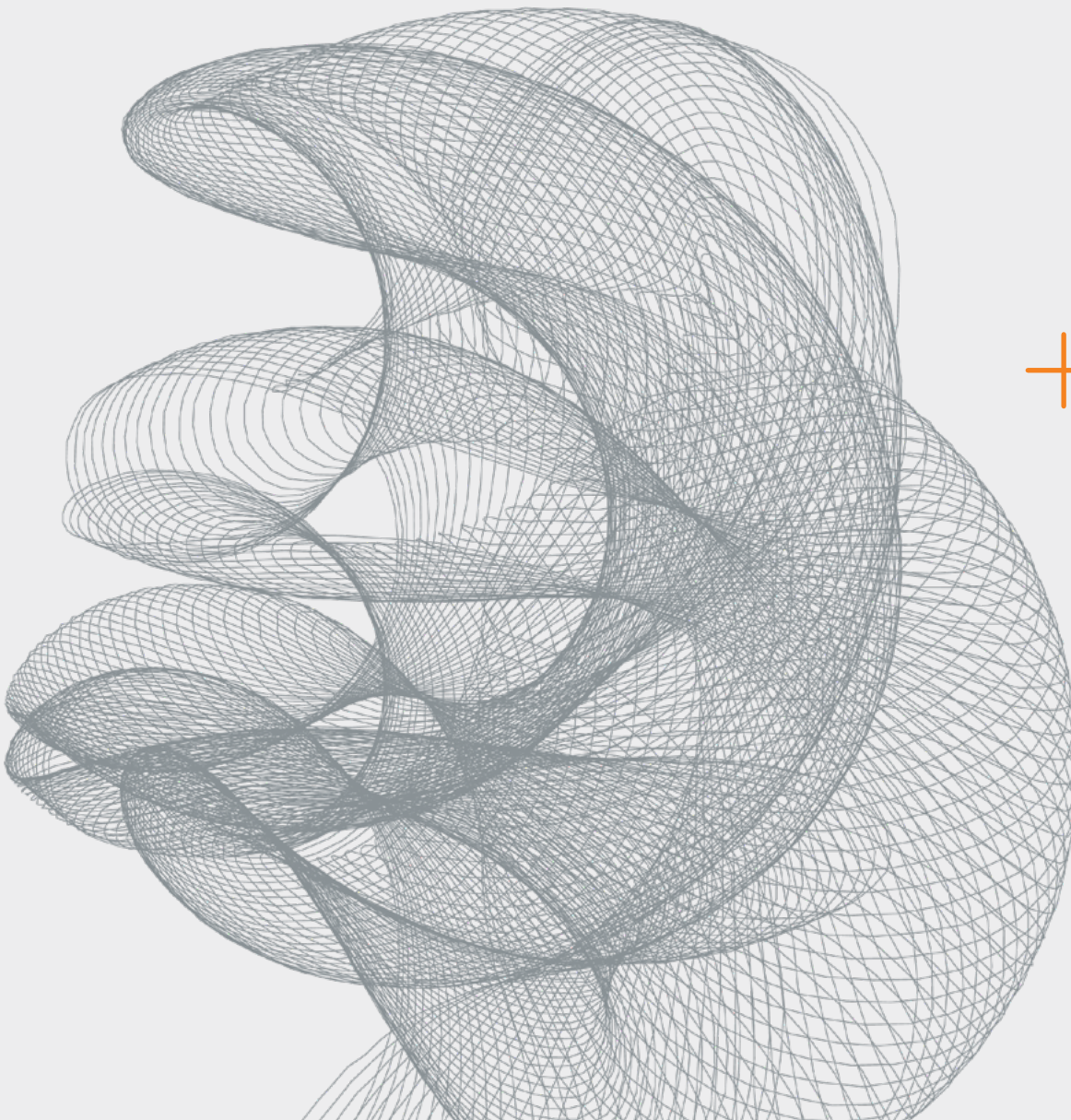




The Use of Medicines in the U.S. 2022

USAGE AND SPENDING TRENDS AND OUTLOOK TO 2026



APRIL
2022

Introduction

While the nation's primary healthcare focus remains on the COVID-19 pandemic as we move through the third year of its disruptive effects and the death toll approaches 1 million, other important dynamics are playing out with respect to the utilization of health services, the use of prescription medicines, and the associated spending levels, including patient out-of-pocket costs. Understanding these elements of the health system and how they may evolve over the next five years remains critical to decision-makers and stakeholders – including patients.

This annual trend report is intended to provide a grounding in relevant information across a range of issues with both short- and long-term implications.

This is the third report to include the impact of the pandemic on the Health Services Utilization Index, which offers a solid foundation for interpreting trends in the use of medicines and spending and growth drivers.

Trends in the use of and spending on medicines illustrate the resilience of the system to the pandemic, and in general, are predominately driven by an aging population with chronic diseases or diseases of aging, including cancer.

Spending and growth drivers reflect the significant differences in levels of spending by stakeholders as discounts and rebates distort these trends even as the most impactful driver has been the amount spent on COVID-19 vaccines and therapeutics.

An overview of patient out-of-pocket costs shows that while most patients' costs are falling, a small proportion have high costs which impact their use of medicines with implications for their health outcomes.

The outlook for the years ahead includes the expected end of the pandemic as well as significant shifts in drivers of usage and spending overall and in key therapy areas.

The study was produced independently by the IQVIA Institute for Human Data Science as a public service, without industry or government funding. The contributions to this report of Aaquib Agwan, Ruthy Glass, Luke Greenwalt, Elyse Muñoz, Urvashi Porwal, Shivika Rastogi, Marcella Vokey and dozens of others at IQVIA are gratefully acknowledged.

Find Out More

If you wish to receive future reports from the IQVIA Institute for Human Data Science or join our mailing list, visit iqviainstitute.org.

MURRAY AITKEN

Executive Director

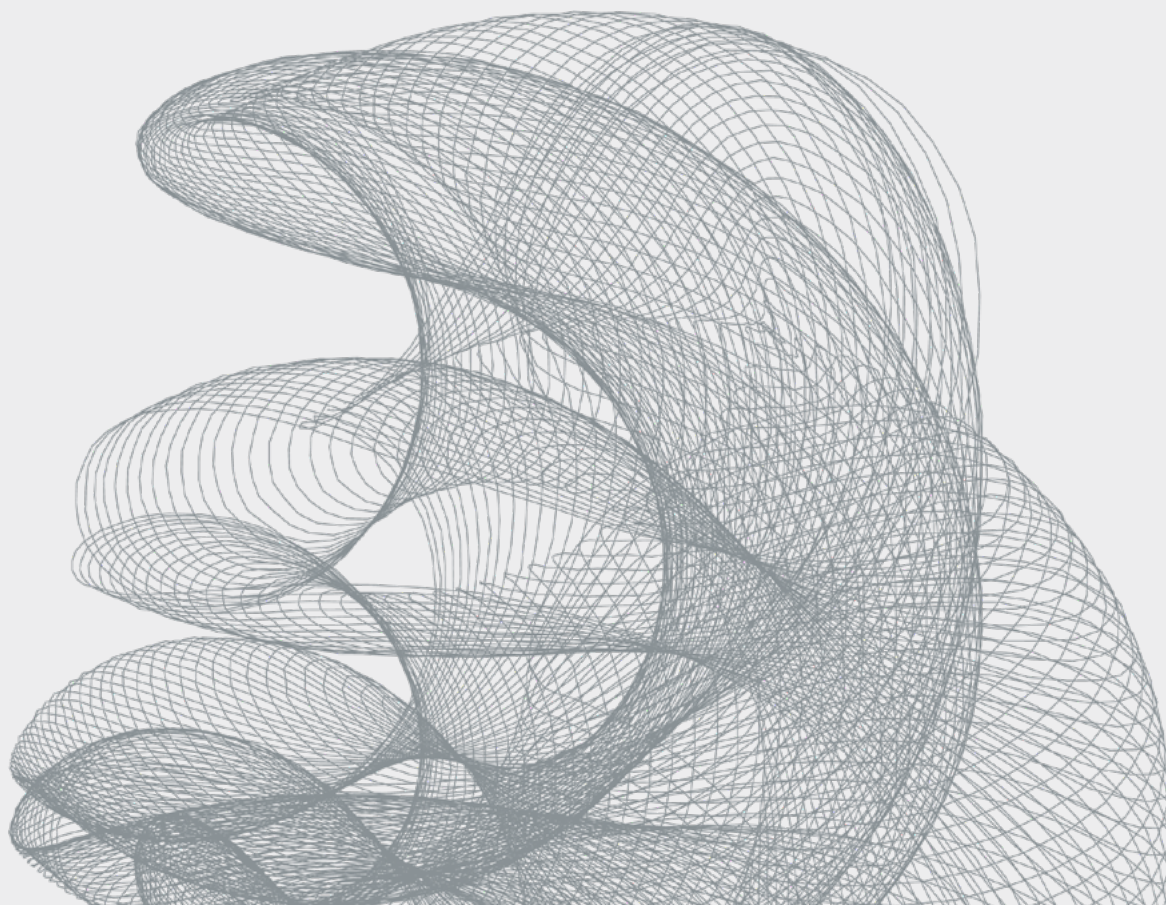
IQVIA Institute for Human Data Science

©2022 IQVIA and its affiliates. All reproduction rights, quotations, broadcasting, publications reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without express written consent of IQVIA and the IQVIA Institute.

Table of Contents



Executive summary	2
Health services utilization	4
Medicine use	12
Medicine spending and growth drivers	21
Patient out-of-pocket costs	34
Outlook to 2026	45
Notes on sources	56
Methodologies	57
References	59
About the authors	60
About the Institute	61



Executive summary

The U.S. health system demonstrated resilience and flexibility during the past two years, recovering to pre-pandemic levels of activity by the end of 2021 even as the backlog of missed or delayed activity remains substantial. Medicine use and spending reached record levels lifted by resilience to pandemic disruptions and billions spent to inoculate the majority of Americans.

HEALTH SERVICES UTILIZATION DURING COVID-19

Health services utilization returned to pre-pandemic levels by the end of 2021 but has yet to make up for the backlog in missed patient visits, screenings and diagnostics, elective procedures and new prescription starts. The IQVIA Health Services Utilization Index – which tracks patient visits, screening and diagnostic tests, elective procedures and new prescription starts – increased to end 2021 at a level of 99, compared to a baseline of 100 during the first eight weeks of 2020, and reflecting strong recovery in activity since the second quarter of 2020 when the index stood at just 66. The cumulative backlog in health services activity since the onset of the pandemic remains high and reflects millions of fewer elective procedures, patient visits, screening and diagnostics and new prescription starts, and averages 10% of the pre-pandemic activity level across all services, some of which reflects avoided interactions due to reductions in risk factors, but also reflects disengagement from routine health services and concerning gaps in care. Pediatric vaccinations in 2021 were 20% lower than 2019 levels, raising significant public health concerns about unvaccinated children

A key shift in the pandemic has been the adoption of telehealth, where visits reached 15% of physician office visits in March/April 2020 and have dropped to 4% in the most recent period across all types of consultations. Telehealth remains over 20% of diagnosis visits in mental health areas including depression and ADHD and appear to offer a meaningful role in the delivery of care. Diagnosis visits for mental health conditions are up

26% in 2021 compared to 2019, compared to a decline of 2% for all other diagnoses, with almost 50% more visits linked to PTSD and 28% more visits for anxiety.

MEDICINE USE

Prescription drug use reached a record level of 194Bn daily doses in 2021 as new prescriptions starts for both chronic and acute care recovered from the slowdown recorded in 2020. Days of therapy from all types of prescription medicines grew 3.3% in 2021, and rebounding from the 1.9% growth in 2020 when usage was more significantly disrupted by the pandemic, especially in hospitals, clinics and long-term care. New prescriptions dispensed through retail channels for acute and chronic therapies fell sharply at the onset of the pandemic in 2020 and have mostly recovered through the end of 2021 but still remain at levels lower than in the pre-pandemic baseline period.

Prescription opioid use has fallen by 48% over the past five years and is now at levels last seen in 2000, reflecting efforts by many stakeholders to limit and manage appropriate prescription opioid use. HIV medicines are reaching 35% more patients at the end of 2021 than at the beginning of 2017, while the average daily pills per patient has fallen below 3 for the first time as more prescriptions are for single tablet regimens including pre-exposure prophylaxis (PrEP).

MEDICINE SPENDING AND GROWTH DRIVERS

Spending on medicines rose sharply in 2021, up 12% to \$407Bn due to the availability and uptake of COVID-19 vaccines and therapeutics, while the rest of the market grew at 5% on a net basis from steady net prices, and the growing impact of biosimilars increased significantly and offset increased use of branded medicines. Differences between list price (WAC) spending and payer net spending reached \$190Bn in 2021, up from \$118Bn in 2016 as negotiated discounts and rebates to payers and providers increase in competitive markets and 340B organizations account for a larger share of medicine use. Specialty medicines now account for 55% of total



spending, up from 28% a decade ago and largely driven by growth in autoimmune and oncology treatments which have tripled in spending over that period while traditional classes have declined by 3% in aggregate.

Over the past five years net manufacturer revenues have increased by \$82Bn, driven mainly by \$88Bn spent on newly launched brands, and an additional \$94Bn spent on increased volume of branded drugs offset by \$93Bn in reduced spending on brands that have lost exclusivity. Increases in prices of protected brands averaged less than 5% for the second consecutive year on a WAC price basis, and 1% on a net price basis, marking the fifth year of net prices at or below the Consumer Price Index.

Biosimilar introductions are having a larger impact on reducing spending on branded biologics, amounting to \$10Bn a year in each of the past two years and reaching half the level of small molecule generic introductions over the past five years.

PATIENT OUT-OF-POCKET COSTS

Patient out-of-pocket costs rose \$4Bn in 2021 to a total of \$79Bn and remain a significant burden for a relatively small part of the population even as average costs per prescription are flat or slightly declining. Medicare beneficiaries in aggregate have seen a sharp 26% increase in their out-of-pocket costs since 2016, mainly due to a shift in the mix of prescriptions to those carrying higher costs as well as increased Medicare enrollees, offset by a 13% decrease in the average cost per prescription.

Across all patients, 8% reach annual out-of-pocket costs above \$500 compared to 16% of those in Medicare programs, largely due to different benefit designs and use of co-pay coupons or vouchers. About 64Mn prescriptions – 1% of the total - were filled in 2021 with a final out-of-pocket cost about \$125 even as 92% of branded and generic prescriptions have an out-of-pocket cost under \$20. Due in part to high costs, an estimated additional 81Mn prescriptions were abandoned at the

pharmacy, with the abandonment rate over one in three for prescriptions above \$75 in out-of-pocket cost, especially for high-cost specialty medicines that treat cancer and immunology.

Over 20% of insulin prescriptions carry an out-of-pocket cost above \$35 and patients filling those prescriptions would have saved about \$555Mn in 2021 if costs were capped at \$35, including \$164Mn by Medicare beneficiaries, and \$254Mn for the uninsured who pay cash at list prices.

OUTLOOK TO 2026

U.S. use and spending on medicines are expected to return to pre-pandemic growth trend lines by 2023 despite year-to-year fluctuations and incremental spending on COVID-19 vaccines and therapeutics, resulting in compound annual growth of 1-4% through 2026 and total market size of about \$450Bn on a net manufacturer price basis. Net spending will be about half the amount when measured at list price levels by 2026 as discounts and rebates continue to increase.

Over 250 new drugs are expected to launch within the next five years and contribute over \$100Bn in new spending. Competition between manufacturers and payer pressure are expected to ensure prices of protected brands remain flat or decline over the next five years, provided inflation remains moderate. Biosimilar introductions and uptake will reduce biologic spending by more than \$40Bn through 2026, exceeding the impact of small molecule generics for the first time, but remaining uncertain due to multiple factors.

Immunology, oncology and neurology will drive the most growth in spending during the forecast period, and next-generation biotherapeutics may reach as much as \$20Bn in annual sales by 2026, though significant scientific and commercial uncertainty exists in this fast-evolving area.

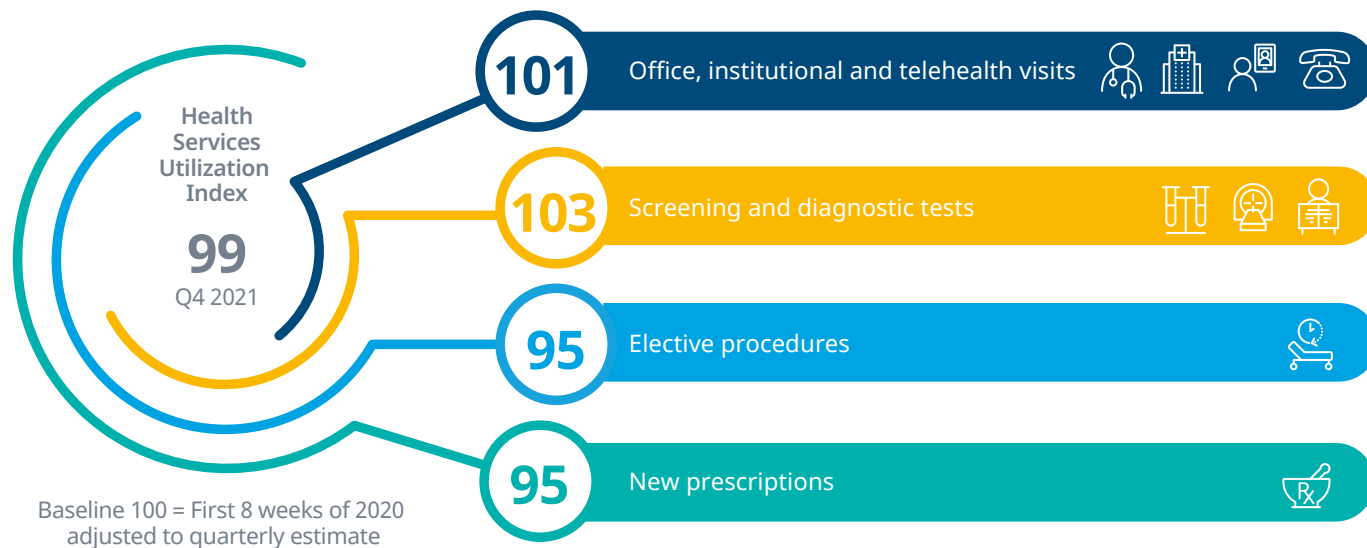
Health services utilization

- Health Services Utilization Index has recovered to 99% of pre-COVID-19 levels.
 - Health Services Utilization Index indicates the U.S. has a cumulative lower level of utilization of 10% compared to pre-COVID-19 levels which may embed a mix of concerning gaps in prevention and treatment and disengagement from care, and some avoided interactions from decreased routine illness (e.g., flu).
 - Patients' visits have recovered from pandemic disruptions but remain below baseline levels of healthcare engagement.
 - Telehealth visits accounted for <1% of visits pre-pandemic, rose to 15% and fallen back to 4% in recent months.
- Visits for mental health disorders have increased 26% during the pandemic while visits for all other diagnoses are down 2%, driven by a 49% increase in PTSD visits and 28% increase in anxiety visits.
 - Visits and prescriptions for cardio-metabolic conditions were impacted at the start of the pandemic but recovered in 2021 at differing rates.
 - Pediatric vaccinations remain below pre-pandemic levels while adult and influenza vaccinations have returned to normal.



The Health Services Utilization Index indicates the U.S. is operating at nearly pre-COVID-19 levels

Exhibit 1: Overview of Health Services Utilization Index



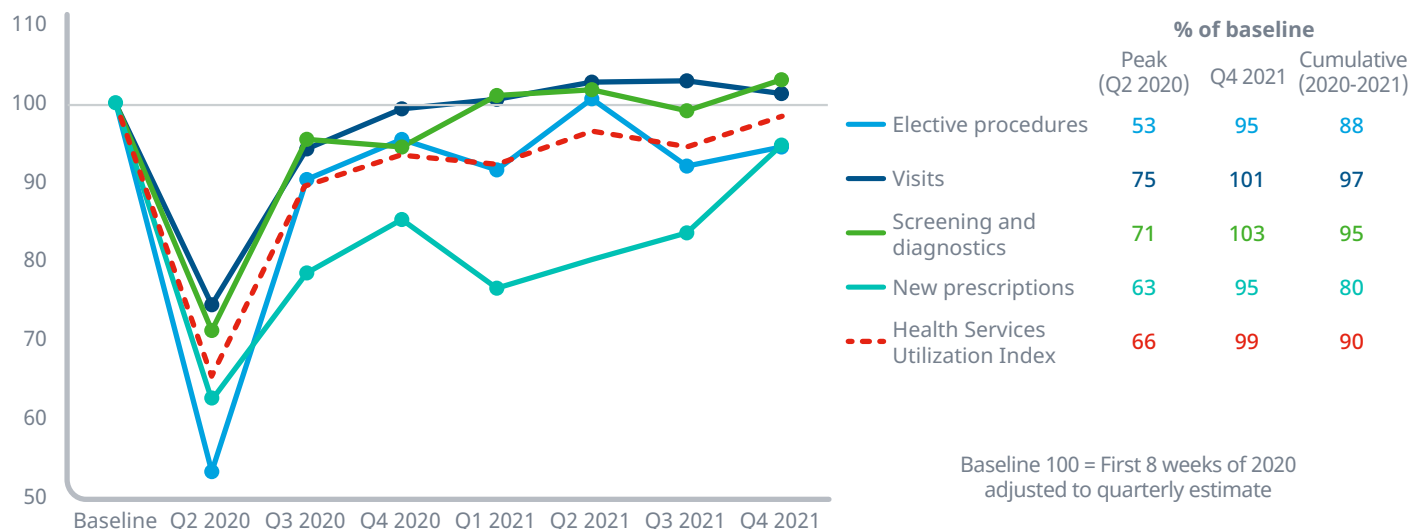
Source: IQVIA Institute; IQVIA Medical Claims Data; LAAD Prescription data, week ending 12/31/2021.

- The return to a pre-pandemic level of utilization in the health system is critical to ensuring all Americans — including all those who have not been infected by the virus SARS-CoV-2 — receive the preventive and treatment services they need.
- A Health Services Utilization Index has been created and includes four essential components of a health system and measures their utilization against a base period of the eight-week average from January 4 to February 28, 2020.
- The four index components are equally weighted, and for each component a score of 100 or higher indicates a return to baseline levels, including elective procedures, doctor visits (face-to-face – office, hospital or clinic — or via telehealth), diagnostic lab tests, and new brand or generic prescriptions filled.
- By fourth quarter of 2021, with Americans largely beginning to return to normal and not yet dealing with the impacts of the COVID-19 Omicron variant, the overall utilization index recovered to 99 with both visits and diagnostic tests above the pre-pandemic baseline while elective procedures and new prescriptions remain 5% below pre-pandemic levels.

Notes: Each component of the index compares the difference between actual values per week and baseline average for the eight weeks from January 4 to February 28. New prescriptions excludes COVID-19 vaccines and therapeutics.

Health Services Utilization Index indicates the U.S. has a cumulative level of utilization of 10% below pre-COVID-19 levels

Exhibit 2: Health Services Utilization Index and component metrics percentage of 2020 baseline



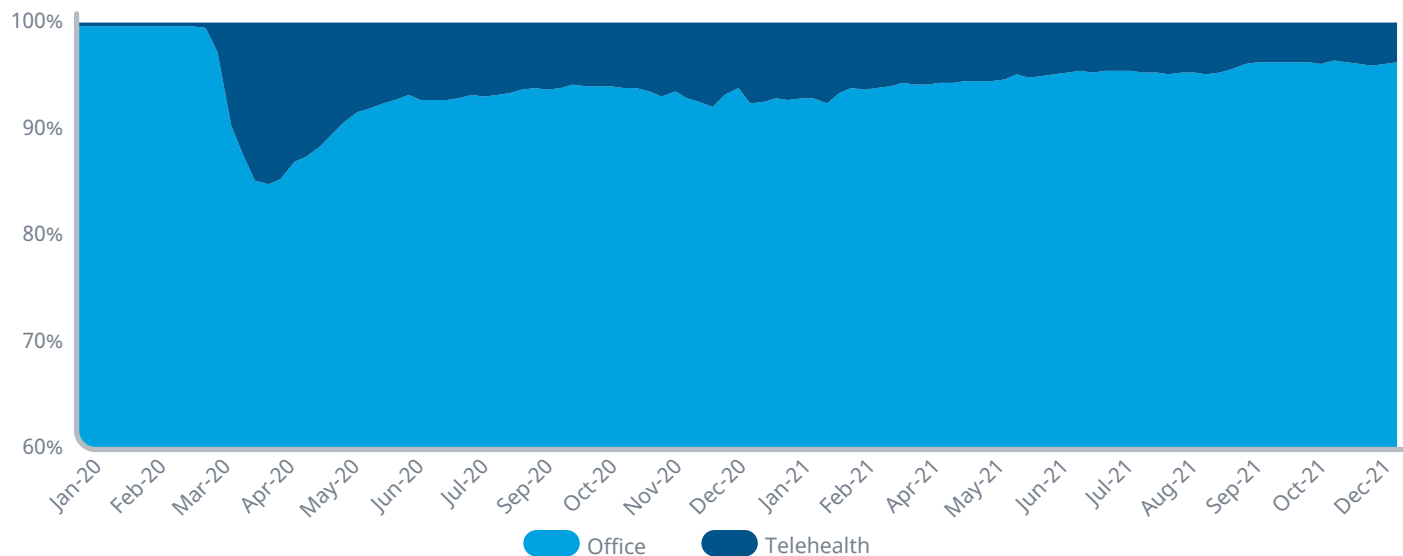
Source: IQVIA Institute; IQVIA Medical Claims Data; LAAD Prescription data, week ending 12/31/2021.

- The Cumulative Utilization Index across the pandemic (Q2 2020-Q4 2021) remains at 90 despite a recovery in recent quarters to pre-pandemic levels, indicating both concerning gaps in preventive and treatment services that have yet to be addressed and avoided interactions with the healthcare system due to declines in routine illnesses (e.g., flu).
- Doctor visits – including face-to-face and telehealth – were the least impacted during the pandemic and have rebounded to higher than pre-pandemic levels. Despite significant increases in visits toward the end of 2021, the cumulative index across the pandemic remains 3% below pre-pandemic levels.
- Screening and diagnostic tests have largely rebounded to pre-pandemic levels, however the cumulative deficit is 5% below baseline, with 41% of this deficit occurring between March and May of 2020.
- After being heavily impacted early in the pandemic, elective procedures briefly rose above pre-pandemic levels in Q2 2021 following widespread vaccination and decreasing COVID-19 cases, before falling again as the Delta variant spread across the U.S. Since the pandemic began, an estimated 10.8Mn elective procedures have been missed compared to pre-pandemic levels.¹
- New prescriptions have been the most impacted by the pandemic, cumulatively 20% below baseline throughout the pandemic and having only recovered to 5% below baseline in the most recent quarter.

Notes: Each component of the index compares the difference between actual values per week and baseline average for the eight weeks from January 4 to February 28. New prescriptions excludes COVID-19 vaccines and therapeutics. Estimate of missed elective procedures calculated from average monthly procedures estimated in Lee et al.¹

Telehealth visits accounted for <1% of visits pre-pandemic, rose to 15%, and has fallen back to 4% in recent months

Exhibit 3: Share of visits in office vs. telehealth, 2020–2021



Source: IQVIA Medical Claims Data, Dec 2021.

