Exploring Potential Benefits of Enumerating All Prescribed Medicines as a Tool for Estimating Opioid Use in the Medicare Current Beneficiary Survey (MCBS)

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The opinions and views expressed in this work are those of the authors. No official endorsement by the Department of Health and Human Services or the Centers for Medicare & Medicaid Services is intended or should be inferred.
Opioid use and misuse is a substantial problem among Medicare beneficiaries in the United States.

- Medicare beneficiaries face unique health challenges making them potentially more susceptible to opioid use and misuse, including multiple comorbidities, chronic-pain associated conditions, and mental and behavioral health issues (Niles, et al., 2020; Dean, 2017, Wright, et al., 2014).

- Many of these conditions require complex drug therapy involving multiple prescriptions for long periods of time, which can increase the risk for opioid harm (Dean, 2017; Ramachandran, et al., 2021; Raman, et al., 2019).
Different methodologies yield inconsistent estimates and measurement gaps for segments of the Medicare population.

**Administrative Data Sources**

- **Provider sources**
  - Pharmacy data

- **Claims**
  - Medicare Part D Prescription Drug Claims

**Survey-Reported Sources**

- **Direct collection of opioid use and misuse**
  Items ask respondents about opioid use or misuse, using drug names and/or pictures to spur recall

- **Enumeration method**
  Enumeration of all prescription drugs; can be enhanced during data processing by matching to claims data and/or linking to an administrative list of opioids to identify opioid use
## Strengths and Limitations of Measurement Approaches

### Administrative Data Sources

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Important to assessing opioid prescribing practices</td>
<td>• Do not provide data on medication adherence</td>
</tr>
<tr>
<td>• Do not provide contextual health information, such as health status</td>
<td>• Potential for coverage bias since ~30% of beneficiaries are not covered by Medicare Part D</td>
</tr>
</tbody>
</table>

### Survey-Reported Data

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provides valuable data on opioid use disorder</td>
<td>• Recall bias due to self-report and social desirability bias</td>
</tr>
<tr>
<td>• Allows for collection of contextual health information</td>
<td>• Do not provide data representative of the Medicare population</td>
</tr>
</tbody>
</table>

**Direct collection of opioid use or misuse:**
- National Health Interview Survey (NHIS)
- National Survey of Drug Use and Health (NSDUH)

**Enumeration-based approaches:**
- Medicare Current Beneficiary Survey (MCBS)
- Medical Expenditure Panel Survey (MEPS)
The Medicare Current Beneficiary Survey (MCBS) is a continuous, multi-purpose longitudinal survey.

- The MCBS represents the population of Medicare beneficiaries aged 65 and over and beneficiaries aged 64 and under with certain disabling conditions living in the United States.

- The MCBS is sponsored by the Office of Enterprise Data and Analytics (OEDA) of the Centers for Medicare & Medicaid Services (CMS) and is conducted through a contract with NORC at the University of Chicago (NORC).

- The MCBS serves as the leading source of information on the Medicare program and its impact on beneficiaries, including health care utilization and costs.
The MCBS employs an enumeration-based approach to collect prescription medication utilization.

- Respondents are asked to report any medications filled in the reference period with the aid of available documentation, such as prescription drug labels.
- Data entry into the instrument is facilitated by a Prescription Medicine Lookup (PMLU) tool, which is powered by the First Databank (FDB) MedKnowledge™ database of all available prescribed medicines.
- Medicare Part D claims data are used to enhance self-reported data during data processing.

Prescribed Medicine Lookup 7 records found

omepraZOLE
OMEPRAZOLE (OMEPRAZOLE)
OMEPRAZOLE-SODIUM BICARBONATE (OMEPRAZOLE/SODIUM BICARBONATE)
ZEGERID (OMEPRAZOLE/SODIUM BICARBONATE)
PRILOSEC (OMEPRAZOLE)
PRILOSEC (OMEPRAZOLE MAGNESIUM)
OMECLAMOX-PAK (OMEPRAZOLE/CLARITHROMYCIN)
LOSEC (OMEPRAZOLE)
1. Is it feasible to estimate opioid usage by enumerating all prescribed medicines during data collection and determining which, if any, are opioids in data processing?

2. What proportion of Medicare beneficiaries are estimated to have obtained at least one prescription opioid during a given year using this approach?

3. How do estimates based on this approach compare to those from external benchmarks?

4. How much does this estimate change once survey data are matched to Part D claims data (adding new medicines that were not reported in the survey, but that are present in claims)?

