Medicare 101

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Epid 766: Epidemiologic research using healthcare databases
26 March 2019
Medicare population

Total enrolled: 53 million
• 18% of US popn
• Median age: 71 yrs

Cost: $583 billion
• 14% of federal budget
• 20% of all healthcare $
Medicare Population

Percent of All Medicare Beneficiaries:

- Functional impairment (1+ ADL limitations): 32%
- Fair/poor self-reported health: 25%
- 5+ chronic conditions: 22%
- Under age 65: 15%
- Age 85+: 12%
- Long-term care facility resident: 3%

NOTE: ADL is activity of daily living.
Medicare: Overview of Benefits

- Part A: Hospital Insurance (HI)
- Part B: Medical Insurance (MI)
  - Doctors' services, hospital outpatient svc
  - Home health care, *some* preventive services
- Part D: Prescription Drug Coverage
- Part C: Medicare Advantage
  - Managed care
  - Includes Part A & Part B, often drugs
Part A: Covered services

- Inpatient hospital services
- Skilled nursing facility (SNF)
  - After 3+ days of related inpatient hospitalization
- Home health care
  - Skilled nursing, speech and occupational therapy
  - Patient confined to home
- Hospice care
  - Terminally ill (<6mo to live)
  - Patient chooses hospice care instead of ‘standard’ benefits
  - Uses Medicare approved program
Part A: Eligibility

- Elderly (85%)
  - Free if you (or spouse) worked and paid Medicare taxes for 40 quarters (10 years)
  - 98% of Americans >64 are enrolled in Part A
- Disabled (15%)
  - Social Security disability benefits (income) for 24mo
- ESRD
  - 30 days of dialysis or kidney transplant to qualify
- ALS / Lou Gehrig’s disease
  - Part A and Part B when disability benefits begin
Part A: Cost sharing

- **Deductible (per benefit period)**
  - $1,364 in 2019
  - Paid out of pocket or by supplemental insurance

- **Co-insurance for hospital stay (2019)**
  - Days 2-60: $0
  - Days 61-90: $341/day
  - Days 91+: $682/day (60 lifetime reserve days)

- **Co-insurance for SNF (2019)**
  - Days 1-20: $0
  - Days 21-100: $170.50 per day
  - Days 101+: All costs

- **No cost sharing for home health or hospice**
Part A: Paying the bills

- Provider (hospital, SNF, etc) submits claims on the UB-04 (aka CMS 1450) form
- Claims go to the MACS
  - formerly Fiscal Intermediaries
- Approved Part A claims paid from Medicare Trust Fund
Part B: Covered services

- Physician services (even those provided while patient is an inpatient)
- Facility charges for outpatient hospital services & ambulatory care centers
  - X-ray, ultrasound, lab work
- Durable medical equipment (DME), home health, ambulance
- Therapy services (occupational, speech, physical)
- Injections, other drugs administered in a doctor’s office
  - Vaccinations, infusions
  - Certain oral cancer drugs
  - Drugs used with some types of durable medical equipment (like a nebulizer or external infusion pump)
Part B: Eligibility

- Premium required
  - Sliding scale based on income (2019: $135.50-460.50)
  - State Medicaid pays premium for dual eligibles
- Must enroll at first eligibility
  - premium increases 10% per year of delay
  - unless covered by employer plan
- Premiums cover 25% of Part B expenditures, rest from general tax revenues
- 96% of Part A benes >64yo are also in Part B
Part B: Cost sharing

- Annual Deductible: $185 in 2019
- Co-insurance: 20% of *Medicare-approved* amount for doctor services (including mental health scvs)
  - None for clinical lab tests
  - No out-of-pocket cost for preventive services rated A or B by US Preventive Services Task Force (e.g. mammography, prostate cancer screenings)
- Some providers don’t ‘accept assignment’ meaning Medicare won’t cover their care
  - More likely true of psychiatrists
Part B: Paying the bills

- Provider (physicians and DME) use CMS 1500
- Hospital outpatient facilities & home health agencies use UB-04 (just like for Part A claims)