- The rapid adoption of telehealth offset some of the declines in doctor visits early in the pandemic.
- Telehealth visits accounted for less than 1% of visits prior to the pandemic, rose to 15% in April 2020 at the height of pandemic lockdowns and declined to 4% over the last half of 2021.
- The shift of some kinds of health services to remote interactions enabled continued management of patients despite pandemic-related lockdowns and requirements in hospitals and medical practices.
- Even as restrictions have been lifted, patients and providers have continued to use remote options, suggesting that the pandemic has resulted in some fundamental shifts in the ways patients and providers interact.
- Prior to the pandemic, telehealth was generally not covered for most interactions under Medicare or commercial insurance, and the extent to which insurers continue to reimburse providers for these remote interactions is the most significant driver of whether they will continue at current levels. As of the end of 2021, 42 states required commercial insurers to reimburse for telehealth.²

Mental health continues to see high usage of telehealth while other conditions have returned to near pre-pandemic levels

Exhibit 4: Share of diagnosis visits in office vs. telehealth for selected diseases, 2019–2021

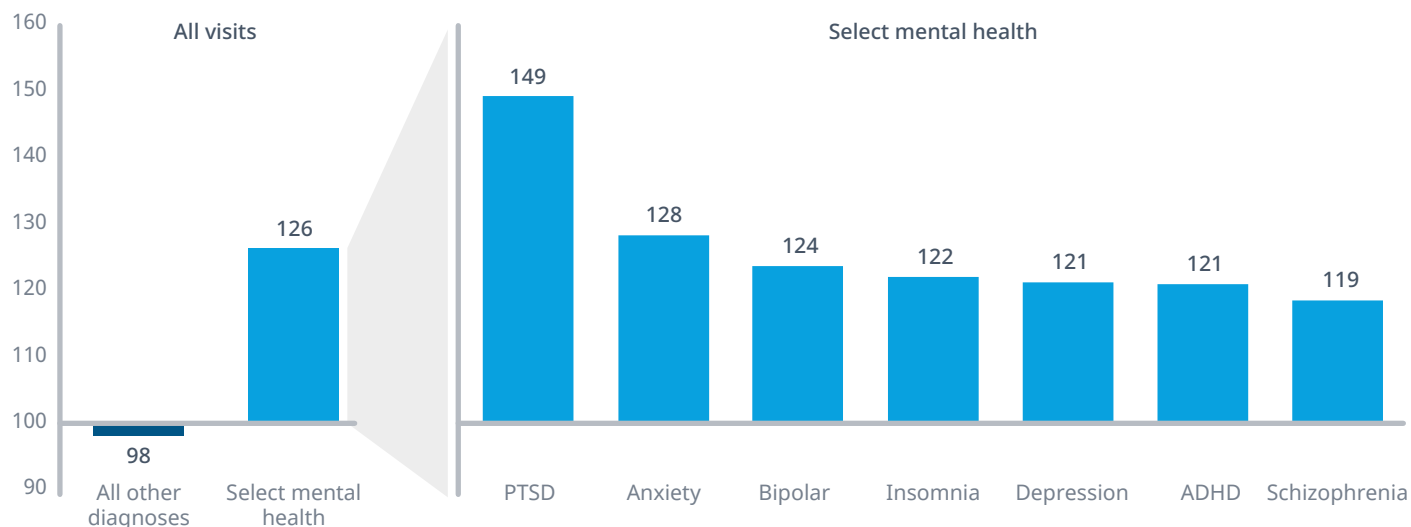


Source: IQVIA Medical Claims Data, Dec 2021.

- While overall telehealth has returned to a single-digit share of doctor visits, there is significant variation in how telehealth is used across diseases.
- Mental health has seen dramatic increases in telehealth use throughout the pandemic with telehealth visits rising from 1% pre-pandemic for depression and ADHD to over 30% shortly after the pandemic began and remaining over 20% at the end of 2021. Migraine similarly saw rapid uptake of telehealth early in the pandemic but to a lesser degree and has fallen back to 7%.
- Mental health disorders are more readily diagnosed and treated through virtual interactions and the continued use of telehealth in this area could increase patients access to providers.
- Other chronic diseases such as hypertension, diabetes, and HIV/AIDS saw increases in the use of telehealth, particularly early in the pandemic, but not as significant as mental health, with peak telehealth use ranging from 5 to 11% of visits.
- These chronic diseases frequently require bloodwork and other testing for diagnosis and treatment that cannot be completed virtually and as a result telehealth has fallen back to just 1–2% of visits at the end of 2021.

Diagnosis visits for mental health disorders have increased in the last two years while other diseases have seen slight declines

Exhibit 5: Number of patient visits by diagnosis in 2021 indexed to 2019 values



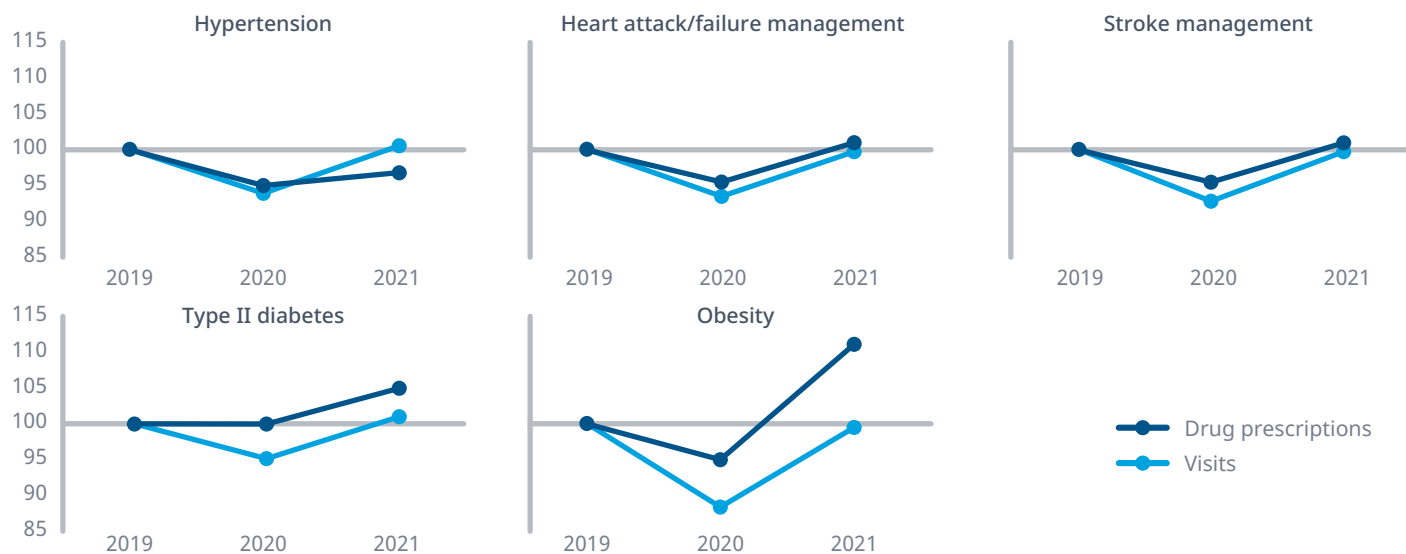
Source: IQVIA National Medical and Treatment Audit, Dec 2021.

- The COVID-19 pandemic has exacerbated an ever-growing mental health crisis in the U.S. with increases in stress and anxiety and related disorders.
- Diagnosis visits for select mental health disorders do not appear to have been disrupted by the COVID-19 pandemic and have instead increased over the last two years with visits up an average of 26% in 2021 over 2019.
- In contrast, visits for all other diagnoses excluding these mental health disorders were disrupted by the pandemic and fell 10% in 2020, mostly recovering in 2021 to down just 2% of the pre-pandemic level.
- Visits for post-traumatic stress disorder (PTSD) have seen the most significant rise since 2019 with more than 20% annual growth in the number of visits in both 2020 and 2021, in part due to the impacts of COVID-19 on frontline healthcare workers in which researchers found 23% experienced PTSD symptoms due to the pandemic compared to the pre-pandemic prevalence in U.S. adults of 4%.³
- Visits for anxiety and depression are up 28% and 21% respectively from 2019, although this is likely an underrepresentation of the prevalence of these disorders as the CDC estimates nearly one-quarter of adults experiencing symptoms during the pandemic did not receive care.⁴
- Attention deficit/hyperactivity disorder (ADHD) visits have risen 21% since 2019, reflecting the impacts of school closures and virtual learning on children.

Notes: Diagnosis areas are based on ICD10 diagnosis codes from IQVIA clinical standard market definitions. Select mental health is the average index of the seven mental health disorders shown. All other diagnoses includes all diagnoses outside of the seven mental health disorders shown.

Cardio-metabolic visits and prescriptions declined at the start of the pandemic but have since returned to pre-pandemic levels

Exhibit 6: Diagnosis visits and products associated with visits for select diseases indexed to 2019 values



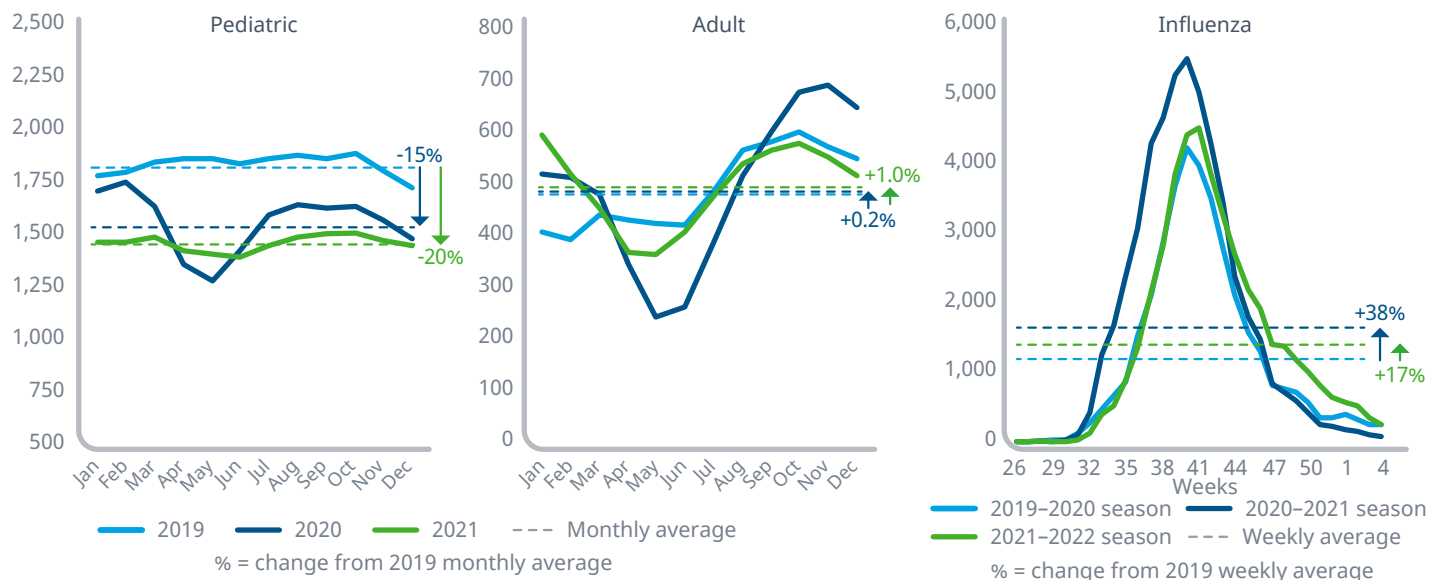
Source: IQVIA National Medical and Treatment Audit, Dec 2021.

- Cardiovascular and metabolic diseases are particularly problematic to manage because they are often asymptomatic at points in the escalation of disease and thus require constant vigilance from providers and patients.
- Further exacerbating the disruptions from the pandemic were the reported coinciding higher risks to these patients from COVID-19.
- Diagnosis and treatment of cardio-metabolic diseases were disrupted by the pandemic but have largely recovered to pre-pandemic levels.
- Visits for cardiovascular diseases fell 6-7% in 2020 and returned to pre-pandemic levels in 2021, which could indicate increased cases of undiagnosed and untreated cardiovascular disease due to pandemic disruptions in healthcare utilization.
- While diabetes and obesity visits also fell in 2020, with obesity declining 12%, products prescribed during these visits were not impacted as much and have grown in the last two years, with prescriptions up in 2021 for diabetes and obesity 5% and 11%, respectively.
- Obesity prescriptions are likely driven higher by the availability of newer highly effective drug treatments with the GLP-1 mechanism of action which originally targeted diabetes.

Notes: Diagnosis areas are based on ICD10 diagnosis codes from IQVIA clinical standard market definitions. Prescriptions are those associated with the selected diagnosis.

Pediatric vaccinations remain below pre-pandemic levels while adult and influenza vaccinations have returned to normal

Exhibit 7: Number of vaccines given for selected vaccines (thousands), 2019-2021



Source: IQVIA National Sales Perspective; IQVIA National Prescription Audit, Feb 2022.

- Adult and pediatric vaccines shown here on average represent 56% of all vaccines (excluding influenza and COVID-19 vaccines) administered in clinics.
- While some pediatric vaccinations have remained stable (i.e., rotavirus) throughout the pandemic others have seen large declines since the pandemic and have not recovered (i.e., MMR and hepatitis B).
- Since the start of the pandemic in March 2020, more than 7Mn pediatric vaccinations have been missed with annual pediatric vaccines down 15% in 2020 and 20% in 2021 compared to 2019 while the pediatric population has declined <0.5% since 2019.
- Adult vaccinations in 2020 remained near pre-pandemic levels due to a surge in pneumococcal vaccines in the fall and were up 1.0% from pre-pandemic levels in 2021, however this increase has not kept up with population growth of 2.7% since 2019 for older adults (50+) indicated for many of these vaccines.
- Due to concerns over a potentially significant respiratory virus season in winter 2020 with both COVID-19 and flu circulating, influenza vaccinations grew 37% in the 2020–2021 flu season and remained 17% above pre-pandemic levels in the 2021–2022 season.

Notes: Pediatric vaccines include vaccines for haemophilus influenzae type b (Hib), hepatitis A, hepatitis B, poliovirus, pneumococcal (Pneumovax 13 only), rotavirus and the combo vaccines for measles-mumps-rubella (M-M-R), DTaP/hepatitis B/polio and DTaP/Poliovirus/Hib/Hepatitis B Vaccine. Adult vaccines include vaccines for HPV, shingles, and pneumococcal (Pneumovax 23, Prevnar 20 and Vaxneuvance only). Adult and pediatric vaccines are those from clinics only. List and age group based on a review of CDC’s U.S. Vaccine’s webpage: <https://www.cdc.gov/vaccines/terms/usvaccines.html> and the FDA label for vaccines not included on CDC’s list. Influenza vaccines represent all influenza vaccines from all settings during typical flu vaccination season (July-January).

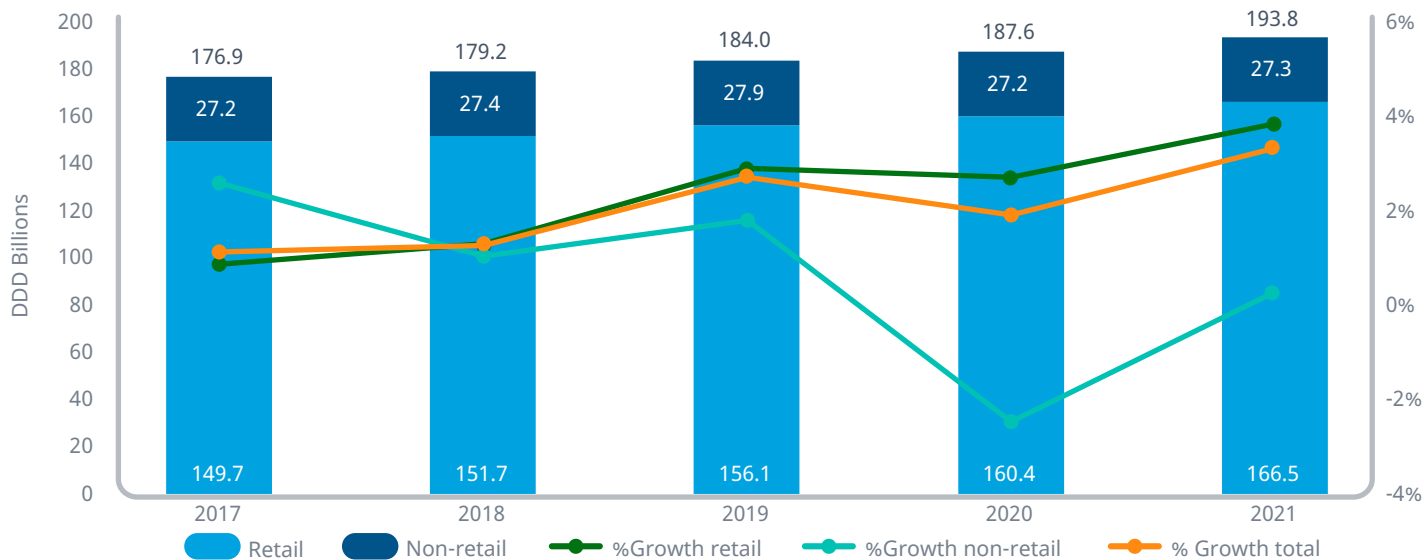
Medicine use

- Use of medicines by days of therapy grew by 3.3% to 194Bn in 2021, rebounding from 1.9% in 2020.
 - In non-retail drug usage, long-term care drives declines in usage since 2019 due to disproportionate impacts of the pandemic on these settings while drugs dispensed in clinics and hospitals rebounded in 2021.
 - In retail drug usage, dispensed prescriptions reached 6.4Bn in 2021 while growth returned to pre-pandemic levels.
 - New prescriptions for acute and chronic therapies were disrupted in the pandemic while chronic continuing prescriptions were less affected.
 - Changes in the share of prescriptions by method of payment were driven by changes in both usage and enrollment.
- Most therapy areas returned to positive growth in adjusted prescription volumes in 2021, except respiratory agents and contraception which had modest declines.
 - Prescription opioid usage continued to decline with usage varying by provider specialty.
 - HIV treatment volume has been impacted by shifts to innovative therapies reducing patient pill burden and the rising (but suboptimal) use of PrEP.



While overall days of therapy continue to grow driven by retail drugs, non-retail continues to be impacted by the pandemic

Exhibit 8: U.S. Defined Daily Doses (DDD) trend and growth by channel, 2017-2021



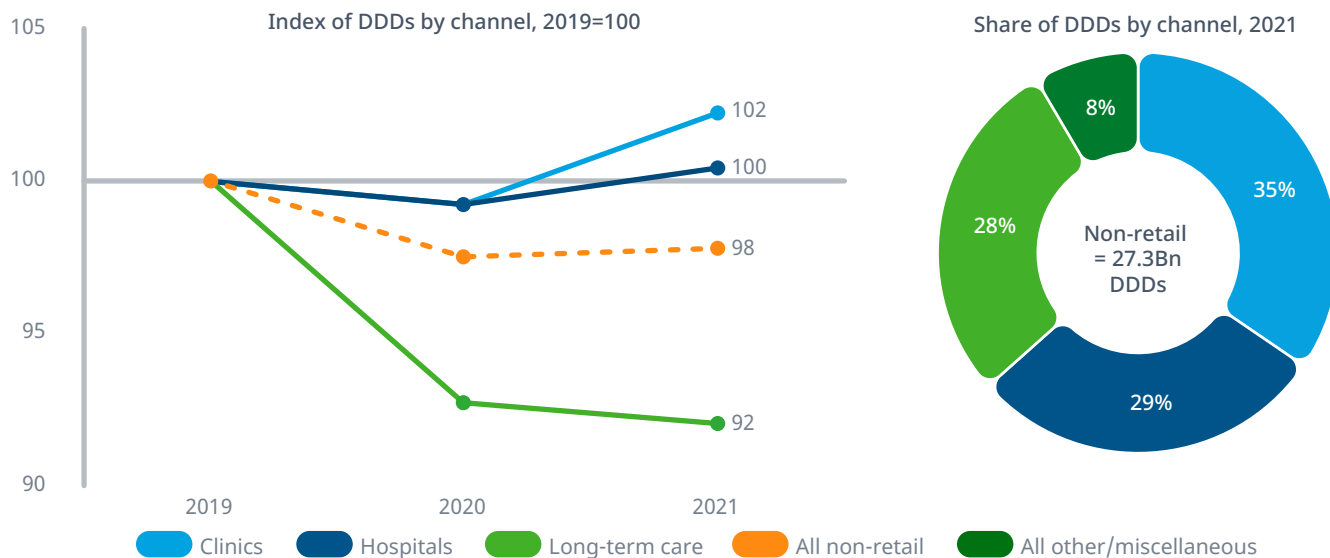
Source: IQVIA National Sales Perspective, Dec 2021; IQVIA Institute, Mar 2022.

- The use of medicines in the U.S. — based on defined daily doses — has grown 9.6% over the last five years to nearly 194Bn days of therapy in both retail and non-retail settings in 2021.
- Retail drugs currently represent 86% of medicine use in the U.S. with only 14% of use in non-retail settings, which has been declining since 2017.
- The use of drugs dispensed from retail pharmacies has continued to grow on average 2.3% annually reaching 166.5Bn days of therapy in 2021.
- While drugs in non-retail settings, such as hospitals and long-term care, saw growing use from 2017 to 2019, days of therapy have contracted 2.2% throughout the pandemic with only a slight recovery in 2021.
- The non-retail downturn and muted recovery reflect how elective procedures were disrupted (see exhibit 2).
- Long-term care facilities were hit particularly hard early in the pandemic with highly susceptible patients and staff being among the most affected populations in the pandemic.

Notes: Defined daily doses (DDD) are based on WHO definitions where each medicine is assigned a volume of medicine per day (see Definitions & Methodology) section. Excludes vaccines.

Long-term care drives declines in non-retail medicine use since 2019, while hospitals have recovered after initial disruptions

Exhibit 9: U.S. Non-retail Defined Daily Doses (DDD) indexed to 2019 values and share by channel



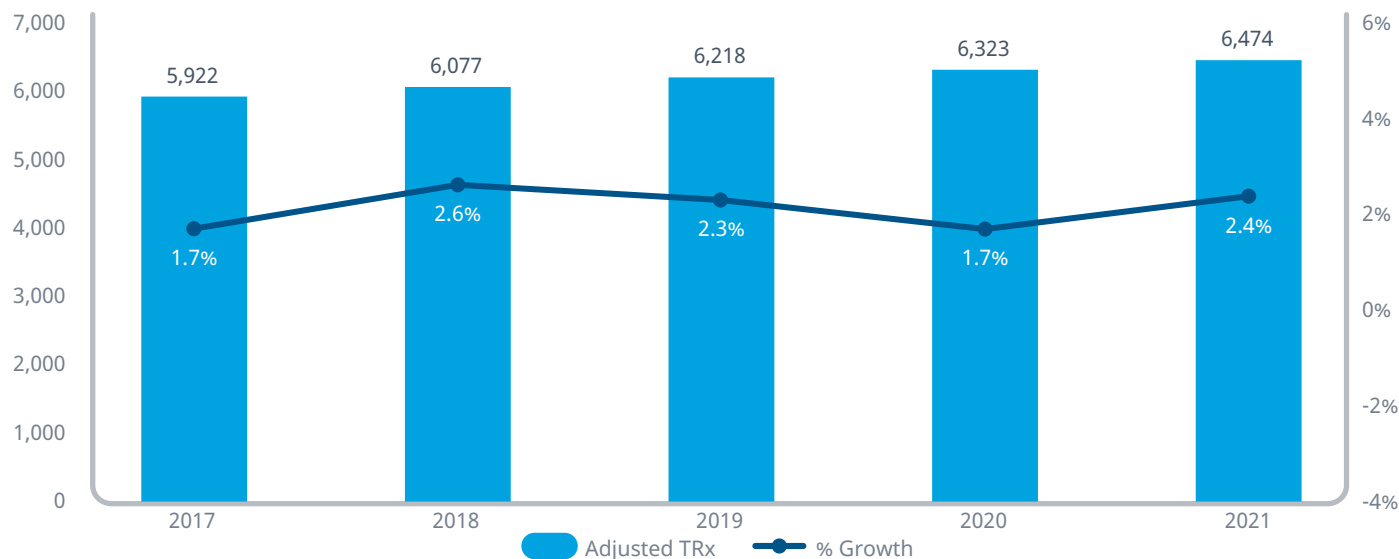
Source: IQVIA National Sales Perspective, Dec 2021; IQVIA Institute, Mar 2022.

- Non-retail medicine use has seen significant declines in the last two years with use down 2% from 2019 or over 600Mn days of therapy.
- This decline is driven by declines in use in long-term care facilities which declined 7.3% in 2020 and an additional 0.7% in 2021 having significant impact on overall non-retail usage given long-term care accounts for 28% of the non-retail days of therapy.
- Declines in medicine use in long-term care facilities are likely due to the overwhelming impacts of the pandemic on these settings with mortality rates consistently higher in residents than the U.S. population and over 195,000 staff and resident deaths through 2021, nearly 23% of all COVID-19 deaths.⁵
- Clinics and hospitals represent 64% of non-retail medicine use and have recovered from disruptions in medicine use in 2020 offsetting declines in other non-retail settings.
- Other non-retail settings such as prisons, universities, and home health account for just 8% of non-retail medicine use and these settings have had varying impacts on medicine use due to the pandemic.

Notes: Defined daily doses (DDD) are based on WHO definitions where each medicine is assigned a volume of medicine per day (see Definitions & Methodology section). Defined daily doses shown are for non-retail channels only. Hospitals includes non-federal hospitals and federal facilities. All other/miscellaneous includes home health, HMO, prisons, universities and all other non-retail not separately defined.

Dispensed prescriptions reached 6.4Bn in 2021, with 2.4% growth compared to 2020

Exhibit 10: Adjusted dispensed prescriptions (Mn), 2017–2021



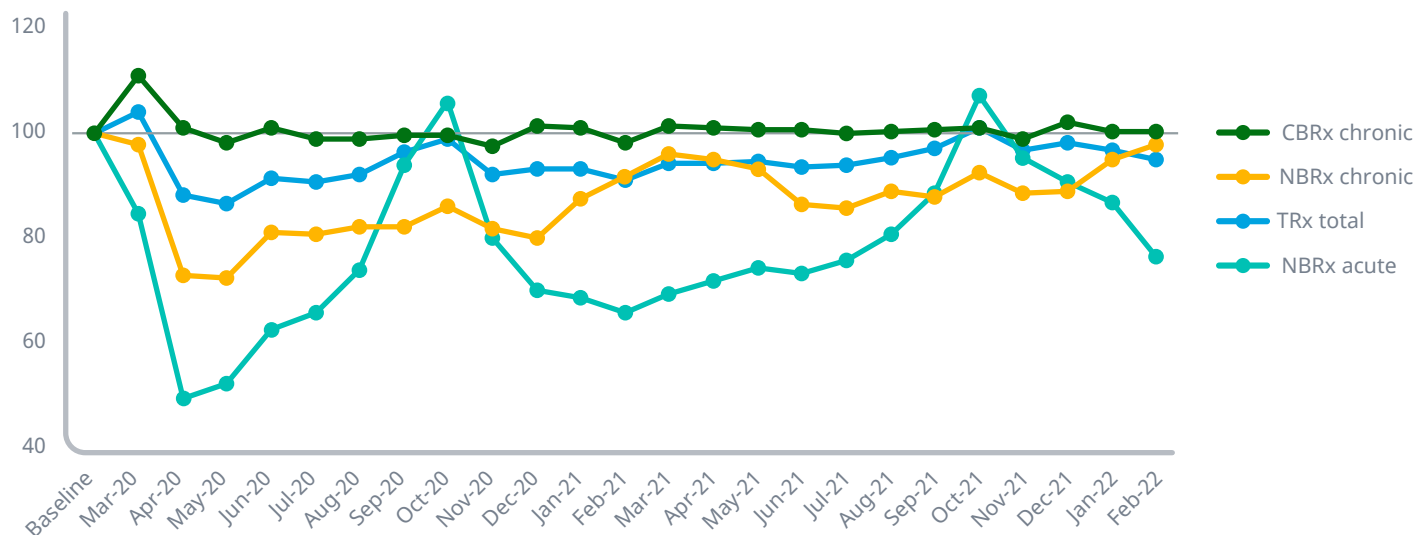
Source: IQVIA National Prescription Audit, Dec 2021; IQVIA institute, Mar 2022.

- Total prescriptions – adjusted for prescription length — reached 6.4Bn in 2021, up from 5.9Bn in 2017.
- The increasing importance of 90-day prescriptions is evident as the rate of growth without adjustment for prescription length was 0.6% in 2021 but 2.4% after adjustment with over 1Bn 90-day prescriptions in 2021.
- In total, dispensed prescriptions increased at an average 2.1% over the past five years with minimal impacts due to the pandemic.
- Prescription growth has been driven mainly by the aging population as seniors use more medicines per capita than other age groups and the 65+ population has grown on average 3.6% annually 2017-2021.
- While prescriptions distributed at retail pharmacies have grown 12% since 2017, mail prescriptions have declined 4% despite a slight increase in 2020 due to shifts to mail prescriptions.
- Prior to the pandemic, more than 90% of mail prescriptions but less than half of retail prescriptions were dispensed in 90-day amounts.
- Longer prescriptions were adopted rapidly early in the pandemic as a mitigation strategy and retail pharmacy scripts increased 5–6% from 44% in 2019 to 50% in 2020 and remained relatively unchanged in 2021. Similar patterns were also observed in independent pharmacies and food stores.

Notes: Prescription counts are adjusted for length of prescriptions and re-aggregated. Prescriptions referred to as '90-day' are calculated based on transactions with 84 days supply or more to include medicines with up to one-week of fewer treatment days. Prescriptions for 84 days supply or more are factored by three, and those under 84 days unchanged. Excludes COVID-19 vaccines and therapeutics.

