Cannabis-related healthcare visits: guidance for indicators using ICD-10-CM coded administrative data

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Purpose

Provide case definitions, and guidance for analysis and reporting, for cannabis-related healthcare utilization measures based on the ICD-10-CM coding system, such as hospitalizations and emergency department visits.

This guidance is provided to support public health surveillance of harms and healthcare burden associated with substance use (cannabis product use and exposure). We define surveillance as the continuous, systematic collection, analysis and interpretation of health-related data needed for the planning, implementation and evaluation of public health practice.

Our intention is to measure public health burden: therefore “cannabis-related” visits are those where data indicate cannabis use consumed healthcare resources by causing a visit directly or contributing to need for care. This is different than studies that seek to determine health effects caused by cannabis.

1. Case definition

Case definitions below are for the ICD-10-CM coding system, which was implemented in October 2015. General information about the specific design of coding system elements is available at the CDC website [https://www.cdc.gov/nchs/icd/icd10cm.htm](https://www.cdc.gov/nchs/icd/icd10cm.htm)

The following table describes three cannabis-related indicators that can be generated using administrative data. These might be used for different reasons:

- **Cannabis burden** provides the most inclusive definition that incorporates nearly all cannabis-related codes. This measure may be best for general monitoring. It includes all codes associated with the “poisonings” and “abuse, dependence, and use” indicators below.
- **Cannabis poisoning** codes (alone) have been used primarily by analysts focused on injury monitoring
- **Cannabis abuse, dependence, and use** codes (alone) have been used to monitor cases where cannabis use was a contributing factor. Often, poisonings

*We recommend that cannabis hospitalization and ED visit data include cases with a cannabis diagnosis in any field.* This is because cannabis use is often a contributor to rather than the direct cause of the visit; this is different than case definitions for other conditions (such as injury hospitalizations) that require the code of interest to be in the primary or first/principal discharge diagnosis field. While there may be interest in limiting to the first 3 or 10 discharge diagnosis code, the order of discharge diagnosis codes is not designed to be systematically applied to reflect magnitude of contribution to the case’s need for treatment. Practices around positioning of specific codes in the discharge diagnosis codes may vary by health system.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>ICD-10-CM code and description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannabis Burden</td>
<td>F12: Cannabis abuse, dependence, and use</td>
</tr>
<tr>
<td>Inclusive definition that incorporates both of those shown below</td>
<td>T40.7: Poisoning by, adverse effects of, and underdosing of cannabis</td>
</tr>
<tr>
<td></td>
<td>P04.81: Newborn affected by maternal use of cannabis (new code added in 2019)</td>
</tr>
<tr>
<td>Cannabis Poisonings</td>
<td>T40.7X1: Poisoning by cannabis (derivatives), accidental</td>
</tr>
<tr>
<td></td>
<td>T40.7X2: Poisoning by cannabis (derivatives), intentional self-harm</td>
</tr>
<tr>
<td></td>
<td>T40.7X3: Poisoning by cannabis (derivatives), assault</td>
</tr>
<tr>
<td></td>
<td>T40.7X4: Poisoning by cannabis (derivatives), undetermined</td>
</tr>
<tr>
<td></td>
<td>T40.7X5: Adverse effect of cannabis (derivatives)</td>
</tr>
<tr>
<td></td>
<td>Does not include:</td>
</tr>
<tr>
<td></td>
<td>T40.7X6: Underdosing of cannabis (derivatives)</td>
</tr>
<tr>
<td></td>
<td>Only includes:</td>
</tr>
<tr>
<td></td>
<td>7th character of A or missing (reflects initial encounter, active treatment, or missing encounter)</td>
</tr>
<tr>
<td>Cannabis Abuse, Dependence, and Use</td>
<td>F12.1: Cannabis abuse</td>
</tr>
<tr>
<td></td>
<td>F12.2: Cannabis dependence</td>
</tr>
<tr>
<td></td>
<td>F12.9: Cannabis use</td>
</tr>
</tbody>
</table>

**Discussion**

The “burden” definition above includes codes for withdrawal (F12.11, F12.21). Although potentially not the immediate result of cannabis use, these symptoms indicate a close proximity to current use and the related effects stemming from that usage.

