

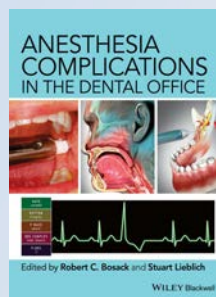
Kentucky, 2024



Bosack



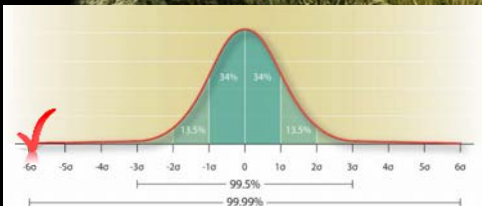
- DDS, Loyola University, 1979
- Oral and Maxillofacial Surgery – Cook County Hospital, 1982
- Private Practice 40+ years
- Clinical Assistant Professor, University of Illinois
- Board Certification
 - American Board of Oral and Maxillofacial Surgery
 - National Dental Board of Anesthesiology
- Co-editor – Anesthesia Complications in the Dental Office, Wiley, 2015.
- 2023 ADSA Heidbrink Award
- Disclosure: Owner, Executive Director - Dental Anesthesia Online, Ltd.



ANESTHESIALAND

1. Providing anesthesia is a serious and complex medical procedure
2. Standardized sedation training remains an unmet need
3. Simple, easily correctable deviations can lead to mortality
4. Patient variability is stochastic
5. You can't fix a bad anesthetic

- Rational, orderly
- Pre-determined
- Consistent, disciplined
- Conservative



✓ Patient Screening
 Team Training
 Techniques

✓ Patient Screening
 ✓ Team Training
 ✓ Techniques

The Upper Airway
 Psychological Disorders
 Substance Use Disorder
 Disorders of Feeding
 The Elderly Patient

Establishing Validity of the Team Sedation Model
 Creating your own SIM center – Immersive Learning
 The New Lost Airway and Ventilation Algorithm
 Cognitive Bias

Anesthesia for prolonged procedures

DENTAL
PATIENT SAFETY
 FOUNDATION

A basic premise of this continuum as that the loss of response to verbal and tactile stimulation is an important clinical milestone to the depth of anesthesia and the likelihood of adverse events.	“Procedural” Sedation			
	Minimal (Anxiolysis)	Moderate (Conscious)	Deep	General Anesthesia
	Normal Response to Voice	<u>Purposeful</u> response to voice or touch	<u>Purposeful</u> response after repeated or painful stimulation	Unarousable
	Is airway intervention needed?	No	No	Maybe
	Is spontaneous ventilation adequate?	Yes	Yes	Maybe
	Is blood pressure and heart rate adequate?	YES	Usually	Usually
Practice Guidelines for Moderate Procedural Sedation and Analgesia 2018. Anesthesiol 138:437-479, 2018. <small>A Report by the American Society of Anesthesiologists Task Force on Moderate Procedural Sedation and Analgesia, the American Association of Oral and Maxillofacial Surgeons, American College of Radiology, American Dental Association, American Society of Dentist Anesthesiologists, and Society of Interventional Radiology.</small>				



Patient Screening

✓ The Upper Airway
Psychological Disorders
Substance Use Disorder
Disorders of Feeding
The Elderly Patient

✓ Patient Screening
Team Training
Techniques

What seems to be the ongoing problem with airway?



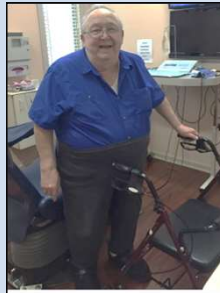
The Difficult Airway

Anatomic



"Composite airway failure"

Physiologic



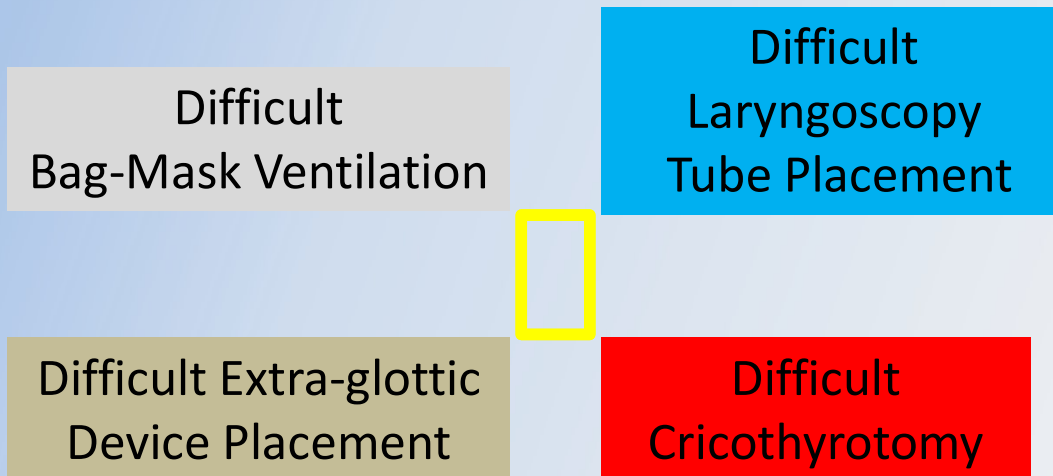
Contextual

- Human factors
- Ability to tolerate distraction
- Paradox of choice
- Cognitive bias
- Skills and ability to perform



Patient Selection: Upper Airway Anatomy

4 dimensions of difficulty



Difficult BMV ROMAN	Difficult EGD RODS	Difficult Intubation LEMON	Difficult FONA SMART
Radiation Restriction	Restriction	Look externally Listen	Surgery
Obesity / Obstruction	Obesity / Obstruction	Evaluate 3-3-2	Mass

Predictors don't guarantee failure
Absence of predictors don't guarantee success

Male Sex			
Age > 55	Short thyromental distance STIFF lungs	Obesity / Obstruction	Radiation
No teeth		Neck Mobility Restriction	Tumor

Patient Selection: History

- Hx of airway difficulty

- DO YOU SNORE ?**
- Prior anesthetic trouble ???
- Mobility issues
 - C-spine injury / Arthritis / DM
 - Radiation
 - Tumor / Pus / Obesity
- Prior neck surgery, radiation

S	Snore
T	Tired
O	Observed Apnea
P	Pressure (HTN)
B	BMI > 35 kg/m ²
A	Age > 50 years
N	Neck > 17"
G	Gender Male

Chung, F., et. al. STOP-Bang Questionnaire: A Practical Approach to Screen for Obstructive Sleep Apnea. Chest 149: 631-8, 2016.

Patient Selection: Exam

Outside In

- Age
- Obesity
- Facial hair, position of jaws, teeth
- Flexibility of the mandible
- Size and flexibility of the neck, scars
- Tongue
 - Size, location, strength
 - Size of space that you can push tongue into
- Size of oropharyngeal opening
- Voice



Full Face Mask ROMAN	LMA RODS	Intubation LEMON	Cricoid SMART
Radiation Restriction	Restriction	Look / Listen	Surgery
Obesity / Obstruction	Obesity / Obstruction	Evaluate 3-3-2 (size)	Mass
Mask Seal Mallampati	Distorted Anatomy	Mallampati (size)	Anatomy
Age > 55	Short thyromental Distance (size)	Obesity Obstruction	Radiation
No teeth		Neck Mobility Restriction	Tumor

1. Age

Generalized ↓ in soft tissue elasticity

How old do you look? > How old are you?

2. Obesity

adds difficulty to all 4 dimensions of airway management



- BMI ?
- Cervical obesity crowds/collapses the upper airway
- Abdominal obesity
 - Restrictive lung disease (severe)
 - ↓ compliance
 - ↓ FRC
 - Is metabolically active, consumes O₂ and decreases "safe apnea time"

3. Facial Hair, Position of jaws, teeth

Can you seal the mask?



Beard



Tooth support



Class II or III mandible



Can you ventilate with adequate mask seal?

Can you splint the airway open with 20mmHg?

Lateral fat
Thick, short neck



Large tongue
In a small space

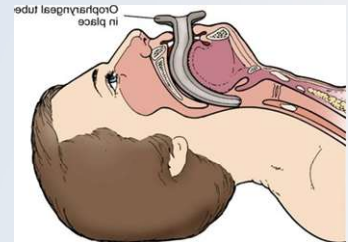
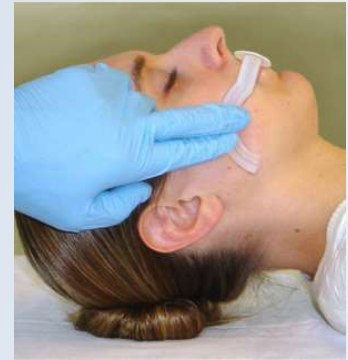


Oropharyngeal Airway

immediately relieves upper airway obstruction in spite of good mask seal, head tilt and jaw thrust



Courtesy of Ken Reed, DMD

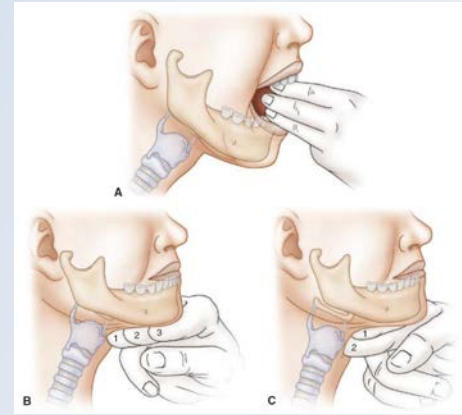


Nasopharyngeal Airway



4. Size and flexibility of mandible

Ability to protrude / bite upper lip



3 - 3 - 2

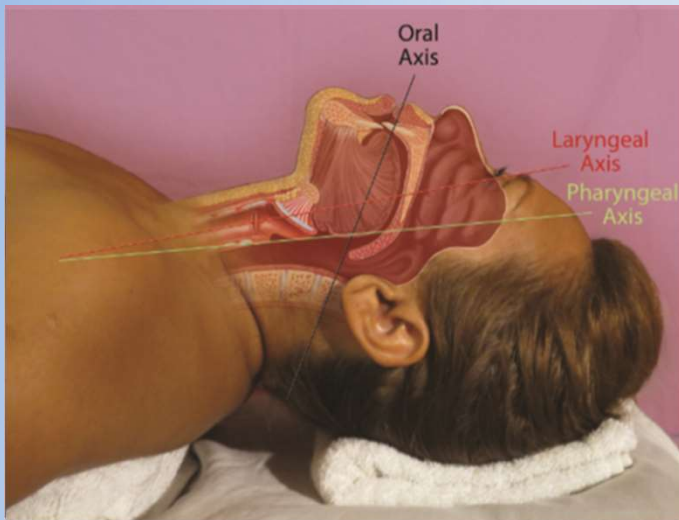
Focus on jaw protrusion

It is difficult to protrude the jaw without extending the upper C-spine

Pulling jaw forward is
much more effective
than extending the neck



5. Size and flexibility of the neck



5. Size and flexibility of the neck, scars



The “anterior” larynx

Or “posterior” mandible



6. The Tongue

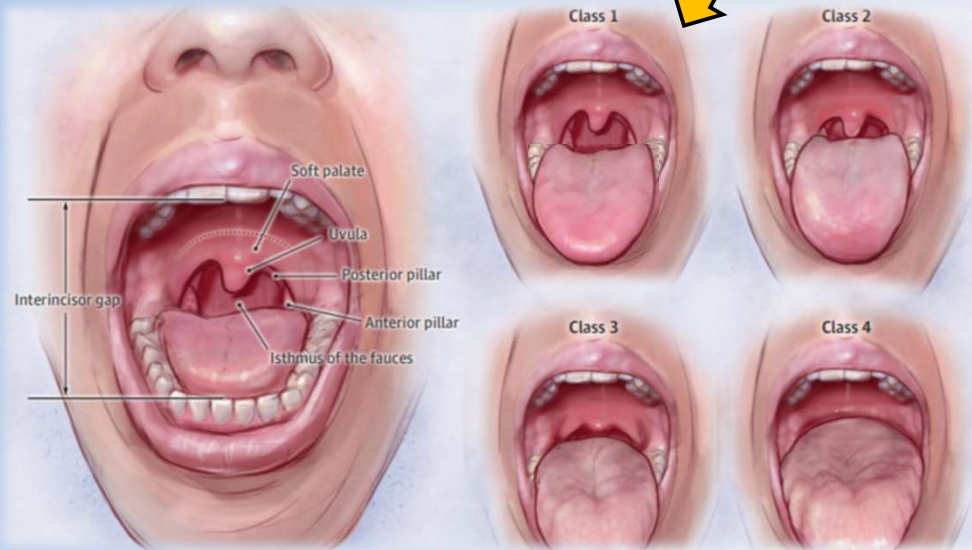
size and strength



6. The Tongue

Mallampati

sitting, extended neck, tongue out, no phonation



6. The Tongue

Size of the space where you can displace the tongue



7. The size of the oropharynx

width, depth, turgidity

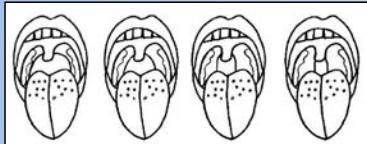


Figure 2. Pharyngeal grading system. Class I = palatopharyngeal arch intersects at the edge of the tongue. Class II = palatopharyngeal arch intersects at 25% or more of the tongue diameter. Class III = palatopharyngeal arch intersects at 50% or more of the tongue diameter. Class IV = palatopharyngeal arch intersects at 75% or more of the tongue diameter.

Narrow, crowded



shallow



deep



Turgid*

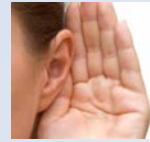


8. The Voice

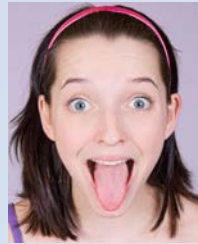
“underwater” or “hot potato” voice



"3 second Gestalt"



1. Say "Hello"
2. Open wide
3. Tip head up
4. Bite lower lip
5. Stick your tongue out
 - Tongue is enemy #1
 - Small mouth is enemy #2



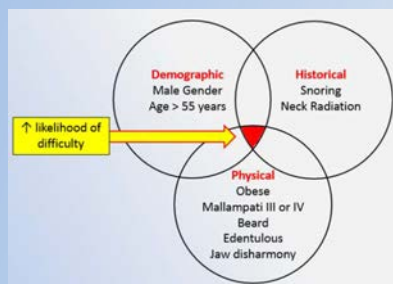
Predicting a difficult airway

How about...

EVERYBODY HAS A DIFFICULT AIRWAY !

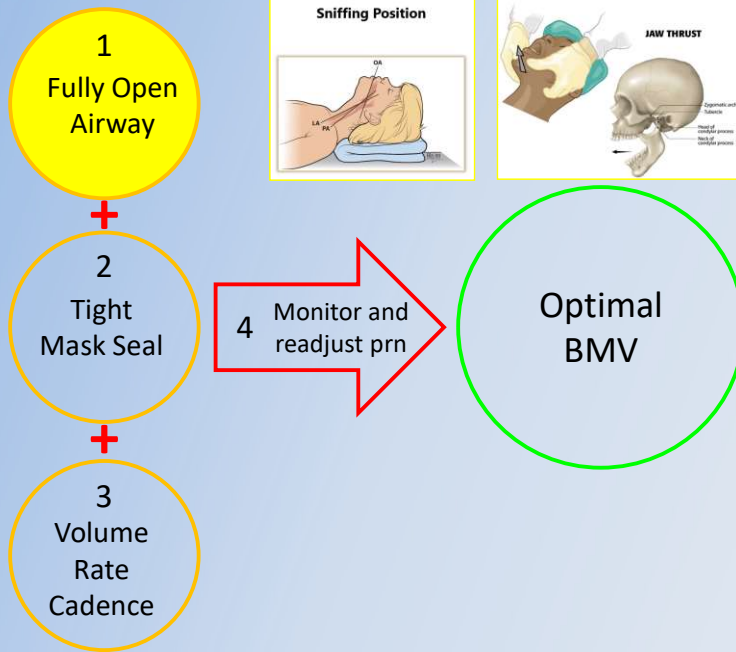


"Composite airway failure"

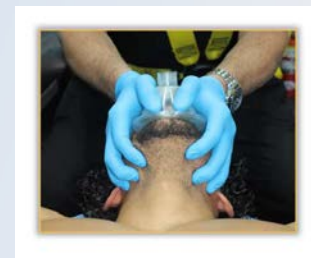
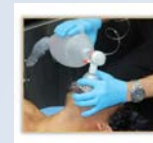
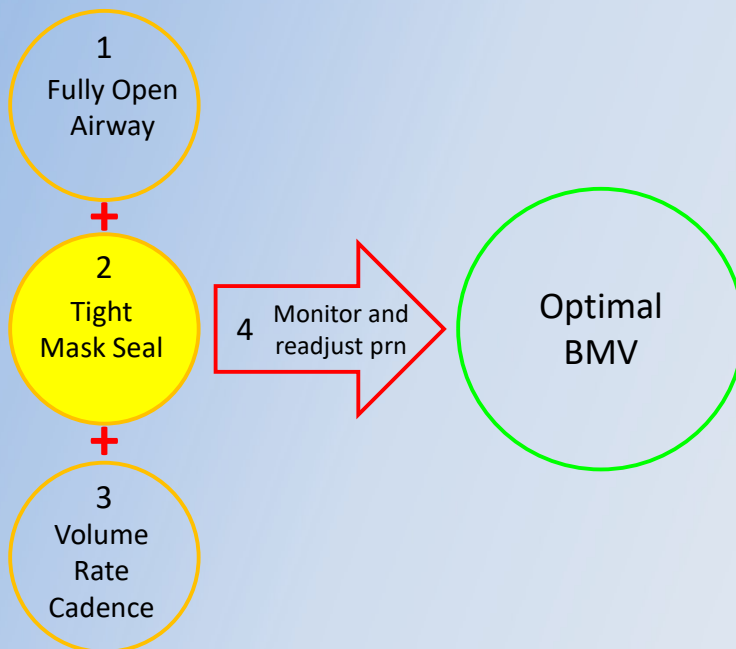


Speech Fac: (7)	M.D.
13309	Pulmonary & Critical Care Consultants
Name: David	Ps
Address:	Date: 7/17/11
R Pr cleared for oral surgery	
<input type="checkbox"/> Label	
Refill: 0 - 1 - 2 - 3 - 4 - P900	
<input type="checkbox"/> May Substitute	M.D.
<input type="checkbox"/> May Not Substitute	M.D.