New prescriptions for acute and chronic therapies were disrupted in the pandemic while chronic continuing remained stable

Exhibit 11: Dispensed new and continuing prescriptions by therapy type as a percent of 2020 baseline by month



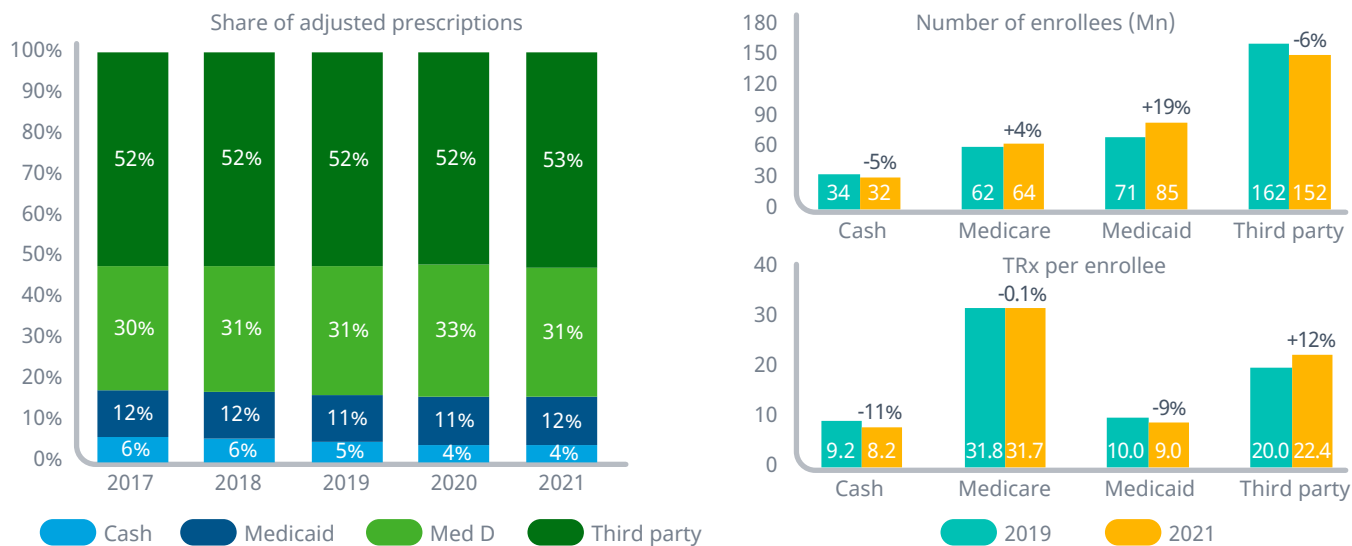
Source: IQVIA National Prescription Audit: New to Brand, Feb 2022.

- New to brand prescriptions (NBRx) are those where the patient is new to the medicine in the past year, and these were significantly below baseline for both chronic and acute prescriptions.
- Acute prescriptions have been significantly disrupted throughout the pandemic with the exception of flu vaccines in the fall months, predominantly because patients didn't require them due to reductions in risk factors from masking, social distancing, stay-at-home orders, and other public health controls.
- Chronic continuing prescriptions have remained relatively stable since March 2020 when a significant amount of stockpiling occurred as COVID-19 began to spread across the U.S.
- There has been a steady increase in new to brand (NBRx) chronic prescriptions, but the level has remained below pre-pandemic levels recovering to 2-5% below baseline in recent weeks, suggesting the presence of undiagnosed and untreated patients who may have more severe long-term health outcomes.

Notes: Average monthly difference between actual values per week and baseline average for the eight weeks from January 4 to February 28 are plotted. Prescriptions are unadjusted. New to Brand (NBRx) prescriptions are those where the patient had no prescription of the medicine in the prior year and includes naïve patients as well as those who switch from another drug or add a new drug to their existing regimens. Continuing prescriptions (CBRx) are those where the patient has filled a prescription of the same medicine in the past year and can include gaps in dispensing. Chronic is determined as whether the medicine is generally intended to be prescribed for more than 180-days, and acute are all other medicines. Chronic and acute are not specific patient or prescription attributes and do not reflect the potential for some medicines to be used on a long-term basis against recommendations. Excludes OTC and COVID-19 vaccines and therapeutics.

Medicaid scripts per enrollee have declined 9% since 2019 despite 19% growth in enrollees

Exhibit 12: Adjusted dispensed prescriptions by method of payment, 2017–2021



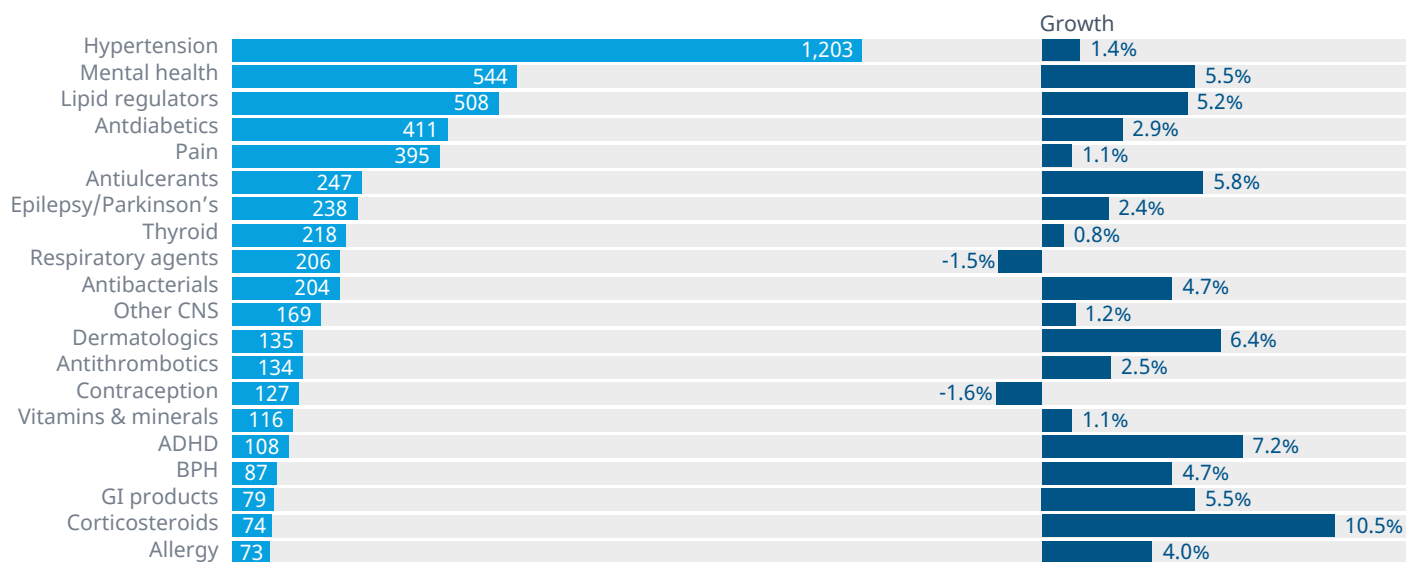
Source: IQVIA National Prescription Audit; Centers for Medicare & Medicaid Services, Dec 2021; IQVIA institute, Mar 2022.

- The pandemic caused significant shifts in insurance coverage with Medicaid enrollment increasing 19% since 2019, or by 14Mn people, due to economic disruption and Medicaid policy changes tied to pandemic relief legislation.
- Despite this growing population of Medicaid beneficiaries, Medicaid’s share of prescriptions has remained stable at 12%, resulting in a declining number of prescriptions per enrollee.
- Third party enrollment has declined 6% over the prior two years, likely due to job loss and an aging population becoming eligible for Medicare, however the share of prescriptions for third-party insured has grown to 53% and shows an increased usage of medicines per enrollee.
- While the uninsured population in the U.S. peaked in 2019 at 10.3% and has since declined to 9.6%, people paying cash have been filling fewer prescriptions with the rate of decline in per capita prescription usage larger than the decline in the uninsured population in recent years.⁶
- As the U.S. population continues to age, Medicare enrollment has climbed 4% since 2019 and 16% since 2017; however, medicine usage remained relatively stable throughout the pandemic and is up 4.3% per enrollee over the last five years.

Notes: Enrollment numbers based on Medicare and Medicaid enrollment statistics from the Centers for Medicare and Medicaid Services and uninsured statistics from the Centers for Disease Control and Prevention.

While use in most therapy areas grew in 2021, respiratory and contraception had modest declines

Exhibit 13: Adjusted dispensed prescriptions 2021 and % growth from 2020



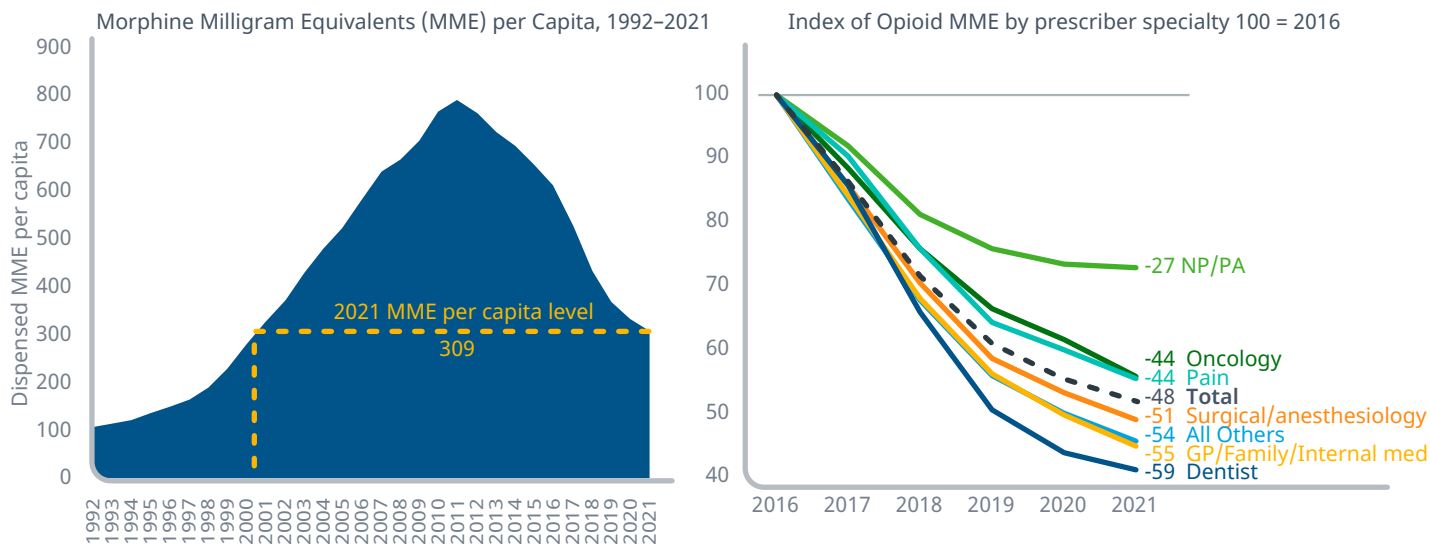
Source: IQVIA National Prescription Audit, Dec 2021; IQVIA Institute, Mar 2022.

- Prescriptions across most therapy areas rebounded in 2021 after disruptions in growth in 2020 due to the pandemic.
- Prescriptions for mental health disorders grew 5.5% in 2021 and 7.6% in 2020, an increase of more than 64Mn prescriptions in two years, reflecting the growing number of people seeking care for mental health disorders in the U.S.
- Although filling of respiratory prescriptions declined in 2021, this is primarily due to stockpiling of rescue inhalers and asthma products in March/April 2020 that contributed to a higher than usual number of prescriptions in 2020; prescriptions were up 4% in 2021 compared to 2019.
- Corticosteroids grew 10.5% in 2021 bringing prescriptions back to pre-pandemic levels following a 14% decline in 2020, likely due to elective procedures resuming.
- Attention-deficit/hyperactivity disorder (ADHD) prescriptions saw significant growth in 2021 with 7.3Mn additional scripts and up 9.4% from pre-pandemic levels highlighting the impacts of remote learning and school closures on children during the pandemic.
- Anti-bacterial prescriptions rebounded slightly in 2021 with 4.7% growth but anti-bacterials are still 40Mn prescriptions, or 16%, below 2019 levels.

Notes: Therapy definitions are mutually exclusive. Excludes COVID-19 vaccines and therapeutics.

Per capita prescription opioid use continues to decline to levels seen in 2000, with varying decreases across specialties

Exhibit 14: Prescription opioid use overall and by prescriber specialty



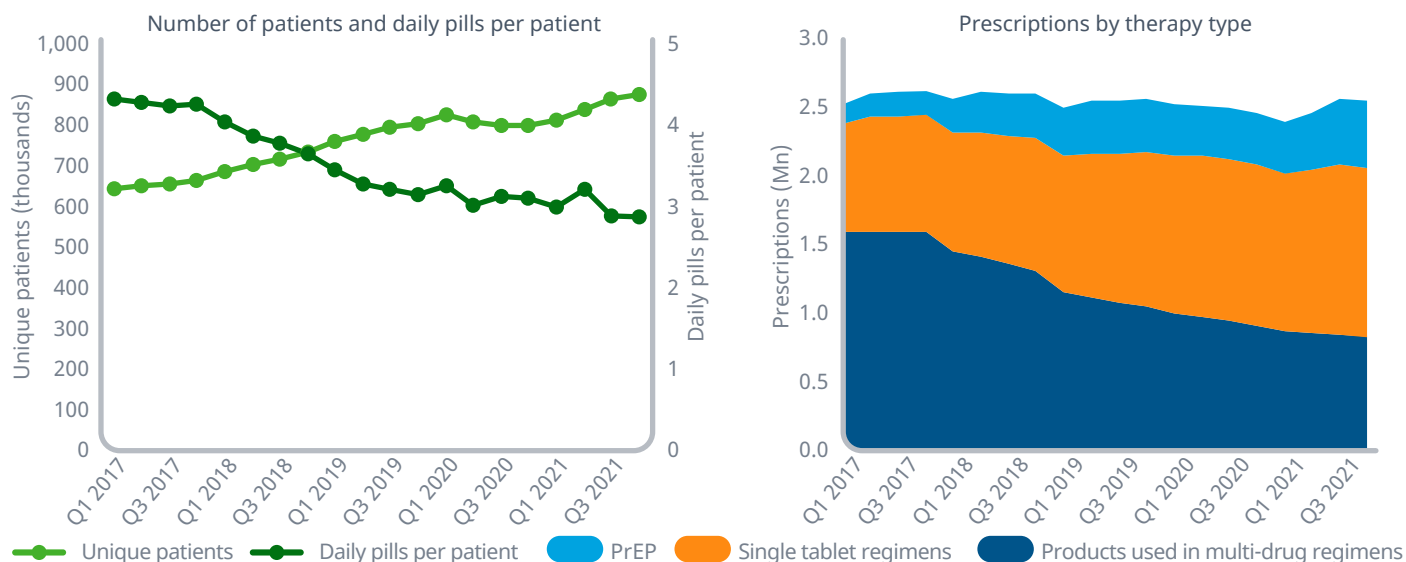
Source: IQVIA Xponent, Feb 2022; IQVIA National Prescription Audit, IQVIA Institute, Mar 2022.

- Prescription opioid volume declined for the tenth consecutive year after peaking in 2011.
- In 2021, use of opioids declined by 6.9% to 103Bn MMEs, dropping back to per capita levels of use seen in the middle of the year 2000.
- The greatest reductions in prescription opioid volume – measured in morphine milligram equivalents — have been in higher-risk segments receiving greater than 90 MMEs per day.
- In the past five years, total opioid usage has declined by 48%, with important pandemic disruptions to elective procedures and ongoing treatment for patients with pain.
- Healthcare providers prescribed longer opioid prescriptions to mitigate some COVID-19 disruptions but that practice quickly returned to normal as longer prescriptions have greater risk of misuse.
- These decreases in volume have been driven by changes in clinical usage, regulatory and reimbursement policies, and progressively more restrictive legislation enacted since 2012, including class-wide guidance from FDA in 2016.
- The level of opioid use by prescriber specialty illustrates the variability in the types of care they deliver and the shifts in policies that impact them.
- Surgical specialists, GPs and dentists have had above average reductions in their prescribing which corresponds to their greater degree of impact from the pandemic with delayed or canceled surgeries, visits and patient interactions.

Notes: Historical NPA archive data for periods 1992-2005 combined with Xponent analysis for periods 2006-2021. Analysis is based on opioid medicines for pain management and excludes those medicines used for medication-assisted opioid use dependency treatment (MAT) or overdose recovery. Opioid medicines are categorized and adjusted based on their relative intensity to morphine, called a morphine milligram equivalent (MME), consistent with methods defined by the Centers for Disease Control and Prevention (CDC). Prescription data is through the retail channel only.

Slight declines in HIV medicine use are due to shifts to PrEP and single tablet regimens from multi-drug regimens

Exhibit 15: Pills per patient and prescriptions by therapy type for HIV antivirals, 2017-2021



Source: IQVIA Longitudinal Prescription Claims, IQVIA National Sales Perspective, IQVIA National Prescription Audit, Dec 2021; IQVIA Institute, Mar 2022.

- The number of patients being treated with HIV antivirals has grown on average 6% annually over the last three years while annual growth in the number of people living with HIV in 2019 had slowed to 2.2% compared to 3.5% annual growth a decade prior.⁷
- The more accelerated growth of patients on HIV antivirals is primarily driven by the increased use for pre-exposure prophylaxis (PrEP) with prescriptions for PrEP growing on average 28% annually 2018-2021 driven by lower costs from generics, increased awareness, and recent required coverage under the Affordable Care Act.
- While the number of people receiving this highly effective prevention is growing, the Centers for Disease Control and Prevention estimates indicate only 25% of those who are eligible for PrEP are receiving it, with African Americans and Hispanics having the lowest rates of PrEP use.⁸
- While the number of patients on HIV medicines is growing, the total prescriptions have remained stable, due to shifts in usage away from traditional HIV therapy consisting of a ‘cocktail’ of multiple antiviral pills each day to newer therapies for both HIV treatment and PrEP that only require a single medication.
- While prescriptions for HIV antivirals used in multi-drug regimens accounted for 62% of the market in 2017 to 34% in 2021, with HIV antivirals used as a single medication for treatment making up 48% of the market in 2021 (up from 32% in 2017) and PrEP making up 18% (up from 6% in 2017).

Notes: Prescriptions are unadjusted. Prescriptions for PrEP are derived from IQVIA Institute calculations and assumptions based on diagnosis codes and trends of the medications approved for PrEP. Drugs included as single tablet regimens are those approved by the FDA as a standalone HIV antiviral treatment, while those only approved for use in combination with other HIV antivirals are included as part of multi-drug regimens based on FDA labels.

Medicine spending and growth drivers

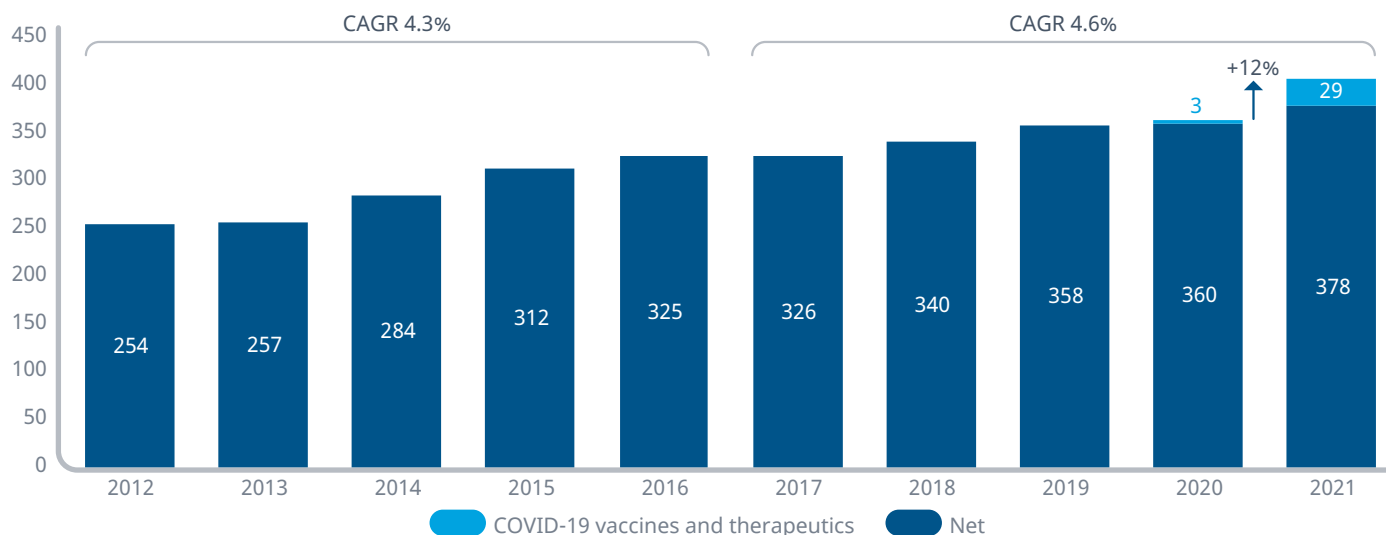
- U.S. medicine spending at estimated net manufacturer prices reached \$407Bn, up by 12.1% in 2021 including the unprecedented contribution of COVID-19 vaccines and therapeutics while spending without COVID-19 vaccines and therapeutics grew by only 4.9%.
 - Diverse measures of medicine spending illustrate differing trends depending on the party doing the spending.
 - There are large differences between list prices and the amounts spent by payers and patients or received by manufacturers.
 - Real per capita spending at estimated net manufacturer prices grew by 5.8% in 2021 but would have declined by 1% excluding the impact of COVID-19 vaccines and therapeutics. Economic recovery exceeded net revenue growth without the influence of the pandemic treatments.
 - Specialty medicines now account for 56% of spending, up from 28% in 2011 and driven by growth in autoimmune, oncology and diabetes.
- Spending at estimated net manufacturer prices increased by \$82Bn over the past five years, primarily driven by new products and brand volume with \$29Bn from COVID-19 vaccines and therapeutics.
 - New brand spending in the U.S. has averaged higher than in the last five years but represents a smaller share of spending.
 - Protected brand list prices increased 4.8% in 2021, while net prices increased by only 1.0% — the fifth year at or below the CPI.
 - The difference between list and net prices varies considerably across therapy areas with diabetes nearing 80%, immunology nearing 50% and oncology below 10%.
 - Volume growth for protected brands has been driven by autoimmune, oncology, COVID-19 and diabetes over the past five years.
 - The impact of losses of exclusivity of biologics has increased dramatically in the past three years.

Note on nomenclature: In this report, “spending on medicines” refers to the amounts paid by a purchaser, with references to different levels depending on the seller or purchaser. The report contains measures of spending at list prices (Wholesaler acquisition costs), at payer price (inclusive of all payers both public and private and patients’ out-of-pocket costs), and spending at manufacturer net prices which reflect all the discounts and rebates and other price concessions made by manufacturers to government for statutory discounts and rebates, distributors, health plans and intermediaries. Spending in this context is not a measure of promotional activity. See the Methodology section for more details.



U.S. net revenue grew by 12% in 2021, including the unprecedented contribution of COVID-19 vaccines and therapeutics

Exhibit 16: U.S. medicine spending at estimated net manufacturer prices, 2012–2021, US\$Bn



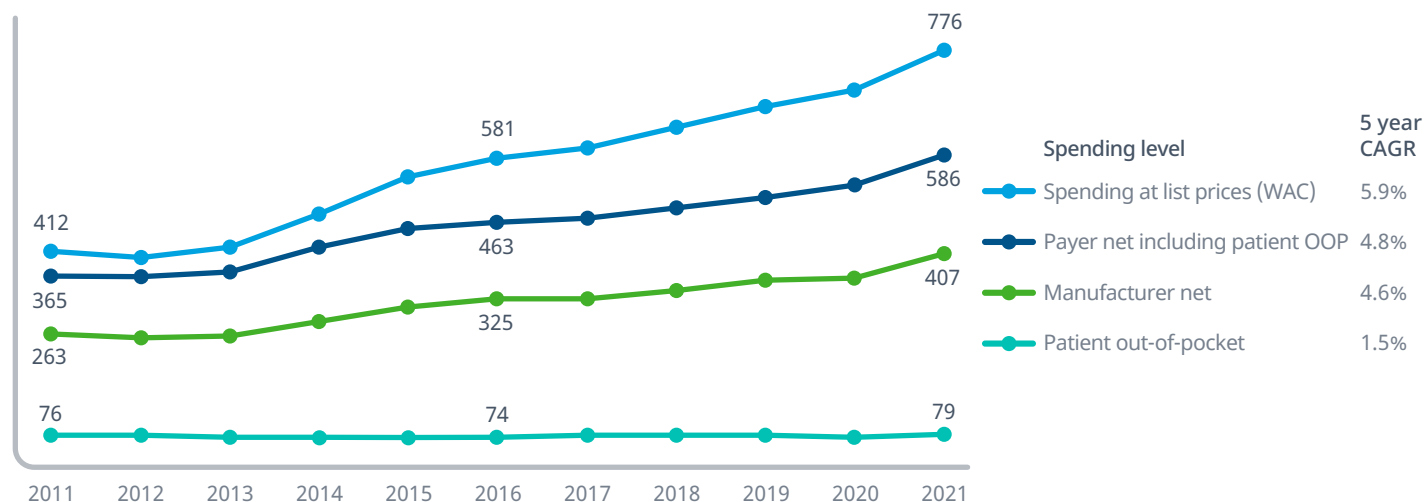
Source: IQVIA Institute, Mar 2022.

- U.S. medicine spending at estimated net manufacturer prices reached \$407Bn, up by 12.1% in 2021 including the unprecedented contribution of COVID-19 vaccines and therapeutics while spending without COVID-19 vaccines and therapeutics grew by only 4.9%.
- While spending growth slowed in 2020 to less than 1%, from a combination of impacts on volume and spending on newly launched medicines, the pandemic impact has been reduced in 2021.
- Net spending in the past five years has grown 4.6% CAGR including COVID-19 but 3.1% for all other medicines, reflecting a slowing trend without these new treatments.
- Medicine spending has grown \$82Bn over the past five years, \$29Bn from COVID-19.
- The five years ending 2016 had spending growth of 4.6% CAGR, with the years including the periods following the largest ever short-term period of patent expiry impact in 2011 and 2012, with slowed growth continuing through 2013.

Notes: Measures total value of spending on medicines, including generics, branded products, biologics, small-molecules, retail and non-retail channels. Net spending reflects company recognized revenue after off-invoice discounts, rebates and price concessions are applied. Includes all medicines in both pharmacy and institutional settings. Estimates of COVID-19 vaccine and therapeutic spending are based on company financials.

Diverse measures of medicine spending illustrate differing trends spending on the party doing the spending

Exhibit 17: Medicine spending at selected reporting levels, US\$Bn



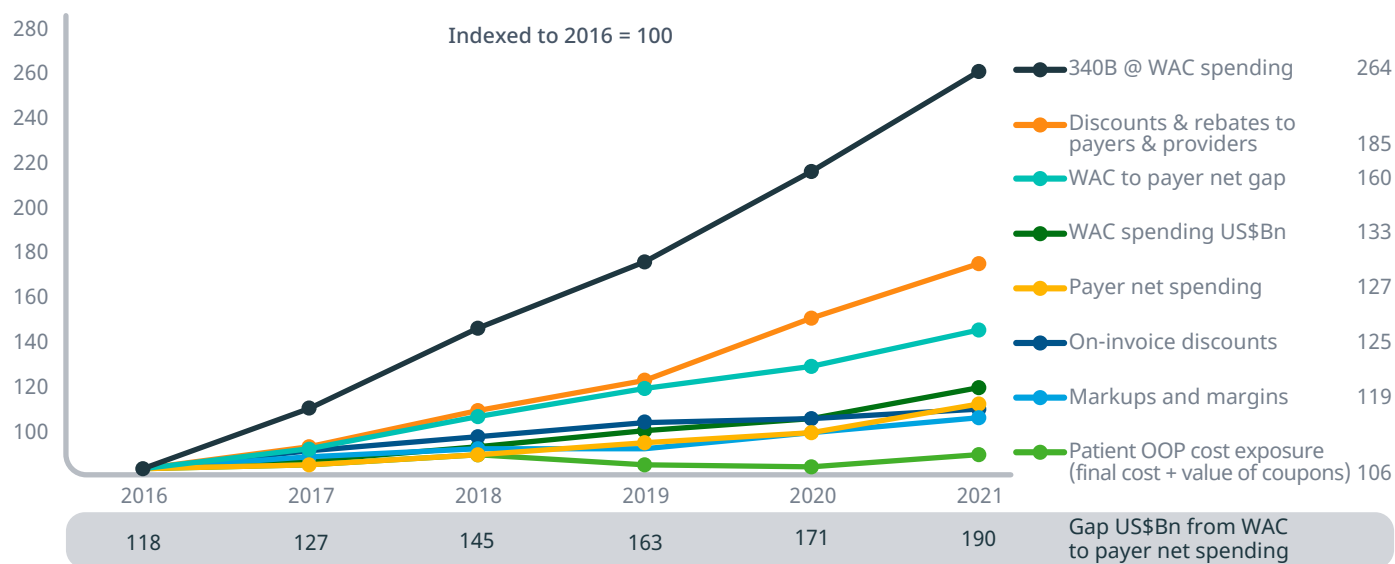
Source: IQVIA Institute, Mar 2022; CMS National Health Expenditures (NHE), Dec 2020.