5. How do opioid use estimates vary based on beneficiary characteristics, including demographics and health factors?
Methods
MCBS Prescription Medicine Data Life Cycle

**Data Collection**
- Survey-collected data
  - Socio-demographics
  - Chronic conditions
  - Chronic pain
  - Prescription medicines

**Data Processing**
- CMS matching process
  - Link survey data to claims

**Limited Data Set (LDS) Releases**
- Survey File LDS
- Cost Supplement LDS

**Administrative data**
- Part D claims
Building an Analytic Dataset

- Input Data
  - MCBS Survey File LDS
  - MCBS Cost Supplement LDS
  - Sept 2018 CDC Oral Morphine Milligram Equivalents File

- Analytic Steps
  - Opioid Match Process
    - Link MCBS medicine data to CDC list to identify opioids

- Analytic Dataset
  - N=8,110 beneficiaries
Metrics:

- **Beneficiary level:**
  - “Any opioid use”: at least one opioid reported in 2018
  - “Consistent opioid use”: at least one opioid reported in each 2018 interview

- **Total opioid counts:**
  - Survey-reported opioid count
  - Survey-reported and claims-only opioid count

All analyses are unweighted, because:

- This is a methodological investigation.
- The MCBS does not create weights for the specific subset of beneficiaries included in this analysis (age 65+, completing >= 2 interviews in 2018).
Results
Estimates of Any Opioid Use Based on Beneficiary Age

SOURCE: Centers for Medicare & Medicaid Services, Medicare Current Beneficiary Survey 2018
Overall Opioid Counts

• For every 10 Medicare beneficiaries in this analysis:

  ![Illustration of 10 people]

• Three opioid medicines were reported in the survey:

  ![Illustration of opioid bottles]

• …and a fourth opioid was identified in claims matching:

  ![Illustration of additional opioid bottles]

SOURCE: Centers for Medicare & Medicaid Services, Medicare Current Beneficiary Survey 2018
Proportion of Beneficiaries with Any Opioid Use and Consistent Opioid Use

SOURCE: Centers for Medicare & Medicaid Services, Medicare Current Beneficiary Survey 2018
## Benchmark Comparison

This study estimates that 27.9% of beneficiaries age 65+ had any opioid use during the calendar year, which is comparable to external benchmarks.

<table>
<thead>
<tr>
<th>Year(s)</th>
<th>Data Source</th>
<th>Methodology</th>
<th>Findings</th>
<th>Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>MCBS</td>
<td>Survey-reported medicines + claims</td>
<td>27.9%</td>
<td>N/A – present study</td>
</tr>
<tr>
<td>2018</td>
<td>IQVIA Total Patient Tracker</td>
<td>Retail pharmacy data</td>
<td>25%</td>
<td>CDC, 2019</td>
</tr>
<tr>
<td>2015-2016</td>
<td>MEPS</td>
<td>Survey-reported medicines, with additional data collection from pharmacies (pending respondent consent)</td>
<td>19.3%</td>
<td>Moriya and Miller, 2018</td>
</tr>
</tbody>
</table>
Odds of Opioid Use, Based on Age Group

Models predicting any/consistent opioid included socio-demographic, health status, chronic condition, and chronic pain predictors.

SOURCE: Centers for Medicare & Medicaid Services, Medicare Current Beneficiary Survey 2018
Odds of Opioid Use, Based on Socio-Demographics

SOURCE: Centers for Medicare & Medicaid Services, Medicare Current Beneficiary Survey 2018

+ p<0.5 * p<0.01 ** p<0.001 *** p<0.0001
Odds of Opioid Use, Based on Health Characteristics

- **Self-reported poor health**:
  - Any Opioid Use: 1.40***
  - Consistent Opioid Use: 1.71***

- **Has >= 9 non-opioid prescription medicines**:
  - Any Opioid Use: 3.44***
  - Consistent Opioid Use: 3.03***

- **Has chronic pain (pain most or every day)**:
  - Any Opioid Use: 1.61***
  - Consistent Opioid Use: 1.96***

- **Has high-impact chronic pain (limits life or work activities most or every day)**:
  - Any Opioid Use: 1.49***
  - Consistent Opioid Use: 1.47*

+ p<0.5 * p<0.01 ** p<0.001 *** p<0.0001

**SOURCE:** Centers for Medicare & Medicaid Services, Medicare Current Beneficiary Survey 2018
Odds of Opioid Use, Based on Chronic Conditions

- **Arthritis**: 1.62***
- **Osteoporosis/broken hip**: 1.61***
- **Dementia**: 1.62***
- **Depression**: 1.17+
- **Cancer**: 0.96
- **Diabetes**: 0.87+ 0.74**

+ p<0.5 * p<0.01 ** p<0.001 *** p<0.0001

**SOURCE:** Centers for Medicare & Medicaid Services, Medicare Current Beneficiary Survey 2018
Discussion
Enumeration of all prescribed medicines is a feasible approach for estimating opioid use among Medicare beneficiaries.

