Medicare 101

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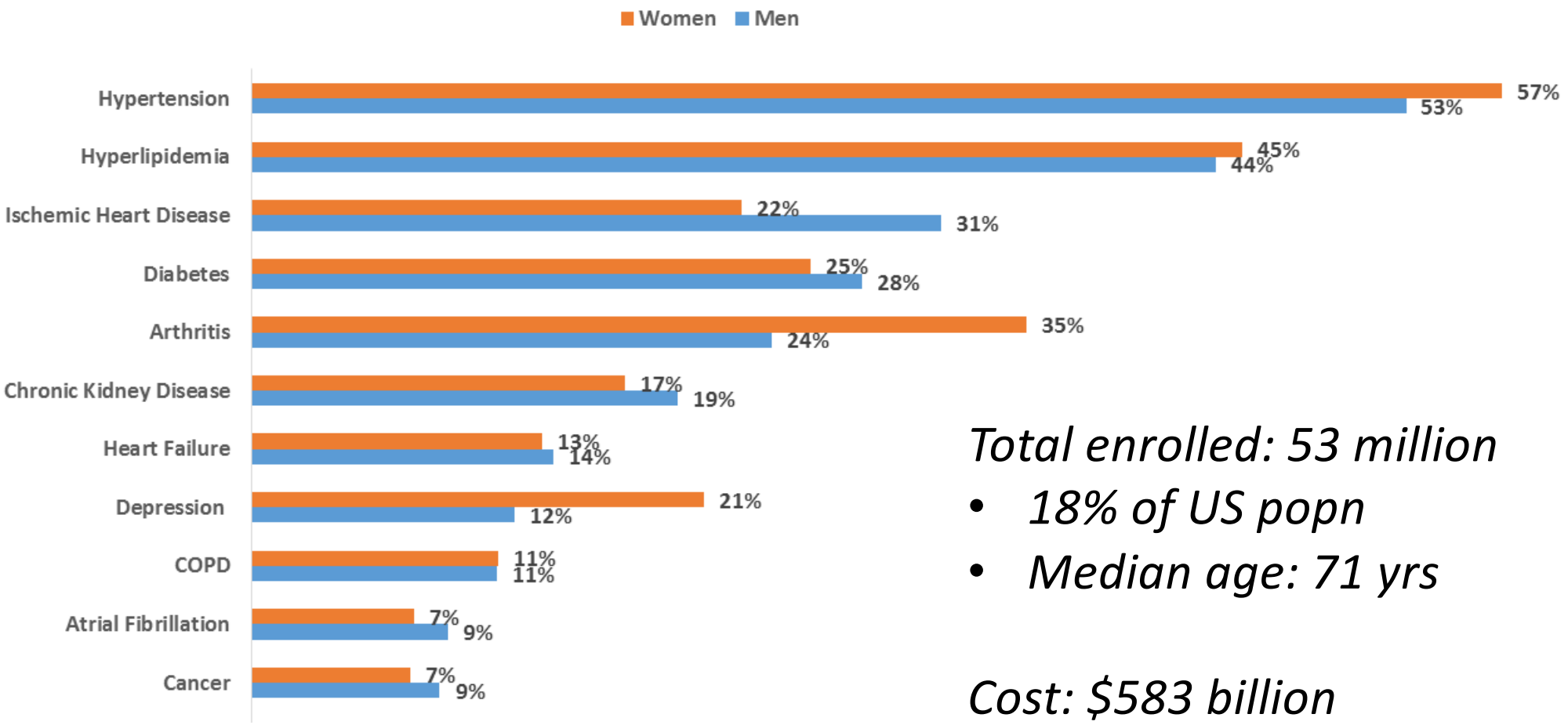
Epid 766: Epidemiologic research using healthcare databases
26 March 2019

Medicare population



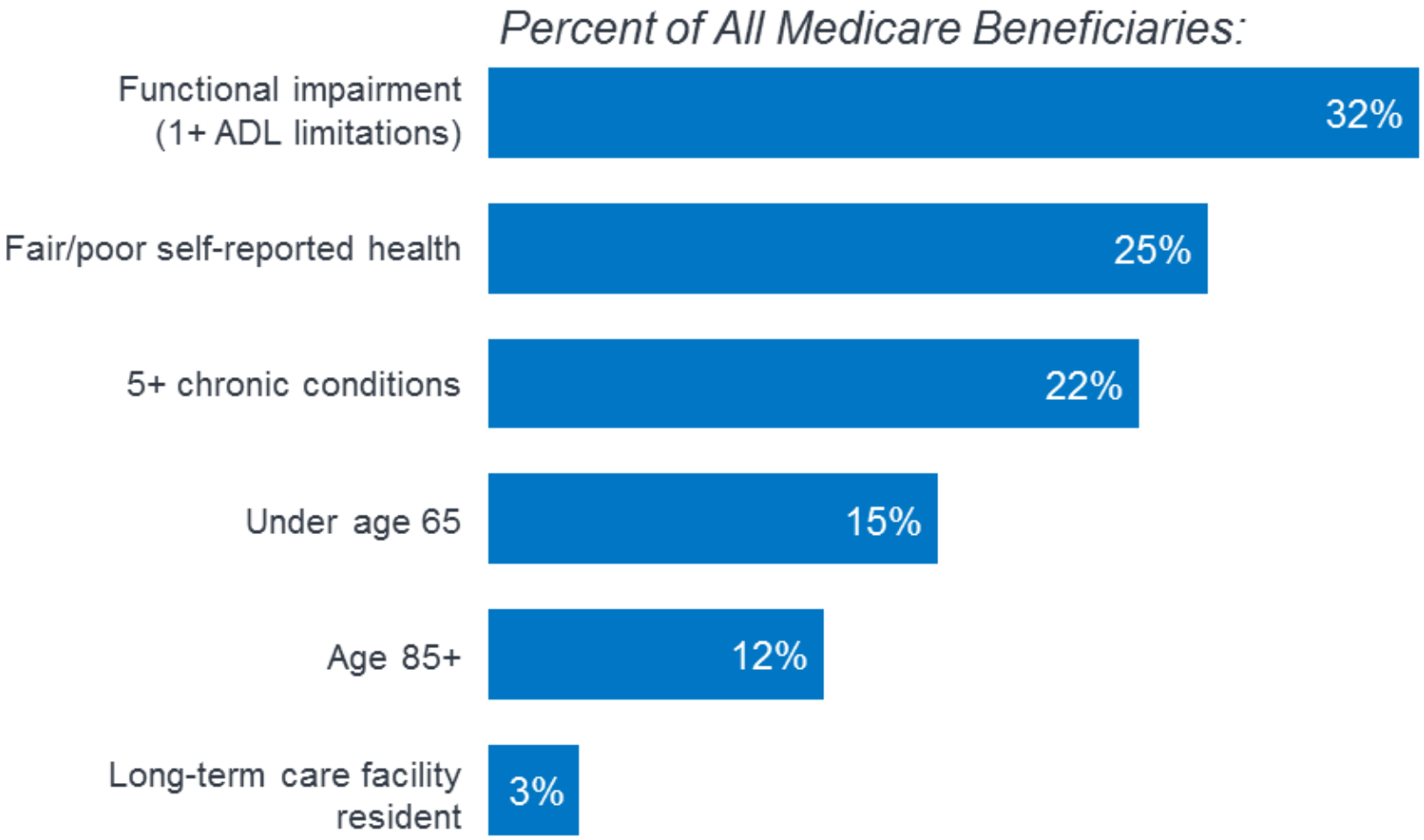
Total enrolled: 53 million

- *18% of US popn*
- *Median age: 71 yrs*

Cost: $583 billion

- *14% of federal budget*
- *20% of all healthcare $*

Medicare Population



NOTE: ADL is activity of daily living.
SOURCE: KFF analysis of the Centers for Medicare & Medicaid Services 2016 Medicare Current Beneficiary Survey.