The definition above implicitly includes remission (F12.23, F12.93). Without knowing the exact length of time for the case’s period in remission, cases with these codes alone may have unknown value. Potentially, these cases could have spent multiple years in remission; however, when combined with other cannabis-related codes their presence suggests relevance to current substance use.
Notably, based on recent data, both withdrawal and remission comprise a very small amount of cases, and their inclusion or exclusion will have a negligible effect. However, users should be aware of this consideration and periodically examine to determine whether the contribution of these cases changes over time or in different legal contexts.

Additional code considered

**J66.2: Cannabinosis** A lung disease caused by exposure to dusts from the processing of cotton, hemp, cannabis, and flax. The small airways become blocked, severely harming lung function.
- This code would be useful if tracking occupational hazards associated with the cannabis industry; however, it is not specific to the cannabis industry, because it includes cotton, as well as flax.
- National data suggest this code is infrequently used. For example, from 2016 US data:
  - Among total US hospitalizations [n= 35,675,421], all-listed cases with J66.2: n=135 (SE: 33). Principal diagnosis of this code was not reportable (suppressed based on 10 or fewer discharges or fewer than 2 hospitals).
  - Among total US Emergency Department Visits [n= 144,842,742], all-listed cases with J66.2: n=597 (SE: 76). Principal diagnosis n=130 (SE:20).


Recommendation: Because the code is infrequently used, non-specific, and not the result of an individual’s cannabis product use or exposure, we do not recommend including it within case definitions when tracking public health outcomes associated with cannabis use or exposure.

Comparison to other case definitions

The CSTE Injury Surveillance Subcommittee has provided a separate “drug overdose indicator” case definition, which includes cannabis among other drugs, and that definition excludes “adverse effects” (T40.7XS). However, we recommend including this code within cannabis poisonings, because it is relevant to and included within a large number of cases, and performs well at identifying valid cases, based on examination of data from Colorado (unpublished).

2. Applicable datasets

The case definitions above are suggested for use in these specific data sources.

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**Hospital discharge data:** Hospitalizations with any of the identified ICD-10-CM diagnosis codes (see table) in any field.

**Emergency department (ED) data:** ED visits with any of the identified ICD-10-CM diagnosis codes (see table) in any field.
- Exclude cases that were admitted to the hospital, to avoid duplication with hospital inpatient case reporting. If examining ED cases alone, this may be reconsidered.

**Related data**
If hospital and ED data are unavailable, or for the purposes of comparing (triangulating) findings, alternative data sources for monitoring cannabis-related healthcare utilization may include:
- Syndromic surveillance systems
- Poison center exposure reports

3. **Inclusion and exclusion criteria**
This discussion reflects choices that analysts may make in reporting cases. Availability of the information below may vary by dataset.

**Facility type**
- Substance use is tied to other behavioral health conditions and as a result is often serviced in non-acute care facilities. If the purpose of monitoring is to capture all outcomes related to cannabis use, data from all available facilities should be included.

**Age**
- We do not recommend applying age restrictions to analysis, although age-stratification for examining data is encouraged.
- Note: although they may be included within case counts, when age is unknown cases will not contribute to age-adjusted rates.

**Residence**
- We do not recommend restricting to only state residents, because out of state residents can contribute meaningfully to counts of burden on the healthcare system (e.g., “cannabis tourism”, as observed in Colorado). We do, however, recommend examining data by residence.
- When age-adjusting, data must first be stratified by state residence before completing the calculation.

4. **Guidance for analysis and reporting cases**
The first part of this document provides case definitions and discusses datasets where those definitions can be applied to generate simple counts. Cases may be reported in different ways,
depending on whether describing the burden of cases is more important (counts) or comparison over time and across jurisdictions or groups (rates).

