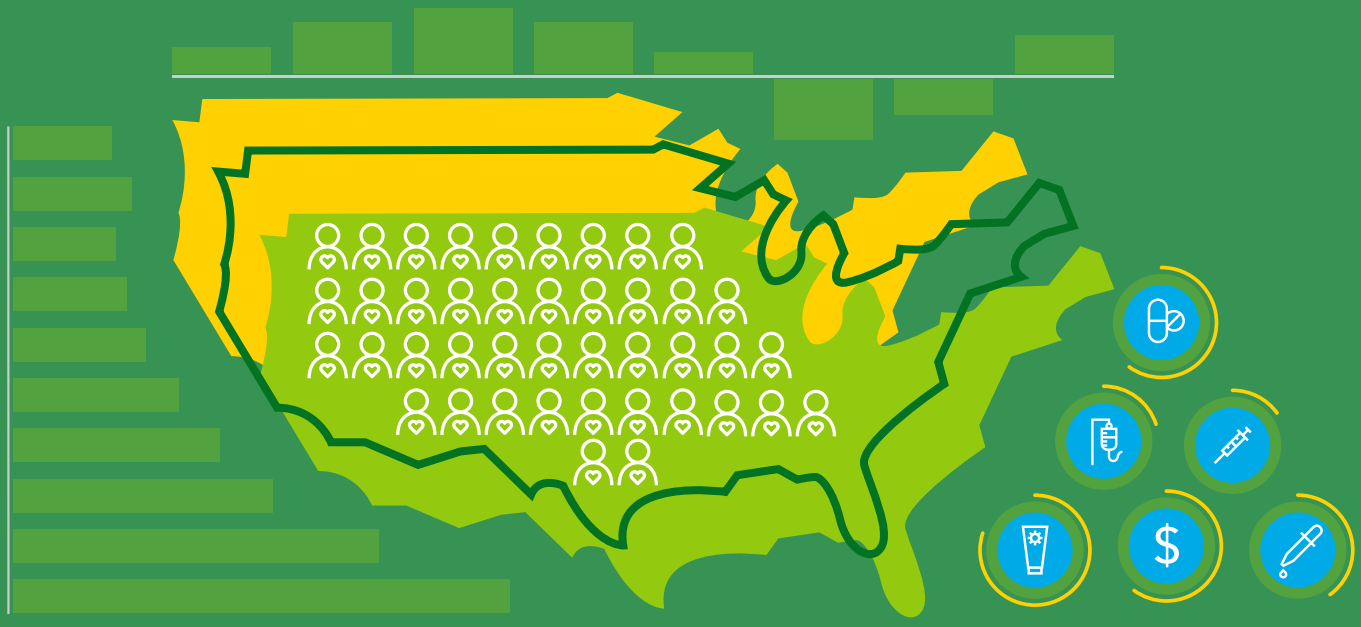
The IMS Institute is now the IQVIA™ INSTITUTE for Human Data Science

MAY 2019

Medicine Use and Spending in the U.S.

A Review of 2018 and Outlook to 2023



Introduction

The use of medicines in the United States is a critical factor influencing the health outcomes of millions of Americans and the level and growth of spending among healthcare stakeholders. The price of new and old drugs and the allocation of costs among patients, employers, health plans, intermediaries and state and federal government agencies all command great attention.

This report focuses its attention on drivers changing the use of medicines, including the availability of new branded drugs, generics and biosimilars and efforts to drive medication adherence in chronic conditions.

To better inform discussions of potential policy reforms, the report also continues to examine "net spending" on medicines in the United States – meaning the amount received by pharmaceutical manufacturers after rebates, off-invoice discounts and other price concessions have been made to distributors, health plans and intermediaries. Further, it tracks the overall volume of prescription opioids used, even as it declines.

In addition, as healthcare costs increase, the report examines the level of out-of-pocket costs borne by patients filling prescriptions at retail pharmacies. The significant differences between initial prices patients are exposed to and the final amounts they spend are highlighted and reasons for these differences are explored.

Finally, the report provides an outlook through 2023 for the pharmaceuticals market, incorporating key dynamics around new product launches, patent expiries and the introduction of generics and biosimilars.

The goal of this report is to provide objective measures of medicine use and their cost to our healthcare system, drawing upon the information and expertise of IQVIA. We hope this report provides the basis for meaningful discussion among stakeholders with an interest in understanding and improving the functioning of our system.

The study was produced independently by the IQVIA Institute as a public service, without industry or government funding. The contributions to this report of Beth Bauer, Allen Campbell, Paul Cariola, Katie Devane, Luke Greenwalt, Brian Hannah, Tim Hughes, Sarah Keefer, Doug Long, Dave MacDougall, Elyse Muñoz, Bernie Gardocki, Deanna Nass, Alana Simorellis, Durgesh Soni, Barry Summers, Mason Tenaglia, Marcella Vokey, Terri Wallace and dozens of others at IQVIA are gratefully acknowledged.

MURRAY AITKEN
Executive Director
IQVIA Institute for Human Data Science

©2019 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

Americans filled 5.8 billion 30-day equivalent prescriptions in 2018, up 2.7% over the prior year at a rate of 17.6 prescriptions per person. More than two-thirds of prescriptions are for chronic conditions, which are increasingly filled with 90-day prescriptions thought to result in better adherence to prescribed regimens. For specialty medicines, which represent 2.2% of volume, use grew by more than twice the rate of other drugs, and more than half of the volume in key therapy areas is now dispensed through retail channels and does not require administration in a hospital, clinic or doctor's office.

In 2018, a growing number of patients were treated with relatively new specialty medicines used across a number of disease areas including oncology, migraine, and atopic dermatitis. A surge of 6.5 million vaccinations also occurred due, in part, to the availability of a new shingles vaccine. Immuno-oncology checkpoint inhibitors, the first of which launched in 2014, were used to treat over 200,000 patients in 2018 with a large variety of cancer types, more than double the number treated with these breakthrough therapies in 2016. Other notable areas for uptake of new medicines were CGRP modulators for migraine and treatments for atopic dermatitis (eczema). Use of medicines for autoimmune diseases increased 20% in 2018, with newly available treatments for ulcerative colitis and psoriasis and related conditions each seeing about 30% growth in the number of patients treated.

Lower-cost prescription medicines in the form of generics and biosimilars had modest growth in volume in 2018, as small molecule generics are already dispensed 97% of the time they are available, and the generic share of prescriptions reached 90%. Generic approvals increased dramatically, with new entrants contributing deflationary pressure to drug prices, though not all approved generics launched. Three novel biosimilars launched in 2018, bringing the total to seven molecules. The biosimilar share of volume exceeded 30% for those medicines, but in total these medicines represent less than 1% of biologic volume. Total biologics spending grew by 9.5% in 2018 and 13% of the spending in the market is now subject to biosimilar competition, where biosimilars have captured about 12% of total available spend.

Prescription opioid volume continued to decline steeply in 2018 as changes in regulations and clinical guidelines, accompanied by high public awareness, drove a 17% decline in total morphine milligram equivalents (MME) dispensed. The biggest decline came from the most potent and dangerous high-dose prescriptions.

Growth in total medicine spending net of rebates, discounts and other price concessions, remained at historically low levels in 2018, increasing 4.5% and reaching $344 billion. When adjusted for population and inflation, net medicine spending in 2018 was $1,044 per person, up 0.9% or $10 from 2017, and up a total of 4.4% or $44 since 2009. Net medicine spending for traditional medicines fell 3.4% on a per capita basis in 2018, while specialty medicines increased 5.8% and now accounts for $517 out of the $1,044 total per person medicine costs.

Total net spending growth in 2018 of $14.9 billion was largely driven by more patients receiving existing branded drugs as well as use of newly launched drugs. These new drugs contributed $24.2 billion to growth, mainly from oncology, autoimmune, diabetes and hepatitis C treatments, which together account for over 75% of the total growth. Price increases for branded drugs by manufacturers contributed only $800 million to growth in 2018 on a net price basis, at a rate of 0.3% – substantially down from prior years and reflecting lower list price increases and sustained increases in price concessions made by manufacturers across the board, but especially in diabetes, asthma/COPD and viral hepatitis.

Total patient out-of-pocket costs climbed in 2018 to an estimated $61 billion, with Medicare patients facing higher annual out-of-pocket levels than patients in commercial plans or on Medicaid. Patients with out-of-pocket costs over $500 annually represent 8.8% of total patients, but 20% of Medicare Part D patients. Commercially insured patients increasingly use manufacturer coupons to offset their initial cost exposure, and average final out-of-pocket costs remained at $42 per brand prescription, similar to 2017 levels. Patient abandonment of prescriptions at retail pharmacies results in patients not receiving medicines prescribed by their doctors and remains a significant issue when the

out-of-pocket costs rise, or when insurance includes a deductible. Patients abandon more than 20% of new-to-brand prescriptions when the out-of-pocket cost is above $50, and they abandon more than 50% when the cost is above $125. Final out-of-pocket costs per prescription paid by patients when filling retail prescriptions fell slightly in 2018 even as average initial patient cost exposure per prescription rose to record highs. Final out-of-pocket costs paid by patients reflect the use of coupons, discounts or patient assistance and excludes the costs of prescriptions that are abandoned at the pharmacy. The average for the year includes those times when the patient is in the deductible period, regular coverage, doughnut hole or catastrophic care, all of which contribute to variability in the pharmacy counter cost for the patient.

While the full impact on manufacturer net sales of potential policy changes are unclear, the base case scenario embeds a net market impact of 1–2% below the prior forecast, with the impacts of potential reforms expected to be phased in gradually. The total net spending growth on pharmaceuticals is forecast to increase at a compound annual growth rate (CAGR) of 3–6% through 2023. The base case scenario for the next five years forecasts net medicine spending in the United States will increase from $344 billion in 2018 to $420 billion in 2023, an aggregate growth of $76 billion compared to aggregate net growth of $84 billion over the past five years.

The largest driver of this growth will be the launch of new brands that are forecast to contribute $73 billion of new spending, as clinical development efforts across the pharmaceutical industry result in new drug approvals and uptake. Offsetting the impact of new brands will be the spending on brands losing exclusivity; forecast to total $78 billion in savings over the next five years. Average brand net price changes for protected branded products are forecast to be between a decline of 1% and increase of 2% per year through 2023 and would result in about $12 billion in incremental spending over the full five-year period.

A large number of potential policy changes, with a particular focus on drug pricing and patient out-of-pocket costs, are currently under consideration and could lead to alternative scenarios based on their impact on payer types, channels and therapy areas and impact invoice spending, net spending and out-of-pocket costs in very different ways. In one scenario where reforms are limited to Medicare programs, patient out-of-pocket costs could decline $14 billion or about 30%, mostly for Medicare patients but including some dynamics that would reduce costs for commercially insured patients and also reduce net spending by as much as 6% to 2023. In another scenario, reforms proposed for Medicare would be extended to the commercial market and largely remove the existence of off-invoice discounts and rebates. This would lower patient out-of-pocket costs 30% or $20 billion below projected 2023 levels for patients of all pay types, and likely drive net spending 9% lower than base case projections. These net spending scenarios embed a large portion of cost reductions coming from manufacturer net price reductions but equally could result in smaller declines for manufacturers with different relative splits of impact between health plans, manufacturers and beneficiary insurance premium increases, all of which could vary significantly. Largely due to the expected surge in innovative medicines over the next five years, the lower of these scenarios still results in net manufacturer revenue growing at a CAGR of 0–3%, and should that growth fail to materialize, or uptake of these medicines be less than expected, revenues could decline.

A Note on Nomenclature

In this report, "spending on medicines" and "invoice-price spending" refer to the amounts paid to distributors by their pharmacy or hospital customers. It does not relate directly to either the out-of-pocket costs paid by a patient, except where noted, nor does it refer to the amount health plans or Medicare pay for medicines, and does not include mark-ups and additional costs associated with dispensing or other services associated with medicines reaching patients.

"Net-price spending" is a proprietary derived estimate of the amount received by pharmaceutical manufacturers after rebates, off-invoice discounts and other price concessions have been made by manufacturers to distributors, health plans and intermediaries.

See the Methodology section for more details.

Medicine Usage Trends

- Nearly 5.8 billion prescriptions were dispensed in 2018, up 2.7% from 2017.
- The top 10 traditional therapy areas, representing nearly two-thirds of traditional prescriptions, grew at 2.4% in 2018.
- Traditional medicines made up 97.8% of prescriptions in 2018 and most large therapy areas grew faster than the total market, and addressed chronic conditions with increases in prescriptions driven by adherence improvements.
- Prescription adherence has improved since 2016 across all regions, particularly in Medicare, which ranged from 78–81% in 2018.
- Adherence is a key driver of better outcomes in chronic therapy areas, but is not uniform regionally and varies by different factors, such as method of payment; Medicare Part D patients are more adherent on average.
- Specialty medicines were 2.2% of prescription volume in 2018, but grew at 5.7% in 2018 and at a 4.2% CAGR since 2013.
- New flu and shingles vaccines are being widely used, leading to 88% of new therapy starts in 2017 and 2018 in vaccines and the remainder in other therapy areas, notably prescription treatments for migraine, atopic dermatitis, autoimmune disorders and diabetes.
- The number of patients being treated with PD-1 and PD-L1 inhibitors has risen rapidly since their introduction in 2014, reaching 200,000 patients treated during 2018, more than double the number treated in 2016.
- The number of autoimmune patients being treated is up 63% since 2013, with six million more patients per year receiving therapy, largely driven by new treatments for psoriasis and related conditions.
- Generics make up 90% of prescriptions dispensed, up from 75% in 2009, and continue to be dispensed 97% of the time when available.
- Biosimilar 'efficiency' has reached 31%, but the accessible market is less than 1% and only seven molecules have biosimilars available in the market.
- Prescription opioid volume has declined 43% since the peak in 2011, with high-dose prescriptions of 90 MMEs per day or greater declining by 61%, while prescriptions for fewer than 20 MMEs have largely remained stable.

There were 5.8 billion prescriptions dispensed in 2018, up 2.7% from 2017

Exhibit 1: Prescriptions in Millions and Growth

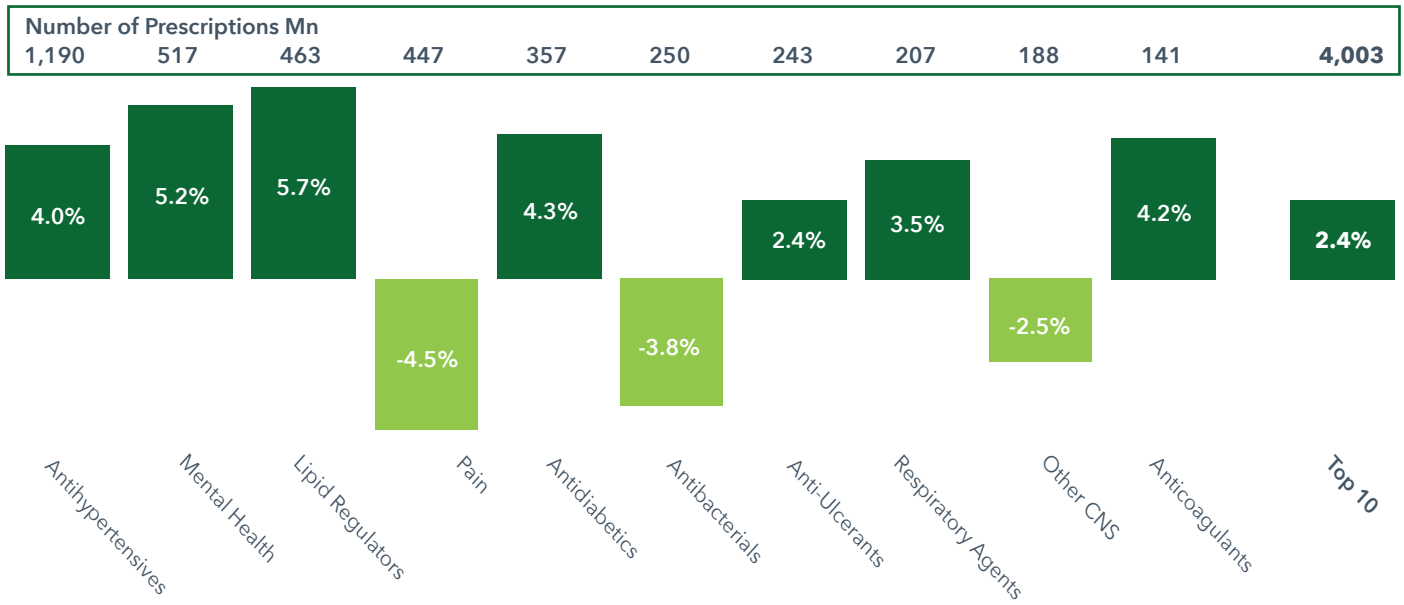
Source: IQVIA National Prescription Audit, IQVIA Institute, Jan 2019

- Total prescriptions – adjusted for prescription length – reached nearly 5.8 billion in 2018, up from an estimated 5.3 billion in 2014.
- Chronic prescriptions account for more than two-thirds of prescriptions, and increasing use of 90-day prescriptions, often with automatic refills is resulting in significant increases in the amount of medicine patients have on-hand.
- The increasing use of 90-day prescriptions is particularly notable as the rate of growth without adjusting for prescription length was -0.6% in 2018 but 2.7% after adjusting.
- A number of incentives are in place for pharmacies, providers and Accountable Care Organizations (ACOs) based on achieving levels of medicine possession by patients, called percentage of days covered (PDC), and that are strongly linked to the rising use of 90-day prescriptions observed here.
- Prescriptions for specialty medicines – those that treat chronic, complex or rare diseases, and possess additional distribution, care delivery and/or cost characteristics – grew by over 5% for the second year even as those medicines account for only 2.2% of prescriptions and have little impact on the overall growth of dispensed prescriptions.
- In total, 127 million specialty prescriptions were dispensed in retail and mail pharmacies in 2018, up by 15 million since 2014.

Chart notes: Chart displays adjusted dispensed prescriptions. 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. Charted values may not sum due to rounding. IQVIA has restated 2017 and 2018 values to reflect data collection and methodology changes related to removing abandoned or voided prescription transactions, and in this exhibit prior periods have been estimated based on back-projection of current values using previously published growth rates. Specialty medicines are those that treat chronic, complex or rare diseases, and which have a minimum of four out of seven additional characteristics related to the distribution, care delivery and/or cost of the medicines (see Methodology section for more details).

Traditional medicines made up 97.8% of prescriptions in 2018 and most large therapy areas grew faster than the total market

Exhibit 2: Traditional Drug Prescriptions and Percentage Growth in 2018 for Top 10 Therapy Areas



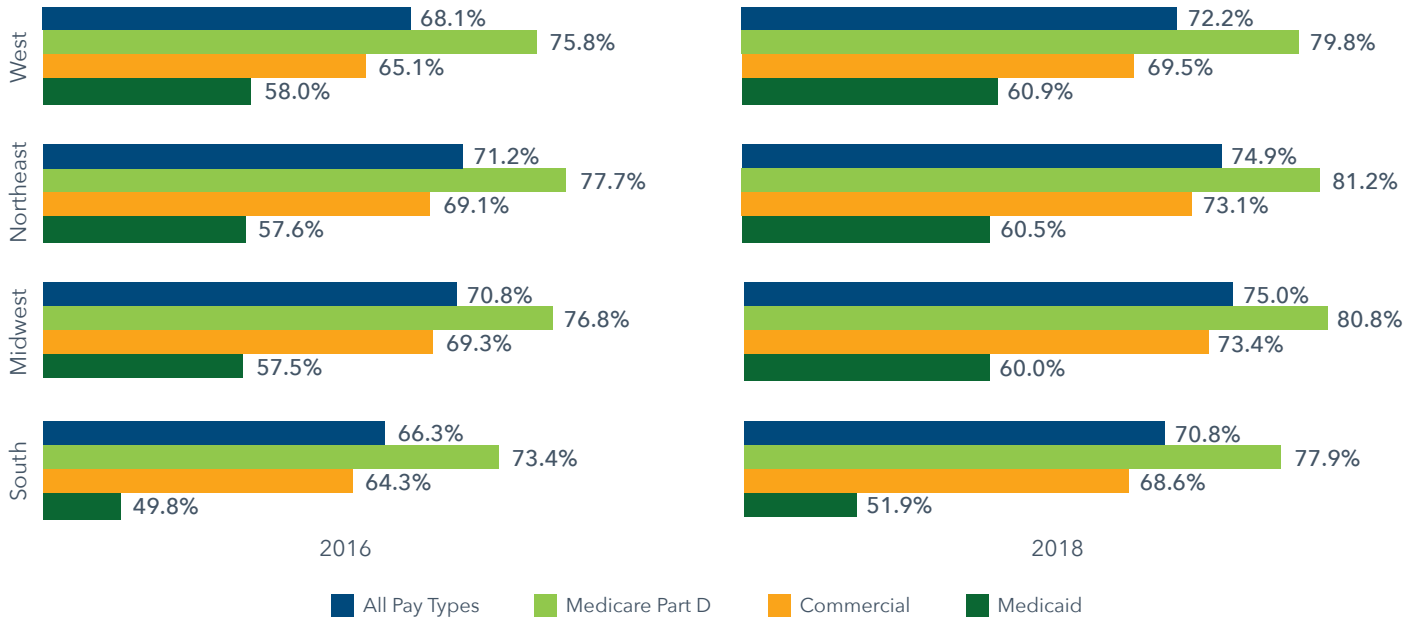
Source: IQVIA National Prescription Audit, IQVIA Institute, Jan 2019

- Dispensed lipid regulator prescriptions saw the greatest growth in 2018, increasing by 5.7%, while pain prescriptions dropped by 4.5%
- The top 10 traditional therapy areas, representing nearly two-thirds of traditional prescriptions, grew at 2.4% in 2018.
- Hypertension prescriptions grew by 46 million, with 36 million driven by changes in use related to the aging population and 10 million by population growth.
- Mental health treatments grew by 26 million prescriptions with only five million tied to population changes (i.e. growth and aging) and 21 million due to increased use.
- Hypertension drugs, lipid regulators and antidiabetic treatments all increased by more than 4% over 2017 driven both by increased disease prevalence and incentives to improve drug adherence.
- Pain medicines, which in this view include non-narcotic drugs, declined by 21 million prescriptions, driven significantly by the declines in prescription opioid use with little, if any, offsetting use of other types of pain treatment.