- After matching survey data to Part D claims data, the proportion of beneficiaries using any opioids rose from 24.6% to 30.0%
- Based on this analysis, 9.1% of beneficiaries were classified as consistent opioid users
- This study’s estimate for any opioid use among adults age 65+ (27.9%) was comparable to external benchmarks
- Multivariate models to predict opioid use correctly classified the majority of beneficiaries (73.2% for any use and 91.0% for consistent use)
  - Both models had higher specificity than sensitivity, meaning they were better able to predict beneficiaries without opioid use outcomes
Some socio-demographic and health characteristics associated with any opioid use differ from those associated with consistent opioid use.

- **Predictors of both any opioid use and consistent use**
  - Age <65
  - White non-Hispanic (compared to Hispanic)
  - less than high school degree or some college (compared to high school degree)
  - Part D coverage
  - >=9 prescriptions
  - poor health
  - chronic pain
  - high-impact chronic pain
  - having arthritis, osteoporosis, or depression,
  - not having diabetes

- **Predictors of any opioid use (but not consistent use)**
  - Having cancer
  - not having hypertension

- **Predictors of consistent opioid use (but not any use)**
  - Black non-Hispanic (compared to White non-Hispanic)
  - residence in rural area
  - <= 200% of Federal Poverty Level
  - having dementia
  - not having high cholesterol, mental condition, or stroke
Limitations:

- Recall bias due to self-report of opioid prescriptions
- Inability to match to claims data for beneficiaries not enrolled in Part D (~30% of beneficiaries*)
- Only collects data on prescribed opioid use and does not capture possible misuse
- Use of unweighted data limits generalizability of results

Looking ahead, we will continue to investigate:

- Are there cross-sectional trends in beneficiaries’ opioid use over time?
- Among beneficiaries who use opioids, can we estimate the quantities they obtain and their frequency of use?

The Medicare population faces unique and complex challenges that may require a different approach to addressing opioid misuse.

- **Painkillers are the most commonly misused prescription among elderly** (Dean, 2021)

- **Misuse may be treated as uncommon or may be undiagnosed or misdiagnosed as other comorbidities**

- **Study contributions include:**
  - Estimating opioid use among beneficiaries **without** Part D coverage to mitigate potential for underestimation via other methodologies
  - Distinguishing between “any opioid use” versus “consistent opioid use” in an effort to better identify the potential for misuse
  - Identifying diverse list of socio-demographics and health conditions associated with increased risk of opioid misuse among the Medicare population
Thank you.

