

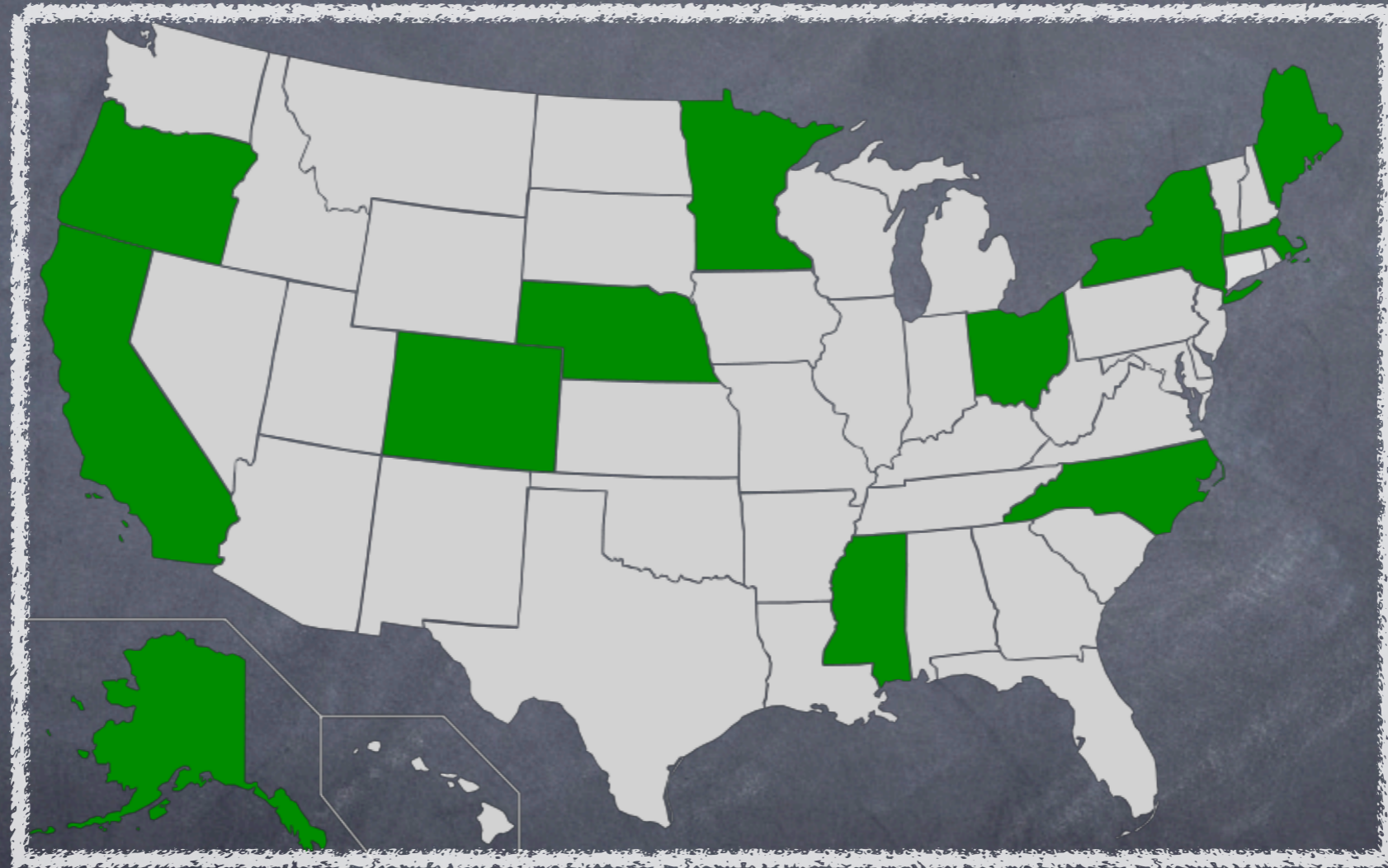


Prevention Implications of Marijuana
Legalization

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Some perspective: "Decriminalization"



<http://en.wikipedia.org/wiki/File:Map-of-US-state-cannabis-decriminalization-laws2.svg>

Accessed 9/24/10

Proposition 19

- Step back to see what our environment is like already
- Proposition 215, 1996
- Senate Bill 420 - Medical Marijuana Program Act
- Voluntary registration

FREE!