- All claims processed by MACS
Original Medicare
Parts A & B do NOT pay for

- Deductibles, coinsurance, copayments
- Hospitalization costs >150 days
- SNF costs >100 days
- Acupuncture
- Dental care and dentures
- Cosmetic surgery
- Custodial care (help with bathing, dressing, using the bathroom, and eating) at home or in a nursing home
- Health care you get while traveling outside of the US
- Hearing aids and hearing exams
- Orthopedic shoes
- Routine foot care
- Routine eye care, eyeglasses
- Certain screening tests
- Certain shots (vaccinations)
- Outpatient prescription drugs (with only a few exceptions)
Supplemental insurance

2016 Total = 32.4 Million Traditional Medicare Beneficiaries

NOTE: Total excludes beneficiaries with Part A only or Part B only for most of the year (n=4.4 million) or Medicare as a Secondary Payer (n=2.0 million), and beneficiaries in Medicare Advantage.
Part C: Medicare Advantage

- Offered by private companies, approved by Medicare
- Health maintenance organization (HMO) or preferred provider organization (PPO)
- Plan must provide all Part A and Part B coverage
  - May offer vision, hearing, dental, and/or health and wellness programs or reduced cost-sharing
  - Typically includes prescription drug coverage (Part D benefits)
- Bene generally pay Part B premium (or have it paid on your behalf); avg $34 in 2018
- Plan is paid a fixed amount per enrollee by CMS
Medicare Advantage (Part C) Enrollment 1999-2018 (in millions)

Percent of Medicare beneficiaries:
18% 17% 15% 14% 13% 13% 13% 16% 19% 22% 23% 24% 25% 27% 28% 30% 31% 31% 33% 34%

NOTE: Includes Medicare Advantage plans and cost plans.
What does this mean for us?

- Encounter data only recently made available for MA enrollees
  - CY 2015 released in Aug 2018
  - May be able to get these data from other sources who work directly with the private insurance companies who offer a Medicare Advantage Plan
Medications

- **Part A**
  - Meds during inpatient/SNF stay covered by Part A

- **Part B**
  - Drugs administered by health care provider
  - Some oral chemotherapy
  - Inhaled via nebulizer at home, provided by DME/HH
  - Flu, pneumonia, and hepatitis B vaccines

- **Part D**
  - Outpatient medications (filled by patient at pharmacy)

- Some can be covered by B or D
  - [https://www.medicareinteractive.org/pdf/B-vs-D-chart.pdf](https://www.medicareinteractive.org/pdf/B-vs-D-chart.pdf)
Part D: Prescription Drug Plans

- Administered exclusively through private plans; not under fee-for-service program
- Two ‘flavors’
  - Stand-alone prescription drug plans (PDPs) for those with ‘original’ Medicare Part A and/or Part B
  - Medicare Advantage prescription drug plans (MA PDs)
- Premiums and cost-sharing vary; most plans have a gap in coverage (“doughnut hole”)
- Additional premium and cost-sharing subsidies for low-income
- Funded by general revenues, enrollee premiums and payments from states
Enrollment in Part D plans

NOTE: Numbers in millions. PDP is prescription drug plan. MA-PD is Medicare Advantage prescription drug plan. Includes enrollment in the territories and in employer-only group plans.
Medicare’s “Standard” Drug Benefit in 2009

But most plans do not offer the “standard” benefit, and coverage varies across most dimensions, including:

- Monthly premiums
- Deductibles
- The “doughnut hole”
- Covered drugs and utilization management restrictions
- Cost sharing for covered drugs
Falling into the donut hole

**NOTE:** Numbers may not sum to total due to rounding.

SOURCE: KFF analysis of a five percent sample of 2007-2016 Medicare prescription drug event claims from the CMS Chronic Conditions Data Warehouse.
What does the doughnut hole mean for medication use?