Chart notes: Chart displays adjusted dispensed prescriptions. Prescription counts are adjusted for length of prescriptions (i.e., days supply). 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 are factored by three, and those under 84 days are unchanged. Other CNS includes behavioral drugs such as tranquillizers, psycholeptic-psychoanaleptic combinations and drugs for addictive disorders, as well as nootropics, neurotonics and other miscellaneous products, antivertigo preparations and parasympathomimetics.

Prescription adherence has improved since 2016 across all regions, particularly in Medicare, which ranged from 78–81% in 2018

Exhibit 3: Percentage of Patients Adherent to Dispensed Prescriptions by Region



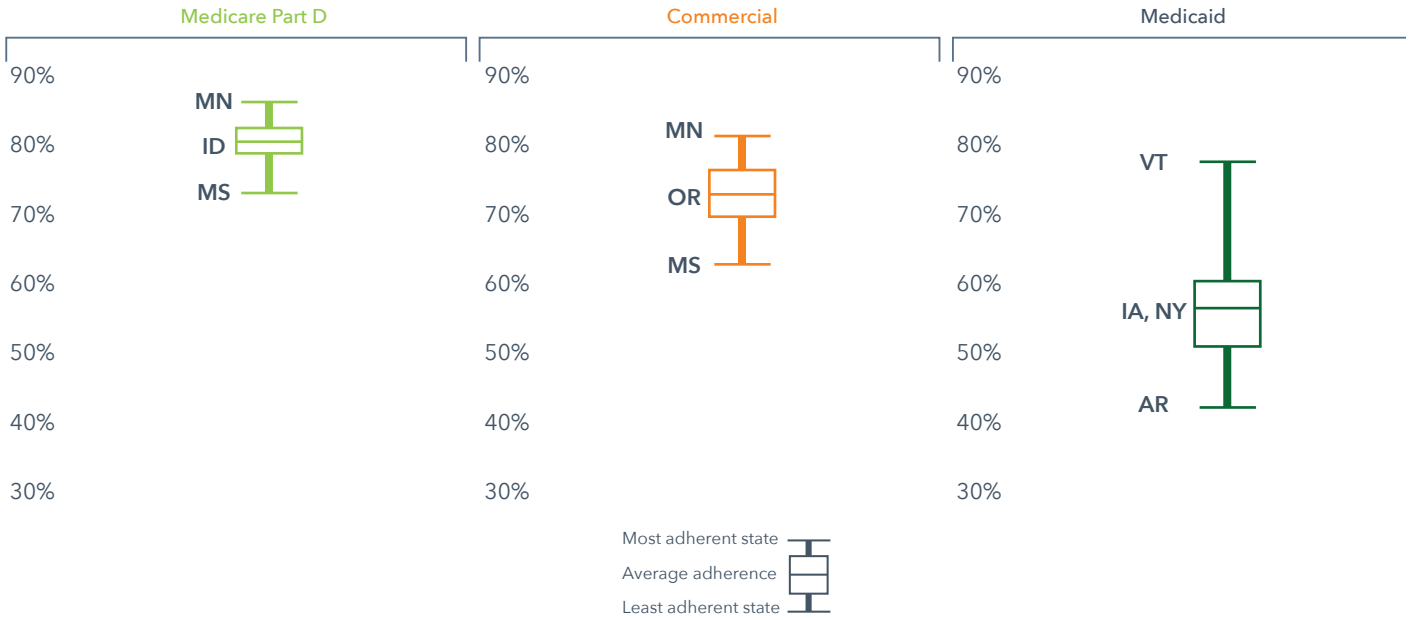
Source: IQVIA Real World Evidence, Longitudinal Prescription Data, Dec 2018

- Across a range of chronic conditions, medication adherence is identified as a key contributor to better outcomes and has been included in various policies and incentives for health system participants to help contribute to better outcomes.
- Approaches to encourage adherence include the use of health navigators and regular reminder communications via phone, e-mail and mobile apps.
- Perhaps the most common and effective method to encourage greater adherence is the use of 90-day duration prescriptions and automatic refill programs.
- While patients receiving longer prescriptions or automatic refills may have a higher rate of medicine in hand, it is unclear whether these contribute to better outcomes, or offset the root causes of some patients' non-adherence.
- Clinically complex patients often have lower adherence and may face multiple chronic conditions, or a severe primary condition (e.g., severe heart failure, metastatic cancer, end-stage renal disease), or have concurrent mental and physical health problems.
- Patients who are adherent to their mental health drugs are often more adherent to medications for other chronic diseases as well.
- Other reasons for poor adherence can include conditions that require treatment by multiple providers and resultant high patient burden and/or specialized sites of care, socioeconomic factors, level of education or literacy.

Chart notes: Chart covers patients with cholesterol, diabetes or hypertension prescriptions. Adherence measures the percentage of patients who have medicine in hand >80% of days of a prescribing period after having started a chronic disease treatment regimen in the three selected therapy areas. Medicaid includes fee for service and Managed Medicaid. 'All therapy areas' includes cash. Adherence 'period' is the quarter used to test patient adherence and is Q4 2016 and Q4 2018, respectively.

Adherence is a key driver of better outcomes in chronic therapy areas, but varies by state and insurance type

Exhibit 4: States with Highest, Lowest and Average Adherence Rates per Pay Type, 2018



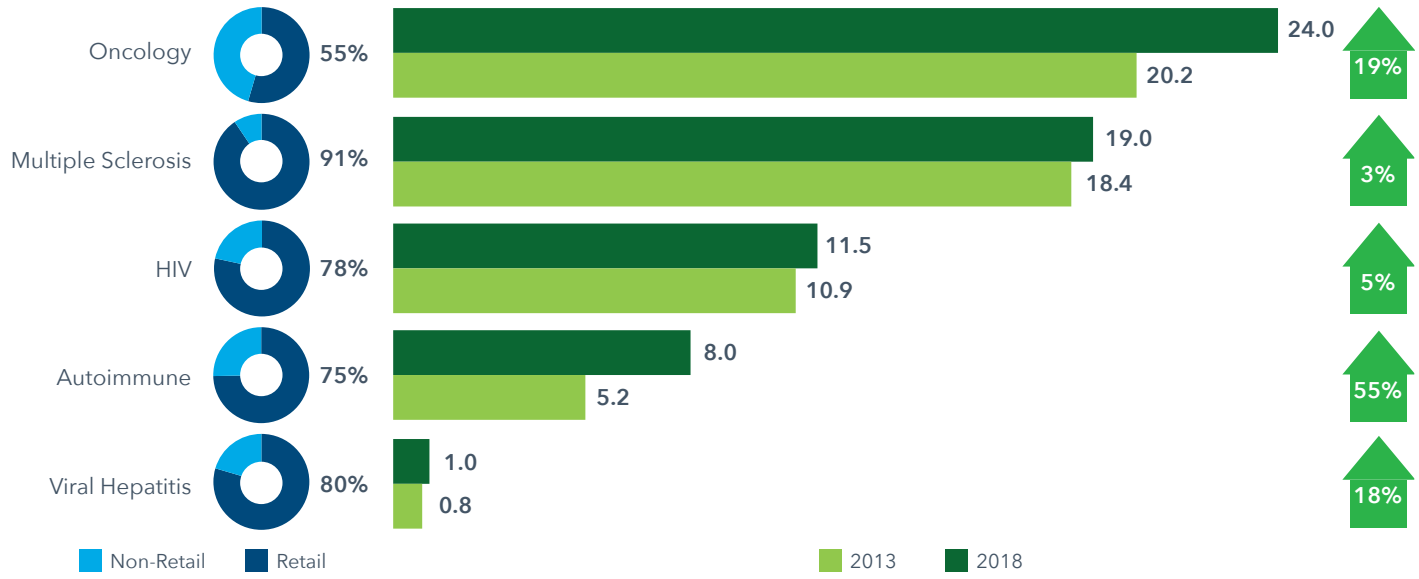
Source: IQVIA Real World Evidence, Longitudinal Prescription Data, Dec 2018

- Adherence to therapy is not uniform regionally and varies by different factors, such as method of payment. For instance, patients with Medicare Part D are more adherent on average.
- Across the country in three large chronic therapy areas (Hypertension, Cholesterol and Diabetes), measures of adherence have varied from as low as 50% in some states among Medicaid recipients, to as high as 85% in others for those covered by Medicare Part D.
- Vermont and Minnesota and some other states have generally high adherence across pay types, while others have consistently poor adherence rates, such as Mississippi and the District of Colombia.
- Certain states, such as Iowa are notably near the average of each pay type.
- The greatest range of variability is within the Medicaid pay type, and could be as a result of socioeconomic differences across states as well as whether states have expanded Medicaid under the ACA.
- Medicare Part D includes incentives for pharmacies and Accountable Care Organizations (ACOs) to improve adherence, and many employers and commercial plans also target similar goals as improved adherence is associated with better outcomes, particularly in chronic conditions.
- It is possible that some of the approaches used to improve adherence in Medicare Part D have had spillover effects and have also been applied to the commercially insured group of patients and even to Medicaid.

Chart notes: Analysis includes the state average adherence across diabetes, cholesterol and hypertension. Adherence measures the extent to which a patient has the prescribed therapy, and measures the percentage of patients who have medicine for >80% of the prescribing days in a period. An adherence rate in this analysis of 85% indicates that 85% of patients had >80% of prescribing days with medicine in hand. The chart plots the most and least adherent states, median of adherence, and callouts of average adherent states across payer channels.

Specialty medicines were 2.2% of prescription volume in 2018, but grew at more than double the rate of traditional medicines

Exhibit 5: 2018 Retail Share of Volume for Selected Specialty Therapy Areas and Adjusted Dispensed Prescriptions, Mn



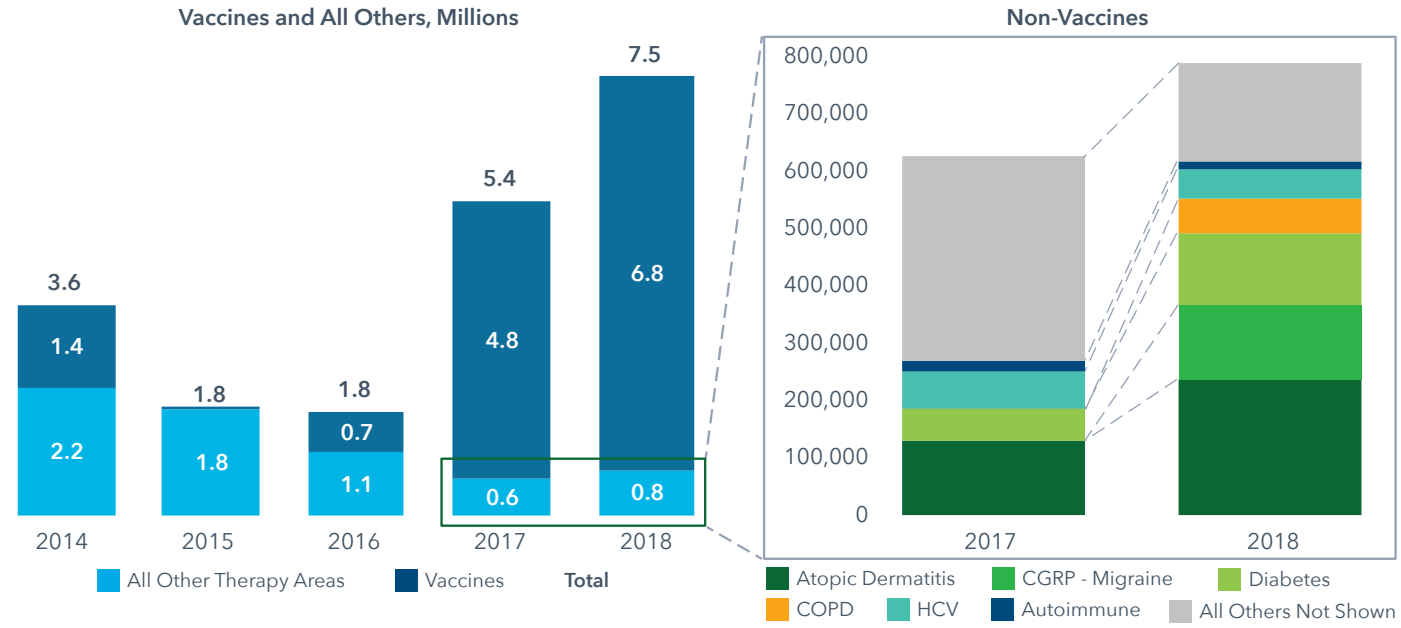
Source: IQVIA National Sales Perspectives, National Prescription Audit, Jan 2019

- Adjusted dispensed prescriptions for specialty medicines grew 5.7% in 2018 and grew at a 4.2% CAGR since 2013 (see Exhibit 1).
- Leading therapy areas have had significant prescription growth in the past five years as a range of new therapies have been introduced in oncology, multiple sclerosis (MS), autoimmune, HIV and viral hepatitis.
- Retail channels, where prescriptions can be dispensed, represent between 55–91% of volume for these specialty classes.
- While each of these therapies employ a mix of prescription medicines and provider-administered drug therapies, these prescription trends represent a significant proportion of the volumes used in these classes.
- The largest increase in prescription volume is in oncology, offering patients a more convenient way to receive treatment than prior requirements for infusions for some tumors.
- In oncology in particular, prescription treatments were once low-cost treatments such as hormonal therapies for breast and prostate cancer, but in recent years oral kinase inhibitors for many solid tumors have driven much of the volume increases seen here.
- In autoimmune diseases, an increasing number of treatments have launched in the past five years, and are treating more patients. Some are for specific disease areas such as psoriasis, while others have uses across multiple conditions.

Chart 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. Volumes in retail include retail and mail order and are measured in extended units.

New flu and shingles vaccines are being widely used, while there are fewer new starts in other notable therapy areas

Exhibit 6: New Therapy Starts for Brands Launched Less Than Two Years Prior



Source: IQVIA National Prescription Audit, Jan 2019

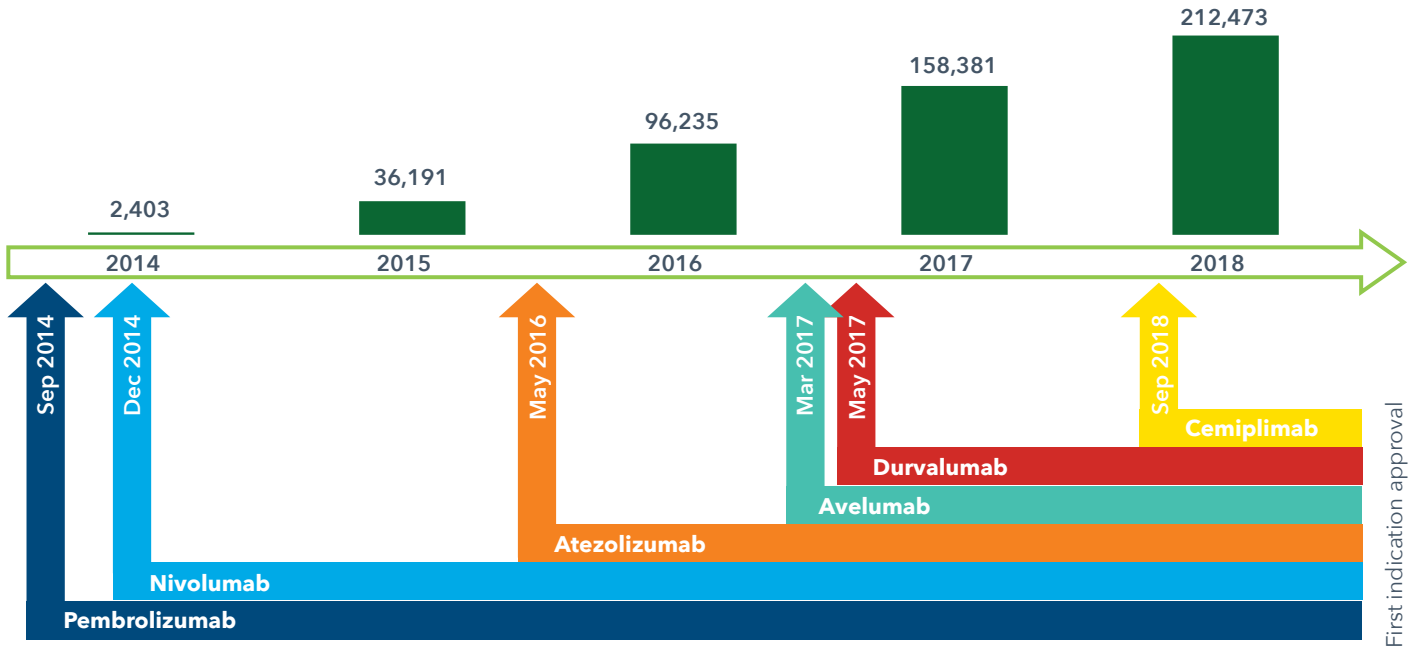
- There were 7.5 million new therapy starts by patients in 2018, a 40% increase from 2017.
- Over 88% of new therapy starts in 2017 and 2018 have been in vaccines, with the remainder in more traditional therapy areas.
- Approximately 40% of new therapy starts in 2018 are due to the launch and rapid uptake of the novel shingles vaccine Shingrix. Shingles is a painful disease that can lead to postherpetic neuralgia, and Shingrix has shown to be more than 90% effective and prevent long-term nerve pain.[1]
- In 2017, almost 60% of new therapy starts were for the flu vaccine Flucelvax Quadrivalent. Unlike other flu vaccines, Flucelvax is manufactured from cell cultures rather than eggs, and the FDA noted this technique helped to provide an improvement in efficacy versus traditional flu vaccines.[2]
- Novel mechanisms in established therapy areas have the potential to rapidly reach patients and change treatment paradigms given the right levels of accessibility.
- The continued uptake of crisaborole (Eucrisa) and dupilumab (Dupixent) for atopic dermatitis, as well as the launch of the novel CGRP therapies for chronic migraine contributed to almost half of all patient starts in 2018.

Chart notes: New Therapy Starts are calculated based on a patient having no previous therapy in the therapy class within the prior year. As these therapies can be novel classes, the patients could have switched from another therapy or mechanism. Atopic dermatitis includes two medicines, crisaborole and dupilumab which is also indicated for severe asthma. Totals may not sum due to rounding.