MOTR

Magazine

Premier Issue



Issue 1, Sept 2010

Conditions That Can Be Treated By Medical Marijuana



Bipolar Disorder
Autism/Aspergers
Anxiety Disorder
Panic Disorder
Agoraphobia
Genital Herpes
Herpetic infection
AIDS Related Illness
Post W.E. Ecnephalitis
Chemotherapy Convaless
Shingles (Herpes Zoster)
Radiation Therapy
Viral B Hepatitis, chronic
Viral C Hepatitis, chronic
Other arthropod borne dis
Lyme Disease
Reiters Syndrome
Post Polio Syndrome
Malignant Melanoma
Other Skin Cancer
Prostate Cancer
Testicular Cancer
Adrenal Cortical Cancer
Brain malignant tumor
Glioblastoma Multiforme
Cancer, site unspecified
Lympho & reticular ca
Myeloid leukemia
Uterine cancer
Lymphoma
Graves Disease
Acquired hypothyroidism
Thyroiditis
Diabetes Adult Onset
Diabetes Insulin Depend.
Diabetes Adult Ons Unctrl
Diabetic Renal Disease
Diabetic Ophthalmic Dis
Diabetic Neuropathy
Diabetic PeripheralVascD

Hypoglycemia(s)
Lipomatosis
Arthropathy, gout
Mucopolysaccharoidosis
Porphyria
Amyloidosis
Obesity, exogenous
Obesity, morbid
Autoimmune disease
Hemophilia A
Henoch-Schoelein Purpur
Senile Dementia
Delerium Tremens
Schizophrenia(s)
Schizoaffective Disorder
Mania
Major Depression, Sgl Epi
Major Depression, Recurr
Obsessive Compulsive Disorder
Dysthymic Disorder
Neurasthenia
Writers' Cramp
~~Impotence~~, Psychogenic
Alcoholism
Opiate Dependence
Sedative Dependence
Cocaine Dependence
Amphetamine Depend
Alcohol Abuse
Tobacco Dependence
Psychogenic Hyperhidrosi
Psychogenic Pylorospas
Psychogenic Dysuria
Bruxism
Stuttering
Anorexia Nervosa
Tic disorder unspec
Tourette's Syndrome
Persistent Insomnia
Nightmares
Bulemia
Tension Headache

Psychogenic Pain
Post Traumatic Stress Dis.
Org. Mental Dis.hd inj
Post Concussion Sydrom
Nonpsychotic Org Bra Dis.
Brain Trauma
Intermittent Explosive Dis
Trichotillomania
ADD w/o hyperactivity
ADD w hyperactivity
ADD other
Pschogenic PAT
Parkinsons Disease
Huntingtons Disease
Restless legs syndrome
Friedreich's Ataxia
Cerebellar Ataxia
Spinal mm atrophy II
Amytrophic Lateral Sclero
Other spinal cord disease
Syringomyelia
Reflex Sympath Dystroph
Multiple Sclerosis
Other CNS demyelinating
Hemiparesis/plegia
Cerebral Palsy
Quadriplegia(s)
Paraplegia(s)
Paralysis, unspecified
Epilepsy(ies)
Grand Mal Seizures
Limbic Rage Syndrome
Jacksonian Epilepsy
Migraine(s)
Migraine, Classical
Cluster Headaches
Compression of Brain
Tic Doloroux
Bell's palsy
Thoracic Outlet Synd
Carpal Tunnel Syndrome
Mononeuritis lower limb