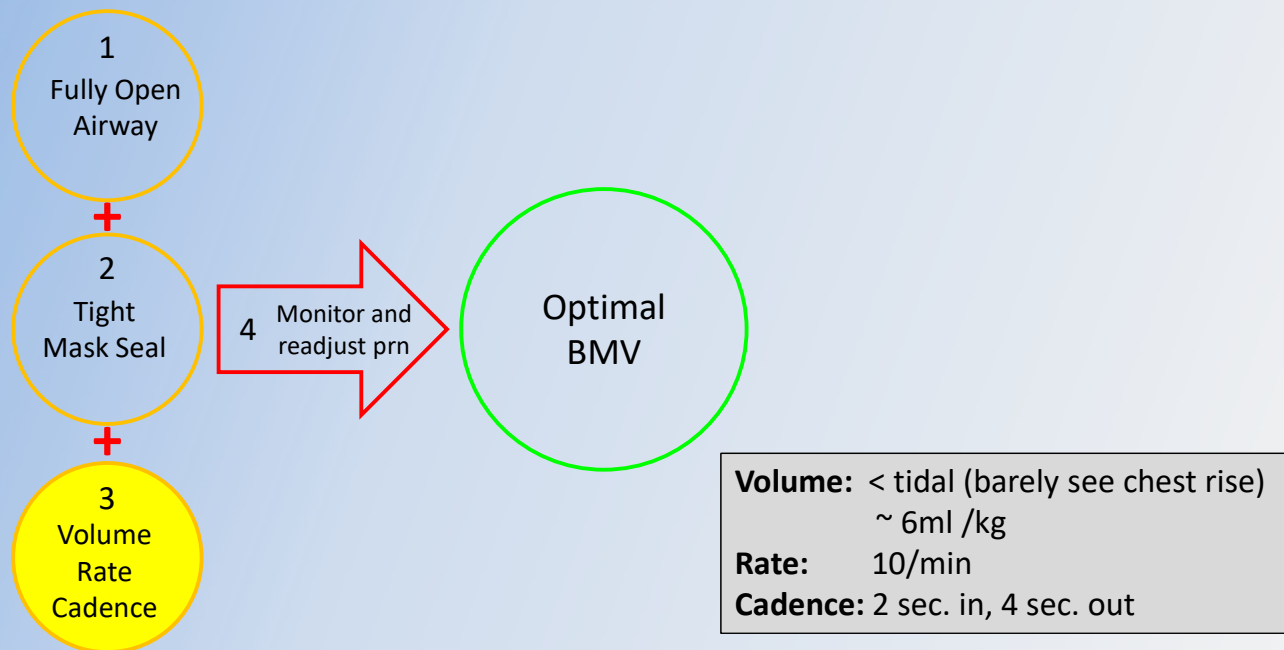
4 critical factors to optimal, dynamic BMV



4 critical factors to optimal, dynamic BMV



4 critical factors to optimal, dynamic BMV

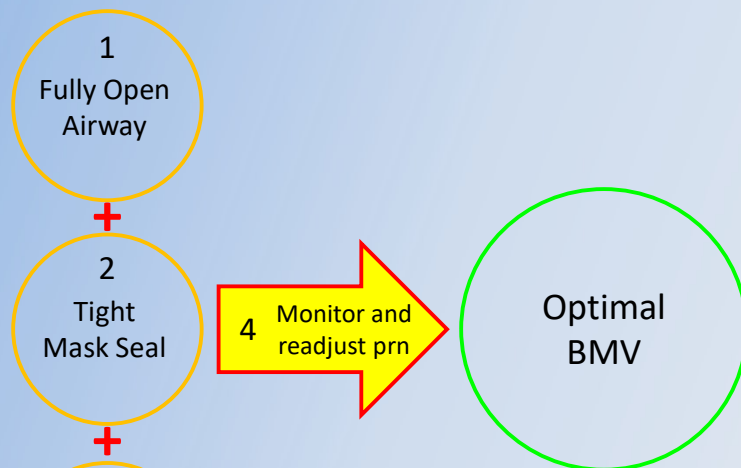


If you are nervous and hyperventilate...

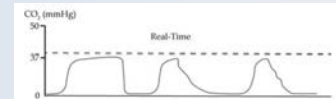
Depth and frequency

1. Hyperinflation – breath stacking
2. ↑ intrathoracic pressure, ↓ venous return, ↓ BP
3. Cerebral vasoconstriction
4. Gastric distension – worsen ability to ventilate
5. Emesis

4 critical factors to optimal, dynamic BMV



- < 20cm H₂O....
- Lung sounds
- Capnography with BMV
 - Rate
 - Volume
 - Confirm perfusion
 - Confirm mask seal
- SpO₂



SpO₂ not improving?



Bag ventilation has failed

you were not good at it
wrong patient – seal impossible
laryngeal obstruction
high airway pressures

• Depending on provider proficiency, comfort level and patient condition consider an attempt to awaken patient, if possible. Otherwise, must continue....

PATIENT CONDITION**:

- Depth of sedation
- Muscle tone: rigid / flaccid / breath-holding
- Duration of apnea prior to ↓SpO₂
- Ability to tolerate hypoxemia

POSSIBILITIES :

Tongue – Larynx – Lungs – Brain

- 1. Oversedation**
 - a. Airway Obstruction - Tongue
 - b. Hypoventilation, apnea
- 2. Laryngeal Obstruction**
 - a. Laryngospasm – crowing
 - b. Laryngeal edema
 - Anaphylaxis
 - ACE Inhibitor angioedema
 - c. Foreign body – tooth, emesis
 - d. Clot, mucous plug
 - e. Undiagnosed pathology
- 3. Bronchospasm**
 - a. Asthma, allergy, aspiration
 - b. Negative pressure pulmonary edema
 - c. Fire
- 4. Opioid-Induced Rigidity**
- 5. Seizure / Hypoglycemia / Stroke**

Patient Screening

✓ Patient Screening
Team Training
Techniques

✓ The Upper Airway
Psychological Disorders
Substance Use Disorder
Disorders of Feeding
The Elderly Patient

Psychological disorders

terminology options: psychiatric; illness; disorder

Select Axis 1 Psychiatric Disorders

Anxiety Disorders

- General Anxiety Disorders
- Panic Attacks

Mood Disorders

- Depression, dysthymia (mild depression)
- Bipolar illness

Thought Disorders

- Psychosis
- Schizophrenia (disorders of thought, perception, emotion, behavior)

Substance Use Disorder

- Addiction

Treatment modalities

1. Psychotherapy – face your demons
2. Psychopharmacotherapy “take your pills”
3. Group / family therapy
4. CBT
5. ECT



Children in Crisis Fill Hospital E.R.s

Long waits for mental-health treatment
leave families desperate for help

BY DAN FROSCHE
AND MELANIE EVANS

Dr. Christopher Lucas
shuttled from room to room,
checking on the children with

ting herself after being bul-
lied over social media.

The youngest new patient
was a 5-year-old boy with be-
havioral disorders. His
mother had tried to get him



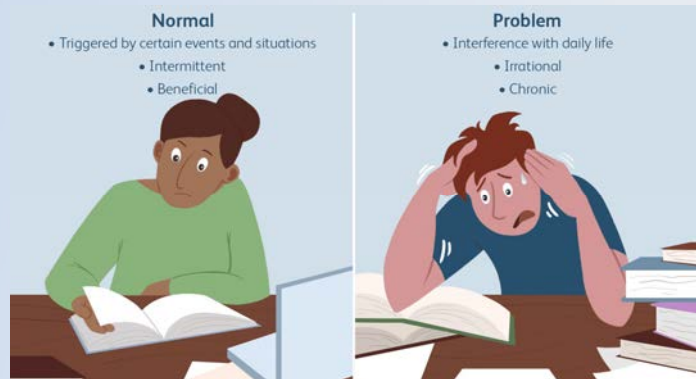
**'We're the place
of last resort to
mop up after
the system has
failed.'**



Anxiety Disorders

General Anxiety Disorders

An internal feeling of worry,
nervousness, unease,
restlessness, apprehension,
dread or unease about a future
circumstance(s)



Signs of anxiety

- Shortness of breath
- Palpitations, tachycardia
- Sweating
- Lightheadedness, dizziness
- Impaired attention and concentration

SSRIs

selective serotonin reuptake inhibitors

Paroxetine	Paxil™
Sertraline	Zoloft™
Escitalopram	Lexapro™
Citalopram	Celexa™
Fluoxetine	Prozac™
Fluvoxamine CR	Luvox CR™

- First line Tx for GAD
- Start low dose to avoid jitteriness
- Titrate up as needed
- 4-6 weeks for full clinical response
- Risk of suicidal ideation in young adults
 - FDA “Black Box” warning
- Falls, GI bleed in elderly
- ↓ libido

SNRIs

serotonin norepinephrine reuptake inhibitors

Duloxetine	Cymbalta™
Venlafaxine XR	Effexor XR™

Epinephrine ?

Serotonin syndrome ≥ 2 serotonergic agents together

5-HT; 5=hydroxytryptamine

Triad

1. Neuromuscular abnormality
2. ANS hyperreactivity
3. Mental status changes



Phenelzine + meperidine

Mechanism	Prescribed Medications	"Co-Ingestion"	Drugs administered for sedation
↑ Serotonin Release	Carbidopa-levodopa	Amphetamines / Cocaine / MDMA (ecstasy)	
↓ Serotonin Reuptake	SSRI	Amphetamines / Cocaine / MDMA	Meperidine
	SNRI	St. John's Wort	5-HT ₃ receptor antagonists (ondansetron)
	Dopamine-norepi reuptake inhibitors		
	Serotonin modulators		
	TCA		
	Valproate		
	Carbamazepine		
	Methadone / Tramadol		
↓ Serotonin Metabolism	MAOI		
Direct Serotonin Agonist	Buspirone	LSD	Fentanyl / cogeners
	Triptans		
↑ Sensitivity of post-synaptic receptors	Lithium		

Szakaly, B. and Strauss, R. Serotonin Syndrome in the Oral and Maxillofacial Surgery Office: A Review of the Literature and Report of a Case. J Oral Maxillofac Surg 66:1949-52, 2008.

Drugs with serotonergic properties

Selective Serotonin Reuptake Inhibitors (SSRI)	
Citalopram	Celexa™
Fluoxetine	Prozac™
Sertraline	Zoloft™
Paroxetine	Paxil™
Escitalopram	Lexapro™

Tricyclic Antidepressants (TCA)	
Amitriptyline	Elavil™
Clomipramine	Anafranil™
Doxepin	Sinequan™
Imipramine	Tofranil™
Desipramine	Norpramin™

Monoamine Oxidase Inhibitors (MAOI)	
Isocarboxazid	Marplan
Phenelzine	Nardil
Tranylcypromine	Parnate

Mood Stabilizing Antidepressants	
Valproate	Depakote™
Carbamazepine	Tegreto™
Lamotrigine	Lamictal™
Levetiracetam	Keppra™
Oxcarbazepine	Trilepta™

Serotonin-Norepinephrine Reuptake Inhibitors (SNRI)	
Duloxetine	Cymbalta™
Venlafaxine	Effexor™

Serotonin Modulators	
Nefazodone	Serzone™
Trazodone	Desyre™

Dopamine-Norepinephrine Reuptake Inhibitors	
Bupropion*	Wellbutrin™
Buspirone	Buspar™

Serotonin syndrome

Presentation Spectrum

Severity of Reaction	Mental Status Changes	Autonomic Instability	Neuromuscular Activity
Mild	Restlessness (akathisia) Anxiety	Tachycardia Mydriasis Sweating Shivering	Intermittent Tremor Hyperreflexia
Moderate	Agitation Easily Startled	Hypertension Fever	Inducible Clonus Horizontal ocular myoclonus
Severe	Confusion Delirium Coma	Fever	Rigidity

Distinguishing features of 3 syndromes with overlapping signs/symptoms

	Drug Exposure	Onset	Vital Signs	Skin	Muscle Tone
Serotonin Toxicity	Serotonergic Drugs	1-24 hours	Tachycardia Hypertension Moderate fever	Wet	Increased
Anticholinergic Toxicity	Anticholinergic Drugs	< 12 hours	Tachycardia Hypertension Mild fever	Dry	Normal
Malignant Hyperthermia	Volatile Gas Succinylcholine	½ - 24 hours	Tachycardia Hypertension Severe fever Hypercarbia	Wet Mottled	RIGID

Alternative medical therapy for GAD

- Tricyclic anti-depressants
- Buspirone
- Benzodiazepines
- KAVA (hepatic toxicity?)
 - Benzodiazepines
 - High abuse potential
 - Dependence
 - Withdrawal

Anxiety Disorders

Panic Attacks

Panic attacks are unexpected and are characterized by at least 4 of these signs / Sx

- Palpitations / racing, pounding heart
- Sweating
- Trembling / shaking
- Feeling of choking
- Chest pain / discomfort
- Nausea / abdominal pain
- Dizzy, lightheaded, unsteady
- Sensation of chills or heat flashes
- Numbness or tingling
- Feelings of unreality or detachment
- Fear of losing control or “going crazy”

AND, at least one attack followed by 1 or more months of fear of another recurrent panic episode, not explained by another mental or physical Dx, or substance use

Take home points

anxiety disorders

- Sx are chronic and persistent
- Highest prevalence in middle aged females
- Anxiety disorders are highly comorbid
- High intensity physical exercise may play a significant role

Unipolar Depression

management

1. Psychotherapy
2. Psychopharmacy
 - SSRI / SNRI
 - Tricyclic anti-depressants
 - Monoamine oxidase inhibitors
 - Atypical agents
3. ECT

Serotonin-Norepinephrine Reuptake Inhibitors (SNRI)

Duloxetine	Cymbalta™
Venlafaxine	Effexor™

Serotonin Modulators

Nefazodone	Serzone™
Trazodone	Desyrel™

Dopamine-Norepinephrine reuptake inhibitors

Bupropion*	Wellbutrin™
------------	-------------

Buspirone	
-----------	--

TCAs (inhibit reuptake of norepi and ser)

tricyclic anti-depressants

Amitriptyline	Elavil™
Clomipramine	Anafranil™
Doxepin	Sinequan™
Imipramine	Tofranil™
Desipramine	Norpramin™
Nortriptyline	Pamelor™
Maprotiline	Ludomil™
Protriptyline	Vivactil™

Anticholinergic

- Blurred vision, constipation, dry mouth, urinary retention, constipation
- Tachycardia, confusion and delirium

Anti-histaminic (H-1)

- Block histamine receptors
- Sedation, increased appetite and wt. gain, confusion
- Delirium

Cardiovascular

- α -1 antagonism (hypotension)
- Possible arrhythmia

MAOIs (side effects start to predominate)

Monoamine Oxidase Inhibitors

Isocarboxazid	Marplan™
Phenelzine	Nardil™
Tranylcypromine	Parnate™
Pargyline	Eutonyl™

Avoid

1. Ephedrine
2. Ketamine
3. Meperidine

Anti-cholinergic

- Xerostomia
- Constipation
- Urinary retention
- Post-op confusion
- Blurred vision
- Tachycardia
- Orthostatic hypotension
- Sedation
- Tyramine → hypertension

Presynaptic build up of ser/norepi/dopamine

Mood disorders

Bipolar disorder

A mood disorder that is characterized by episodes of mania, hypomania and major depression.

Bipolar I

- **Manic episodes** and almost always experience major depressive and hypomanic episodes

Bipolar II

- At least 1 hypomanic episode
- At least 1 major depressive episodes
- **Absence of manic episodes.**



Bipolar disorder

management

- Mood stabilizing anticonvulsants Valproate - Depakote™
- Lithium
- 2nd generation anti-psychotics
- Adjunctive psychotherapy
- ECT

Lithium and anesthesia

- Prolonged NM block
- Reduce anesthetic requirement
- Dysrhythmias
- NSAIDs reduce renal excretion
- Thyrotoxic, nephrotoxic
- Stop before surgery

Thought disorders

psychosis

Emotion
Cognition
Behavior

Schizophrenia is a psychotic disorder.

Positive symptoms

(distortion of language, perception, thought, behavior)

- Delusion, hallucination
- Disordered thought
- Disorganized, bizarre behavior
- Incoherent speech
- Severe anxiety, agitation

Negative symptoms

(diminution of function, emotion, behavior)

- Apathy
- Social withdrawal
- Blunted, flat affect
- Anhedonia
- Poverty of thought

Cognitive symptoms

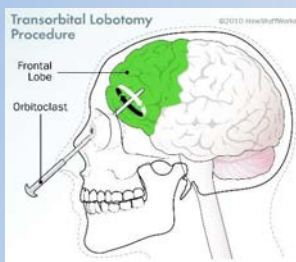
- Impairment in attention
- Difficulty in information processing
- Defective memory formation and recall

Medical management of psychoses

antipsychotics ~ neuroleptics ~ major tranquillizers
dopamine (D2) blockers

- 1st generation (*typical*) antipsychotics
 - Low potency
 - High potency
- 2nd generation (*atypical*) antipsychotics

Less propensity for extrapyramidal side effects (EPS)



As many as 50,000 lobotomies were performed in the U.S., most from 1949-1952 using Walter Freeman II's transorbital technique of hammering an ice pick into the corner of the eye socket and jiggling it.

1st generation antipsychotic medication

typical

"Dirty" drugs

Chlorpromazine	Thorazine™
Thioridazine	Mellaril™
Prochlorperazine	Compazine™
Haloperidol	Haldol™
Droperidol	Inapsine™
Loxapine	Loxitane™
Perphenazine	Trilafon™
Pimozide	Orap™
Thiothixene	Navane™
Trifluoperazine	Stelazine™
Fluphenazine	Prolixin™

Low potency
Less D2 receptor
blockade

- ↓ risk of EPS
- Greater anti-histaminic and anticholinergic activity
- More sedation
- More α-1 blockade - hypotension
- Weight gain

High potency
More D2 receptor
blockade

- ↑ risk of EPS
- ↓ anti-histaminic or anticholinergic activity
- ↓ sedation
- ↓ orthostatic hypotension
- Less weight gain

2nd generation antipsychotic medication

atypical

Schizophrenia
Schizo-affective disorder
Bipolar disorder
Major Depression
Autism
Alzheimer's disease

Aripiprazole	Abilify™
Asenapine	Saphris™
Brexipiprazole	Rexulti™
Cariprazine	Vraylar™
Clozapine	Clozaril™
Iloperidone	Fanapt™
Lumateperone	Caplyta™
Lurasidone	Lurasid™
Olanzapine	Zyprexa™
Paliperidone	Invega™
Pimavanserin	Nuplazid™
Quetiapine	Seroguel™
Risperidone	Risperdal™
Ziprasidone	Geodon™

Less propensity for
extrapyramidal side
effects (EPS)

Antipsychotic

5 categories of possible side effects

Metabolic syndrome

- Weight gain
- Type II DM
- Dyslipidemia
- CV diseases

CV effects

- QT prolongation and sudden cardiac death
- 1.5 patients per 1000 years of exposure
- Orthostatic hypotension, reflex tachycardia
 - α 1 adrenergic blockade

Anti-histaminic effect

- Sedation, drowsiness
- Hypotension
- Potentiate opioids and BZ

Anticholinergic effects

- Esp. with low potency FGA
- Dry mouth
- Constipation
- Blurred vision
- Tachycardia
- Agitation
- Delirium
- Esp. with BZ, ATR, TCA, and 1st generation antihistamines (diphenhydramine and hydroxyzine)

Drug Induced Movement Disorders

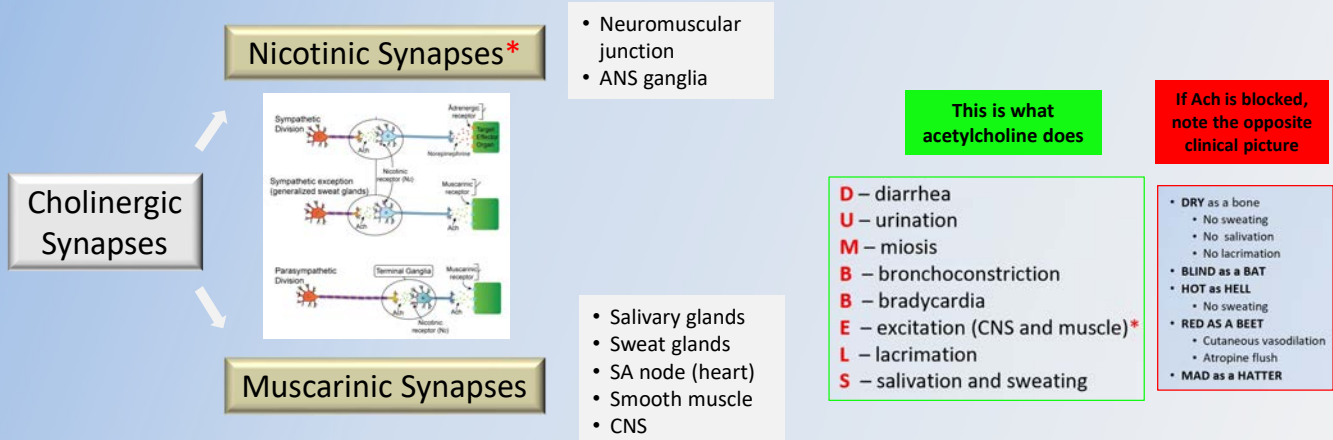
EPS (extrapyramidal Sx) (parkinsonism)

- Acute akathisia / dystonia
- Rigidity – bradykinesia
- Tremors

Tardive Dyskinesia

Central Anticholinergic Syndrome

Acetylcholine (ACh) activity review....