1. CDC. New Shingles Vaccine Fact Sheet for Adults. Accessed Apr 2019. Available from: https://www.cdc.gov/shingles/fact-sheets/shingles-factsheet-adults.html.
2. STAT. Flu vaccine grown without eggs provided measurably better protection this season, FDA says. Mar 2018. Available from: https://www.statnews.com/2018/03/09/cell-culture-flu-vaccine-flucelvax/

The number of patients being treated with PD-1 and PD-L1 inhibitors has risen rapidly since their introduction in 2014

Exhibit 7: Unique Patients Treated with PD-1 and PD-L1, 2014–2018



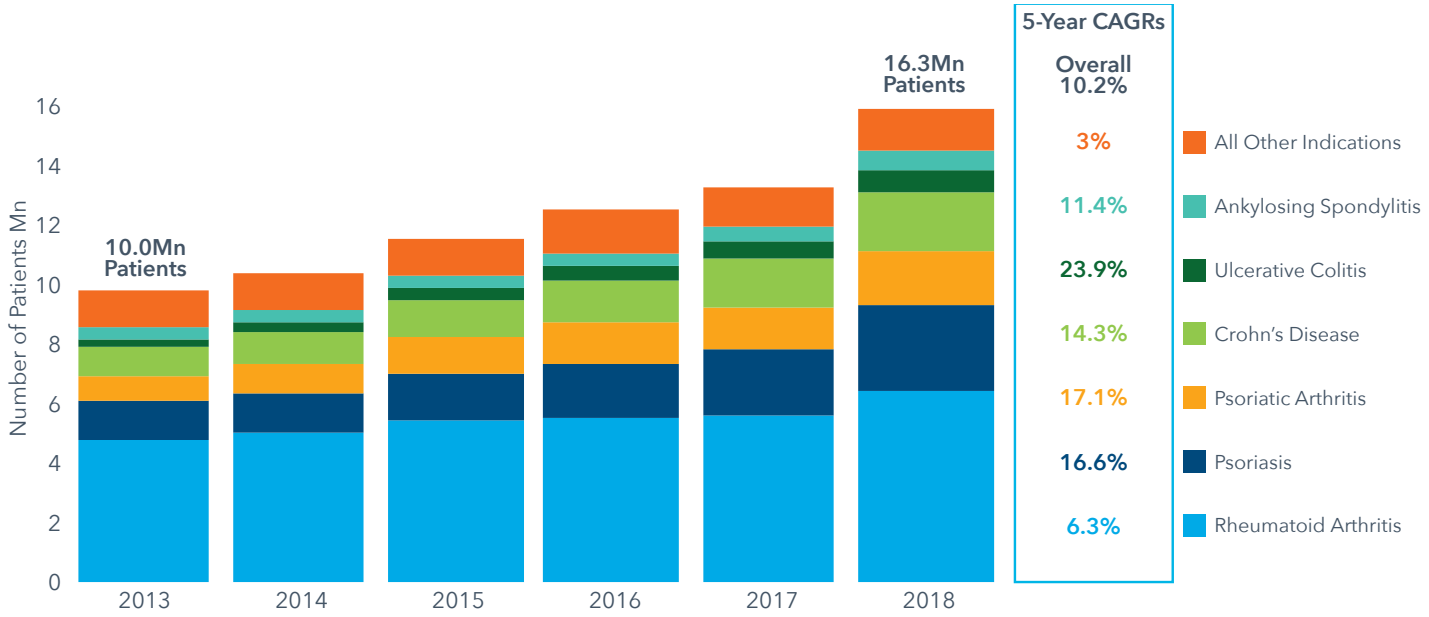
Source: IQVIA Real World Evidence, Medical Claims, Dec 2018

- The introduction of PD-1 and PD-L1 checkpoint inhibitors over the past five years have dramatically improved outcomes for patients with a wide range of solid tumors.
- These drugs work by using the patient's own immune system that is otherwise inhibited or impaired in its ability to identify and target cancer cells.
- There were more than two hundred thousand patients treated during 2018, up from 2,403 in 2014 when pembrolizumab became the first approved drug of this type to launch in September 2014.
- There have been dozens of indications approved for these medicines since that time but together they represent the some of the most advanced types of treatments available to patients with cancer.

Chart notes: Patients are identified as unique patients receiving at least one infusion in that year and do not reflect patients who completed a course of treatment.
PD-1 = Programmed cell death protein 1; PD-L1 = Programmed cell death protein ligand 1.

The number of patients with autoimmune diseases being treated per year is up 63% since 2013, an increase of six million patients

Exhibit 8: Number of Patients Receiving Treatment for Autoimmune Diseases per Year by Indication, Millions



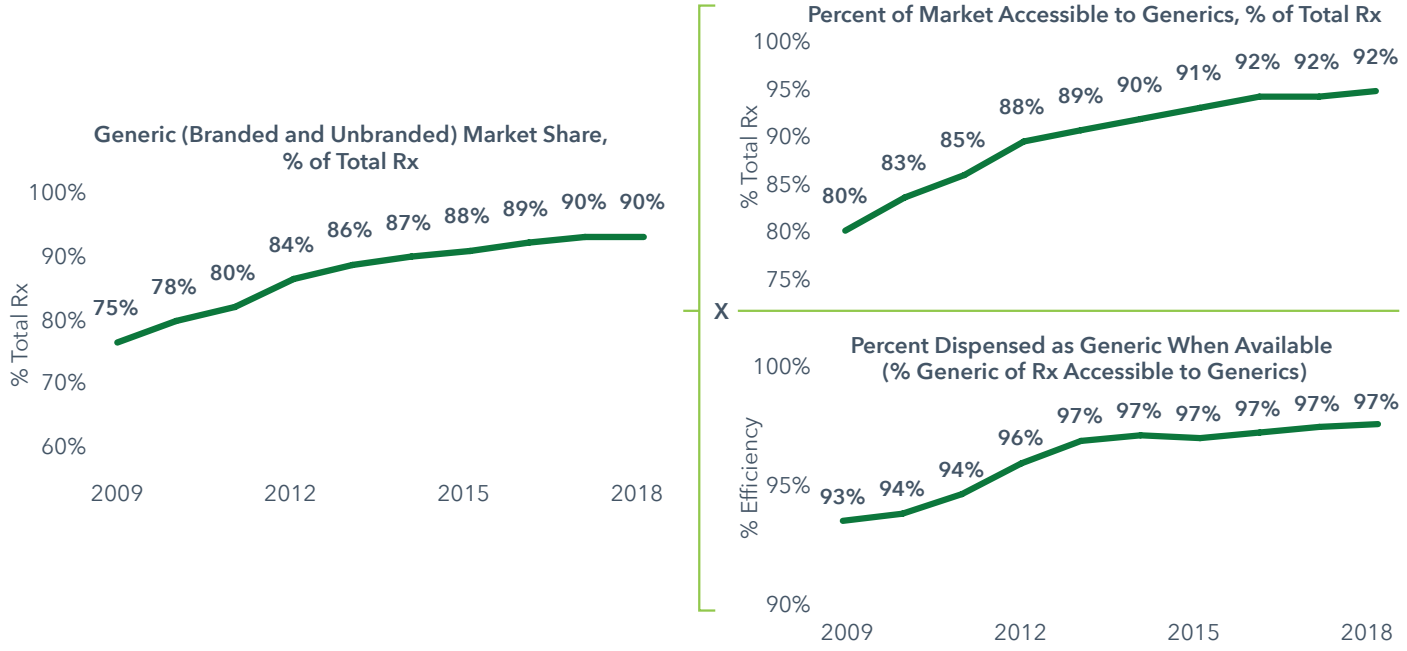
Source: IQVIA Real World Evidence, Longitudinal Prescription Data, Jan 2019

- The number of autoimmune patients receiving drug treatments also grew by 20% alone in 2018.
- Ulcerative colitis and psoriasis grew the most in 2018 with 29% and 30% increases, while Crohn's Disease, psoriatic arthritis, and ankylosing spondylitis increased by 27%, 23%, and 21%, respectively.
- From 2013 to 2018 there has been a 63% increase in patients treated for autoimmune diseases – corresponding to a 10.2% CAGR.
- Areas of high unmet need, such as Crohn's disease and ulcerative colitis, saw a doubling (195%) and tripling (292%) of patients treated since 2013, respectively.
- Psoriasis and psoriatic arthritis treated patient populations have also both more than doubled, increasing by 120% since 2013, with 16.6% and 17.1% CAGRs, respectively.
- Rheumatoid arthritis continues to be the most common autoimmune disease treated, with 41% of all autoimmune patients treated for the condition in 2018. However, this is a decrease from 2013, when rheumatoid arthritis patients comprised 48% of all treated patients, indicating the emergence of effective therapies for other autoimmune conditions.
- Psoriasis and psoriatic arthritis now comprise 18% and 11% of patients receiving treatment.
- Autoimmune prescriptions increased at a five-year CAGR of 9%, while patient volume has a 10.2% CAGR over the same timeframe, suggesting new patients are being treated but overall rates of adherence are relatively unchanged during the past five years.

Chart notes: CAGR = Compound Annual Growth Rate. Anonymized patient data used to identify patients receiving at least one claim for prescription or treatment associated with relevant conditions.

Generics make up 90% of prescriptions dispensed, up from 75% in 2009, and are dispensed 97% of the time when available

Exhibit 9: Generic Shares of Dispensed Prescriptions



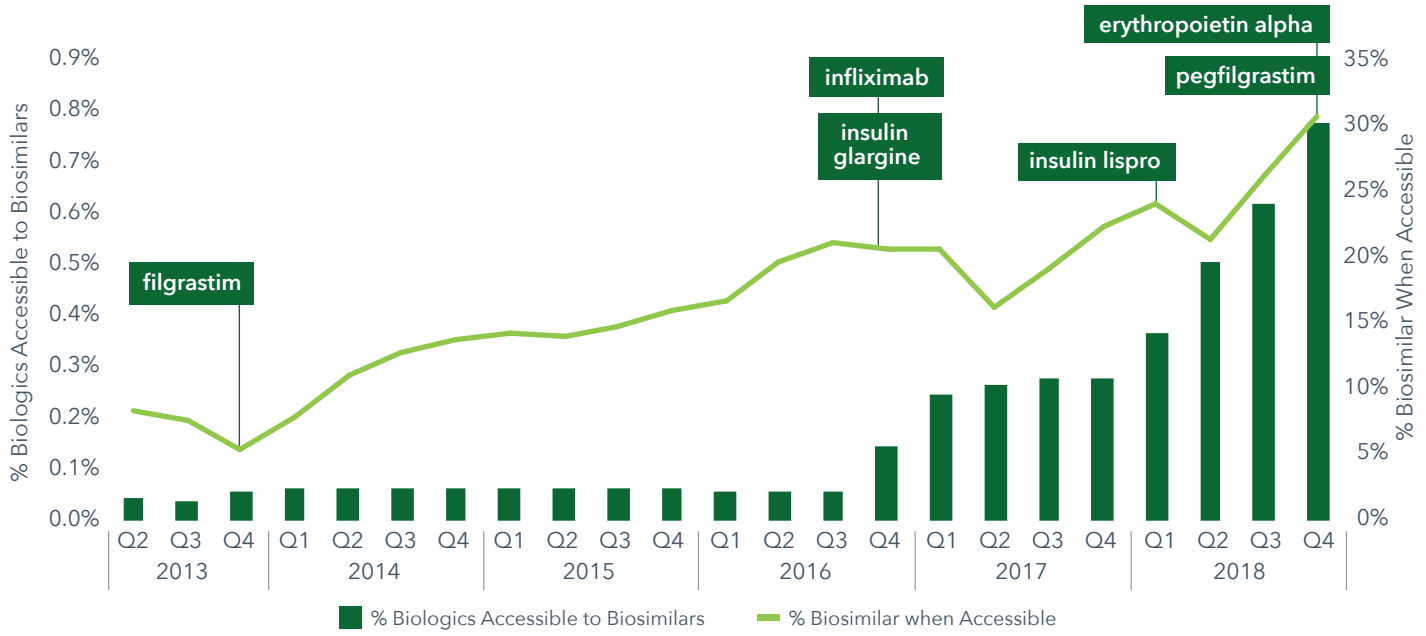
Source: IQVIA National Prescription Audit, Jan 2019

- The overall level of generic dispensing of prescription medicines has risen from 75% in 2009 to 90% in 2018.
- The market accessible to generics, measured as that part of the market where generics have launched, has risen from 80% of prescriptions to 92% over ten years.
- The overall rate of generic dispensing, when it is possible to do so, rose from 93% to 97% by 2013, and has remained steady for the past six years.
- The high level of generic dispensing is consistent with significant financial incentives for patients and providers to make use of the lowest cost alternatives where possible.
- There remain several therapy areas where the interchangeability of small molecule generics is not considered appropriate by the FDA and individual doctors, which are often called narrow therapeutic index therapy areas.
- In other cases, patients have preferred the original brand but usually face higher out-of-pocket costs if a generic is available.
- In many therapy areas, however, the rate of generic dispensing is at or near 100%.
- This rate includes biosimilars and with a number of approvals since 2016, the accessible market, while remaining small, has increased dramatically.

Chart notes: If a generic or branded generic is available in the market for a medicine (i.e., a molecule, molecule combination, of a specific formulation) it is considered to be available, whether or not the FDA Orange Book indicates that they are substitutable.

Biosimilar use remains small, with under 1% of the market accessible to biosimilars and biosimilars used less than a third of the time

Exhibit 10: Percent of Biologics Volume Accessible to Biosimilars and Dispensed as Biosimilar When Accessible



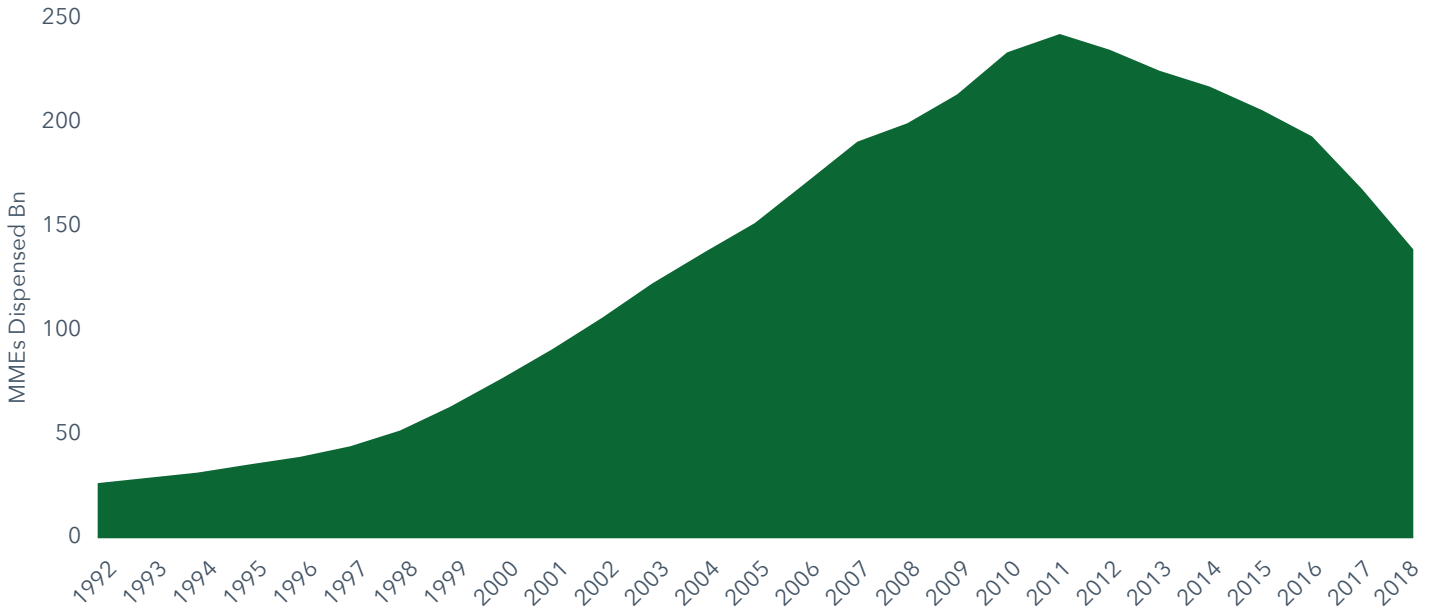
Source: IQVIA National Sales Perspectives, Jan 2019

- The first biosimilars approved in the United States captured an average 15–30% share of their respective molecules and averaged 15% from Q2 2013–Q3 2016.
- In 2016, infliximab and insulin glargine biosimilars were approved and the accessible market by volume nearly tripled, although the total market remained below 0.3% of overall biologic extended units in the country.
- In 2018, another three molecules became available as biosimilars and the overall volume accessible to biosimilars reached nearly 0.8%.
- The biosimilar share of the accessible market has generally been rising, and now averages 31%.
- The biosimilar share of the accessible market dropped in Q2 2017 and Q2 2018 following the introduction of new biosimilars as more of the market became accessible to biosimilars without those new biosimilars yet penetrating. It has subsequently risen as those new biosimilar products have gained market share.
- Across multiple therapy areas, the presence of biosimilars often increases use of the molecule as a whole as well as putting downward pressure on pricing of competing originator brands in the same therapy areas.

Chart notes: If a biosimilar (or non-original biologic approved through a non-biosimilar pathway) is available in the market for a medicine (i.e., a molecule, molecule combination, of a specific formulation) it is considered to be available, whether or not the FDA Orange Book indicates that they are substitutable. Volume analysis conducted using extended unit volume across all channels.

Use of prescription opioids in 2018 declined by 17% as clinical guidelines and public awareness reduced high-dose prescriptions

Exhibit 11: Narcotic Analgesic Dispensed Volumes in Morphine Milligram Equivalents (MME) Bn



Source: IQVIA National Prescription Audit, Dec 2017; IQVIA Xponent, Feb 2019

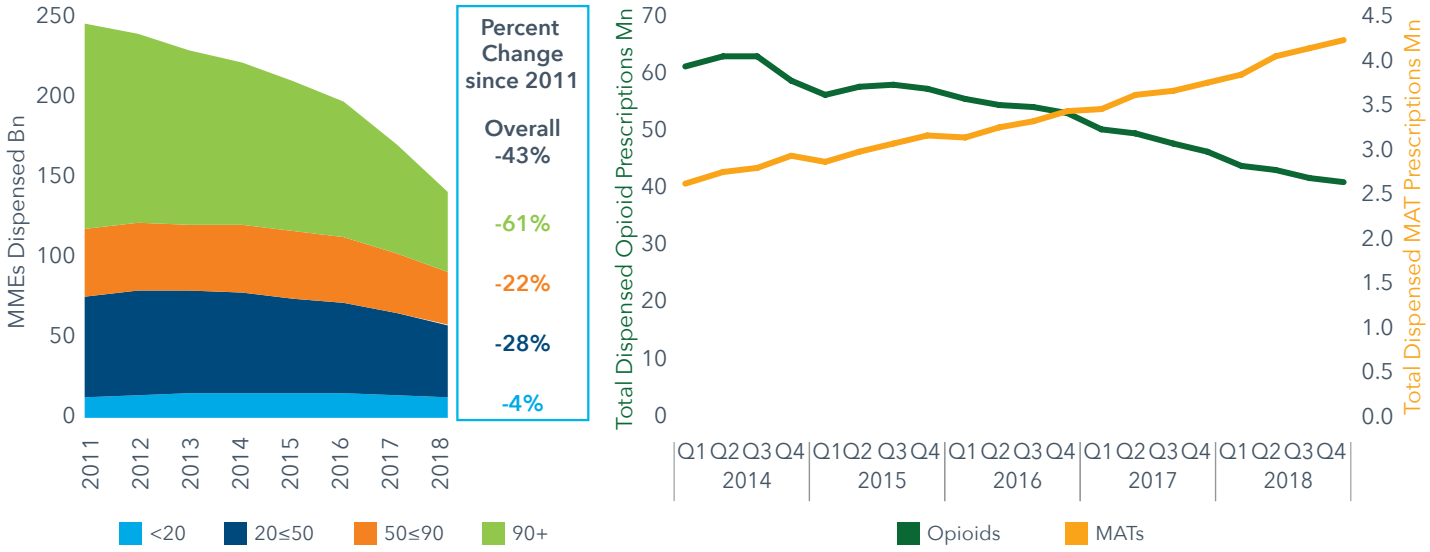
- The largest single-year decline in prescription opioid volume occurred in 2018, dropping by 29.2 billion MMEs.
- Prescription opioid use in the United States is now declining rapidly with a 17.1% drop in prescription opioid volume in 2018 and total declines since 2011 of 43%.
- Prescription opioid use was about 22 pills or 134 morphine milligram equivalents (MMEs) per adult American in 1992 and rose to a peak of 72 pills or 768 MMEs in 2011. Use has since declined to 34 pills and 432 MMEs per adult.
- Decreases in prescription opioid volume have been driven by changes in clinical use, regulatory and reimbursement policies and legislation, all of which have increasingly restricted prescription opioid use since 2012.
- Prescription drug monitoring programs (PDMPs) are now in place in 49 states and significantly limit prescribing of high doses of prescription opioids, which according to the Centers for Disease Control and Prevention (CDC) are associated with a higher risk of dependency and overdose.[3]

Chart notes: Historic NPA archive data for periods 1992–2005 combined with Xponent analysis for periods 2006–2018. Analysis based on opioid medicines for pain management and exclude 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, see Methodology section for more details.