Charcot-Marie-Tooth
Neuropathy
Muscular dystrophies
Macular Degeneration
Glaucoma
Dyslexic Amblyopia
Color Blindness
Conjunctivitis
Drusen of Optic Nerve
Optic neuritis
Strabismus & other binoc
Nystagmus, Congenital
Meniere's Disease
Tinnitus
Hypertension
Ischemic Heart Disease
Angina pectoris
Arteriosclerotic Heart Dis
Cardiac conduction disord
Paroxysmal Atrial Tach
Post Cardiotomy Syndrom
Raynaud's Disease
Thromboangiitis Obliteran
Polyarteritis Nodosa
Acute Sinusitis
Chronic Sinusitis
Chronic Obst Pulmo Dis
Emphysema
Asthma, unspecified
Pneumothorax, Spontaneo
Pulmonary Fibrosis
Cystic Fibrosis
Dentofacial anomaly pain
T.M.J Syndrome
GastroEsophgeal Rflx Dis
Acute Gastritis
Gastritis
Peptic Ulcer/Dyspepsia
Colitis, Ulcerative
Pylorospasm Reflux
Regional Enteri & Crohns
Colitis
Colon diverticulitis
Constipation
Irritable Bowel Synd.
Dumping SydroPost Sur
Peritoneal pain

Hepatitis-non-viral
Pancreatitis
Nephritis/nephropathy
Ureter spasm calculus
Urethritis/Cystitis
Prostatitis
Epididymitis
Testicular torsion
Pelvic Inflammatory Dis
Endometriosis
Premenstrual Syndrome
Pain, Vaginal
Menopausal syndrome
Sturge-Weber Disease
Eczema
Pemphigus
Epidermolysis Bullosa
Erythma Multiforma
Rosacea
Psoriatic Arthritis
Psoriasis
Pruritus, pruritic
Atrophy Blanche
Alopecia
Lupus
Scleroderma
Dermatomyositis
Eosinophilia-Myalgia Syn.
Arthritis, Rheumatoid
Felty's Syndrome
Arthritis, Degenerative
Arthritis, post traumatic
Arthropathy, Degenerat
Patellar chondromalacia
Ankylosis
Multiple joints pain
Intervertebral Disk Diseas
L-S disk dis sciatic N irrit
IVDD Cerv w Myelopathy
Cervical Disk Disease
Cervicobrachial Syndrome
Lumbosacral Back Diseas
Spinal Stenosis
Lower Back Pain
Peripheral enthesopathies
Tenosynovitis
Dupuytens Contracture

Muscle Spasm
Fibromyagia/Fibrosit
Osgood-Schlatter
Tietze's Syndrome
Melorheostosis
Spondylolisthesis
Cerebral Aneurism
Scoliosis
Spina Bifida Occulta
Osteogenesis imperfi
Ehlers Danlos Syndr
Nail patella syndrom
Peutz-Jehgers Syndr
Mastocytosis
Darier's Disease
Marfan syndrome
Sturge-Weber Eye Sy
Insomnia
Sleep Apnea
Chronic Fatigue Syn
Tremor/Invol Moveme
Myofacial Pain Syndr
Anorexia
Hyperventilation
Cough
Hiccups
Vomiting
Nausea
Diarrhea
Pain, Ureter
Cachexia
Vertebral disloc unsp
Whiplash
Back Sprain
Shoulder Injury Unsp
Fore Arm/Wrist/Hand
Hip, Knee, ankle
& foot injury
Motion Sickness
Anaphylactic or Reac
Trachoria Growths



What becomes legal

- ◉ Personal Use
 - ◉ 1 oz of cannabis
 - ◉ Cannabis is defined as "all parts of the plant Genus Cannabis...the resin extracted from any part of the plant; concentrated cannabis; edible products containing same; and every active compound, manufacture, derivative, or preparation of the plant, or resin"
 - ◉ In edible products, only active amount is included in weight
 - ◉ Cultivation of 25 sq ft of land per property and the harvest of that cultivation
 - ◉ Personal consumption in residence, non-public places, licensed on-premise establishments away from those under 21.