**Measures of frequency options**
Counts of cases can be important for understanding the magnitude of burden.
- Annual or more time-specific number of cases, overall or by age group and sex.
- Annual age-adjusted rates, overall and by sex, standardized by the direct method to the year 2000 standard U.S. population (for example, see Klein and Schoenborn, 2001).
  - When age-adjusting, data must first be stratified by state residence before completing the calculation.
  - Cases with age missing will not contribute to age-adjusted rates.

**Rate denominator options**
Rates (e.g., counts per a defined population) are preferred to standardize reporting of data over time or across jurisdictions. The following guidance is offered for use in calculating rates of cannabis-related cases. *Specific approaches for rate reporting can vary, based on the purpose of the analysis, and should follow any guidance within your jurisdiction.*

The denominator used for rate reporting may vary based on the purpose of the analysis.
- Total population, such as mid-year population for the calendar year under surveillance obtained from the U.S. Census Bureau or suitable alternative. This approach can support comparisons across jurisdictions, groups, or over time.
- All hospitalizations or emergency department (ED) visits. This approach can help to adjust for variance in healthcare capacity. Unlike treatment for critical conditions that definitely require medical intervention, such as a serious injury, treatment for many cases involving cannabis could be provided in other settings, or people could avoid seeking treatment, influenced by changes in healthcare system capacity such as availability of other resources or costs. The COVID pandemic in 2020 dramatically changed utilization rates for hospitals and ED, which would change the frequency of cases independent of the background burden.

**5. Guidance for interpreting and sharing findings**
As findings are communicated to different audiences, we encourage clear communication of findings so that the results can be appropriately interpreted and used by stakeholders.

- *We strongly discourage interpretation of or communication about the data in ways suggesting all identified cases were caused by cannabis use or exposure.* Rather, we suggest framing data as “cannabis-related” and indicating that cases counted are those where a cannabis-related discharge code is present, and that there are important limitations to interpreting the meaning of the presence of those codes.
- Using an “any mention” approach in these case definitions may reduce the specificity of the indicators. The sensitivity and specificity of these indicators may vary over time and
by location. As part of interpreting findings, examining results stratified by different factors may help to determine whether any overall changes are being driven by changes in a specific group (e.g., if a hospital system added cannabis assessment to its intake form, this could increase documentation of cannabis-related codes within their system).

- When reporting, always note what facility types are included (e.g., acute care only or other), and whether out of state residents are included or not. Any other exclusion criteria (e.g., age) should also be specified.
- Other limitations of the case definitions and the data (see next section) should be acknowledged as relevant and as appropriate for the communication purpose and audience.

6. Limitations
A number of important factors potentially limit the accuracy of the case definitions described in this document. A few common caveats include:

- The accuracy of indicators based on codes found in hospitalization and ED visit data are limited by the completeness and quality of coding. This may vary by healthcare system, region, and can also vary over time (e.g., as legalization changes what is asked and honesty of reporting).
- Jurisdictions may have different numbers of available diagnosis fields, jurisdictions with more diagnosis fields may code cannabis diagnoses more than jurisdictions with less diagnosis fields.
- Cannabis product type and mode of administration are not specified within these codes (e.g., smoked, edible, concentrate). Thus, the case definitions can only be applied to “cannabis” as a whole. Further, this does not distinguish by cannabis potency, so the case definitions include cannabis-related effects from both cannabis plants and products that include delta-9-tetrahydrocannabinol (THC, the ingredient commonly recognized as a main psychoactive ingredient) and also cannabis that does not contain THC (e.g., hemp-derived cannabis products containing cannabidiol [CBD] which was federally legalized in December 2018 as part of the Agriculture Improvement Act of 2018 or “2018 Farm Bill”).
- Cannabis indicators generated using the ICD-9-CM coding system (applied in healthcare systems prior to October 2015) may not be comparable to ICD-10-CM.
References
Applications of these case definitions can be seen in the following state surveillance reports:


Peer-reviewed publications that use these or similar definitions include:


General reference for reporting rates: