



Healthcare Economics and the Future of Radiology

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Disclosures



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ACCR[®]

AMERICAN COLLEGE OF
RADIOLOGY

100th
1923 2023

A CENTURY OF QUALITY, INTEGRITY,
LEADERSHIP & INNOVATION

MICHIGAN
RADIOLOGICAL
— S O C I E T Y —



YEARS

Agenda

- Brief History of Radiology
- Healthcare Economics 101
- Physician Reimbursement
- Future State

Brief History of Radiology



1895

X-rays are discovered by Wilhelm Conrad Roentgen in 1895, Germany. The first image captured was of his wife's hand, showing its skeletal outline with a ring on one of her fingers.



1946

Nuclear magnetic resonance (NMR) is discovered independently by American physicists, Edward Purcell and Felix Bloch.

1955

Ian Donald, a Scottish physician, endeavors ultrasound in gynecology. Together with engineer Tom Brown, he develops a portable ultrasound machine.



1972

English electrical engineer, Godfrey Hounsfield, develops first clinical prototype of CT scanner.





1973

The first NMR image is published by American chemist, Paul Lauterbur.



1977

American physician, **Raymond Damadian**, completes the first MRI.



2000

The PET-CT scanner, attributed to David Townsend and Ronald Nutt, is named by TIME Magazine as the medical invention of the year.

10 Health Advances That Changed the World

From vaccines to clean water, health advances have changed the world.

By **DAN CHILDS and SUSAN KANSAGRA, M.D.**
 ABC News Medical Unit

September 20, 2007, 7:10 AM

Vaccines

Surgical Anesthetic and Antisepsis

Clean Water and Improved Sanitation

Antibiotics and Antivirals

The Birth Control Pill

Improvements in Heart Surgery and Cardiac Care

Randomized Controlled Trials

Radiologic Imaging

Advancements in Childbirth

Organ Transplantation

History of Radiology

- Relatively new discipline in Medicine
- Rapid technological innovation
- Imaging has become widely recognized as high value

Healthcare Economics 101

Healthcare Economics

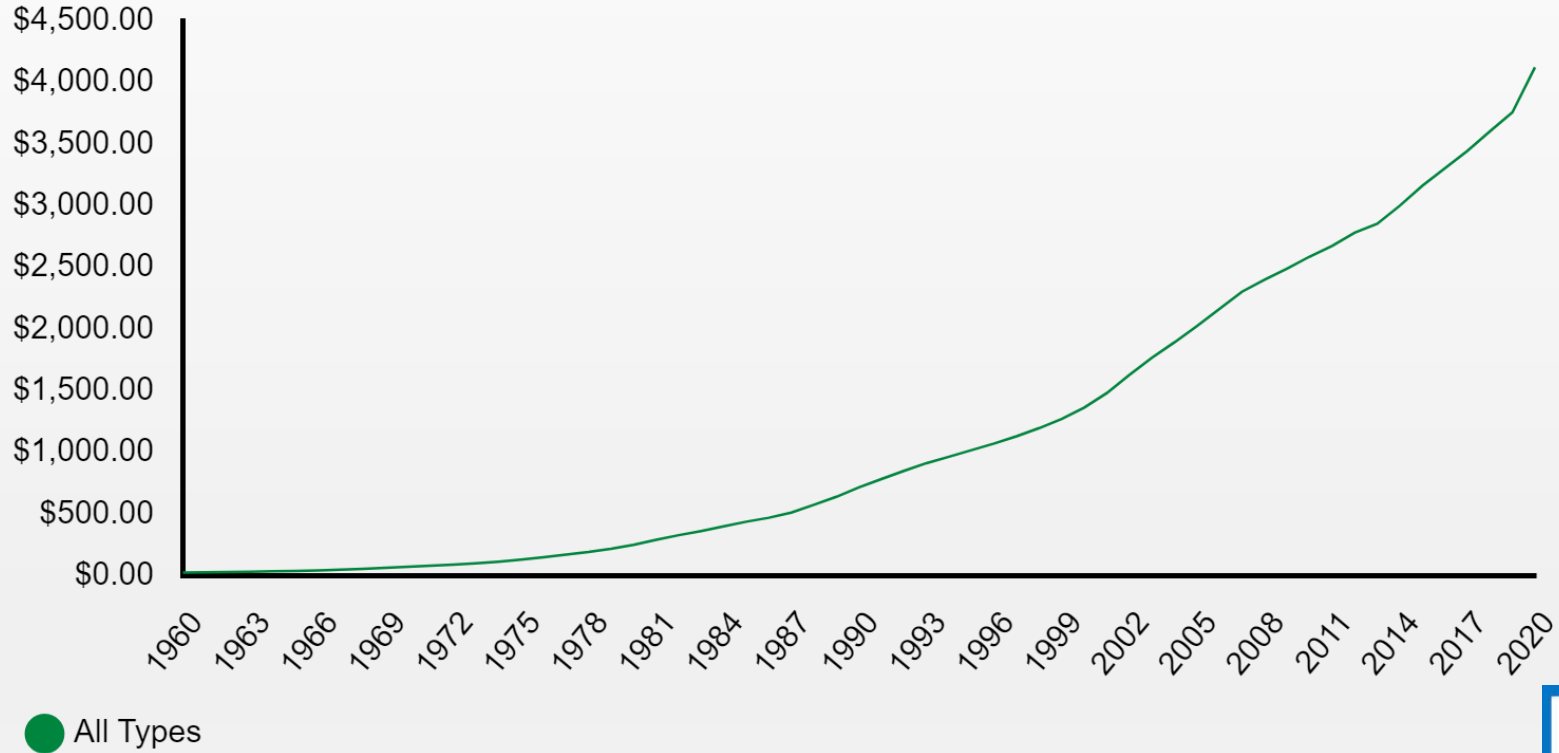
Supply and Demand Theory:

- The main interested parties are the buyers and sellers.
- Buyers are good judges of what they get from sellers.
- Buyers pay sellers directly for the goods and services being exchanged.
- Market prices are the primary mechanism for coordinating the decisions of market participants.
- Result is efficient allocation of resources.

Health Care:

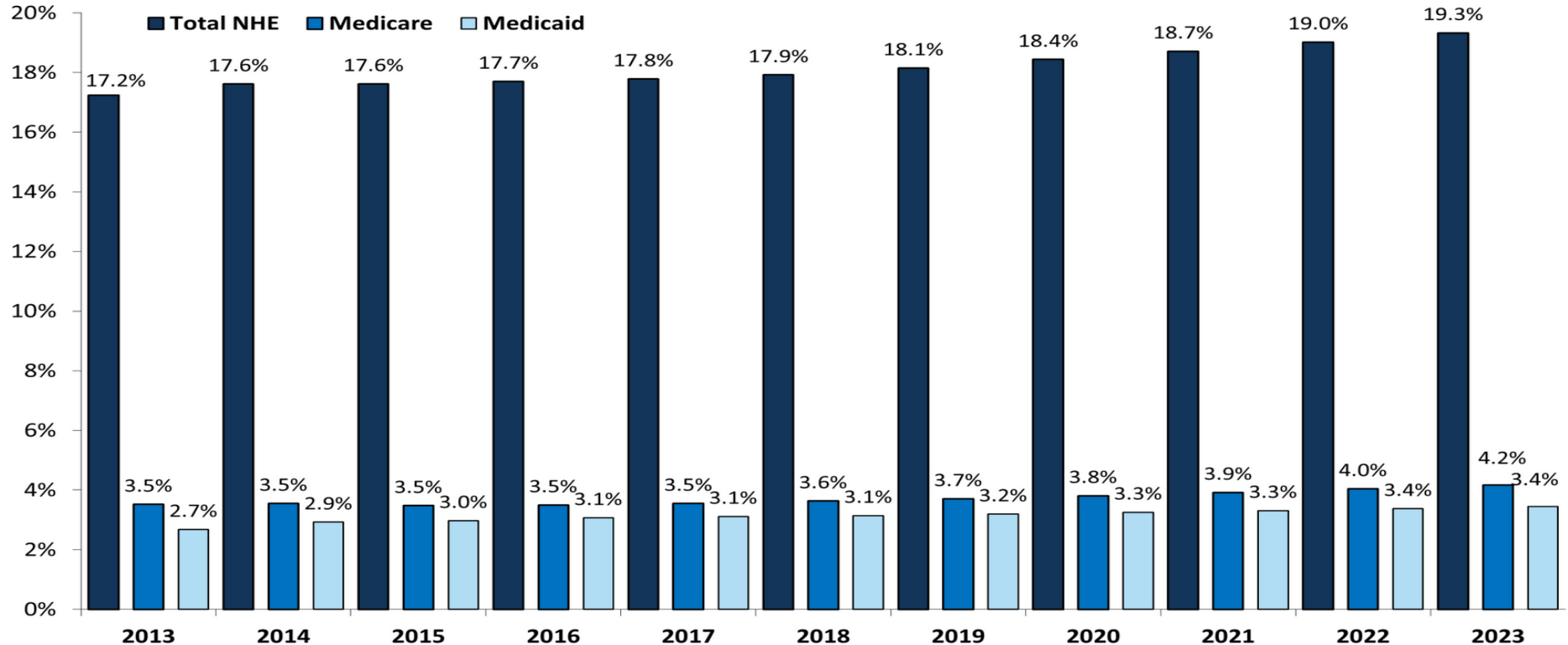
- Third parties—insurers, governments, and other—often have an interest in healthcare outcomes.
- Patients often don't know what they need and cannot evaluate the treatment they are getting.
- Healthcare providers are often paid not by the patients but by private or government health insurance.
- The rules established by these insurers, more than market prices, determine the allocation of resources.
- Allocation of resources in the healthcare market can end up highly inefficient.