- Over the past five years, spending at list prices [Wholesaler Acquisition Cost (WAC)] has increased from \$581Bn to \$776Bn — an average of 5.9% per year.
- Payer net spending has increased from \$463Bn to \$586Bn over five years at a compound annual growth rate of 4.8%.
- Spending at manufacturer net prices, including all products, are estimated to have grown an average of 4.6% over five years and 12.1% from 2020 to 2021, including \$26Bn of growth from COVID-19 vaccines and therapeutics.
- Patient out-of-pocket costs for drugs dispensed in a retail setting and those costs for drugs dispensed in hospitals or at doctor’s offices have both risen and fallen over the past decade, totaling \$76Bn 2011, dropping to \$74Bn in 2016 and then rising to \$80Bn in 2021.
- Manufacturer net revenue is lower than other measures of spending based on a combination of statutory discounts to Medicaid, discounts for 340B eligible institutions, the branded pharmaceutical fee in the ACA, donut-hole subsidies in Medicare Part D, supply chain discounts (often for generic drugs), as well as the value of coupons given to patients.

Notes: Includes COVID-19 vaccines and therapeutics. IQVIA Audits include measures of sales at Wholesaler Acquisition Cost (WAC) or list prices. Additionally, the IQVIA Institute has analyzed company reported net revenues for a sample of companies and products and projected a total market estimate (see Methodology section). Payer net spending reflects the total amounts spent by payers for medicines in both retail and non-retail settings, including all insurance types, and cash paying patients, offset by the estimates of rebates or payments which reduce payer responsibility. Payer net spending is derived from an analysis of CMS NHE data, IQVIA audited sales, and IQVIA estimates of manufacturer invoice-level and net revenue. Payer net spending has been estimated to include non-retail drug spending which is otherwise not reported by CMS. Patient out-of-pocket costs are derived from IQVIA audited measures of pharmacy out-of-pocket costs and informed by IQVIA audited non-retail sales and CMS NHE out-of-pocket costs share of non-retail healthcare costs. Due to lag times in reporting, CMS-derived measures are projections for 2021 while IQVIA-derived metrics are actual.

Spending at list prices has increased faster than all-payer net spending but far slower than 340B institutions

Exhibit 18: Selected elements of differences between list price spending (WAC) and payer net spending



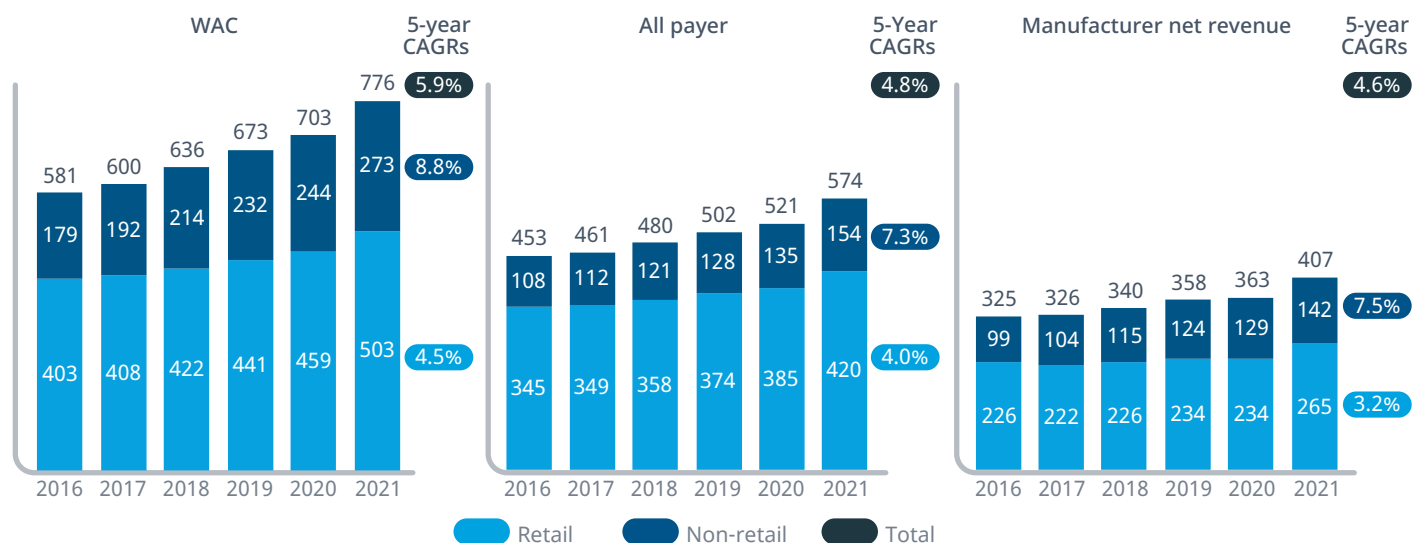
Source: IQVIA Institute, Mar 2022; CMS National Health Expenditures (NHE), Mar 2022; 340B estimate from IQVIA US Market Access analysis of IQVIA DDD Subnational Sales database.

- Differences between list price (WAC) spending and payer net spending reached \$190Bn in 2021, up from \$118Bn in 2016 as negotiated discounts and rebates to payers and providers increase in competitive markets and 340B organizations account for a larger share of medicine use.
- Wholesaler acquisition costs (WAC) represent list prices that influence the costs paid by others in the supply chain and some patients. Spending at list prices has increased dramatically, 33% higher than the level in 2016.
- List price spending does not reflect discounts and rebates, which cause significant differences in the prices experienced by various stakeholders and individuals.
- Payer net spending for medicines increased 27% over five years reaching \$586Bn in 2021, including those paid through a patient’s medical benefit for doctor-administered drugs or drugs used during a hospitalization.
- Patient out-of-pocket costs have generally not changed as much in aggregate for reasons explored in more detail in the next chapter.

Notes: Includes COVID-19 vaccines and therapeutics. IQVIA Audits include measures of sales at Wholesaler Acquisition Cost (WAC) or list prices. Additionally, the IQVIA Institute has analyzed company reported net revenues for a sample of companies and products and projected a total market estimate (see Methodology section). Payer net spending reflects the total amounts spent by payers for medicines in both retail and non-retail settings, including all insurance types, and cash paying patients, offset by the estimates of rebates or payments which reduce payer responsibility. Payer net spending is derived from an analysis of CMS NHE data, IQVIA audited sales, and IQVIA estimates of manufacturer invoice-level and net revenue. Payer net spending has been estimated to include non-retail drug spending which is otherwise not reported by CMS. Patient out-of-pocket costs are derived from IQVIA audited measures of pharmacy out-of-pocket costs and informed by IQVIA audited non-retail sales and CMS NHE out-of-pocket costs share of non-retail healthcare costs. Due to lag times in reporting, CMS-derived measures are projections for 2021 while IQVIA-derived metrics are actual.

Measures of medicine spending often exclude non-retail drugs, making comparisons difficult

Exhibit 19: U.S. medicine spending levels and segmentation by channel, 2016–2021



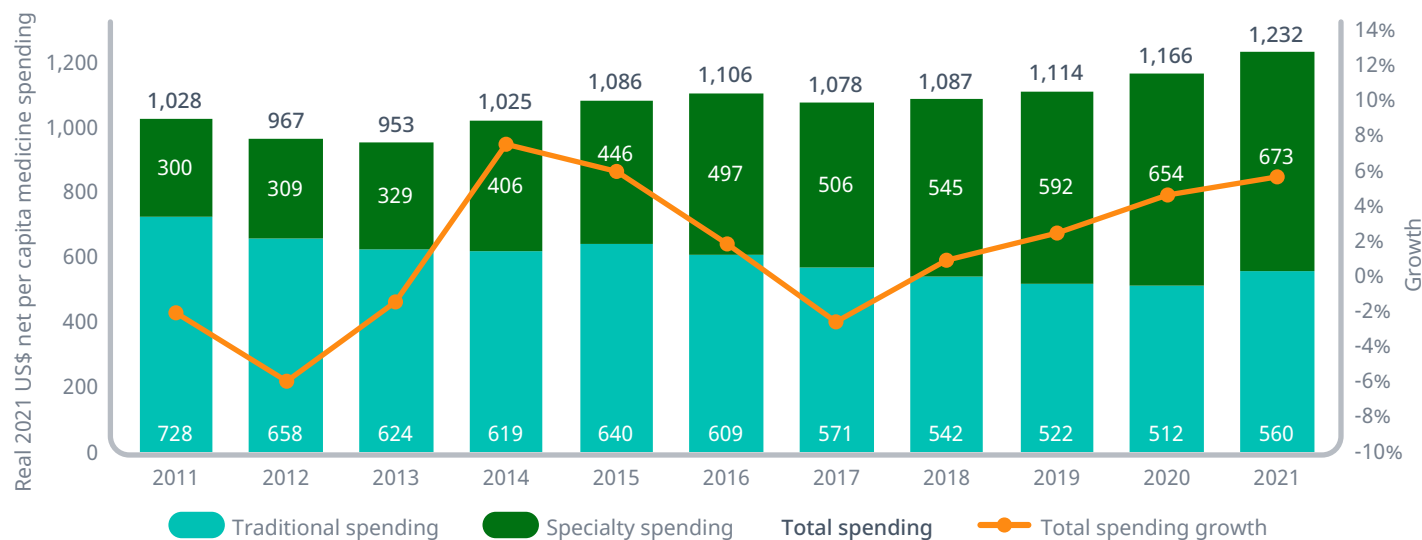
Source: IQVIA Institute, Mar 2022; CMS National Health Expenditures (NHE), Mar 2022.

- Measures of drug spending often mirror reimbursement structures which split by pharmacy and medical benefits, and which roughly correspond to distribution channels for retail and non-retail.
- Non-retail spending includes hospitals, clinics, long-term care pharmacies as well as a variety of other non-traditional outlets.
- Whether spending is measured at list prices, payer net, or manufacturer net, non-retail drug spending is growing faster than retail spending, consistent with shifts in the types of medicines which drive spending including oncology.
- Over the past five years non-retail spending at list prices grew at 8.8%, compared to 7.3% at payer net level and 7.5% for manufacturers as discounts and rebates grew faster than list prices in this channel.
- Similarly in retail, list price spending grew at 4.5% while payer net spending increased at 4.0% and spending at manufacturer net prices grew at 3.2% including the significant increases due to COVID-19 vaccines and therapeutics in the past two years.

Notes: Includes COVID-19 vaccines and therapeutics. IQVIA Audits include measures of sales at Wholesaler Acquisition Cost (WAC) or list prices. Additionally, the IQVIA Institute has analyzed company reported net revenues for a sample of companies and products and projected a total market estimate (see Methodology section). Payer net spending reflects the total amounts spent by payers for medicines in both retail and non-retail settings, including all insurance types, and cash paying patients, offset by the estimates of rebates or payments which reduce payer responsibility. Payer net spending is derived from an analysis of CMS NHE data, IQVIA audited sales, and IQVIA estimates of manufacturer invoice-level and net revenue. Payer net spending has been estimated to include non-retail drug spending which is otherwise not reported by CMS. Patient out-of-pocket costs are derived from IQVIA audited measures of pharmacy out-of-pocket costs and informed by IQVIA audited non-retail sales and CMS NHE out-of-pocket costs share of non-retail healthcare costs. Due to lag times in reporting, CMS-derived measures are projections for 2021 while IQVIA-derived metrics are actual.

Real per capita spending at estimated net manufacturer revenues grew 5.7% as GDP recovered strongly

Exhibit 20: Real per capita spending and growth by product type at estimated net manufacturer prices US\$



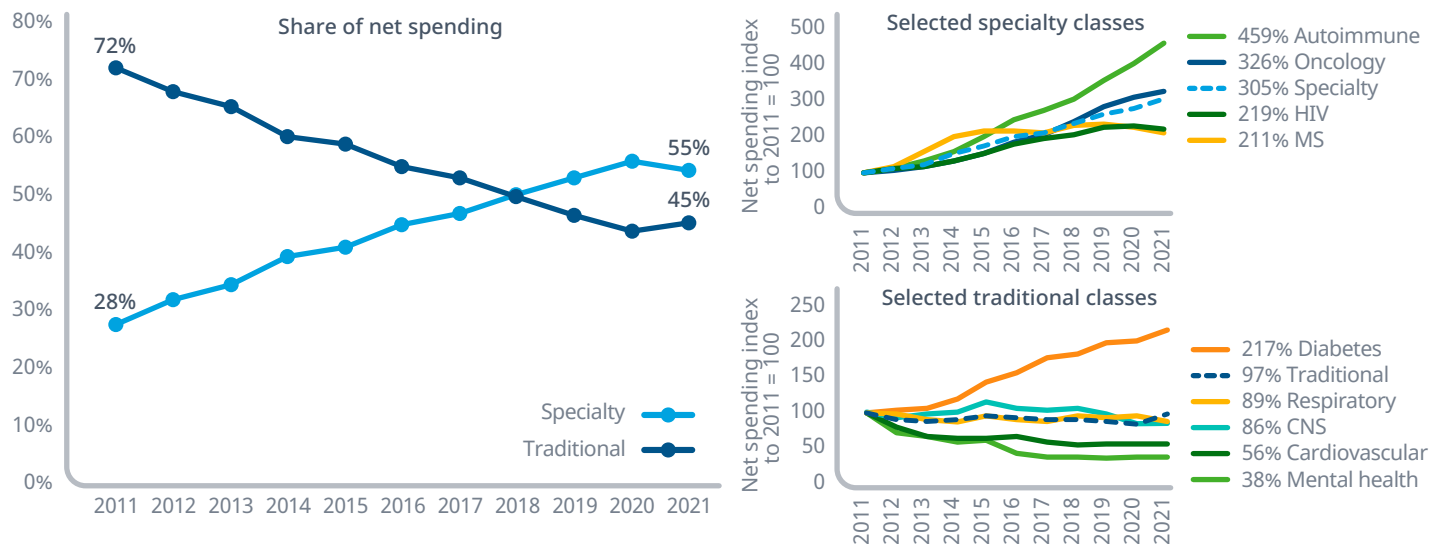
Source: IQVIA National Sales Perspectives, IQVIA Institute, Mar 2022; U.S. Census Bureau; U.S. Bureau of Economic Analysis (BEA) https://apps.bea.gov/iTable/index_nipa.cfm accessed Mar 30, 2022.

- Medicine spending per capita, adjusted for population growth and shown in current (2021) dollars, grew \$204 since 2011, a 1.8% compound annual growth rate.
- Real net per capita spending grew by 5.7% in 2021 from COVID-19 vaccines and therapeutics and would have declined 1.0% otherwise.
- Specialty share of net spending across institutional and retail settings rose from 28% in 2011 to 55% in 2021, driven by innovation, and the declining share for traditional medicines as growth has slowed due to higher off-invoice discounts and rebates and patent expiries.
- Growth in real net per capita spending for specialty medicines peaked in 2014, when it grew by 21.0% with the introduction of several breakthrough therapies for the hepatitis C virus, cancer and autoimmune diseases.
- The largest proportion of new medicines launched in the past decade has been specialty drugs, and specialty spending per person has more than doubled from \$300 in 2011 to \$673 in 2021, while traditional net medicine spending has declined by \$168 per person over the same period.
- Across all settings, specialty medicines treat relatively few patients, accounting for 3% of volume measured in defined daily doses (WHO DDD) and have costs far higher per patient than traditional medicines.

Notes: Includes COVID-19 vaccines and therapeutics. Real medicine spending reflected in 2021 US\$. Specialty and traditional medicines are defined by IQVIA. Specialty medicines – those that treat chronic, complex or rare diseases, and possess additional distribution, care delivery and/or cost characteristics which require special management by stakeholders. Includes all medicines in both pharmacy and institutional settings, and all brands and generics. Totals may not sum due to rounding.

Specialty medicines now account for 55% of spending, up from 28% in 2011, driven by growth in auto-immune and oncology

Exhibit 21: Share of spending at estimated net manufacturer prices



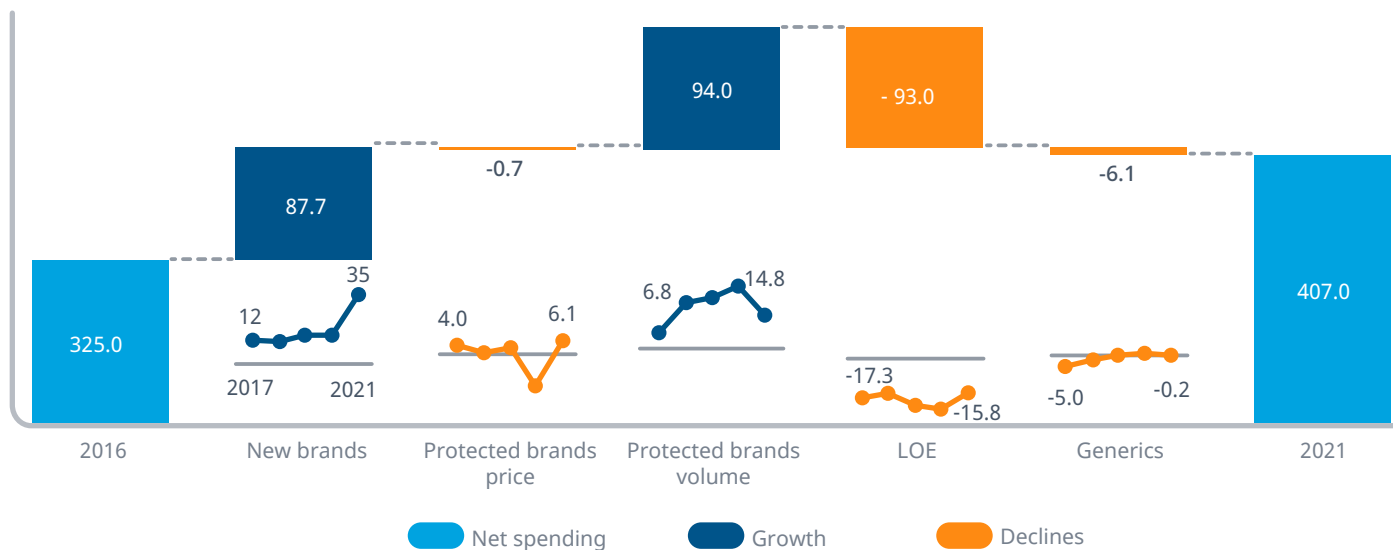
Source: IQVIA Institute, Mar 2022.

- Specialty medicines — those that treat chronic, complex or rare diseases and possess additional distribution, care delivery and/or cost characteristics which require special management by stakeholders —now represent 55% of net manufacturer revenue.
- The rise in specialty spending has been predominately driven by autoimmune diseases and oncology, where spending has increased 459% and 226% respectively since 2011 on a net basis.
- Traditional therapies have generally faced declining spending as many had faced patent expiries and had not had newer generation therapies introduced into the classes over time.
- This pattern has driven mental health and cardiovascular classes to 38% and 56% respectively of their 2011 level of net spending as of 2021.
- Diabetes has increased to 217% of the 2011 level as a result of significant innovation, with three new classes of treatments (DPP-IV, GLP-1, and SGLT-2) introduced and gaining wide usage during the period, as well as novel insulin products, and offset by some of the highest off-invoice discounts and rebates in the market.

Notes: Specialty and Traditional medicines are defined by IQVIA. Specialty medicines — those that treat chronic, complex or rare diseases, and possess additional distribution, care delivery and/or cost characteristics which require special management by stakeholders. Includes all medicines in both pharmacy and institutional settings, and all brands and generics. Selected therapy areas shown. Totals may not sum due to rounding.

Spending increased by \$82Bn over the past 5 years driven by new products and brand volume, offset by expiries

Exhibit 22: Spending and growth at estimated net manufacturer prices 2015–2020, all channels, US\$Bn



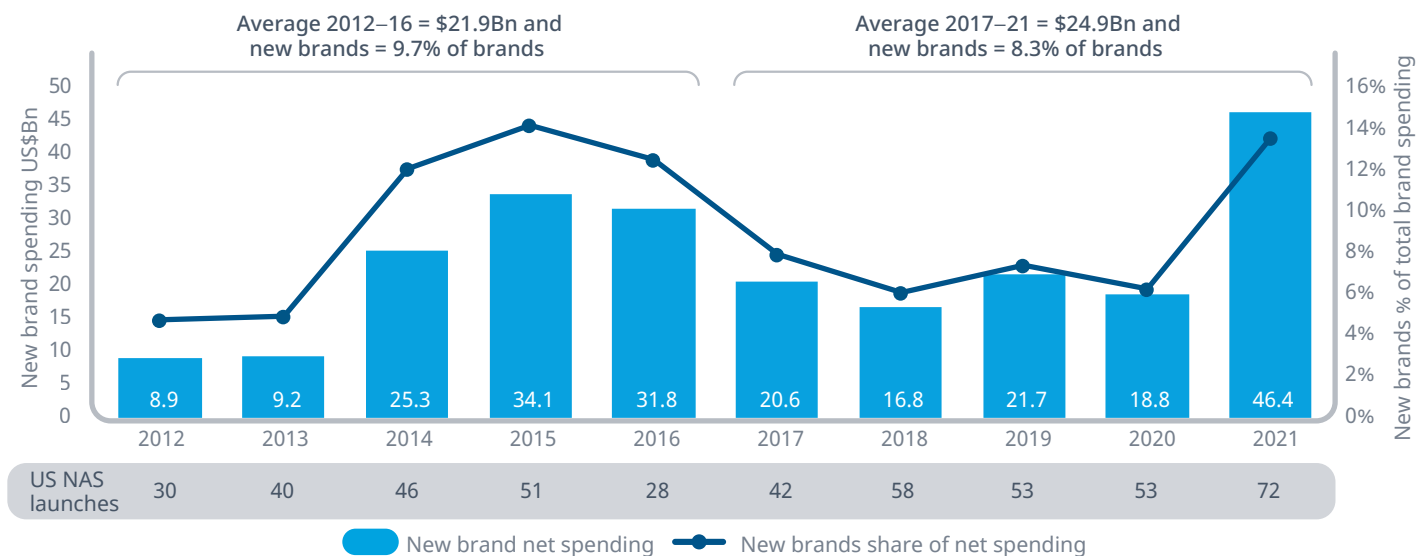
Source: IQVIA Institute, Mar 2022.

- New products, including 278 new active substances that launched from 2017 through 2021, contributed \$87.7Bn to spending at manufacturer net prices over the past five years.
- Price increases for protected brands, which have slowed substantially in recent years, declined by \$0.7Bn over five years.
- Volume growth experienced by protected brands — most often driven by brands in the three to five-year period since their launch when adoption by HCPs grows — contributed \$94Bn to growth over the five-year period.
- Losses of Exclusivity (LOE), or patent expiries, typically result in a dramatic shift of volume to generics and also lower brand sales for the originator. These contributed a decline of \$93Bn to manufacturer net revenues.
- The impact of LOE had a significant inflection from biosimilars in 2020, with brand losses of \$10Bn, which was repeated in 2021 (see exhibit 27).
- During the past five years, generic prices have been deflating, driven by an increase in the number of generic approvals, shrinking a previous backlog in applications at FDA and bringing new competition to existing generic molecule markets as well as the impact from new patent expiries during the period.

Notes: Includes COVID-19 vaccines and therapeutics. IQVIA estimates of spending at net manufacturer prices are based on comparisons of IQVIA audited data and company reported net revenues (see Methodology section). Products are assigned to segments in each month based on time relative to launch or patent expiry and product type. Growth is calculated annually on a like-for-like product segment basis and then aggregated to five-year totals.

New brand spending in the U.S. increased sharply in 2021, more than half from COVID-19 vaccines and therapeutics

Exhibit 23: U.S. New brand spending at estimated manufacturer net prices



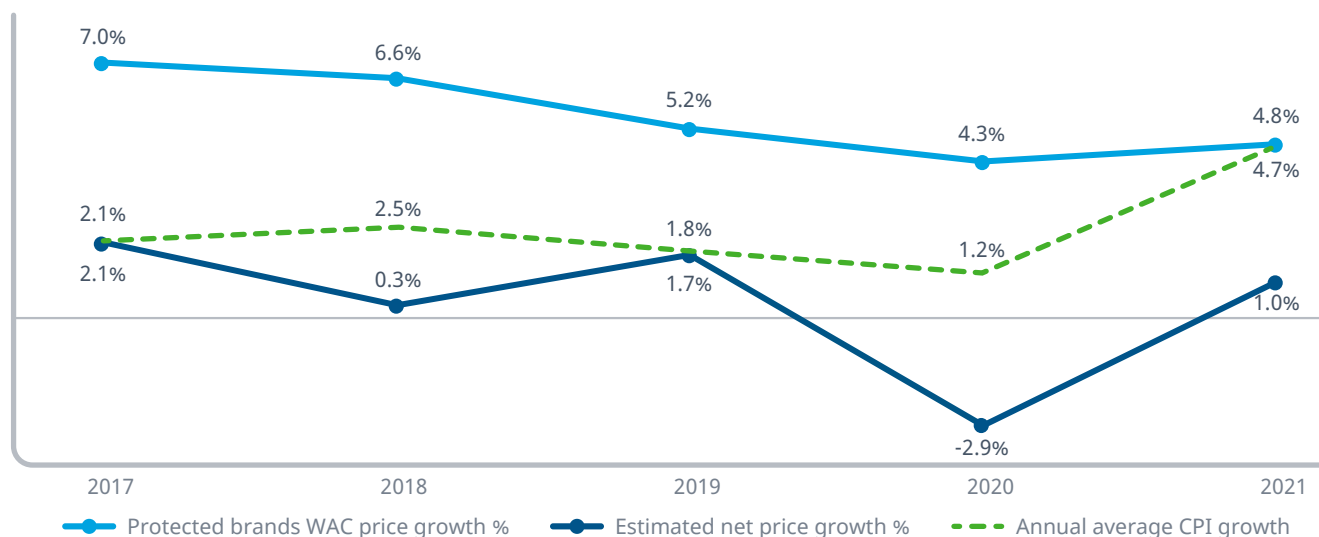
Source: IQVIA Institute, Mar 2022.

- New medicines launched in the past two years drove spending of \$46.4Bn in 2021, up from \$18.8Bn in 2020 primarily from the \$29Bn of spending for COVID-19 vaccines and therapeutics which was up from \$3Bn in 2020.
- There were 72 novel active substances (NAS) launched in 2021, including emergency use authorizations (EUA) for COVID-19, and cell or gene therapies.
- The number of NAS launches per year was 50 or more for the fourth year in a row even as spending for new products would have trended down as a share of brand spending without the COVID-19 vaccines and therapeutics.
- Increasingly, new medicines are specialty, niche and orphan disease drugs, driving most of the increase in new medicines and in the spending which has been elevated since 2014 with the launch of drugs for hepatitis C and a range of other specialty conditions.
- New launches were impacted in 2020 by disruptions from COVID-19, with newer products performing worse than comparators, both from a skew to more orphan products in the launch group, as well as lack of promotion due to shutdowns.

Notes: New brand spending is defined as products marketed for less than two years in each year. Number of New Active Substances (NAS) per year reflects launches rather than approvals as there can be a lag between approval and launch, and FDA approvals do not include the same medicines. Specifically, NAS launches include cell and gene therapies and emergency use authorizations (EUA) for COVID-19 vaccines and therapeutics, counting each type of vaccine (mRNA or viral vector vaccines) once based on the first to launch in the U.S.

Protected brand list prices increased 4.8% in 2021, while net prices increased 1% — the fifth year at or below the CPI

Exhibit 24: Wholesaler Acquisition Cost (WAC) growth and net price growth for protected brands



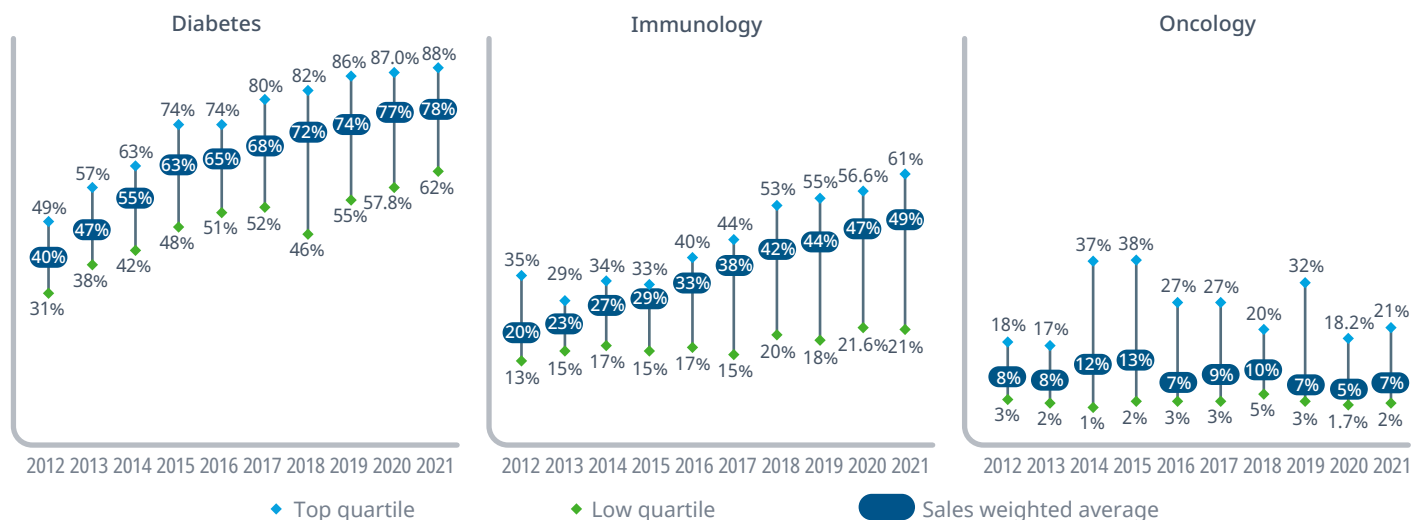
Source: IQVIA Institute, National Sales Perspectives, Dec 2021; Bureau of Labor Statistics, Annual Average Monthly CPI Growth, Dec 2021.

- The list prices of protected branded products — those products more than two years after launch having not yet lost patent protection — increased 4.8% in 2021.
- Net manufacturer prices — the cost of medicines after all discounts and rebates have been paid — increased only 1.0% in 2021, continuing below inflation for the fifth year.
- Overall U.S. annual average inflation increased sharply in 2021, but driven by increases very late in the year, where December monthly inflation exceeded 7%, and the net price growth for drugs is not thought to have been linked.
- Prices paid by different stakeholders in the U.S. health system are based to varying degrees on list prices and the discounts and rebates they negotiate or receive and do not apply uniformly to all parties.
- Most discounts are offered to wholesalers and pharmacies and do not necessarily result in lower out-of-pocket costs for patients.
- Some of the rebates and other price concessions manufacturers pay (resulting in lower net prices) are statutory payments to government programs such as Medicaid, or to 340B eligible entities. Price concessions also include coupons offered to patients using private insurance, whereas those with government insurance cannot use coupons.
- These complexities mean that the price for each medicine can be unique, reflecting the drug, the insurance type, the other medicines a patient takes during the year, the time of year, the pharmacy, the coupons offered by manufacturers, and whether a patient chooses to use them.

Notes: Wholesaler Acquisition Cost (WAC) price. Protected brands are brands more than 24 months after first launch and not yet off-patent. Net price growth estimates based on public information compared to IQVIA data (see Methodology section). CPI = consumer price index is averaged annually.

List prices are higher than net prices but vary considerably by therapy area

Exhibit 25: Selected therapy area protected brand net sales % below list price sales (WAC)



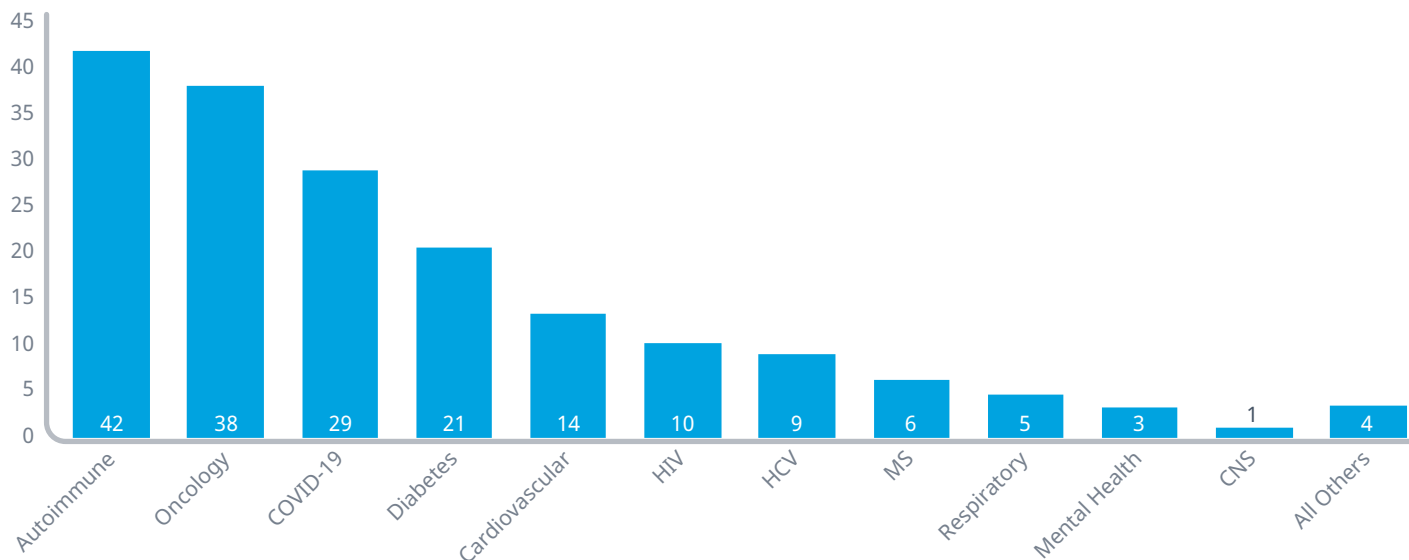
Source: Company annual financial reports, IQVIA MIDAS, IQVIA Institute, Mar 2022.

- The difference between list prices measured at wholesaler acquisition cost (WAC) and net prices is sometimes significant but varies across and within therapy areas.
- Diabetes, immunology and oncology represent three quite different therapy area dynamics, with off-invoice discounts and rebates representing a significantly different importance and role in the commercialization and distribution of products.
- In diabetes for a sample of protected branded products, the weighted average net price is 78% below the WAC price but the highest quartile of products average 88% and the lower quartile average 62%.
- These significant differences are most often negotiated discounts and rebates as well as statutory rebates in the Medicaid program, and the payment of rebates is a key aspect of negotiations between stakeholders.
- In immunology, a collection of diseases including rheumatoid arthritis, psoriasis, ulcerative colitis and Crohn’s disease, the average WAC to net difference has risen from 20% a decade ago to 49% in 2021 and is expected to continue to rise as competitive intensity in the class is amplified by large numbers of competitors and the introduction of biosimilars for key products.
- Oncology most often represents products that don’t compete directly with each other or that are paid via the medical benefit where there is less rebate negotiation generally and specifically doesn’t take place in Medicare part B.

Notes: IQVIA Audits include measures of sales at Wholesaler Acquisition Cost (WAC) or list prices. IQVIA Institute has analyzed company reported net revenues for a sample of companies and products and projected a total market estimate (see Methodology section). Selected therapy areas shown based on sample analyzed protected branded products including weighted average difference between WAC and Net, and the average of the top and lowest quartiles of sample products.

New and existing medicines drove \$184Bn in spending growth over 5 years excluding impact of expiries and prices

Exhibit 26: Medicine net spending growth 2017–2021 for new brands and protected brands volume



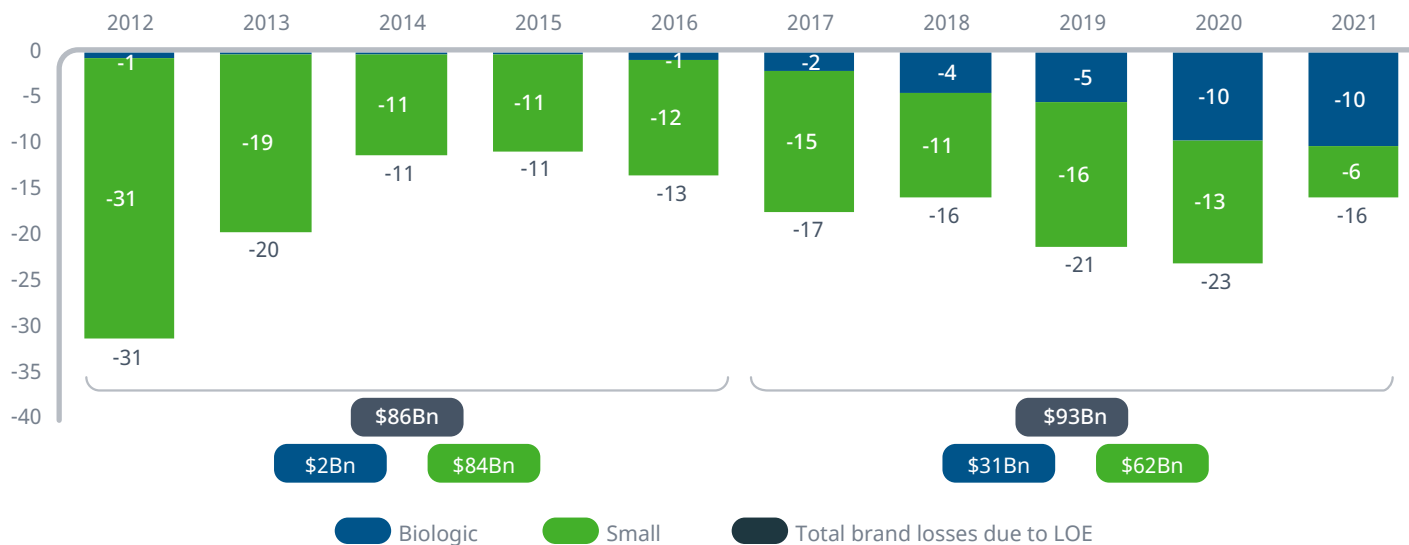
Source: IQVIA National Sales Perspectives, IQVIA Institute, Mar 2022.

- Positive growth drivers for protected brands — including volume growth which added \$94Bn and new products which added \$88Bn — in total contributed \$182Bn in growth over five years led by autoimmune, oncology and diabetes, as well as the \$29Bn from COVID-19 vaccines and therapeutics.
- Volume growth — growth without the impact of net price changes and covering products older than two years after launch but not yet off-patent — has grown to widely differing degrees across therapy areas.
- Autoimmune products including those for a wide range of immunological conditions had net growth from both new products and volume of \$42Bn over five years.
- Oncology added \$38Bn while diabetes added \$21Bn.
- Hepatitis C volume has been declining as fewer patients are being treated after the initial waves when the drugs were first introduced.

Notes: Growth for New Original Branded Products and for Protected brands growth due to volume growth, excluding the impacts of price growth as well as the impact of losses of exclusivity. The therapy totals reflect those therapy area totals of the two growth drivers shown on exhibit 23. Spending growth is measured at manufacturer net price level. Includes COVID-19 vaccines and therapeutics. Overall growth over 5 years has been included.

The impact of losses of exclusivity of biologics has increased dramatically in the past 3 years

Exhibit 27: Impact of brand losses of exclusivity 2012–2021, spending at estimated net manufacturer prices US\$Bn



Source: IQVIA Institute, Mar 2022.

- Most of the impact from LOE in 2021 was from biosimilars introduced in the prior three years including three molecules in the oncology market — bevacizumab, rituximab, and trastuzumab — which have contributed to a significant increase in brand losses due to losses of exclusivity (LOE).
- Biologic brand losses were \$10Bn in 2020 and 2021, an increase from the \$5Bn in 2019 and totaling \$31Bn in the past five years.
- Small molecule brand losses were much less in 2021 as few products with higher spending lost exclusivity, and deflationary effects of earlier expiries were not as strong.
- Small molecule LOE effects are also more muted when measured at estimated net spending levels than when measured at list prices, as the originator products generally have higher discounts and rebates than biologics.
- Small molecules contributed \$62Bn in brand losses to LOE over the past five years, down from \$84Bn in the prior five years.
- Notably, biosimilars earlier in the period didn't reduce brand sales as much as there were relatively fewer products and net savings were offset by increased volume to a greater degree, resulting in only \$2Bn in brand losses from 2012 to 2016.

Notes: Chart reflects the lower spending for branded products which have lost exclusivity but does not reflect the increased spending for generics or biosimilars. Analysis at manufacturer net price level.

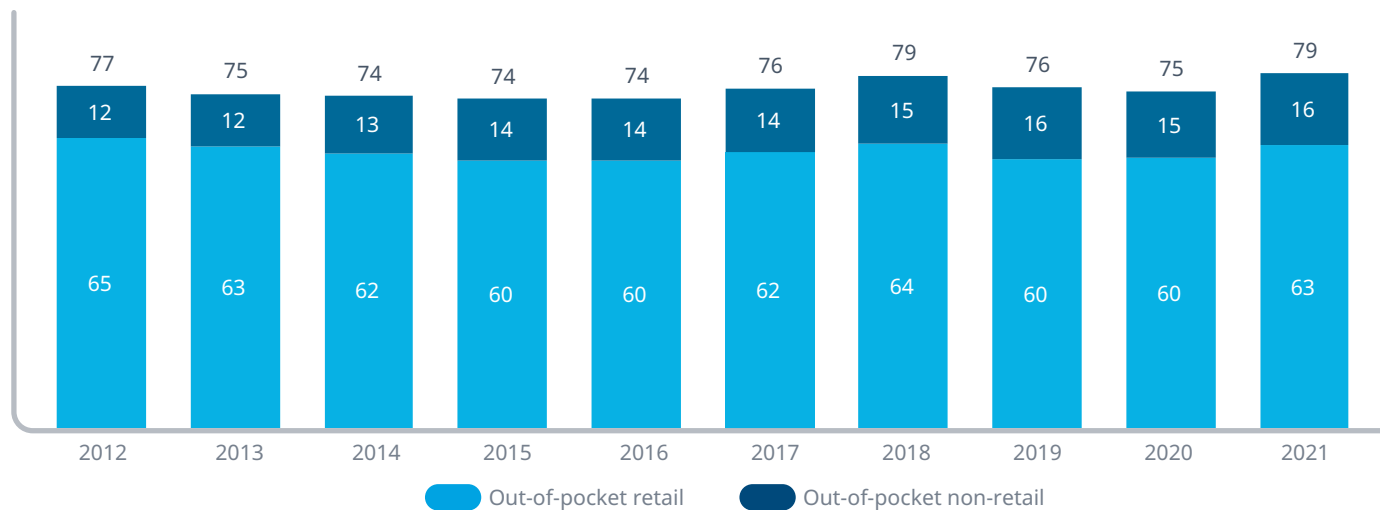
Patient out-of-pocket costs

- Out-of-pocket costs in aggregate increased \$4Bn in 2021 to \$79Bn but a smaller share of all-payer net spending than a year ago.
 - Medicare aggregate out-of-pocket costs have risen over the past five years, with population increases accounting for nearly half of the increase.
 - The average amount paid out-of-pocket per retail prescription has dropped from \$10.14 in 2016 to \$9.41 in 2021.
 - Generics and branded generics account for 16% of invoice-level spending but represent 65% of patient out-of-pocket costs.
 - Overall, 8% of patients reach annual out-of-pocket costs above \$500 compared to 17% in Medicare, in large part due to benefit design.
- Over 92% of branded and generic prescriptions have a final out-of-pocket cost below \$20, and only 0.9% have a cost above \$125.
 - Patients starting new therapy abandoned 81Mn prescriptions at pharmacies in 2021 with increasing frequency as costs rise.
 - Chronic therapy abandonment resulted in 5.3Bn lost patient days of therapy, particularly affecting the uninsured.
 - Insulin costs have declined but patient payments above \$35 are more common for these drugs than in the overall market.
 - Insulin out-of-pocket costs have declined by \$500Mn since 2018 and would further decline by \$555Mn if costs were capped at \$35.



Out-of-pocket costs in aggregate increased \$4Bn in 2021, mostly driven by retail pharmacy drugs

Exhibit 28: Aggregate patient out-of-pocket cost for medicines dispensed in retail and non-retail settings, US\$Bn



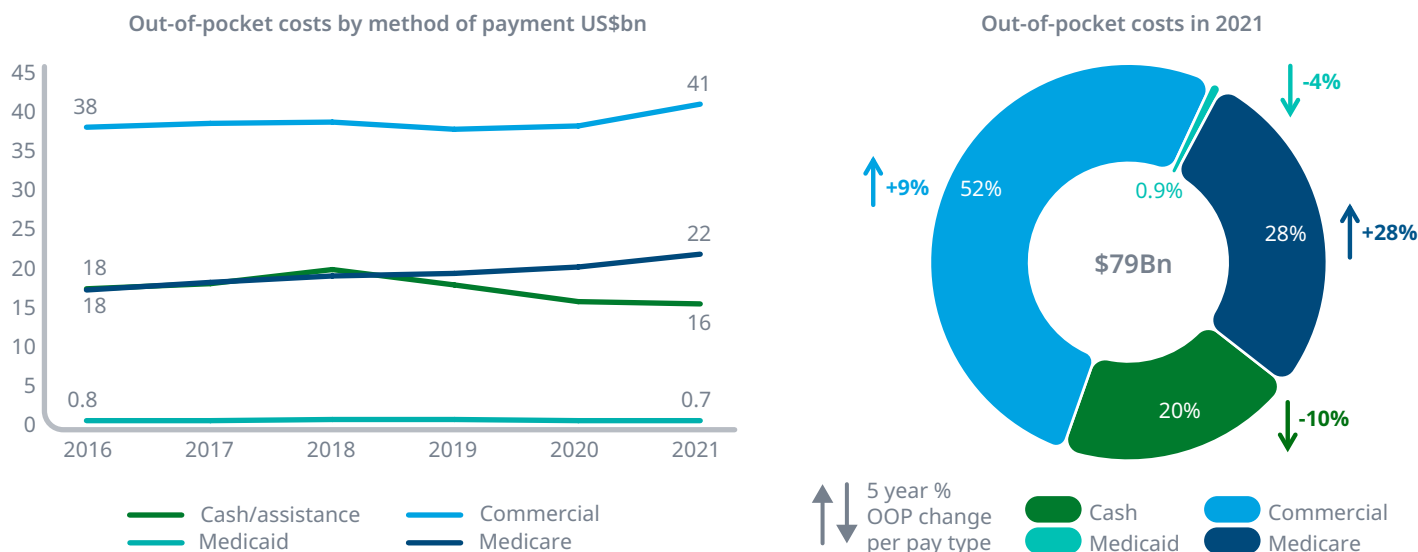
Source: IQVIA Xponent, IQVIA LAAD Sample Claims Data, Dec 2021; IQVIA Institute, Mar 2022; CMS National Health Expenditures, Dec 2020.

- Patient out-of-pocket costs increased \$4Bn in 2021, returning to levels seen in 2018.
- This growth was driven by retail out-of-pocket costs, which grew 4.8% in 2021 following two years of declines and lower growth but are slightly down from retail costs in 2018.
- Non-retail out-of-pocket costs have remained relatively stable over the last four years but have grown 16% since 2016.
- Total patient out-of-pocket costs were highest in 2021, with out-of-pocket costs increasing \$2.5Bn, or 3.3%, over the last decade.
- As the vast majority of prescriptions are dispensed as generic drugs, and individual prescription costs fall, overall out-of-pocket costs have risen, driven by population changes, the mix of medicines used, and offset by the use of coupons for commercially-insured patients have reached \$12Bn in 2021, including the use of pre-paid debit cards issued to eligible patients by manufacturers.
- Patients with Medicare Part D or high-deductible private health plans have seen some individual prescription costs rise in line with the rising list prices of drugs but be offset by filling the Medicare “donut hole” or the use of coupons, respectively.
- This use of coupons and debit cards is occurring alongside benefit-design changes, including the preponderance of deductibles in most private insurance plans and a rising number of them termed high-deductible plans, which expose patients to the list price of a drug until a deductible is met.

Notes: Retail OOP based on LAAD sample prescription data, grossed up to NPA adjusted prescriptions normalizing for 90-day prescription dispensing. Non-retail estimates based on CMS NHE for personal healthcare excluding retail prescription drugs. IQVIA estimates of non-retail drug (modified by estimates of rebates and offset by applying the estimated net cost of insurance and typical channel markups) with CMS PHC OOP % applied to those amounts.

Commercial and Medicare out-of-pocket costs for drugs have risen in the past 5 years while cash has declined

Exhibit 29: Out-of-pocket costs by method of payment US\$Bn



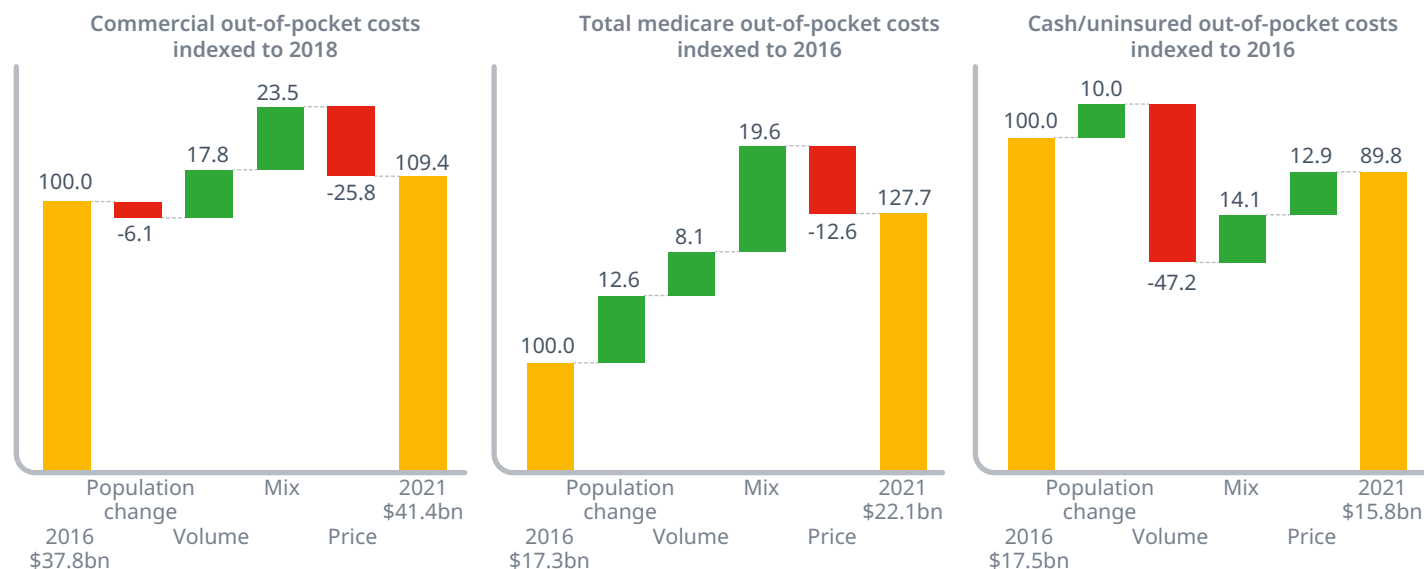
Source: IQVIA LAAD Sample Claims Data, Dec 2021.

- Out-of-pocket costs rose in aggregate for commercial and Medicare beneficiaries while those who paid cash declined due to reduced volumes, potentially linked to abandonment of prescriptions due to costs.
- Commercial insurance out-of-pocket costs rose 9% in aggregate over five years, all within the last two years from increased enrollment.
- Medicare out-of-pocket costs rose, in aggregate, by 28% from \$18Bn in 2016 to \$22Bn in 2021.
- Patients paying cash account for 20% of overall patient out-of-pocket costs and paid \$16Bn in 2020, for only 4% of prescriptions.
- Medicaid patients account for 11% of prescriptions and 1% of patient out-of-pocket costs as most of their costs are waved as the basis for the program.

Notes: OOP = out-of-pocket. OOP costs estimated based on prescription volumes and observed OOP costs. OOP costs were projected from a sample in the IQVIA LAAD sample claims data to a national estimate using national adjusted prescriptions. Method of payment is determined based on the most common or mode pay type in recorded claims. Cash method of payment includes those where patients used no insurance, including those who received some assistance from charities, foundations or other programs, or where a mode pay type was impossible to determine.

Medicare and commercial out-of-pocket costs are both up overall driven by per enrollee costs; Medicare also driven by enrollment

Exhibit 30: Total drug out-of-pocket costs (retail & non-retail) and change from 2016 to 2021



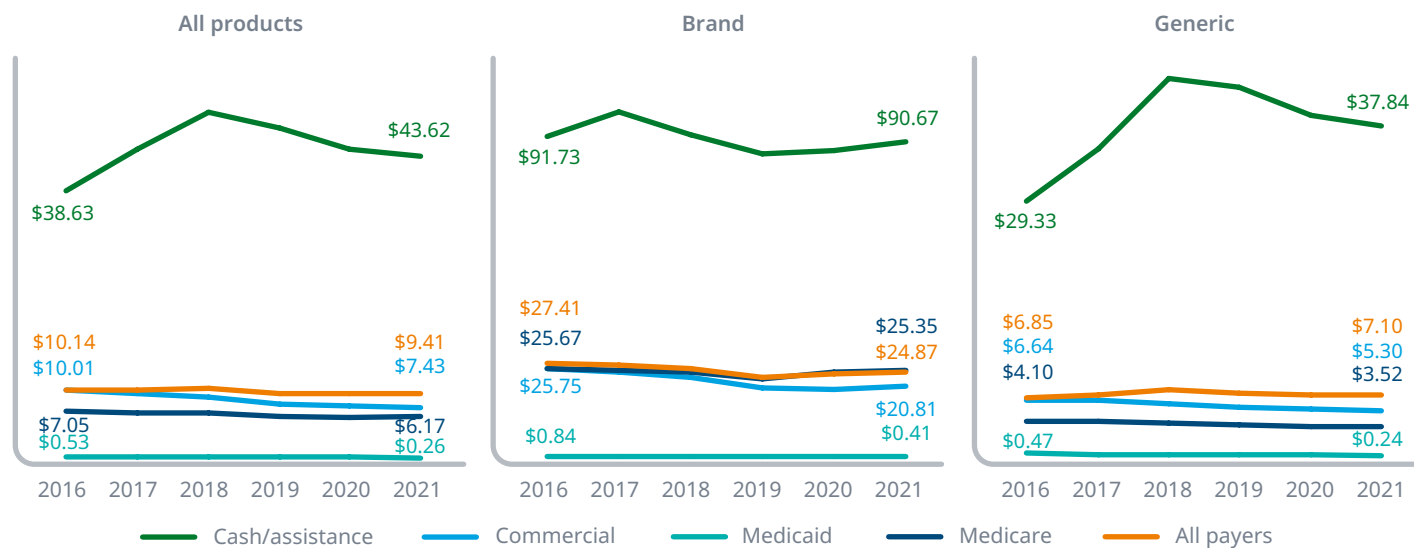
Source: IQVIA LAAD Sample Claims Data, Dec 2021; IQVIA institute, Mar 2022; Centers for Medicare & Medicaid Services, Nov 2021.

- Drivers of changes in out-of-pocket costs vary by method of payment with population, volume, mix and price impacting out-of-pocket costs to varying degrees.
- Commercial out-of-pocket costs have risen 9.4% since 2016 with costs driven by increased usage and shifts in the mix of prescriptions to those carrying higher costs, despite 26% decreases in the average cost per prescription and decreases in the number of enrollees as they aged into Medicare or became Medicaid eligible, especially in the last two years.
- A 13% increase in the number of Medicare beneficiaries has contributed to the 28% increase in out-of-pocket costs in the last five years, but the mix of prescriptions has had a higher impact with increasing usage also increasing total costs, offset by a 13% decrease in the average price.
- Uninsured patients out-of-pocket spending declined over five years primarily due to reduced use of medicines even as the absolute number of uninsured increased.
- Costs for this group remain linked to list prices that are, when high, strongly correlated with patients not filling prescriptions.

Notes: OOP = out-of-pocket. OOP costs estimated based on prescription volumes and observed OOP costs. OOP costs were projected from a sample in the IQVIA LAAD sample claims data to a national estimate using national adjusted prescriptions. Method of payment is determined based on the most common or mode pay type in recorded claims. Cash method of payment includes those where patients used no insurance, including those who received some assistance from charities, foundations or other programs, or where a mode pay type was impossible to determine. Mix growth is the remainder of all growth minus population, volume and price growth.

