**ARTICLE:**


- **Country:** US
- **Funding Sources:**

**PURPOSE:**

- **Research Question(s):** What is / are the primary questions being addressed by this study?
  - To describe hydrocarbon burns associated with BHO (Butane hash oil) manufacture in Colorado.

- **Hypothesis:** What is the anticipated outcome or alternatively, the null hypothesis (there will be no difference between groups).
  - The number of burns has increased since the liberalization and legalization of marijuana in Colorado and public health messaging, standardization of manufacturing process, and worker safety regulations are needed to decrease the risks of burns and other injuries.
  - BUTANE HASH OIL = butane poured over marijuana clippings and a potent extract is collected in a basin. The extract is then headed to cause evaporation of the hydrocarbon solvent leaving THC concentrate (90% THC) behind. The evaporated butane gases are very flammable.

**DESIGN:**

- **Study Design:**
  - Cross-sectional
  - Retrospective

- **Dependent / outcome Variable(s):** What is the variable of interest / outcome being studied. **None**

- **Independent / research Variable:** What is the variable that is modified among groups? **None**

**SETTING / SUBJECTS:**
Research Setting: Inpatient / outpatient, rural / urban, academic / community, EM / non-em, etc.
  o Inpatient, urban, academic, EM
  o University of Colorado Burn Center = Rocky Mountain region = Colorado and surrounding states

Subjects:
  o Study population:
    • All patients presenting with burns related to hash oil production.
  o Inclusion / Exclusion criteria:
    • Excluded hydrocarbon burns from other etiologies and burns from other marijuana-related activities. Did not count re-admissions.
  o Number (control / intervention groups):
    • 29 patients
  o Demographics:
    • Median age was 26 (range 15-58)
    • Variables: demographics, body surface area burned, burn depth, location of burn, length of stay, ventilator days, co-morbidities, mortality, circumstances surrounding burn, and burn treatment.
  o Attrition: None

METHODS:
  • Interventions: None
  • Study Groups:
    • All patients admitted during this period for BHO associated burns (searched “explosion of gases,” ignition of highly flammable material,” then BHO in event description)
  • Instruments:
    • American Burn Association National Burn Repository for U. of Colorado.

Data Collection: Who collected data? What was their training? Was there consistency among data collectors? Were there changes to data collection / study protocol during the period of the study.
  o Data collector – JS (Jessica Slim?)
  o Data analysis – JMP 10

DATA ANALYSIS:
  • Level of Data: □ Nominal or none?
  • Statistics Used: What types of statistical tests were utilized? (eg: T-test, ANOVA, regression analysis). None
  • What, if any, variables were controlled for?: None
RESULTS:

- **Brief answers to research questions:** What were the conclusions made by the authors? Do they answer the original research questions? Do you think their conclusions are valid based on the data reported?
  - There was a dramatic increase in flash burns a/w BHO production following the liberalization of marijuana in Colorado
  - 0 cases prior to MJ liberalization
  - 19 cases during 3 years of MJ liberalization
  - 12 cases since MJ legalization
  - Median age: 26
  - Mostly Caucasian males
  - 26/29 = flash burns
  - Median TBSA = 10%
  - Median LOS = 10 days
  - Location = upper extremity > head/neck
  - Intubated = 6
  - Skin grafting = 19
  - Wound care only = 8
  - Surgical debridement = 1
  - Deaths = 0

- **Additional findings:** Any additional findings other than the primary research questions discussed? Were these expected or unexpected based on the study design?
  - No

- **Other possible explanation for findings:** Are their other possible / probable explanations for the results other than those presented by the authors? Do the results correspond with the purpose of the study? Consider: sample size issues, measurement issues (did they measure the right outcomes?), attrition, treatment integrity (was the intervention always delivered exactly the same way?), and other issues you identify.
  - No

- **Limitations:** Are their important limitations identified by the authors? Do you see any other important limitations? Do these limitations significantly alter the conclusion or the applicability of the study?
  - Self reported histories
  - Potential for lost data
    - Likely missed minor injuries not transferred to major Burn Center = may lead to assumption that flash burns are more severe. BUT WOULD INCREASE THE NUMBER WHICH WOULD STILL HELP THEIR POINT.
  - REPORTING BIASES - Could have been going on prior to this, but patients didn’t tell us they were using BHO because it was illegal at the time.
Increased use of BHO could be unrelated to legalization.

**IMPLICATIONS FOR PRACTICE:**
- *Applicable to this clinical practice:* Is the study population generalizable to the population likely to be affected by this intervention / outcome in your clinical practice? If not, what setting may this be applicable to?
  - Yes, if we legalize marijuana. Could have different health impacts based on our older population.

- *Feasible (cost, resources, etc):* Is this an intervention that would be reasonable to institute in clinical practice? Are instruments / medications available? Does the study adequately asses risks and unforeseen outcomes? Is the intervention cost / resource effective? Does the study account for cost / benefit? Are there more effective treatments available?

- *Clinically Relevant:* Is this intervention likely to make a clinically significant impact on your patients if instituted? That is, some interventions may show statistically significant changes without making an impact that is clinically important.
  - Yes. Not in the sense that we can use any intervention, but that we will likely see more flash burns due to BHO here if/when marijuana is liberalized in Maine.

**LEVEL OF EVIDENCE / DECISION FOR USE:**
- ☑️ Background ☐ Consider Replication ☐ Ready for use

- *Level of Evidence:*
  - ☑️ Ia Evidence obtained from meta-analysis of randomized controlled trials
  - ☑️ Ib Evidence obtained from at least one RCT
  - ☑️ IIA Evidence obtained from at least one well-designed controlled study without randomization
  - ☑️ IIb Evidence obtained from at least one other type of well-designed quasi-experimental study
  - ✗ I III Well-designed non-experimental studies
  - ☐ IV Expert committee reports, opinions of experts