HEALTH EXPENDITURES 1960 - 2020



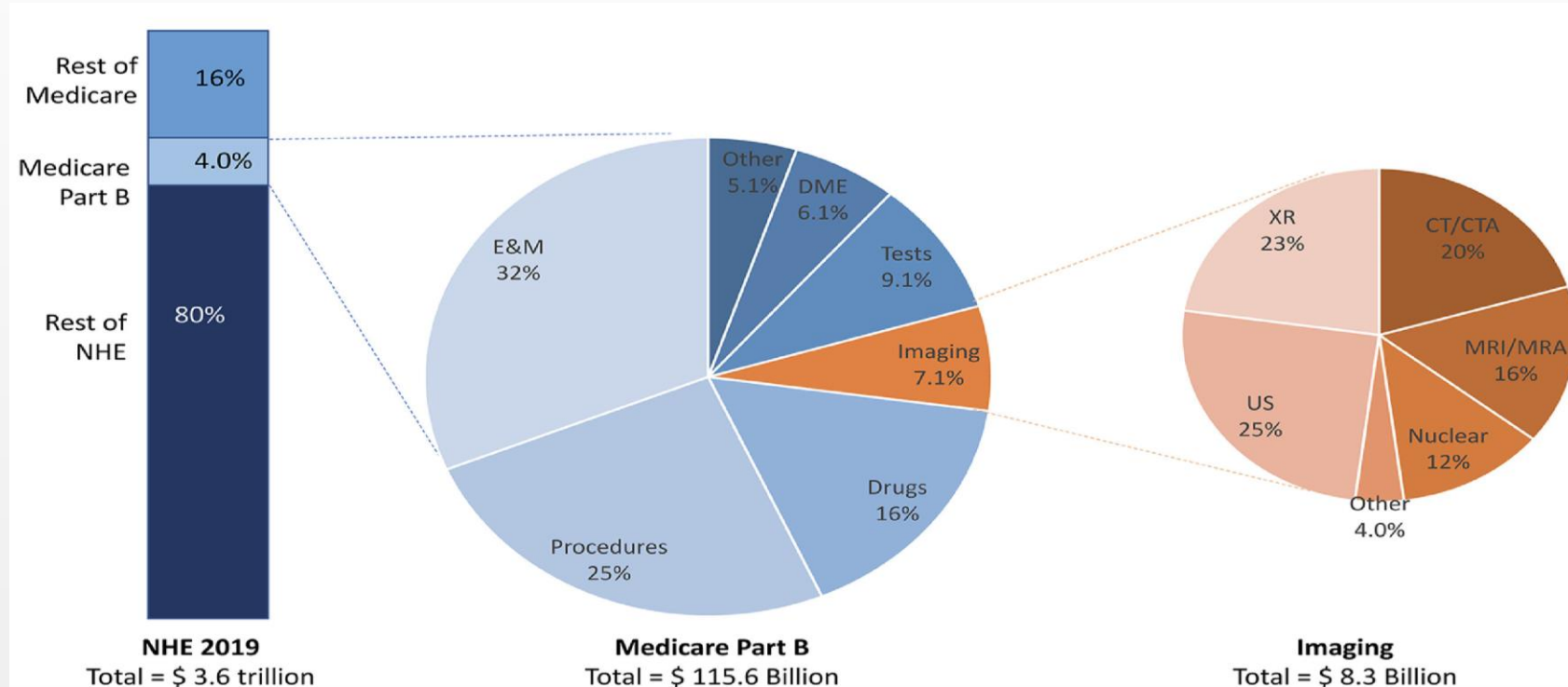
● All Types

Projected Health Care Spending as % GDP



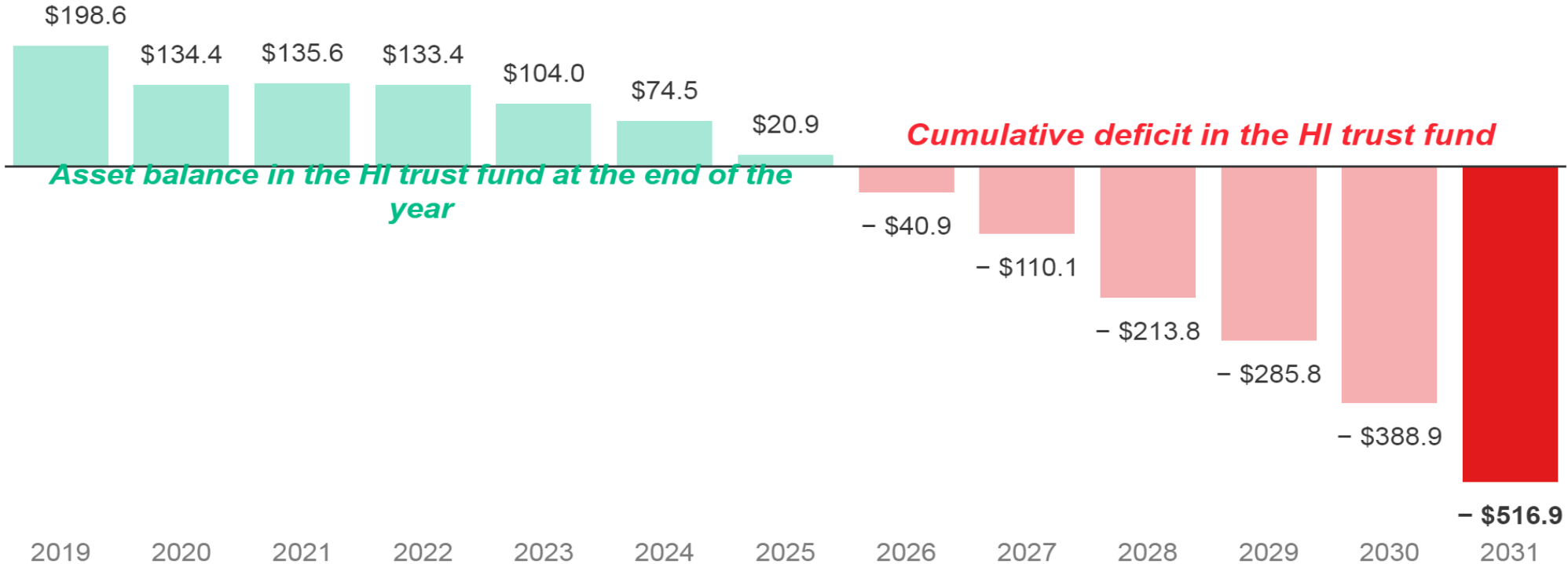
SOURCE: Kaiser Family Foundation calculations using NHE data from Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group, at <http://www.cms.hhs.gov/NationalHealthExpendData/> (see Projected; NHE Historical and projections, 1965-2023, file nhe65-23.zip).

