ANESTHETIC IMPLICATIONS OF

Marijuana
ILlicit Drugs

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For Perspective – Let’s Look at Current Alcohol and Tobacco Use in the U.S....

U.S. Alcohol Users in Last 30 Days – 12+
2017

50.7% Total
136.7 Million Current Alcohol Users
65.3 Million Binge Alcohol Users (47.8% of Current Alcohol Users)
16.3 Million Heavy Alcohol Users (24.9% of Binge Alcohol Users and 11.9% of Current Alcohol Users)

U.S. Dept. of Health & Human Services – SAMHSA – 2017
UNDER-AGE ALCOHOL USERS - 2017

19% of 12-20 year-olds

7.3 Million Current Alcohol Users
4.5 Million Binge Alcohol Users (62.5% of Current Alcohol Users)
1.1 Million Heavy Alcohol Users (23.5% of Binge Alcohol Users and 14.7% of Current Alcohol Users)

U.S. DEPT. OF HEALTH & HUMAN SERVICES – SAMHSA – 2017

FOR PERSPECTIVE – LET’S LOOK AT CURRENT ALCOHOL AND TOBACCO USE IN THE U.S....
CURRENT CIGARETTE SMOKERS – 51.3 MILLION (19% OF U.S.) DECREASED FROM 25% DURING 2002-2008
DID NOT SPECIFICALLY ASK ABOUT E-CIGARETTE USE
DRAMATIC INCREASE IN USE OF E-CIGARETTES IN TEENS

U.S. DEPT. OF HEALTH & HUMAN SERVICES – SAMHSA – 2017

PROPONENTS OF VAPING
SAFER THAN CONVENTIONAL CIGARETTES
DOESN'T BURN TOBACCO – FREE RADICALS AND THOUSANDS OF ADDITIONAL CHEMICALS TO INHALE

SKEPTICS OF VAPING
FLAVORED LIQUIDS AND CHEMICALS UNREGULATED
UNKNOWN HEALTH EFFECTS
INITIAL STUDIES QUITE UNFAVORABLE
VAPING INCREASED RISK OF MI, CAD, DEPRESSION
LOWER RISK THAN TRADITIONAL SMOKING
TAKEAWAY ISN'T THAT VAPING IS 'SAFER' THAN SMOKING
INSTEAD, VAPING 'STILL INCREASES THE RISK' OF
CONDITIONS ASSOCIATED WITH SMOKING
HOW PERVERSIVE ARE THE USE OF ILLICIT DRUGS IN OUR PATIENT POPULATION?

U.S. DEPT. OF HEALTH & HUMAN SERVICES – SAMHSA – 2017

U.S. DRUG-USE IN PEOPLE AGED 12 YEARS OR OLDER 2017 STATISTICS – REPORTED USE LAST 30 DAYS

ALCOHOL 50.7%
TOBACCO 23.5%
ALL ILLICIT DRUGS (28.6 MILLION) 10.6%
MARIJUANA 84%
PAIN RELIEVERS 12%
TRANQUILIZERS & SEDATIVES 9%
STIMULANTS (METHAMPHETAMINE) 8%
COCAINE 7%
HALLUCINOGENS 5%
HEROIN 2%
INHALANTS 2%

U.S. DEPT. OF HEALTH & HUMAN SERVICES – SAMHSA – 2017
LET'S DISCUSS BACKGROUND AND ANESTHETIC MANAGEMENT OF...

MARIJUANA
TRANQUILIZERS & SEDATIVES
COCAINE & STIMULANTS
HALLUCINOGENS
INHALANTS
CONVENTIONAL DRUG DEVELOPMENT
Discovery of Drug
Development and Screening of Compounds
Safety and Dose Estimates
Phase I-III Clinical Trials
Approval of Drug Sought
by Drug Maker
Labelled Indication
Proven Safety & Efficacy

MEDICAL ACCESS TO CANNABIS
Has Occurred in ‘Reverse’ to Conventional Drug Development!
Because of It’s Schedule I Status...
‘No Acceptable Medical Use’
‘High Potential for Abuse’
Long History of Use Before It was Known...
How the Drug Worked
Identification & Understanding of the Ingredients

‘CLINICIANS ARE BEING ASKED TO WORK WITH A DRUG THAT HAS COME TO THEM BACKWARD.’
‘FIRST WE HAVE THE DRUG, THEN WE FIGURE OUT HOW IT WORKS’
CANNABINOID RECEPTORS

G Protein-Coupled Receptor Superfamily
Activated by 3 Major Groups of Ligands...
1. Endocannabinoids – produced by the mammillary bodies in the Hypothalamus
2. Plant Cannabinoids
3. Synthetic Cannabinoids (such as HU-210)