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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
  - Transition period Oct 2007 – Oct 2011
- 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
  - Xray, 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

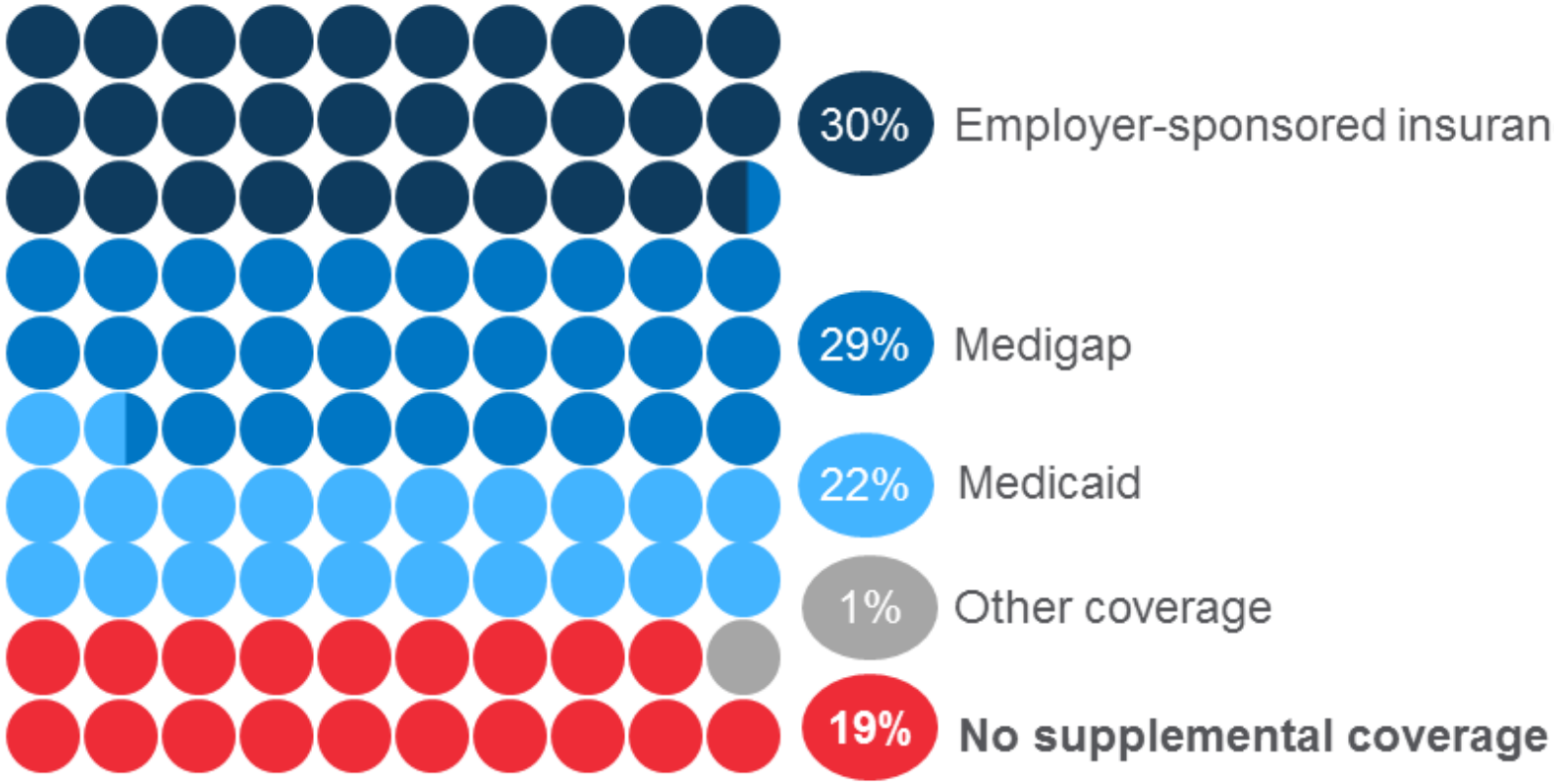
- Provider (physicians and DME) use CMS 1500
- Hospital outpatient facilities & home health agencies use UB-04 (just like for Part A claims)

- 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.
SOURCE: KFF analysis of Centers for Medicare & Medicaid Services 2016 Medicare Current Beneficiary Survey.

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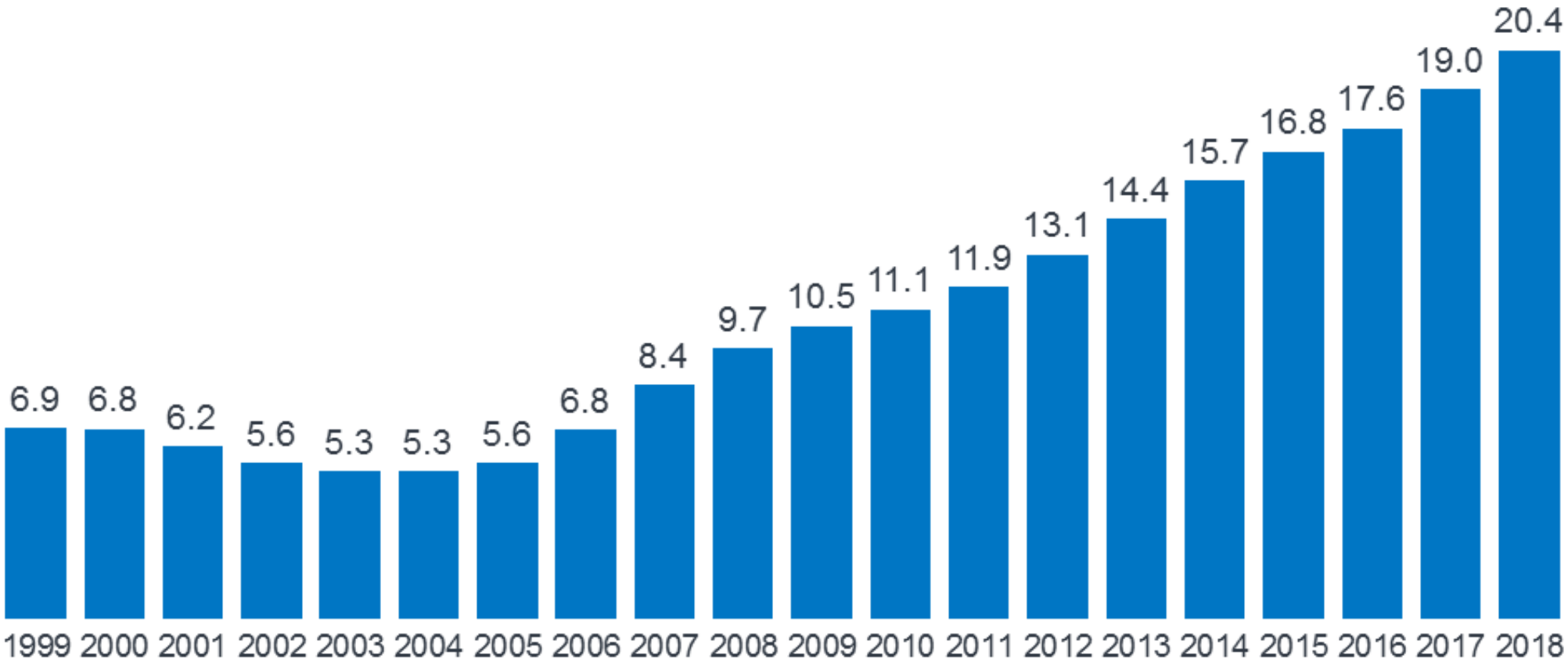
Part C: Medicare Advantage

- 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)



NOTE: Includes Medicare Advantage plans and cost plans.
SOURCE: KFF analysis of Centers for Medicare & Medicaid Services Medicare Advantage enrollment files, 2008-2018, and MPR, 1999-2007; based on March enrollment of each year (April for 2006).

