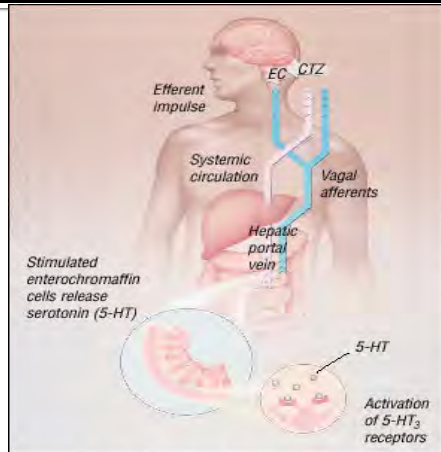
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Impact on Patient

- Feeling of embarrassment and degradation
- Possible dissatisfaction with the surgical procedure
- Increased anxiety
- Anticipatory nausea in future surgeries

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Physiology of PONV



Proposed peripheral and central pathways for initiation of the emetic response. Following release of 5-HT (serotonin) in the gut, 5-HT₃ receptors are activated, and impulses are transmitted to the CTZ and/or emetic center (EC) via vagal afferents. 5-HT may also stimulate the CTZ through the systemic circulation.²³

- CTZ Receptors
 - 5-HT₃, Histamine, Muscarinic, Dopamine
 - Opioid & Enkephalins
- Emetic Center
 - GI Tract
 - Pharynx
 - Vestibular
 - Visual & Taste

121

Patient-Related Risk of PONV

Factors

- Age- highest incidence in teens
- Gender- female 5.3% and male 3.3%
- Obesity (There is now evidence against this)
- Delayed gastric emptying- GERD or Hiatal Hernia
- Anesthetic history- previous PONV provided likelihood of happening again by 3 times
- Motion Sickness
- Anxiety/Stress
- Menstrual cycle
- Smoking- decreased PONV by 34%

122

Type of Surgery as Risk of PONV

- Breast Augmentation- 41.5%
- Adenotonsillectomy
- Ocular
- Gynecological

123

Surgery-Related Risk of PONV

- Strabismus
- Gastric suction
- Mask ventilation
- PreOp intake by mouth
- Duration of surgery
- PO postoperative fluids
- Anesthesia drugs



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Anesthesia Drugs as PONV

Risk of

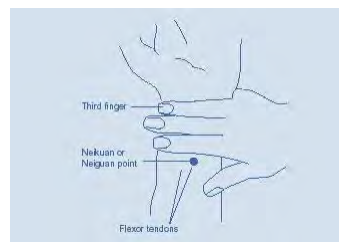
- Volatile anesthetics
- Nitrous oxide
- Opioids
- Ketamine
- Etomidate
- Neuromuscular reversal- neostigmine
 - Increase acetylcholine
 - Increase gastric motility

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Classifications of Agents

Antiemetic

- Phenothiazines
- Antihistamines
- Benzamide
- Anticholinergic
- Butyrophenones
- 5-HT₃ Receptor Antagonists



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Phenothiazines

- Chlorpromazine (THORAZINE)
- Prochlorperazine (COMPAZINE)
- Act via dopamine, histamine, and acetylcholine receptors
- Duration 6-12 hours
- Side effects: sedation, confusion, anticholinergic effects, hypotension, and extrapyramidal effects

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Antihistamines

- Promethazine (PHENERGAN)
- Hydroxyzine (VISTARIL or ATARAX)
- Dimenhydrinate (DRAMAMINE)
- Act via histamine receptor antagonist and anticholinergic effects
- Duration: 4 hours
- Side effects: sedation, apnea, anticholinergic effects, extrapyramidal effects, hypotension
- Caution in elderly

128

Benzamides

- Metoclopramide (REGLAN)
 - Promotes gastric emptying and GI transit thus decreasing aspiration-pneumonia risk
- Trimethobenzamide (TIGAN)
 - Long term antiemetic
- Action: Blocks dopamine, Ach
- Duration: 2-6 hours
- Side effects: drowsiness, restlessness, anxiety, dizziness, abdominal cramping on rapid administration, may exacerbate depression

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Anticholinergics

- Scopolamine (TRANSDERM-SCOP)
- Action: muscarinic/cholinergic receptor antagonist
- Duration: Patch 72 hours
- Side effects: dry mouth, tachycardia, sedation, visual changes, confusion, excitability
- Withdrawal symptoms including nausea, vomiting, headache, and dizziness (may occur when used for > 72 hours)

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Butyrophenones

- Droperidol (INAPSINE)
 - Highly effective at relatively low doses
 - Less effective in pediatric patients
- Action: primarily via dopamine receptors
- Prevents and treats nausea and vomiting
- Side effects: sedation, extrapyramidal effects, restlessness/anxiety, dysphoria, hypotension, peripheral vasodilation
- FDA "Black Box" warning

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Droperidol: Black Box Warning

- FDA issued in 2001
- At or below recommended doses patients have experienced QT prolongation/or torsade de pointes
- Some cases have occurred in patients with no known risk factors
- Droperidol should be used for treatment in those that fail to show response from other adequate treatments

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Droperidol: Black Box Warning

- 18 patients out of 100 that have had cardiovascular adverse reactions have died
- Be especially careful with patients who have liver problems or are taking Haldol
- Cautions: Patients that have prolonged QT, > 65yrs, alcohol abuse, use of benzodiazepines, and IV opioids
- Recommendations:
 - All patients should have a 12 lead EKG prior to droperidol

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5-HT₃ Receptor Antagonists

- Ondansetron (ZOFTRAN)
 - More effective for vomiting than nausea
- Dolasetron (ANZEMET)
- Granisetron (KYTRIL)
- Action: Antagonist at 5-HT₃ receptors
- Very popular drugs
- Duration: > 12 hours
- Side effects: headache, diarrhea, arrhythmias, constipation, malaise, dizziness

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Treatment for PONV

- Prevention/treatment of underlying cause(s) to decrease incidence
- Prevention is especially important in high risk patients and those with special concerns
- Minimally effective dose to reduce incidence of side effects
- Multi-Modal Therapy
- Aprepitant (emend)