Select drugs with anticholinergic properties

competitive inhibition of acetylcholine

Antimuscarinics	
Centrally acting X BBB	Atropine
	Scopolamine
Peripherally acting Does not X BBB	Glycopyrrolate

Effect	Atropine	Glycopyrrolate
Anti-sialagogue	+	++
Heart Rate	↑↑	-- ↑
Cross BBB	Yes	No
Duration of action	Short	Long
Starting Dose (IV)	0.4mg (adult) 0.01-0.02mg/kg	0.2mg (adult) 0.005-0.01mg/kg

CNS drugs
Antipsychotics
MAOI
SSRI
TCA
Benzodiazepines
Narcotics / ketamine

Anti-histamines
Diphenhydramine*
Hydroxyzine

Cardiovascular
ACE Inhibitors*
Warfarin
Digoxin

Miscellaneous
Glucocorticoids
Anti-Parkinson agents
Illicit drugs

Central Anticholinergic Syndrome ⇒

↓ acetylcholine

- Confusion, delirium, agitation, prolonged recovery in a patient exposed to drugs with anticholinergic properties.
 - Atropine, antihistamines, psychotropics and benzodiazepines.

- Treatment is supportive, protect from injury, IV fluids
- Consider physostigmine – blocks acetylcholinesterase to ↑ Ach
 - XBBB
 - 0.01-0.04mg/kg or start with 0.5mg in an adult – slowly
 - Watch for bradycardia, bronchospasm, hyperperistalsis
 - Onset 5-10 minutes, duration 1-2 hours

This is what acetylcholine does

D – diarrhea
U – urination
M – miosis
B – bronchoconstriction
B – bradycardia
E – excitation (CNS and muscle)*
L – lacrimation
S – salivation and sweating

- DRY as a bone
 - No sweating
 - No salivation
 - No lacrimation
- BLIND as a BAT
- HOT as HELL
 - No sweating
- RED AS A BEET
 - Cutaneous vasodilation
 - Atropine flush
- MAD as a HATTER

- Xerostomia
- Blurred vision
- Constipation
- Tachycardia
- Cognitive dysfunction
- Agitation, delirium
- Prolonged recovery
- Seizure
- Disorientation

Side effects of psychotropic drugs

hypotension / tachycardia / sedation

- Hypotension, tachycardia
 - α -1 Blockade
- Tachycardia
 - Anticholinergic
- Sedation + hypotension
 - H-1 blockade

What to look for....

- Ensure ongoing successful medication and therapy compliance
 - Engaged ?
 - “Steady-Eddie” medication
 - No overdose or withdrawal
- **Continue all drugs into perioperative period**



Psychostimulants for ADHD can be withheld morning of sedation

Smith, FA. Medical Complications of Psychiatric Treatment. Crit Care Clin 24:635-656, 2008.

How should I proceed ?

Low and slow

1. Avoid meperidine, macrolides (QT), ATR
2. No ephedrine or ketamine with MAOI's
3. Careful with vasoconstrictors + TCA
4. Rhythm screen (prolonged QT)
 - Syncope
 - Structural heart Disease
 - Pre-existing arrhythmias
 - Hypokalemia
5. Orthostatic hypotension / hypertension
6. Prolonged blockade with succinylcholine
7. Steroid psychosis ?
8. Substance use disorder ?

Hypokalemia triggers


- β_2 adrenergic stimulation
- Non- K^+ sparing diuretics
- Hyperventilation
- Dumping s/p bariatric surgery
- Disorders of feeding

Patient Screening

The Upper Airway
Psychological Disorders
✓ Substance Use Disorder
Disorders of Feeding
The Elderly Patient

✓ Patient Screening
Team Training
Techniques






Once Upon A Time


2021 - 80K dead
2022 - 102K dead

In the US, 1 person dies every 5 minutes from opioid overdose

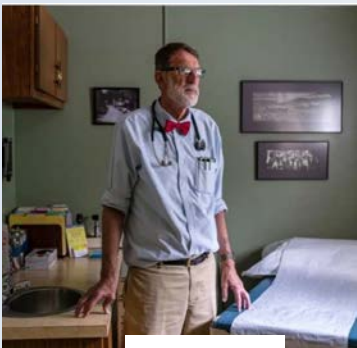


A Nun, a Doctor and a Lawyer — and Deep Regret Over the Nation's Handling of Opioids

In an Appalachian town, an unlikely group of activists recognized the early signs of the deadly drug epidemic, and fought to warn for others this time.



Sr. Beth Davies



Dr. Art Van Zee

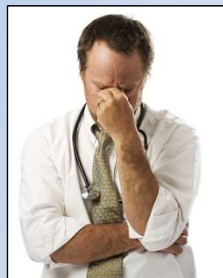
Tolerance, Dependence, Addiction

<u>Mild</u>	<u>Moderate</u>	<u>Severe</u>
Anxiety	Irritability / Agitation	Delirium, Violence
Nausea	Vomiting / cramping	Diarrhea / Incontinence
Wet runny eyes and nose sneezing, sweating		
Tremors	Muscle Cramping	Muscle Spasm
Loss of appetite		Dehydration
Piloerection	Hot and cold flashes	
Yawning	Hypertension / Tachycardia / Tachypnea	

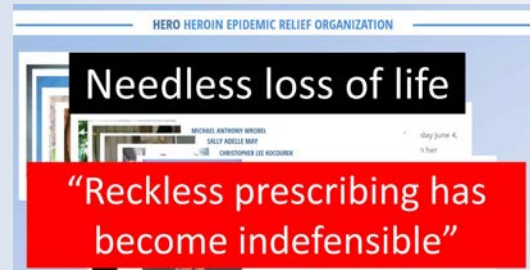
Addiction – a need for bonding

- A chronic, neurobiological, relapsing, dynamic disease with genetic, psychosocial and environmental factors influencing its development and manifestations
- 3 C's
 - Impaired control over use / compulsive
 - Continued use despite harm
 - Craving
- Compulsive drug seeking behavior
- Inability to limit use on your own
- Difficulty in functioning without the drug

Substance use disorder



Addiction



www.brucekalexander.com



"Rat Park"



Professor Peter Cohen

www.cedro-uva.org/cohen/



THE OPPOSITE OF ADDICTON IS CONNECTION.



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Dr. Nuno Felix da Costa



Unless the addict embraces the awfulness (what is more awful than relinquishing one's right to oneself) of what the first step says, the person cannot experience the awesomeness of the 12-step recovery.



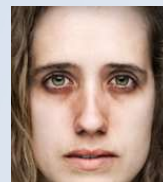
SUD, addiction, in general pandemic? Undetected?

All socio-economic strata, age, race

- ER physicians, dental sedation providers, anesthesiologists, psychiatrists
- DENIAL is UNIVERSAL

Concomitant

- Psychiatric disorders
- Infectious disease
- Criminal behavior



Opioid use disorder

“yet disease” – relapse, jail, death

- Chronic, relapsing disease
- Compulsive, prolonged self-administration of opioid substances that are used for no legitimate medical purpose, or in doses greatly in excess of the amount needed for a medical condition.
- Physical and psychiatric components.

- Economic hardship
- Social isolation
- Incarceration
- Blood-borne infections
- Mortality



Treatment options: Opioid Use Disorder

- **Psychosocial Treatment (no meds)**
 - Abstinence-based therapy – dismal long term results
 - Urine testing; incentives, group dynamics
 - ↓treatment----↑relapse
- **Maintenance medication: opioid agonists**
 - Methadone; buprenorphine
 - “medication-assisted treatment”
- **Opioid antagonist treatment**
 - Naltrexone

- **Maintenance medication: opioid agonists**
 - Methadone; buprenorphine
 - “medication-assisted treatment”

Methadone (analgesic effect)

- **Suppress craving**
- **Blocks euphoric** effects of other opioids
- Full agonist, no “dopamine buzz”
- Prolonged onset, prolonged offset
- Physiologic dependence persists
- Can function in society
- MMT – witnessed administration of liquid
- Prolonged QT interval with higher doses (300mg/day)
 - Elderly, ↓K⁺, bradycardia, female, structural heart disease, arrhythmia
- Naloxone will reverse
- Respiratory depression >>> analgesia

Buprenorphine (little analgesia)

- Other opioids won't work
- High affinity for mu receptor
 - Prevents other opioids/naloxone binding
- Partial (weak) agonist – ceiling respiratory depression
- Overdose possible
- Ceiling respiratory effect
- Less restriction on prescribing
- Suboxone™ sublingual film (4:1 with naloxone)

Opioid antagonist treatment

- Naltrexone

- Requires total withdrawal prior to initiation
- Prevents users from experiencing opioid intoxication
- Prevents physiological dependence

- Blocks opioid receptors
- All opioids have no effect
- Need to withdraw first

A word about naloxone

1. Opioid reversal should not be viewed as a reliable rescue plan
2. Hypoxia and hypercarbia both depress the CNS
3. Onset and efficacy depend on
 - Type and amount of opioid on board
 - “co-ingestion”
4. Administer slowly > 2mg OK, nausea

Patient Screening

The Upper Airway
Psychological Disorders
Substance Use Disorder
✓ Disorders of Feeding
The Elderly Patient

✓ Patient Screening
Team Training
Techniques



Disorders of Habit / Feeding

FEEDING DISORDERS:

Persistent disturbances of eating
that impairs health or
psychological functioning.



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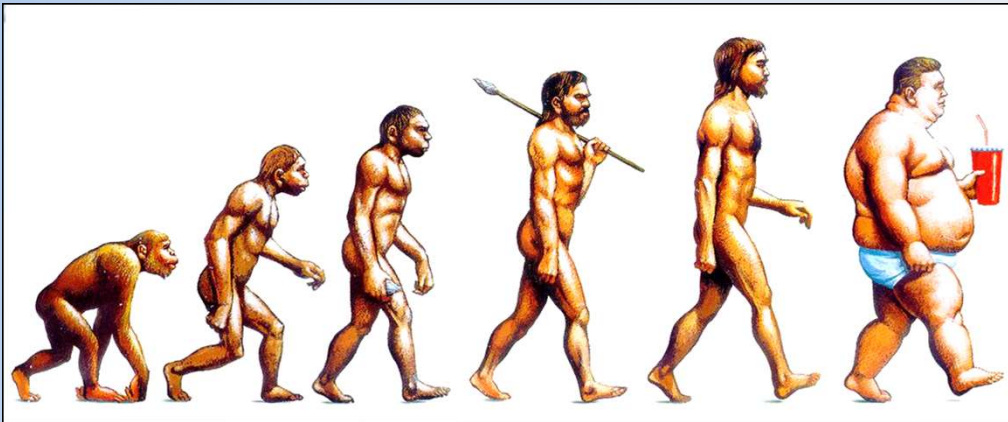
Adult BMI Chart

weight / height
kg/m²

		Underweight	Healthy		Overweight					Obese			
	<u>BMI</u>	<u>15</u>	<u>19</u>	<u>24</u>	<u>25</u>	<u>26</u>	<u>27</u>	<u>28</u>	<u>29</u>	<u>30</u>	<u>35</u>	<u>40</u>	<u>45</u>
Height	Height "	Weight in pounds	Weight in pounds		Weight in pounds					Weight in pounds			
5'0"	60	77	97	123	128	133	138	143	149	154	179	205	230
5'1"	61	79	101	127	132	138	143	148	153	159	185	212	238
5'2"	62	82	104	131	137	142	148	153	159	164	191	219	246
5'3"	63	85	107	135	141	147	152	158	164	169	198	226	254
5'4"	64	87	111	140	146	151	157	163	169	175	204	233	262
5'5"	65	90	114	144	150	156	162	168	174	180	210	240	270
5'6"	66	93	118	149	155	161	167	173	180	186	217	248	279
5'7"	67	96	121	153	160	166	172	179	185	192	223	255	287
5'8"	68	99	125	158	164	171	178	184	191	197	230	263	296
5'9"	69	102	129	163	169	176	183	190	196	203	237	271	305
5'10"	70	105	132	167	174	181	188	195	202	209	244	279	314
5'11"	71	108	136	172	179	186	194	201	208	215	251	287	323
6'0"	72	111	140	177	184	192	199	206	214	221	258	295	332
6'1"	73	114	144	182	190	197	205	212	220	227	265	303	341
6'2"	74	117	148	187	195	203	210	218	226	234	273	312	351
6'3"	75	120	152	192	200	208	216	224	232	240	280	320	360

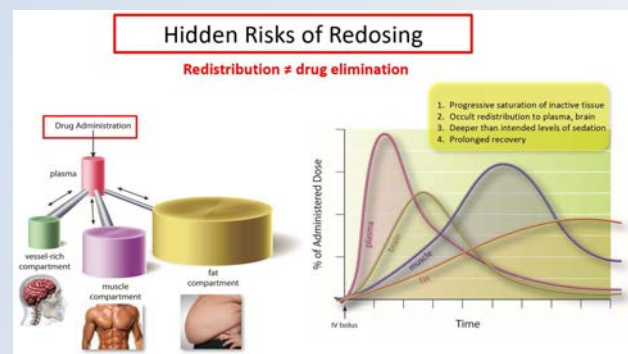
Globesity

Excessive body fat in relation to lean body mass



Degree / duration of obesity : co-morbidities

- **Drug Reservoir** - Adipose tissue serves as a drug reservoir for lipid soluble drugs
- **Mass effect** – displace and/or compress lungs, airway, blood vessels
- **Co-morbidities** (esp. with age)
 - CV disease: HTN, LVH, atherosclerosis
 - Type II DM
 - “weird” diets / drugs
 - Binge eating / purging
 - OSA



Location of adipose tissue matters



- Upper airway difficulty



- Ventilation difficulty
- Reduced FRC
- Mask seal difficulty
- Pharmacokinetic changes



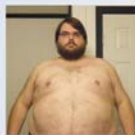
- Pharmacokinetic changes

Effects of obesity on various organ systems

respiratory system

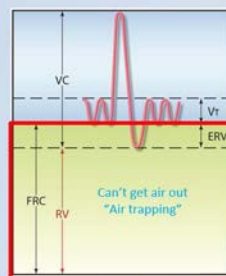
Obesity

adds difficulty to all 4 dimensions of airway management



Difficult Bag-Mask Ventilation
Difficult Laryngoscopy Tube Placement
Difficult Extra-glottic Device Placement
Difficult Orotracheal Intubation

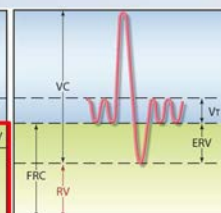
Increased lung volume



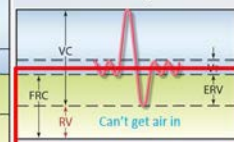
OBSTRUCTIVE DISEASE

- COPD**
- Asthma
 - Chronic Bronchitis
 - Emphysema
- Elderly**

Normal lung volumes



Decreased lung volumes



RESTRICTIVE DISEASE

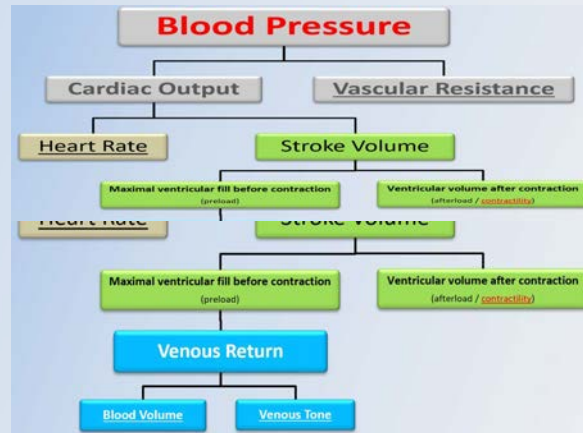
- Patients with obesity
- Compressive tumors
- Radiation
- Spinal column deformity
- Age extremes
- Pregnancy / puerperal female

And, disordered breathing during sleep

Effects of obesity on various organ systems

cardiovascular system

- Hypertension
- Arrhythmias
- Atherosclerosis
- Inaccurate oscillometric BP measurement
- Difficult venous cannulation



Effects of obesity on various organ systems

metabolic alterations

- Insulin resistance.....Type II diabetes mellitus
- All diabetes co-morbidities – esp. CV
 - Large and small vessel atherosclerosis
- Extreme periodic dieting -- electrolyte imbalance

Effects of obesity on various organ systems

pharmacokinetic alterations

- ↑ blood volume
- Alterations in [plasma proteins]
- All drug dosing based on lean body weight estimate
 - Except succinylcholine

LEAN BODY WEIGHT

- 100# for first 5 feet
- 5# for each inch after that
- 6 feet tall = 160#

Effects of obesity on various organ systems

gastro-intestinal system

- Elevated gastric pressures
- Reflux
- Passive aspiration during sedation

Risk mitigation for patients with obesity seeking office-based sedation

1. Consistent, conservative patient selection.
2. Airway: small, collapsible, can you open it?
3. Can you seal a mask and can you push air in?
4. Did you discuss limiting depth of sedation?
5. Does your staff know what to do and can they do it?

Obesity

adds difficulty to all 4 dimensions of airway management



Difficult Bag-Mask Ventilation
Difficult Laryngoscopy Tube Placement
Difficult Extra-glottic Device Placement
Difficult Disintubation

Obese have shorter "SAFE" apnea periods

- Smaller O₂ "gas tank"
- More difficult to fill
- Smaller O₂ "gas tank"
- More difficult to fill
- Quicker to empty



FEEDING DISORDERS:

Persistent disturbances of eating that impairs health or psychological functioning.

ANOREXIA NERVOSA

BULIMIA NERVOSA

Adult BMI Chart

weight / height
kg/m²

		Underweight	Healthy		Overweight		
	<i>BMI</i>	<i>15</i>	<i>19</i>	<i>24</i>	<i>25</i>	<i>26</i>	<i>27</i>
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6'1"	73	114	144	182	190	197	205
6'2"	74	117	148	187	195	203	210
6'3"	75	120	152	192	200	208	216

Eating disorders

skewed body image; fear of weight gain

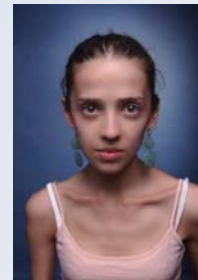
- Prevalence grossly underestimated
- Denial is near universal
 - Shame – “self-imposed”; failure of will
- Suspicion clinches Diagnosis



Anorexia Nervosa

signs and symptoms

- Underweight
- Cold intolerance
- Hypotension, arrhythmias
- Depression (meds)
- Irritable mood
- Dermatologic changes
 - Dry, scaly skin; “blotchy”
 - Lanugo-like, thin body hair
 - Acne
 - Cold, blue extremities
 - Petechia



- “over” exercising
- Refusing to eat around others
- Diuretics, diet pills, laxative

Anorexia Nervosa

Gastro-intestinal / renal / hematologic complications

Gastrointestinal

- Gastroparesis
- Nausea / vomiting
- ↓ sphincter tone; GERD
- Aspiration

Renal

- Electrolyte disturbance – arrhythmia

Hematologic

- Anemia
- Leukopenia
- Thrombocytopenia

Anorexia Nervosa

Pulmonary complications

- Wasting of respiratory muscles (including diaphragm)
- Shortness of breath
- **Reduced exercise tolerance**
- Decrease in all volumes and capacities

Eating disorders

Anesthetic concerns:

- **Hypotension**
 - Blunted autonomic reflexes, hypovolemia
 - Worsened by sedative drugs (except ketamine)
- **Bradycardia**
 - Contributes to hypotension
 - Worsened with narcotics
- **Exaggerated drug response**
 - Hypovolemia, ↓ [plasma proteins]
 - ↓ fat and muscle compartments

Eating disorders

Anesthetic concerns:

- **Electrolyte disturbances**
 - Cardiac dysrhythmias
- **Pulmonary soiling**
 - ↓ tone of esophageal sphincters
- **Weak pulmonary and cardiac muscles**
 - Hypotension, hypoventilation
- **Re-feeding syndrome**



- Insulin spike
 - Drives PO_4^{-2} , K^+ , Mg^{+2} into cell
- ↓ATP –
 - Arrhythmia
 - Respiratory insufficiency
 - Seizure
 - Delirium, coma

Bulimia nervosa

signs and symptoms

- Russell's sign: calluses on dorsum of hand
- Tachycardia
- Hypotension
- Dry skin
- Parotid gland swelling
- Oral findings: dental erosion, mucosal petechiae
- Findings associated with emesis
 - Subconjunctival hemorrhage
 - Epistaxis



Ipecac-induced myopathy

- Emetine – accumulates in cardiac myocytes and skeletal muscle
 - Angina
 - Hypotension
 - Premature beats
 - Tachycardias
 - Prolonged QT interval
 - Muscle tenderness and weakness

Concerns s/p bariatric surgery

- Vomiting
- Diarrhea
- Malnutrition
- Electrolyte disturbance
- Possible aspiration
- May still be overweight



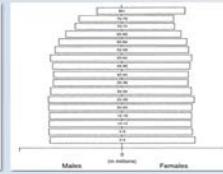
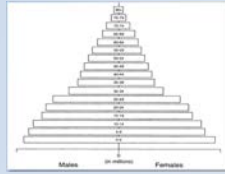
Patient Screening

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Elderly (Boomers)

less reserve, not noticed at rest
fibrous tissue replaces elastic tissue
fat replaces muscle



Aging: multisystem decline in both resilience and reserve

- Normal
- Universal
- Progressive
- Heterogenous
- Variable
- Unpredictable
- Unfavorable



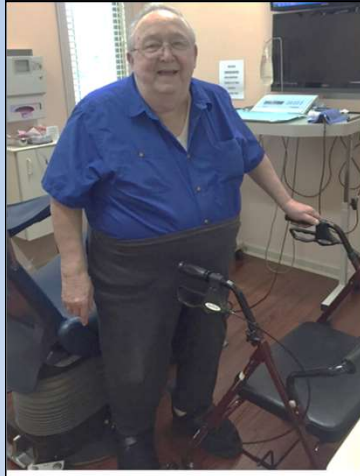
1. Difficult to ↑ HR
2. Immobile / stiff
3. Compromised reflexes



96 y.o.
She would
like to be
put under
for it.