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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

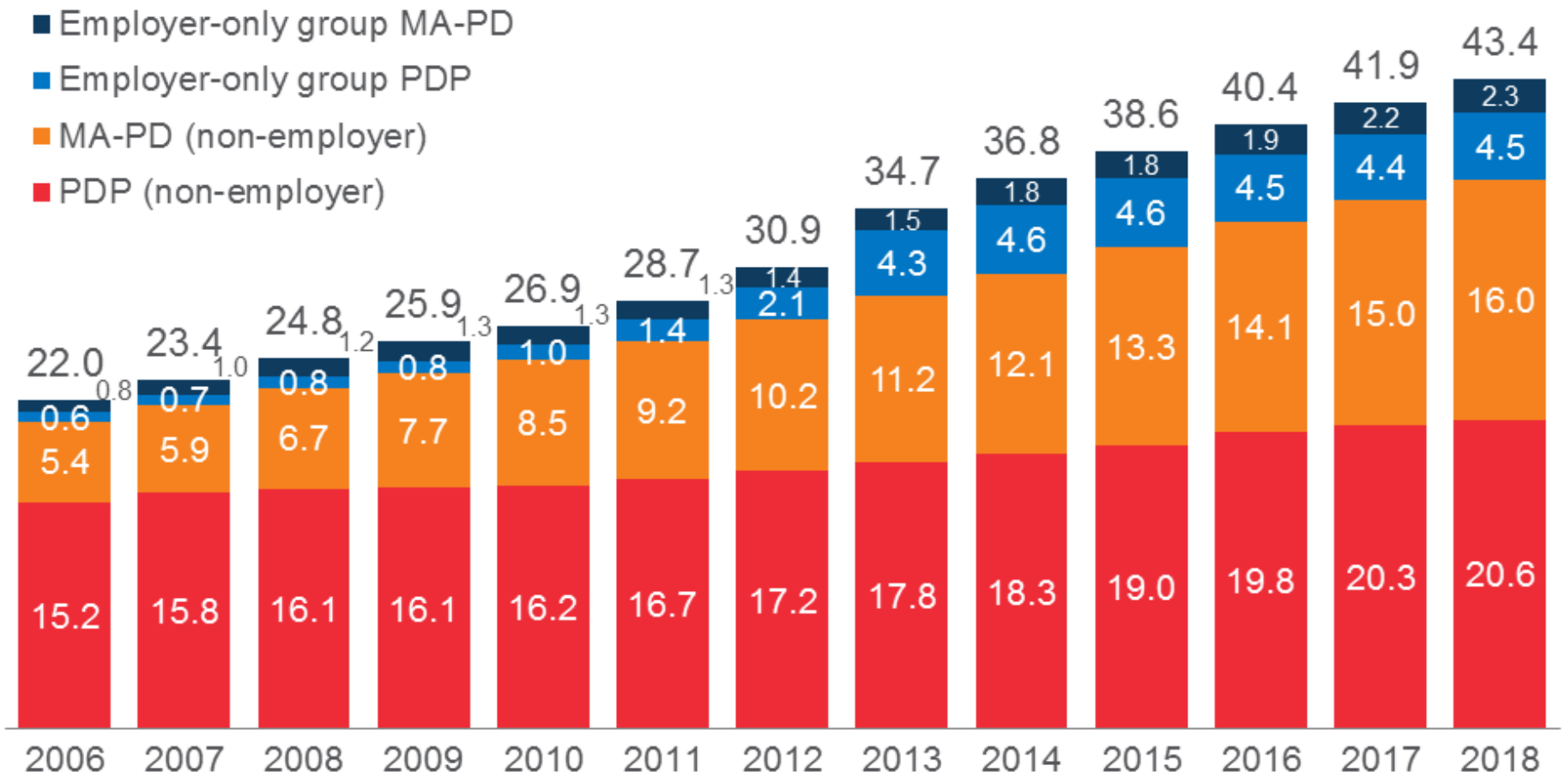
Medications

- 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

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.
SOURCE: KFF analysis of CMS 2006-2018 Part D plan files.

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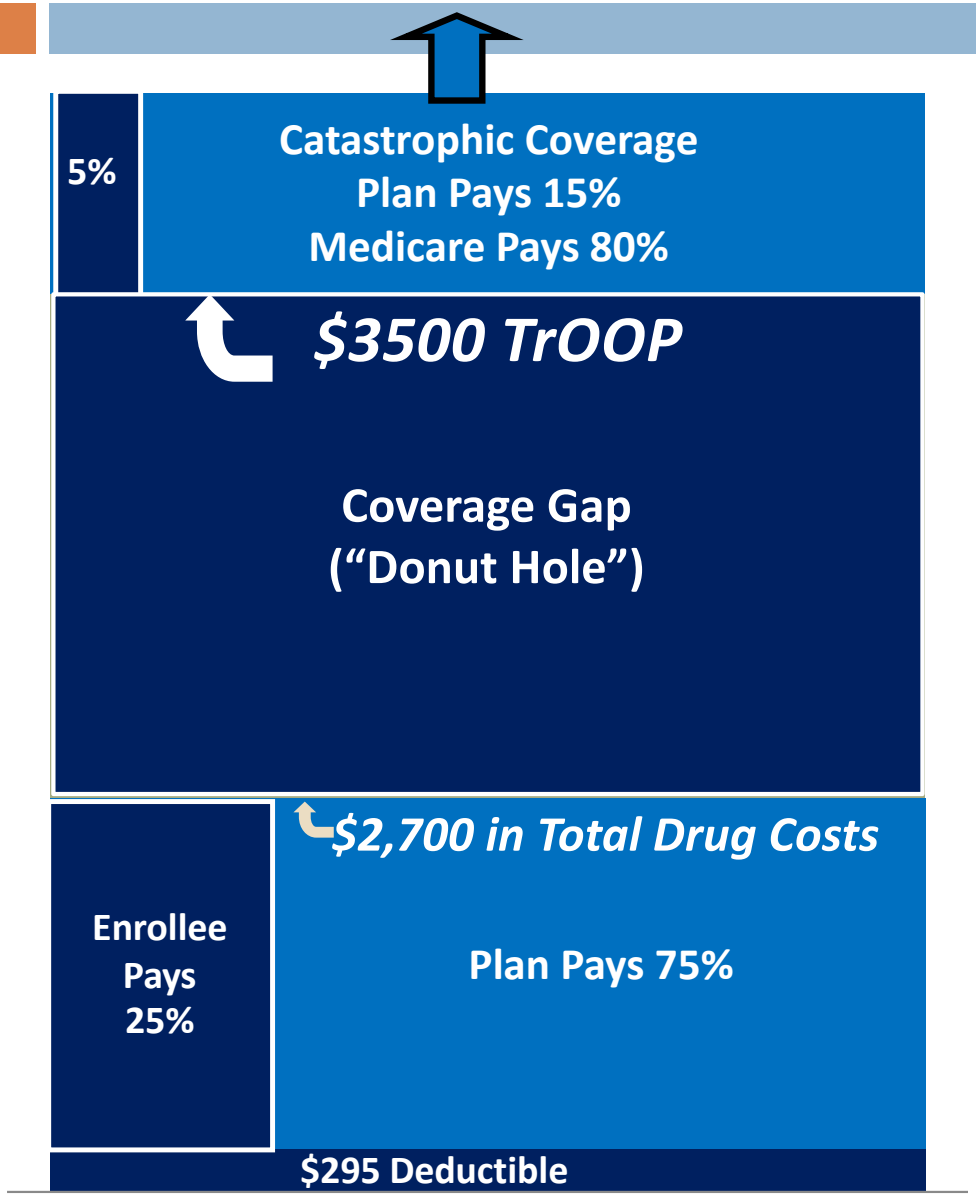
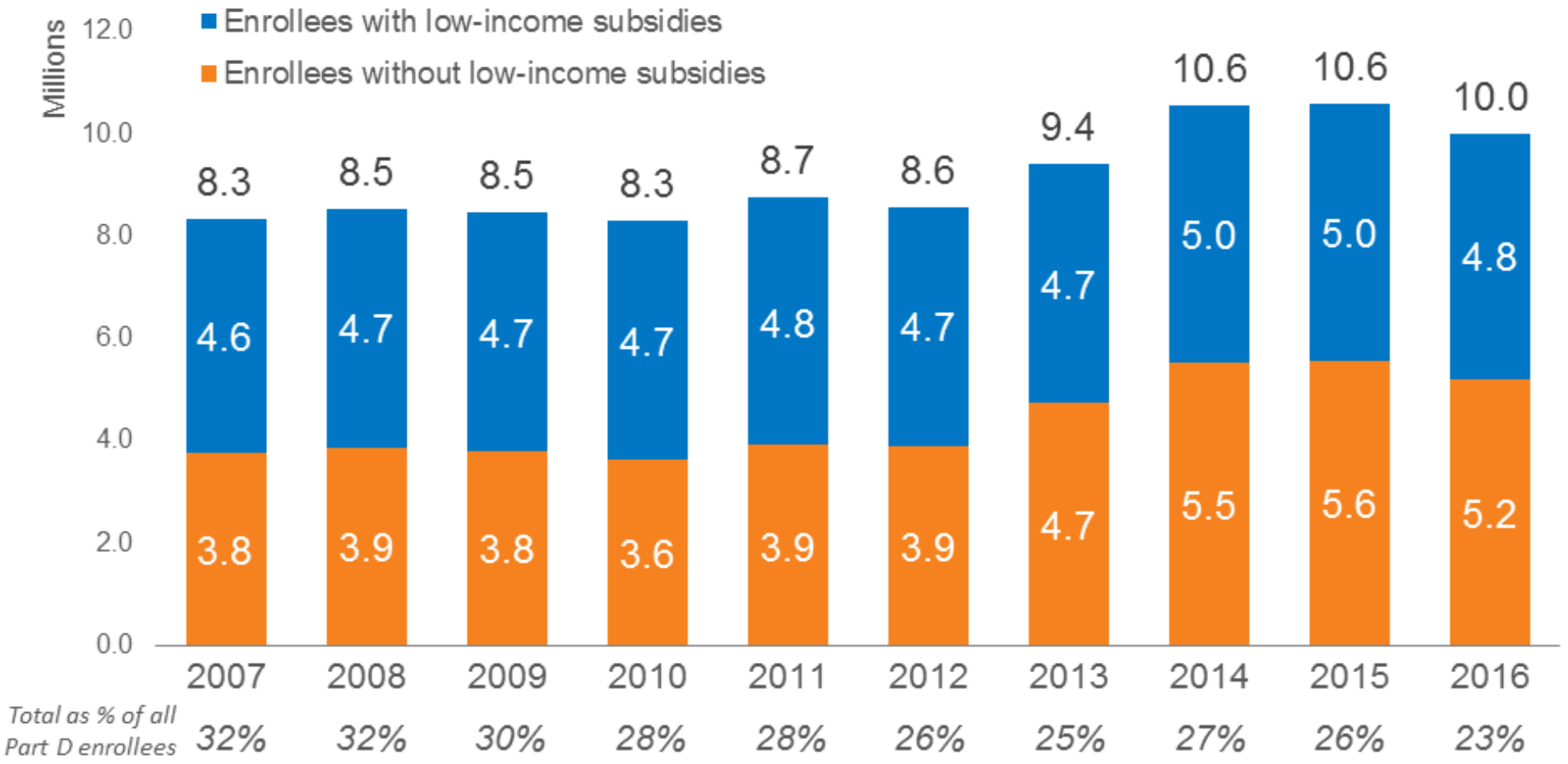
Medicare's "Standard" Drug Benefit in 2009