Data Sources:
- MCBS Cost Supplement and Survey File LDS files

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# RESULTS

Multivariate Model Results: Any/Consistent Opioid Use

<table>
<thead>
<tr>
<th>Socio-demographic Variables</th>
<th>Any Opioid Use (N=8,093)</th>
<th>Consistent Opioid Use (N=8,093)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pseudo R² = 0.20</td>
<td>Pseudo R² = 0.22</td>
</tr>
<tr>
<td></td>
<td>Correct Classification = 73.2</td>
<td>Correct Classification = 91.0</td>
</tr>
<tr>
<td></td>
<td>Sensitivity = 31.1, Specificity = 91.2</td>
<td>Sensitivity = 7.7, Specificity = 99.3</td>
</tr>
<tr>
<td>Age: (reference: &lt;65 years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65-74 years</td>
<td>0.74* (0.62, 0.89)</td>
<td>0.55*** (0.43, 0.72)</td>
</tr>
<tr>
<td>75-84 years</td>
<td>0.68*** (0.57, 0.82)</td>
<td>0.46*** (0.35, 0.60)</td>
</tr>
<tr>
<td>85+ years</td>
<td>0.54*** (0.44, 0.67)</td>
<td>0.42*** (0.31, 0.58)</td>
</tr>
<tr>
<td>Sex: Female</td>
<td>0.96 (0.86, 1.08)</td>
<td>0.04 (0.23, 0.63)</td>
</tr>
<tr>
<td>Race/ethnicity (reference: White)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.78+ (0.64, 0.95)</td>
<td>0.57* (0.41, 0.80)</td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>1.19 (0.99, 1.42)</td>
<td>1.49* (1.16, 1.90)</td>
</tr>
<tr>
<td>Other race</td>
<td>0.91 (0.71, 1.15)</td>
<td>1.31 (0.93, 1.84)</td>
</tr>
<tr>
<td>Educational attainment (reference: high school degree)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school degree</td>
<td>1.23+ (1.05, 1.45)</td>
<td>1.34+ (1.05, 1.70)</td>
</tr>
<tr>
<td>Some college/vocational school</td>
<td>1.17+ (1.02, 1.35)</td>
<td>1.39* (1.12, 1.72)</td>
</tr>
<tr>
<td>Bachelor’s degree or higher</td>
<td>1.01 (0.87, 1.19)</td>
<td>1.05 (0.80, 1.39)</td>
</tr>
<tr>
<td>Residence in rural area</td>
<td>1.08 (0.95, 1.22)</td>
<td>1.23+ (1.03, 1.48)</td>
</tr>
<tr>
<td>&lt;=200% of the Federal Poverty Level</td>
<td>0.98 (0.86, 1.11)</td>
<td>1.32* (1.08, 1.61)</td>
</tr>
<tr>
<td>Part D coverage</td>
<td>1.49*** (1.28, 1.72)</td>
<td>1.86*** (1.41, 2.46)</td>
</tr>
</tbody>
</table>

+ p<0.5 * p<0.01 ** p<0.001 *** p<0.0001

SOURCE: Centers for Medicare & Medicaid Services, Medicare Current Beneficiary Survey 2018
## Multivariate Model Results: Any/Consistent Opioid Use

<table>
<thead>
<tr>
<th>Health Variables</th>
<th>Any Opioid Use</th>
<th></th>
<th></th>
<th>Consistent Opioid Use</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has &gt;=9 prescription medicines</td>
<td>3.44*** (3.06, 3.87)</td>
<td>3.03*** (2.48, 3.71)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-reported poor health status</td>
<td>1.40*** (1.22, 1.60)</td>
<td>1.71*** (1.41, 2.06)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic conditions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arthritis</td>
<td>1.53*** (1.37, 1.70)</td>
<td>1.62*** (1.36, 1.94)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart disease</td>
<td>0.93 (0.82, 1.04)</td>
<td>0.93 (0.77, 1.11)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osteoporosis/broken hip</td>
<td>1.23* (1.08, 1.41)</td>
<td>1.61*** (1.33, 1.95)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parkinson’s disease</td>
<td>1.12 (0.74, 1.69)</td>
<td>0.89 (0.47, 1.71)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancer</td>
<td>1.16+ (1.01, 1.32)</td>
<td>0.96 (0.78, 1.19)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>0.87+ (0.77, 0.99)</td>
<td>1.04 (0.85, 1.28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.87+ (0.77, 0.98)</td>
<td>0.74** (0.61, 0.89)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High cholesterol</td>
<td>0.94 (0.84, 1.07)</td>
<td>0.79+ (0.66, 0.94)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alzheimer’s disease</td>
<td>1.13 (0.81, 1.59)</td>
<td>1.09 (0.64, 1.86)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dementia, other than Alzheimer’s</td>
<td>1.00 (0.73, 1.35)</td>
<td>1.62+ (1.07, 2.46)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>1.17+ (1.02, 1.33)</td>
<td>1.36* (1.12, 1.65)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mental condition</td>
<td>0.89 (0.73, 1.08)</td>
<td>0.70+ (0.53, 0.92)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>0.91 (0.77, 1.07)</td>
<td>0.70* (0.54, 0.91)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulmonary disease</td>
<td>1.11 (0.98, 1.27)</td>
<td>1.10 (0.91, 1.33)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic pain</td>
<td>1.61*** (1.40, 1.85)</td>
<td>1.96*** (1.58, 2.42)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High-impact chronic pain</td>
<td>1.49*** (1.22, 1.82)</td>
<td>1.47* (1.14, 1.91)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**SOURCE:** Centers for Medicare & Medicaid Services, Medicare Current Beneficiary Survey 2018