[3.] CDC. Prescription Opioid Data. Accessed Apr 2019. Available from: https://www.cdc.gov/drugoverdose/data/prescribing.html

Prescription opioid volume has declined 43% with reduced use of higher doses, while medication-assisted treatments have risen

Exhibit 12: Narcotic Analgesic Dispensed MMEs Bn, Prescriptions and Medication-Assisted Treatments (MAT) Mn



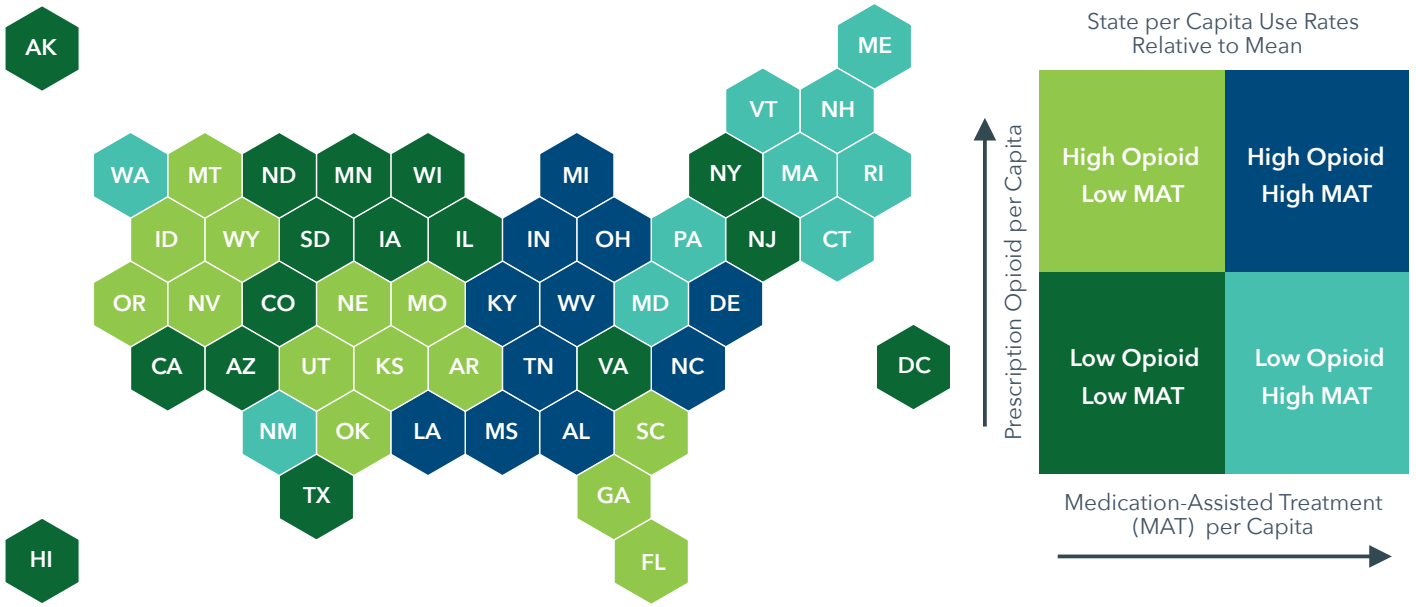
Source: IQVIA National Prescription Audit, Jan 2019; Xponent, Feb 2019

- Overall opioid volumes in MMEs have declined by 43% since the peak in 2011, while high-dose prescriptions for 90 MMEs per day or greater declined by 61%.
- Prescriptions for fewer than 20 MMEs have largely remained stable, indicating low doses of opioids are still perceived by physicians and patients as relatively safe.
- Prescriptions for more than 50 MME/day, which are associated with greater risk of both dependency and overdoses, account for 83% of the decline.
- On a quarterly basis, opioid prescriptions have declined by 33% from 60.8 million in Q1 2014 to 40.8 million in Q4 2018. During the same time period MATs has risen 62% from 2.6 to 4.2 million.
- From 2014-2018 annual opioid prescriptions declined from 244.5 to 168.9 million, while MATs increased from 11 million to 16.2 million in 2018.
- Prescription opioid pain medicine new therapy starts (not shown), is defined as a patient receiving a prescription who has had no previous therapy in the class of drugs in the prior year, declined by 9.9% to 33 million in 2018, and by 23% since 2014 when 43 million patients started a new prescription opioid treatment.
- New therapy starts for MATs (not shown) have increased to 1.2 million in the full year 2018, up from 460,000 in 2014.
- The rise in new starts on MATs is an important indicator of the effects of increased funding and support for treatment programs in the efforts to address addiction.

Chart notes: Medicines identified by MME potency at molecule, form and strength level, and divided by days supply at a prescription level to determine MME/day per prescription. Analysis based on opioid medicines for pain management and exclude those medicines used for evidence-based opioid use dependency or overdose recovery. Analysis on right-hand chart shows unadjusted dispensed prescriptions for opioids in total (for pain management), including those that are abuse-deterrent forms, and but excludes those medically assisted opioid use dependency treatment (MAT), which are shown separately.

The relative per capita rates of prescription opioids and medication-assisted treatment use vary widely by state

Exhibit 13: Retail Dispensed Prescriptions for Opioids and Medication-Assisted Treatments per Capita By State



Source: IQVIA Xponent, US Census Bureau, Feb 2019

- The national averages for opioids per capita and MATs per capita are 516.1 (per 1,000) and 49.4 (per 1,000), respectively, but states differ significantly in their per capita use of opioids and MATs.
- States shaded in light green have opioids per capita above the national mean but have MATs per capita below the mean. Arkansas and Oklahoma have among the highest prescription opioid-to-MAT per capita ratios. Arkansas' opioid per capita use is 906, while their MAT per capita is 34, followed by Oklahoma with 797 opioid prescriptions and the second lowest MAT per capita at 47.
- States shaded in dark green have both opioids and MAT per capita below the national average. These include states with the lowest opioid use, such as Minnesota (341), Hawaii (343), and California (354). Of note, these states have low MAT use with 21, 20, and 15, respectively.
- States shaded in dark blue indicate high per capita use of both opioids and MAT relative to the mean. Notably, this includes states hit hardest by the opioid crisis, such as Alabama, Tennessee, Kentucky and West Virginia, each with 958, 852, 780, and 657 opioids per capita, respectively.
- States shaded in light blue have lower than average opioids per capita but higher MAT per capita compared to the mean, and include all of the New England states, which have enacted new controls on opioid prescribing and support for opioid dependency in the past three years.
- Among these, the state with the highest MAT per capita is Vermont, with 247 and opioid per capita use of 415. Maine has the second highest MAT per capita, with 175 and opioids per capita of 483.

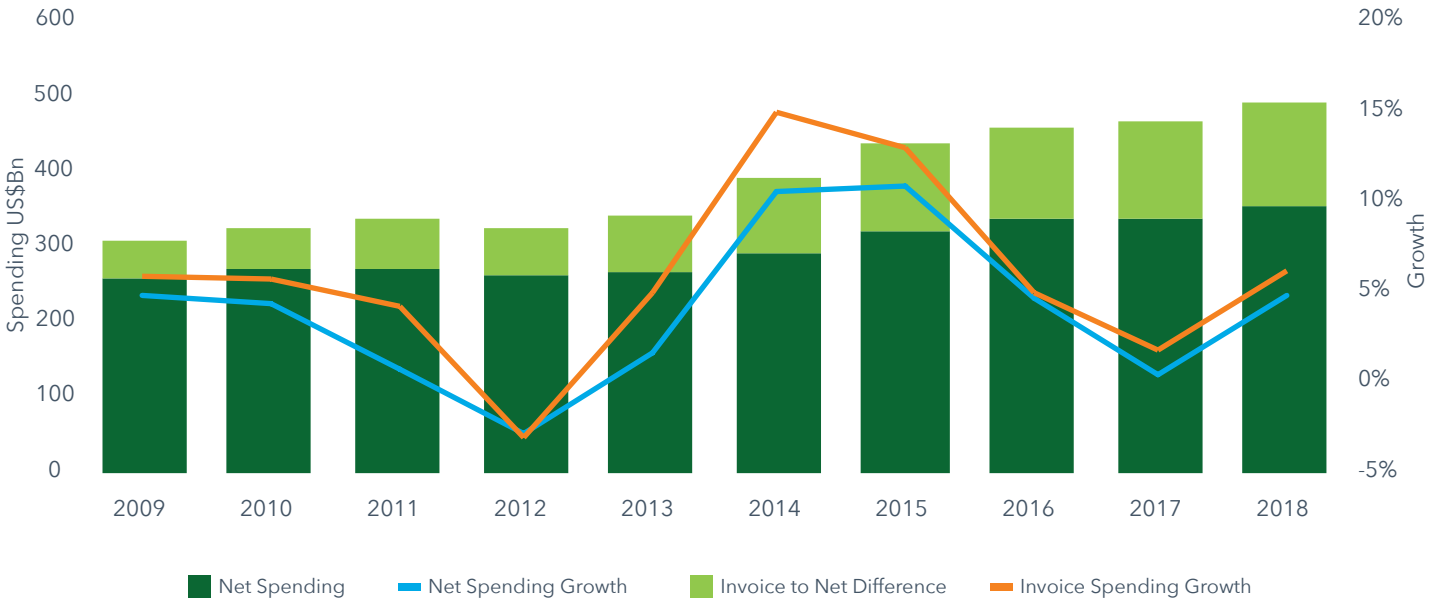
Chart notes: Per capita figures expressed per 1,000 population. Analysis based on opioid medicines for pain management and exclude those medicines used for medication-assisted opioid use dependency treatment (MAT) or overdose recovery. Opioid medicines are categorized and adjusted based on their relative intensity to morphine, see Methodology section for more details. High denotes above the mean. Low denotes below the mean.

Medicine spending and growth dynamics

- Medicines spending growth in the United States rebounded to 4.5% on a net basis, while growth at the invoice-level was 5.7%.
- Discounts, rebates and other price concessions on brands reduced absolute invoice spending by an estimated 28% to $344 billion.
- Real net per capita spend in 2018 is $1,044, nearly the same as in 2009 when it was $1,000.
- In 2018, net spending growth rebounded to $14.9 billion due to new and protected brand volume and despite lower price growth.
- In the past five years a total of 219 NASs were launched with 136 in specialty classes and 57 in oncology.
- Protected brand net prices moderated to 0.3% on average in 2018, continuing below invoice price growth and now lower than inflation.
- Net price growth was 0.3% in 2018, a drop of 1.6% below the Consumer Price Index in that year, while price increases for protected brands averaged 5.5% on an invoice-price basis.
- The number of new generic approvals has increased dramatically, with 3,446 ANDAs for 677 distinct molecules approved since 2013, contributing to price deflation, but not all approvals have launched.
- Biologics growth continues, and three new molecules had their first biosimilar competitors in 2018; overall biosimilars now compete for market share among medicines with $15.9 billion in spending.

Medicines spending growth in the United States rebounded to 4.5% on a net price basis

Exhibit 14: Total Spending on Medicines and Growth US$Bn



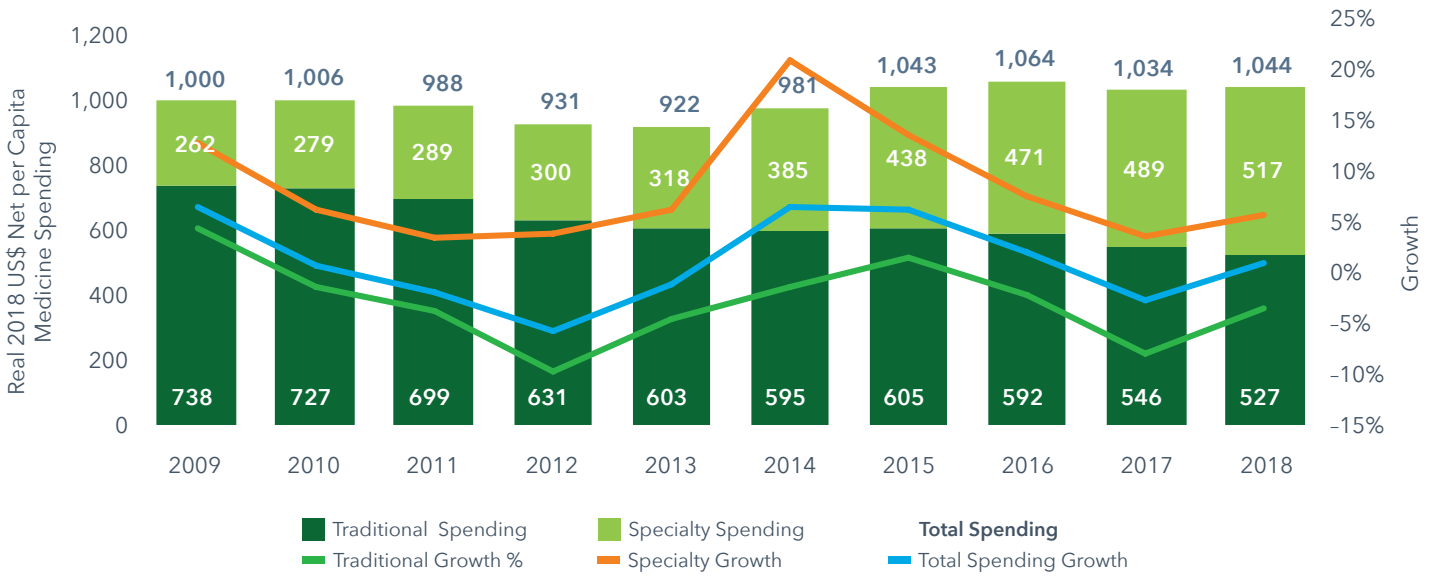
Source: IQVIA, National Sales Perspectives, Jan 2019; IQVIA Institute, Apr 2019

- In 2018, spending grew 4.5% net of off-invoice discounts and rebates, while growth at the invoice-level was 5.7%.
- Discounts, rebates and other price concessions on brands reduced absolute invoice spending by an estimated 28% to $344 billion.
- Spending grew in 2018 due, in part, to the launch of new branded products as well as an increase in the volume of current branded products.
- On an invoice basis, spending has risen 57% since 2009, from $290 to $479 billion in 2018, but only 36% on a net basis, from $252 to $344 billion in 2018.
- The past decade has included both the most impactful concentration of patent expiries in 2011 and 2012, as well as the largest impact from new brand launches from late 2013 through 2015, while periods since have shown more modest growth dynamics.

Chart notes: Measures total value of spending on medicines, including generics, branded products, biologics, small-molecules, retail and non-retail channels. Invoice spending is based on IQVIA reported values from wholesaler transactions measured at trade/invoice prices and exclude off-invoice discounts and rebates that reduce net revenue received by manufacturers. 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. Pricing is at the manufacturer level.

Real net per capita spending per year grew by only $44 since 2009 as specialty nearly doubled and traditional drugs declined

Exhibit 15: Real Net per Capita Medicine Spending and Growth by Product Type US$



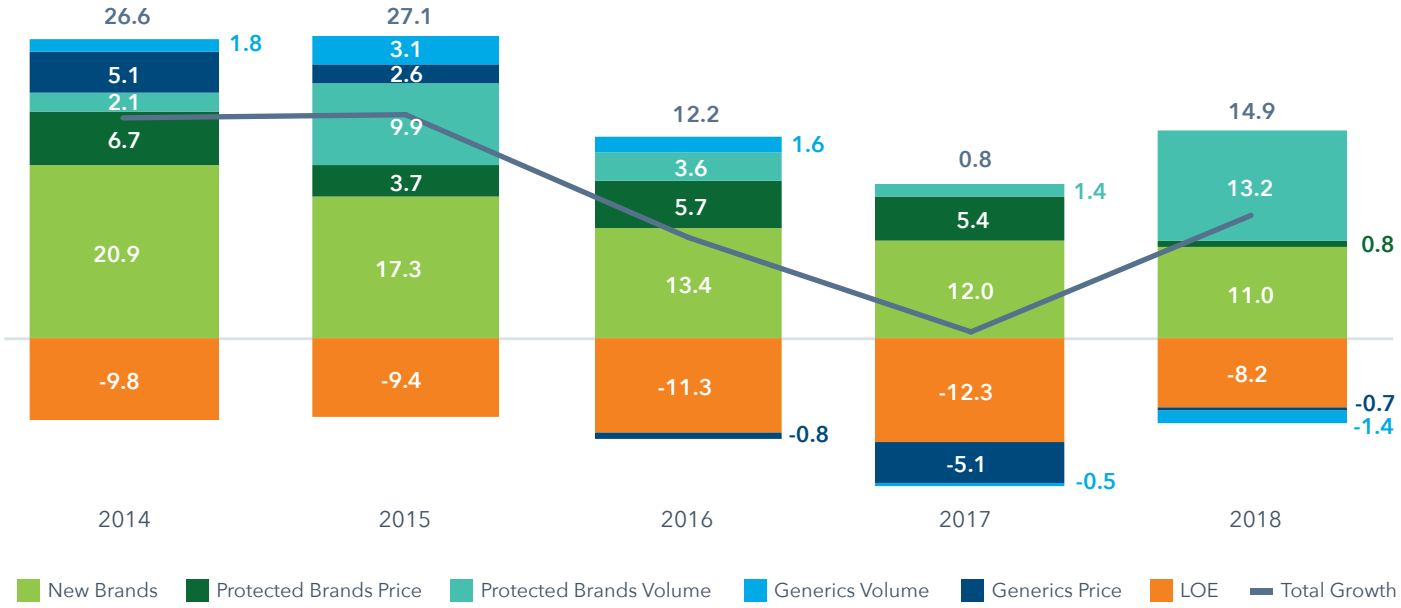
Source: IQVIA, National Sales Perspectives, IQVIA Institute, Jan 2019; U.S. Census Bureau; U.S. Bureau of Economic Analysis (BEA), Dec 2018

- Medicine spending per capita, adjusted for population growth and shown in current dollars, grew only $44 since 2009.
- Real net per capita spending grew by 0.9% from $1,034 per person in 2017 to $1,044 in 2018 in current dollars, and 1.1% 10-year CAGR to 2018.
- Specialty share of net spending across institutional and retail settings rose from 26.2% in 2009 to 49.5% in 2018.
- Specialty medicines are rapidly approaching half of medicine spending, driven by innovation, and the declining share for traditional medicines as growth has slowed due to patent expiries.
- Growth in real net per capita spending for specialty medicines peaked in 2014, when it grew by 21% with the introduction of several breakthrough therapies for hepatitis C virus, cancer and autoimmune diseases.
- The largest proportion of new medicines launched in the past five years have been specialty drugs, and specialty spending per person has risen $255 per person since 2009, while traditional net medicine spending has declined by more than $210 per person over the same period.
- Across all settings, specialty medicines treat relatively fewer patients and have costs far higher per patient than traditional medicines.
- Spending on traditional medicines has declined primarily due to patent expiries and associated brand losses of exclusivity, as well as a general shift in the focus of innovation.

Chart notes: Real medicine spending reflected in 2018 US$. Specialty and Traditional medicines are defined by IQVIA, see Appendix. Includes all medicines in both pharmacy and institutional settings. Totals may not sum due to rounding. Pricing is at the manufacturer level.

Growth rebounded to $14.9 billion in 2018 due to new and protected brand volume increases and despite lower price growth

Exhibit 16: Net Spending Growth by Product Type US$Bn



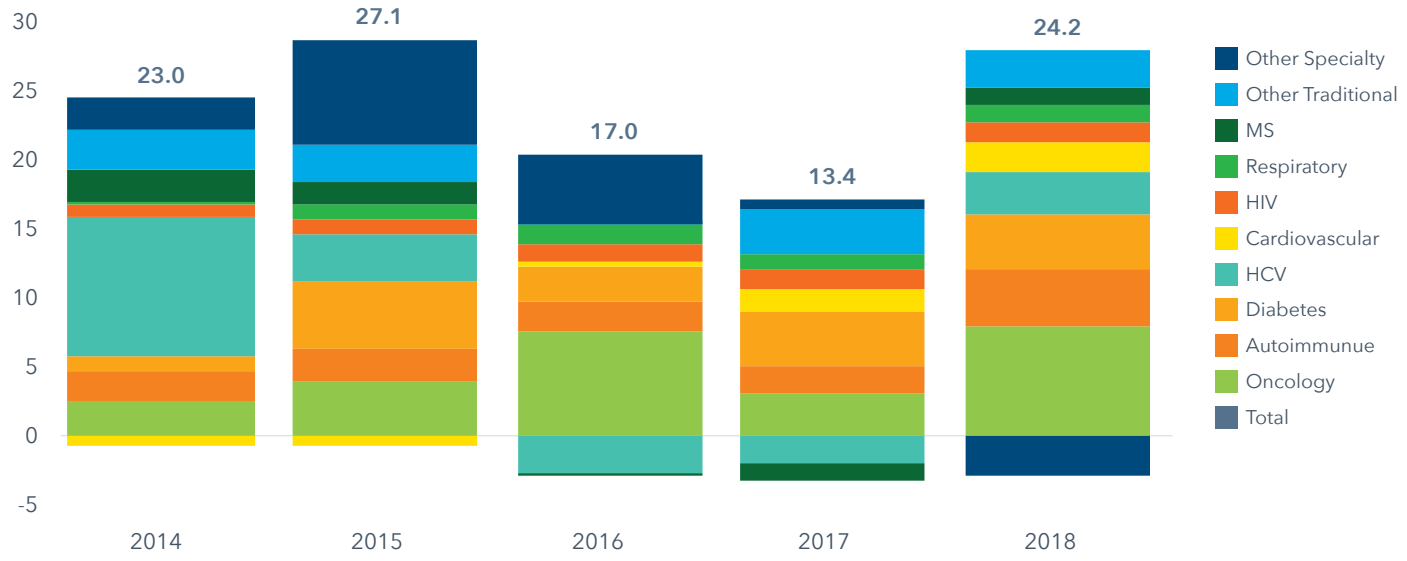
Source: IQVIA National Sales Perspectives, Jan 2019; IQVIA Institute, Apr 2019

- In 2018, net spending growth amounted to $14.9 billion, much higher than the 800 million increase in 2017, driven by new brand spending and growing volume use of protected brands.
- Protected brand volume growth on a net basis expanded to $13.2 billion from $1.4 billion the year before. This trend is, in part, due to earlier-launched innovative brands seeing increased uptake as standards of care gradually shift.
- Protected brand price growth is lower than experienced in 2017, at only $800 million, suggesting that price increases have slowed or have been offset by coupons and discounts.
- New brand net spending growth added $11 billion to spending in 2018 reflecting the launch and uptake of almost 60 new active substances (NAS) in 2018.
- Loss of exclusivity (LOE) had the lowest impact of the past five years, at $8.2 billion. LOE was a significant downward pressure on net spending growth from 2015–2017, but in 2018 fewer branded products lost market exclusivity, and thus LOE had less impact on net spending growth.
- From 2013–2015 generics had been a positive driver of spending growth as the combination of fewer expiries and price increases lifted generics spending. However, starting in 2016, generics volume and price growth declined as greater competition in a number of markets drove down prices. In 2018, the volume use of generics shrank, decreasing spend by $1.4 billion.