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.

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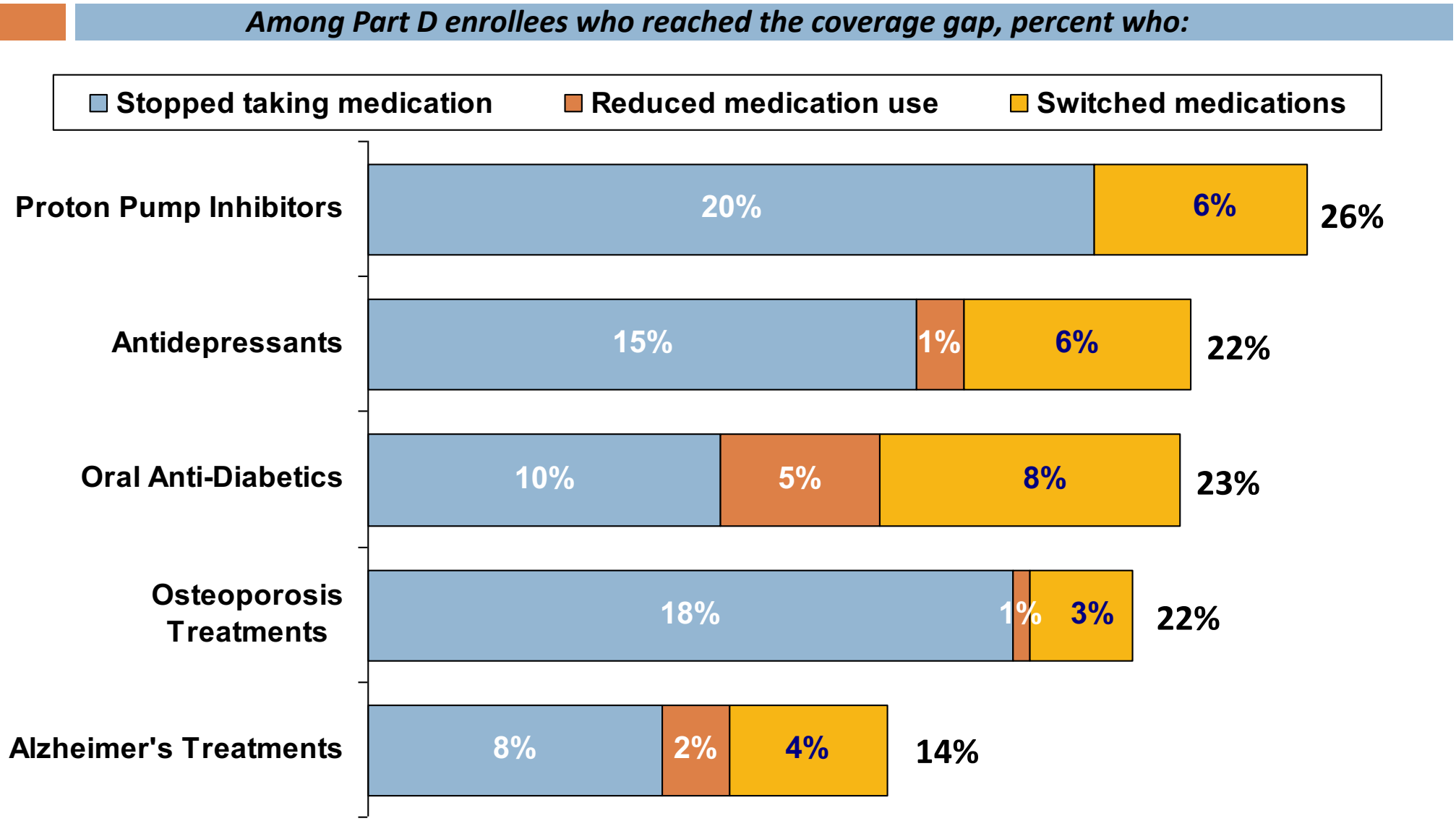
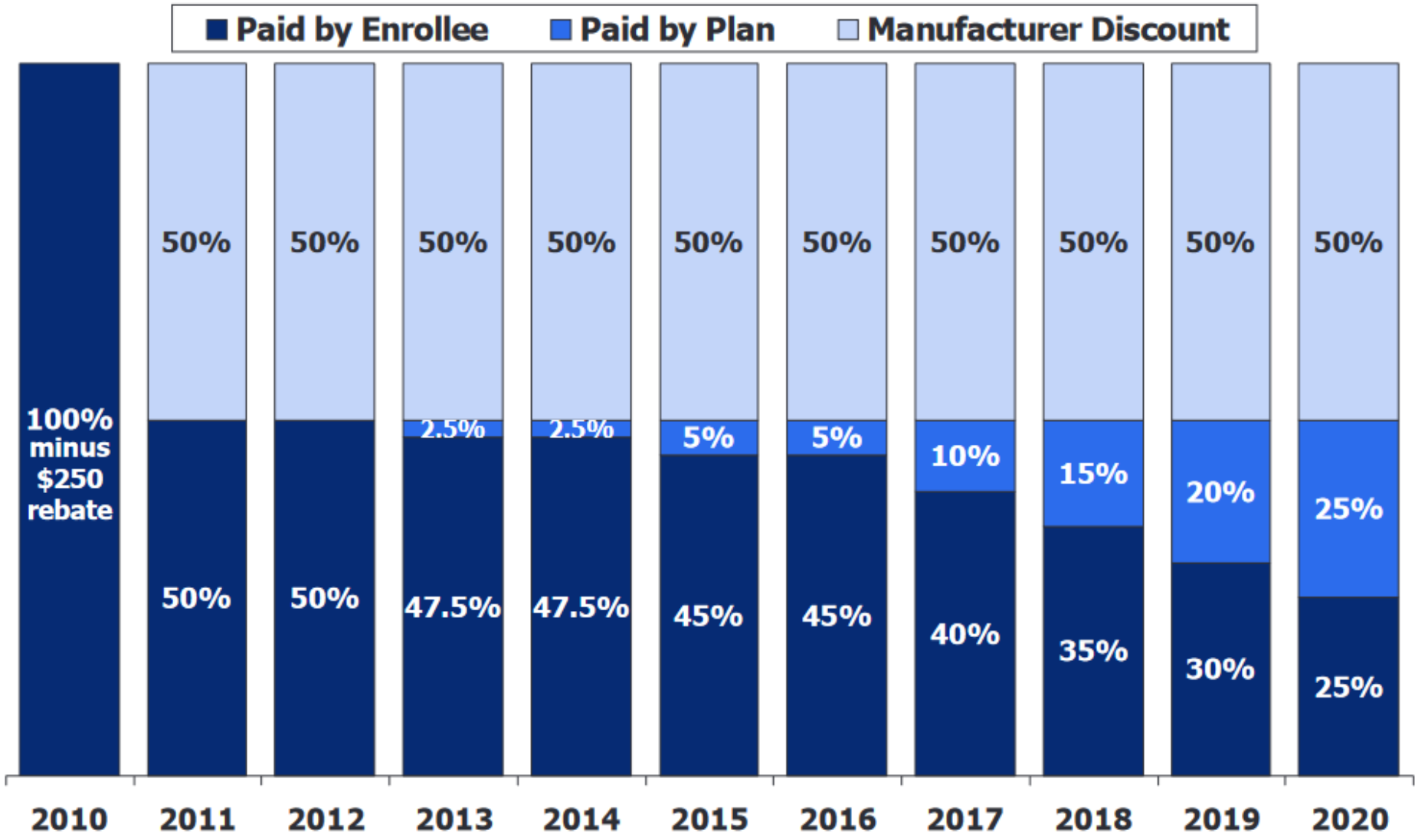
What does the doughnut hole mean for medication use?