135

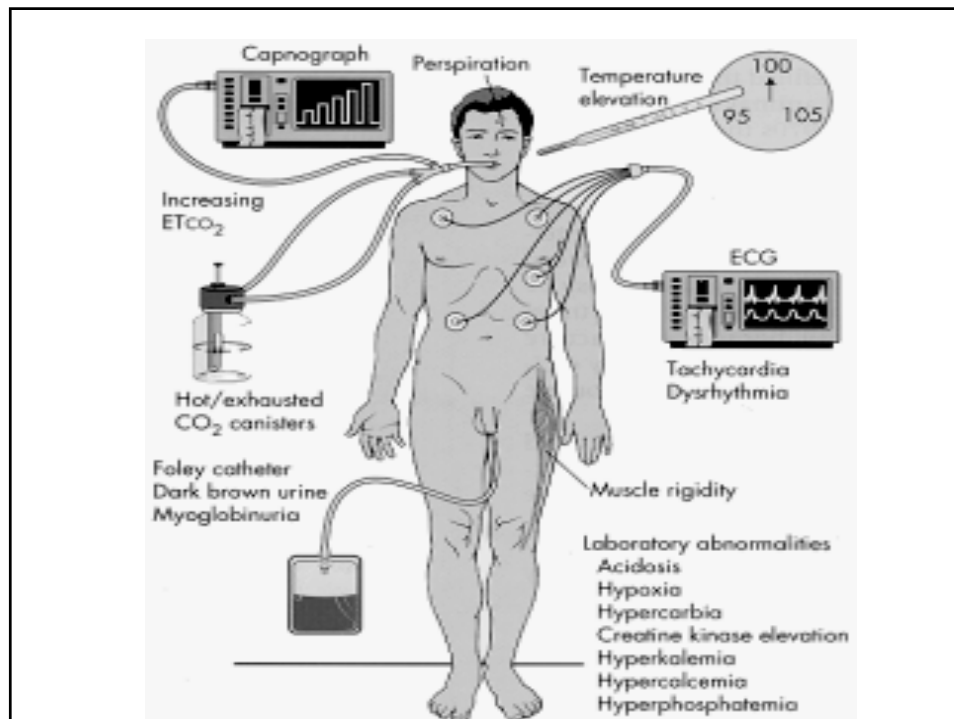
Multi-Modal Therapy for PONV

- Proven to be more effective than single agent therapy
- Increasingly common, especially for patients with intractable PONV
- Most effective drug combinations:
 - droperidol+5HT₃ antagonist or steroid (decadron)
- Combination of drug plus non-drug therapy may be effective

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Malignant Hyperthermia

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Hypermetabolic Syndrome

- Syndrome of unknown cause triggered in susceptible individuals
- Triggered by volatile anesthetic agents, depolarizing muscle relaxants, and/or stress
- ONLY disorder “caused” by anesthetic agents!

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Triggering Agents

- Volatile Inhalation Agents
 - Halothane
 - Enflurane
 - Isoflurane
 - Desflurane
 - Sevoflurane
- Depolarizing Muscle Relaxants
 - Succinylcholine

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Incidence

- Males are more prevalent than females
- Adults: 1 in 50,000
- Children: 1 in 15,000
- Many cases go undetected because:
 - Never anesthetized
 - Short anesthetic period
 - Mild cases go undiagnosed

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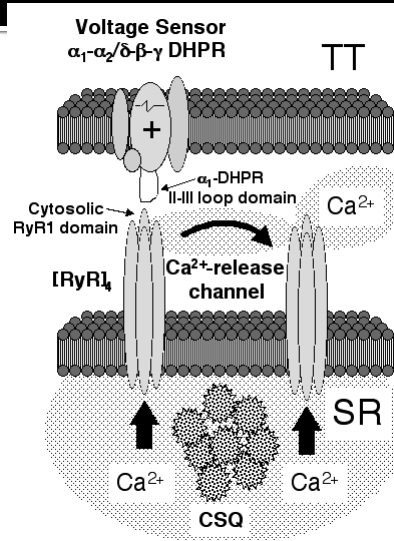
Autosomal Inheritance

- Trait appears in every generation
- Trait transmitted by an affected person to half of their children (on average)
- A person with MH will have a 50% chance of having a parent or sibling with MH and a 25% chance of having a grandparent or aunt/uncle with MH

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Normal Muscle Cell

- Calcium is stored inside muscle cell
- Muscle contracts and calcium leaves
- Muscle relaxes and calcium returns



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Muscle in MH

- Calcium leaves muscle therefore produces contraction
- Calcium is unable to get back into the muscle
- Muscle cannot relax causing a hypermetabolic state
- Increased extra cellular calcium
- ATP (adenosine triphosphate) production is triggered then triggered again

144

Hypermetabolic State

- With ATP over production there is much anaerobic metabolism and lactic acidosis occurring
 - Heat
 - Acid
 - Carbon dioxide
- More and more energy is demanded by the muscle cells
- Cellular ischemia occurs- rhabdomyolysis

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Early Signs and Symptoms

- CO₂ Production
- Muscle rigidity- masseter muscle spasm when succinylcholine given
- Tachycardia and/or dysrhythmias
- Skin color changes- flushed , mottled, then cyanosis
- Hyperkalemia

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Late Signs and Symptoms

- Pyrexia- temp may increase 1 degree F every 3 minutes
 - Temperatures recorded as high as 114°F
- Coagulopathy- DIC
- Rhabdomyolysis- muscle membrane breakdown
 - Cola colored urine

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Sequel to Crisis

- CNS damage
 - Coma
 - Convulsions
 - Paralysis
 - Blindness
- Renal failure
- Reoccurrence- up to 72 hours after first crisis
- Muscle edema- compartment syndrome

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Missed Diagnosis

- Shortened anesthetic periods
- Overlooked “signs”
- Ruled out reasons
- People don’t usually show a partial picture of MH

149

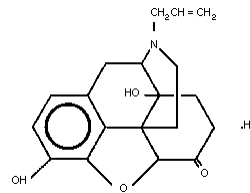
Treatment

- STOP surgery
- Administer 100% O₂ - by hand
- Administer Dantrolene
- Cool patient- pack in ice in hot spots
 - Carotid, axillary, groin
- Maintain fluid and electrolyte balance
- Monitor cardiac output

150

Dantrolene

- 1975
- Mortality rate before: 90%
- Mortality rate after: 10%
- Action: Causes skeletal muscle relaxation by preventing calcium flux across the sarcoplasmic reticulum
- Do you have Ryanolene?



151

Administering Dantrolene

- 2.5mg/kg up to a total of 10mg/kg
- Reconstitute 20mg vial with 60cc preservative free, sterile water
- Very crystalline- difficult to mix
- Dissolves in 2-3 minutes lifetime during a crisis)



152

PACU Care of the MH Patient

- Continue cooling until patient reaches 100°F
- Maintain fluid and electrolyte balance
 - Monitor CVP and/or PA
 - Treat metabolic acidosis- Bicarb per ABG
 - Monitor urine output
 - IV fluids
 - Lasix and/or Mannitol
 - Glucose/Dextrose and Insulin for hyperkalemia

153

Post Crisis Concerns

- Reappearance of initial episode- redose with Dantrolene
- Renal protection
- DIC
- Delayed awakening- cerebral edema
- Underlying surgical intervention

154

Significant Labs

- Electrolytes- hyperkalemia, hypercalcemia
- ABGs- elevated PaCO₂, metabolic and respiratory acidosis
- Glucose
- CK level- elevated- peaks in 6-12 hours
- PT/PTT
- Myoglobin- blood and urine

155

Hypothermia

156

Interventions for Hypothermia

- Forced air warmers
- Passive insulation
- Ambient room temperature
- Warm IV fluids
- Humidified O₂
- Reassess often
- Demerol for shivering

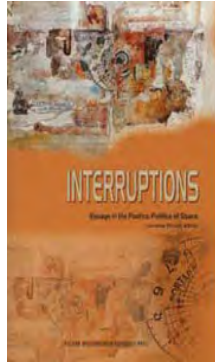
157

Thermoregulatory System

- Body attempts to maintain normothermia
- Balances heat production, heat loss, and heat conservation
- Thermoreceptors notify hypothalamus of body temperature changes

158

Surgical Interruptions



- Mechanisms of thermoregulatory system are interrupted during surgery
- General and regional anesthesia, as well as the environment, partially suspend the body's ability to balance the core temperature

159

Inadvertent Hypothermia

- Defined as core body temp $< 36^{\circ}\text{C}$
- Different than induced hypothermia
- Unwarmed surgical patients can lose up to 1.6°C during the first hour of surgery