The average amount paid out-of-pocket per retail prescription has dropped from \$10.14 in 2016 to \$9.41 in 2021

Exhibit 31: Average final out-of-pocket cost per retail prescription by product type and method of payment, 2016–2021



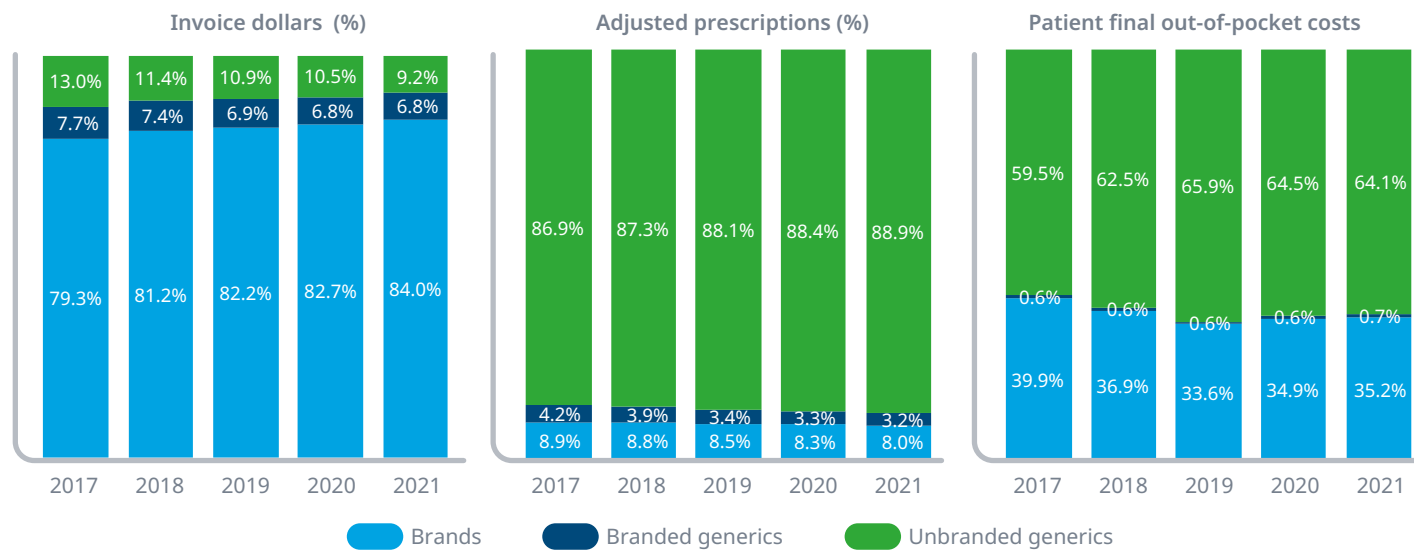
Source: IQVIA LAAD Sample Claims Data, Dec 2021.

- Overall, average out-of-pocket costs are not rising rapidly, with an average cost declining from \$10.14 in 2016 to \$9.41 in 2021 across all products and all payers.
- Uninsured patients paying with cash have seen costs rise for all types of products from \$38.63 to \$43.62, driven by generic prices which rose until 2018 and then have been declining while brand prices have dropped slightly.
- Medicare average prescription costs dropped from \$7.05 to \$6.17 as brand costs declined \$0.32 and generic costs declined \$0.58 but generics were used more often; all of these cost changes embed the benefit design changes associated with closing the ‘donut hole.’
- Commercially-insured patient prescription costs have declined from \$10.01 to \$7.43 as brand costs dropped from \$25.75 to \$20.81 over five years, predominately from the use of coupons to offset higher list prices.
- For generics, commercial and Medicare patients have seen their costs decline while cash-paying patients saw costs rise from \$29.33 in 2016 to \$43.27 in 2018 and then drop to \$37.84 in 2021.

Notes: Includes paid claims only for patients filling at least one prescription. Prescriptions and costs normalized to 30 days.

Generics and branded generics account for 16% of invoice-level spending but represent 65% of patient out-of-pocket costs

Exhibit 32: Share of spending, prescriptions and patient out-of-pocket costs by product type, 2017–2021



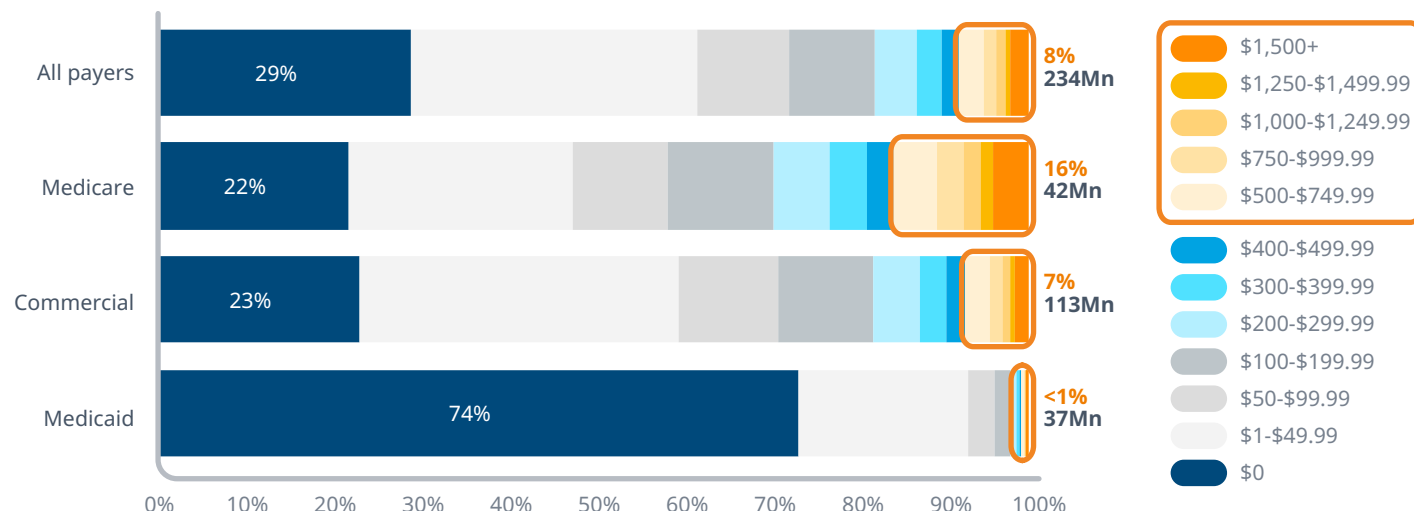
Source: IQVIA National Sales Perspectives; IQVIA National Prescription Audit; IQVIA LAAD Sample Claims Data, Dec 2021.

- Patent expiries over decades for products used by millions of patients have contributed to overall generic share of adjusted prescriptions reaching 92% — including branded generics.
- While these products are relatively inexpensive, accounting for 16.0% of invoice-level spending, they account for 64.8% of patients’ out-of-pocket costs.
- Over the past five years generic share of invoice-level spending has dropped from 20.7% to 16.0% while the share of prescriptions has risen from 91.1% to 92.0%, and yet patient out-of-pocket costs have risen.
- Generics have seen a rising share of out-of-pocket costs as some are paid by cash-paying patients at list prices.
- While brand invoice spending has risen to 84.0%, a declining share of prescriptions are for brands with just 8.0% in 2021 and share of out-of-pocket costs for brands has declined 4.5% since 2017 driven by the use of coupons to offset higher prices.

Notes: Prescription counts are adjusted for length of prescriptions and re-aggregated. Prescriptions referred to as ‘90-day’ are calculated based on transactions with 84 days supply or more to include medicines with up to one week fewer treatment days. Prescriptions for 84 days supply or more or factored by three, and those under 84 days unchanged.

Overall, 8% of patients reach annual out-of-pocket costs above \$500 compared to 16% in Medicare largely due to benefit design

Exhibit 33: Patients by annual prescription out-of-pocket cost in 2021



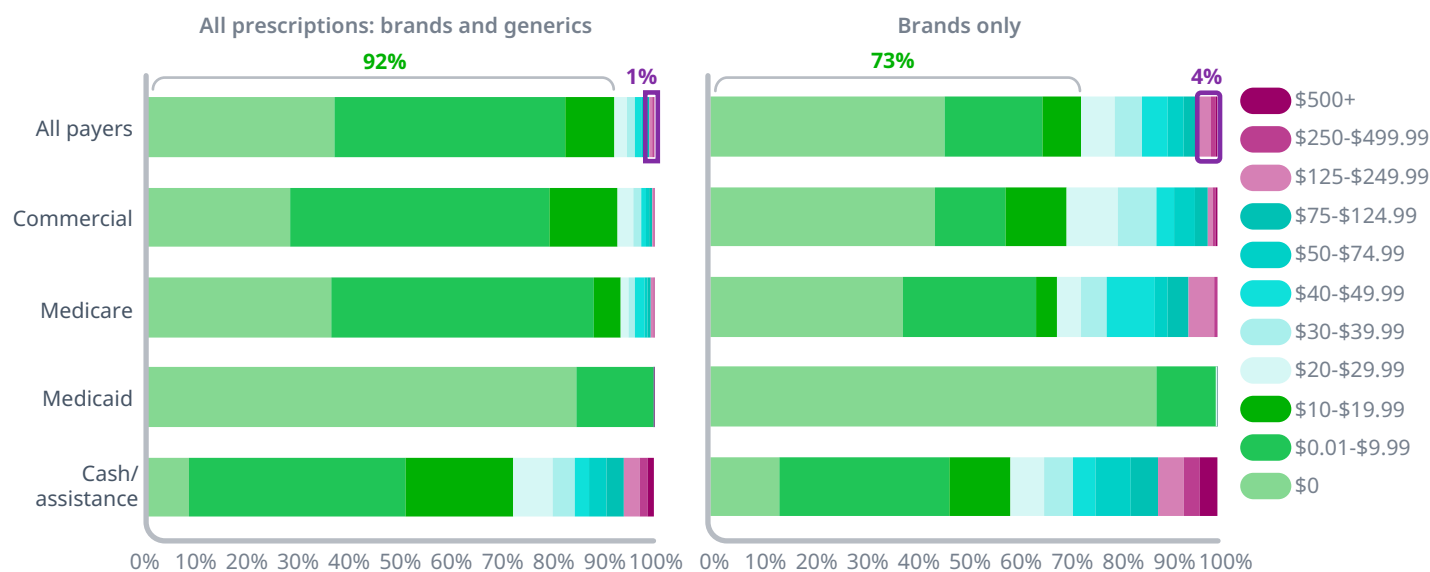
Source: IQVIA LAAD Sample Claims Data, Dec 2021.

- Across all patients, 8% reach annual out-of-pocket costs above \$500 and 2.1% pay more than \$1,500 out-of-pocket for prescriptions.
- In Medicare, 16% of patients pay more than \$500 out-of-pocket — the amount where cost-sharing starts for patients with standard coverage under Medicare Part D, and patients become responsible for 25% of costs. Four percent also pay more than \$1,500.
- In commercial coverage, 7.3% of patients pay more than \$500 and 1.6% pay more than \$1,500.
- In Medicaid, 74% of patients have no annual out-of-pocket costs for prescriptions with less than 1% of patients paying more than \$500 out-of-pocket for prescriptions.
- For the millions of seniors who become Medicare eligible each year, the cost exposure difference as their insurance changes can be a significant shock as seniors have higher cost exposure than the commercially-insured, which could lead to changes in adherence to planned medication.

Notes: Patients who filled at least one prescription in our sample were included. Patients were grouped into cohorts by mode pay type and costs aggregated in the year.

Over 92% of prescriptions have a final out-of-pocket cost below \$20, 1% (64Mn) of prescriptions have costs above \$125

Exhibit 34: Distribution of prescriptions by out-of-pocket cost in 2021, all channels



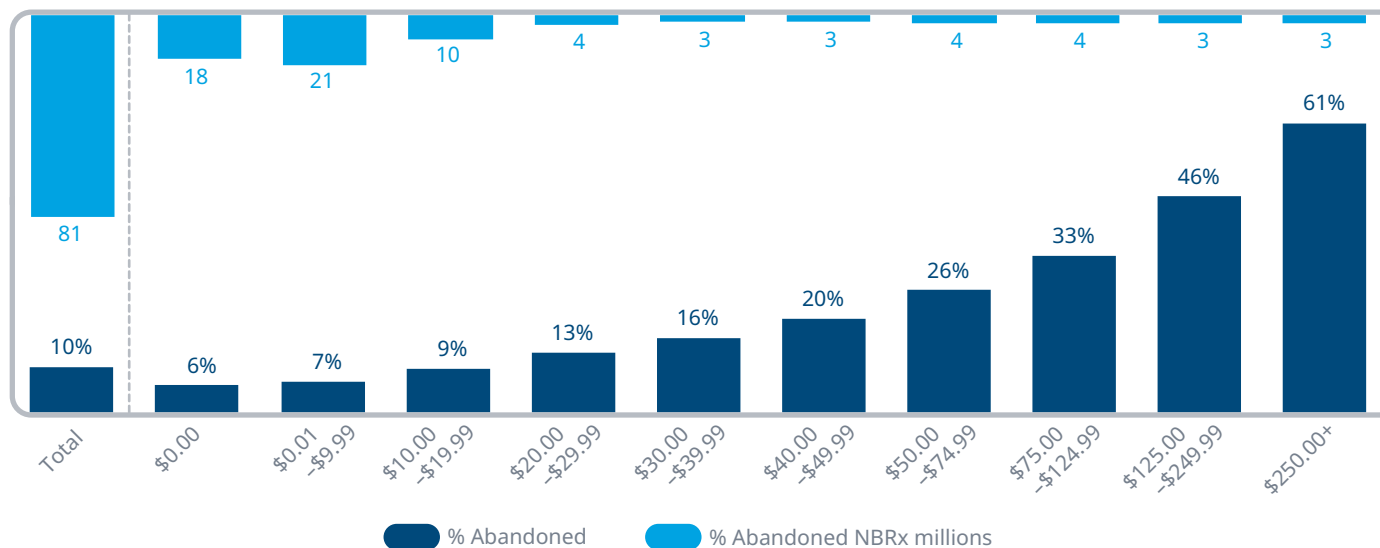
Source: IQVIA LAAD Sample Claims Data, Dec 2021.

- About 64Mn prescriptions — 1% of the total — were filled in 2021 with a final out-of-pocket cost above \$125 with over 8.5Mn prescriptions with an out-of-pocket cost over \$500.
- While 92% of all prescriptions across all payers have an out-of-pocket cost under \$20, this drops to 72% of prescriptions for the uninsured costing less than \$20 while 6% of prescriptions cost above \$125 for the uninsured.
- Four percent of brands have a final out-of-pocket cost over \$125 with Medicare beneficiaries exposed to higher prescription costs with 6% of prescriptions for brands having an out-of-pocket cost over \$125.
- Cash paying patients have significantly higher costs for brand prescriptions with 12% having out-of-pocket costs greater than \$125 likely leading to higher abandonment of brands among these patients.
- While relatively few patients fill prescriptions at higher cost levels, abandonment rates are higher, and those prescriptions may be underrepresented as those prescriptions might have been abandoned due to cost (see exhibit 35).
- A rising number of prescriptions are now dispensed with a \$0 payment by the patient and now amount to 46% of all branded prescriptions and 37% of all product prescriptions in 2021.
- These zero cost prescriptions are driven by a combination of factors, including patients reaching out-of-pocket maximums, receiving coupons (some of which lower costs to zero), or being driven by benefit designs which provide free products in certain classes, or from Medicaid.

Notes: Includes paid claims only for patients filling at least one prescription. Prescriptions and costs normalized to 30-days.

Patients starting new therapy abandoned 81Mn prescriptions at pharmacies in 2021 with increasing frequency as costs rise

Exhibit 35: 14-day abandonment share of new-to-product prescriptions by final out-of-pocket cost in 2021, all payers, all products



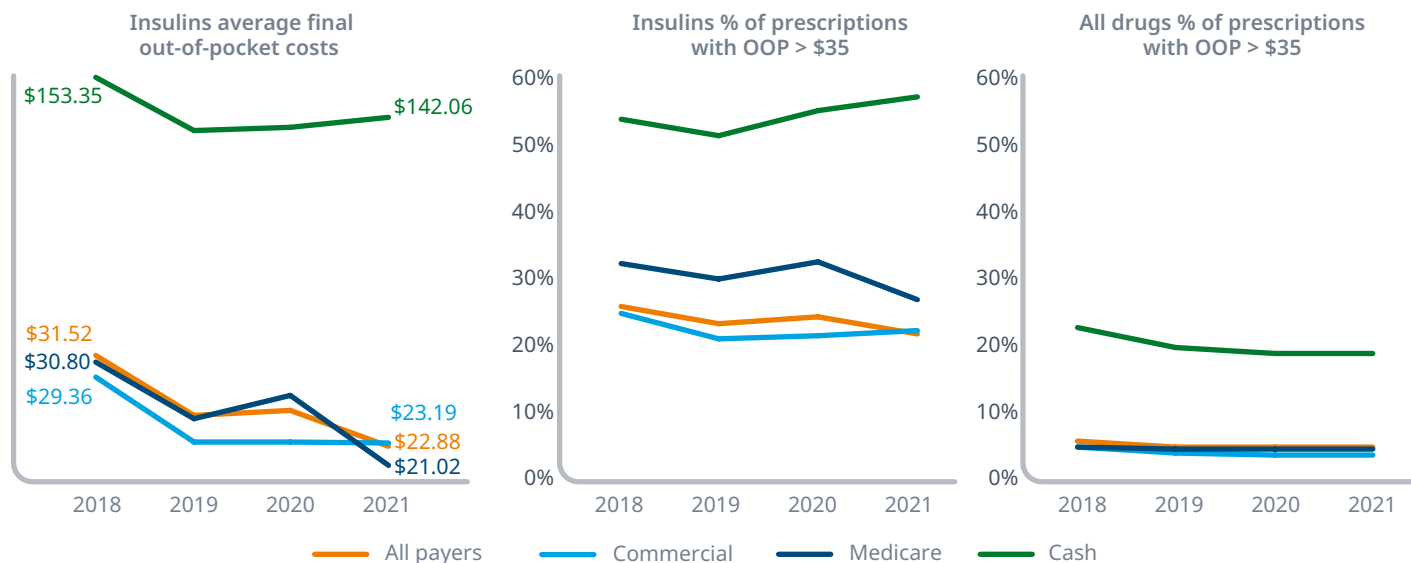
Source: IQVIA National Prescription Audit: New to Brand, LAAD Sample Claims Data, Dec 2021.

- The number of prescriptions written and transmitted to pharmacies by doctors, either by traditional paper, by phone or electronically, exceeds the number that patients filled by 10% for a variety of reasons, the most common reason being the cost of the prescription, with the effect rising as costs rise.
- Of prescriptions with a final cost above \$250, 61% are not picked up by patients, as compared with 7% of patients who do not fill when the cost is less than \$10.
- Of the 81Mn new-to-product prescriptions abandoned in 2021, 39Mn were abandoned when costs were under \$10, including zero cost prescriptions, while the remaining 42Mn were abandoned at greater rates as costs rise.
- Many traditional insurance plans with a fixed copay design include brand copays of less than \$30 for preferred products, with abandonment of 13% or less. This can be compared to a non-preferred brand copay of \$75 with an abandonment of 33% or higher.
- Benefit designs that inherently expose patients to costs use this patient behavior relating to costs to encourage the use of lower-cost medicines but can equally result in patients not taking necessary medicines.
- Some therapy areas where branded products are often more costly at list prices, including oncology and immunology, have notably rates of abandonment exceeding 30% for the pharmacy-dispensed medicines in those therapy areas.

Notes: New to product prescriptions are those where patients have not had a prescription for the specific brand or generic drug within the prior year. Pharmacies in the sample provide information on prescriptions which were prepared for dispensing and whether they were dispensed, with abandonment defined as the prescription in question not being dispensed to the patient within 14 days of the initial fill. Analyses on a sample of claims projected to national totals, where a similar analysis in prior reports were not projected and thus not comparable in terms of total abandoned new prescriptions.

Insulin costs have declined but patient payments above \$35 are more common for these drugs than in the overall market

Exhibit 36: Insulin average out-of-pocket costs and share of prescriptions with costs >\$35



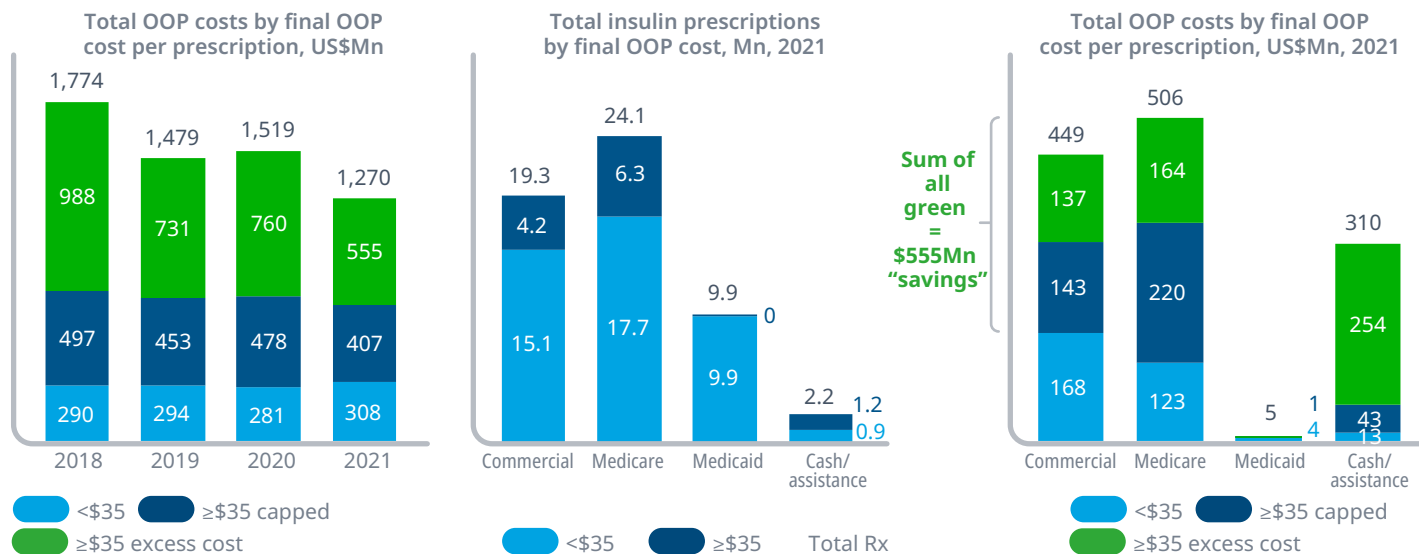
Source: IQVIA LAAD Sample Claims Data, Dec 2021.

- The costs of insulins when paid without insurance are over \$142 per month, and while insulin prescriptions paid with cash represent about 2% of insulin volumes, overall cash is 4% of volumes suggesting that insulin volumes are likely understated because of high list prices and the likely abandonment of these high-cost prescriptions.
- Across all medicines, patients abandon 46% of new prescriptions that cost them from \$125 to \$249.99 and 61% of those costing more than \$250, which would reflect the costs uninsured patients could pay depending on their pharmacy.
- Insurance influences what patients pay for insulin with 57% of cash-paid prescriptions costing those patients more than \$35 compared to 18% of cash-paid prescriptions across all medicines.
- Even among those with insurance, commercially-insured patients pay over \$35 for insulin 22% of the time, consistent with how many patients have high deductible health plans. Medicare patients pay over \$35 about 26% of the time, down from 32% in 2018.
- Across all patients, benefit design changes combined with the availability of biosimilars are contributing to falling insulin costs.

Notes: Includes paid claims only, for patients filling at least one prescription. Prescriptions and costs normalized to 30 days. Does not reflect initial cost exposure.

Insulin out-of-pocket costs have declined by \$500Mn since 2018 and would further decline by \$555Mn if costs were capped at \$35

Exhibit 37: Number of insulin prescriptions with final out-of-pocket cost above and below \$35 and potential savings if costs were capped at \$35, US\$Mn



Source: IQVIA LAAD Sample Claims Data, IQVIA National Prescription Audit, Dec 2021.

- Total out-of-pocket costs paid by patients with insulin prescriptions amounted to \$1.27Bn in 2021, and 44% of those costs are linked to the 20% of prescriptions that cost patients more than \$35.
- If those costs were reduced to \$35 for all of those patients, a simplification of the provisions of the Affordable Insulin Now bill, they would save \$555Mn: \$137Mn in commercial plans, \$164Mn in Medicare, and \$254Mn for cash-paying patients (typically the uninsured).
- Notably the amount spent for prescriptions over \$35 has been declining, potentially as a result of filling the 'donut hole' and the 2019 IRS guidance, allowing high deductible health plans to reduce patient costs prior to reaching a deductible.
- Patients spent \$449Mn in commercial plans, \$506Mn in Medicare, and \$310Mn when paying cash, and per prescription savings would average \$33 in commercial, \$26 in Medicare, and \$212 for cash.
- These savings do not reflect potential changes in the costs of lower-cost prescriptions or additional volume due to better adherence related to lower costs but are consistent with other analyses of potential savings in Medicare.⁹
- Some lower-cost prescriptions are currently supported by manufacturer coupons, which would likely no longer be required. Notably, patients may not reach their deductibles as quickly if these lower costs are counted, and some may fail to realize savings on an annual basis as a result.

Notes: Values may not sum due to rounding. Prescriptions in retail pharmacies were adjusted to consistent 30-day prescription lengths for cost and volume comparison purposes. Final out-of-pocket cost reflects the final patient responsibility after insurance and the use of coupons or other assistance for cash or commercial patients. Savings calculated as out-of-pocket cost minus \$35 per month for prescriptions costing above \$35. Savings could be offset in future if lower-cost prescriptions have higher costs. The Affordable Insulin Now bill passed by the U.S. House of Representatives on March 31st 2022, but has not yet been passed by the U.S. Senate or signed into law.

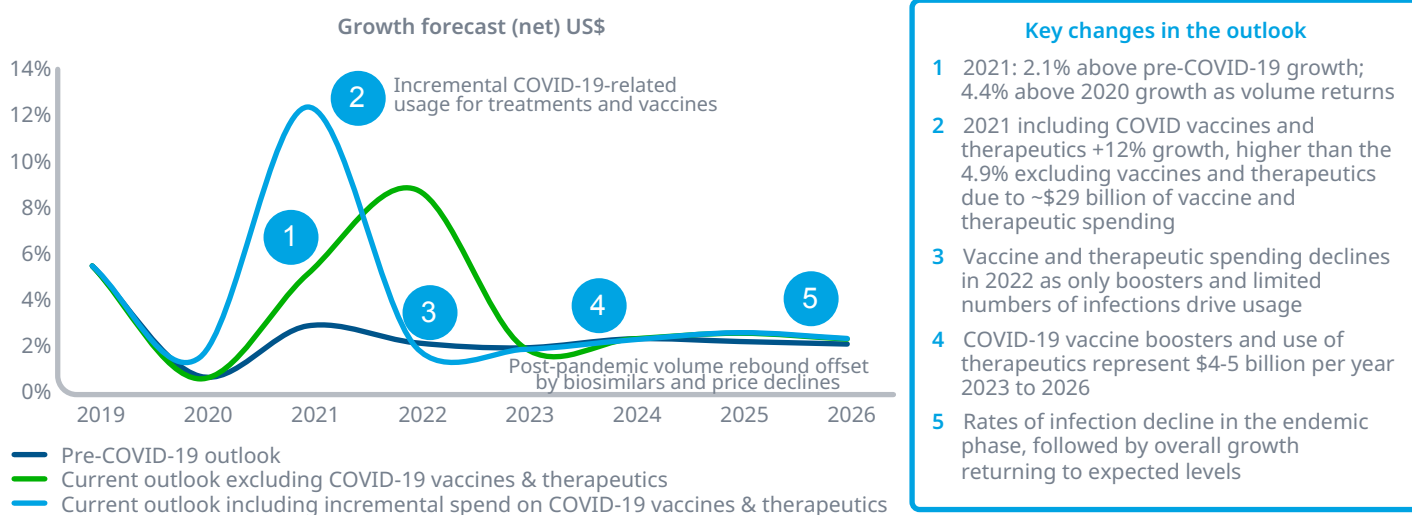
Outlook to 2026

- U.S. market growth will return to pre-pandemic projection trend by 2023 despite year-to-year fluctuations and incremental vaccine and therapeutic spending.
 - The U.S. spending forecast reflects an increasing gap between list price-level spending and manufacturer net revenues.
 - New brand spending in the U.S. is projected to be lower than the last five years due to the impacts of COVID-19 vaccines and therapeutics and a smaller share of spending.
 - Net price growth for protected brands is forecast to be 0 to -3% through 2026.
 - Losses of exclusivity expected to result in \$56.0Bn of lower brand spending through 2026 with \$41.6Bn from branded biologics.
- Immunology, oncology and neurology drive growth.
 - U.S. oncology spending to exceed \$113Bn by 2026, with growth slowing to 9% from biosimilar savings.
 - Diabetes spending at estimated net manufacturer prices to decline 12% through 2026 while list prices continue to grow 10-13% annually.
 - Treatments for autoimmune disorders to exceed \$70Bn at net prices in the U.S. by 2026, slowing after 2022 due to key biosimilars.
 - Next-generation biotherapeutics to reach \$11Bn by 2026, up from \$3Bn in 2021, with a wide range of potential scenarios.