Chart notes: New brands are protected branded products on the market less than 24 months during the year reported. Protected brands are products that are no longer "new" and have yet to reach patent expiry. Loss of Exclusivity (LOE) are brands that were once protected and have since lost patent protection. Generics include both unbranded and branded generics. All segments are mutually exclusive in each time period. Includes all medicines in both pharmacy and institutional settings. Charted values may not sum due to rounding.

Use of new brands and volume growth of existing brands totaled $24 billion in 2018, up from $13 billion in 2017

Exhibit 17: New Brand & Existing Protected Brand Volume Net Spending Growth by Therapy Area US$Bn



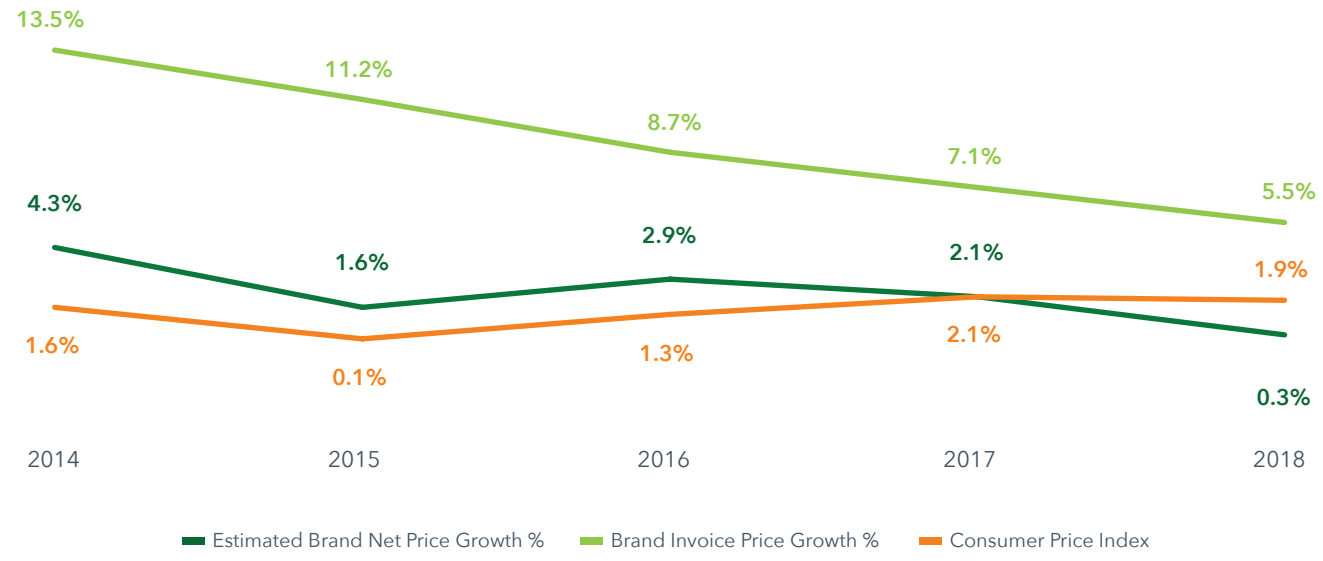
Source: IQVIA National Sales Perspectives, Jan 2019; IQVIA Institute, Apr 2019

- New medicines launched in the past two years contributed $11 billion to net growth in 2018, which along with $13.2 billion from volume growth for existing protected brands, accounted for $24.2 billion in spending growth.
- The new medicines first launched in 2018 included 59 New Active Substances (NAS), 39 of which are in specialty therapy areas.
- In the past five years a total of 219 NASs were launched with 136 in specialty classes and 57 in oncology.
- Oncology spending growth derived from use of new medicines and an increased volume use of existing patent-protected medicines – driven by expansion to new indications or earlier lines of therapy – totaled $7.7 billion in 2018.
- Autoimmune treatments added $3.9 billion in 2018 as a range of newer treatments options became available for patients with psoriasis and other conditions.
- Diabetes treatments with newer mechanisms of action continue to be adopted more widely and added $3.8 billion in 2018.
- Treatments for hepatitis C added $3.1 billion in 2018 as new treatment options have gained wider adoption and have offset the significant net price concessions made by most manufacturers.

Chart notes: New brands are defined as brands launched in the last twenty-four months and defined separately for each year. Specialty and traditional medicines are proprietary definitions by IQVIA, see Methodology section for more details. Traditional in the chart includes diabetes and other traditional. Charted values may not sum due to rounding. Includes all medicines in both pharmacy and institutional settings. MS = multiple sclerosis; HCV = hepatitis C.

Protected brand net price increases moderated to 0.3% on average in 2018 as invoice price growth continued to fall

Exhibit 18: Protected Brand Invoice and Net Price Growth %



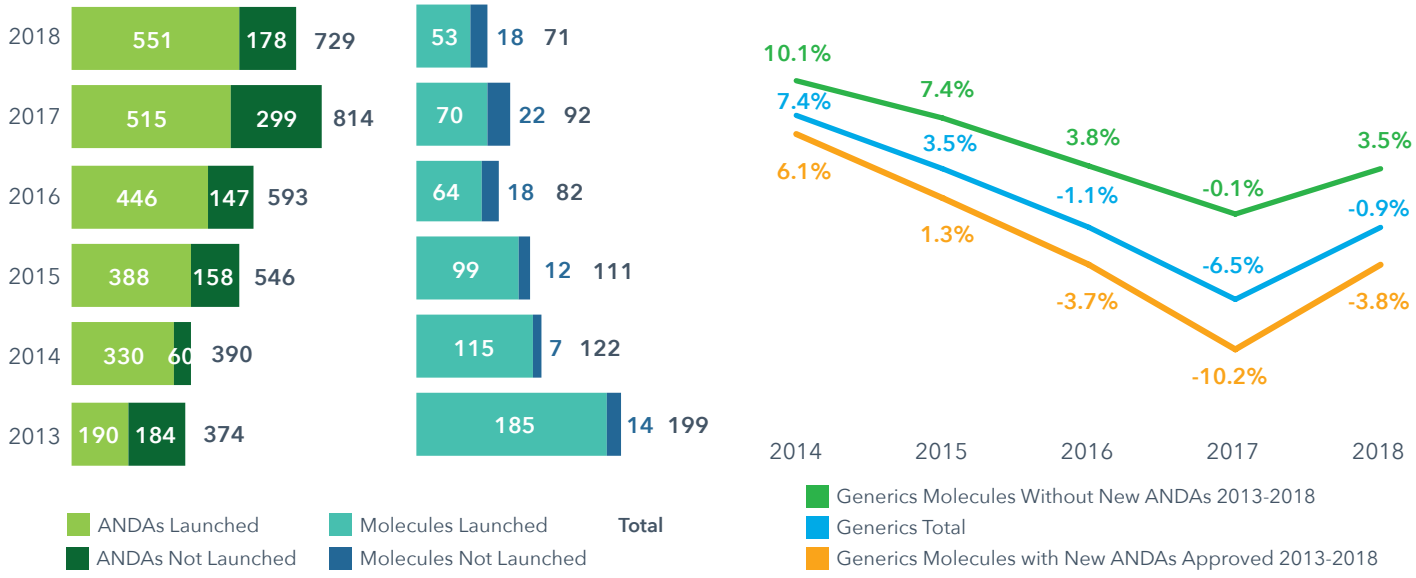
Source: IQVIA National Sales Perspectives, Jan 2019; IQVIA Institute, Apr 2019

- Net price growth was 0.3% in 2018, 1.6% below inflation in that year based on the Consumer Price Index, while invoice price increases for protected brands averaged 5.5%, both historically low growth rates.
- Most of the top ten pharmaceutical companies have announced commitments to both lower levels of list price growth and net price transparency, including the regular release of more sensitive information around net price growth.
- Increasing competition across multiple therapy areas including diabetes, asthma/COPD, viral hepatitis products and autoimmune biologic treatments, is contributing to net price growth slowing to near zero.
- In addition to negotiated rebates, other discounts, fees under the affordable care act and the value of patient coupons have contributed to lower net price growth.

Chart notes: "Invoice" values are IQVIA reported values from wholesaler transactions measured at trade/invoice prices and exclude off-invoice discounts and rebates that reduce net revenue received by manufacturers. "Net" values denote company recognized revenue after discounts, rebates and other price concessions. Results are based on a comparative analysis of company reported net sales and IQVIA reported sales and prices at product level for branded products representing 75–93% of brand spending in the period displayed. All growth is calculated over same cohort of products in the prior year. See Methodology section for more details. Includes all medicines in both pharmacy and institutional settings.

The number of new generic approvals has increased dramatically, contributing to price deflation, but not all approved drugs launched

Exhibit 19: Generics Approvals and Launches and Generics Net Price Growth



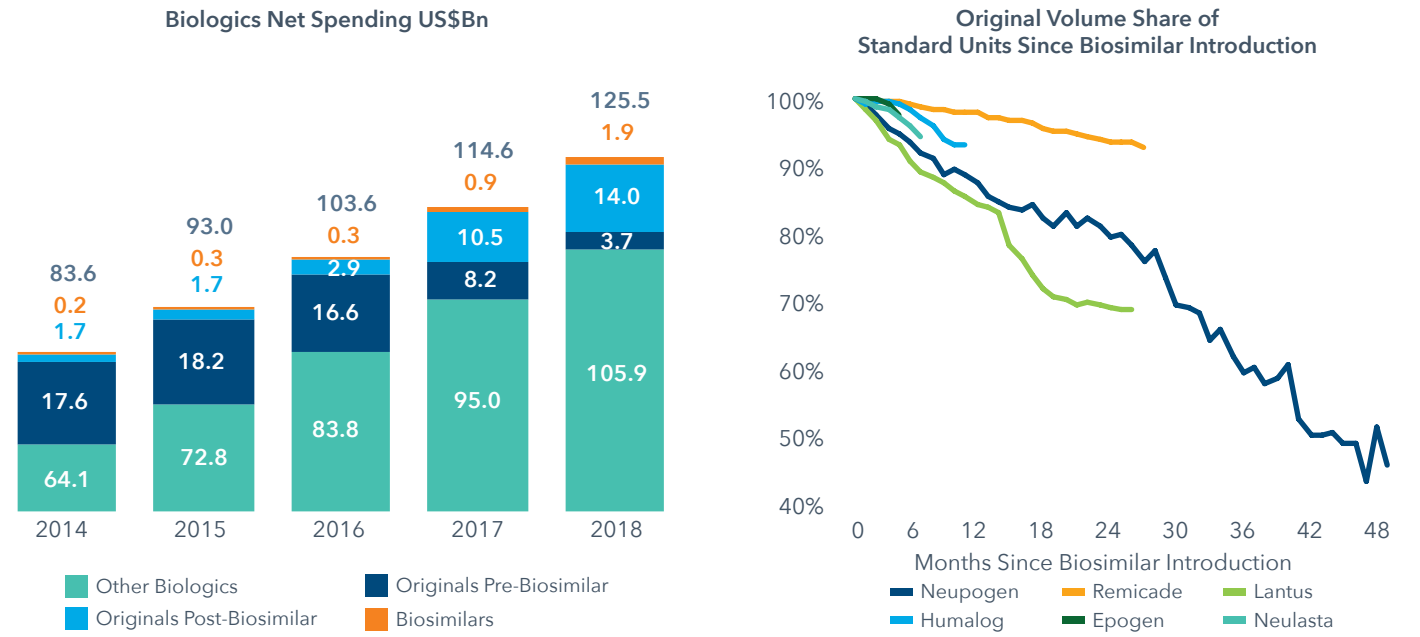
Source: FDA Orange Book, Feb 2019; IQVIA National Sales Perspectives, IQVIA Institute, Jan 2019

- Since 2013, 3,446 ANDAs received FDA approval, relating to 677 distinct molecules or molecule combinations.
- Of the 677 distinct generic molecules, 87% had a subsequent generic launch over the same time period.
- The number of ANDA approvals increased dramatically between 2014 and 2018 to 729 approvals, up from 390 – an increase of 87%.
- On average in 2018 there were 10 ANDAs per launched generic molecule compared to 2013 where on average there was one ANDA per launched generic molecule, suggesting that there is greater generic competition at the molecule level in 2018 than in 2013.
- The period from 2014 to 2015 was marked by high-generic net price growth driven by older generic medicines, many of which were not facing competition at the time.
- Generic net price growth has declined since 2016, impacted more heavily by generic molecules where ANDAs were approved, as these molecules face increased competition and downward price pressure.
- Generic molecules without ANDAs approved between 2013 and 2018 saw positive growth in 2018, in part due to the ability to increase prices in the absence of competition, but price growth was modest at 3.5%.

Chart notes: ANDA = abbreviated new drug approval. ANDAs approved correspond to all ANDAs approved by the FDA, including multiple ANDA filed by a company for a single molecule. Generics include unbranded and branded generics if approved through the abbreviated pathway. ANDAs approved since January 2013 were identified and compared to launches in IQVIA data. Analyses at ANDA level aggregate to the molecule and company level, while analyses at the molecule level show if any company was approved or launched generics for that molecule.

Biologics growth continues and biosimilars now compete for market share among medicines with $15.9 billion in spending

Exhibit 20: Impact of Biosimilars



Source: IQVIA National Sales Perspectives, IQVIA Institute, Jan 2019

- Net spending on biologics totaled $125.5 billion in 2018, up 9.5% since 2017.
- Biosimilar spending has doubled since 2017 but still represents under 2% of the total U.S. biologics market in 2018.
- Despite a significant number of biosimilars approved by the FDA since the creation of a biosimilar pathway in the Affordable Care Act in 2010, so far only seven molecules have been launched. Two non-original versions of these molecules were approved through other pathways.
- Granix and Zarxio were among the first filgrastim (Neupogen) biosimilars to launch in the United States in 2013 and 2015, respectively, followed by an insulin glargine (Lantus) biosimilar, Basaglar, in December 2016.
- Two biosimilars for infliximab (Remicade), Renflexis and Inflectra, launched at the end of 2016 and in 2017, respectively, but have faced challenges with market penetration.
- There were three novel biosimilars that launched in 2018: Retacrit, a biosimilar for epoetin alfa (Epogen); Udenyca, a biosimilar for pegfilgrastim (Neulasta) and Admelog, an insulin lispro (Humalog) biosimilar. A third biosimilar to filgrastim was also launched, Nivestym.
- The FDA continues to advocate for biosimilar use and in 2018 released a biosimilar action plan and updated their guidance on biosimilar development to support the continued uptake of biosimilars in the United States. Market penetration for these molecules will continue to rise, particularity with the launch of an adalimumab (Humira) biosimilar before 2025.

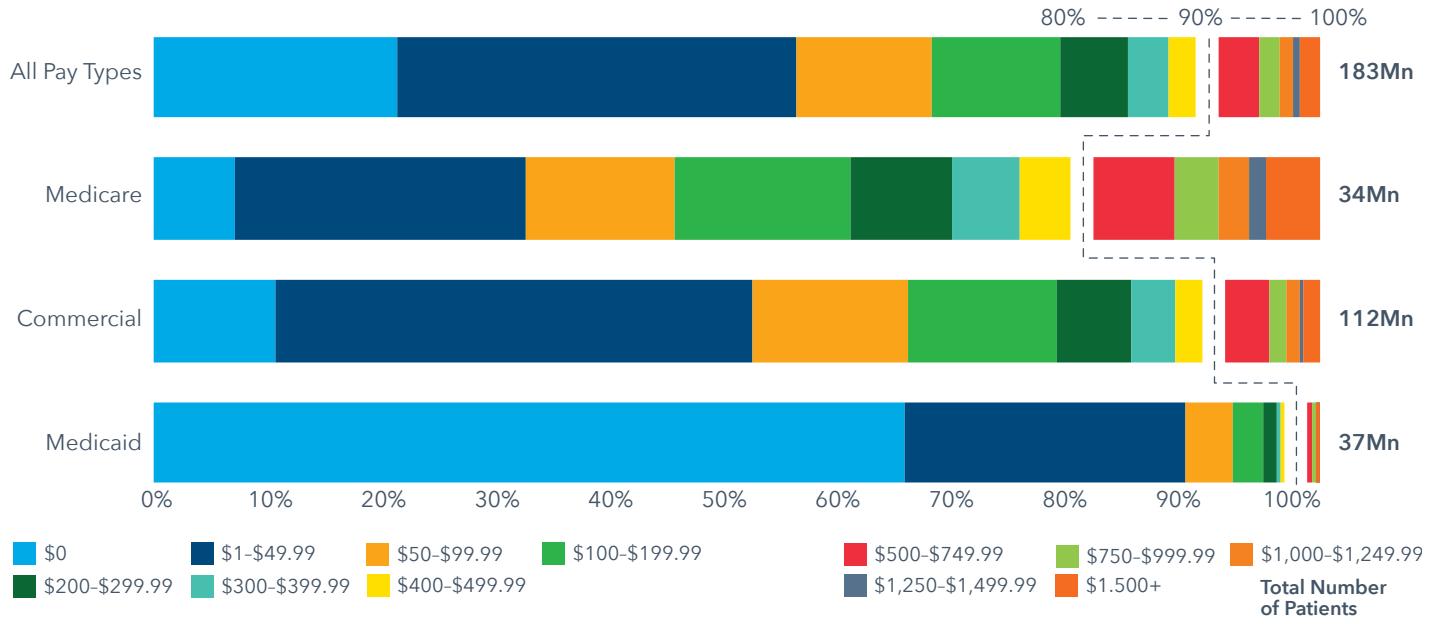
Chart notes: Biologics are defined by IQVIA as clearly identifiable molecules of biologic origin, including but not limited to products created with recombinant DNA technology and without necessarily adhering to classifications by regulatory bodies, which are sometimes inconsistent with this approach. Biosimilars are abbreviated biologic approvals made with reference to an original biologic and demonstrating similarity to the reference product. Non-original products approved outside the official biosimilar pathway have been noted as "biosimilar". Original biologics that have later faced competition have been shown separately in the chart based on whether or not they are facing competition in that period. Includes all medicines in both pharmacy and institutional settings.

Patient out-of-pocket costs

- While prescription costs have been noted to be high in some cases, relatively few patients face high costs in aggregate over the whole year, but more of those who do are in Medicare Part D, with 20% facing annual costs over $500.
- Across all pay types, patients with out-of-pocket costs over $500 per year make up 8.8% of patients and 1.8% pay more than $1,500. Excluding Medicaid, 10.8% of patients pay more than $500 out-of-pocket, and only 2.2% pay over $1,500.
- The rate of prescription abandonment increases steadily as costs exceed $50, where 31.2% and 27.6%, for commercially insured and Medicare Part D, respectively, abandon new prescriptions.
- Some commercially-insured patients final out-of-pocket costs have been offset by coupons and final out-of-pocket costs overall are trending down.
- The initial cost exposure for commercial patients has slightly increased over the last six years, increasing from $43 at the beginning of 2013 to $61 at the beginning of 2018 across brands and generics.
- When patients in Medicare Part D have significant cost exposure, copay assistance can reduce costs, if patients are eligible for a variety of programs offered by charities or run in some states.
- Overall Medicare patients have seen stable initial cost exposure, with slight increase from $33 in 2013 to $43 in 2018, and final out-of-pocket costs have also slightly increased, moving from $29 in 2013 to $37 in 2018.
- Out-of-pocket costs have been rising, while $13 billion of costs have been offset by coupons for commercially-insured patients.
- Along with the increase in out-of-pocket costs, coupons for commercially-insured patients have reached an all-time high of $13 billion in 2018, more than double the $6 billion coupon offset in 2014.
- Patient out-of-pocket costs for brands and generics in total have decreased by $1.23 since 2014.
- The list price of the average brand rose from $364.92 to $657.08 since 2014, while final out-of-pocket costs for patients on those brands were nearly unchanged at $30.59.