Among Part D enrollees who reached the coverage gap, percent who:

- **Proton Pump Inhibitors**
  - Stopped taking medication: 20%
  - Reduced medication use: 6%
  - Switched medications: 6%
  - Total: 26%

- **Antidepressants**
  - Stopped taking medication: 15%
  - Reduced medication use: 1%
  - Switched medications: 6%
  - Total: 22%

- **Oral Anti-Diabetics**
  - Stopped taking medication: 10%
  - Reduced medication use: 5%
  - Switched medications: 8%
  - Total: 23%

- **Osteoporosis Treatments**
  - Stopped taking medication: 18%
  - Reduced medication use: 1%
  - Switched medications: 3%
  - Total: 22%

- **Alzheimer's Treatments**
  - Stopped taking medication: 8%
  - Reduced medication use: 2%
  - Switched medications: 4%
  - Total: 14%

**NOTE:** Estimates based on analysis of retail pharmacy claims for 1.9 million Part D enrollees in 2007.
**SOURCE:** Georgetown University/NORC/Kaiser Family Foundation analysis of IMS Health LRx database, 2007.
ACA: Closing the donut hole for brand-name drugs

<table>
<thead>
<tr>
<th>Year</th>
<th>Paid by Enrollee</th>
<th>Paid by Plan</th>
<th>Manufacturer Discount</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>50%</td>
<td>2.5%</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>50%</td>
<td>2.5%</td>
<td>5%</td>
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<tr>
<td>2015</td>
<td>50%</td>
<td>5%</td>
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<td>2016</td>
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<td>2017</td>
<td>50%</td>
<td>10%</td>
<td>15%</td>
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<td>2018</td>
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<td>15%</td>
<td>20%</td>
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<tr>
<td>2019</td>
<td>50%</td>
<td>20%</td>
<td>25%</td>
</tr>
<tr>
<td>2020</td>
<td>50%</td>
<td>25%</td>
<td></td>
</tr>
</tbody>
</table>
ACA: Closing the donut hole for generic drugs
Medicare’s “Standard” Drug Benefit in 2020

2009

- Donut hole
  - 100% paid by enrollee
  - 25% paid by enrollee
  - 75% paid by plan

2020

- Brands:
  - 50% discount
  - 25% paid by plan
- Generics:
  - 75% paid by plan

- Catastrophic coverage
- Initial coverage limit
- Deductible
Increasing TrOOP for catastrophic coverage

Out-of-Pocket Threshold for Catastrophic Coverage

Initial Coverage Limit

Deductible

Annual percentage increase in OOP threshold: 6.86% 4.64% 7.54% 4.66% 0.31% 3.34% 1.40% -4.03% 3.77% 3.62% 1.85% 1.22% 1.83% N/A

NOTE: Where applicable, estimates are rounded to nearest whole dollar.
Quick Poll

- What types of services does Medicare cover?
Medicare RIF: File structure

**Denominator Files**

- Master Beneficiary Summary File: Base, Chronic Conditions, Cost & Use

**Part A**
- MedPAR: Inpatient + SNF
- Home Health: base claims & revenue center
- Hospice: base claims & revenue center

**Part B**
- OutPatient: base claims & revenue center
- Carrier: claims & line
- DME: claims & line

**Part D**
- Part D Events + Drug Char
- Pharmacy Characteristics
- Plan Char. Tier, Service Area, Premium
- Prescriber Characteristics

Medicare RIF: File structure
Master beneficiary summary file (MBSF)

- **MBSF: Base**
  - DOB, Race/ethnicity, age (at end of year or death), residential zip code, death, date of death
  - Detailed enrollment (by month) in all parts (a/b/d)
  - Reason for entitlement (age, disability, esrd), dual eligible
  - AKA Beneficiary Summary File

- **MBSF: Chronic conditions (ffs only)**
  - 3 variables each of 27 conditions based on published algorithms
    - Date first met, mid-year flag, end of year indicator

- **MBSF: Other Chronic or Potentially Disabling Conditions**
  - 35 additional conditions

- **MBSF: Cost & Utilization**
  - Summary data on annual expenditures, health care utilization
MedPAR

- Inpatient hospital & skilled nursing facility claims
- Final action, 1 record per stay
- Included in Year of data corresponding to:
  - Date of discharge (inpatient hospital)
  - Date of admission (skilled nursing facility)
- Up to 25 ICD-9-CM/ICD-10-CM Dx codes
  - Principle +24 other; Present on admission; admitting
- Up to 25 ICD-9-CM/ICD-10-CM Procedure codes
  - Primary +24 other; date of procedure
Home Health Agency (HHA) File