U.S. market growth will return to pre-pandemic projections by 2023 despite year-to-year fluctuations

Exhibit 38: Comparison of current outlook to pre-COVID-19 outlook



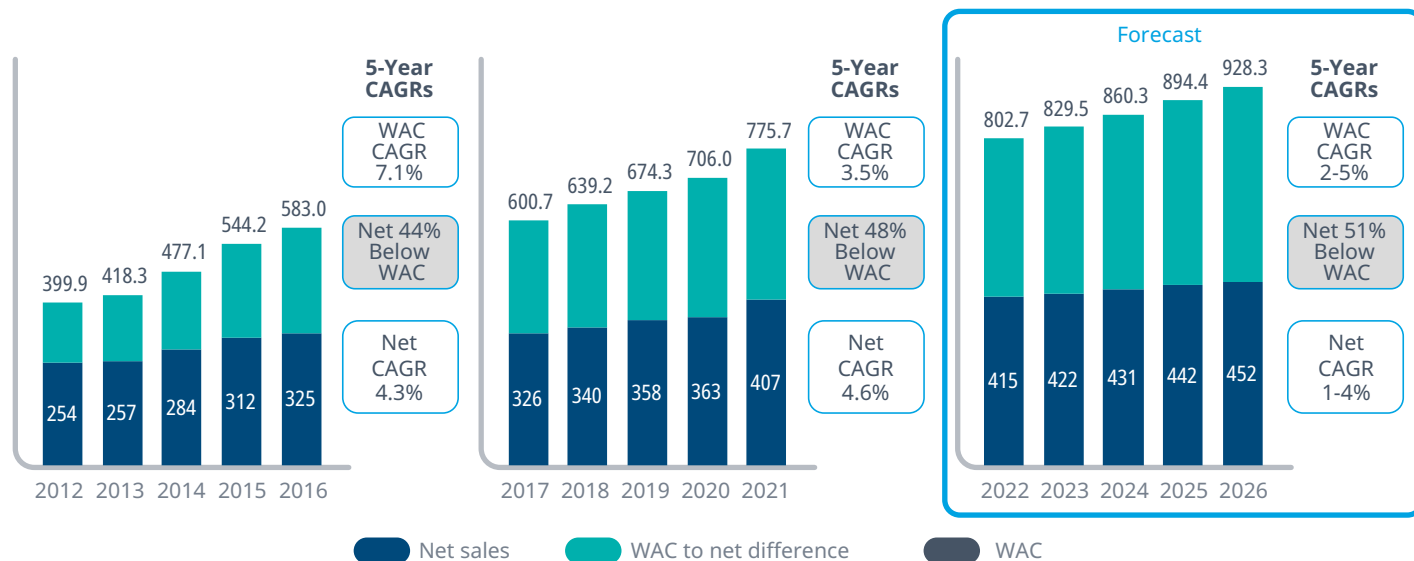
Source: IQVIA Market Prognosis, Sep 2021; IQVIA Institute, Mar 2022.

- While the short-term impact from COVID-19 in 2020 and 2021 has been significant, the long-term impact on growth trends is more muted.
- Including estimates of higher spending growth from COVID-19 vaccines and disruptions from the pandemic, the five-year CAGR to 2026 is unchanged compared to the pre-COVID-19 outlook and the forecasts differ by only 0.2% within the range of uncertainty of 2-5%.
- The market growth dynamics include the contribution in 2021 of \$29Bn in spending on COVID-19 vaccines and therapeutics, which moderates to only \$4-5Bn per year afterward, masking the stability of the rest of the market — especially in 2022.
- Because the effectiveness of current vaccines against new variants, as well as the duration of immunity, remains uncertain, it is expected that many people will need to receive new booster vaccinations in future years.
- The effects on the forecast outlook of sustained high inflation in the wider economy or an extended economic downturn have not been modeled. The spending and use of medicine have proven remarkably resilient in the face of the pandemic and past economic crises. Furthermore, public pressure is likely to limit drug price increases to a greater degree than in the wider economy.

Notes: Pre-COVID-19 outlook based on IQVIA Market Prognosis, Sept. 2019 edition. Current outlook based on IQVIA Market Prognosis Sept. 2021 edition but updated reflecting year-end 2021 actual data. Incremental COVID-19 vaccine & therapeutics scenario based on current outlook combined with incremental spending for vaccines & therapeutics. The growth shown here are estimated at manufacturer net prices.

The U.S. spending forecast reflects an increasing gap between invoice level spending and manufacturer net revenues

Exhibit 39: U.S. medicine spending and growth at WAC and estimated net 2012–2026



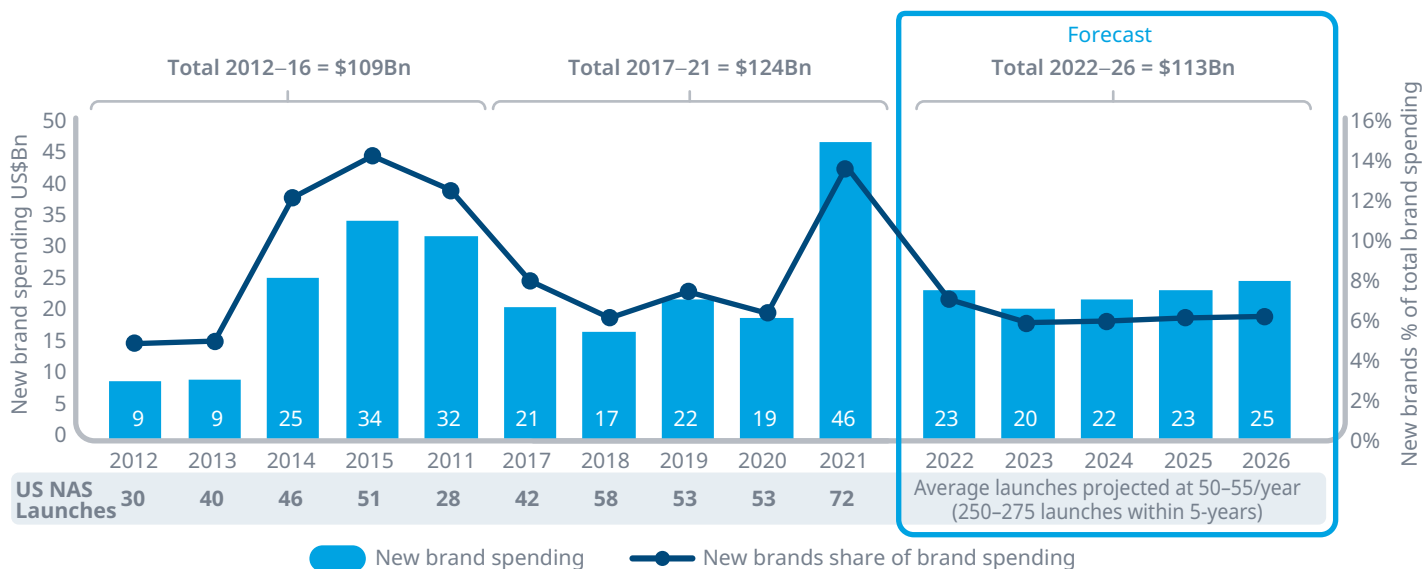
Source: IQVIA Institute, Mar 2022.

- Total net spending on medicines is expected to reach over \$450Bn in 2026, up from \$407Bn in 2021 and includes spending across all channels and product types.
- Over the next five years, medicine spending will grow between 2–5% on a list price basis and 1–4% after discounts and rebates.
- Growth will be driven by adoption of newly launched innovative products, which are expected to occur at higher levels than in past years with an average of 50–55 new medicines launching per year over the next five years, including those in oncology or with specialty or orphan status.
- Spending growth will be offset by losses of exclusivity and continued emergence and uptake of biosimilars, and a shift in COVID-19 spending to reflect a shift to endemic status.
- The effect of price growth on overall spending over the next five years is expected to be 0 to -3% as list price increases continue at historically low levels and net prices will decline in markets with significant competitive intensity.

Notes: Spending is based on IQVIA reported values from wholesaler transactions measured at list (WAC) prices and exclude discounts and rebates that reduce net revenue received by manufacturers. Net spending reflects company recognized revenue after both invoice and off-invoice discounts, rebates and price concessions are applied. Includes all medicines in both pharmacy and institutional settings. Includes COVID-19 vaccines and therapeutics from company reported values.

New brand spending in the U.S. is projected to be higher than the last 5 years but a smaller share of spending

Exhibit 40: U.S. new brands estimated spending at net manufacturer prices



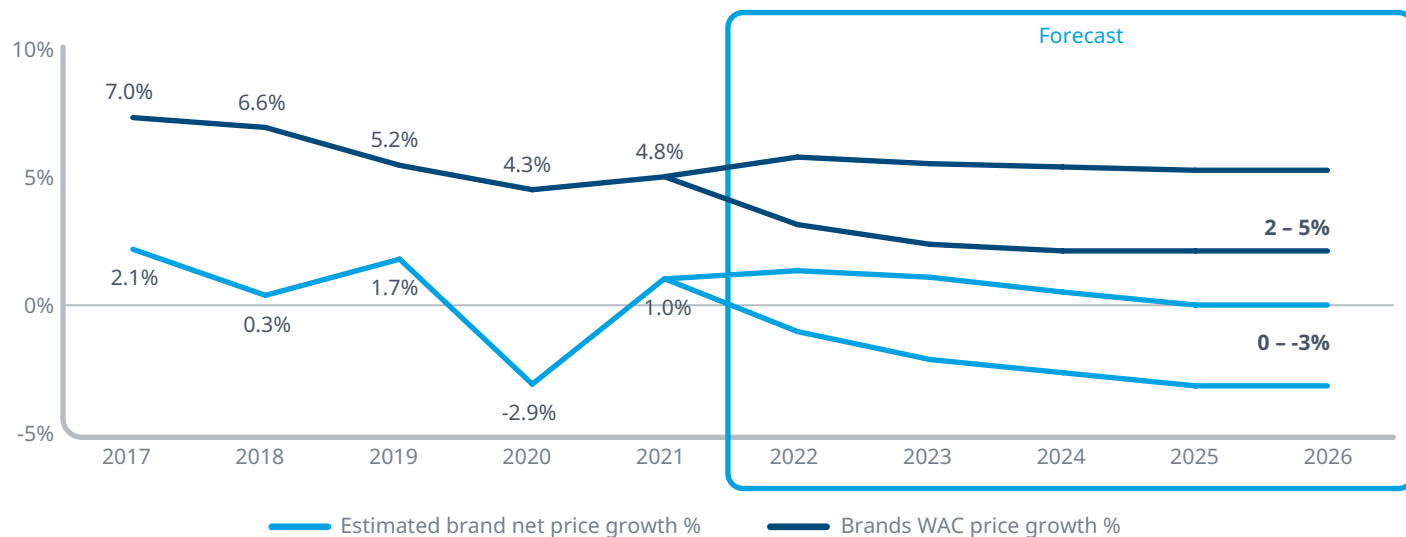
Source: IQVIA Market Prognosis, Sep 2021; IQVIA Institute, Mar 2022.

- The growing output of drug R&D is expected to continue to result in an average 50-55 NASs per year and an aggregate of \$113Bn of new drug spending over five years.
- NAS launches in 2021 reached 72, differing from reports of drug approvals due to the inclusion of emergency use authorizations, cell and gene therapies and launches from prior years.
- The aggregate amount of new brand spending rose sharply in 2021 from the inclusion of \$29Bn in COVID-19 vaccines and therapeutics, without which new brand spending would have dipped because more medicines are for smaller populations and generate less spending per drug.
- Over the next five years, 250-275 NAS launches are expected but are anticipated to represent an average 6-7% of brand spending compared to 11% in the past five years.
- New brands in the next five years are expected to include large numbers of oncology, immunology and neurology drugs as well as a significant proportion of rare disease treatments.

Notes: NAS = new active substance. New brands are protected branded products on the market less than 24 months during the year reported. New brand spending is at estimated net manufacturer price levels.

Net price growth for protected brands is forecast to be 0 to -3% through 2026

Exhibit 41: Protected brand invoice and net price growth



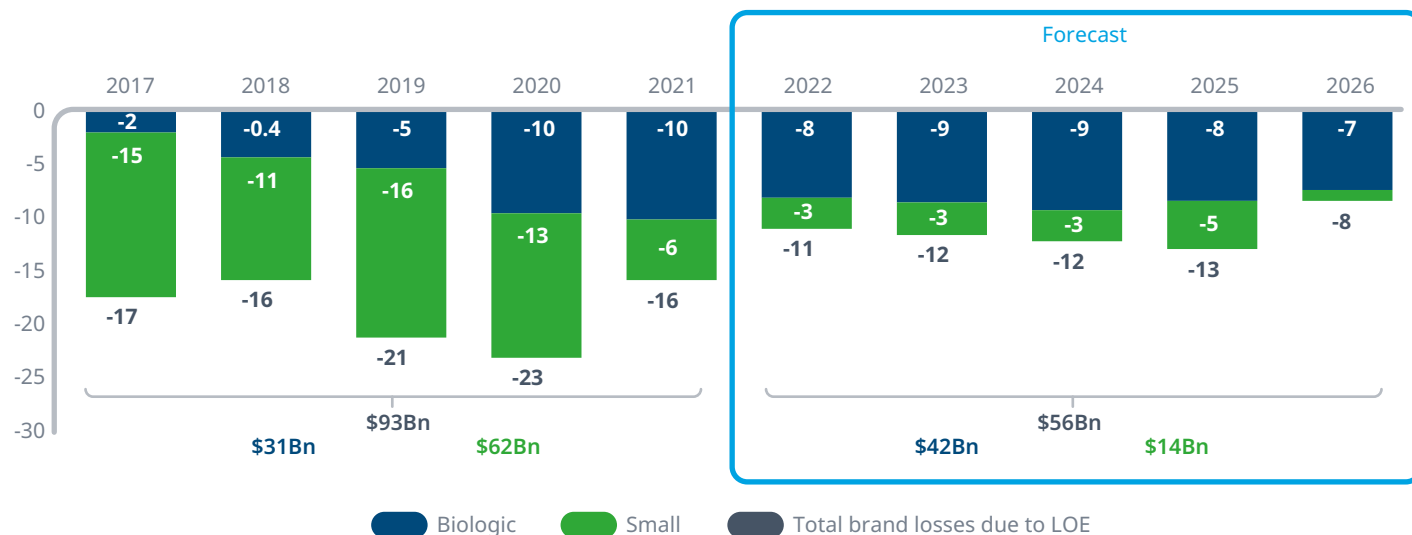
Source: IQVIA Institute, Mar 2022.

- As public pressure on drug pricing has escalated, list price increases have slowed to 4.8% in 2021 and are expected to average 2–5% per year through 2026, provided inflation remains moderate.
- Net price growth is likely to continue to see declines in the 0 to -3% range as the structural drivers of low net price growth are expected to remain in effect and be amplified by increased competitive intensity in many therapy areas, especially those with new launches and/or upcoming biosimilar events such as diabetes and immunology.
- Some products and therapy areas may be able to increase net prices to a greater or lesser extent, linked to the level of differentiation and/or competition in their markets.
- The lower level of net price growth and the continued gap between invoice and net price growth reflect the higher levels of off-invoice discounts, rebates and price concessions, which began to increase in 2012 and have continued.
- The macroeconomic outlook including inflation and the potential for recession are not embedded in these estimates, but the continued public pressure on drug pricing is likely to continue, especially in the absence of large policy reforms, and preclude significant price changes.

Notes: Wholesaler Acquisition Cost (WAC) price. Protected brands are brands more than 24 months after first launch and not yet off-patent. Net price growth estimates based on public information compared to IQVIA data (see Methodology section).

The impact of exclusivity losses will drop to \$56Bn over 5 years including significant biosimilars impact through the period

Exhibit 42: U.S. impact of brand losses of exclusivity 2017–2026, US\$Bn



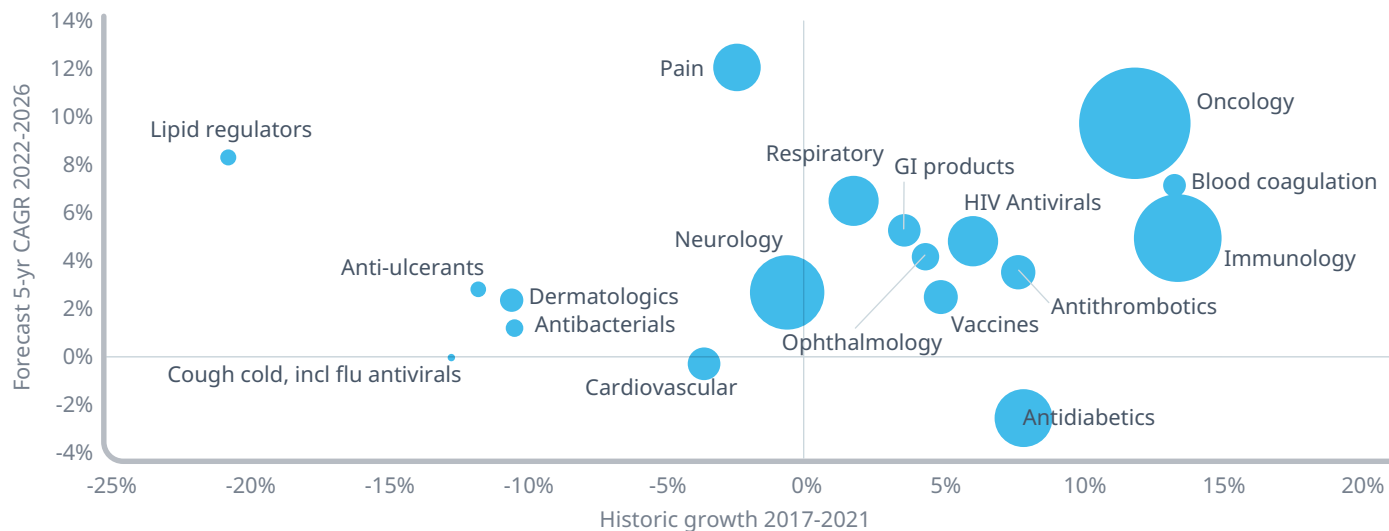
Source: IQVIA Market Prognosis, Sep 2021; IQVIA Institute, Mar 2022.

- The impact of patent expiries is expected to decrease over the next five years measured at net prices.
- Small molecule impact is expected to be less than a quarter of the level of the last five years as small molecule impacts are fewer, rebates are higher, and the prior five years embedded a significant effort by FDA to approve more generics from older expiries, which contributed significantly to the impact.
- Biologics impact will increase to over \$40Bn of brand losses on a net basis from the continued impact of earlier biosimilar events, as well as the largest impacts in 2022-2024 when products such as ranibizumab (Lucentis), adalimumab (Humira), and ustekinumab (Stelara) all could face biosimilars.
- The largest biologic impact is expected in 2023 when adalimumab (Humira) is expected to face competition. While biosimilars for this drug are already approved, litigation and settlements between originators and biosimilar companies have agreed on market entry in early 2023.
- These estimates embed significant uncertainty as the number of competitors in each molecule, their decisions as well as the competitive actions of originators and the cost negotiating tactics of insurers and drug purchasers, could all impact market dynamics.
- In some cases, negotiations may even spill over into other still-patent-protected brands in the same therapy areas, resulting in higher discounts, rebates, and use of coupons, driving up competitive intensity.

Notes: Lower brand spending based on invoice prices. Forecast impacts are modeled by projecting individual products sales growth to the point of patent expiry and then modeling expected impact based on historical analogues and actual data for in-progress events. Chart totals may not sum due to rounding. Estimates are based on manufacturer net price levels and estimated future evolution of associated discounts and rebates.

Immunology, oncology, neurology drive growth through 2026 along with COVID-19 vaccines

Exhibit 43: Historic and forecast net spending growth for leading therapy areas



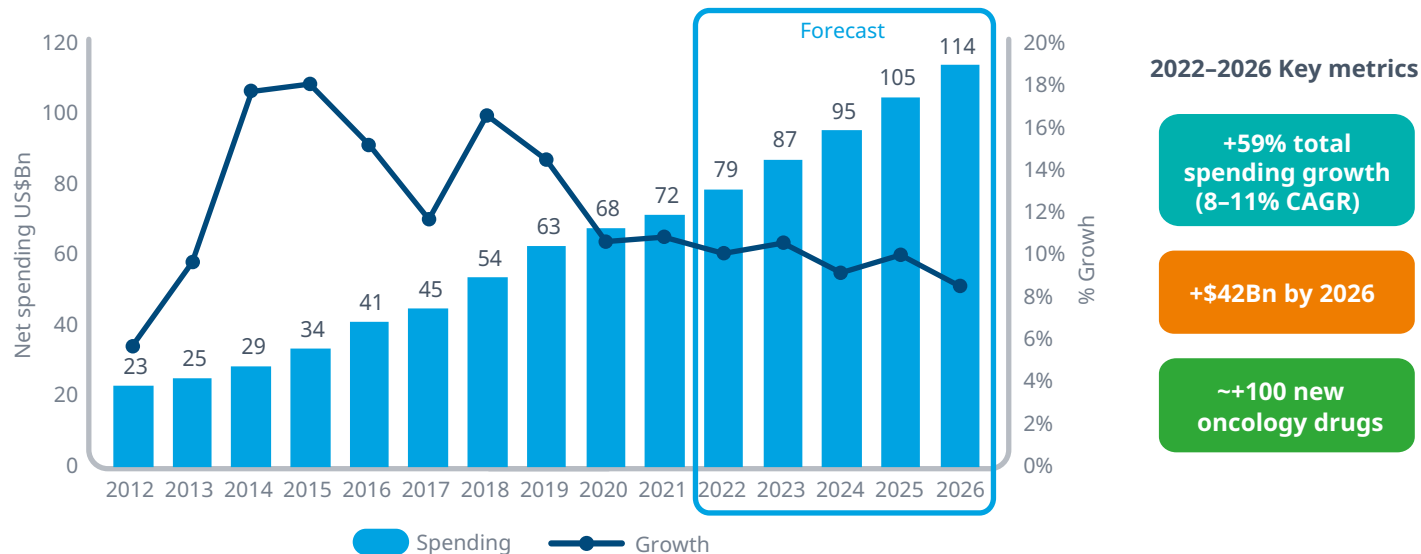
Source: IQVIA Institute, Mar 2022.

- Oncology, immunology and neurology represent the largest aggregate contributors to net growth in the next five years, predominately from a continued flow of new medicines and offset by losses of exclusivity.
- Diabetes growth is expected to slow significantly over the period as the effects of biosimilars, continued high gross-to-net effects and small molecule expiries all contribute to declining growth.
- Overall growth in neurology is expected to shift to positive in the next five years as continued innovation in wider population areas as well as significant potential upside related to Alzheimer’s and Parkinson’s therapies as well as rare neuromuscular disorders that is not included in the base case forecast.
- Pain defined broadly to include chronic pain relief, anesthesia and other pain treatments such as migraine is expected to be the fastest growing area over the next five years of the selected high spending classes, lifted in the near term by continued growth in migraine.
- HIV growth is expected to continue from several novel therapies with lower pill burden as well as the addition of new approvals for pre-exposure prophylaxis, offset by the impact of patent expiries.
- Lipid regulators including newer mechanisms is expected to see growth rebound even as newer drugs will be limited to smaller sub-populations while wider use of older generic statins remains the norm.

Notes: Bubble size represents forecast in 2026; neurology includes nervous system disorders such as epilepsy, Parkinson’s, Alzheimer’s, other neurological disorders but excluding mental health or pain. Neurology estimate based on risk-adjusted potential for Alzheimer’s approval and uptake.

U.S. oncology spending to reach \$114Bn by 2026, with growth slowing to 10% from biosimilar savings

Exhibit 44: Oncology spending at estimated manufacturer net prices, US\$Bn



Source: IQVIA Institute, Mar 2022.

- U.S. oncology spending is expected to slow to 8–11% through 2026 as patent expiries for both small molecules and biosimilars offset a continued flow of newer treatments.
- Over the next five years spending is expected to increase 59% on a net basis and add \$42Bn in spending.
- More than 100 new oncology drugs are anticipated based on the current pipeline, although they are expected to be increasingly narrowly focused as precision medicine and biomarker-driven therapies become more common.
- While some therapies are being developed with wide tumor applicability and are being approved based on biomarkers or mutations and termed ‘tissue

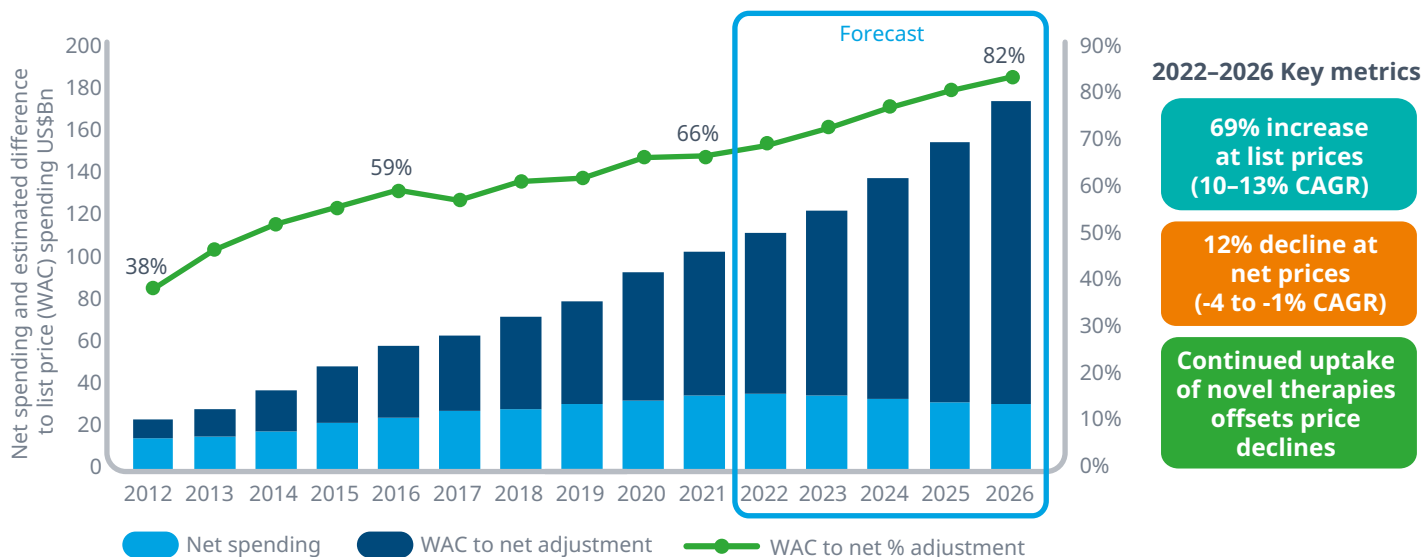
agnostic’ approvals, there are also a continued flow of treatments for very specific tumor or biomarker situations which do not translate to wider use.

- In addition to the flow of more biomarker-driven therapeutic choices, the wider use of next-generation sequencing technologies (NGS), which can test for multiple potential mutations at once and guide therapy selection more precisely, including the timing of shifting lines of therapy for more optimal results.
- While still in earlier stages of adoption, the use of liquid biopsies where NGS is used on blood samples has the potential to identify tumors or changes in growth much earlier and drive much more effective outcomes for patients.

Notes: Oncology includes therapeutics and not supportive care. Spending is at estimated net manufacturer price level.