Patients with out-of-pocket costs over $500 per year make up 8.8% of patients overall but 20% of the Medicare population

Exhibit 21: Patients by Annual Prescription Out-of-Pocket Cost in 2018



Source: IQVIA Formulary Impact Analyzer (FIA), IQVIA Institute, Jan 2019

- Across all pay types, 8.8% of patients pay more than $500 and 1.8% pay more than $1,500 out-of-pocket for prescriptions.
- Excluding Medicaid, 10.8% of patients pay more than $500 out-of-pocket, and only 2.2% over $1,500.
- In Medicare, 19.8% 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.
- Patients whose annual costs exceeded $1,500 for the year – where catastrophic coverage begins – accounted for 4.7% of Part D patients.
- In commercial coverage, only 8% of patients pay more than $500 and 1.4% pay more than $1,500.
- As a result, seniors have higher cost exposures than the commercially insured population.
- With the average deductible in commercial near $1,000 per year and Medicare Part D deductible at $185 per year, the cost exposure of Medicare Part D patients represents a potentially significant cost barrier to adherence.
- With the average deductible in commercial of $1,573 per year and coupons contributing to deductible progress, many more commercially insured patients would not reach their deductible without coupons.[4]
- While the average Medicare Part D deductible is $185 per year, and a maximum in 2018 of $405, that phase is followed by 25% cost-sharing up to the catastrophic coverage level, and the use of coupons is not allowed, and therefore, the cost exposure of Medicare Part D patients represents a potentially significant cost barrier to adherence.[5]

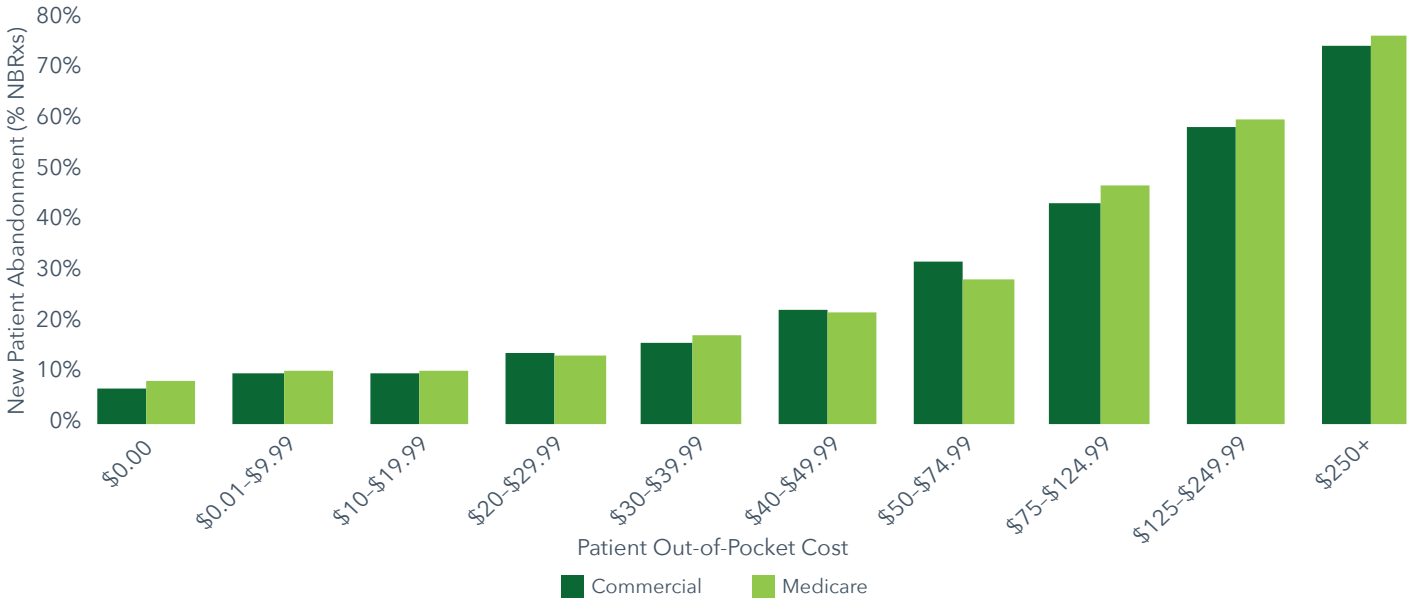
Chart notes: Patients who filled at least one prescription in our sample were included. Patients were grouped into cohorts by mode copay and pay type.

[4] Kaiser Family Foundation. An Overview of Medicare. Updated Feb 2019. Available from: https://www.kff.org/medicare/issue-brief/an-overview-of-medicare/

[5] Kaiser Family Foundation. Premiums for Employer-Sponsored Family Health Coverage Rise 5% to Average $19,616; Single Premiums Rise 3% to $6,896. Updated Oct 2018. Available from: https://www.kff.org/health-costs/press-release/employer-sponsored-family-coverage-premiums-rise-5-percent-in-2018/

The rate of prescription abandonment increases as cost exposure rises

Exhibit 22: 30-Day New-to-Brand Abandonment by Patient Out-of-Pocket Cost in 2018 (Top Brands)



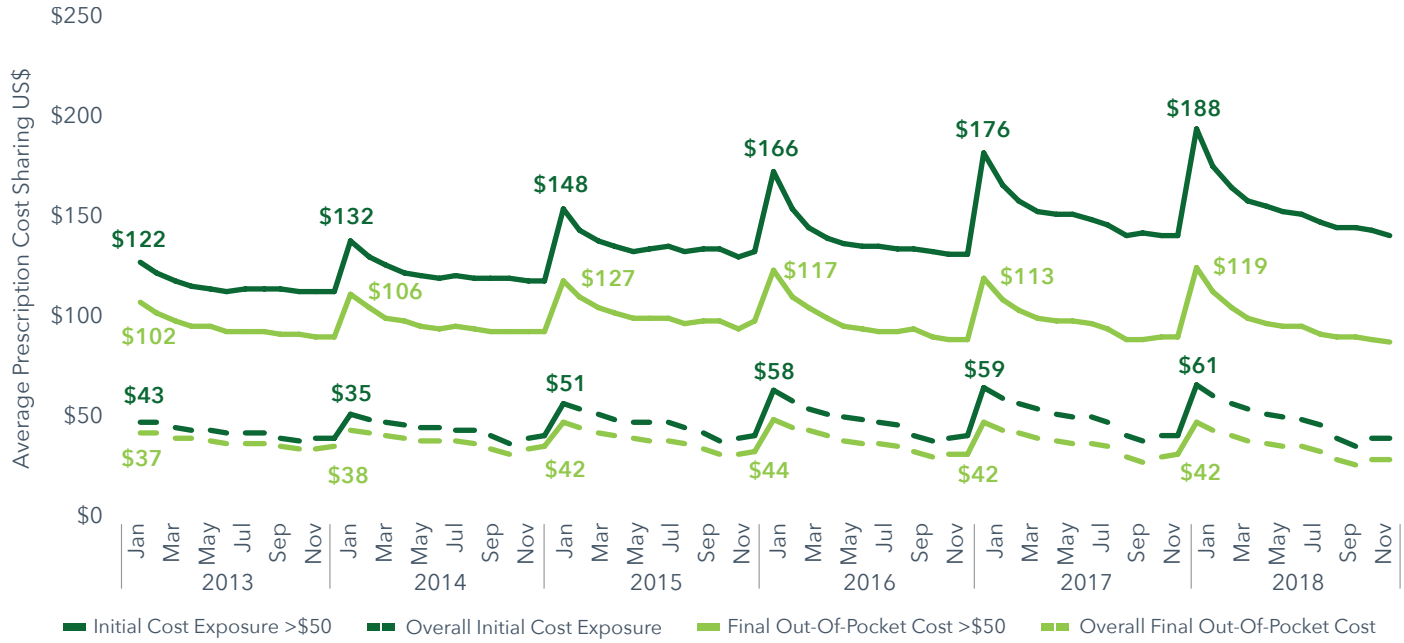
Source: IQVIA Formulary Impact Analyzer; IQVIA Analysis, Dec 2018

- Due to rising exposure to deductibles and to rising list prices, more patients are being exposed to higher costs for their prescription drugs.
- Patients abandon prescriptions for a variety of reasons, including cost, efficacy and side effects, which shift their likelihood of refilling prescriptions.
- New patient abandonment rates for both commercial and Medicare begins to steadily increase once patient out-of-pocket costs reach $50.
- At $50 out-of-pocket, new patient abandonment rates for both commercial and Medicare are 31.2% and 27.6%, respectively, with a slightly higher abandonment in commercial. However, above $75, abandonment rates in Medicare exceed those in commercial, and this trend continues through the remaining patient out-of-pocket cost cohorts.
- The largest driving force for new patient abandonment in both segments is cost, though other issues such as polypharmacy, perceived lack of drug efficacy, or increased perception of sickness (at times linked to polypharmacy) also affect abandonment rates.

Chart notes: Analysis for sample of branded products representing 55% of branded prescription claims. 30-Day New-to-Brand abandonment for Commercial and Medicare Part D patients was measured from Jan 2015 to Mar 2018 and estimated for April to December 2018. Patients did not pick up relevant prescription or switch to another product during the 30 days after the initial prescription was abandoned. Patients were also analyzed to determine how many filled another prescription in the month following initial claim approval, which was abandoned.

Commercially insured patients, final out-of-pocket costs have been offset by coupons and final out-of-pocket costs are trending down

Exhibit 23: Average Initial Cost Exposure and Final Out-of-Pocket Cost per Prescription US$ (Commercial, Brands)



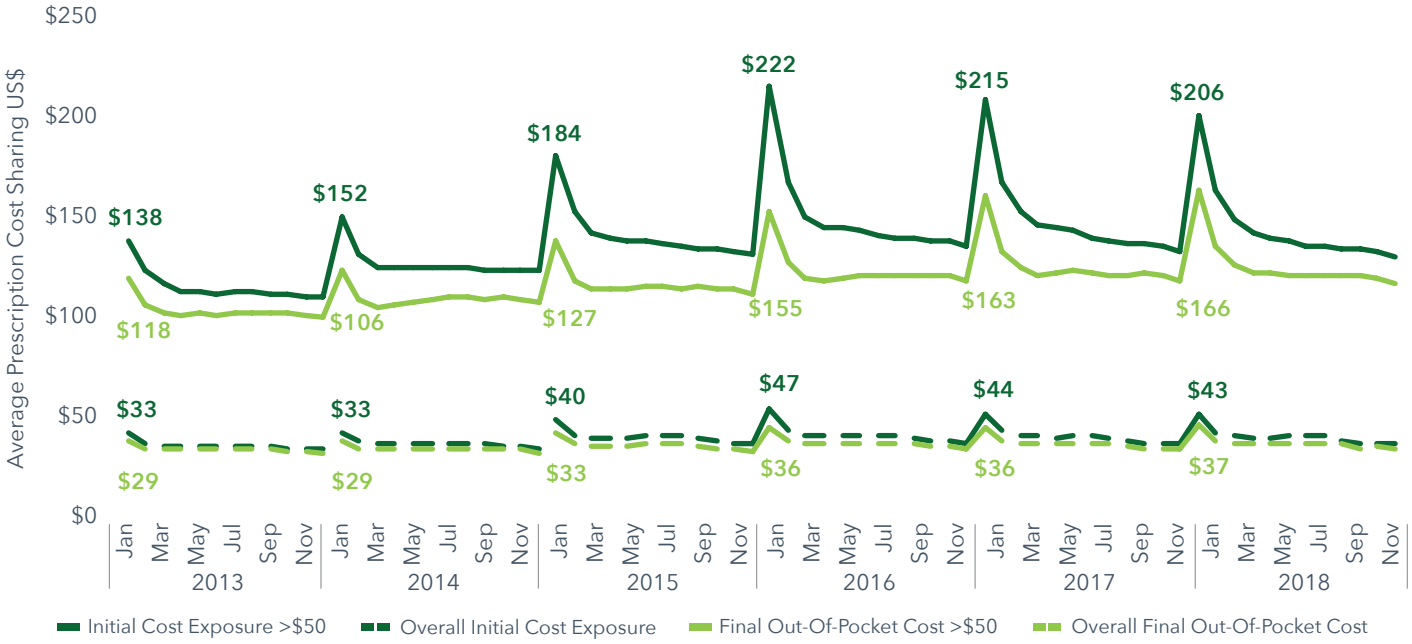
Source: IQVIA Formulary Impact Analyzer, IQVIA Institute, Jan 2019

- Patients with commercial insurance have a range of benefit designs and are also able to use coupons to lower their final out-of-pocket costs for medicines.
- Initial cost exposure represents the copay that a pharmacist would initially present to a patient, and the final out-of-pocket cost takes into account any reduction in cost the patient was able to achieve through the use of secondary insurance or coupons, and these coupons can come from manufacturers, pharmacies or from independent third-party coupon companies.
- The chart shows the initial exposure and final out-of-pocket costs for all branded drugs for commercially-insured patients, and also shows the same for prescriptions where the initial cost exposure was more than $50.
- The overall initial cost exposure for commercial patients has slightly increased over the last six years, increasing from $43 at the beginning of 2013 to $61 at the beginning of 2018.
- For patients in the $50 or greater cohort, their initial cost exposure has also increased year over year, from $122 to in 2013 to $188 in 2018. However, final out-of-pocket remains relatively stable, with an increase from $102 in 2013 to $119 in 2018.
- Despite the rising increase of initial cost exposure, which is linked to list price, commercial patient out-of-pocket is lower and relatively unchanged over time, however, it does increase earlier in the year as more patients are in their insurance plan's deductible phase.

Chart notes: Averages are calculated among paid claims and normalized to 30 days.

When patients in Medicare Part D have significant cost exposure, copay assistance reduces costs modestly

Exhibit 24: Initial Cost Exposure and Final Out-of-Pocket Cost (Medicare Part D, Brands)

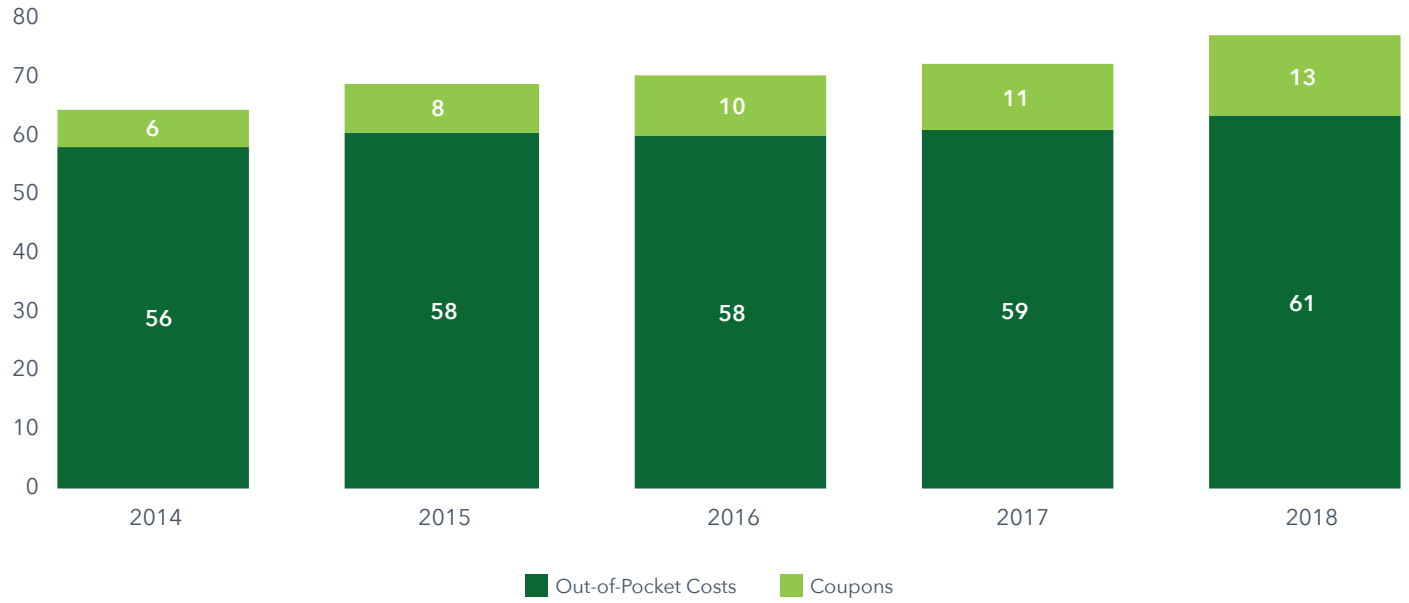


Source: IQVIA Formulary Impact Analyzer, IQVIA Institute, Jan 2019

- Patients with Medicare Part D include patients with low-income subsidies, with employer supplemental insurance and those with standard benefits that expose them to the cost-sharing model.
- The subset of Part D patients who are exposed to the cost-sharing model would be required to pay 25% of the costs for their drugs after an initial deductible and up to the catastrophic coverage phase.
- Very high-cost prescriptions for some specialty medicines would therefore result in out-of-pocket cost exposures which average above $200.
- In Medicare Part D, patients are not able to use coupons to offset their costs and the difference between initial cost exposure and final out-of-pocket costs is made up of contributions to offset patient costs from charitable foundations, programs for low-income patients in some states or from other organizations.
- Due to the nature of plan designs, and the eligibility requirements for patient assistance programs, there are strong incentives for patients to choose generics or lower-cost brands, and as a result, patients have seen initial cost exposure for all brands increasing from $33 in 2013 to $43 in 2018.
- Final out-of-pocket costs have increased more slowly, moving from $29 in 2013 to $37 in 2018.
- For patients requiring more expensive, often specialty drugs, initial cost have been higher, peaking in 2016 and reducing more recently while final out-of-pocket costs have trended up steadily from $118 in 2013 to $166 in 2018.
- The higher initial cost exposure and out-of-pocket costs are likely to influence behavior amongst this group potentially affecting prescription abandonment and adherence.

Out-of-pocket costs have been rising, while $13 billion of costs have been offset by coupons for commercially-insured patients

Exhibit 25: Patient Out-of-Pocket Cost for Prescriptions in Aggregate and Value Offset by Coupons, $Bn



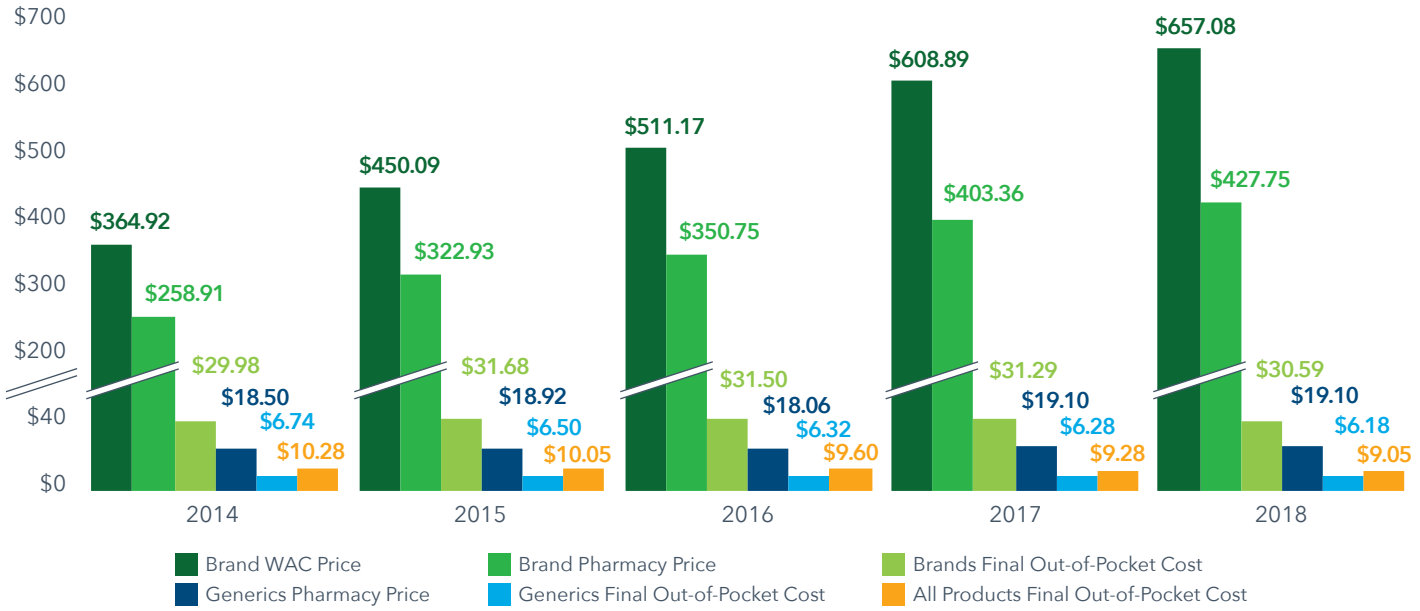
Source: IQVIA National Prescription Audit, Formulary Impact Analyzer, Jan 2019

- Overall out-of-pocket costs have risen from $56 billion in 2014 to $61 billion in 2018 although some patients have seen their costs decline as generic prescription costs have declined.
- Patients with some types of insurance including Medicare Part D or high-deductible private health plans have seen their costs rise in line with rising list prices of drugs.
- As out-of-pocket costs have risen, coupons for commercially-insured patients have reached an all-time high of $13 billion in 2018 – more than double the $6 billion coupon offset in 2014 – and helping lower commercially-insured patients out-of-pocket costs over the period.
- Of commercially-insured patients on branded medications, 19% of them used coupons to reduce their out-of-pocket costs in 2018.
- Some insurers are introducing plans called "accumulators" where use of a coupon does not make progress towards a patient's deductible, or 'maximizers' which maximize the coupon contribution a manufacturer will support under their eligibility rules and thus, limit plan exposure to costs while still allowing patients to use coupons.
- In total, these plan designs are still relatively rare as an average of 9.5% of brand coupon transactions analyzed appear to be in insurance plans that uses an accumulator or maximizer design, or 1.8% of commercially insured branded prescriptions overall.

Chart notes: OOP (out-of-pocket) costs estimated based on prescription volumes and observed OOP costs. OOP costs projected from sample in FIA to a national estimate using national adjusted prescriptions which were backprojected to estimate the trend prior to the trend break after 2016 due to restatement of NPA volumes (see Methodology section for more details).