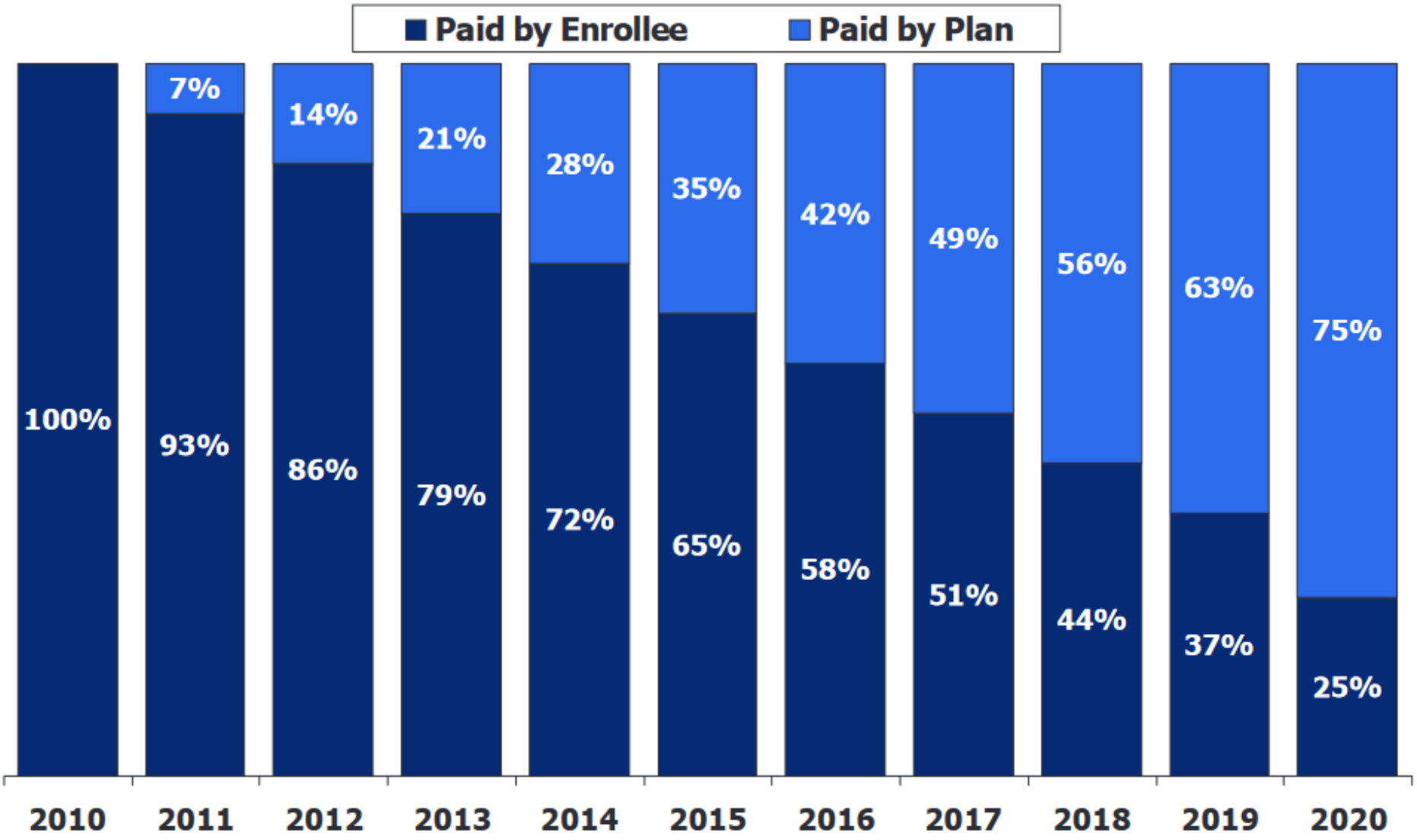


NOTE: Estimates based on analysis of retail pharmacy claims for 1.9 million Part D enrollees in 2007.
SOURCE: Georgetown University/NORC/Kaiser Family Foundation analysis of IMS Health LRx database, 2007.