Total Health Expenditures: 2019



<https://pubmed.ncbi.nlm.nih.gov/34600796/>

CBO Medicare Trust Fund Projections



NOTE: HI is Hospital Insurance. Amounts in billions. Actual data for 2019 and 2020 and projected data for 2021-2031.

SOURCE: KFF analysis of data from the Congressional Budget Office (CBO), 10-year Trust Fund Projections, February 2021. • [PNG](#)



Burden of Healthcare Costs: Personal Debt

One in six Americans have past-due health care bills on their credit report.

<https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2018.0349>

In the 2016 National Health Interview Survey, nearly three-quarters of Americans between ages 20 and 65 said they were insured but could not pay their medical bills.

<https://www.cdc.gov/nchs/nhis/index.htm>

17.8% of individuals in the US had medical debt in collections in June 2020

<https://jamanetwork.com/journals/jama/article-abstract/2782187>

Medical bills were the largest single cause of bankruptcy filings and more than half of debtors had medical debts as part of their bankruptcies.

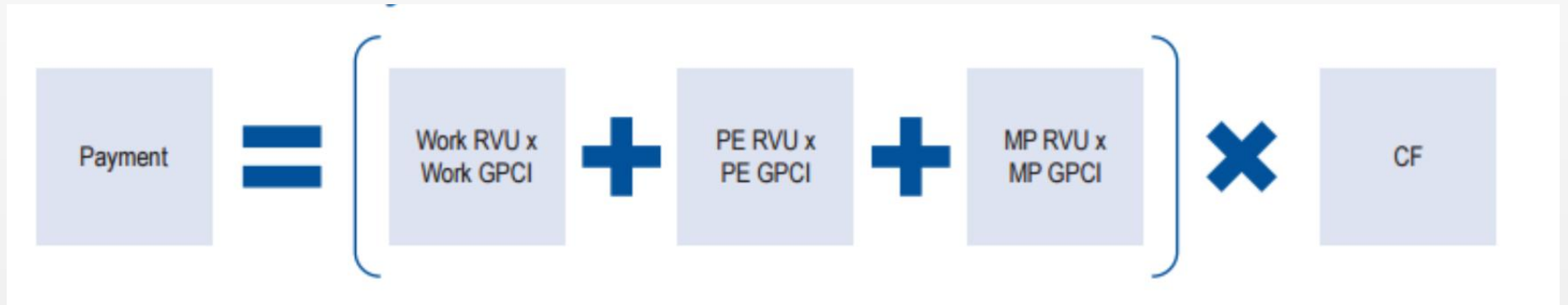
Austin D. Medical Debt As a Cause of Consumer Bankruptcy (Jan. 2014),

Medical debt now outweighs all other personal debt in U.S.

<https://www.fiercehealthcare.com/finance/medical-debt-now-outweighs-all-other-personal-debt-us-those-medicaid-nonexpansion-states>

Physician Reimbursement

Medicare Physician Fee Schedule (MPFS)



Current Procedure Terminology (CPT)

- Medical code set that is used to report medical, surgical, and diagnostic procedures and services to entities such as physicians, health insurance companies and accreditation organizations.
- CPT is a registered trademark of the American Medical Association. The CPT® Editorial Panel is responsible for maintaining the CPT code set
- **Category 1: Procedures and contemporary medical practices**
Covers procedures and contemporary medical practices that are widely performed. Category 1 identifies a procedure or service that is approved by the Food and Drug Administration (FDA), performed by healthcare professionals nationwide, and is proven and documented.
- **Category 2: Performance Measures**
Supplementary tracking codes that are used for performance measures and are intended to help collect information about the quality of care delivered.
- **Category 3: Emerging technologies, services and procedures**
Temporary codes that cover emerging technologies, services and procedures.