Patient out-of-pocket costs for brands and generics in total have decreased by $1.23 since 2014 to $9.05 on average

Exhibit 26: Patient Cost Exposure and Average Costs, US$



Source: IQVIA Formulary Impact Analyzer, IQVIA Institute, Jan 2019

- The list (WAC) price of the average brand rose from $364.92 to $657.08 since 2014, while final out-of-pocket costs for patients on those brands were nearly unchanged at $30.59.
- While wholesaler acquisition cost (WAC), commonly referred to as list prices, is the most easily researched by patients, the average prices at pharmacies before discounts and coupons are lower.
- The gap between WAC and pharmacy prices has been influenced by the rising percentage of patients with high-deductible plans, with out-of-pocket costs linked to list prices but potentially much lower if patients reach their deductible or out-of-pocket maximum spend.
- Final out-of-pocket costs could be even lower if patients use coupons.
- In 2014, pharmacy prices for brands were nearly $106 lower than list prices on average, and final out-of-pocket costs were a further $346 lower. In 2018, the gap from list to pharmacy prices increased to $229, yet final out-of-pocket costs were $626 lower.
- Generic pharmacy and final out-of-pocket costs remained relatively stable. In 2018, generic pharmacy prices slightly increased to $19.10 from $18.50 in 2014, and generic final out-of-pocket cost decreased from $6.74 in 2014 to $6.18 in 2018.
- With over 90% of prescriptions filled as a generic, the final average out-of-pocket cost including both brands and generics declined from $10.28 to $9.05.
- With current trends towards increasing generic use, the decrease in cost represents increased competition in this space and potentially greater access for patients.
- These average costs reflect only patients who filled a prescription and not those who did not seek healthcare at all, or those who abandoned a prescription.

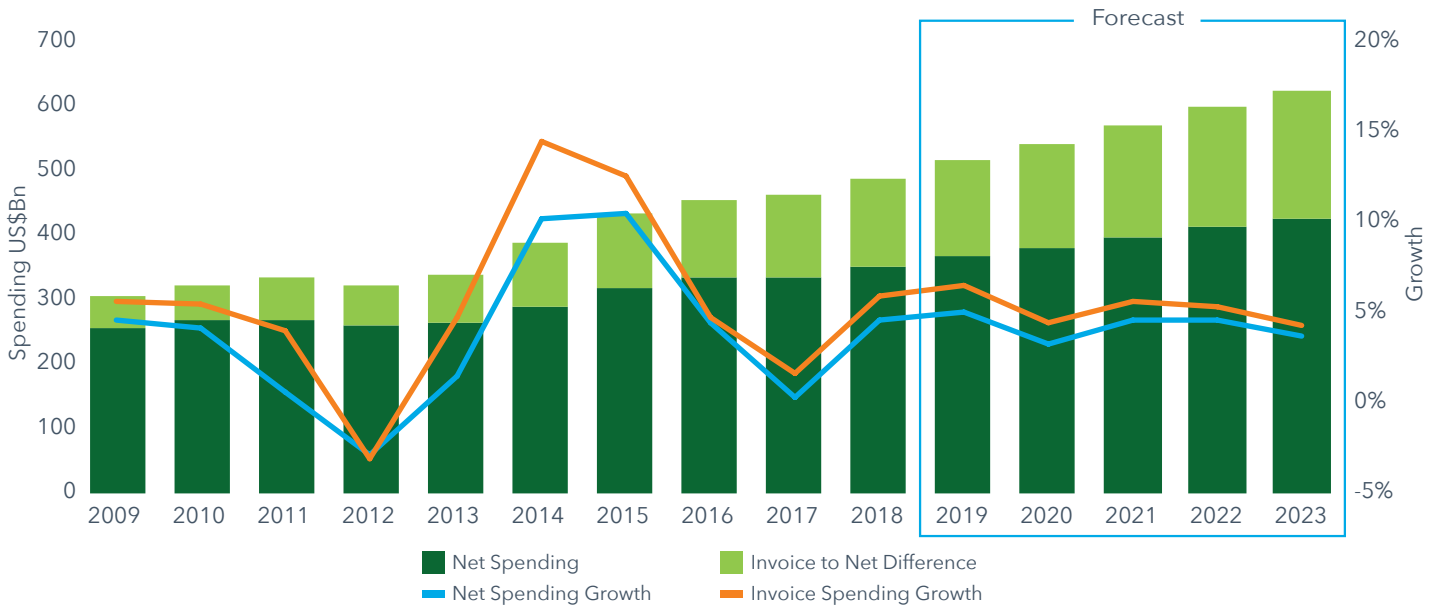
Chart notes: Costs are normalized to 30-day prescriptions. Brand and generic pharmacy prices' cost exposure calculated using paid and reversed claims and include the amount paid by the primary insurer and the amount of patient responsibility before the application of coupons. Brand WAC price is the Wholesaler Acquisition Cost and is often the most publicly available reference price. Final out-of-pocket costs are calculated as patient responsibility after the application of all applicable discounts and coupons.

Outlook to 2023

- Net total spending growth will average 3–6% over the next five years, while invoice growth will average 4–7%.
- Net total spending on medicines is expected to reach $405–435 billion in 2023, up from $344 billion in 2018 and includes spending across all channels and product types.
- The outlook includes assumptions for continued evolution of trends affecting key stakeholders, including payer and provider consolidation, pressure on manufacturer prices through off-invoice discounts and rebates and the expectation of significantly higher spending growth from new products, which will launch in historically high numbers.
- New brand net spending is estimated to rise over the levels in the past few years but overall the five-year total growth will slow to $73 billion, with volume growth for protected brands adding another $46 billion.
- At an invoice price level, the $105 billion impact of losses of exclusivity are expected to be 46% greater in the next five years including biosimilars, but are not to be greater than the combined growth from new brands and volume growth for existing brands.
- The impact of patent expiries has been relatively unchanged for the past five years but is expected to increase steadily over the next five, peaking in 2023 when protected brands will lose $33 billion due to patent expiries and associated competition.
- Protected brand net prices are expected to grow at -1 to 2% over the next five years, adding only $12 billion in spending due to price growth over five years, but scenarios for pricing reforms could result in further net price declines below these levels.
- Scenarios for the impact of reforms to drug pricing are expected to impact invoice spending, net spending and out-of-pocket costs in very different ways, with out-of-pocket costs in two scenarios between $14 to $20 billion below projected 2023 levels in the base case, while net spending could be approximately 6% or 9% lower, and invoice spending may be 20% to 40% lower.

Net total spending growth will average 3–6% over the next five years, while invoice growth will average 4–7%

Exhibit 27: Total Spending on Medicines and Growth US$Bn



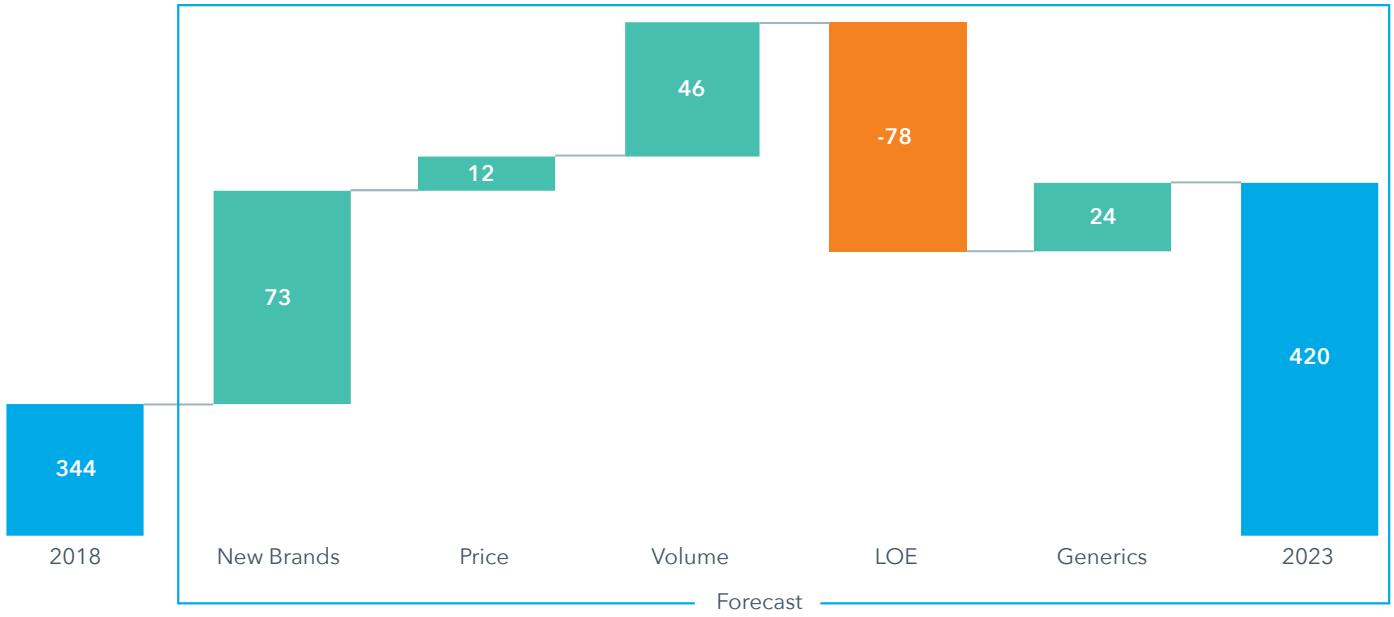
Source: IQVIA Market Prognosis, Mar 2019; IQVIA Institute, Apr 2019

- Total net spending on medicines is expected to reach $405–435 billion in 2023, up from $344 billion in 2018 and includes spending across all channels and product types.
- Over the next five years, medicine spending will grow between 4–7% on an invoice basis and 3–6% after off-invoice discounts and rebates, but growth will be slower over the next five years than in the past five.
- Growth will be driven by adoption of newly launched innovative products, which are expected to occur at higher levels than past years with an average of 54 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.
- Even with a rising proportion specialty and orphan products – medicines typically associated with a higher cost but lower volumes – the effect of price growth on overall spending over the next five years is expected to be modest.
- Price competitiveness in many therapy areas has been increasing and is predicted to continue, especially as upcoming new products are expected to be in therapy areas with multiple competitors.
- For those launches in rare diseases, ongoing pressure is expected to limit launch prices in the absence of robust clinical evidence.

Chart notes: Invoice spending is based on IQVIA reported values from wholesaler transactions measured at trade/invoice prices and exclude off-invoice discounts and rebates that reduce net revenue received by manufacturers. 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.

New medicines and volume are expected to offset losses of exclusivity and drive growth to 2023

Exhibit 28: Net Spending and Growth Drivers Outlook to 2023 US$Bn



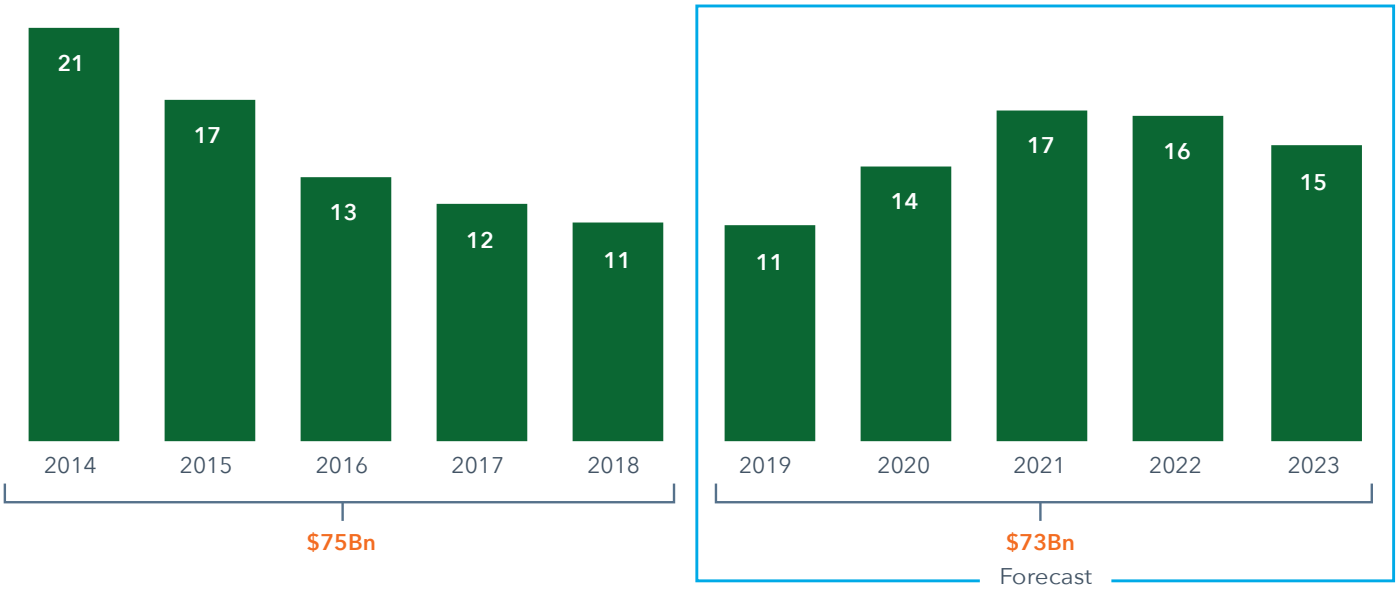
Source: IQVIA Market Prognosis, Mar 2019; IQVIA Institute, Apr 2019

- New medicines and volume growth from protected brands are expected to continue to be the main drivers of growth in the next five years.
- Volume growth will continue to drive growth as products will see some slow early uptake after launch but then continue to grow by achieving greater market utilization three or more years after launch.
- Net spending on new brands is expected to be $70–75 billion, about 20% lower than projections of invoice spending for those products as greater concessions will occur in the periods immediately after launch either in the form of negotiated rebates or greater use of coupons.
- Price growth for protected branded products is expected to average from 2% to a decline of -1% as increased competitive dynamics continue.
- Losses of exclusivity will total $105 billion on an invoice basis, but as that spending embeds existing off-invoice discounts and rebates, they will only lower net spending by $78 billion.
- The uptake of generics and biosimilars will result in net growth of $24 billion over the next five years, which embeds expectations of deflationary pressures on those molecules.
- More medicines expiring in the coming years are specialty or biologics which are expected to have relatively lower levels of price deflation compared to traditional small molecule generics.

Chart notes: Growth modeling has been based on invoice-price forecasts and ten adjusted based estimates of the net spending levels in specific product types and subsegments. Historic patterns of net spending and growth by product type have been used to estimate the impacts on segments illustrated. Estimates include expectations of continued market dynamics around both commercial, Medicare, Medicaid rebate dynamics, use of coupons and continuation of manufacturers' lower list price increases.

The net new brand spending of $73 billion over the next five years will be slightly lower than the past five years

Exhibit 29: Estimated Net New Brand Spending Growth, 2014–2023 US$Bn



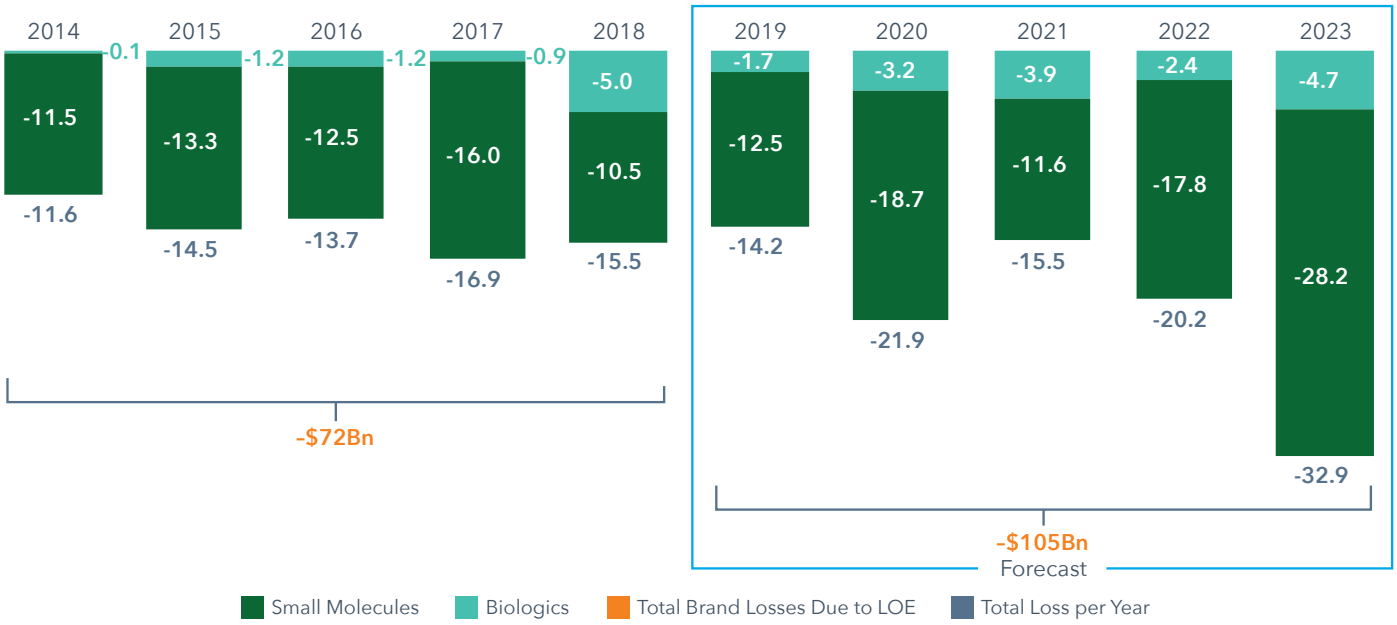
Source: IQVIA Market Prognosis, Mar 2019; IQVIA Institute, Apr 2019

- The growing output of R&D is expected to continue to result in an average 54 NASs per year and an aggregate of $73 billion of net new drug spending growth over five years.
- Despite 2018 NAS launches reaching their highest point compared to the past 10 years, annual net spending growth from new branded products will remain lower through 2023 than seen in peak years of 2014 and 2015.
- Still, net spending levels on new brands are expected to rise from current levels in 2018.
- Many of the newer product launches represent specialty and orphan drugs that treat smaller patient populations and therefore, lead to lower overall sales.
- In some markets, such as migraine, atopic dermatitis, psoriasis and others, significant off-invoice discounts and rebates, or the use of patient copay coupons, are being used in large numbers, lowering net revenue growth from these fast-growing products.

Chart notes: NAS = new active substance. New brands are protected branded products on the market less than 24 months during the year reported. 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.

At an invoice price level, impact of losses of exclusivity are expected to be 46% greater in the next five years including biosimilars

Exhibit 30: Lower Brand Invoice Spending Due to Loss of Exclusivity US$Bn



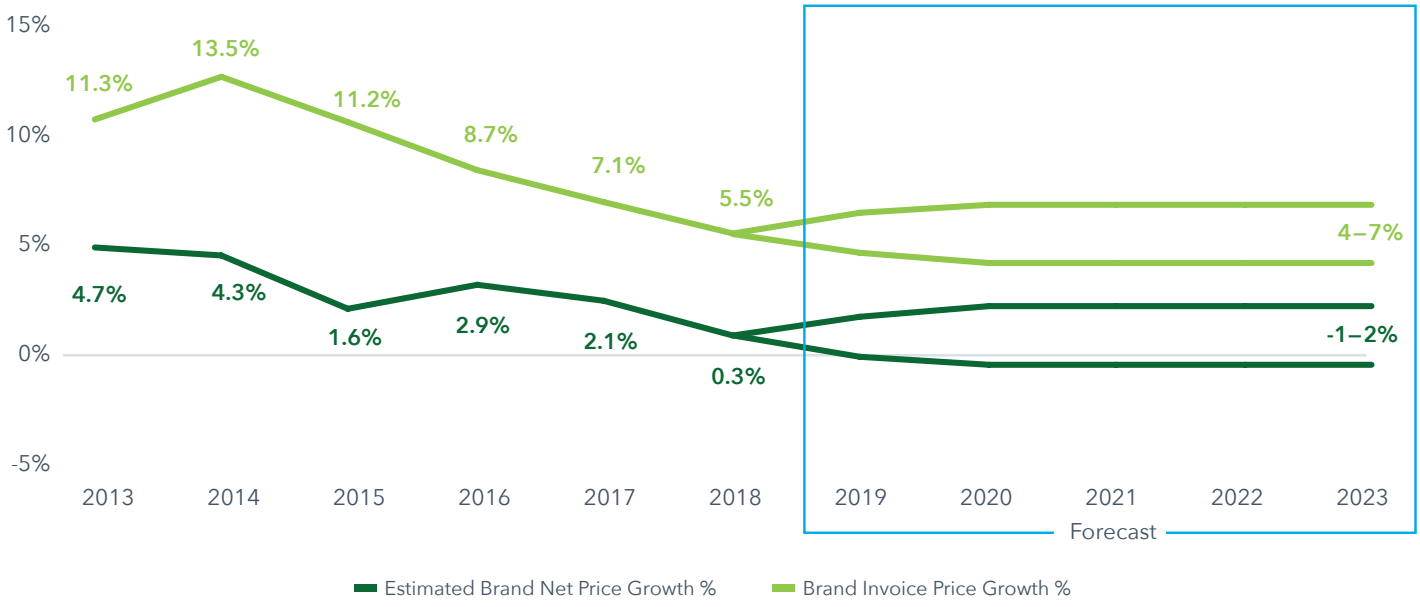
Source: IQVIA Market Prognosis, Mar 2019

- The impact of patent expiries has been relatively unchanged for the past five years but is expected to increase steadily over the next five years peaking in 2023 when protected brands will lose $33 billion due to patent expiries and associated competition.
- The total impact of patent expiries is expected to be 46% higher in the next five years than the past five. Excluding the impact of biosimilars, the next five years will see $88.9 billion of lower brand spending compared to $63.8 billion in the past five years.
- The largest biologic impact is expected in 2023 when the largest selling branded medicine in 2018, adalimumab (Humira), is expected to face competition. While biosimilars for this drug are already approved, litigation and settlements between originators and biosimilar companies are expected to delay biosimilar entry.
- While 2018 has seen some of the largest overall impact on branded spending from biosimilars – mainly from those that entered in 2016 – there were also three new biosimilars in 2018: pegfilgrastim, insulin lispro and epoetin alfa.
- Small molecule expiry impact in 2023 is the largest in the outlook with medicines expiring in 2022 such as Januvia and Spiriva fully impacting the market in 2023.