160

At Risk Patients

- Parkinsons and CVA patients' ability to shiver is diminished
- Geriatric and pediatric patients have impaired or underdeveloped thermoregulatory mechanisms
- Patients that are at risk because of their decreased ability to produce heat include:
 - hypoglycemia
 - hypothyroidism
 - hypopituitarism
 - malnutrition



161

Laws of Heat Exchange

- Radiation
- Convection
- Conduction
- Evaporation

162

Radiation

- Accounts for 30% to 50% of body heat lost
- Heat is lost via infrared heat rays from a warmer object to cooler objects in the form of radiant energy
- Vasodilation causes more blood to pass closer to the skin's surface allowing more radiant energy to be lost
- The body's surface is an example of radiant heat loss

163

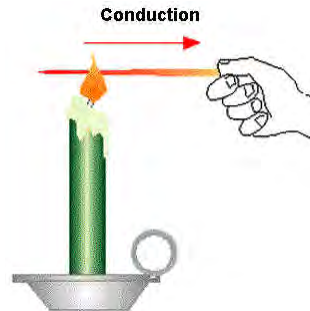
Convection

- Wind chill effect
- Accounts for 15% to 30% of body heat lost
- Air currents pass over the body
- Occur when the body surfaces are exposed
- Irrigants, air movement, and air conditioning also contribute to convective heat loss

164

Conduction

- Accounts for 20% to 35% of body heat lost
- Occurs via the transfer of heat from one object or media to another
- Example: warm body to surface



165

Evaporation

- Accounts for less than 10% of body heat loss
- Heat flow creates droplets that change to vapor
- Loss occurs through open body cavities and through respiration
- Wound irrigants, insensible water loss, prepping solutions, and wet dressings contribute to evaporative heat loss

166

Anesthesia

- Commonly causes hypothermia
- Impairs the body's ability to regulate its core temperature by vasoconstriction or vasodilation
- Impairs the body's response to hypothermia by behaviors as shivering because its direct effect on the brain (hypothalamus)

167

Anesthesia

- Largest drop in core body temperature is during the first hour of surgery
- General anesthesia has greater decrease intraoperatively
- With regional anesthesia (epidural and spinal)
 - patient is unable to shiver when very hypothermic
 - patient may report being normothermic although they may actually be hypothermic
 - warming is more difficult because impaired vasoconstriction

168

IV Fluids & Blood

- Convection and conduction contribute to heat loss during lavage or vigorous volume replacement
- Each liter of IV fluid or unit of blood infused at ambient temperature, decreases the mean body temp by approximately 0.25°C
- Warming blood and/or fluid will help combat hypothermia but will not prevent without other active heating methods

169

Complications Associated with Hypothermia

- Increased oxygen consumption
- Delayed emergence
- Shivering
- Coagulopathy
- Wound infections
- Cardiac dysfunction
- Altered Drug Effects
- Increased Mortality
- Prolonged Recovery



170

Wound Infections

- Hypothermia causes vasoconstriction, impaired immunity, decreased blood flow and oxygen to the surgical site which increase the patient's chances of acquiring a SSI or having delayed or impaired healing
- Hospital stay may increase by 5 to 20 days thus increasing medical costs
- Hypothermic patients are 3 times as likely to have a SSI

171

Cardiac Dysfunctions

- Association between intraoperative mild hypothermia and postoperative cardiac events including MI, arrest, unstable angina, or Vtach in patients with CAD
- Temperature differences as little as 1.3°C during surgery were found to effect the postoperative recovery of patients at high risk for CAD

172

Cardiac Dysfunctions (cont.)

- One study found that 50% of hypothermic patients were hypokalemic and half of those patients developed cardiac complications and respiratory muscle insufficiency
- Decrease in heart rate and cardiac output
- Increase in systemic vascular resistance and central venous pressure
- Sinus bradycardia, prolonged PR and QT interval and widened QRS complex

173

Coagulopathy

- Blood loss is a complication of hypothermia
- Increased allogeneic blood requirement
- Impaired platelet function
- Reduced intrinsic and extrinsic clotting
- Increased fibrinolysis
- Blood viscosity increases by 2% to 3% per degree of decrease in temperature

174

Altered Drug Effects

- Body's ability to metabolize propofol and the muscle relaxants vecuronium and antracurium is affected by hypothermia
- Stored anesthesia drugs recirculate when released during rewarming, potentially causing decreased chest wall compliance, hypoventilation, respiratory acidosis, and hemodynamic instability

175

Altered Drug Effects (cont.)

- Caution giving insulin because hypothermia impairs the liver and pancreas functions which decreases the release of insulin and the uptake of glucose by the tissues causing an elevated glucose
 - What happens when they "warm up"?!

176

Increased Mortality

- Organ dysfunction and death of hypothermic patients has been reported in studies during and after elective AAA repair
- Survival rates following elective AAA repair were 8 times higher in normothermic patients

177

Prolonged Recovery

- Complications secondary to hypothermia often require prolonged hospitalization or recovery resulting in increased medical costs
- Inverse relationship exist between admitting temperatures and recovery times
 - patients with lower admitting temperatures take longer to recover

178

Passive Prevention

- Passive and active external warming modalities should be used
- Passive modalities include increasing the OR suite's temperature, applying warm blankets and covering the patient's head
- Layering blankets of any type does not significantly reduce further heat loss

179

Active Prevention

- Active modalities include using conductive blankets, convective blankets and fluid warming
- Skin is the main source of heat loss
- Active warming should start preoperatively by using a convective blanket over the patient, a conductive blanket over and under the patient and fluid warmers

180

Preoperative Warming

- Increases the core temperature slightly
- Increases the peripheral compartment temperature from which the body draws heat during anesthesia (adults- legs)
- This additional heat transfer is sufficient to counterbalance the initial drop in core temperature during the first hour of surgery

181

Warming Devices

- Conductive Blankets
- Convective Blankets
- Fluid Warmers



182

Conductive Blanket

- Advantages
 - Water can store and transfer more heat than air
 - Effective at preventing heat loss initially
 - Safe for elderly or fragile patients because of their slow rewarming effect
- Disadvantages
 - Should be warmed prior to use
 - Not as effective as convective blankets in warming a patient
 - Where thought to be associated with increases in pressure ulcers in the OR

183

Convective Blanket

- Advantages
 - Relatively inexpensive
 - Covers large surface area
 - Most effective single modality
 - Rapid rewarming
- Disadvantages
 - Concern regarding the rapid rewarming effect
 - Assess patient's skin often
 - Used cautiously during crossclamping d/t excess warming of lower extremities leading to an imbalance of oxygen supply and demand

184

Fluid Warmers

- Advantages
 - Can help prevent heat loss by maintaining normothermia
 - Warm fluids through a central line will help maintain core temp
 - Help cavities maintain temp
- Disadvantages
 - Not effective as a modality alone or for rewarming

185

On the Horizon....