- Number and dates of visits
- Type of visit
  - skilled-nursing care, home health aides, physical therapy, speech therapy, occupational therapy, and medical social services
- Up to 25 ICD-9-CM / ICD-10-CM diagnosis codes
- Reimbursement amount
Hospice

- Type of hospice care received
  - routine home care, inpatient respite care
- Dates of service, reimbursement amount
- Primary diagnosis for all
  - <10% have secondary diagnosis
- Data fields for procedure codes, in general, such information is not found on the Hospice File.
- Physician claims are for services provided by physicians employed or receiving payment from the Hospice facility.
- Medications related to hospice care covered here
  - Pain, symptom management related to terminal condition
Outpatient File

- Claims from institutional providers
  - Hospital outpatient departments
    - Surgery, radiology, radiation therapy, clinic visits, pathology, chemotherapy, emergency dept, implants, supplies, diagnostic services & tests
  - Rural health clinics
  - Renal dialysis facilities
  - Outpatient rehabilitation facilities
  - Community mental health centers
Outpatient File: Contents

- Claims from institutional outpatient providers
- Diagnosis and procedure codes
  - 25 ICD-9-CM / ICD-10-CM dx + 3 reasons for visit dx codes
  - 25 HCPCS/CPT for procedures
- Dates of service
- Reimbursement amounts
- Revenue center codes (REC_CNTR)
- Demographic information (DOB, race, sex)
  - More reliable to get this from the denominator file
Claims from non-institutional professional providers

- Mostly physician services
  - Also physician assistants, clinical social workers, nurse practitioners,
  - Independent clinical laboratories, ambulance providers, freestanding ambulatory surgical centers, free-standing radiology centers, and some DME claims

- Both inpatient & outpatient

- Procedures coded using HCPCS/CPT

- ICD-9/10 Dx code to justify
  - Except in case of lab tests where lab may not have dx (XX000)

- Provider NPI
DME File

- Oxygen, walker, wheel chairs, infusion pump, nebulizer, etc
- 25 ICD-9-CM / ICD-10-CM diagnosis codes
- HCPCS for services provided
- Service type codes, dates of service
- Reimbursement amount, charge
- Supplier NPI

Also check Carrier file for DME claims!
Part D Event (PDE) data

- Bene_ID (same as Part A / B)
- NDC (unique identifier for drug/package)
- Date filled
- Benefit phase (doughnut hole)
- Tier
- Provider ID (formerly encrypted; now NPI)
- Plan ID (formerly encrypted)
- Pharmacy ID (formerly encrypted; now NPI)
Reference data for Part D

- Pharmacy characteristics
- Prescriber characteristics
- Plan characteristics
  - Tier
  - Service Area
  - Premium
- Formulary characteristics
Quick Poll

- Where will the claims show up for these services?
# Chronic Condition Warehouse (CCW)

<table>
<thead>
<tr>
<th>CCW Chronic Condition Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Myocardial Infarction</td>
</tr>
<tr>
<td>Alzheimer's Disease</td>
</tr>
<tr>
<td>Alzheimer's Disease, Related Disorders, or Senile Dementia</td>
</tr>
<tr>
<td>Atrial Fibrillation</td>
</tr>
<tr>
<td>Cancer, Colorectal</td>
</tr>
<tr>
<td>Cancer, Endometrial</td>
</tr>
<tr>
<td>Cancer, Female Breast</td>
</tr>
<tr>
<td>Cancer, Lung</td>
</tr>
<tr>
<td>Cancer, Prostate</td>
</tr>
<tr>
<td>Cataract</td>
</tr>
<tr>
<td>Chronic Kidney Disease</td>
</tr>
<tr>
<td>Chronic Obstructive Pulmonary Disease</td>
</tr>
<tr>
<td>Depression</td>
</tr>
<tr>
<td>Diabetes</td>
</tr>
<tr>
<td>Glaucoma</td>
</tr>
<tr>
<td>Heart Failure</td>
</tr>
<tr>
<td>Hip / Pelvic Fracture</td>
</tr>
<tr>
<td>Ischemic Heart Disease</td>
</tr>
<tr>
<td>Osteoporosis</td>
</tr>
<tr>
<td>Rheumatoid arthritis / Osteoarthritis</td>
</tr>
<tr>
<td>Stroke / Transient Ischemic Attack</td>
</tr>
</tbody>
</table>
CCW: COPD