Relative Value Units (RVU's)

- Measure of “value” used in the Medicare reimbursement formula for physician services.
- RVUs are a part of the resource-based relative value scale (RBRVS).
Omnibus Budget Reconciliation Act of 1989
- RVU's recommended by a private group of 32 physician members of the American Medical Association's Specialty Society Relative Value Scale Update Committee (RUC). Final determination by HHS Secretary.
- Medicare Reimbursement formula contains three RVUs:
 - Physician work
 - Practice expense
 - Malpractice expense

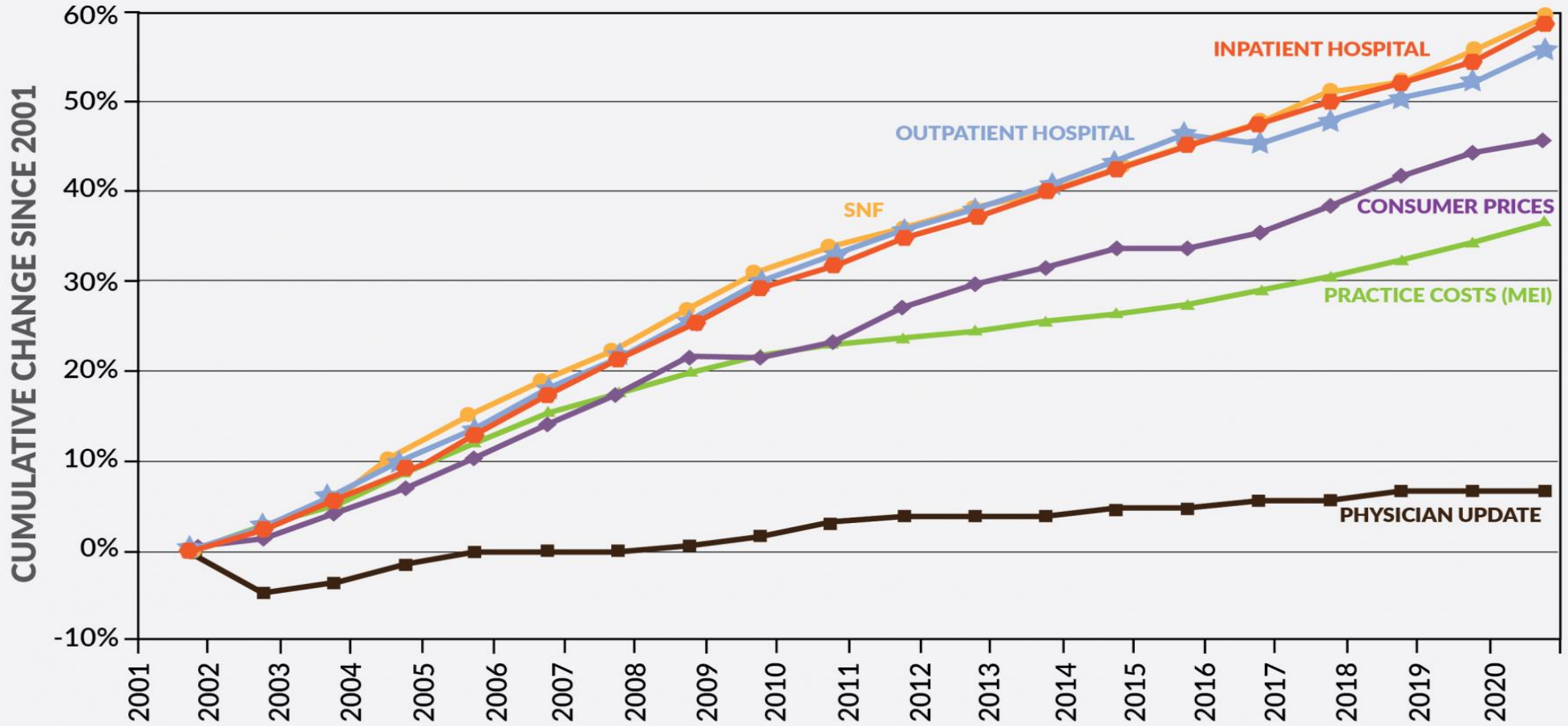
Geographic Practice Cost Index (GPCI)

- MPFS adjustments to reflect the variation in practice costs from area to area.
- A geographic practice cost index (GPCI) has been established for every Medicare payment locality.
- RVU's are adjusted (multiplied) by the GPCI for that component.
 - Work
 - Practice expense
 - Malpractice

Conversion Factor

- Overall multiplication factor to determine reimbursement
- Determinants
 - Prior to 2015, the conversion factor was calculated using a complex and flawed formula called the Sustainable Growth Rate (SGR).
 - The Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) removed the SGR and replaced it with a series of regular 0.5% conversion factor updates through 2019 along with QPP
 - Budget Neutrality: requires any increase in the relative expenditures in one area of the Medicare program to be offset by cuts in other areas.
 - Legislative Changes

MEDICARE UPDATES COMPARED TO INFLATION (2001-2020)