- Radiant Heat Lamps to suppress post-operative shivering
- Non-disposable resistive warming system
 - low voltage direct current
 - 15V of direct current through semiconductive carbon-fiber woven fabric
 - intrinsically safe

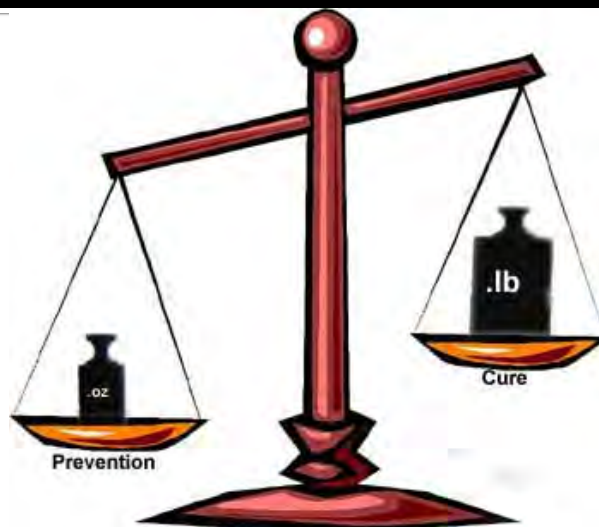
186

Nursing Interventions

- Choosing a warming method
- Maintaining Normothermia
- Using Convective & Conductive Temperature Regulating Blankets
- Using Blood & Fluid Warming Devices

187

An ounce of prevention...



188

Practice Question

A 16 year old male is scheduled for knee arthroscopy. During the interview process he tells the nurse that an uncle has previously had a problem during anesthesia. The nurse suspects:

- A. Malignant hyperthermia
- B. Grave's Disease
- C. Allergy to anesthetic drugs
- D. Hyperparathyroidism

A

189

Practice Question

Which of the following body temperatures is indicative of hypothermia in the Perianesthesia setting:

- A. 100.4F/ 38C
- B. 95F/ 35C
- C. 99.6F/ 37.6C
- D. 97.8F/ 36.5C

B

190

Practice Question

Following endoscopic sinus surgery, the patient becomes agitated, makes crowing sounds while breathing and the O2 saturation drops below 80. The perianesthesia nurse prepares to:

- A. Suction the oropharynx
- B. Administer 100mg methylprednisolone IV piggyback
- C. Insert an oral airway
- D. Provide positive pressure ventilation with 100% O2

D

191

Practice Question

_____ is used to treat
Malignant Hyperthermia:

Dantrolene

192

Practice Question

Gastric suctioning and vomiting
can result in _____:

Metabolic alkalosis

193

Practice Question

Increasing ventilatory depth
and/or rate is one intervention for:

Respiratory acidosis

194

Practice Question

The most sensitive indicator of neurologic deterioration is

_____:

decreased level of consciousness

195

Practice Question

Which of the following statements present critical information concerning airway management of an infant in the PACU:

- A. The infant's narrow larynx is easily compromised by edema
- B. The infant's trachea is proportionally longer than that of an adult
- C. The infant's crying interferes with adequate lung ventilation
- D. Atropine cannot be given to infants under the age of 1 year

A

196

Question of the week!

Courtesy www.cpancapa.org

1

During a postoperative phone call, the patient describes symptoms of akathisia. The perianesthesia nurse suspects a reaction to:

1. fentanyl.
- ☒ 2. prochlorperazine.
3. ondansetron.
4. dexamethasone.

Domain: Physiological Needs

Content Area: Appropriate medication regimen (including, but not limited to, minimal interruption of normal medication regimen, preemptive interventions)

Reference: Hodgson, B., and Kizior, R. Saunders Nursing Drug Handbook 2015. Saunders (Elsevier), 2015. p 999.

2

OSHA mandates that when inserting an intravenous fluid access in a patient, the PACU nurse must:

- 1. wash hands.
- 2. wear gloves.
- 3. use an antibacterial gel.
- 4. wear eye goggles.

Domain: Safety Needs

Content Area: Protect patient from harm and take preventive measures related to exposure to infections and diseases.

Reference: Odom-Forren, J, Drain's Peri-Anesthesia Nursing: A Critical Care Approach (6th). Elsevier Saunders, 2013. pp 45-46.

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Before initiating a blood transfusion, the perianesthesia nurse ensures that the patient received:

1. diazepam.
2. involuntary consent.
3. informed consent.
4. diphenhydramine.

CPAN/CAPA Test Blueprint

Domain: Safety Needs

Content Area: Deliver, document, and communicate care based on accepted national standards of perianesthesia nursing practice and applicable laws, guidelines, and regulations

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 89.

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6

The perioperative nurse reviews the discharge instructions with a patient in the presence of a caregiver. It has been noted that the patient has formal education up to the 8th grade. The perioperative nurse is aware that:

1. discharge instructions are best understood if written at fifth-grade level.
2. reading materials beyond a very basic level is acceptable.
3. Comprehension of written information develops through high school level courses.
4. post operative discharge instructions are written at a 9th grade reading level.

CPAN/CAPA Test Blueprint

Domain: Behavioral/Cognitive Needs

Content Area: Assess patient/family/significant other's ability to learn, learning style (for example kinetic, auditory, visual), readiness to learn, and barriers to learning

Reference: Litwack, K. Clinical Coach for Effective Perioperative Nursing Care, F.A. Davis Co., 2009. p 42.

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A 79 y.o. patient admitted to the PACU following general anesthesia is restless, agitated, screaming and demanding to go home. The perianesthesia nurse's **BEST** response is to:

1. obtain an order for Valium to calm the patient down.
2. apply a full body restraint on the patient for safety.
3. have patient sign the "Discharge Against Medical Advice" form.
4. remain with patient and frequently assess oxygenation.

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Stability of respiratory system

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Domain: Physiological Needs

Content Area: Stability of respiratory system

10

Despite having received written instructions, the patient reports for surgery on the wrong day. When questioned, the patient replies, "It said today." The perianesthesia nurse reviews the record, observing that the patient had used an "X" to sign the surgical consent form. At this time, the nurse:

1. assesses the patient's visual and hearing acuity.
2. contacts the patient's companion.
3. rewrites the instructions using larger print.
4. asks the patient to verbalize the instructions.

CPAN/CAPA Test Blueprint

Domain: Behavioral/Cognitive Needs

Content Area: Assess patient/family/significant other's ability to learn, learning style (for example kinetic, auditory, visual), readiness to learn, and barriers to learning

Reference: American Society of PeriAnesthesia Nurses. Schick, L. and Windle, P., (Editors) Third Edition. Perianesthesia Nursing Core Curriculum – Preoperative, Phase I and Phase II PACU Nursing. WB Saunders, St. Louis, MO., 2015. p 89.

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12

A PACU nurse manager receives a report that two PACU nurses who do not work well together are discussing their conflicts in front of a patient. Before taking disciplinary action, the nurse manager will **FIRST**:

1. discuss solution of the conflict with the perioperative nursing director.
2. acknowledge the existence of a conflict and identify a solution.
3. send a written warning about the incident to the nurses involved.
4. refer both nurses to human resources to deal with the conflict.

CPAN/CAPA Test Blueprint

Domain: Behavioral/Cognitive Needs

Content Area: Recognize and respect patient/family/significant other diversity (for example, cultural, religious, physical, age-related, cognitive, and language differences)

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 24-27.

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1. can be delegated to nurse as determined by hospital/ facility policy.
2. should be witnessed by a close family member.
3. is solely the responsibility of the surgeon's nurse or office staff.
4. is to be obtained prior to arrival at the surgical facility.