- Reference time period: 1 year
- 1 inpatient, SNF, HHA OR 2 HOP or Carrier claims at least 1 day apart with DX codes during the 1-yr period
- DX 491.0, 491.1, 491.20, 491.21, 491.22, 491.8, 491.9, 492.0, 492.8, 494.0, 494.1, 496 (any DX on the claim – not limited to Dx1)
CCW: Ischemic Heart Disease

- Reference time period: 2 years
- At least 1 inpatient, SNF, HHA, HOP or Carrier claim with DX, Procedure or HCPC codes during the 2-yr period
  - DX 410.00, 410.01, 410.02, 410.10, 410.11, 410.12, 410.20, 410.21, 410.22, 410.30, 410.31, 410.32, 410.40, 410.41, 410.42, 410.50, 410.51, 410.52, 410.60, 410.61, 410.62, 410.70, 410.71, 410.72, 410.80, 410.81, 410.82, 410.90, 410.91, 410.92, 411.0, 411.1, 411.81, 411.89, 412, 413.0, 413.1, 413.9, 414.00, 414.01, 414.02, 414.03, 414.04, 414.05, 414.06, 414.07, 414.10, 414.11, 414.12, 414.19, 414.2, 414.3, 414.8, 414.9
  - Proc 00.66, 36.01, 36.02, 36.03, 36.04, 36.05, 36.06, 36.07, 36.09, 36.10, 36.11, 36.12, 36.13, 36.14, 36.15, 36.16, 36.17, 36.19, 36.2, 36.31, 36.32
  - HCPCS 33510, 33511, 33512, 33513, 33514, 33515, 33516, 33517, 33518, 33519, 33521, 33522, 33523, 33533, 33534, 33535, 33536, 33542, 33545, 33548, 92975, 92977, 92980, 92982, 92995, 33140, 33141
## Condition Prevalence and Per Capita Utilization for 2005

<table>
<thead>
<tr>
<th>Chronic Condition</th>
<th>Prevalence (%)</th>
<th>Number of Beneficiaries</th>
<th>Avg # Inpatient Discharges</th>
<th>Avg # Inpatient Days</th>
<th>Avg # SNF Days</th>
<th>Avg # HH Visits</th>
<th>Avg # OP Visits</th>
<th>Avg # Physician Office Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Cohort²</td>
<td></td>
<td>1,649,574</td>
<td>0.39</td>
<td>2.32</td>
<td>1.91</td>
<td>2.77</td>
<td>3.96</td>
<td>6.88</td>
</tr>
<tr>
<td><strong>Condition</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cancer</td>
<td>6.3%</td>
<td>103,850</td>
<td>0.69</td>
<td>4.29</td>
<td>2.71</td>
<td>3.79</td>
<td>6.39</td>
<td>11.28</td>
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<td>CKD</td>
<td>9.0%</td>
<td>149,220</td>
<td>1.35</td>
<td>9.51</td>
<td>7.30</td>
<td>8.64</td>
<td>8.09</td>
<td>10.28</td>
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<tr>
<td>COPD</td>
<td>10.9%</td>
<td>179,564</td>
<td>1.25</td>
<td>8.18</td>
<td>6.29</td>
<td>7.90</td>
<td>6.45</td>
<td>10.24</td>
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<tr>
<td>Depression</td>
<td>11.5%</td>
<td>190,282</td>
<td>0.97</td>
<td>6.49</td>
<td>6.94</td>
<td>6.62</td>
<td>6.81</td>
<td>8.99</td>
</tr>
<tr>
<td>Diabetes</td>
<td>24.3%</td>
<td>400,268</td>
<td>0.66</td>
<td>4.18</td>
<td>3.40</td>
<td>5.58</td>
<td>5.53</td>
<td>9.06</td>
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<tr>
<td>HF</td>
<td>17.7%</td>
<td>292,776</td>
<td>1.10</td>
<td>7.28</td>
<td>6.44</td>
<td>8.43</td>
<td>6.64</td>
<td>9.74</td>
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<tr>
<td><strong># Conditions</strong></td>
<td></td>
<td></td>
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<tr>
<td>None</td>
<td>50.7%</td>
<td>836,428</td>
<td>0.12</td>
<td>0.50</td>
<td>0.36</td>
<td>0.77</td>
<td>2.40</td>
<td>4.86</td>
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<tr>
<td>One</td>
<td>29.0%</td>
<td>478,449</td>
<td>0.35</td>
<td>1.80</td>
<td>1.45</td>
<td>2.36</td>
<td>4.40</td>
<td>7.89</td>
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<tr>
<td>Two</td>
<td>12.7%</td>
<td>209,360</td>
<td>0.76</td>
<td>4.66</td>
<td>3.98</td>
<td>5.74</td>
<td>6.30</td>
<td>9.97</td>
</tr>
<tr>
<td>Three +</td>
<td>7.6%</td>
<td>125,337</td>
<td>1.76</td>
<td>12.50</td>
<td>10.54</td>
<td>12.70</td>
<td>8.78</td>
<td>11.36</td>
</tr>
</tbody>
</table>
Logistics