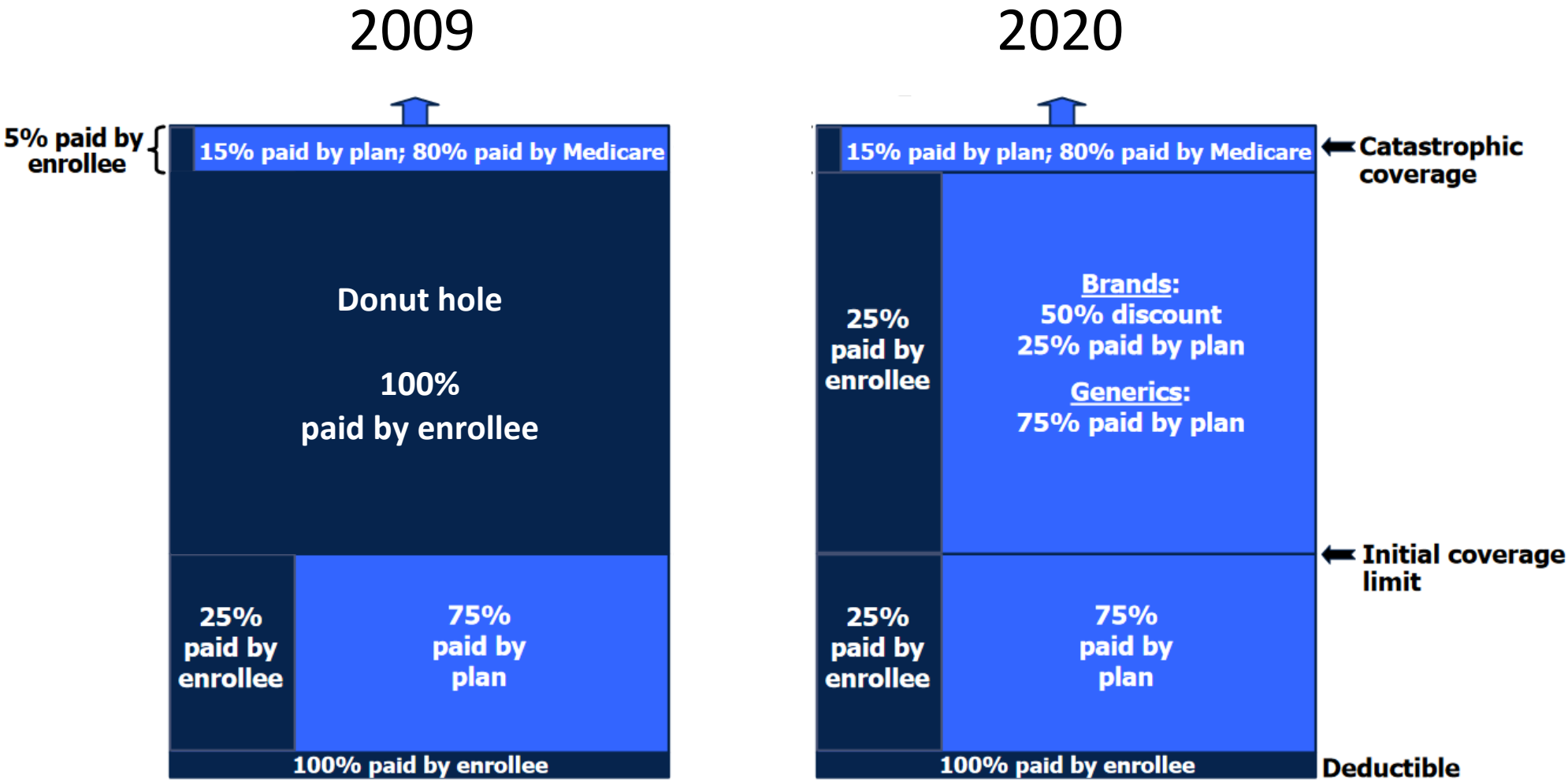
ACA: Closing the donut hole for brand-name drugs



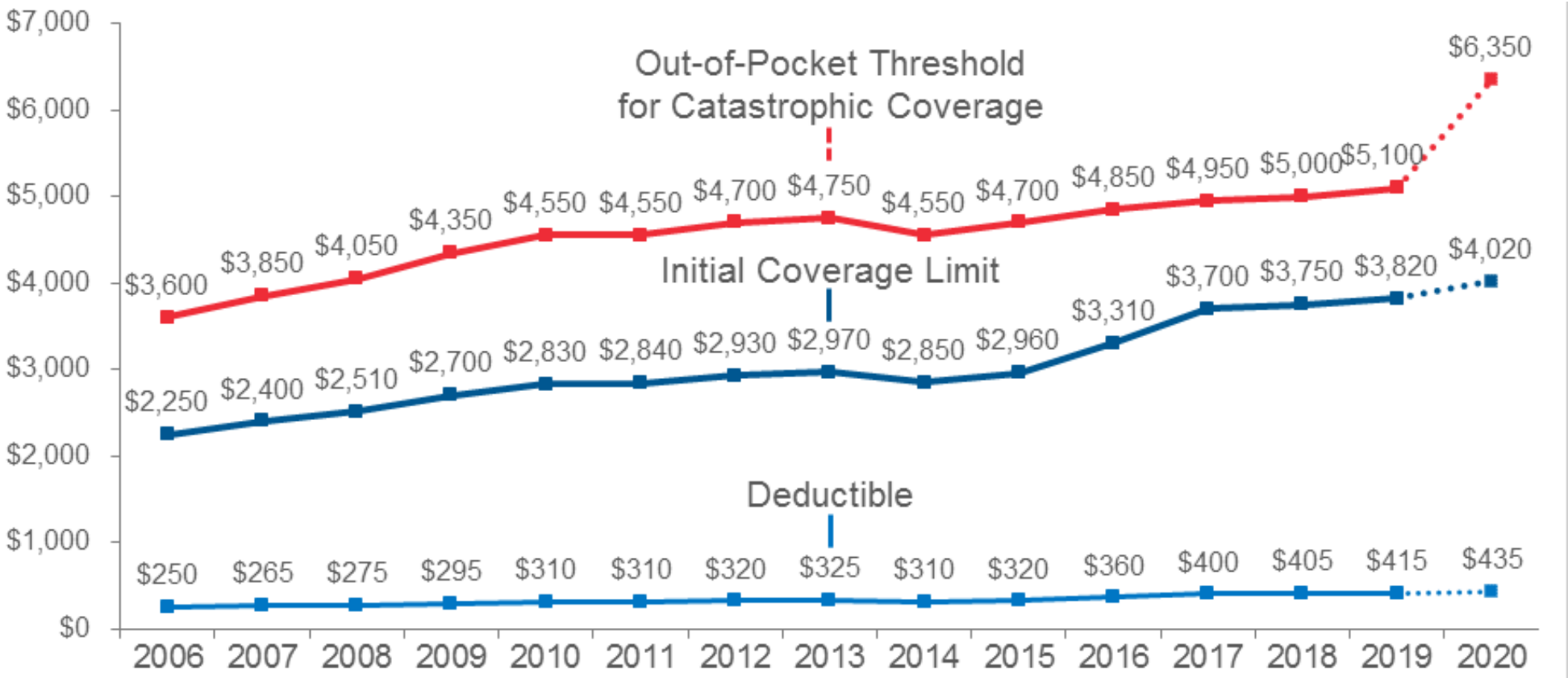
ACA: Closing the donut hole for generic drugs



Medicare's "Standard" Drug Benefit in 2020



Increasing TrOOP for catastrophic coverage



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.
SOURCE: 2006-2019: KFF, based on Part D benefit parameters; 2020: Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds, Table V.E2. *Amounts calculated by CMS and released with updated Part D benefit parameters in the annual Call Letter.