What becomes legal

- For commercial purposes, by lawfully authorized persons
 - Cultivation
 - processing
 - distribution
 - transportation
 - sale and possession for sale
- Consumption within licensed premises

Conflict with Federal Law

- ◉ Federal law continues to take precedence
- ◉ Previous court rulings imply that California need not have drug laws that match Federal law
- ◉ State police need not enforce Federal law
- ◉ Appropriations may be contingent if there is political will in congress
- ◉ Perhaps similar "bloody border" issues will arise

So will it happen?
Wanna bet?

CA.LEG.MARIJ.NOV10

Apr 14, 2010 - Oct 18, 2010



Source: www.intrade.com ©

Question 1: What will happen to use rates?

- ◉ Studies on medical marijuana use:
 - ◉ Gorman and Huber (2007) - Analyzed DAWN and ADAM data - Showed no increase
 - ◉ Kjatapoush and Hallfors (2004) - survey data - decrease in perceived harm, no increase in use
- ◉ The Dutch
 - ◉ Korf (2002) - Use mirrored regulatory environment
 - ◉ Youth increased use in spite of age controls
- ◉ U.S. and New Zealand experience with drinking age

Question 2: Assuming increase use, what are the physical consequences expected?

- What does the research show?
- What levels of use are most harmful?
- Are there ways of minimizing harm?

Han et al (2010)

- Large survey (NSDUH) of nationally representative sample
- Surprisingly the first of its kind
- Focus on duration, not just use/no use

Han et al Methods

- ◉ Sample
 - ◉ Restricted 35-49 year olds to allow for diseases to occur
 - ◉ Older population had too few drug users
 - ◉ 29,195 35-49 year olds

Han et al Measures

- List of 20 health conditions, including: Heart disease, lung cancer, HIV/AIDS, STDs and Cirrhosis
- Duration measured as age of last use minus age of first use
 - Categories of duration (≤ 1 , 2-10 and 11+)
- No current use requirement, or measure of frequency within timeframe
- Control variables included: Tobacco use, alcohol, other illicit drugs.

What they found

- Lung cancer was 7.87 times more likely among 11+ marijuana smokers
- Slight increases in anxiety, depression and Bronchitis
- Weird results: Increase in STDs, sinusitis only among 2-10 year smokers

Other findings

- ◉ Raising methodological concerns
 - ◉ Cocaine user at reduced risk of bronchitis, sinusitis, ulcers, tinnitus
 - ◉ Hallucinogen users at reduced risk of hypertension
 - ◉ Heroin users at reduced risk of sinusitis
- ◉ "incompletely controlled for confounding factors"

Chen et al (2008)

- Directly contradicts Han et al (2010)
- Study conducted in 90's at Kaiser
 - Smokers between 15-49 years old in '79-'85 follow up in 1993
 - 64,855 health records
- Review of the literature focuses on biological mechanisms for inhibition of cancer

What they found

- Marijuana use predicted reduced risk of various cancers
- Tobacco raised risk of cancer
- Still no effort to stratify sample by amount, frequency or duration of use.
- Very small incidence of cancers among marijuana sample (3 cases instead of the 16 expected)

Maternal use

- ◉ Literature review by Huizink and Mulder (2006)
- ◉ Focus on functional abnormalities not malformations.
- ◉ They also reviewed smoking and alcohol

Results

- Decrease cognitive functioning
- Lower verbal skills
- Lower memory scores
- With older children (9 and 12) executive function - needed for problem solving - was hampered
- Hyperactivity, delinquent behavior, impulsive in 6 year olds

How much and when

- ◉ Depending on the study effects were found with:
 - ◉ 1 joint per day in 1st trimester
 - ◉ More vague "heavy use"
- ◉ No studies of moderate use in pregnancy

Mental health

- Macleod and Hickman (2010) review of the UK policy experience
- Debate on reducing penalties for use included dubious research on schizophrenia - one Swedish study.
- Other studies within a systematic review were less convincing.
- Causal link remains only one possible explanation

Minimizing Risk:

What does the research say?

- Mode
- Quantity
- Duration

Mode

- Eating versus smoking
- Bong versus joint
- Vaporizers
- Epidemiological nightmare, as few are exclusive users of one mode

Quantity

- Very few studies even measure quantity.
- Quantity is usually defined by frequency or duration of lifetime use

Duration

- Lifetime duration is rarely defined to include consistency

Question 3: What about Dependence, Abuse and Treatment?