CPAN/CAPA Test Blueprint

Domain: Behavioral/Cognitive Needs

Content Area: Regulatory, legal, and ethical guidelines (for example, Patient Bill of Rights, advance directives, informed consent, HIPAA)

Reference: Litwack, K. Clinical Coach for Effective Perioperative Nursing Care, F.A. Davis Co., 2009. p 23.

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An 80 year old male arrives in PACU status post splenectomy for abdominal trauma sustained in an MVA. Patient has significant blood loss in the OR. BP 90/60, HR 125, RR 30. A set of arterial blood gases are obtained. Results: pH 7.27, pO₂ 120, CO₂ 30, and HCO₃⁻ 18. What is the best INITIAL treatment for this patient?

1. Start a dopamine infusion at 5mcg/kg/minute
2. Increase the ventilator tidal volume
3. Administer a bolus of isotonic fluids
4. Administer sodium bicarbonate 1mg/kg

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Fluid and electrolyte management

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18

The perianesthesia nurse is giving discharge instructions to a patient status post surgery with application of a cast. Which of the following should be included?

1. Expect increased pain as healing occurs
2. Discoloration of skin is normal
3. Report tightening of cast
4. Adjust the cast as needed for comfort

CPAN/CAPA Test Blueprint

Domain: Behavioral/Cognitive Needs

Content Area: Provide patient/family/significant other education, and evaluate understanding related to discharge care (including, but not limited to, ambulation, diet, wound care, physical therapy, effects on sexuality, pain management, catheter care, equipment and medical devices, routine course, and/or potential complications)

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20

An elderly patient requires re-intubation in PACU and a Propofol infusion is started. The patient's blood pressure has decreased to 88/45mmHg. The FIRST consideration of the perianesthesia nurse should be that:

1. the medication should be changed because the drug is not tolerated well in geriatric patients.
2. transient hypotension is not unusual with this medication. Observe only.
3. unless accompanied by tachycardia, no intervention usually required.
4. the infusion rate may be adjusted because the drug may cause dose-related hypotension.

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Stability of cardiovascular/peripheral vascular/hematological systems

Reference: Hodgson, B., and Kizior, R. Saunders Nursing Drug Handbook 2015. Saunders (Elsevier), 2015. p 1007-1009.

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22

When providing discharge instructions to a patient following a rhytidectomy, the perianesthesia nurse informs the patient to call the MD for:

1. numbness of cheeks.
2. hair loss on the incision line.
3. numbness of ears.
4. hematoma formation.

CPAN/CAPA Test Blueprint

Domain: Behavioral/Cognitive Needs

Content Area: Discharge care (including, but not limited to, ambulation, diet, wound care, physical therapy, effects on sexuality, pain management, catheter care, equipment and medical devices, routine course, and/or potential complications)

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 637.

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24

A 32-year-old s/p total abdominal hysterectomy is admitted to PACU after having returned to the OR for cauterization of an arterial bleed. As a Jehovah Witness (JW), the patient signed a refusal for blood consent prior to surgery. On arrival to PACU the patient is pale, diaphoretic, and lethargic. Anesthesia reports an EBL =1200 cc and hemoglobin 7.2. Current vitals HR 136, BP 72/35 and oxygen saturation 88% on a non-rebreather. The perianesthesia nurse has an order to transfuse 2 units of PRBC's stat. The nurse's response is to:

1. visit with patients' family about the grim outcome and obtain consent to permit this transfusion.
2. petition the leader of the Jehovah's Witness church to allow a one-time life-saving transfusion.
3. abide by the JW religious preferences and refuse to follow the doctor's transfusion orders.
4. follow the doctor's order and prepare to administer 2 units packed red blood cells (PRBC).

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4. follow the doctor's order and prepare to administer 2 units packed red blood cells (PRBC).

26

A 36-year-old woman with a history of minor problems with asthma had a D & C under general anesthesia. She received 0.5 cc naloxone at the end of the procedure and came to the PACU awake. After 1 hour in the PACU, her saturation dropped to 88% and she was coughing frequently, producing pink, frothy sputum. Upon auscultation, expiratory wheezes could be heard on both lung fields. The patient is exhibiting signs/symptoms of:

1. respiratory depression.
2. pulmonary embolus.
3. obstructive lung disease.
4. pulmonary edema.

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Stability of respiratory system

Reference: American Society of PeriAnesthesia Nurses. Schick, L. and Windle, P., (Editors) Third Edition. Perianesthesia Nursing Core Curriculum – Preoperative, Phase I and Phase II PACU Nursing. WB Saunders, St. Louis, MO., 2015. p 472.

27

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Content Area: Stability of respiratory system

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28

While taking a preoperative history the patient reports an allergy to bananas. The perianesthesia nurse understands that the patient is at risk for an allergy to:

1. succinylcholine.
2. chlorhexidine.
3. povidone iodine.
4. latex products.

CPAN/CAPA Test Blueprint

Domain: Safety Needs

Content Area: Protect patient from harm and take preventive measures related to adverse environmental influences (including, but not limited to, latex and/or equipment failure)

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 233.

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29

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30

Preoperative instructions for patients with a history of COPD would include:

1. efforts to maximize lung volume.
2. limiting oral fluid intake the day before surgery.
3. limiting use of inhalers.
4. efforts to treat inspiratory airflow obstruction.

CPAN/CAPA Test Blueprint

Domain: Behavioral/Cognitive Needs

Content Area: Provide patient/family/significant other education, and evaluate understanding related to: Admission procedures Preparations for procedures/surgery Anesthesia expectations Postanesthesia recovery settings

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 677.

31

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Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 677.

32

A patient arrives to the PACU status post right femoral-popliteal bypass surgery. The perianesthesia nurse explains to the patient that the rationale for using a doppler to assess pedal pulses is because:

1. calloused fingers are error prone.
2. pulses are commonly present but not palpable.
3. a monophasic sound is the expected finding.
4. a biphasic sound requires surgeon notification

CPAN/CAPA Test Blueprint

Domain: Behavioral/Cognitive Needs

Content Area: Provide patient/family/significant other education, and evaluate understanding related to post-anesthesia recovery settings.

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 531-532.

33

A patient arrives to the PACU status post right femoral-popliteal bypass surgery. The perianesthesia nurse explains to the patient that the rationale for using a doppler to assess pedal pulses is because:

1. calloused fingers are error prone.
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Content Area: Provide patient/family/significant other education, and evaluate understanding related to post-anesthesia recovery settings.

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 531-532.

34

What EKG changes would the perianesthesia nurse see with a hyperkalemic patient?

1. Tall, narrow peaked T waves
2. Elevated ST segment
3. Q-T interval is lengthened
4. P-R interval is shortened

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Stability of fluids and electrolytes

Reference: Urden, L., et al. Thelan's Critical Care Nursing, Diagnosis and Management, 7th Ed. Elsevier, 2014. p 311.

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35

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Reference: Urden, L., et al. Thelan's Critical Care Nursing, Diagnosis and Management, 7th Ed. Elsevier, 2014. p 311.

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36

An elderly patient with urinary retention postoperatively refuses catheterization. The perianesthesia nurse is aware that:

1. insertion of the catheter could be considered false imprisonment.
2. insertion of the catheter can be done as part of the protocol.
3. insertion of the catheter is assault and battery.
4. it is acceptable to perform an in and out catheterization.