Radiology and Fee for Service

Imaging Modality	Mean CAGR	Mean Annual Change	Mean Unadjusted Total Percentage Change	Mean Total Percentage Change
Bone densitometry	-9.7%	-\$8.24	-63.6%	-70.5%
CT	-4.9%	-\$17.66	-32.2%	-45.1%
CTA	-6.0%	-\$38.12	-41.4%	-52.5%
Mammography	-0.6%	-\$0.98	14.7%	-7.1%
MRA	-6.2%	-\$39.83	-42.8%	-53.7%
MRI	-8.2%	-\$52.08	-55.7%	-64.1%
Nuclear medicine	-0.4%	-\$0.32	18.2%	-4.3%
Radiography	-1.3%	-\$0.71	5.5%	-14.6%
Ultrasound	-2.1%	-\$4.13	-4.8%	-22.9%

Kulmar, S. Trends in Diagnostic Imaging Medicare Reimbursements: 2007 to 2019, JACR, Vol. 17, Issue 12, 2020, Pgs. 1584-1590,

Budget Neutrality and Medicare Physician Fee Schedule Reimbursement Trends for Radiologists, 2005 to 2021

- Unadjusted reimbursement to radiologists per beneficiary increased 4.2% between 2005 and 2021, but when adjusted for inflation, it declined 24.9%.
- Between 2005 and 2021, the conversion factor declined 7.9%, and when adjusted for inflation, it declined 33.6%.
- RVUs per beneficiary performed by radiologists increased 13.1% from 2005 to 2021, but this increase did not offset conversion factor and inflation declines.
- From 2005 through 2023, the inflation-adjusted conversion factor declined 43.1%.

Future of FFS: MedPAC

MedPAC report (March 2021)

- *Despite temporary issues caused by the COVID-19 pandemic, Medicare beneficiaries have had stable access to clinician services over the last decade. MedPAC believes the temporary cash flow issues experienced by providers was resolved by temporary relief passed by Congress.*
- *Access was equal to or better than that of privately insured individuals.*
- *MPFS updates in the range of 0 percent to 1 percent over the last 10 years have been sufficient to ensure beneficiary access to care.*
- *Recommendation for 2022: no update*
- *Citing compensation differences between primary care physicians and specialists, MedPAC continues to have concerns about the “mispricing of fee schedule services and its impact on primary care”.*

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ACR Update: Impact Table: 2024

	CMS Estimated Impact CY 2024 Proposed Rule	Expiration of 2.5% Increase and Addition of 1.25% to Conversion Factor
Radiology	-3%	-4.2%
Nuclear Medicine	-3%	-3.65%
Interventional Radiology	-4%	-4.8%
Radiation Oncology and Radiation Therapy Centers	-2%	-3.2%

Radiology: Future State

- Innovation
- Opportunities
- Leadership

Innovation

Innovation

- **Interventional**
 - Embolotherapy: “Emborhoid”, Bariatric, inflammatory joint disease
 - Interventional Immuno-oncology
 - Percutaneous AV fistula for dialysis access
 - Image Fusion Intervention with virtual reality
- **Radiation Therapy**
 - Stereotactic radiotherapy
 - Intrafraction motion
 - FLASH
 - Proton Beam
 - VMAT: Volume modulated arc therapy
- **Nuclear Medicine: Theragnostics**



Beta Amyloid Positron Emission Tomography in Dementia and Neurodegenerative Disease

- **Decision Summary:** The Centers for Medicare & Medicaid Services (CMS) is proposing to remove the national coverage determination (NCD) at § 220.6.20, ending coverage with evidence development (CED) for positron emission tomography (PET) beta amyloid imaging and permitting Medicare coverage determinations for PET beta amyloid imaging to be made by the Medicare Administrative Contractors (MACs) under § 1862(a)(1)(A) of the Social Security Act (the Act).



Possible Applications of AI in Medical Imaging

- **Image interpretation**

- Quantification of findings
- Quantified comparison between multiple studies
- Multiparametric analysis across multiple modalities
- Volumetric analysis
- Textural analysis
- Automation of Region Of Interest targeting and measuring

- **Patient care and safety**

- Detection and prioritization of potentially critical results
- Radiation dose optimization
- Pre-test probability assessment of patient risk of positive findings and contrast reactions
- Cancer and mammography screening
- Automatic protocoling of studies from EMR data



- **Radiologist and practice optimization for productivity and quality**

- Automated transcription of audio narration
- Automated population of structured reports
- Optimization for case assignment across teams
- Smarter PACS hanging protocols and synchronization protocols
- Communication and tracking of primary and incidental findings
- Decreased patient waiting times
- Quality improvement in scanning
- Prediction and prevention of missed patient appointments