- How do the laws affect treatment?
- How are dependence and abuse defined?
- What is the research on risks and prevalence of cannabis dependence and abuse?

SB 1449

- Signed on Oct 1, 2010
- Reduces 1 oz of marijuana possession to infraction
- Removes treatment as a diversion
- No apparent limit on number of times one can offend this law

Referral to Treatment

- SAMHSA TEDS (2007) Report 37% of all treatment admissions were from criminal justice referrals
- California TEDS (2008) Data:
 - 196,480 Treatment admissions
 - 34,562 (17.6%) admissions for marijuana
 - 48.9% of those cases (or 16,914) were court referral (8.6% of all treatment in CA)
- 61,164 CA misdemeanor marijuana arrests in 2009 (NORML)

Demographics of the court referred (compared with other admissions)*

- National data, more likely to be :
 - Young
 - Male
 - Employed (if over 25)
 - First time admissions
- Much more likely to be for marijuana (24% vs 11%)

*TEDS 2007 Report

What is Dependence, Abuse, Withdrawal: DSM IV Definition - Substance Abuse Disorders

A maladaptive pattern of substance use, leading to clinically significant impairment or distress.

Dependence (3+) of: Tolerance; Withdrawal; Taking more than intended; Persistent desire; Much time obtaining; Interferes with important activities; Continued use in face of physical or psychological problem

Substance Abuse

- A maladaptive pattern of substance use, leading to clinically significant impairment or distress.
- Substance abuse if 1+ of: recurrent failure to fulfill major obligation, recurrent use in hazardous situations, recurrent related legal problems, recurrent social problems

Withdrawal

- The DSM IV does not recognize withdrawal as a separate disorder for cannabis
- But recall it can be a symptom of dependence

DSM IV Structure

- ◉ If both dependence and abuse can be diagnosed, then dependence takes precedence.
- ◉ Implies a hierarchy of conditions.
- ◉ No gradients of diagnoses: You either have it or you don't
- ◉ Actual use quantity/frequency is only relevant as evidence of tolerance or tangentially to other indicators (time, more than intended)

Beseler and Hasin (2010)

- Sought to test if:
 - Dependence was "dimensional"
 - Abuse was included in broader disorder construct
 - Quantity measures add to predictive validity - much like alcohol screens

Methods

- NESARC - National Epidemiological Survey on Alcohol and Related Conditions - 2001-2002
 - 43,093 respondents
 - Used 8,172 "Lifetime" cannabis users
 - Measures: Dependence, Abuse, and Weekly Use
 - Dependence needed a withdrawal item, so they used a 2+ criteria with list of symptoms
- Validated against: Family History, Age of Onset, and Antisocial Personality Disorder

Conclusions

- Caution should be used when combining Abuse and Dependence
- Dependence appears dimensional
- Adding Weekly use muddied the results

Other interesting findings:

- 8% of users have had treatment
- Legal problems and hazardous use were most disliked dependence criteria on predicting family history
- This leaves (1) failure in major obligation, (2) continued use in spite of social problems

Withdrawal: Levin et al (2010)

- Is it real?
- What are the symptoms?
- Used a convenience sample of 469 cannabis smokers in Baltimore
 - Primarily African American (79.5%)
 - 90.6% met criteria for dependence (79.7% showing tolerance, 42.4% showing withdrawal)
 - Had to have tried to stop at least once while not in treatment

Results

- Psychological symptoms were most common:
Craving, mood, sleep
- Physical symptoms next: Weight gain, headaches
- High variability of duration
- 70.7% used cannabis to help with symptoms
(evidence of negative reinforcer)
- Many also use either alcohol or tobacco

Problems with study

- Retrospective
- Convenience sample
- Possible confounds incompletely controlled: reason for quitting, tobacco use (a lot of blunt use), other drug use

Treatment

- How many may need it?
- Does it work?
- What are some treatment models?