- Current data @ UNC
- 20% random sample of benes with Part A/B/D coverage
  - 2007-2016 (2017 pending CMS approval)
  - 2015-2016: 100% sample of patients seen in the UNC health system (2014-2017)
- Approval by CMS required
  - Study specific
  - $2000 reuse fee (waived for dissertations)
  - 4-6mo timeline
Limitations of Medicare

- Not strictly representative
  - Fee-for-service enrollees are sicker than those in Medicare Advantage plans
  - Those with Part D are sicker than those without

- Relatively long lag
  - CY 2018 claims will be released Dec 2019

- Expensive to buy new data
  - <1million benes still $27k/year for all file types
  - 1-5m benes ~$48k/yr
Limitations of Claims Data

- Diagnoses received (not symptoms)
- Care received (not needed)
- No Dx on Rx (Part D) data
- Lots of missing confounders (bmi, smoking)
- Lots of missing clinical detail (lab results, vitals, tumor pathology, etc)
- Timing not exact
- Only covered benefits for which claims were submitted (may change over time)
Strengths

- Very large, stable population of elderly
- Reliable demographics (incl race)
- Ascertainment of deaths outside hospital
- Linkage to other data sources
- Can contact participants ($$)
Resources

- www.ResDAC.org
- www.cms.gov/home/medicare.asp
- www.medicare.gov
- ccwdata.org
Acknowledgements

- CMS 101 course materials, ResDAC
- KaiserEDU
  - Medicare101
  - RxDrugBenefit
- www.medicare.gov
- Chronic Condition Data Warehouse
  http://ccwdata.org
All available lookbacks

- 1-year look-back
- 2-year look-back
- 3-year look-back
- All available look-back

- Exclude prevalent statin use
- Exclude prevalent cancers
- Require continuous enrollment (fixed look-back approaches)
- Assess covariates

- Continuous enrollment required (all approaches)
- Apply Heart Protection Study eligibility criteria

Follow-up for outcomes
- 6-mo for cancer
- 2-yr for mortality

Index Date
- Statin Exposure
  - 6-mo
  - 14-days
All available lookbacks

- What's the argument against using all available data?
- In other words, why I have been throwing away perfectly good data all the time?
Does it matter if we are trying to detect a prior outcome (e.g. prevalent cancer), prevalent users of the exposure of interest, or measuring a covariate?
Prior statin use

![Graph showing the percentage of cohort with prior statin use in all available data over years 2008 to 2012. The graph分为 Initiators and Non-initiators, with 1-year and 3-year fixed groups. The Initiators 1-year fixed group shows an increase from 8% in 2008 to 46% in 2012. The Non-initiators 1-year fixed group shows an increase from 16% in 2008 to 30% in 2012. The Initiators 3-year fixed group shows an increase from 5% in 2008 to 7% in 2012. The Non-initiators 3-year fixed group shows an increase from 21% in 2008 to 23% in 2012.](image-url)
Prior cancer diagnosis
Why is it that the sample size goes down sometimes when we use all available data compared to a fixed look back even though we don’t have the continuous enrollment criteria?
Excluding patients