Medical consultation vs medical clearance

“perioperative medicine”



“clear for dental sedation”

Obesity
COPD
120 pack-years
SOB at rest
Type 1 DM
Liver / Kidney transplant
OSA without CPAP
HTN
Legs wrapped
Orthostatic intolerance

How old is too old?

chronologic vs. physiologic

How old do you look? > How old are you?

- No limit is set
 - Functional status more important than age
- Is age, by itself, predictive of “trouble”
 - Eventually, YES
 - Variation among individuals
 - Variation among organ systems
- **Frailty**

Amrock, L G. and Deiner, S. The Implication of frailty on peri-operative risk assessment. Curr Opin Anesthesiol 27: 2014.

Elderly

- Are not alike
- Diagnostic errors common
- Co-morbidity / polypharmacy
 - *Rapidly changing conditions, skipped meds



Physiologic cost of aging

nervous system

“↓ cognitive resilience / reserve”

- ↓ mass, blood flow and neurotransmitter production (connectivity)
 - ↓ dopamine – decline in cognitive and motor performance
 - ↓ serotonin – reduced synaptic plasticity
- Decline in cognitive, motor, sensory and autonomic function
 - ↓ cholinergic activity
 - Avoid centrally acting drugs with anticholinergic activity
 - Respiratory effects of opioids are exaggerated
 - Blunted responses to hypercarbia / hypoxia
 - Impaired autoregulation – diminished response to hypotension

• Atropine
• Diphenhydramine
• Midazolam (?)

Physiologic cost of aging

nervous system

Pharmacodynamic sensitivity increases for all agents

Reduction in anesthetic requirements

Physiologic cost of aging

cardiovascular system

- Elastin is replaced with collagen and atheromatous plaques

- Narrowing and stiffening of vasculature
- Myocardial stiffening Compromised diastolic fill (esp with a-fib)
- Fibrosis of the cardiac conduction system Ectopy
- ↓ myocyte number – weak pump

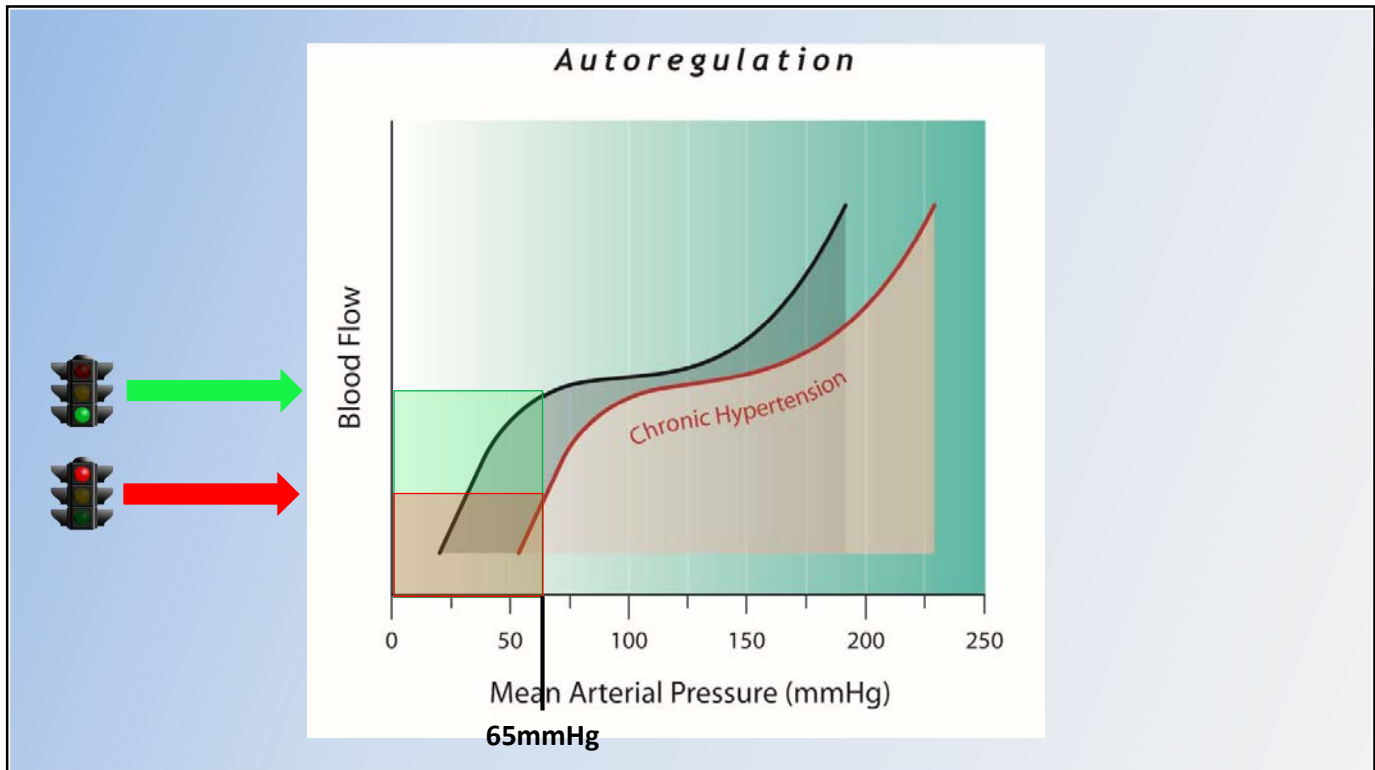
- Systolic hypertension: valvular disease
- LVH
- CAD
- Myocardial stiffening
- Wide BP swings – labile BP
- Blunting of baroreceptor reflex
- Prone to hypotension, less able to compensate
- Prone to fluid overload

- “Dysautonomia of aging”

- Sympathetic > parasympathetic
- Impaired β receptor activity
 - Limits compensatory tachycardia, hypotension likely



Worries: hypotension more likely, less able to respond



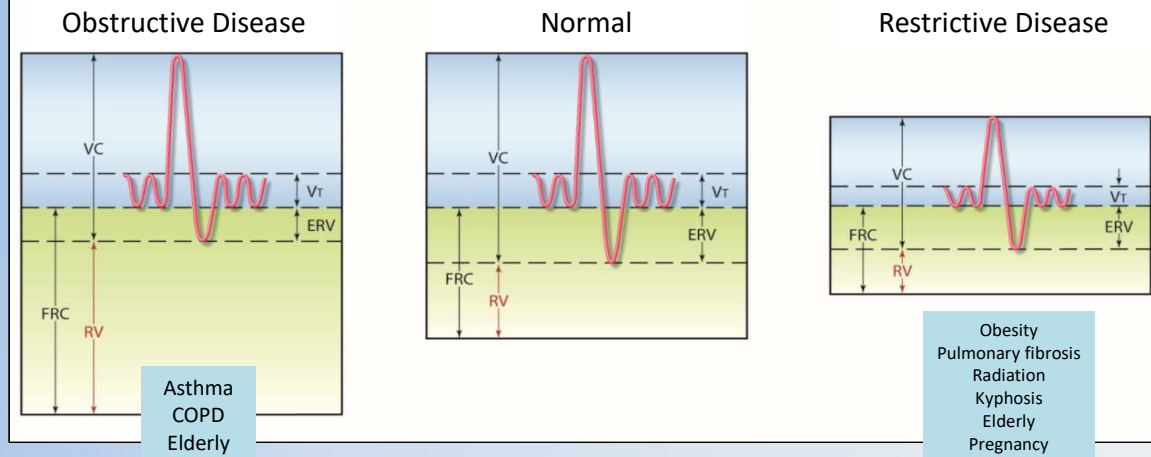
Physiologic cost of aging respiratory system

- ↓ elasticity of neck, chest wall, lung parenchyma
- Loss of muscle tone – snore, OSA
- Blunted protective airway reflexes, impaired cough
- Years of environmental insults – COPD
- SOB, ↓ functional reserve (METS)
- Exaggerated respiratory depressant effect of drugs

- Triple airway maneuver can be ineffective
- Deep breaths difficult
 - Weak muscles of respiration
 - ↑ work of breathing
- Atelectasis likely – V/Q mismatch
- Restrictive and obstructive disease

Worries: airway obstruction and hypoventilation more likely, less able to respond

LUNG VOLUMES



Physiologic cost of aging

hepatorenal systems

- **↓ hepatic mass, blood flow and function**
 - ↓ drug metabolism
 - ↓ [plasma proteins]
- **↓ renal blood flow**
 - ↓ drug elimination
 - Less able to conserve Na^+ , dehydration, electrolyte imbalance

Worries: prolonged drug action (hangover)

Physiologic cost of aging

altered pharmacokinetics

- ↓ muscle mass
- ↑ body fat (proportional)
- ↓ total body water
- Hypovolemia
- Higher initial effect site concentration
- Drug accumulation in fat stores

Worries: prolonged drug action

Frailty

descriptors:

1. Weight loss
2. Exhaustion
3. Weakness
4. Slow walking
5. Decreased physical activity



Santhirapala, R. et.al. The older surgical patient – to operate or not? A state of the art review. Anaesthesia 75: e46-53, 2020.

Malignancy

Cancer Risk

- Hypercoagulability
- Blood glucose abnormality
- Distorted anatomy
- Blood dyscrasias
- Altered $[K^+]$; $[Ca^{++}]$
- Cachexia

Treatment Risk

(radiation/chemotherapy)

- Cardiomyopathy
- Dysrhythmias
- Blood dyscrasias
- Pulmonary fibrosis
- Limitation of movement
- GI toxicity: N/V/diarrhea
- Electrolyte imbalance



6. Have you recently been taking "blood thinners" or aspirin?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7. Have you ever had any excessive bleeding requiring special treatment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. Are you subject to frequent nosebleeds?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9. Have you ever had a blood clot?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. Have you or any family member ever had a heart attack?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11. Do you, or have you ever, had a stroke?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12. Are you or your family member ever on dialysis?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
13. Do you smoke or have you ever smoked?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
14. Do you drink alcohol?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
15. Do you snore or have you ever had sleep apnea?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
16. Has a physician ever told you you have a heart condition?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
17. Do you have joint pain or arthritis?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
18. Are there any other medical conditions?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Please check yes or no for the following conditions:

Extensive metastatic lung CA	<input checked="" type="checkbox"/>
Obstructive + restrictive disease	<input checked="" type="checkbox"/>
Hypercoagulability	<input checked="" type="checkbox"/>
Hypoalbuminemia	<input checked="" type="checkbox"/>
Mets to brain, liver, pancreas, kidney	<input checked="" type="checkbox"/>
Superior VC syndrome	<input checked="" type="checkbox"/>
BG = 600mg/dl	<input checked="" type="checkbox"/>
Electrolyte imbalance	<input checked="" type="checkbox"/>
SpO ₂ = 94% room air	<input checked="" type="checkbox"/>
Angina (chest pain)	<input type="checkbox"/>
Heart murmur	<input type="checkbox"/>
Artificial heart valve	<input type="checkbox"/>
Heart attack	<input type="checkbox"/>
Irregular heart beat	<input type="checkbox"/>
Pacemaker	<input type="checkbox"/>
Angioplasty/bypass surgery	<input type="checkbox"/>
Any other heart trouble	<input type="checkbox"/>
Diabetes	<input type="checkbox"/>
High Blood Pressure	<input type="checkbox"/>
Kidney problem	<input type="checkbox"/>
Ulcers	<input type="checkbox"/>
Shortness of breath	<input type="checkbox"/>
Artificial joint	<input type="checkbox"/>
Stroke / TIA	<input type="checkbox"/>
Hepatitis / liver disease	<input type="checkbox"/>
Anemia	<input type="checkbox"/>
Thyroid Disease	<input type="checkbox"/>
AIDS / HIV	<input type="checkbox"/>



Is there a cognitive cost?

for office-based sedation?



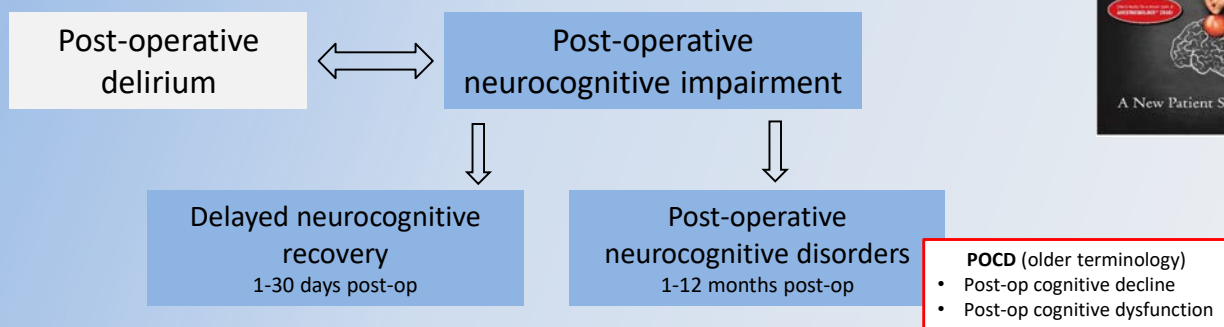
“Don’t have a general anesthetic once you’re 50 - it’ll wipe out a quarter of your brain.”

- Barbara Cartland, novelist (died age 98)

THE LANCET]	ORIGINAL ARTICLES	[AUGUST 6, 1955
<p>ADVERSE CEREBRAL EFFECTS OF ANÆSTHESIA ON OLD PEOPLE *</p> <p>P. D. BEDFORD M.D. Leeds, M.R.C.P. CONSULTANT PHYSICIAN TO THE COWLEY ROAD HOSPITAL, OXFORD</p> <p>It is well established that the human brain is extremely vulnerable to short periods of vascular insufficiency (Courville 1939, Hoff et al. 1945, Corday et al. 1953).</p>		
<p>he is either quite unable to give an account of himself or gives a story upon whose accuracy no reliance can be placed. Secondly, relations and friends tend to blame any dramatic incident, such as an operation or an accident, for the dementia which has in fact been a slowly progressive intellectual degradation, antedating the operation or accident. This is a natural tendency. The old person had been suffering a mental decline so gradual as to have gone unnoticed by those with whom he lived. Defects which to an outsider would have been obvious signs of dementia had to his intimates been</p>		

Perioperative Neurocognitive Disorders

- Behavior
- Affect
- Cognition



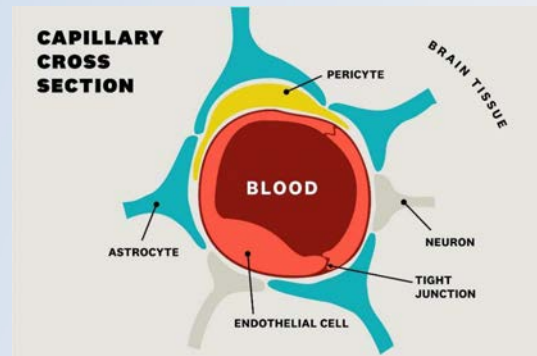
A deterioration of intellectual function that occasionally occurs after anesthesia and surgery.

- Executive function
- Perceptual organization
- Language
- Attention
- Psychomotor function

Proposed mechanisms

post-operative neurocognitive disorders

- Neuroinflammation
- Blood-brain barrier dysfunction



Post-operative
neurocognitive disorders
1-12 months post-op

POCD (older terminology)

- Post-op cognitive decline
- Post-op cognitive dysfunction

Risk factors (PREDICTORS)

- Advanced age
- Depression
- Pre-op cognitive dysfunction
- xs EtOH/smoking/"co-ingestion"
- Polypharmacy
- Psychotropic drug use
- Medical co-morbidities – vascular/DM/prior stroke, traumatic brain injury/ frailty
- Lower formal educational level

PROVOKERS

- Prolonged or complex surgery/anesthesia
- Hypoxia
- Excessive anesthetic depth
- Extremes of BP
- Drugs with anticholinergic properties*
 - Atropine
 - Diphenhydramine
 - Metoclopramide
- Benzodiazepines (?)

*Difficult to isolate drugs as causation, perhaps the result of drug administration – hypoxia, hypotension

CLINICAL INVESTIGATIONS

American Geriatrics Society 2019 Updated AGS Beers Criteria[®] for Potentially Inappropriate Medication Use in Older Adults

By the 2019 American Geriatrics Society Beers Criteria[®] Update Expert Panel*

Benzodiazepines <i>Short and intermediate acting:</i> Alprazolam Estazolam Lorazepam Oxazepam Temazepam Triazolam <i>Long acting:</i> Chlordiazepoxide (alone or in combination with amitriptyline or citalopram) Clonazepam Clorazepate Diazepam Flurazepam Quazepam	Older adults have increased sensitivity to benzodiazepines and decreased metabolism of long-acting agents; in general, all benzodiazepines increase risk of cognitive impairment, delirium, falls, fractures, and motor vehicle crashes in older adults. May be appropriate for seizure disorders, rapid eye movement sleep behavior disorder, benzodiazepine withdrawal, ethanol withdrawal, severe generalized anxiety disorder, and preprocedural anesthesia	Avoid
Meprobamate Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics (ie, "Z-drugs") Eszopiclone Zaleplon Zolpidem	High rate of physical dependence; sedating Nonbenzodiazepine benzodiazepine receptor agonist hypnotics (ie, Z drugs) have adverse events similar to those of benzodiazepines in older adults (eg, delirium, falls, fractures); increased emergency room visits/hospitalizations; motor vehicle crashes; minimal improvement in sleep latency and duration	Avoid Avoid

- Anticholinergics
- Meperidine
- Pentazocine
- 1st gen antihistamines

SPECIAL ARTICLE

Postoperative Delirium in Older Adults: Best Practice Statement from the American Geriatrics Society



The American Geriatrics Society Expert Panel on Postoperative Delirium in Older Adults

Table 7. Commonly Used Medications Used in the Perioperative Setting That May Induce Postoperative Delirium⁴⁶

Drug class or drug	Examples
Drugs with anticholinergic properties	Tricyclic antidepressants: amitriptyline, doxepin, imipramine Antihistamines: cyproheptadine, diphenhydramine, hydroxyzine Antimuscarinics: oxybutynin, tolterodine Antispasmodics: hyoscyamine, scopolamine First-generation antipsychotics: chlorpromazine, thioridazine H ₂ -receptor antagonists: cimetidine, ranitidine Skeletal muscle relaxants: cyclobenzaprine, tizanidine Anticemetics: promethazine Olanzapine Paroxetine
Corticosteroids	Methylprednisolone Prednisone
Meperidine	Meperidine
Sedative hypnotics	Benzodiazepines: alprazolam, diazepam, lorazepam, midazolam Sedative-hypnotics: zolpidem, zaleplon
Polypharmacy	Starting ≥5 new medications increases risk of delirium

No comment on 1mg midazolam for light sedation



Conclusions: This guidelines contains recommendations and suggestions based on the best evidence available for the management of sedation, analgesia and delirium of the critically ill patient, including a bundle of strategies that serves this purpose. We highlight the assessment of pain and agitation/sedation through validated scales, the use of opioids initially to appropriate analgesic control, associated with multimodal strategies in order to reduce opioide consumption; to promote the lowest level of sedation necessary avoiding over-sedation. Also, in case of the need of sedatives, choose the most appropriate for the patient needs, avoiding the use of benzodiazepines and identify risk factors for delirium, in order to prevent its occurrence, diagnose delirium and treat it with the most suitable pharmacological agent, whether it is haloperidol, atypical antipsychotics or dexmedetomidine, once again, avoiding the use of benzodiazepines and decreasing the use of opioids.