CPAN/CAPA Test Blueprint

Domain: Behavioral/Cognitive needs

Content Area: advance directives, Patient Bill of Rights and informed consent

Reference: American Society of PeriAnesthesia Nurses. Schick, L. and Windle, P., (Editors) Third Edition. Perianesthesia Nursing Core Curriculum – Preoperative, Phase I and Phase II PACU Nursing. WB Saunders, St. Louis, MO., 2015. p 23.

37

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38

A preoperative patient asks the perianesthesia nurse what the facility is doing to prevent postoperative surgical site infections. With knowledge of the surgical care improvement project (SCIP), the nurse informs the patient that preoperatively antibiotics should be administered:

- 1. within 60 minutes of incision time.
- 2. within 90 minutes of incision time.
- 3. prior to leaving the holding area.
- 4. upon arrival to the facility.

Domain: Safety Needs

Content Area: Deliver, document, and communicate care based on accepted national standards of perianesthesia nursing practice and applicable laws, guidelines, and regulations

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. Pg 50.

39

A preoperative patient asks the perianesthesia nurse what the facility is doing to prevent postoperative surgical site infections. With knowledge of the surgical care improvement project (SCIP), the nurse informs the patient that preoperatively antibiotics should be administered:

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Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. Pg 50.

40

After a procedure under general anesthesia, a patient was admitted to PACU. The perianesthesia nurse knows that a SpO₂ of 88% on room air is most likely due to:

- 1. lack of supplemental oxygenation during transport.
- 2. no administration of a reversal agent intraoperatively.
- 3. being instructed by the anesthesiologist to deep-breathe.
- 4. being ventilated by the anesthesiologist prior to transfer.

Domain: Physiological Needs

Content Area: Stability of cardiovascular/peripheral vascular/hematological systems

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. Pp 415-417.

41

After a procedure under general anesthesia, a patient was admitted to PACU. The perianesthesia nurse knows that a SpO₂ of 88% on room air is most likely due to:

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Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. Pp 415-417.

42

The perianesthesia nurse recognizes which of the following as a test used for evaluation of the glomerular filtration rate?

1. Osmolarity
2. Proteinuria
3. Sodium
4. Specific gravity

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Stability of renal system

Reference: American Society of PeriAnesthesia Nurses. Schick, L. and Windle, P., (Editors) Third Edition. Perianesthesia Nursing Core Curriculum – Preoperative, Phase I and Phase II PACU Nursing. WB Saunders, St. Louis, MO., 2015. p 866.

43

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44

During a pre-admission testing interview a patient informed the nurse of problems with severe snoring. The perianesthesia nurse is aware that the assessment tool with the highest accuracy to predict severe obstructive sleep apnea is:

1. GASP assessment
2. STOPBang Questionnaire.
3. Epworth Sleepiness Scale.
4. Berlin Questionnaire.

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Stability of respiratory system

Reference: American Society of PeriAnesthesia Nurses. Perianesthesia Nursing Standards, Practice Recommendations, and Interpretive Statements 2015 - 2017. ASPAN, Cherry Hill, NJ, 2015. p 74.

45

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Content Area: Stability of respiratory system

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46

The perianesthesia nurse discusses with the anesthesia provider a post operative pain management plan for the OSA patient that includes:

1. use of PCA with basal mode.
2. use of multimodal approach.
3. frequent oral narcotic dosing.
4. titrating opioids quickly.

CPAN/CAPA Test Blueprint

Domain: Safety Needs

Content Area: Deliver, document, and communicate care based on accepted national standards of perianesthesia nursing practice and applicable laws, guidelines, and regulations

Reference: Pasero, C and McCaffery, M. Pain Assessment and Pharmacological Management, Elsevier Health Sciences, 2011. p 515-517.

47

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Reference: Pasero, C and McCaffery, M. Pain Assessment and Pharmacological Management, Elsevier Health Sciences, 2011. p 515-517.

48

Which of the following patients has a greater risk of post-operative nausea and vomiting (PONV)?

1. Female with no history of smoking
2. Male with no history of PONV
3. Female with no history of motion sickness
4. Male with no history of hiatal hernia

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Physiological comfort (including, but not limited to, relief from pain, shivering, nausea and vomiting; temperature control and appropriate positioning)

Reference: American Society of PeriAnesthesia Nurses. Schick, L. and Windle, P., (Editors) Third Edition. Perianesthesia Nursing Core Curriculum – Preoperative, Phase I and Phase II PACU Nursing. WB Saunders, St. Louis, MO., 2015. p 1251.

49

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50

A two year old weighing 35 pounds enters the PACU following excision of a hemangioma of the right cheek. The anesthesiologist orders morphine 0.05 mg/kg/hr IV. How many mg. would you administer?

1. 0.4mg.
2. 0.8mg.
3. 1.5mg.
4. 1.6mg.

CPAN/CAPA Test Blueprint

Domain:Physiological Needs

Content Area: Appropriate medication regimen (including, but not limited to, minimal interruption of normal medication regimen, preemptive interventions)

Reference: American Society of PeriAnesthesia Nurses. Schick, L. and Windle, P., (Editors) Third Edition. Perianesthesia Nursing Core Curriculum – Preoperative, Phase I and Phase II PACU Nursing. WB Saunders, St. Louis, MO., 2015. p 244.

51

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52

The perianesthesia nurse recognizes that a late sign of malignant hyperthermia is:

1. elevated end tidal carbon dioxide.
2. muscle rigidity.
3. fever.
4. tachycardia

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Stability of musculoskeletal system

Reference: Urden, L., et al. Thelan's Critical Care Nursing, Diagnosis and Management, 7th Ed. Elsevier, 2014. p 1113.

53

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54

When discharging a 5 year old child to home after a tonsillectomy, the nurse ensures the family understands the importance of reporting which symptom immediately?

1. Frequent or continuous swallowing
2. Cream colored membrane in the back of the throat
3. Blood-tinged mucus
4. Bad breath

CPAN/CAPA Test Blueprint

Domain: Behavioral/Cognitive Needs

Content Area: Provide patient/family/significant other education, and evaluate understanding related to discharge care (including, but not limited to, ambulation, diet, wound care, physical therapy, effects on sexuality, pain management, catheter care, equipment and medical devices, routine course, and/or potential complications)

Reference: Hockenberry, M., Wilson, D. Wong's Nursing Care of Infants and Children. 10th Ed. CV. Mosby, 2015. p 1175.

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55

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56

The **TREATMENT OF CHOICE** for magnesium toxicity is:

1. calcium gluconate.
2. ammonium chloride.
3. sodium bicarbonate.
4. potassium chloride

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Stability of neurological system

Reference: Hodgson, B., and Kizior, R. Saunders Nursing Drug Handbook 2015. Saunders (Elsevier), 2015. p 178.

57

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Domain: Physiological Needs

Content Area: Stability of neurological system

Reference: Hodgson, B., and Kizior, R. Saunders Nursing Drug Handbook 2015. Saunders (Elsevier), 2015. p 178.

58

A report from the anesthesia provider reveals the patient received a neuromuscular block and reversal with pyridostigmine with atropine followed by succinylcholine for emergent reintubation for severe laryngospasm. The perianesthesia nurse understands the patient will experience prolonged neuromuscular blockade because:

1. cholinesterases, in conjunction with succinylcholine, cause the muscle cells to remain depolarized thus blocked.
2. anti-cholinesterases are inactivated by succinylcholine leaving the non-depolarizing muscle relaxant unopposed.
3. pseudocholinesterase metabolizes succinylcholine and anti-cholinesterases inhibit pseudocholinesterase.
4. non-depolarizing muscle relaxants act synergistically with depolarizing muscle relaxants.