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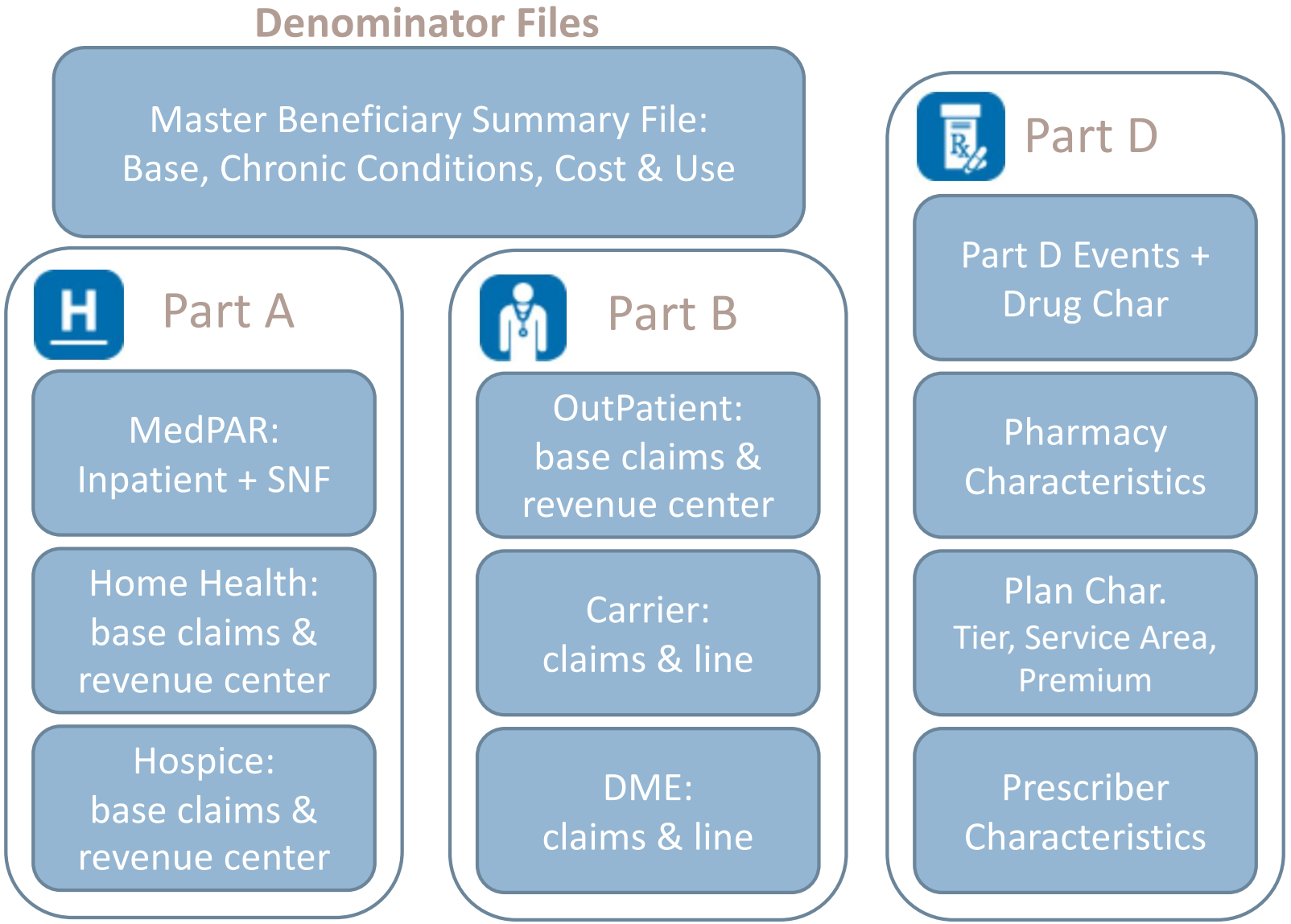
Quick Poll

- What types of services does Medicare cover?
- https://bit.ly/2USNcN7

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

Carrier 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?
- https://bit.ly/2HPo46o

Chronic Condition Warehouse (CCW)

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

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

Chronic Condition	Prevalence (%)	Number of Beneficiaries	Avg # Inpatient Discharges	Avg # Inpatient Days	Avg # SNF Days	Avg # HH Visits	Avg # OP Visits	Avg # Physician Office Visits[1]
Study Cohort[2]		1,649,574	0.39	2.32	1.91	2.77	3.96	6.88
Condition								
Cancer	6.3%	103,850	0.69	4.29	2.71	3.79	6.39	11.28
CKD	9.0%	149,220	1.35	9.51	7.30	8.84	8.09	10.28
COPD	10.9%	179,554	1.25	8.18	6.29	7.90	6.45	10.24
Depression	11.5%	190,282	0.97	6.49	6.94	6.62	6.81	8.99
Diabetes	24.3%	400,268	0.66	4.18	3.40	5.58	5.53	9.06
HF	17.7%	292,776	1.10	7.28	6.44	8.43	6.64	9.74
# Conditions								
None	50.7%	836,428	0.12	0.50	0.36	0.77	2.40	4.86
One	29.0%	478,449	0.35	1.80	1.45	2.36	4.40	7.89
Two	12.7%	209,360	0.78	4.65	3.98	5.74	6.30	9.97
Three +	7.6%	125,337	1.76	12.50	10.54	12.70	8.78	11.36

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
  www.kaiseredu.org/Tutorials-and-Presentations.aspx
  - Medicare101
  - RxDrugBenefit
- www.medicare.gov
- Chronic Condition Data Warehouse
  http://ccwdata.org

QUESTIONS

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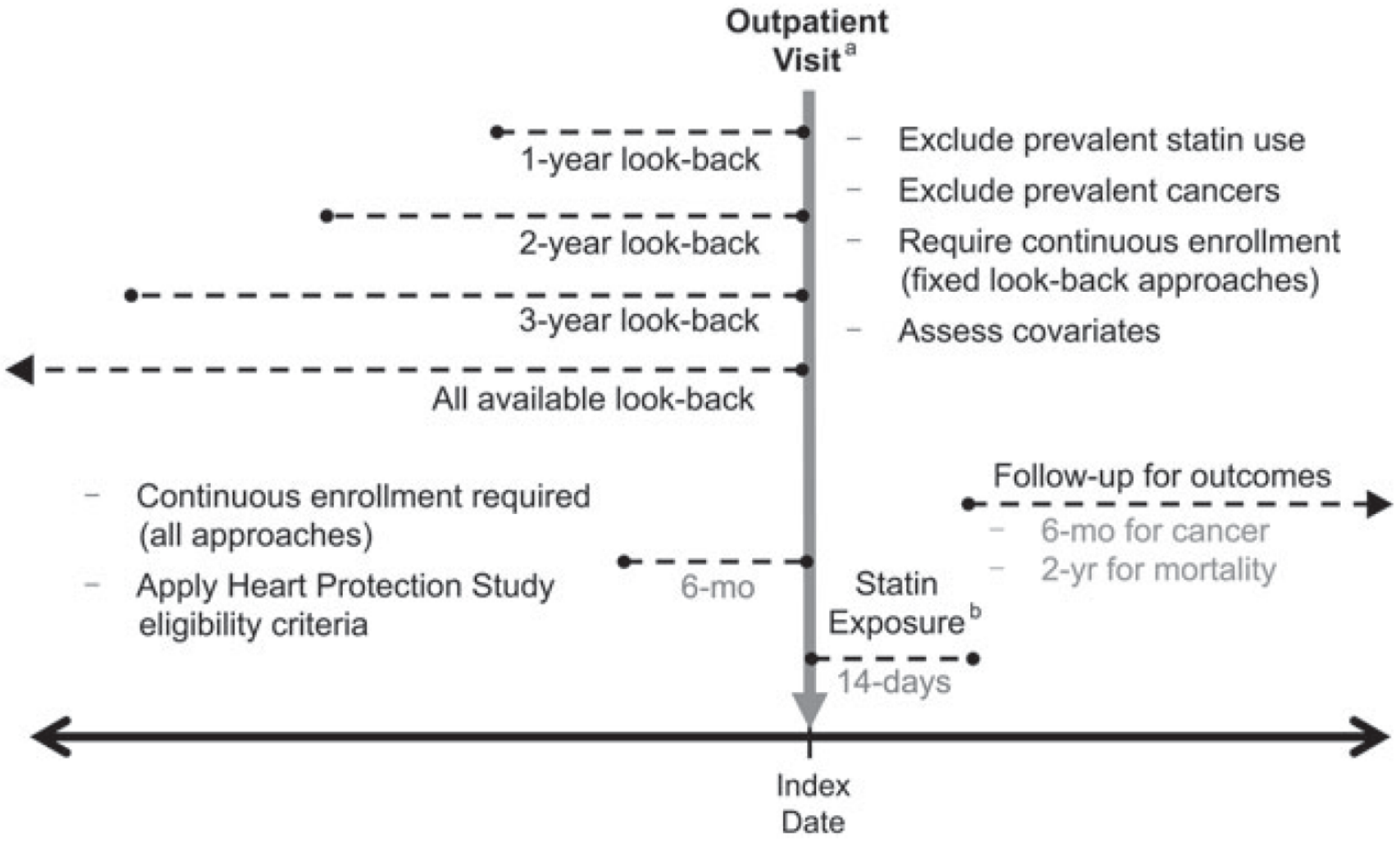
All available lookbacks