Elderly

“sedation is stochastic”

Risk of sedation_{elderly} >>> risk of the procedure



1. ↑ drug sensitivity

- Lower starting doses
- Administer slowly
- Minimize # of drugs given
- Shorter acting drugs preferred

2. More time need to reach peak effect

- Ample time between intervallic dosing

3. More time for recovery

4. Periodic deep inspiration to minimize atelectasis

Elderly

Risk of sedation_{elderly} >>> risk of the procedure

“sedation is stochastic”



7. **Hypotension** more likely, less able to compensate
 - Maintain BP within 20% of true baseline
 - MAP > 65mmHg
 - Systolic BP > 100 mmHg
8. **Upper airway collapse** likely, triple airway maneuver can be difficult
9. **Exaggerated respiratory depression** – intervallic deep inspiration
10. Post-op neurocognitive disorder ?
 - Avoid benzodiazepines (or single low dose)
 - Avoid atropine, metoclopramide, 1st generation antihistamines
11. Avoid excessive depth and duration of sedation / surgery
12. Profound local is the bedrock of successful sedation

Team Training

✓ Patient Screening
Team Training
Techniques

✓ Establishing Validity of the Team Sedation Model
Creating our own SIM center – Immersive Learning
The New Lost Airway and Ventilation Algorithm

Is the team anesthesia model valid?

1. How much education is necessary?
2. Learning neither starts nor stops with a diploma?



Team anesthesia well established in medicine

"Patient Safety Advocates"

1 member of the team should be DEDICATED to patient monitoring

- Trained to acquire and interpret technological and clinical information
- CANNOT be the person performing the procedure
- CAN perform brief, interruptible tasks



Team anesthesia

well established in medicine

1. Gastrointestinal endoscopy suite
 2. Emergency department
 3. Cardiac catheter laboratory
 4. Interventional radiology suite
- “proceduralist-directed” sedation without the involvement of an anesthesia provider¹

Ambulatory Anesthesia and NORA:
Anesthesia in the Room Where It Happens

What's Next for Patient Safety in Non-OR Anesthesia? Exploring Opportunities for Teamwork

Emily Methangkool, MD, MPH
Richard D. Urman, MD, MBA

OPPORTUNITIES FOR QUALITY IMPROVEMENT IN NON-OPERATING ROOM ANESTHETIZING LOCATIONS

TEAM TRAINING
An understanding and recognition of the roles and responsibilities of the anesthesia team is critical to patient safety.

PROTOCOLS AND PREVENTS
Proceduralist-directed sedation and NORA are not without risks. Standardized protocols and checklists can help reduce the risk of adverse events.

PRE-PROCEDURE Huddle
All team members should be present in the room before the procedure.

DIRECTOR OF NORA
A role and focus on the anesthesia team is needed to ensure patient safety.

CONSIDERED CONSEQUENCES
Continued efforts to improve patient safety in non-OR locations are needed to ensure patient safety.

Figure: Opportunities for quality improvement in non-operating room anesthetizing locations. NORA team members should be present in the room before the procedure.

Continued on next page

¹Methangkool,E and Urman, R.D. What's Next for Patient Safety in Non-OR Anesthesia? Exploring Opportunities for Teamwork. ASA Monitor, June, 2022.

The advantages are hidden in PLAIN SIGHT !



- It is a privilege, and NOT a distraction, to work in and continuously assess the airway
- It is not possible to do 2 jobs at once, but practitioners can rapidly shift attention when necessary
- FOCUSED LEARNING: Anesthesia assistants are trained to look for specific things and will get very good at it
- Dropping SpO₂, changes in heart rate/rhythm, loss of capnographic tracing

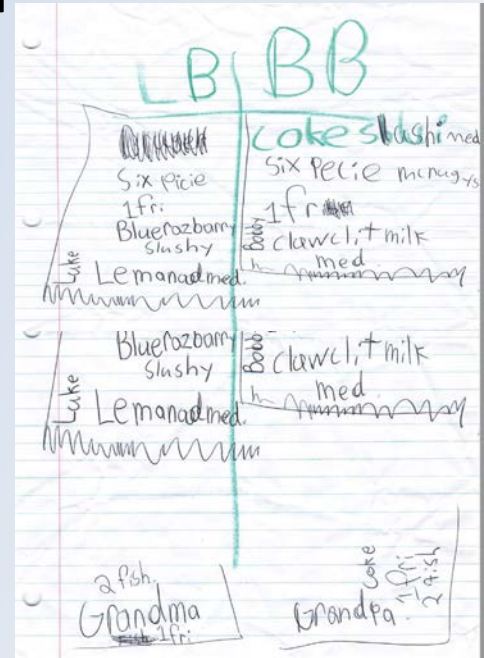
Teams don't always work well

Lukey Bosack (6)

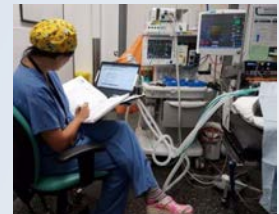
- 6 piece chicken
- 1 French Fry
- Blue Raspberry Slushy

Bobby Bosack (7)

- 6 piece chicken
- 1 French Fry
- Chocolate Milk



Distractions.... in medical anesthesiology



- “self-initiated” distractions are common during maintenance of anesthesia
 - Short spurts of internet, text, reading
- HAS not been associated with an increased risk of adverse events
- “may help maintain vigilance”
 - Vigilance latency was less in distraction cases
- “non-routine” events occurred in 51% of distraction and 71% of non-distraction cases!

Slagle, JM., et. al. Prevalence of Potentially Distracting Noncare Activities and Their Effects on Vigilance, Workload, and Nonroutine Events during Anesthesia Care. *Anesthesiol* 128:44-54, 2018.

Interestingly

“Medicare will pay for moderate sedation when rendered by the operating surgeon; therefore, it should not be bundled.....”

Coding Corner, AAOMS Today, Vol 21 (2), 2023.

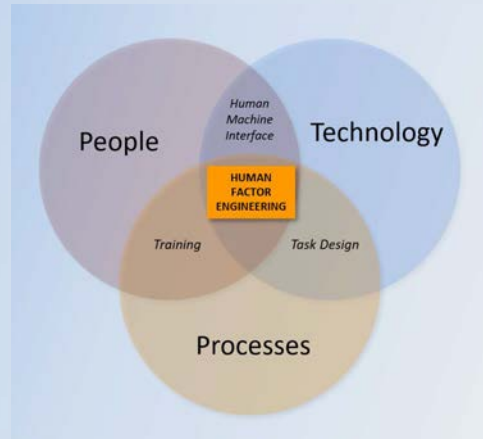
Team Training

✓ Establishing Validity of the Team Sedation Model
Creating our own SIM center – Immersive Learning
The New Lost Airway and Ventilation Algorithm

✓ Patient Screening
Team Training
Techniques

Human Factor Engineering

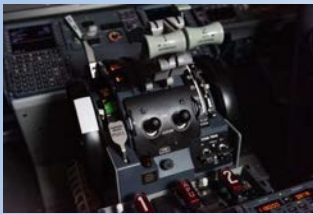
"making it easier to do the right things and harder to do the wrong things"



Team
↓
SIMULATE



What is the BEST location for simulation?



The AIRWAY Manikin

GOAL – every office acquires one



AIRWAY MANAGEMENT: learn, practice, master

- Anatomic knowledge
- Procedural proficiency
- Clinical judgement

1. Improves anatomic recognition
2. Team familiarity with devices and connections
3. Movement and hand-offs of devices
4. Practice protocols and task sequencing
5. Create muscle memory
6. Practice with it FOREVER
7. Comprehend algorithms
8. Puts office on high alert that you prioritize safety
9. Create your own scenarios
10. Simple, shared structured responses

IN SITU, self-guided, HIGH^{EST} FIDELITY SIMULATION

Each assistant will act independently without prompt or waiting for others to act – they know their duties and positions.



The "Dance"

Surgical Assistant

1. Tonsillar suction
2. Maintain chin lift
3. Administer drugs

Chinner

1. Call out TIME
2. Check O₂ delivery
3. Get AMBU Bag

Circulator

1. Bring airway tray
2. Document / Scribe
3. Draw up drugs



If I miss one day of **PRACTICE**, I notice it.
If I miss two days, the critics notice it.
If I miss three days, the audience notices it.



Ignacy Jan Paderewski

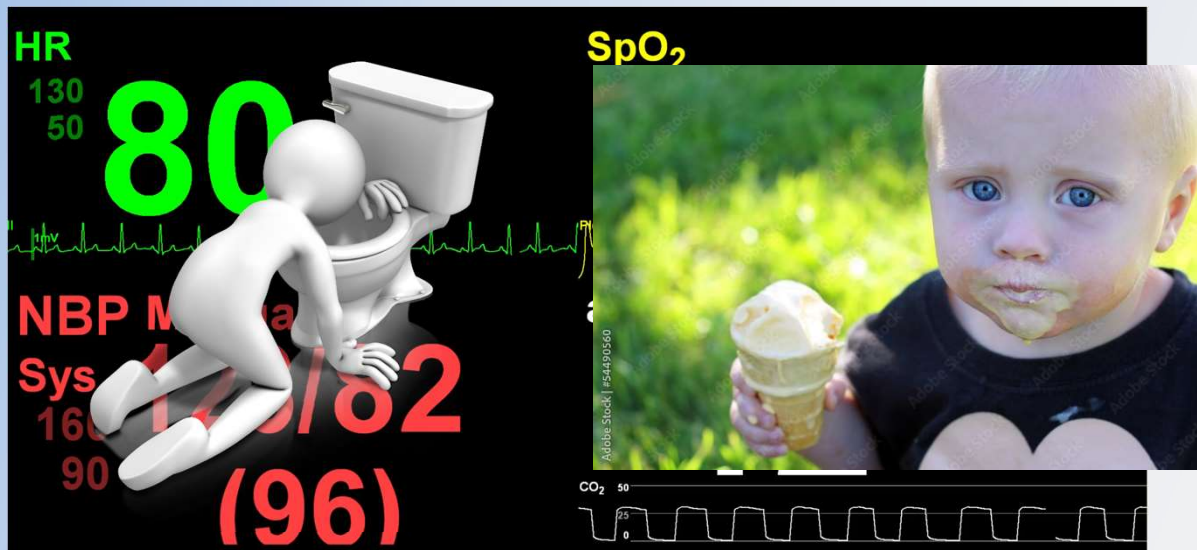
Team Training




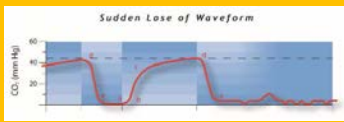
Establishing Validity of the Team Sedation Model
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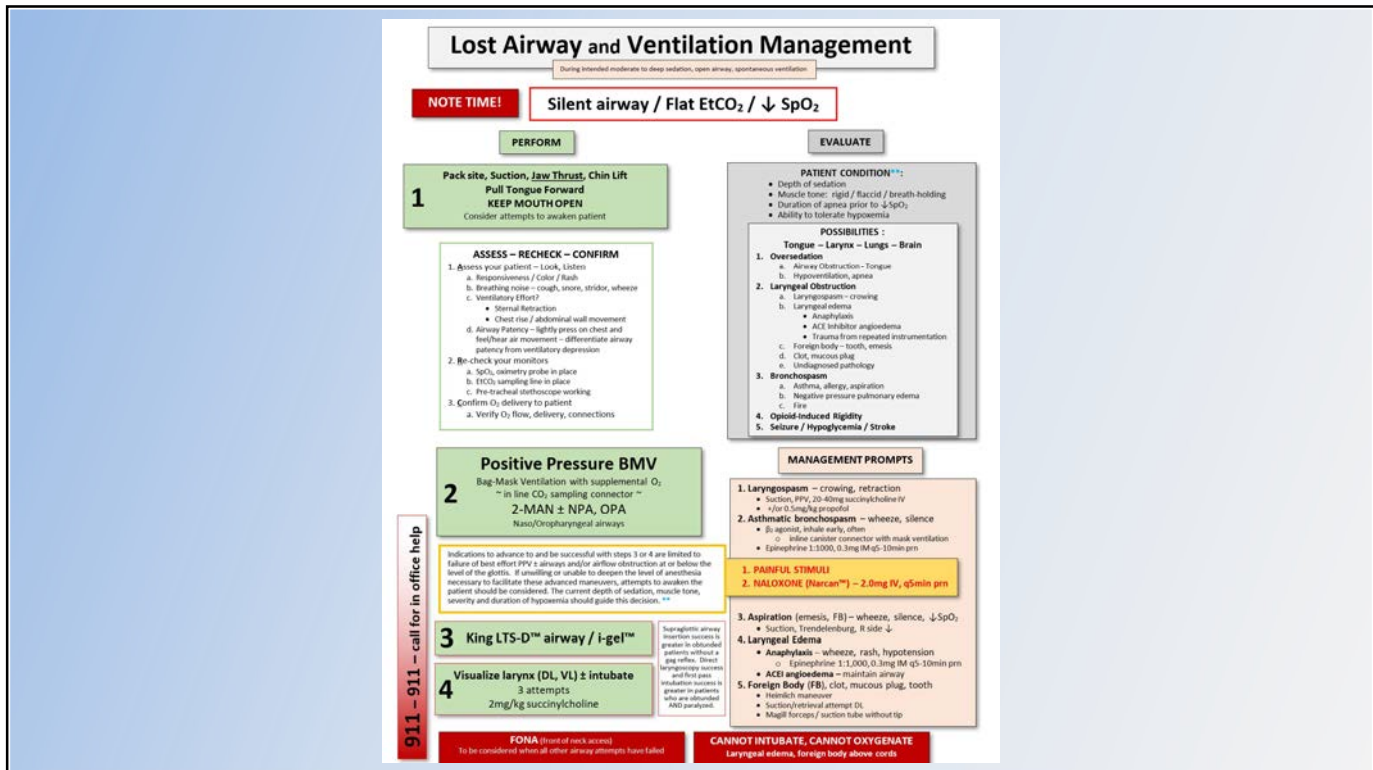
✓ Patient Screening
Team Training
Techniques

Anoxia not only stops the machine, it wrecks the machinery.

J.S. Haldane, J. Physio. circa 1919



	Ventilatory Depression Physiologic Problem 	Upper Airway Obstruction Anatomic Problem 
	Decreased CO ₂ sensitivity in brainstem	Partial or complete obstruction at base of tongue, soft palate due to loss of muscle tone and proprioception
Manage	Stimulate patient, stop or reverse drugs Positive Pressure Ventilation	Triple airway maneuver, JAW THRUST Oral or naso pharyngeal airway, ++++
Capnography		
SpO ₂	↓	↓
Pre-tracheal auscultation	↓	No sounds; snoring, gurgling, wheezing, crowing
Chest movement	Minimal to no chest rise	Paradoxical movement, sternal retraction, chest collapse, abdominal rise
Feel air movement at mouth	Minimal to none, may hear with light chest pressure	None



1. Loss of Airway Noise
2. Lost of CO₂ tracing
3. Dropping SpO₂


Obstruction

- Supraglottic – large, related tongue in small space
- Glottic
 - Laryngospasm
 - Laryngeal edema – allergy, trauma, angioedema
 - Physical blockage
 - Foreign body – tooth, emesis
 - Clot, mucous plug
- Subglottic
 - Laryngeal edema
 - Bronchospasm / allergy / aspiration / fire
 - NPPE
 - Foreign body

Obtundation – drug overdose, co-ingestion

- Hypoventilation
- Apnea
- Seizure / hypoglycemia / stroke

Rigidity - rapid mu receptor occupation



Pack site, Suction, JAW THRUST, Chin lift
Pull Tongue Forward
Stimulate Patient
Keep Mouth Open

1. Apnea
2. Crowded airway
3. Stiff neck
4. Obstruction at / below glottis

Obstruction

- **Supraglottic** – large, related tongue in small space
- **Glottic**
 - Laryngospasm
 - Laryngeal edema – allergy, trauma, angioedema
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Obtundation – drug overdose, co-ingestion

- Hypoventilation
- Apnea
- Seizure / hypoglycemia / stroke


Rigidity – rapid mu receptor occupation

Positive Pressure Ventilation (BMV)
Supplemental O₂
In-line CO₂ sampling
2 MAN with airways


King LTS-D™ airway / i-gel™

Visualize larynx (DL,VL) ± intubate
3 attempts
2mg/succinylcholine


1. Not available, poor fit, can't seal
2. Need > 20cm H₂O
3. Can't use airway
4. Anterior larynx
5. Obstruction at or below glottis



1. Not available, poor fit
2. "reluctant" airway
3. Need > 20cm H₂O (igel)
4. Obstruction at or below glottis ?



1. "reluctant" airway
2. Can't see / can't pass
3. Obstruction at or below glottis
4. Altered anatomy / bleeding



Try to awaken
Reverse



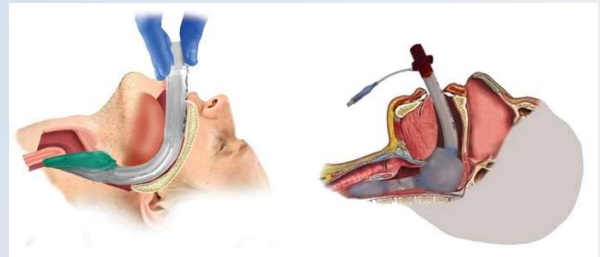
	Try to awaken	Paralyze
Skill, knowledge, proficiency and comfort level of sedation provider	Limited	Proficient
Degree of urgency	Low	High
Duration of compromise	Brief	Extended
Purposeful response to pain	Yes	No
Estimated "wake-up" time	Quick	Delayed
Condition of patient		Rigid
Intended level of sedation	Moderate	Deep / GA
Degree of obstruction	Partial	Complete
EGD successful ?	Yes	No
Did epinephrine help ? <small>(if indicated)</small>	Yes	No

Induce
Paralyze

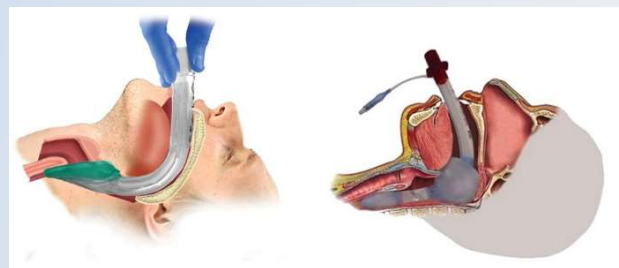
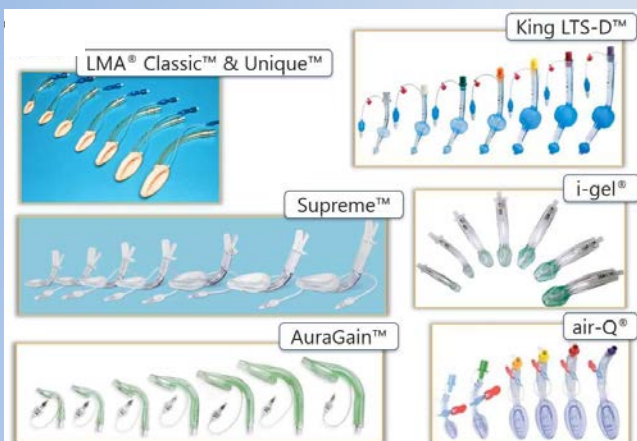