Domain: Behavioral/Cognitive Needs

Content Area: Provide patient/family/significant other education, and evaluate understanding related to anesthesia expectations

Reference: American Society of PeriAnesthesia Nurses. Schick, L. and Windle, P., (Editors) Third Edition. Perianesthesia Nursing Core Curriculum – Preoperative, Phase I and Phase II PACU Nursing. WB Saunders, St. Louis, MO., 2015. p 392, 394, 400.

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59

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60

A patient who arrives in the post anesthesia care unit still paralyzed from muscle relaxants is on a ventilator. The patient's color is good and the blood pressure is +20% preanesthetic level but the patient is obviously unable to move and is not responding. This patient's Aldrete score is:

1. 2.
2. 4.
3. 0.
4. 8.

Domain: Physiological Needs

Content Area: Stability of respiratory system

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 22.

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61

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62

An intubated patient in the PACU is now awake and following commands. In preparation for routine "awake" endotracheal extubation, the perianesthesia nurse interprets that the muscle relaxant is fully reversed when the patient demonstrates:

1. A vital capacity equal to 6ml/kg.
2. Sustained head lift of 5 seconds.
3. Sustained tetanic contraction below 5 seconds with peripheral nerve stimulator.
4. Regular respiratory rate above 27 breaths/min in the adult.

Domain: Physiological Needs

Content Area: Stability of musculoskeletal system

Reference: American Society of PeriAnesthesia Nurses. Schick, L. and Windle, P., (Editors) Third Edition. Perianesthesia Nursing Core Curriculum – Preoperative, Phase I and Phase II PACU Nursing. WB Saunders, St. Louis, MO., 2015. p 545.

63

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64

The perianesthesia nurse is aware that effective communication during the preoperative interview provides pertinent information and can:

1. substitute the need of patient's rapport and family support.
2. replace the pre-operative written instructions.
3. decrease the need for a medical language interpreter.
4. decrease the incidence of postoperative complications.

Domain: Safety Needs

Content Area: Deliver, document, and communicate care based on accepted national standards of perianesthesia nursing practice and applicable laws, guidelines, and regulations

Reference: Litwack, K. Clinical Coach for Effective Perioperative Nursing Care, F.A. Davis Co., 2009. p 1.

65

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66

Rapid correction of chronic respiratory acidosis **MOST LIKELY** results in:

1. ventricular fibrillation.
2. respiratory alkalosis.
3. convulsions.
4. apnea.

Domain: Physiological Needs

Content Area: Stability of neurological system

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 175.

67

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2. respiratory alkalosis.
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4. apnea.

Domain: Physiological Needs

Content Area: Stability of neurological system

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 175.

68

In providing preoperative teaching to a patient requesting spinal anesthesia, the perianesthesia nurse is aware that an absolute contraindication for spinal anesthesia is:

- 1. patient refusal.
- 2. chronic back pain.
- 3. sickle cell anemia.
- 4. multiple sclerosis.

Domain: Behavioral and Cognitive Needs

Content Area: Provide patient/family/significant other education and evaluate understanding related to advance directives, Patient Bill of Rights and informed consent

Reference: American Society of PeriAnesthesia Nurses. Schick, L. and Windle, P., (Editors) Third Edition. Perianesthesia Nursing Core Curriculum – Preoperative, Phase I and Phase II PACU Nursing. WB Saunders, St. Louis, MO., 2015. p 361.

69

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- 1. **patient refusal.**
- 2. chronic back pain.
- 3. sickle cell anemia.
- 4. multiple sclerosis.

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Reference: American Society of PeriAnesthesia Nurses. Schick, L. and Windle, P., (Editors) Third Edition. Perianesthesia Nursing Core Curriculum – Preoperative, Phase I and Phase II PACU Nursing. WB Saunders, St. Louis, MO., 2015. p 361.

70

The perianesthesia nurse monitors a patient's respiratory status with capnography. Patient's temperature is 95.9 F. On rewarming the patient, the perianesthesia nurse appraises the increase of ETCO₂ as:

1. a decrease in metabolic rate.
2. normal as metabolic rate increases.
3. an untoward reaction.
4. pulmonary hypoperfusion.

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Maintenance of normothermia

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 360-361.

71

The perianesthesia nurse monitors a patient's respiratory status with capnography. Patient's temperature is 95.9 F. On rewarming the patient, the perianesthesia nurse appraises the increase of ETCO₂ as:

1. a decrease in metabolic rate.
2. normal as metabolic rate increases.
3. an untoward reaction.
4. pulmonary hypoperfusion.

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Maintenance of normothermia

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 360-361.

72

A patient received an interscalene peripheral nerve block. The perianesthesia nurse suspects that the patient is exhibiting symptoms of Horner's Syndrome when the following is observed:

1. tremors of extremities.
2. circumoral numbness.
3. increased sweating
4. hoarseness of voice.

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Stability of Neurological System

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 337.

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73

A patient received an interscalene peripheral nerve block. The perianesthesia nurse suspects that the patient is exhibiting symptoms of Horner's Syndrome when the following is observed:

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Content Area: Stability of Neurological System

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74

A patient arrives in Phase I PACU receiving oxygen by nasal cannula at 2 liters per minute. The wave forms on pulse oximetry are initially normal with an oxygen saturation of 100%. Ten minutes after arrival to Phase I the alarm is sounded and the nurse notes that the monitor has stopped tracking the pulse. The perianesthesia nurse should **FIRST**:

1. increase the oxygen flow rate to the nasal cannula.
2. move the probe from the finger to the earlobe.
3. encourage patient to cough and deep breathe.
4. evaluate the patient for adverse physiological changes.

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Stability of respiratory system

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 357.

75

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CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Stability of respiratory system

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 357.

76

By minimizing harm and maximizing comfort, the perianesthesia nurse exhibits which of the following principles?

1. Respect for autonomy
2. Justice
3. Confidentiality
4. Non-maleficence

CPAN/CAPA Test Blueprint

Domain: Behavioral/Cognitive Needs

Content Area: Provide patient/family/significant other education and evaluate understanding related to postoperative pain control measures, including pharmacological and nonpharmacological interventions

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 88.

77

By minimizing harm and maximizing comfort, the perianesthesia nurse exhibits which of the following principles?

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CPAN/CAPA Test Blueprint

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Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 88.

78

The perianesthesia nurse knows that "Standard Precautions" applies to all body fluids except:

1. GI contents.
2. urine.
3. sweat.
4. semen.

CPAN/CAPA Test Blueprint

Domain: Safety Needs

Content Area: Deliver, document, and communicate care based on accepted national standards of perianesthesia nursing practice and applicable laws, guidelines, and regulations

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 46, 48.

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79

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80

In the treatment of post anesthesia emergence phenomena associated with ketamine administration, the drug of choice is:

1. diazepam.
2. meperidine hydrochloride.
3. morphine.
4. chlorpromazine hydrochloride.

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Appropriate Medication Regimen

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 275.

81

In the treatment of post anesthesia emergence phenomena associated with ketamine administration, the drug of choice is:

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CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Appropriate Medication Regimen

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 275.