Diabetes spending to decline 1-4% through 2026 as off-invoice discounts and rebates continue to offset list prices

Exhibit 45: Diabetes spending at net and list price (WAC) levels



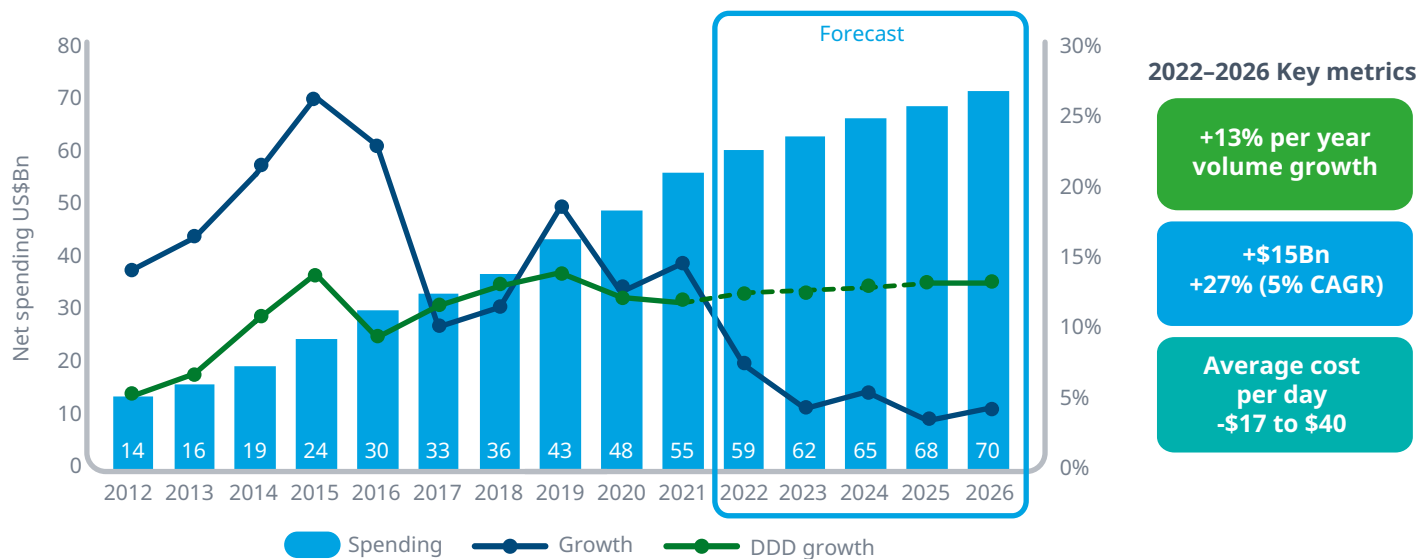
Source: IQVIA Institute, Mar 2022.

- Diabetes spending in the U.S. reflects both the consistent use of older therapies as patients’ type 2 disease progresses, and the adoption of novel therapies later in the treatment pathway.
- Diabetes therapies have among the highest levels of discounts and rebates with list prices 82% higher overall than net manufacturer prices for all products, with wide variations by product (see exhibit 25).
- Over the next five years net revenues for manufacturers will decline by 12%; at -1% to -4% CAGR as net price declines continue.
- The continued uptake of novel therapies in the GLP-1 and SGLT-2 mechanisms continue to contribute but are limited by the degree of discounts and rebates and offset by small molecule expiries and biosimilars.
- Demographic shifts which will likely increase the number of diabetes patients will contribute to greater volume but be offset by net price reductions.

Notes: Spending is at both list price (WAC) and estimated net manufacturer price level. Diabetes does not include obesity drugs using the GLP-1 target which have begun to be marketed as these are categorized elsewhere.

Treatments for autoimmune disorders to exceed \$70Bn in the U.S. by 2026, slowing due to key biosimilars

Exhibit 46: Autoimmune spending at estimated manufacturer net prices, US\$Bn



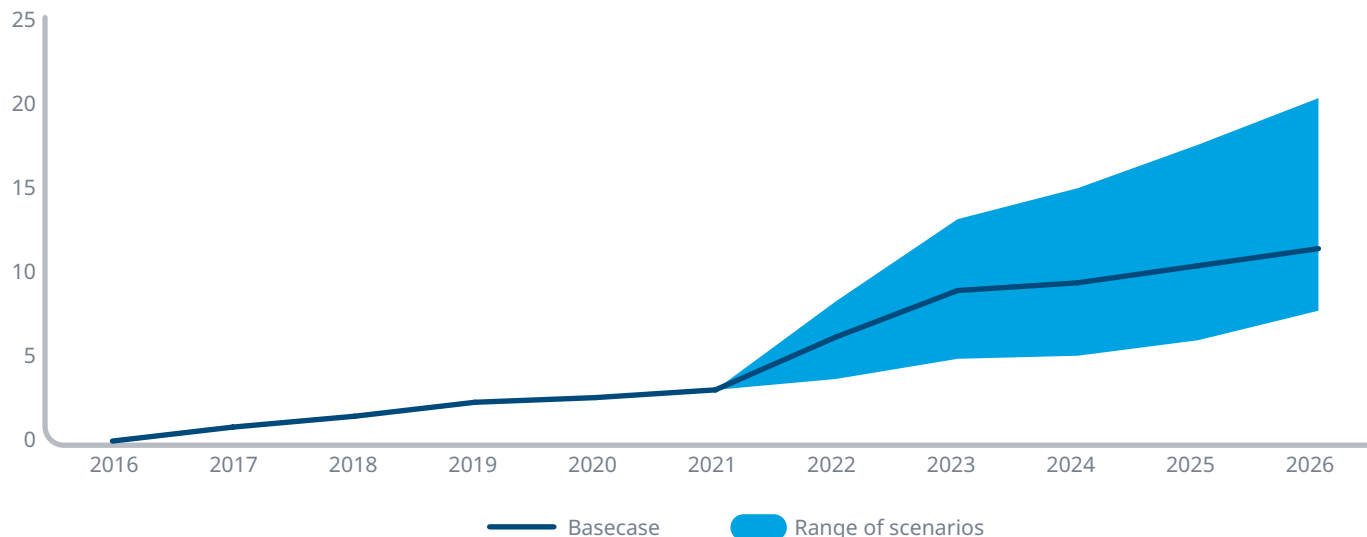
Source: IQVIA Institute, Mar 2022.

- Over the past 10 years, immunology treatments have consistently been driven by increasing volume, averaging 12% volume growth in days of therapy and averaging a higher rate of growth in spending as newer products with higher prices have contributed to growth.
- In the next five years, spending is expected to increase 27% or \$15Bn and slowing to an average 5% CAGR.
- The average cost per day has been rising for most of the past 10 years as prices were rising but costs have declined when spending growth is lower than volume (DDD) growth and costs are expected to drop considerably in advance of major biosimilar events in 2023.
- The introduction of biosimilar adalimumab (Humira) in 2023 and ustekinumab (Stelara) as early as 2024 (but potentially later) will contribute significantly to lower costs for immunology treatments, with the full impact visible in 2023 when spending growth slows to 4%.
- The entrance of biosimilars for leading products is expected to have both direct and indirect effects on market competition contributing to slowing net growth as companies increase discounts and rebates as part of negotiations for formulary position.
- Overall, costs at net manufacturer prices are expected to decline \$17 to \$40 per day, though these costs are not the same as patient cost exposure which can be significantly different based on insurance type and benefit design.

Notes: Spending is at estimated manufacturer net prices. Autoimmune includes small molecule and biologic immunology treatments for a range of diseases including but not limited to rheumatoid arthritis, psoriasis, atopic dermatitis, lupus, ulcerative colitis, severe asthma. Defined daily doses are based on the most common indication and stable maintenance dosing in the label, using body weight assumptions rather than real-world data. These dose assumptions are consistent with the World Health Organization defined daily dose metric (see Methodology section).

Next-generation biotherapeutics to reach \$11Bn by 2026 up from \$3Bn in 2021, with a wide range of potential scenarios

Exhibit 47: U.S. next-generation biotherapeutics spending at estimated net manufacturer prices, US\$Bn



Source: Company Financials for medicines launched in the U.S., Dec 2021, IQVIA Institute, Mar 2022.

- There are currently 33 cell, gene or RNA-based therapies launched globally to-date but only 18 of them are currently marketed in the U.S. An additional 55–65 new therapies are expected to be launched globally by 2026, with a dozen new per year on average, up from the average of three per year in the past five years, and about 60% of those are expected to be available in the U.S.
- While there is considerable R&D activity related to these mechanisms of action, there remains significant uncertainty about the emergence of safety risks and the pace of clinical trials and regulatory reviews, and as has happened for some existing treatments, some may be removed from the market after launch for commercial reasons.
- Total U.S. spending to date has reached \$3Bn, which is 60% of the global spending on these drugs. Total spending is expected to rise to \$11Bn by 2026, but with the potential for both higher or lower scenarios ranging from \$7 to \$20Bn.
- Even considering the large numbers of these products, they will not be more than 20% of all new drugs expected to be launched in the next five years and less than 10% of the spending on new drugs in the same period.
- The lower end of expectations would be driven by lower uptake due to more limited reimbursement, resulting in more risk-sharing agreements and lower net prices or outcomes-based contracts.
- Demonstration of significant clinical benefits could coincide with evolving provider comfort with complex logistics for cell and gene therapies, and significant demonstrated efficacy perhaps using real-world data.

Notes: Spending estimates based on company financials and IQVIA audited data to address potential underreporting of therapies with unique distribution methods. RNA excludes mRNA vaccines.

Notes on sources

THIS REPORT IS BASED ON THE IQVIA SERVICES DETAILED BELOW

IQVIA's Longitudinal Prescription Data: IQVIA receives nearly 4Bn prescription claims per year with history from January 2006 with coverage over 90% for the retail channel, 60–85% for mail service, and 75– 80% for long-term care. Longitudinal data derives from electronic data received from pharmacies, payers, software providers and transactional clearinghouses. This information represents activities that take place during the prescription transaction and contains information regarding the product, provider, payer, and geography. Rx data is longitudinally linked back to an anonymous patient token and is linkable to events within the data set itself and across other patient data assets.

IQVIA's Medical Claims Data: Dx data are pre-adjudicated claims collected from office-based physicians and specialists. These data are sourced from CMS-1500 form-based claim transactions, the standard reimbursement form for all non-cash claims. Medical claims data includes patient-level diagnosis and procedures for visits to U.S. office-based individual professionals, ambulatory and general healthcare sites. The medical claims data includes more than 205Mn patients, over 1.7Bn claims and 3Bn service records obtained annually.

IQVIA's National Prescription Audit (NPA): NPA is the industry standard source of national prescription activity for all pharmaceutical products. It measures demand for prescription drugs, including dispensed pharmaceuticals to consumers across three unique channels: retail, mail service, and long-term care pharmacies. From sample pharmacies, IQVIA collects new and refilled prescription data daily. NPA represents and captures over 92% of all outpatient prescription activity in the United States and covers all products, classes, and manufacturers.

IQVIA's National Prescription Audit: New To Brand (NPA NTB)

NPA New to Brand provides enhanced visibility into the volume of a patient's true, first-time use of a brand versus continued therapies. IQVIA's longitudinal data allows users to analyze new therapy starts, switched to/add-on products, as well as continued therapies. In addition to reporting the new or refill information from a prescription, the therapy history for the patient is taken into account in order to categorize that prescription. New to Brand RX (NBR) = New Therapy Start Rx + Switch/Add-On Rx.

NATIONAL SALES PERSPECTIVES (NSP)TM measures revenue within the U.S. pharmaceutical market by pharmacies, clinics, hospitals and other healthcare providers. NSP reports 100% coverage of the retail and non-retail channels for national pharmaceutical sales at actual transaction prices. The prices do not reflect off-invoice price concessions that reduce the net amount received by manufacturers.

IQVIATM MARKET PROGNOSIS is a comprehensive, strategic market forecasting publication that provides decision makers with insights on the drivers and constraints of healthcare and pharmaceutical market growth. This includes political and economic developments, alongside dynamics in healthcare provision, cost containment, pricing and reimbursement, regulatory affairs and the operating environment for pharmaceutical companies. Market Prognosis contains economic forecasts from the Economist Intelligence Unit and delivers in-depth analysis at a global, regional and country level, and analyzes dynamics at distribution channel, market segment and therapy class level.

Methodologies



DISPENSED PRESCRIPTIONS ADJUSTED FOR 90-DAY PRESCRIPTIONS (METHOD USED IN APPENDIX TABLES)

Prescriptions with >84 days supply to the patient are assumed to represent a three-month prescription, and all other prescriptions are assumed to represent a one-month prescription. Three-month prescriptions are factored by three to normalize prescriptions to one-month durations.

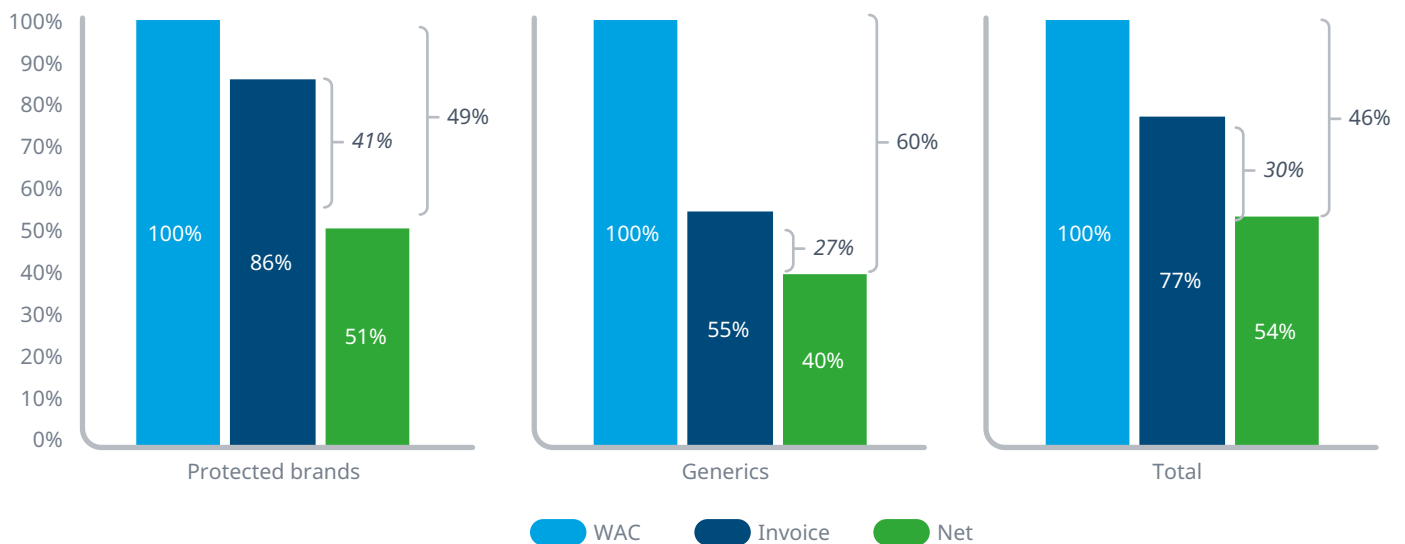
WHO Defined Daily Doses (WHO-DDD) - The World Health Organization (WHO) has developed a method of normalizing medicines of varying intended doses using a defined daily dose (WHO-DDD). The WHO-DDD measure is intended to most often represent a standard day of therapy for a maintenance dose of a chronic therapy. The WHO-DDD measure does not reflect actual treatment decisions and is not derived from distinct patients measured with anonymized data. The WHO-DDD guidance is provided online (see https://www.whocc.no/atc_ddd_index/) but does not include factors or guidance for all drug products. Distinct numeric factors are provided in relation to milligrams or international units

(IU) depending on the medicine, or in terms of number of pills per day in the case of chronic medicines such as hypertension. WHO provides guiding principles for calculating DDDs for fixed-dose combination products. The IQVIA institute has developed additional factors using the same or highly similar concepts to represent more than 75% of audited standard unit volume. DDDs have been estimated for other products based on the standard unit to DDD ratios per product type and therapy area, where specific DDD values had already been determined.

ESTIMATES OF SPENDING AT NET MANUFACTURER PRICES

IQVIA audits reflect invoice-based pricing or list prices derived from proprietary information gathered from wholesalers and company direct sales. While IQVIA invoice prices reflect supply-chain price concessions, they do not reflect the off-invoice discounts and rebates separately paid to insurers, or other price concessions paid to patients or other health system participants. Estimated net prices and revenue are projected from

Exhibit 48: WAC, invoice and net prices, 2021



Source: IQVIA Institute, Mar 2022.

a sample of large and mid-sized companies analyzed from 2011–2021. Branded products are included in the sample if their net sales amount is disclosed in financial filings with the Securities and Exchange Commission (SEC) and if the volume of sales captured in IQVIA audits is consistent with information provided directly by manufacturers in support of IQVIA proprietary datasets. Net prices are calculated by dividing publicly reported net sales values by volumes for the same products reported to IQVIA. Estimated brand net price growth for the total market is projected from the analysis sample to the total market. Net prices represent an estimate of the average manufacturer realized price, reflecting any

reductions in net revenues due to off-invoice discounts, rebates, copay assistance or other price concessions, and do not necessarily reflect the net costs paid by insurers, the federal government, or patients, which all vary significantly and independently. For generic companies, a sample of five large generic companies' generic portfolios were analyzed in aggregate consistent with their SEC filings, as specific generic product analyses are not possible. The IQVIA "net sales adjustment" analysis is based on ex-manufacturer invoice sale prices, which are lower than wholesaler acquisition cost (WAC). In the market overall, invoice prices are 24% below WAC, with net prices are 47% below that list price.

References



1. Squitieri L, Ko C, Brook R H, Chung, K C Resuming Elective Surgery during Covid-19: Can Inpatient Hospitals Collaborate with Ambulatory Surgery Centers?, *Plastic and Reconstructive Surgery - Global Open*: February 2021 - Volume 9 - Issue 2 - p e3442 doi: 10.1097/GOX.0000000000003442. Available from: https://journals.lww.com/prsgo/Fulltext/2021/02000/Resuming_Elective_Surgery_during_Covid_19__Can.53.aspx. Accessed April 6, 2022
2. Health and Human Services information for providers. Available from: <https://telehealth.hhs.gov/providers/billing-and-reimbursement/private-insurance-coverage-for-telehealth/> Last updated October 21, 2021. Accessed April 6, 2022.
3. Feingold JH, Peccoralo L, Chan CC, et al. Psychological Impact of the COVID-19 Pandemic on Frontline Health Care Workers During the Pandemic Surge in New York City. *Chronic Stress*. January 2021. doi:10.1177/2470547020977891 Available from: <https://journals.sagepub.com/doi/full/10.1177/2470547020977891>. Accessed April 6, 2022
4. Vahratian A, Blumberg SJ, Terlizzi EP, Schiller JS. Symptoms of Anxiety or Depressive Disorder and Use of Mental Health Care Among Adults During the COVID-19 Pandemic — United States, August 2020–February 2021. *MMWR Morb Mortal Wkly Rep* 2021;70:490–494. DOI: <http://dx.doi.org/10.15585/mmwr.mm7013e2>. Accessed April 6, 2022
5. Kaiser Family Foundation. Key Questions About Nursing Home Cases, Deaths, and Vaccinations as Omicron Spreads in the United States. Available from: <https://www.kff.org/coronavirus-covid-19/issue-brief/key-questions-about-nursing-home-cases-deaths-and-vaccinations-as-omicron-spreads-in-the-united-states/>. Accessed April 6, 2022.
6. Centers for Disease Control and Prevention (CDC) National Health Interview Survey. Early Release Reports on Health Insurance Coverage. Available from: <https://www.cdc.gov/nchs/nhis/healthinsurancecoverage.htm>. Accessed April 6, 2022.
7. Centers for Disease Control and Prevention. HIV Surveillance Report, 2019; vol. 32. Available from: <http://www.cdc.gov/hiv/library/reports/hiv-surveillance.html>. Published May 2021. Accessed April 6, 2022.
8. Centers for Disease Control and Prevention. Core indicators for monitoring the Ending the HIV Epidemic initiative (preliminary data): National HIV Surveillance System data reported through June 2021; and preexposure prophylaxis (PrEP) data reported through March 2021. *HIV Surveillance Data Tables* 2021;2(No. 4). Available from: <http://www.cdc.gov/hiv/library/reports/hiv-surveillance.html>. Published October 2021. Accessed April 6, 2022.
9. Benefits and Cost of a \$35 Insulin Cost-Sharing Cap for Medicare Patients Kao-Ping Chua, Joyce M. Lee, Joshua E. Tucker, Dominique Seo, Rena M. ContimedRxiv 2022.01.06.22268864; doi: <https://doi.org/10.1101/2022.01.06.22268864>. Accessed April 6, 2022

About the authors



MURRAY AITKEN
Executive Director, IQVIA Institute
for Human Data Science

Murray Aitken is Executive Director, IQVIA Institute for Human Data Science, which provides policy setters and decisionmakers in the global health sector with objective insights into healthcare dynamics. He led the IMS Institute for Healthcare Informatics, now the IQVIA Institute, since its inception in January 2011. Murray previously was Senior Vice President, Healthcare Insight, leading IMS Health's thought leadership initiatives worldwide. Before that, he served as Senior Vice President, Corporate Strategy, from 2004 to 2007. Murray joined IMS Health in 2001 with responsibility for developing the company's consulting and services businesses. Prior to IMS Health, Murray had a 14-year career with McKinsey & Company, where he was a leader in the Pharmaceutical and Medical Products practice from 1997 to 2001. Murray writes and speaks regularly on the challenges facing the healthcare industry. He is editor of Health IQ, a publication focused on the value of information in advancing evidence-based healthcare, and also serves on the editorial advisory board of Pharmaceutical Executive. Murray holds a Master of Commerce degree from the University of Auckland in New Zealand, and received an M.B.A. degree with distinction from Harvard University.



MICHAEL KLEINROCK
Research Director, IQVIA Institute
for Human Data Science

Michael Kleinrock serves as Research Director for the IQVIA Institute for Human Data Science, setting the research agenda for the Institute, leading the

development of reports and projects focused on the current and future role of human data science in healthcare in the United States and globally. Kleinrock leads the research development included in Institute reports published throughout the year. The research is focused on advancing the understanding of healthcare and the complex systems and markets around the world that deliver it. Throughout his tenure at IMS Health, which began in 1999, he has held roles in customer service, marketing, product management, and in 2006 joined the Market Insights team, which is now the IQVIA Institute for Human Data Science. He holds a B.A. degree in History and Political Science from the University of Essex, Colchester, UK, and an M.A. in Journalism and Radio Production from Goldsmiths College, University of London, UK.



JAMIE PRITCHETT
Thought Leadership Manager,
IQVIA Institute for
Human Data Science

Jamie Pritchett is Thought Leadership Manager for the IQVIA Institute, managing aspects of IQVIA Institute projects and conducting research and analysis within global healthcare. Prior to joining IQVIA in 2021, he held positions with the North Carolina Department of Health and Human Services and the Duke Human Vaccine Institute, where he developed skills in understanding and addressing the array of physical, environmental, and social contributors to individual health. Jamie uses his experience in public health, health communication, and drug development and research to understand current trends in healthcare and the life sciences industry. He holds a Bachelor of Science in Animal Science and Zoology and a Master of Toxicology from North Carolina State University.

About the Institute



The IQVIA Institute for Human Data Science contributes to the advancement of human health globally through timely research, insightful analysis and scientific expertise applied to granular non-identified patient-level data.

Fulfilling an essential need within healthcare, the Institute delivers objective, relevant insights and research that accelerate understanding and innovation critical to sound decision making and improved human outcomes. With access to IQVIA's institutional knowledge, advanced analytics, technology and unparalleled data the Institute works in tandem with a broad set of healthcare stakeholders to drive a research agenda focused on Human Data Science including government agencies, academic institutions, the life sciences industry, and payers.

Research agenda

The research agenda for the Institute centers on five areas considered vital to contributing to the advancement of human health globally:

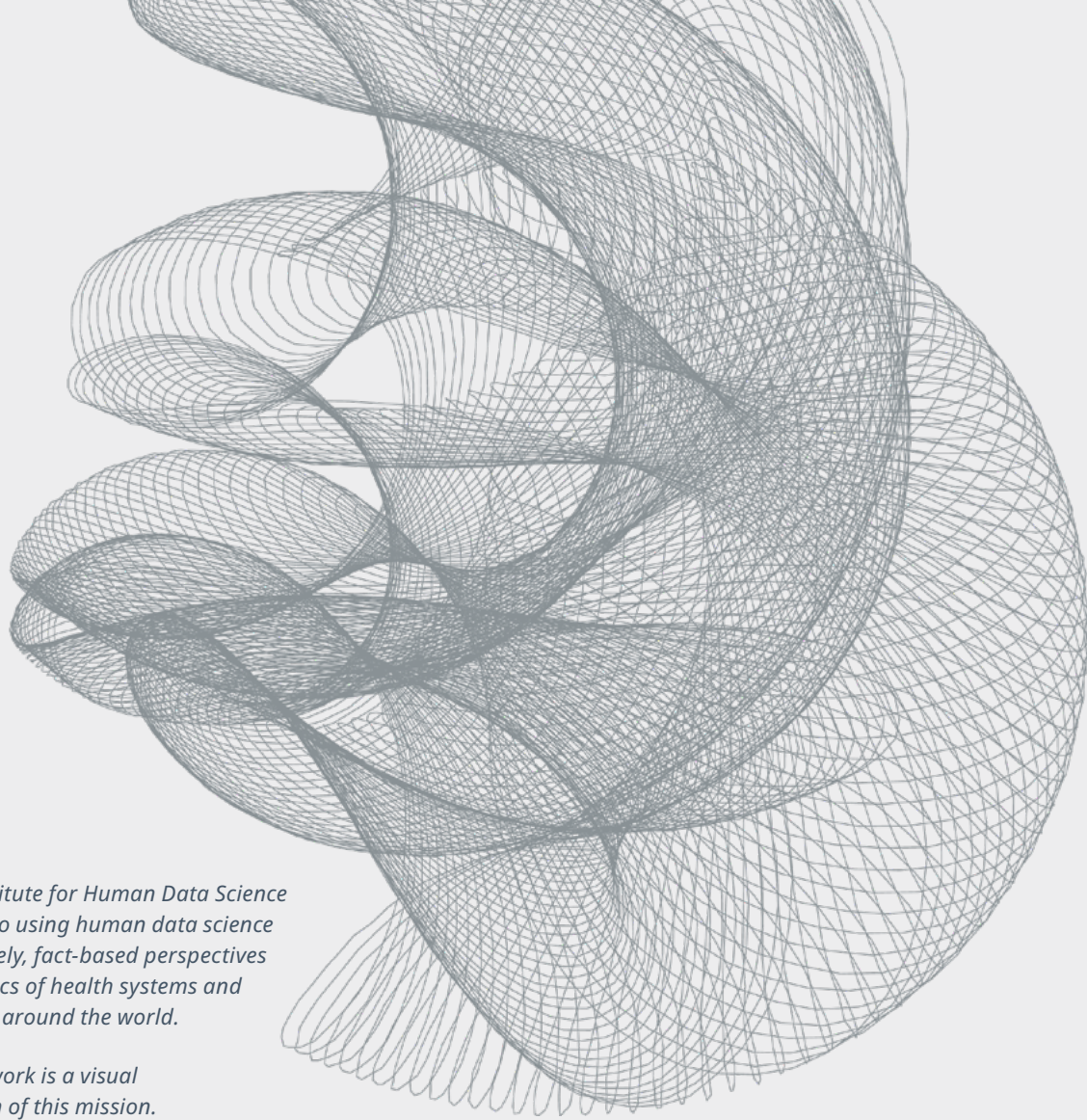
- Improving decision-making across health systems through the effective use of advanced analytics and methodologies applied to timely, relevant data.
- Addressing opportunities to improve clinical development productivity focused on innovative treatments that advance healthcare globally.
- Optimizing the performance of health systems by focusing on patient centricity, precision medicine and better understanding disease causes, treatment consequences and measures to improve quality and cost of healthcare delivered to patients.

- Understanding the future role for biopharmaceuticals in human health, market dynamics, and implications for manufacturers, public and private payers, providers, patients, pharmacists and distributors.
- Researching the role of technology in health system products, processes and delivery systems and the business and policy systems that drive innovation.

Guiding principles

The Institute operates from a set of guiding principles:

- Healthcare solutions of the future require fact based scientific evidence, expert analysis of information, technology, ingenuity and a focus on individuals.
- Rigorous analysis must be applied to vast amounts of timely, high quality and relevant data to provide value and move healthcare forward.
- Collaboration across all stakeholders in the public and private sectors is critical to advancing healthcare solutions.
- Insights gained from information and analysis should be made widely available to healthcare stakeholders.
- Protecting individual privacy is essential, so research will be based on the use of non-identified patient information and provider information will be aggregated.
- Information will be used responsibly to advance research, inform discourse, achieve better healthcare and improve the health of all people.



The IQVIA Institute for Human Data Science is committed to using human data science to provide timely, fact-based perspectives on the dynamics of health systems and human health around the world.

The cover artwork is a visual representation of this mission. Using algorithms and data from the report itself, the final image presents a new perspective on the complexity, beauty and mathematics of human data science and the insights within the pages.

The artwork on this report cover is based on medicine spending and usage data in the U.S. over the last five years.



CONTACT US

100 IMS Drive
Parsippany, NJ 07054
United States
info@iqviainstitute.org
iqviainstitute.org