Extraglottic Devices

1. Triple Airway Maneuver
2. Check for Airway Patency
3. Bag-Mask Ventilation ± Airways
4. Extra-Glottic Device
5. DL/VL ± Intubation
6. FONA



Extraglottic devices subtypes



i-gel™

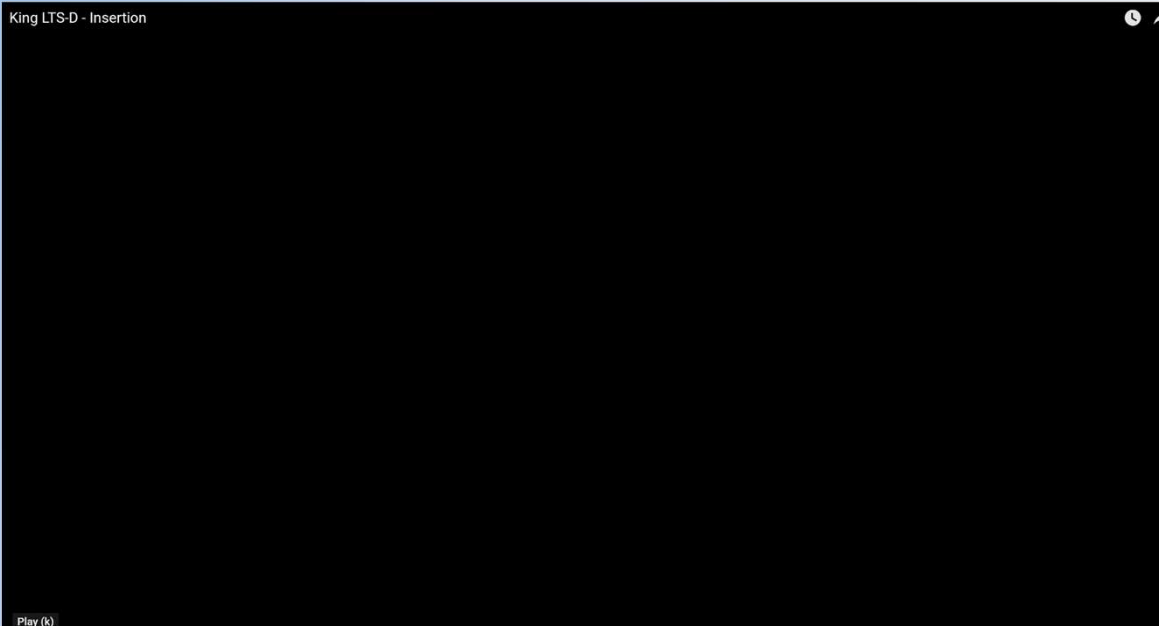
King LTS-D™

King LTS-D airway



King LTS-D Size	0	1	2	2.5	3	4	5
Size selection Based on..	<u>Weight</u>	<u>Weight</u>	<u>Weight</u>	<u>Weight</u>	<u>Height</u>	<u>Height</u>	<u>Height</u>
	< 5kg	5-12kg	12-25kg	25-35kg	4-5 feet	5-6 feet	> 6 feet
Connector color	Clear	White	Green	Orange	Yellow	Red	Purple
Cuff volume	10cc	20cc	25-35cc	30-40cc	40-55cc	50-70cc	60-80cc
Gastric tube size	10F	10F	16F	16F	16F	18F	18F

King LTS-D - Insertion



Can you place an EGD?

RODS

- **R**estriction
- **O**besity / obstruction
- **D**isrupted or distorted anatomy
- **S**hort thyromental distance (**S**tiff lungs)



www.i-gel.com

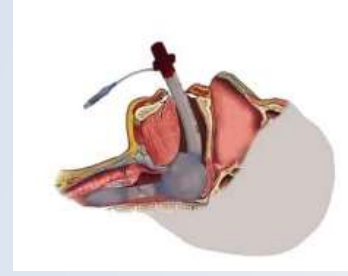


- Non inflatable, anatomic seal of the pharyngeal and laryngeal structures
- Gastric channel, integrated bite block and a shape that minimizes rotation



You can see this
on YouTube™

Insertion technique



Obstruction

- **Supraglottic** – large, relaxed tongue in small space
- **Glottic**
 - Laryngospasm
 - Laryngeal edema – allergy, trauma, angioedema
- Physical blockage
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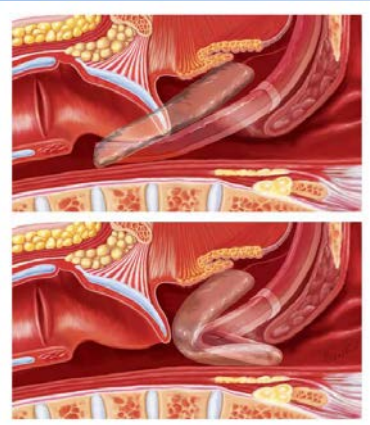
Obtundation – drug overdose, co-ingestion

- Hypoventilation
- Apnea
- Seizure / hypoglycemia / stroke

Rigidity – rapid mu receptor occupation

1. Will it prevent aspiration?
2. Will it work with laryngeal pathology
3. Will it work with bronchospasm
4. Will it work with foreign body

Problems with EGD



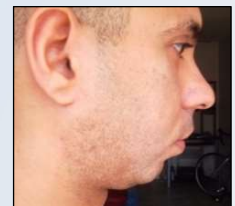
1. Faulty insertion
2. Inadequate fit – altered anatomy
3. Gastric distention
4. Gag – vomit
5. Sub-laryngeal obstruction
6. High airway pressures impossible
7. Stabilize ?
8. Connectors ?
9. Laryngospasm under the mask

There are 3 (three) indications for intubation

failure to ventilate/oxygenate by (optimal) BMV or EGD placement

This will include 1 or more of the following:

- 0. Poor (failed) BMV or EGD technique***
- 1. Known or suspected foreign body**
 - Tooth, emesis, gauze, instrument
- 2. Laryngeal edema**
 - Anaphylaxis
 - Angioneurotic edema
 - Trauma from repeated instrumentation
- 3. Bronchospasm**
 - Aspiration
 - Need of > 20 cmH₂O PPV

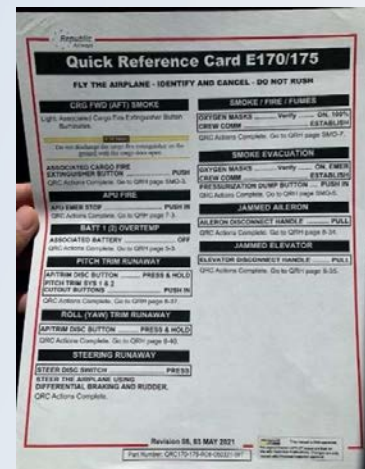
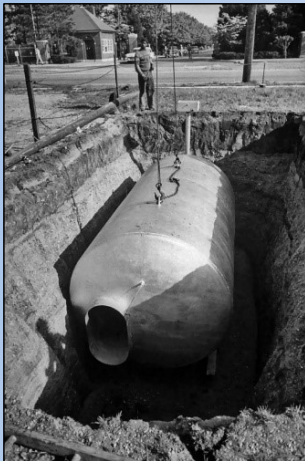


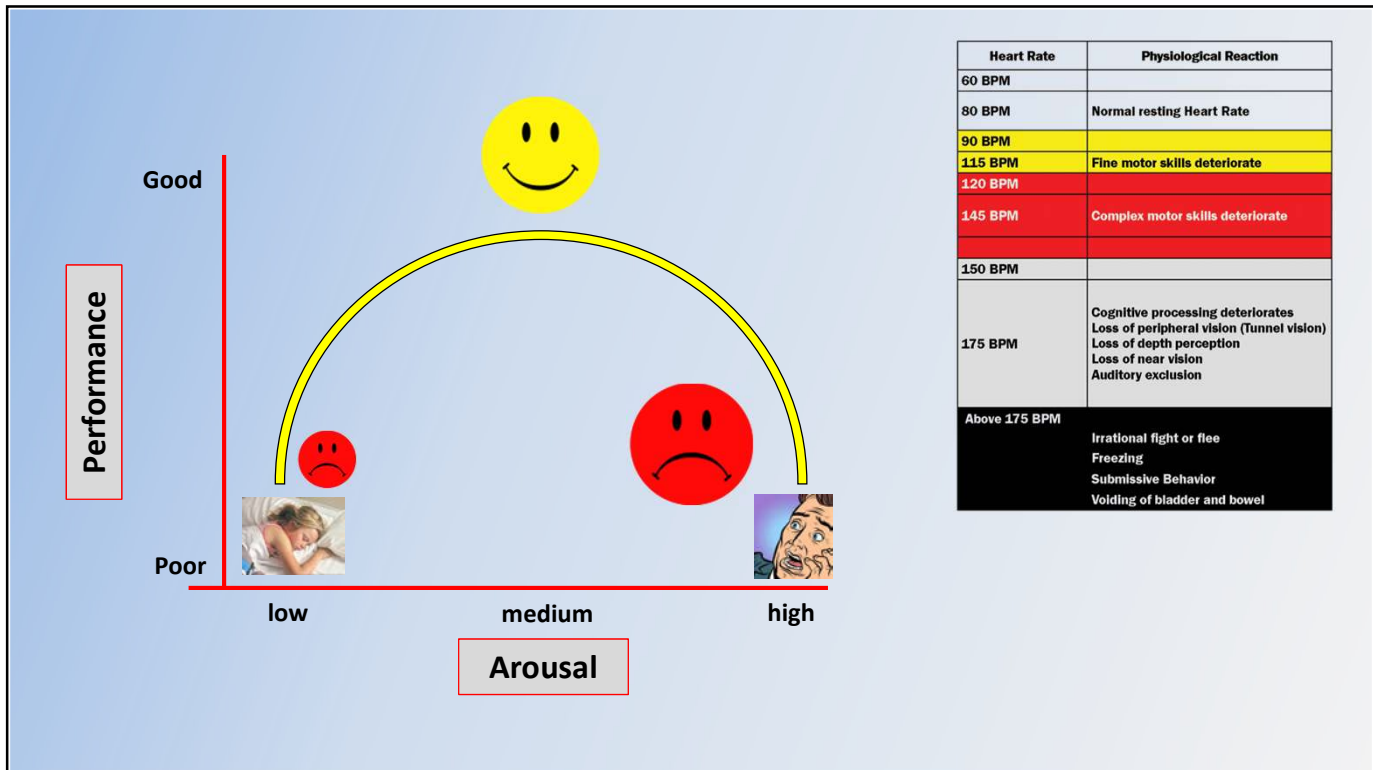
Team Training

Establishing Validity of the Team Sedation Model
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 The New Lost Airway and Ventilation Algorithm
 Cognitive Bias

3. Improve performance Prepare and rehearse workflow

Human Factor
 Engineering





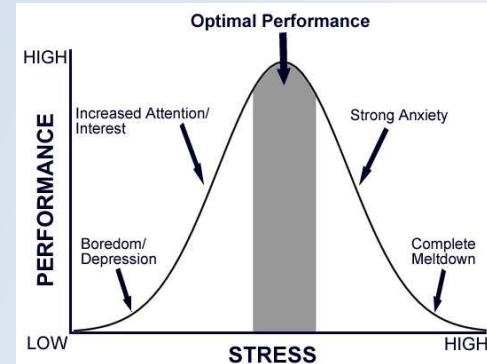
Situational Paralysis

unable to think /act

- **Failure to maintain focus on goals**
 - “What is going to happen to me”
 - Versus “what will happen with the patient”
- **Sub-optimal performance**
 - No second chance, time urgency, life and death
- **Sedation providers**
 - Plenty of working memory = cognitive horsepower
 - Worry short-circuits the brain
 - Must prioritize and focus only on the next critical action

How to stay calm to improve performance

- Stay positive
- Disconnect
- Limit caffeine
- Adequate sleep
- Squash negative self talk
- Reframe
- Focus on process, not outcome
- Box Breathing
- “partner” with your anxiety
- Use your support system (HINT: the team that you trained)



Cognitive Bias

name it and tame it



3 keys to behavior change

Direct the rider

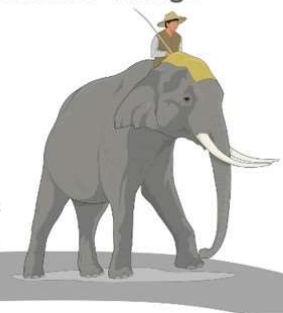
- give clear direction, reduce mental paralysis

Motivate the elephant

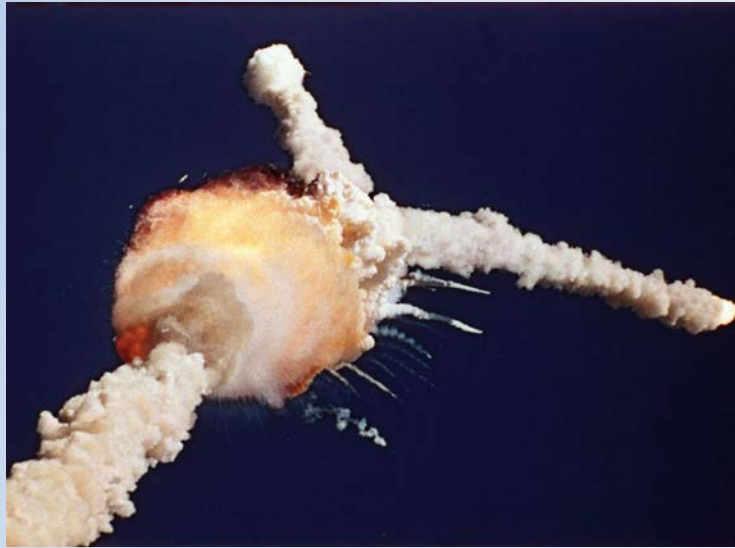
- find the emotional connection

Shape the path

- Reduce obstacles, tweak the environment, make the journey go downhill



Go fever



Group Think



Cognitive Biases

- Anchoring
- Availability Bias
- Confirmation Bias
- Commission Bias
- Overconfidence
- Sunk Cost
- Paradox of Choice
- Prospect Theory
- Group Think....
- Go fever.....

1	Anchoring (fixation error, tunnel vision)	Focusing on 1 issue at the expense of noticing, understanding and reacting to the whole situation	Attending to a monitor alarm, you are unaware that the patient has aspirated
2	Availability BIAS	Choosing a diagnosis because it is at the forefront of your mind, due to an emotionally charged experience in the past	Thinking a ↓SpO ₂ is due to an upper airway obstruction, without consideration of laryngeal or bronchial trouble
3	Premature Closure	Accepting first plausible diagnosis prematurely and without verification, failure to consider other possibilities	Assuming bronchospasm in an asthmatic patient who cannot breathe, without regard to possibility of laryngeal obstruction
4	Feedback BIAS	Mis-interpretation of no feedback as positive feedback. Significant time elapses between action and consequence.	Thinking that epinephrine has corrected hypotension, but no proof of this exists.
5	Confirmation BIAS (posturing)	Seeking/accepting only that information that confirms your Dx or Tx, and subconsciously discounting contrary evidence	Repeatedly cycling BP measurements because you "do not believe" the low value on the monitor
6	Framing effect	Subsequent thinking is swayed by leading aspects of the initial presentation	Pre-sedation hysteria is "blamed" for post-sedation agitation, disregarding other plausible causes such as hypoxia, hypoglycemia, drug interaction, etc.
7	Commission BIAS	Tendency toward action rather than inaction. Performing un-indicated maneuvers, deviating from protocol. May be due to overconfidence, desperation, or pressure from others	Attempting intubation rather than focusing on better technique for PPV or placement of LMA
8	Overconfidence BIAS	Inappropriate boldness, not recognizing the need for help, belief that you are infallible. Hazardous attitudes. Dunning-Kruger effect, impulsivity, invulnerability	Delay in calling for help, because you "know you've got this"
9	Omission BIAS	Tendency toward inaction, due to fear of causing harm or failing with an unfamiliar procedure, conservative retreat. Game theory: deviation from appropriate decisions to conservatism as risk increases.	Failing to recognize failure of an initial airway maneuver and hesitating to perform the next airway intervention
10	Sunk cost	Unwillingness to retreat from a failing diagnosis, decision or maneuver, in order to validate prior action or decisions, esp. when so much time and resources have been spent. An inappropriate escalation of commitment. Go fever: being in a rush to get things done while overlooking potential problems.	Repeatedly attempting PPV with a BVM, in spite of dropping SpO ₂
11	Zebra retreat	Rare Dx figures prominently among possibilities, but provider is hesitant to pursue it	Hesitant to use vasopressin for recalcitrant hypotension in a patient taking ACE inhibitors unresponsive to epinephrine
12	Psych-out error	Medical causes for behavioral problems are missed in favor of a psychological diagnosis	Patient is combative and incoherent in recovery, failure to consider hypoxia
13	Situational paralysis	Unable to think/act due to overwhelming worry of doom in time-urgent, high stakes, no second chance situations	Having an LMA in hand, but unable to proceed with insertion
14	Paradox of choice	↑# of choices increase anxiety and response times and contributes to analysis paralysis	Unable to choose among BVM, LMA or intubation
15	Prospect theory	Fear of reprisal invites pursuit or persistence of futile efforts to avoid loss. Losses loom larger than gains.	Failure to recognize or accept ineffective PPV with BVM, delaying the call to 911
16	Group think	Dysfunctional group dynamic that prioritizes minimizing conflict and supporting harmony, conformity and cordiality without critical evaluation of alternative viewpoints. Actively suppressing dissenting viewpoints.	Anesthesia Assistants hesitant to speak up if they see something not quite right; steep hierarchy


Contributors to Cognitive Bias


Clinician	Patient	Systematic	External
<ul style="list-style-type: none"> • Cognitive Load • Fatigue • Emotions 	<ul style="list-style-type: none"> • Complex • Incomplete information 	<ul style="list-style-type: none"> • Schedule • Information flow • Information technology • Poor communication 	<ul style="list-style-type: none"> • Overconfidence • Framing • Emotions • Anchoring • Loss aversion

Managing Cognitive Bias

PERSONAL	SYSTEMATIC
<ul style="list-style-type: none"> • Acknowledgement / Awareness • Explore answers against intuition • Imagination - mindfulness • Education - Retraining • Use of “slow-down” strategies 	<ul style="list-style-type: none"> • Checklists • Team-based decision making • AI ? • Clinical decision support systems • Stopping / standing rules

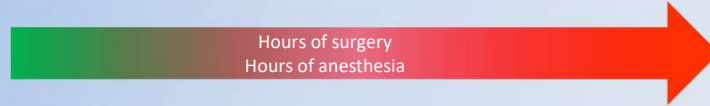
APSF Newsletter, Feb 2023

 Patient Screening
 Team Training
 Techniques

Techniques  Anesthesia for prolonged procedures

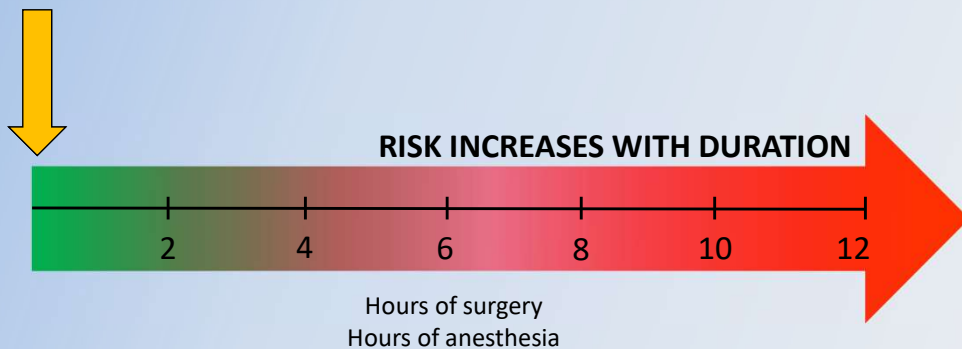
Risks of Prolonged Surgery / Anesthesia / Deep sedation

Definition of terms
 Provider Profile
 Patient and Procedure Matching
 Depth of Anesthesia
 Location of Anesthesia
 ✓ Risks of Prolonged Anesthesia
 Techniques
 Patient Safety



1. LAST – local anesthetic systemic toxicity
2. Fluid and caloric balance
3. Hypotension
4. Thermoregulation
5. Pulmonary mechanics
6. PONV – post-operative nausea and vomiting
7. POCD – post-operative cognitive dysfunction
8. Prolonged Immobilization
 - Blood clots
 - Pressure necrosis
9. Prolonged recovery
10. Waste gas accumulation

Risks of Prolonged Surgery / Anesthesia / Deep sedation



Is general anesthesia necessary during lab conversion for hybrid restorations?