82

A patient in PACU status post right ankle ORIF develops sternal chest pain, tachypnea, and pallor. The monitor shows a blood pressure of 84/45. Oxygen is applied via NRM at 10L per minute and ECG shows new onset of atrial fibrillation. The PACU nurse initiates intervention and plans initial treatment which is to:

1. check the patient's blood sugar.
2. **relieve chest pain.**
3. prepare for possible code blue.
4. examine fractured limb for bleeding.

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Stability of cardiovascular/peripheral vascular/hemotological systems

Reference: Odom-Forren, J. Drain's PeriAnesthesia Nursing: A Critical Care Approach. 6th Ed. Elsevier Saunders, 2013. p 399-400.

83

The perianesthesia nurse provides discharge instructions to a patient who underwent liposuction with abdominoplasty. Instructions should include:

1. removal of the compression garment upon arrival home.
2. Avoid straining, lifting and exercising for 4-6 weeks.
3. sleeping in supine position with the head of the bed down.
4. maintaining an upright position when walking.

CPAN/CAPA Test Blueprint

Domain: Behavioral/Cognitive Needs

Content Area: Provide patient/family/significant other education, and evaluate understanding related to discharge care (including, but not limited to, ambulation, diet, wound care, physical therapy, effects on sexuality, pain management, catheter care, equipment and medical devices, routine course, and/or potential complications)

Reference: American Society of PeriAnesthesia Nurses. Schick, L. and Windle, P., (Editors) Third Edition. Perianesthesia Nursing Core Curriculum – Preoperative, Phase I and Phase II PACU Nursing. WB Saunders, St. Louis, MO., 2015. p 1122-1123.

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85

Discharge teachings on positioning for post vitrectomy patients include:

1. head elevated.
2. face down.
3. supine with head flat.
4. trendelenburg.

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Stability of neurological system

Reference: American Society of PeriAnesthesia Nurses. Schick, L. and Windle, P., (Editors) Third Edition. Perianesthesia Nursing Core Curriculum – Preoperative, Phase I and Phase II PACU Nursing. WB Saunders, St. Louis, MO., 2015. p 972.

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86

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87

Which of the following drugs produces an inactive metabolite making it suitable for use in patients with end stage renal disease?

1. Hydromorphone
2. Morphine
3. Meperidine
4. Tizanidine

CPAN/CAPA Test Blueprint

Domain: Physiological Needs

Content Area: Appropriate medication regimen (including, but not limited to, minimal interruption of normal medication regimen, preemptive interventions)

Reference: Urden, L., et al. Thelan's Critical Care Nursing, Diagnosis and Management, 7th Ed. Elsevier, 2014. p 156-159.

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88

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89

During preoperative screening, a 28-year-old male reports cocaine use. The perianesthesia nurse informs the patient that cocaine use may cause:

1. significant vasodilation and decreased blood pressure.
2. depression of the central nervous system.
3. myocardial ischemia with cardiovascular instability.
4. postoperative hypotension and bradycardia.

Domain: Behavioral/Cognitive Needs

Content Area: Impact of existing medical conditions (for example, diabetes, COPD, hypertension) on current surgery/procedure

Reference: Fleisher, L. and Roizen, M. Essence of Anesthesia Practice, 3rd Ed. Elsevier Health Sciences, December, 2011. p 596.

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90

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91

A teaching plan based upon the developmental stage of a 9-year-old patient includes:

1. allowing the patient to assist with care.
2. restricting the use of diagrams.
3. internalizing previously learned values to focus on identity.
4. limiting the amount of communication techniques.

Domain: Behavioral/Cognitive Needs

Content Area: Recognize and respect patient/family/significant other diversity (for example, cultural, religious, physical, age-related, cognitive, and language differences)

Reference: American Society of PeriAnesthesia Nurses. Schick, L. and Windle, P., (Editors) Third Edition. *Perianesthesia Nursing Core Curriculum – Preoperative, Phase I and Phase II PACU Nursing*. WB Saunders, St. Louis, MO., 2015. p 203, 206.

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92

A teaching plan based upon the developmental stage of a 9-year-old patient includes:

1. **allowing the patient to assist with care.**
2. restricting the use of diagrams.
3. internalizing previously learned values to focus on identity.
4. limiting the amount of communication techniques.

Domain: Behavioral/Cognitive Needs

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Reference: American Society of PeriAnesthesia Nurses. Schick, L. and Windle, P., (Editors) Third Edition. Perianesthesia Nursing Core Curriculum – Preoperative, Phase I and Phase II PACU Nursing. WB Saunders, St. Louis, MO., 2015. p 203, 206.

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93

While caring for a pregnant patient postoperatively, the PACU nurse notes that the patient's fetal heart rate has increased from 152 to 172 and the patient is experiencing abdominal cramping. In which position should the patient be placed?

1. Trendelenburg position
2. Supine with head flat
3. Left lateral tilt
4. Semi-Fowler's position

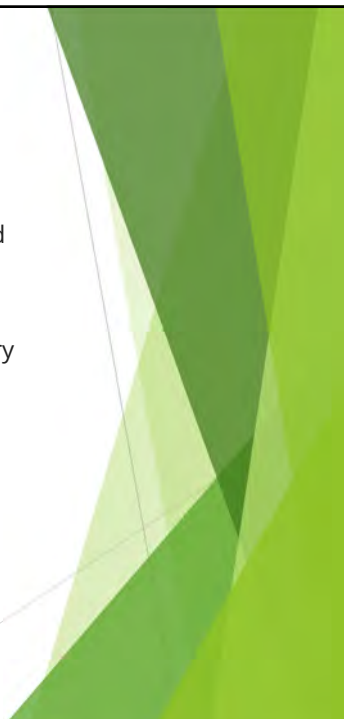
94



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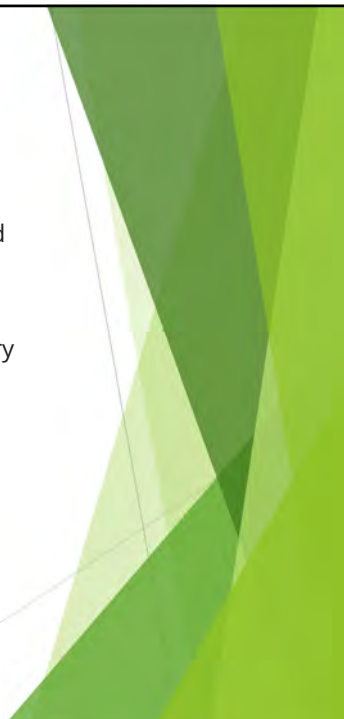
95



The preoperative nurse is aware that the BEST method to prepare a 5 year old child for surgery is to provide:

1. video to be reviewed more than once with explanation and demonstration on the day of surgery.
2. a phone call to the guardian 5-7 days prior to surgery with explanation of the preoperative process.
3. pictures, diagrams and models for practice and handling of actual equipment.
4. an opportunity for the child to speak with nurse without the guardian present.


96



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97



A 12 year old with known sickle cell disease and autism has undergone an inguinal hernia repair. The perianesthesia nurse is aware that the MAIN surgical risk to this patient is:

1. hypoxia from anesthesia.
2. end-organ damage.
3. renal insufficiency.
4. toxicity from heavy metal.


98



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4. toxicity from heavy metal.


99



A patient is MOST likely to experience sickle cell crisis following:

1. exposure to inhalation agents.
2. administration of ketorolac.
3. injection and absorption of a nerve block.
4. depressed respiratory function.

100



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