McRae et al (2003)

Review

- 4% of US population has a lifetime dependence; highest of any illicit drug
- But actually cannabis is least likely (9%) to develop into dependence compared with Alcohol (15%), cocaine (17%) heroin (23%), Tobacco (23%)
- Demand for marijuana treatment is high and generally been increasing.

Effectiveness of Treatment

- ◉ Review shows that there are few randomly controlled treatment trials
 - ◉ First one was published in 1994!
- ◉ All psychotherapy based trials included at least some part of:
 - ◉ Cognitive-behavioral skills
 - ◉ Motivational enhancement or MI techniques common
 - ◉ Some very brief - including adapted from Drinking Check-Up
- ◉ All showed positive effects, with some effects lasting 16 months

Question 4: What about Impaired Driving?

- How prevalent is it?
- What are the risks?
- How would it be enforced in a legalized environment?

Prevailing view

- ◉ Some believe that marijuana poses no risk to road safety
- ◉ "No one has ever been killed in a traffic accident because of marijuana, but look at the alcohol numbers," said Barbara Cooke, 24. "I think it should be regulated and legalized." quote from VisaliaTimesDelta.com, 9/30/10

Is anyone really doing it?

- As before research is thin: MTF only added items in 2001.
- O'Malley and Johnston (2007) say yes!
 - MTF study of high school seniors
 - Driving after use of marijuana about as prevalent as after alcohol.
 - Many of the same kids doing both
 - Trend has been going down between 2001 and 2006

Who is doing this?

Among high school seniors

- Males
- non-western states
- Urban
- Lower grades
- Truant
- Work outside
- Low religiosity
- Drive more
- Drive while drunk
- Higher incidence of crashes

Crash Risk

- A student who has driven after marijuana (but not alcohol) had a crash risk equal to a student who had driven after heavy drinking (38% v. 39%). A student with no such history had a lower risk (23%).
- We are warned by the authors that no causal inference can be made from this

Problems with MTF study

- No explicit timeframe for use before driving
- Co-occurrence of marijuana and alcohol or other drugs in same driving experience not asked
- Proximity to instance and crashes reported is not measured
- Only "smoking" asked about

What about other research

- Review by Sewell et al (2009): focus not only on cannabis but on alcohol too.
- Epidemiological studies
- Experimental research

Epi Findings

- Conflicting results some find crash risk increases others did not
- Some found culpability increases, others did not
- Possible cutoff level of 5 ng/mL

Problems with Epi Studies

- Measurement
- Control selection
- Control variables:
 - Too few
 - Too many

Measurement

- THC is not BAC
 - Pharmacokinetics of THC in blood is very different than alcohol
 - Lipophilic means blood concentrations do not translate to CNS concentrations
 - Stays in blood at low levels much longer than impairment
 - Non-linear metabolism - Delays in testing can mean dramatically reduced levels of THC even if at the crash site THC was very high
- Requires blood test, though saliva tests correlate with blood levels.

Experimental Findings

- Most find impairments: Tracking, motor coordination, visual functions, divided attention
- Simulator studies sometimes do not find impairments
- Marijuana dosed subjects overestimate their impairment
- Alcohol dosed subjects underestimate their impairment

Mixing with Alcohol

- Even very low levels of each can cause dramatic increases in impairment
- THC level beginning to show impairment was 5 ng/mL dropped to 2.3 ng/mL when any alcohol was present
- Grotenhermen et al note that cannabis impaired automatic functions, while alcohol impaired cognitive functions. Thus the compensatory ability of marijuana users is impaired by even small amounts of alcohol

Recommendations for Driving

- per se limit set at 7-10 ng/mL
- Advise users to wait 3 hours before driving
- No alcohol should be mixed with cannabis use for drivers

General Issues

- ◉ We need to know what we are to prevent (Under-age use, Disease, Dependence, Injury,...)
- ◉ Consider the Context and Manner of use
 - ◉ Context can be personal, social and environmental
 - ◉ Manner can be frequency, dose, drug combinations, as well as mode of administration