Local Anesthetic Systemic Toxicity

Drug	Maximum dosage	Maximum adult dose	Maximum # of cartridges
2% lidocaine / epi	3.3 mg/lb	500 mg	12
2% lidocaine plain	2 mg/lb	300 mg	7
4% articaine / epi	3.3 mg/lb	500 mg	6
4% prilocaine	4.0 mg/lb	500 mg	6
2% mepivacaine with levo	2.6 mg/lb	400 mg	10
3% mepivacaine plain	2.6 mg/lb	400 mg	6
.5% bupivacaine with epi	0.6 mg/lb	90 mg	9

Maximal dose?

- 2.0 mg/lb for all except bupivacaine
- 0.5mg/lb for bupivacaine

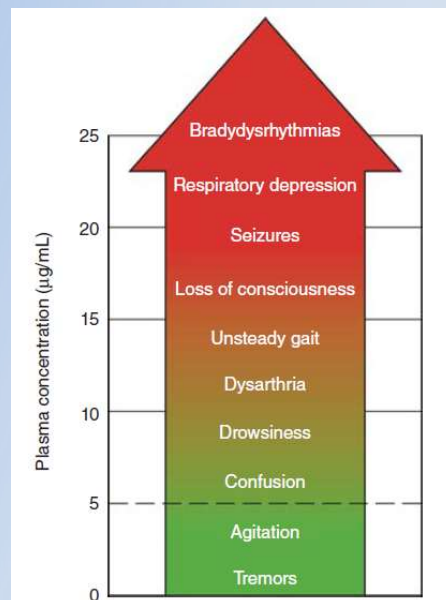
Risk factors

- Long cases
- Elderly
- Low BMI, frailty
- Use without epi
- Rapid or repeated injection
- Intravascular injection
- Using non-bupivacaine LA within 20 minutes of Exparel™

Weinberg, G., et. al. Local Anesthetic Systemic Toxicity (LAST) Revisited: A Paradigm in Evolution. AFSF Newsletter, Feb., 2020.

Local Anesthetic Systemic Toxicity

LAST



Systemic Complications

1. Psychogenic reactions
2. Local anesthetic systemic toxicity (LAST)
3. Acquired methemoglobinemia
4. Allergy
5. Complications with vasoconstrictor additives
6. Adverse drug interactions with vasoconstrictors

These signs and symptoms may be "hidden" in patients who are sedated !

Local Anesthetic Systemic Toxicity

signs and symptoms

Prodrome	Major CNS	Major CV
Tinnitus	Agitation / confusion	Bradycardia, heart block
Metallic taste	Obtundation	Hypotension
Hypertension	Twitching, seizure	Ventricular dysrhythmias
Tachycardia	Coma	Asystole

Weinberg, G., et. al. Local Anesthetic Systemic Toxicity (LAST) Revisited: A Paradigm in Evolution. AFSF Newsletter, Feb., 2020.

Techniques

align expectations, profound local

Definition of terms
 Provider Profile
 Patient and Procedure Matching
 Depth of Anesthesia
 Location of Anesthesia
 Risks of Prolonged Anesthesia
 ✓ Techniques
 Patient Safety

- **Stage your procedures**
 - Remove posterior teeth first
 - 1 arch at a time
 - 1 location (side) at a time
- **Eliminate lab conversion time**
 - Complete digital planning – prefabricated teeth
 - Office or OR

Techniques

align expectations, profound local

Definition of terms
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	Onset <small>Dose and rate of injection dependent</small>	Duration of effect <small>Dose and rate of injection dependent</small>
Midazolam	Up to 6 min	30 – 60 min
Fentanyl	Up to 4 min	30 – 60 min
Ketamine	< 1 min	dose dependent
Propofol	1 min	10 min

• Moderate sedation

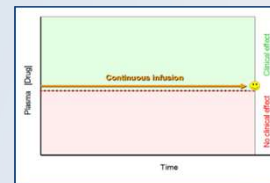
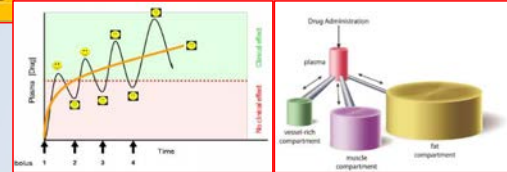
- Consider longer acting oral BZ ± N₂O
- Limited redosing of BZ / fentanyl

• Deep sedation

- Redose BZ, fentanyl, ketamine, propofol
- Longer acting drugs – dexmedetomidine, hydromorphone
- Infusion pump – propofol (± remifentanyl, remimazolam)*

• General anesthesia (with intubation)

- Sevoflurane
- Propofol infusion



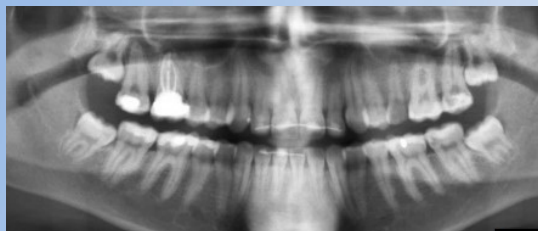
*off-label

General anesthesia license necessary

A Beautiful Sleep*



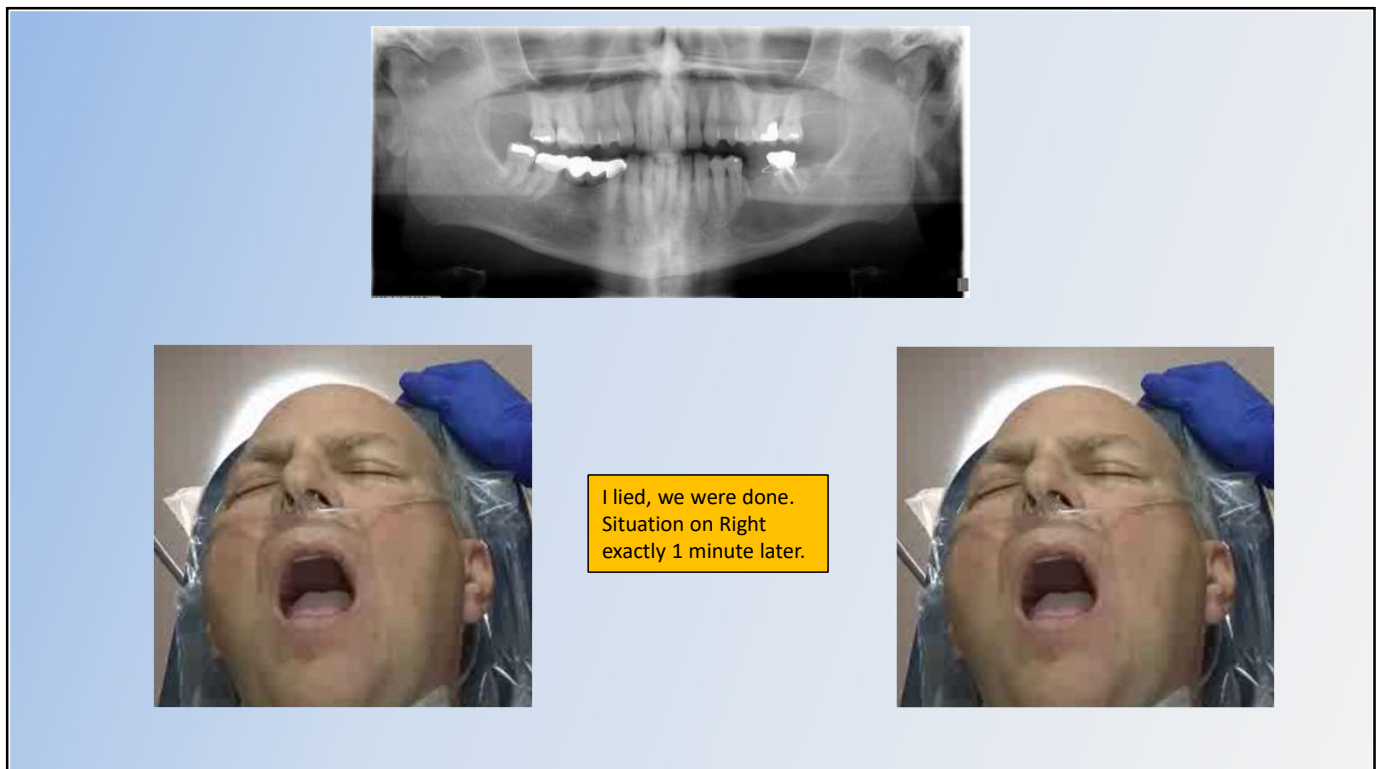
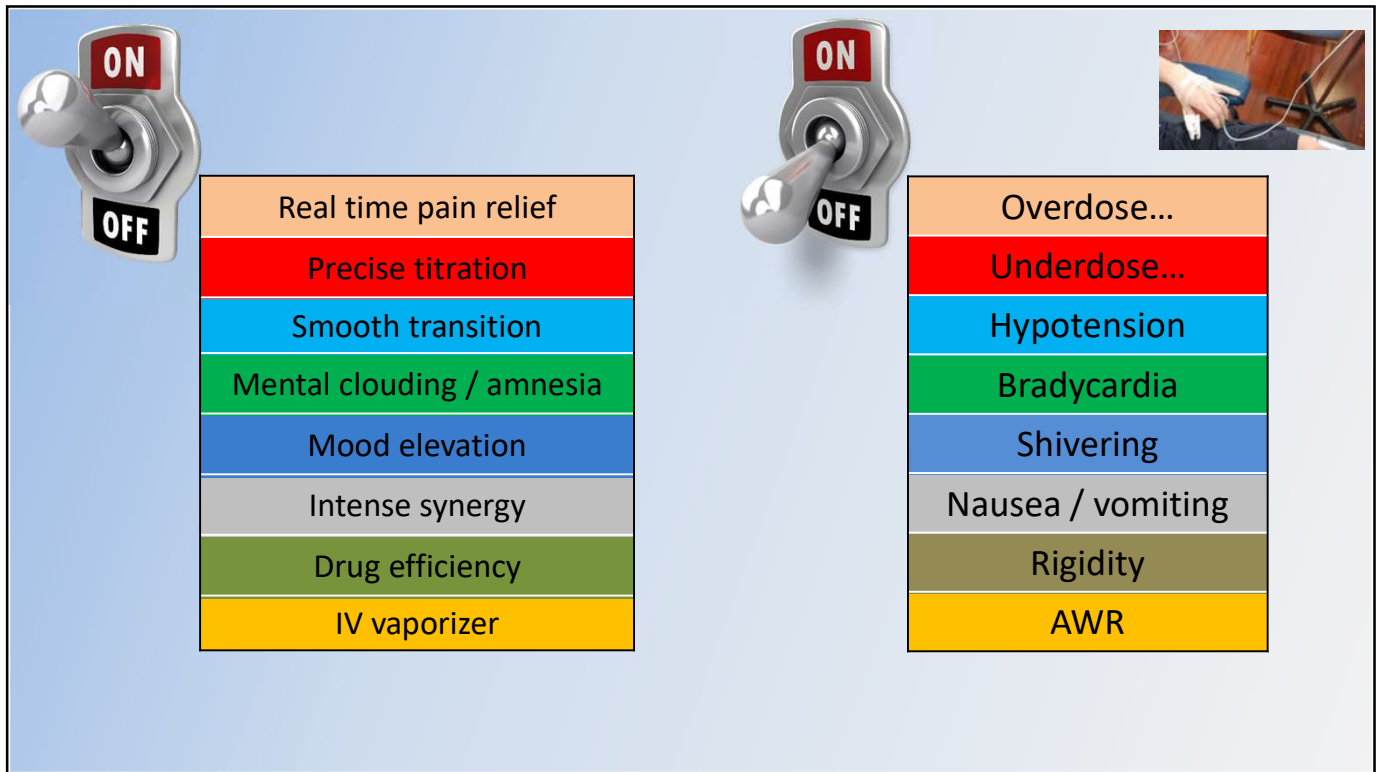
*General Anesthesia Training and License required, this is **OFF-Label**



8:38 am – first bolus
 8:41 am – start surgery
 8:46 am – infusion off
 8:47 am – wake up



Dec, 2006



0:00

Baseline

0:05

5 boluses / shots
No wincing on 2nd block !

1:00

1 hour later
Ready for CBCT

1:45

45 minutes later
Ready for conversion

Rapid and precise attainment of targeted anesthetic depth

Steady state maintenance of anesthetic depth

Rapid / precise adjustment of anesthetic depth

Rapid / predictable offset

100-125 μg of remifentanyl into 200 mg of propofol

OFF LABEL

- **MicroBolus** - 150 $\mu\text{g}/\text{kg}$ (intermittent, 30-60 sec for full effect) – **NEVER CHANGE**
- **Starting Infusion** - 70 $\mu\text{g}/\text{kg}/\text{min}$ – **CONTINUALLY ADJUST**

Doses based on Propofol

O'Connor, S., et. al. Remifentanyl and propofol undergo separation and layering when mixed in the same syringe for total intravenous anesthesia. *Ped Anesth* 26:703-9, 2016.

Abalom, A. R., et. al. De-mystifying the "Mixfusor". *Ped Anesth* 30:1292-8, 2020.

Baghaw, O., et. al. The safety profile and effectiveness of propofol-remifentanyl mixtures for total intravenous anesthesia in children. *Ped Anesth* 30:1331-9, 2020.

Malherbe, S., et. al. Mixing of propofol and remifentanyl. Correspondence. *Ped Anesth* 31:504-5, 2021.

Wylie, N., et. al. Consistency of remifentanyl concentrations in propofol-remifentanyl infusions. A laboratory-based study. *Ped Anesth* 32:727-331, 2022.

Immobility with Stimulus

"A Beautiful Sleep"

Awake / Aware

Awake / Aware

DOSE

Minutes since IV bolus injection

Summary

safety 1st

A true patient connection is 100x more potent than the strongest sedative drug.

- Accept your own limitations
- Align realistic patient expectations - “engagement”
 - Your patient owns their treatment plan
 - Plan for **PATIENT VARIABILITY**
- VOID right before procedure, calculate fluid replacement
- Nice to verbally check on patient from time to time.
 - Occasional deep breath, leg movement (minimize clots, pressure necrosis)
- **Wait** for sedation prior to local. Wait for local prior to surgery.
- Consider 30mg IV ketorolac after ~ 1 hour into the surgery
- Re-anesthetize at first indication of discomfort (avoid overdose)

Can we close the gap between the Perception and Reality of safety?

- How much longer will organizations ignore safety opportunities ?
- When will we stop punishing and shaming necessary human fallibility ?
- When will we be able to accept our shortcomings and move forward ?
- Staying safe is quite difficult – value and reward are hard to identify ?
- Will increased oversight or accountability help ?



Chronology of Events "A perfect Storm"
*The Deep Sleep, 6000 Will Die or Suffer
 Brain Damage*
 (April 22, 1982)



The Deep Sleep

April 22, 1982

Can sedation in the dental office be safer?



Qauttrone, M. Is the Physician Office the Wild, Wild West of Health Care? *J Amb Care Manage* 2000;23:64-73.



Opinion > Second Opinions
The Wild West of Non-Operating Room Anesthesia
 — Preserving patient safety is essential
 by Emily Methangkool, MD, MPH
 February 11, 2023

HOW can this be improved ?



Can We Close the GAP
between
Perception of Safety and Reality?

Knowing what to do and doing it are 2 totally different things

- Identifying risk is **NOT** the problem
- Recognizing the possible solution to safety risk is **NOT** the problem
- The problem is accepting and practicing intervention bundles that will reduce the risk of an adverse event

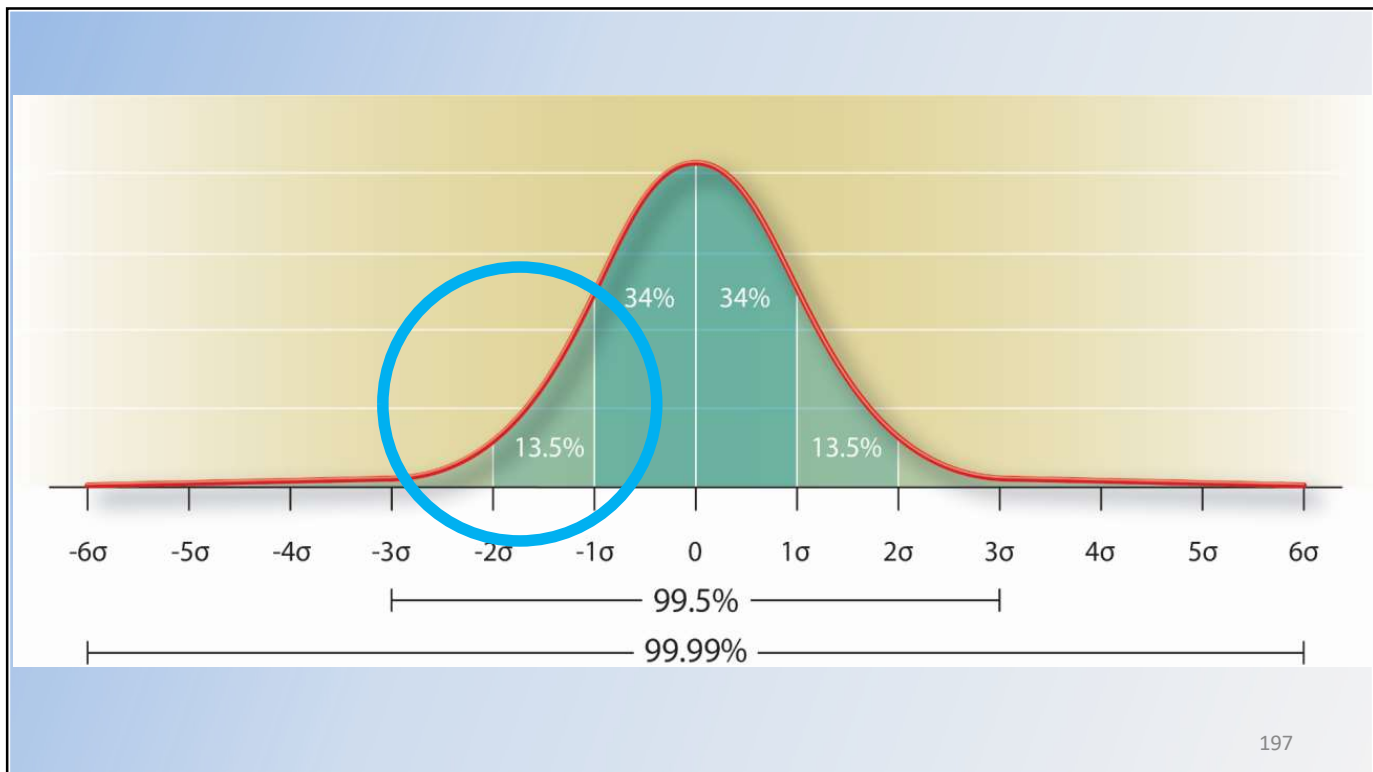
APSF/ASA Ellison C. Pierce Patient Safety
Memorial Lecture
Robert K. Stoelting, MD



“Safety is doing the right thing because it makes sense. Evidence-based data is not necessary for the acceptance of a safety practice”.