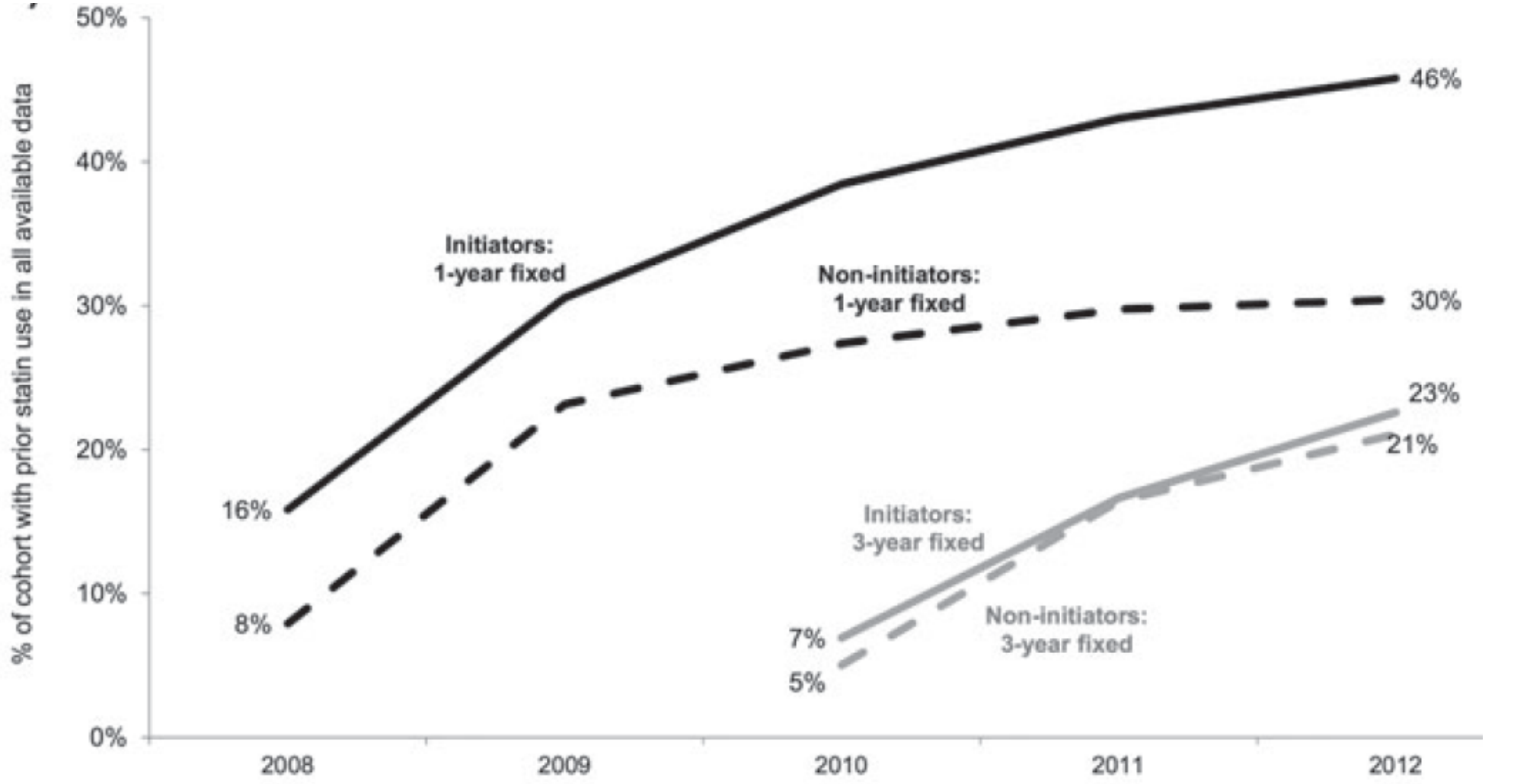


All available lookbacks

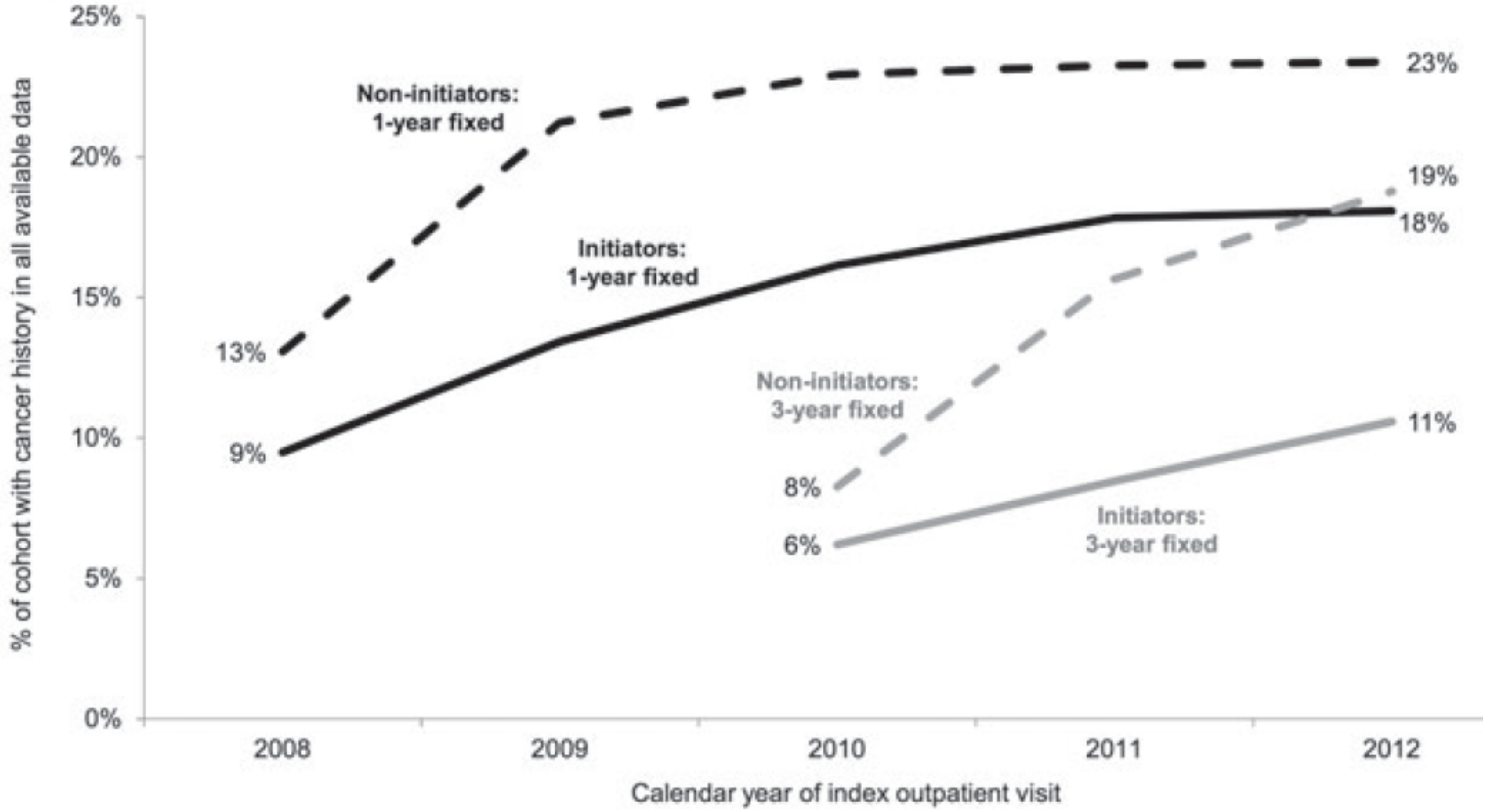
- What's the argument against using all available data?
- In other words, why I have a been throwing away perfectly good data all the time?

- 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



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