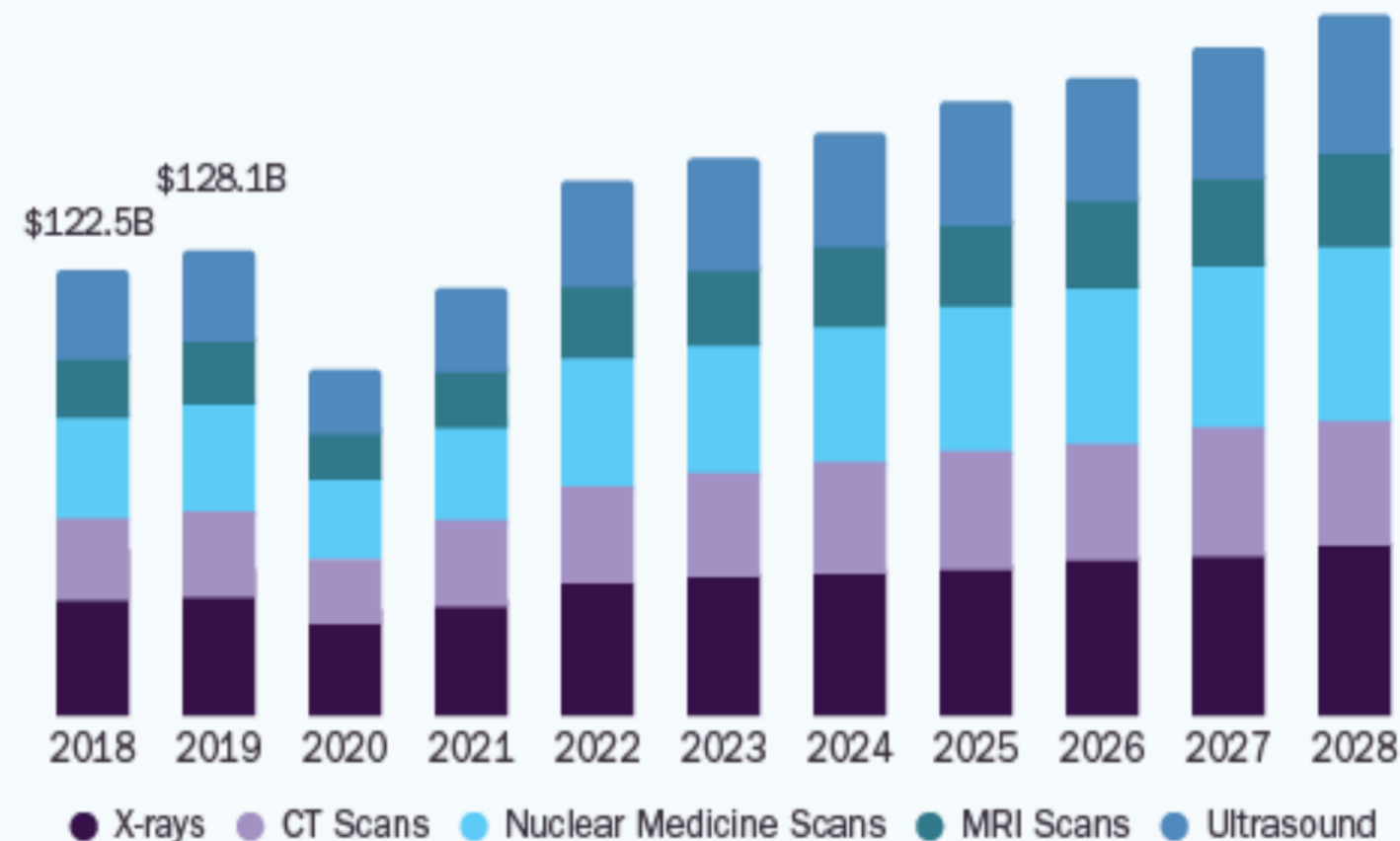


“AI-assisted modeling and analysis have the potential to dramatically reduce the cost and risk of creating new innovations, helping transform our practices into vast digitally assisted test beds for human ingenuity.”

Opportunities

U.S. Imaging Services Market

size, by modality, 2018 - 2028 (USD Billion)



GRAND VIEW RESEARCH

7.3%

U.S. Market CAGR,
2021 - 2028

Source:
www.grandviewresearch.com

POPULATION HEALTH MANAGEMENT

SURVEILLANCE AND PREVENTION



Mammography
Low Dose Chest CT
Virtual Colonoscopy
AAA screening
AI tools

ACUTE CARE



ACR Imaging 3.0 · Choosing Wisely
Best Practice Recommendations
Clinical Decision Support
IP Care Coordination
Clinical Pathway Management