Dr. Robert Stoelting

Boston, 2017

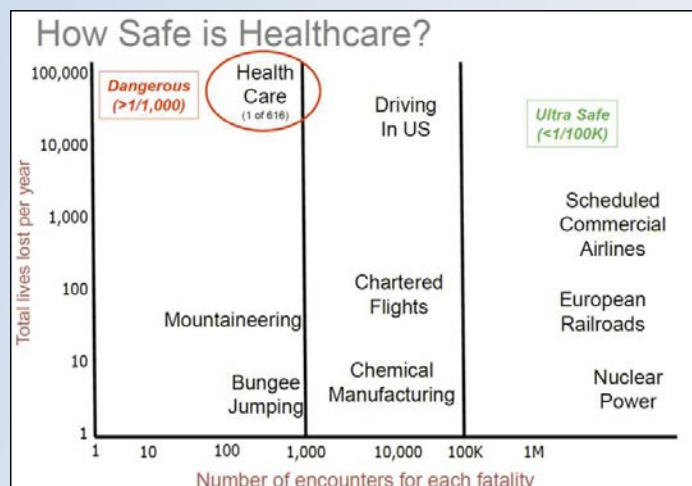


197

Are we safe?

Causes of death, US, 2013

1. CV
2. Cancer
3. Medical Error





- 98,000 patients die each year from medical error
- 1800/week, one 747 crash every other day
- There are ~ 20 Million flights/year

9 years later.....

2008 National Healthcare Quality Report, released by the Agency for Healthcare Research and Quality (AHRQ): Safety is getting WORSE, NOT BETTER.

Institute of Medicine. To Err is Human: Building a Safer Health System. Washington, DS: National Academies Press; 2000.

Agency for Healthcare Research and Quality. 2008 National Healthcare Quality & Disparities Report. <http://www.ahrq.gov/qual/grdr08.htm>. Accessed 6/20/2022.

Safety

“protected from or not exposed to danger or risk, not likely to be harmed”

1. Are we safe?
2. Can we be safer?
3. How can safety be measured?
 1. Closed claims ?
 2. Registries ?
4. What does being safer look like ?

Causes of death, US, 2013

1. CV
2. Cancer
3. Medical Error



Safety is measured by the number and intensity of safety behaviors that a individual or group routinely participates in. It is not measured by outcomes.

Patient Fire



Fire will not occur or will extinguish when any one of these 3 legs of the fire triangle is absent, exhausted, or removed.

Ignition sources

heat sources

- Electrosurgery
- Electrocautery
- Laser
- Heat and/or spark from a dental bur
- “battery burners”
- Defibrillators



Fuels

- Cotton/paper products
- Hair
- Plastic, rubber
- Alcohol-based prep solutions



Oxidizer

O_2 and N_2O

Ambient [O_2]	21%
OEA [O_2]	23.5%

OEA = Oxidizer Enriched Atmosphere

- Open delivery of O_2 (N_2O) – cannula, nasal hood
- During sedation
- Pulmonary patients to maintain $SpO_2 > 90\%$
- O_2 accumulating under surgical drapes

Airway Fires

management

- Stop gas, remove burning material, blot, water, CO₂ extinguisher
- Once fire is extinguished, anticipate bronchial mucosal burns
- Supplemental O₂
- 911

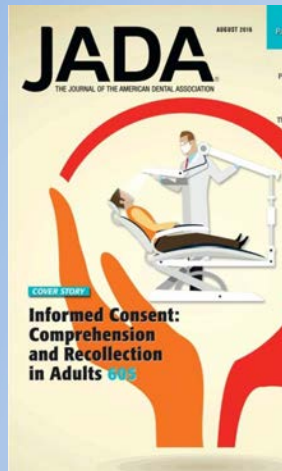


New to the Dental Profession...

Practical implications

When the source of a fuel cannot be removed from the immediate area, soaked with water or covered with a water-soluble jelly, **the open flow of oxygen or nitrous oxide/oxygen mixtures to the patient should be stopped for 1 minute prior to the use of a potential ignition source** and intraoral suction should be used to clear the ambient atmosphere of oxidizer-enriched exhaled gas.

2016



CASE REPORT:
Patient Fire during Dental
Care 175

**ORIGINAL
CONTRIBUTIONS**
Pre and Postoperative Sedation:
Systematic Reviews,
Clinical Practice
Guidelines 133, 172

The Frequency of Typical,
Atypical Periapical
Lesions 145

The Impact of Painful
Temporomandibular
Disorders on Diet 167

Patient fire during dental care A case report and call for safety

Robert C. Bensch, DDS, Mark E. Bradley, DCE, EIT, BS,
Andrea M. VanCleave, DDS, MEd, and M. Weaver, DDS, PhD

Patient fire—that is, burning of substances on or in a patient during the delivery of dental care—is an infrequent but high-impact event that can result in disfigurement, disability, or death for both patients and dental staff members. To date, with only 1 dental-related case report in the literature to our knowledge, the need for disseminating education about patient fire risk, prevention, and management cannot be overstated. We add this case report to the literature to heighten awareness of the possibility of these preventable mishaps.

CASE REPORT

A 74-year-old patient arrived at her appointment to receive restorative dental care, which involved the preparation of a titanium post with a high-speed, irrigated dental drill. Her medical history included hypertension and hyperlipidemia. A history of nasal polyps was noted, but she reported that it did not interfere with nasal breathing. As was customary before dental procedures, the patient applied a thin layer of petroleum jelly to her lips. A disposable nasal hood with scavenging was placed on the patient's face, and a 20% oxygen and 80% nitrous oxide mix was administered. The mouth had not been wiped with any antiseptic agent.

As stated by the patient, approximately 30 minutes into the procedure, she felt intense heat on her nose and face. The heat was localized to the left side of her

ABSTRACT

Background and Overview: Fire risk is present whenever there is a combination of fuel, oxidant, and an ignition source, which is called the fire triangle. A heightiest must awareness of fire risk is necessary whenever a fire triangle is present. This authors provide a detailed event case report of fire in a dental office.

Case Description: A 74-year-old woman received second-degree facial burns from a fire that ignited near the nasal hood supplying a nitrous oxide-oxygen mixture. The proximal ignition source was heat generated during the preparation of a titanium post with a high-speed, irrigated dental drill. The patient was transferred to the local emergency department and subsequently discharged after possible pulmonary complications were ruled out. The patient was then transferred to a regional burn unit and was discharged home with second-degree burns.

Conclusions and Practical Implications: When the source of a fire cannot be removed from the procedure area, dental staff should use a water-soluble jelly; the dentist should stop the open flow of oxygen or nitrous oxide; oxygen measures for the patient for 4 minutes before the use of a potential ignition source; and nitrous oxide should be used to clear the ambient atmosphere of oxidant-enriched residual gas.

Key Words: Dental fire; nitrous oxide; oxygen; fire triangle; ignition source; oxidant-enriched atmosphere; facial burns.

JADA. 2016;137(8):175-180.
<http://dx.doi.org/10.1016/j.jadl.2016.07.002>

2017

DPSF

DENTAL
PATIENT SAFETY
FOUNDATION

Shared Learning

from the Dental Patient Safety Foundation Reporting Tool

"What gets measured gets managed" is the DPSF philosophy to encourage reporting. All received information about patient safety events (unsafe conditions, near misses or adverse events) are contextually de-identified (full confidentiality is preserved), aggregated, analyzed and abstracted by selected experts from our DPSF committees. Reports are generated and disseminated as the only means to learn from our errors. The information in these peer-reviewed reports is provided for its educational value only, and does not purport to establish any legally binding standard of care. Feedback is encouraged.

Case 2017.12A: Patient Fire during Dental Care

Situation: An otherwise healthy 72 y/o female underwent intraoral preparation of a titanium post with a high-speed irrigated drill while breathing N₂O/O₂ (30/70 mixture) via nasal hood. An unnoticed spark ignited the oxidant-enriched environment under the nitrous hood, triggering fire, burning velum hair and skin. The mask was quickly removed and the fire was smothered. Patient was immediately transported by EMS to the local emergency department for definitive management of the second-degree facial burns and monitoring of possible delayed pulmonary



2020

NEWS

Girl's mouth allegedly set on fire by a dentist in what experts call a 'freak accident'

Girl's mouth allegedly set on fire by a dentist in what experts call a 'freak accident'

"It's really unfortunate but at the same time really unheard of," said a spokesman for the American Dental Association.



Dental experts are telling parents not to panic after a Las Vegas dentist **allegedly set a fire in the mouth** of a 5-year-old girl during a routine procedure, calling the incident an unprecedented "freak accident."

“Patient Safety Events”

- **Incidents** – patient safety events that reach a patient, whether or not harm was involved
- **Near misses (close calls)** – patient safety events that do not reach the patient
- **Unsafe Conditions** – circumstances that increase the probability of the occurrence of an incident or near miss.

1

30

300

Only a PSO can capture this data



1 – 30 – 300

DPSF

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FOUNDATION

www.dentalpatientsafety.org



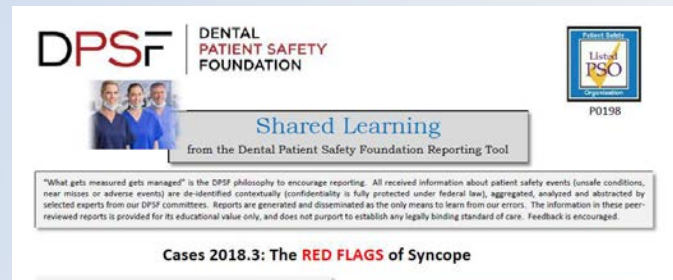
Agency for Healthcare Research and Quality
Advancing Excellence in Health Care • www.ahrq.gov

P0198



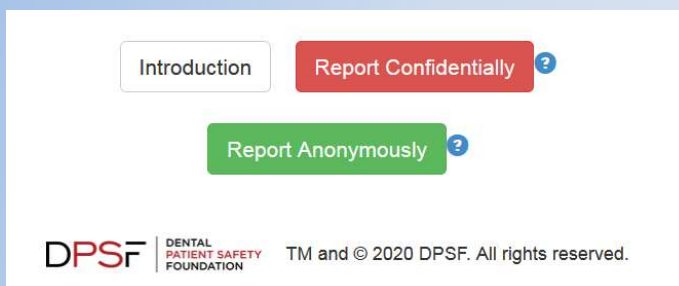


- **Create awareness**
 - Improved visibility of safety initiatives
- **Provide education**
 - Practice advisories
 - Videos
 - Social media
 - Newsletters

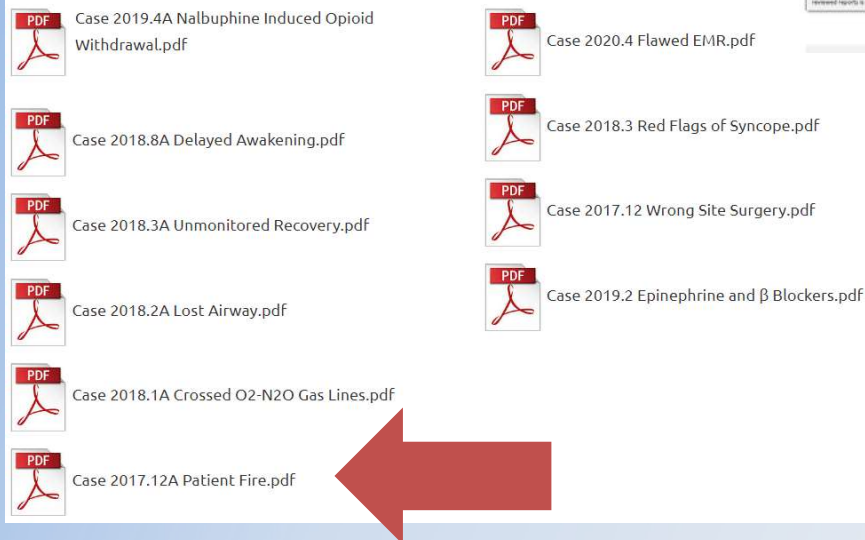


The reporting tool

voluntary self-reporting



Shared Learning Reports



Is there a better way?

- Not so far, or PSOs would not exist
- Closed claims as our safety signal ?
 - No suit – no info (missed close calls)
 - Info is delayed
 - Most info is held secret
- Anesthesia Registries
 - Can't be a PSO
 - Will tell of frequency and severity
 - Will not reveal nuances of patient disease, evolving clinical circumstances or clinical judgment
 - Will not capture near miss

Will this work ?

- History says YES
 - Australia, GB, Western Europe +++++
- This is the best system available on our planet at this time
- Dentistry has unique challenges
- NEED YOUR SUPPORT
- System works best with Culture of Safety



DENTAL
PATIENT SAFETY
FOUNDATION

www.dentalpatientsafety.org

Your PSO is a learning lab, it is not a place to be punished.
The DPSF fosters a culture of safety engineering.

Raise Awareness

Provide Education

Exercising safety behaviors

Provider

1. Optimize self
2. **CE**
3. Conservatism
4. Depth setting
5. Checklists/SOP
6. Standardized practices
7. Report safety events !!!

TEAM

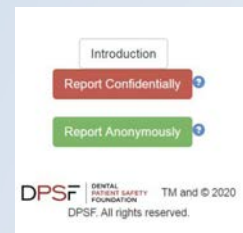
1. CRM
2. **Education**
3. Rehearsal
4. Preparation
5. Unhurried schedule

Organizations / Corporations other Foundations

1. Support PSO activities
2. Website links
3. Ad space in publications ,
mailers
4. Podium time
5. Exhibition space

How can I help?

1. Spread the word
2. Visit the website
3. Report often
4. *Practice Safety Behaviors*
5. Contribute



EVIDENCE BASED DATA IS NOT NECESSARY FOR THE ACCEPTANCE
OF A SAFETY PRACTICE
SAFETY IS DOING THE RIGHT THING BECAUSE IT MAKES SENSE



DENTAL
ANESTHESIA
ONLINE

Patient Safety Through Education

www.DAOce.org

3 Complete Web-Based CE Programs



ANESTHESIA
ASSISTANT
TRAINING
PROGRAM

Anesthesia Assistant Training

17 CE Hours

Teaching templates. Sedation providers mentor their own staff. Live, "hands-on" training.



TEAM SEDATION
TRAINING

Team Training

15 CE Hours

All 12 virtual SIMMAN™ simulation experiences.
Create your own **SimCenter**.



LIFELONG LEARNING

Anesthesia CE for Sedation Providers

50 CE Hours

Peer-reviewed, Up-To-Date "Video Textbook"
Standardized, sequenced curriculum.

ADA CERP® | Continuing Education
Recognition Program

Dental Anesthesia Online is an ADA CERP Recognized Provider.

ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP does not approve or endorse individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry. Concerns or complaints about a CE provider may be directed to the provider or to the Commission for Continuing Education Provider Recognition at ADA.org/CERP.



*Thank
You !*



Lost Airway and Ventilation Management[©]

During intended moderate to deep sedation, open airway, spontaneous ventilation

NOTE TIME!

Silent airway / Flat EtCO₂ / ↓ SpO₂

PERFORM

EVALUATE

1

Pack site, Suction, Jaw Thrust, Chin Lift
Pull Tongue Forward
KEEP MOUTH OPEN
Consider attempts to awaken patient

ASSESS – RECHECK – CONFIRM

- Assess** your patient – Look, Listen
 - Responsiveness / Color / Rash
 - Breathing noise – cough, snore, stridor, wheeze
 - Ventilatory Effort?
 - Sternal Retraction
 - Chest rise / abdominal wall movement
 - Airway Patency – lightly press on chest and feel/hear air movement – differentiate airway patency from ventilatory depression
- Re-check** your monitors
 - SpO₂, oximetry probe in place
 - EtCO₂ sampling line in place
 - Pre-tracheal stethoscope working
- Confirm** O₂ delivery to patient
 - Verify O₂ flow, delivery, connections

PATIENT CONDITION**:

- Depth of sedation
- Muscle tone: rigid / flaccid / breath-holding
- Duration of apnea prior to ↓SpO₂
- Ability to tolerate hypoxemia

POSSIBILITIES :

Tongue – Larynx – Lungs – Brain

- Oversedation**
 - Airway Obstruction - Tongue
 - Hypoventilation, apnea
- Laryngeal Obstruction**
 - Laryngospasm – crowing
 - Laryngeal edema
 - Anaphylaxis
 - ACE Inhibitor angioedema
 - Trauma from repeated instrumentation
 - Foreign body – tooth, emesis
 - Clot, mucous plug
 - Undiagnosed pathology
- Bronchospasm**
 - Asthma, allergy, aspiration
 - Negative pressure pulmonary edema
 - Fire
- Opioid-Induced Rigidity**
- Seizure / Hypoglycemia / Stroke**

Positive Pressure BMV

2

Bag-Mask Ventilation with supplemental O₂
~ in line CO₂ sampling connector ~
2-MAN ± NPA, OPA
Naso/Oropharyngeal airways

Indications to advance to and be successful with steps 3 or 4 are limited to failure of best effort PPV ± airways and/or airflow obstruction at or below the level of the glottis. If unwilling or unable to deepen the level of anesthesia necessary to facilitate these advanced maneuvers, attempts to awaken the patient should be considered. The current depth of sedation, muscle tone, severity and duration of hypoxemia should guide this decision. **

3 King LTS-D™ airway / i-gel™

4 Visualize larynx (DL, VL) ± intubate
3 attempts
2mg/kg succinylcholine

Supraglottic airway insertion success is greater in obtunded patients without a gag reflex. Direct laryngoscopy success and first pass intubation success is greater in patients who are obtunded AND paralyzed.

MANAGEMENT PROMPTS

- Laryngospasm** – crowing, retraction
 - Suction, PPV, 20-40mg succinylcholine IV
 - +/- 0.5mg/kg propofol
- Asthmatic bronchospasm** – wheeze, silence
 - β₂ agonist, inhale early, often
 - inline canister connector with mask ventilation
 - Epinephrine 1:1000, 0.3mg IM q5-10min prn

1. PAINFUL STIMULI

2. NALOXONE (Narcan™) – 2.0mg IV, q5min prn

- Aspiration** (emesis, FB) – wheeze, silence, ↓SpO₂
 - Suction, Trendelenburg, R side ↓
- Laryngeal Edema**
 - Anaphylaxis** – wheeze, rash, hypotension
 - Epinephrine 1:1,000, 0.3mg IM q5-10min prn
 - ACEI angioedema** – maintain airway
- Foreign Body (FB)**, clot, mucous plug, tooth
 - Heimlich maneuver
 - Suction/retrieval attempt DL
 - Magill forceps / suction tube without tip

FONA (front of neck access)

To be considered when all other airway attempts have failed

CANNOT INTUBATE, CANNOT OXYGENATE

Laryngeal edema, foreign body above cords

911 – 911 – call for in office help

This resource / teaching tool is for teams that administer and monitor open airway sedation outside of the hospital setting. Appropriate and disciplined patient selection is paramount, as the depth of sedation is continuously variable and unpredictable, regardless of dose or route of sedative medication administration. Adverse patient responses, including loss of upper airway patency and/or ventilatory depression are similarly unpredictable and may not be dose-related. Patients will vary in their ability to tolerate hypoxemia as well as the rapidity in which hypoxemia develops after apnea or lost airway patency. Immediate availability of oxygen, suction and appropriately sized and functioning airway devices, attachment, connectors, monitors and dose-ready succinylcholine should be verified prior to the start of sedation. Prompt recognition of completion of best effort without improvement should trigger progression to next intervention. Intubation and surgical neck entry should not be considered a go-to endpoint, especially by those clinicians untrained or inexperienced in these procedures.