CANNABINOID RECEPTORS
CB₁ Receptors
Exists Mainly in the Brain
Other Sites – Lungs, Liver, Kidneys

CB₂ Receptors
Exists Mainly in the Immune System
Other Sites – Hematopoietic Cells

Non-CB₁, Non-CB₂ Receptors
Exists in Endothelial Cells, CNS

CANNABIS
Over 100 Bio-Active Compounds Identified...
THC – Tetrahydrocannabinol
THCa – Tetrahydrocannabinolic Acid
CBD – Cannabidiol
CBN – Cannabinol
CBC - Cannabichromene
Some Cannabinoids Clearly have Therapeutic Value...
**THC - TETRAHYDROCANNABINOL**

Psychoactive Effects – ‘The High’ – Euphoria
Relaxing Feeling
Memory/Cognitive Impairment
Lack of Coordination
Disorganized Thinking
Altered Time Perception
Apprehension
Irritability
Paranoia

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**THC EFFECTS**

**Low/Moderate dose**
Increase in Sympathetic activity
Reduction of Parasympathetic activity
Tachycardia
Increased Cardiac Output
Myocardial Depression

*Potentiates effects of drugs affecting BP, HR

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**THC EFFECTS**

**High dose**
Inhibition of Sympathetic activity
No Inhibition of Parasympathetic activity
Bradycardia
Hypotension
Myocardial Depression
Increased in SVT and Ventricular Ectopy

*Potentiates effects of drugs affecting BP, HR

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CBD - CANNABIDIOL

Anti-Emetic
Anti-Convulsant
Anti-Psychotic
Anti-Tumoral

Does Not Interfere with Many Psychomotor & Psychological Functions

ROUTES OF ADMINISTRATION

SUBLINGUAL

DABBING
VAPORIZED
TOPICAL

TRANSDERMAL
SMOKED
ORAL

Edibles Education

Start with One Serving
Start with a low-dose or single serving product until you know how edibles will affect you.

Wait
Edibles can take up to 2 hours or longer to take effect.

Don’t Mix
Edibles should not be mixed with alcohol or controlled substances.

Out of Reach
Keep away from children, pets, or ANYONE under 21 and store in original packaging.
FOR ‘POT TOURISTS’, THE TRIP IS MORE LIKELY TO END UP IN THE ER

NUMBER OF OUT-OF-STATE RESIDENTS ENDING UP IN EMERGENCY ROOMS FOR CANNABIS-RELATED REASONS DOUBLED FROM 2012-2014 – 168/10,000

SIGNIFICANT INCREASE IN THE AMOUNT OF THC EDIBLES REQUIRE A SIGNIFICANT TIME FOR ONSET OF EFFECTS

COLORADO MARIJUANA USE 2017

NATIONAL MARIJUANA USE IN LAST 30 DAYS: 8.4%
COLORADO MARIJUANA USE IN LAST 30 DAYS: 15.3%
SMOKED: 84%
EDIBLES: 40%
VAPORIZED (VAPED): 30%
HIGH SCHOOL STUDENTS USE IN LAST 30 DAYS: 19% - UNCHANGED X 2 YEARS
COLORADO HIGHEST USE…
MALES: 19.8%
AGES 18-25: 29%
MARIJUANA IS NOT COLORADO ADULTS’ DRUG OF CHOICE…
DAILY OR NEAR-DAILY USE – ALCOHOL 22%
TOBACCO 16%
MARIJUANA 6.4%

WASHINGTON MARIJUANA USE 2016

NATIONAL MARIJUANA USE IN LAST 30 DAYS: 8.4%
CALIFORNIA MARIJUANA USE IN LAST 30 DAYS: 14%
HIGH SCHOOL STUDENTS USE IN LAST 30 DAYS: 17%
USE AMONG 10TH GRADERS STABLE SINCE 2002
HIGHEST USE: MALES AGED 18-24
PREVALENCE OF USE INCREASED AS LEVELS OF EDUCATION AND INCOME DECREASED