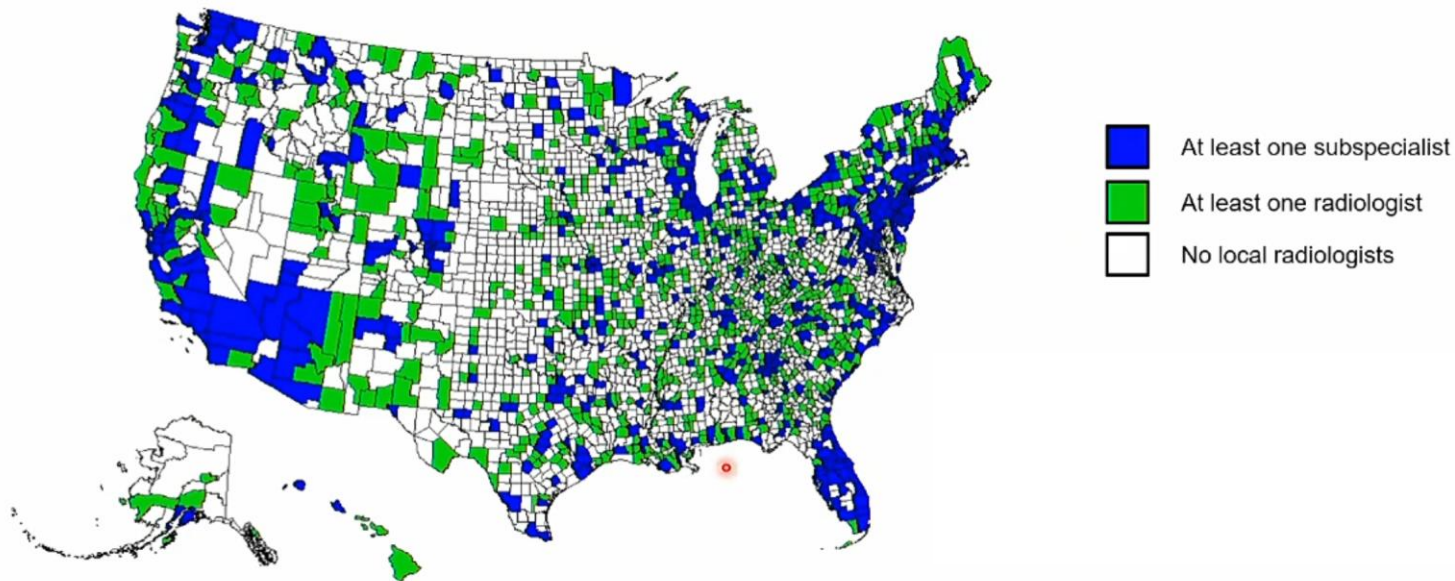
CHRONIC CARE MANAGEMENT



Follow-up: AAA, Lung
Nodules Oncology
Intervention
Fatty Liver
Metabolic Syndrome
QALY improvements



Radiologist Supply by County



Rosenkrantz, A. A County-Level Analysis of the US Radiologist Workforce: JACR. 15. 10.1016, 2018

Health Equity



Racial and/or Ethnic Disparities in the Use of Imaging: Results from the 2015 National Health Interview Survey

*Andrew B. Ross, MD, MPH • Maria Daniela Martin Rother, MD • Randy C. Miles, MD, MPH •
Efrén J. Flores, MD • Newman Kwame Boakye-Ansa, MSc • Corey Brown, MEng • Anand K. Narayan, MD, PhD*

Parameter	Non-Hispanic White	Non-Hispanic Black	Hispanic	Asian American	Other	<i>P</i> Value
Imaging use						
Chest radiograph in last 12 months	21.5 (20.5, 22.5)	26.7 (24.3, 29.2)	16.2 (14.7, 18.0)	17.6 (14.9, 20.8)	21.5 (15.3, 29.4)	<.001
Ever undergone CT	48.9 (47.5, 50.2)	41.0 (38.3, 43.7)	26.4 (24.4, 28.6)	27.7 (24.3, 31.3)	42.9 (33.6, 52.9)	<.001

Leadership

“[Organized Radiology] can collectively do for radiologists and their practices what they cannot do for themselves”.

Bibb Allen, M.D
Former Chair and Pres. , ACR

Defining Value

OPINION



New Ways to Quantify the Value of Diagnostic Imaging in the Era of Value-Based Health Care


Artem T. Boltyenkov, PhD, MBA, Pina C. Sanelli, MD, MPH, Ruth C. Carlos, MD, MS, Christian D. Eusemann, PhD

Radiology in the Era of Value-Based Healthcare: A Multi Society Expert Statement From the ACR, CAR, ESR, IS3R, RANZCR, and RSNA

Adrian P. Brady^{1,13}, Jaqueline A. Bello^{2,14}, Lorenzo E. Derchi^{3,13}, Michael Fuchsjäger^{4,13}, Stacy Goergen^{5,15}, Gabriel P. Krestin^{6,16}, Emil J. Y. Lee^{7,17}, David C. Levin^{8,18,†}, Josephine Pressacco^{9,17}, Vijay M. Rao^{8,18}, John Slavotinek^{10,15}, Jacob J. Visser^{6,16}, Richard E. A. Walker^{11,17}, James A. Brink^{12,14,16}

Conclusion

- Radiology has always been a dynamic and innovative specialty.
- Given existing limitations under FFS, several Radiology practices have been successful with APM's.
- The Volume to Value transition presents not only challenges but opportunities.
- Radiology is well positioned to be not only *sustainable* but *thrive* in future healthcare paradigms.

A top-down photograph of a group of people's hands reaching towards the center, symbolizing teamwork and unity. The hands are of various skin tones and are positioned around a central point, creating a circular pattern. The background is a blurred green, suggesting an outdoor setting.

“Coming together is the beginning.
Keeping together is progress.
Working together is success.”

– Henry Ford



Thank You

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<https://doi.org/10.1016/j.jacr.2023.07.009>

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