PERCEIVED RISK OF HARM IS DECREASING
33% OF WASHINGTON TEENS PERCEIVE LITTLE RISK

SOURCE – 2018 WASHINGTON STATE HEALTH ASSESSMENT
COMMON CONDITIONS ELIGIBLE FOR MEDICAL MARIJUANA TREATMENT

- AIDS – HIV +
- AMYOTROPHIC LATERAL SCLEROSIS (ALS)
- ALZHEIMER’S DISEASE
- CANCER
- CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)
- CROHN’S DISEASE
- EPILEPSY (SEIZURES)
- FIBROMYALGIA
- GLAUCOMA
- HEPATITIS C
- SPINAL CORD INJURY / INJURY
- TOURETTE’S SYNDROME
- TRAUMATIC BRAIN INJURY (TBI)
- ULCERATIVE COLITIS
- INFLAMMATORY BOWEL DISEASE
- MULTIPLE SCLEROSIS
- CHRONIC/INTRACTABLE PAIN
- POST-TRAUMATIC STRESS DISORDER (PTSD)
- SICKLE CELL ANEMIA

EVIDENCE STATEMENTS
NATIONAL ACADEMY OF SCIENCE – JANUARY 2017

Conclusive or Substantial Evidence

- Effective Treatment of Chronic Pain in Adults
- Effective Anti-Emetic for Chemotherapy Induced Nausea/Vomiting
- Effective in Improving Multiple-Sclerosis Spasticity Symptoms
- Development of Schizophrenia – Higher Use = Higher Risk
- Initiating Use at Earlier Age Increases Risk for Problem Use

Moderate Evidence

- Improving short-term sleep outcomes in OSA, Fibromyalgia, Chronic Pain, Multiple Sclerosis
- Increased risk of overdose injuries among pediatric populations in U.S. states where cannabis is legal
- Increased symptoms of mania and hypomania in patients with Bipolar Disorder
- Increased incidence of social anxiety disorder with regular cannabis use
EVIDENCE STATEMENTS
NATIONAL ACADEMY OF SCIENCE – JANUARY 2017

Insufficient Evidence
Effective treatment for cancers
Effective treatment for Irritable Bowel Syndrome
Effective treatment for epilepsy
Effective treatment for spasticity in spinal cord injury
Increased risk of myocardial infarction
Increased risk of multiple cancers

WWW.NATIONALACADEMIES.ORG/CANNABISHEALTHEFFECTS

WHAT WE KNOW - THERAPEUTIC USES
NEEDS MORE RESEARCH

HIV/AIDS
Appetite Stimulant
Chronic Nausea

Seizures
Dravet Syndrome (SMEI)
Lennox-Gastault Syndrome (LGS)

PTSD
Tourette’s Syndrome

COMMON CONDITIONS ELIGIBLE FOR MEDICAL MARIJUANA TREATMENT

AIDS - HIV +
AMYOTROPHIC LATERAL SCLEROSIS (ALS)
ALZHEIMER’S DISEASE
CANCER *
CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)
CROHN’S DISEASE
EPILEPSY (SEIZURES)
FIBROMYALGIA *
GLAUCOMA
HEPATITIS C
SPINAL CORD DISEASE / INJURY
TOURETTE’S SYNDROME
TRAUMATIC BRAIN INJURY (TBI)
ULCERATIVE COLITIS
INFLAMMATORY BOWEL DISEASE
MULTIPLE SCLEROSIS *
CHRONIC/INTRACTABLE PAIN *
PARKINSON’S DISEASE
POST-TRAUMATIC STRESS DISORDER (PTSD)
SICKLE CELL ANEMIA
NO DOSE – RESPONSE STUDIES
NO DOUBLE-BLIND COMPARISON TO CONVENTIONAL MEDICAL THERAPIES

REVIEW OF THE LITERATURE
MOST ARE REVIEWS OF SCIENCE, OPINIONS, LETTERS TO THE EDITOR & CASE REPORTS
VERY LITTLE SCIENTIFIC RESEARCH

REVIEW OF THE LITERATURE
Study #1
10 male patients – Age 19-28
All with previous marijuana experience
4 separate weekly trials – 1 3rd molar removed
1. 0.044 mg/kg IV THC
2. 0.022 mg/kg IV THC
3. Diazepam 0.157 mg/kg
4. Placebo

Study #2
10 patients – (7 women 3 male) – ASA I, II
5 previously smoked marijuana last 72 hours
Extraction 2-4 3rd molars
Received IV atropine, fentanyl, diazepam methohexital

Predisposition of patients to...
Syncopal hypotension with THC – dose related
Tachycardia – dose-related suggesting synergy between THC & atropine/methohexital
Arrhythmias – benign
THC compromised the patient’s adaptability to stress
OVERALL CANNABIS CONCLUSIONS...

- More Research is Clearly Needed
- Important to Differentiate the Heavy User from the Casual One
- Heavy Users Should be Expected to Require Increased Doses of Anesthetic Medications and Postoperative Analgesics
- Smoking cannabis can cause upper airway irritability, chronic cough, bronchitis, bronchospasm

OVERALL CANNABIS CONCLUSIONS...

- Marijuana is a ‘mood-intensifying drug’
- Potentiates the depressant effects of alcohol
- Summates the excitatory effect of amphetamines
- THC Caused a Predisposition Towards Sustained Tachycardia and Syncope
- Drugs increasing heart rates such as Ketamine, Atropine, Epinephrine, and Methohexital should be used with Caution

CONCLUSIONS...

- THC Appears to Compromise Many Patient’s Adaptability to Stress
- Effects May be Seen For a Long Period of Time after Cannabis Intake
  - Elimination Half-Life – Occasional user 56 hours
  - Elimination Half-Life – Chronic user 28 hours
- Requiring the Patient to Avoid Use of the Psychoactive Forms of Cannabis in the 7 Days Leading up to Anesthesia is Indicated
COCAINE & STIMULANTS

Produces prolonged adrenergic stimulation
Blocks reuptake of sympathomimetics
  Norepinephrine, Serotonin, Dopamine
Euphoric effect – prolonged dopamine in the limbic system & cerebral cortex
Half-life – 60-90 minutes – 10 hours
Metabolites detected in the urine for up to 72 hours after ingestion
How active are the metabolites of cocaine?

COCAINE & STIMULANTS

Hypertension
Tachycardia
Coronary artery vasospasm
Platelet aggregation
Promotion of thrombus formation
Cardiac arrhythmias
  Sodium, Potassium channel blockade
  QRS, QTc prolongation
  PVCs, Ventricular tachycardia
How ‘safe’ is it to anesthetize patients with recent short-term cocaine abuse?

How much time should elapse after the last positive screening or self-reported use before it is ‘safe’ to proceed?

Should we rely on a drug screen alone or is it more important to consider clinical signs and symptoms of acute toxicity?

SHOULD WE DELAY ANESTHESIA WITH RECENT COCAINE USE?

Risk of acute MI increased 24x in the 60 minutes after cocaine use in low risk patients

Meta-analysis – 2/3 of patients had their MI within 3 hours of cocaine use

Age, Pre-existing CAD, hyperlipidemia, and smoking increase risk of MI and cocaine use

SHOULD WE DELAY ANESTHESIA WITH RECENT COCAINE USE?

Brogan, et. al study 1992 – coronary artery catheterization with intranasal cocaine

- Coronary vasospasm occurred at 30 & 90min

Hill et. al study 2006 – patients undergoing elective surgery with positive cocaine screen and no clinical toxicity – no greater risk

JOMS study 2007 – safe to proceed with anesthetic care after 8 hr period without cocaine if no signs of clinical toxicity
SHOULD WE DELAY ANESTHESIA WITH RECENT COCAINE USE?

Anesthetic Management
Routine testing is not necessary if the patient isn’t showing signs of clinical toxicity
Elective anesthesia cancelled within...
- 8 hours last dose?
- 24 hours last dose?
- Recent dose but no current symptoms of intoxication?

COCAINE & STIMULANTS

Anesthetic Management
Consider Drug-Drug Interactions
*Potentiates sympathomimetic effects
Epinephrine
Ketamine
Anticholinergics
Atropine, Scopalamine, Ipatropium
Judicious use of local anesthetics, especially bupivacaine due to dysrhythmic effects

- Labile blood pressure due to catecholamine depletion
- Consider medical consultation in the user with an extensive cardiac history, abnormal QT interval
ADMINISTERING EPHEDRINE AND PHENYLEPHRINE

Ephedrine (alpha/beta receptor agonist)
- 50mg/ml: dilute 1ml in 5ml = 10mg/ml
- Administer 5-10 mg Q 5 min (up to 50mg)

Phenylephrine (selective alpha agonist)
- 10mg/ml: dilute 1ml in 10ml, discard 9ml, dilute remaining 1ml in 10 ml = 0.1mg/ml
- Administer 0.1 mg Q 3 min (up to 0.5mg)

HALLUCINOGENS

Effects
Auditory, Visual, Tactile Hallucinations
Distortions of Body Image, Surroundings
Anxiety, Panic Attacks Likely
Not associated with physical dependence
Not associated with withdrawal
Psychological dependence possible
Sympathomimetics
Intrinsic alpha-2 analgesic properties
HALLUCINOGENS

Anesthetic management
Avoid treatment during acute intoxication
Extreme caution with ephedrine
Sympathomimetic activity
Arrhythmias possible
Extreme consumption of water occurs
Avoid volatile agents and succinylcholine
Emergent Treatment when suspicious:
Benzodiazepines