Chart notes: Lower brand spending based on invoice prices. Historic impacts from IQVIA National Sales Perspectives, 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.

Net price growth for protected brands is forecast to be -1 to 2% through 2023

Exhibit 31: Protected Brand Invoice and Net Price Growth



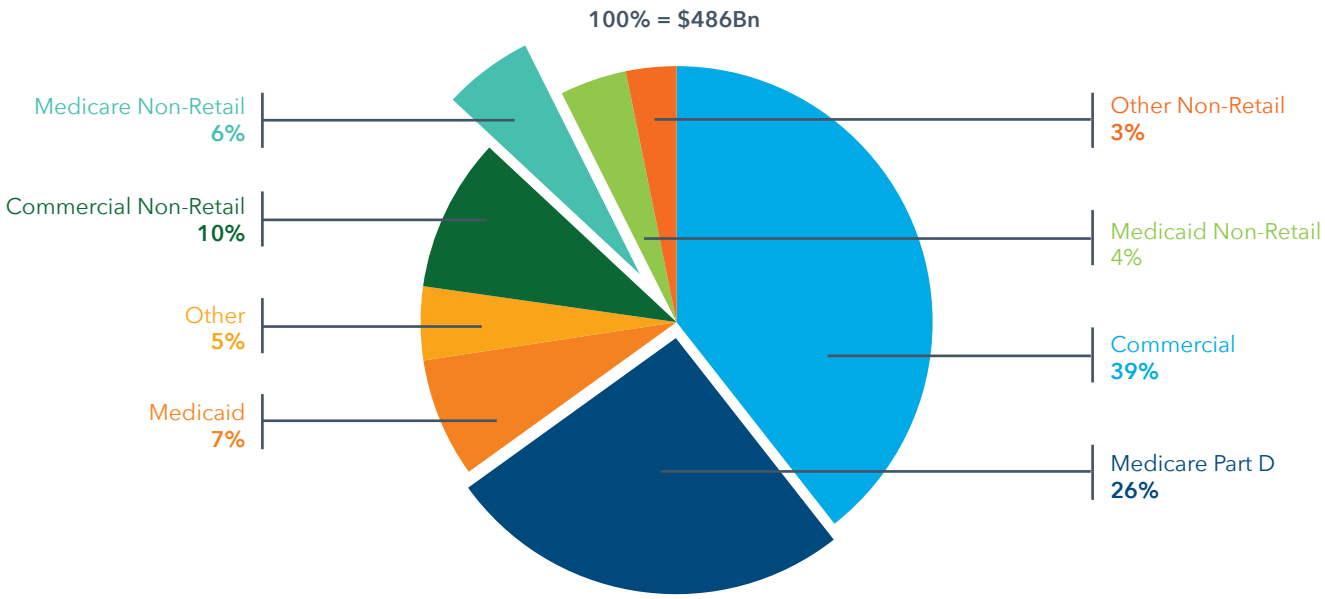
Source: IQVIA Institute, Apr 2019

- As public pressure on drug pricing has escalated, list price increases have slowed to 5.5% in 2018 and are expected to average 4–7% per year through 2023.
- Net price growth is likely to remain in the -1 to 2% range as the structural drivers of low net price growth are expected to remain in effect including competitive intensity in many therapy areas, payer pressure and influence on prescribing.
- 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 has continued.
- While there is a clear expectation that drug pricing policies will be reformed, there are likely impacts of those policies on either invoice prices, consumer out-of-pocket costs or net prices, and the exact nature of those changes remain significantly uncertain.
- These forecasts embed a level of pressure on net pricing associated with the historic patterns of payer pressure, negotiated rebates and the use of coupons, which are expected to continue in many parts of the market in some scenarios.

Chart notes: "Invoice" values are IQVIA reported values from wholesaler transactions measured at trade/invoice prices and exclude off-invoice discounts and rebates that reduce net revenue received by manufacturers. "Net" values denote company recognized revenue after discounts, rebates and other price concessions. Results are based on a comparative analysis of company reported net sales and IQVIA reported sales and prices at product level for branded products representing 75–93% of brand spending in the period displayed. All growth numbers calculated over same cohort of products in the prior year.

Insurance types represent very different shares of net spending on medicines

Exhibit 32: U.S. Net Pharmaceutical Spending by Channel and Pay Type (2016)



Source: CMS NHE, Jan 2017, and IQVIA Institute Analysis, *'How Much is the United States Actually Spending on Drugs?' Poster Presentation, ISPOR,* May 2018

- Key aspects of the administration's American Patients First blueprint are targeted at patients in the Medicare program. The most likely and impactful of these policies to progress into practice will be those that can be implemented without legislative changes and therefore, not require legislative compromise.
- In total, Medicare spending, represents about 32% of spending on prescription drugs, including those dispensed in retail pharmacies, by mail order or those that are administered by healthcare providers in non-retail settings.
- While these spending shares represent an official estimate by the Centers for Medicare & Medicaid Services (CMS), it is also notable that only about one-third of Medicare beneficiaries have a standard benefit and are therefore, exposed to the coverage 'donut hole', while low income subsidy or those with remaining employer insurance are not generally exposed to Medicare Part D cost sharing.
- In Medicare Part B, a large numbers of seniors purchase supplemental insurance and only a small portion of patients are exposed to the uncapped 20% coinsurance in the standard version of the benefit.
- These examples demonstrate that discussion of these policy proposals based on broad simplifications of the insurance types will be less helpful in understanding the effects of these policies in practice.

Chart notes: Med D = Medicare Part D. CMS National Health Expenditures for retail prescription drug spending by pay type have been used as a basis for modeling overall spending by pay type across channels which are not reported for drugs separately from other medical costs by CMS. Patient out-of-pocket costs have been allocated by pay type based on CMS published assumptions. Non-retail medicine spending levels have been estimated by IQVIA and then segmented based on CMS NHE pay type shares of overall spending on personal healthcare costs excluding retail prescription costs. Net spending by all payers, including patients result in spending levels that are notably higher than net manufacturer revenues reported elsewhere in this report.

A large number of policies tied to the administration's American Patients First blueprint are being considered

Exhibit 33: Policies Tied to the American Patients First Blueprint

POLICY	PROBABILITY	CHANNEL / PAY TYPE IMPACT
Eliminate payer rebate safe harbor		Pharmacy & Medical / Medicaid & Medicare
International benchmark reimbursement		Medicare Part B
TrOOP excludes manufacturer pay		Pharmacy / Medicare Part D
Cap patient $ in catastrophic phase		Pharmacy / Medicare Part D
Reduce protected classes limitations		Pharmacy / Medicare Part D
Eliminate LIS cost-sharing on generics		Pharmacy / Medicare Part D
LIS biosimilar subsidy		Pharmacy / Medicare Part D
Shift from Part B to D coverage		Medical / Medicare Part B
Part B inflation limit on prices		Medical / Medicare Part B
Less WAC-based reimbursement		Medical / Medicare Part B
State-level pilot Medicaid programs		Pharmacy & Medical / Medicaid
Indication/value-based costs		Pharmacy & Medical / Medicaid & Medicare
340B reimbursement		Medical / Medicaid
Cross-border trade		All
Encourage biosimilar uptake		All
Coupon use limitations / accumulators		Commercial

Source: IQVIA Consulting, Apr 2019

- A large number of policies tied to the administration's American Patients First blueprint are being considered, and will likely be implemented through executive authority in the absence of bipartisan support in Congress.
- The proposals from the administration listed here are an illustration of the complexity of the system and the realization that a single change or overhaul is less likely to be effective compared to many discrete reforms. The overall goal stated by the administration is a significant reduction in out-of-pocket costs of approximately 30%.
- Among the most transformative of these proposed changes is the rebate safe harbor in Medicare Part D, which allows plans to negotiate rebates. Under the proposal, rebates would cease January 1st 2020, resulting in lower list prices immediately for patients.
- In addition, in October 2018, CMS began soliciting public comments related to Medicare Part B drug payment for provider-administered treatments, and is currently considering a mechanism to benchmark prices to the average price in other developed countries.
- Other policies could have additional effects with varying impacts either in isolation or in combination with each other, all linked to the goals of encouraging greater competition and lowering patient costs and costs to Medicare.

Chart notes: WAC = Wholesale Acquisition Cost; DTC = direct-to-consumer; LIS = low-income subsidy; TrOOP = true out-of-pocket.

Alternative scenarios for implementation of drug pricing reform

Exhibit 34: Scenarios of U.S. Pricing Reforms and Potential Impacts

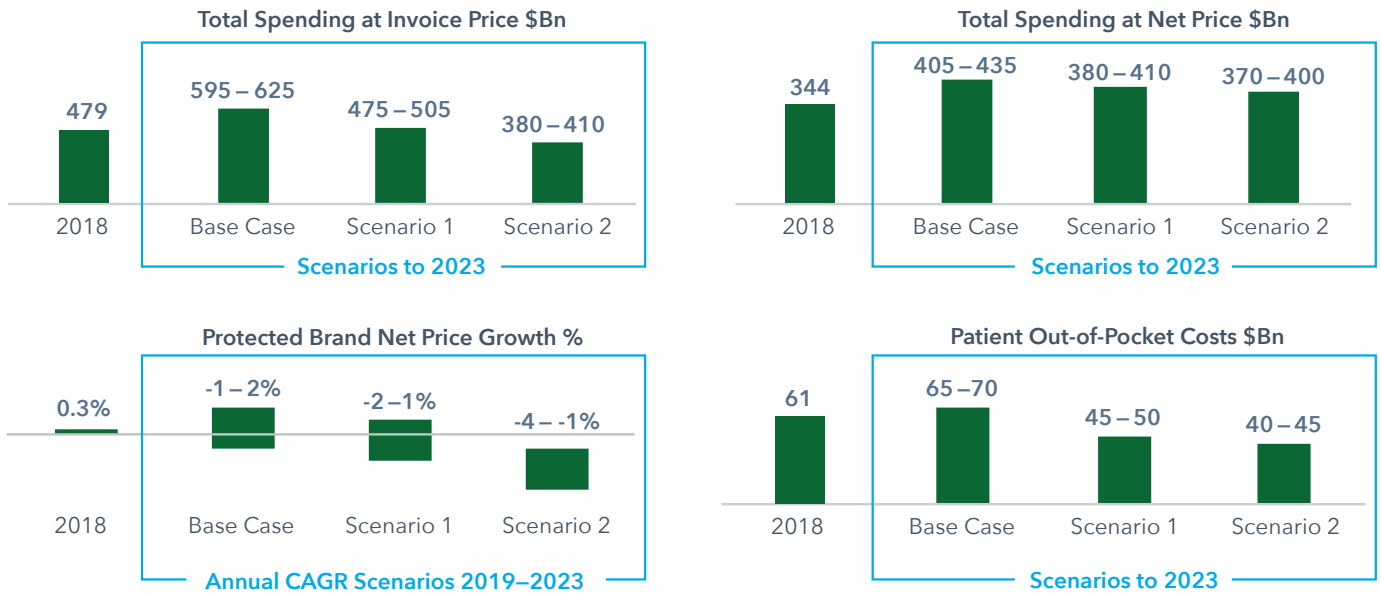
	Pricing Reform Scenarios	Implications for Medicine Spending
Base Case	• Current market dynamics will persist as policy changes are phased in, constraining pricing and growth • Payer and provider consolidation • Innovation-driven medicine spending growth • Lower invoice and net price growth due to competitive dynamics • Policy changes are announced but phased in over a longer period • Cost reductions for patients will initially appear through slowing growth in costs and later as actual reductions	• Invoice revenue: 4–7% CAGR reaching $595–625 billion • Net revenue growth: 3–6% CAGR reaching $405–435 billion • Protected brands net price growth -1 to 2% for a total of $12 billion growth over 5 years, about $15 billion below a scenario without reform (not shown) • Patient out-of-pocket costs rising $1 billion per year from current $61 billion reaching $66 billion by 2023, with coupon use also rising to offset rising costs in commercial plans reaching $18 billion by 2023 from the current $13 billion
Scenario 1	• Key policies in the American Patients First blueprint are implemented in 2020 with others phasing in over subsequent years • Repeal of rebate safe harbor in Medicare Part D takes effect 1/1/2020 • Brands in therapy areas with high prices and rebates will see their net prices decline to the level of the lowest net-priced competitor and competition will be more aggressive • Policies targeting Medicare Part B could begin to be phased in during 2020 • Commercial plans not affected, except as more modest spillover effects	• Invoice revenue: -1 to 2% CAGR reaching $475–505 billion • Protected brands net price growth -2 to 1% for a total of -$20 billion over 5yrs • Net revenue growth: 1–4% CAGR reaching $380–$410 billion as new brands and volume growth offset net price declines • Patient out-of-pocket costs reduced by 30% from the base case or $14 billion by 2023, but focused in Medicare Part D
Scenario 2	• Both Medicare and commercial insurance adopt largely similar policies and across all pay types and channels and out-of-pocket costs are reduced from 20 to 30% • Medicare policy changes are implemented first and followed soon after by commercial insurance • Net prices for medicines drop more sharply as insurers drive more restrictive formularies or receive greater price concessions from manufacturers	• Invoice revenue: -4 to -7% CAGR reaching $345–375 billion, approximately $120 billion below current level with almost no difference between invoice and net spending remaining in 2023 • Protected brands net price growth -4 to -1% for a total of -$35 billion over five years • Net revenue growth: 0-3% CAGR reaching $370-400 billion as new brands and volume growth offset net price declines • Patient out-of-pocket costs reduced by 30% across all insurance types for a reduction of $20 billion below the base case

Source: IQVIA Consulting, IQVIA Institute, Apr 2019

Chart notes: Estimates as of April 26th, 2019 and based on IQVIA assumptions and modeling of likely scenarios of policy proposals, contents, implementation, and the responses of market participants.

The potential impact in 2023 of pricing reform scenarios on key metrics relative to the 2018 baseline are substantial

Exhibit 35: Potential Impact of Pricing Reform Scenarios



Source: IQVIA Institute, Apr 2019

- Total spending on pharmaceuticals at invoice prices are forecast to rise at a 4–7% CAGR in the base case to $595-625 billion by 2023, but under Scenario 1 growth would slow to a pace of -1 – 2%, and decline by 2-5% CAGR under Scenario 2 resulting in a $380-410 billion market in 2023.
- In those two scenarios, net spending could be approximately 6% or 9% below projected 2023 levels in the base case, and invoice spending may be 20% to 40% lower.
- On a net price basis, the total market of $344 billion in 2018 would grow under all scenarios but could vary from 1–4% under Scenario 2 to 3–6% under the Base Case.
- Average protected brand net price growth would be affected by greater price competition within certain therapy classes, resulting in a shift from the 2018 level of 0.3% to a CAGR of between -1 and -4% under Scenario 2.
- Patient out-of-pocket costs, a primary focus of pricing reforms, could decline from the 2018 level of $61 billion to a range of $45–50 billion or $40–45 billion in 2023 under Scenarios 1 and 2, respectively.
- Quantifying the future impact of undecided reforms is necessarily uncertain and these scenarios are presented as helpful to frame the scope of potential changes under current discussion rather than predictions or forecasts.

Chart 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. Pricing is at the manufacturer level. Out-of-pocket costs reflect final costs for patients after coupons and other patient assistance for retail and mail-order prescriptions are reflected.

Notes on sources

THIS REPORT IS BASED ON THE IQVIA SERVICES DETAILED BELOW

National Sales Perspectives (NSP)™ 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.

National Prescription Audit (NPA)™ is a suite of services that provides the industry standard source of national prescription activity for all products and markets across the retail, mail, and long term care channels.

Real World Evidence is a suite of services that provides near census level coverage of dispensed prescription information at a prescriber and insurance plan level, and tracks de-identified anonymous patient records over time to analyze distinct use patterns.

Formulary Impact Analyzer (FIA) provides insight into what impact popular utilization-control measures enforced by managed care organizations have had on prescription volumes including the dynamics that affect patient behavior in filling and/or refilling prescriptions. Formulary measures include tiered copay benefit designs, prior authorization restrictions, and often result in non-preferred prescriptions being rejected or switched at the pharmacy. FIA offers visibility to claims rejected for other reasons such as contraindications as well as those attempted to be refilled too soon. FIA sources include national and regional chains, independent pharmacies and a switch house providing a comprehensive view of retailers and across geographies.

Market Prognosis is a comprehensive, strategic market forecasting publication that provides insight to decision makers about the economic and political issues that can affect spending on healthcare globally. It uses econometric modeling from the Economist Intelligence Unit to deliver in-depth analysis at a global, regional and country level about therapy class dynamics, distribution channel changes and brand vs. generic product spending.

Xponent® provides detailed prescriber level prescription information for the U.S and Puerto Rico markets. It includes dispensed drug prescription information from retail pharmacies (chain, mass merchandisers, independent and food stores), mail service pharmacies and long term care facilities. It covers 92% of the retail channel and up to 85% coverage in the mail and LTC channels and uses a customized and patented estimation methodology to generate accurate market estimates.

Note: IQVIA regularly updates and restates historical data based on revised information from data suppliers and information in this report may not be consistent with prior editions.

Methodology

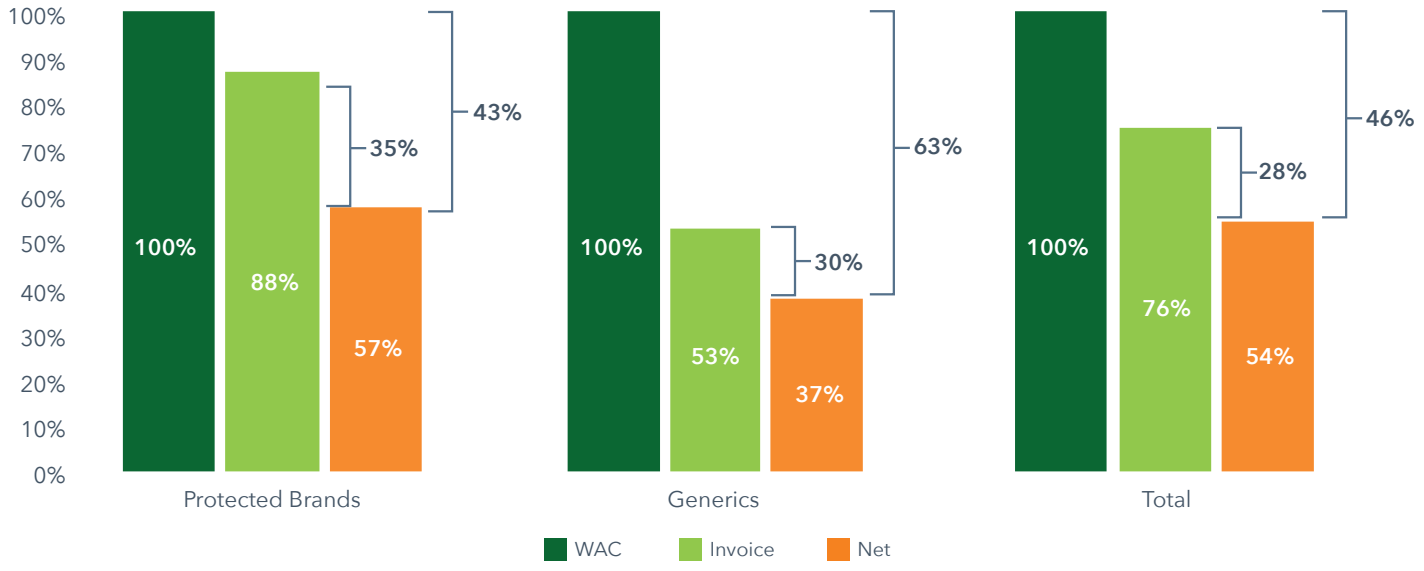
The analysis covers the U.S. prescription-bound pharmaceutical market, including all channels of distribution (pharmacies, mail order, hospitals, clinics, etc.).

ESTIMATES OF NET PRICING

WAC-based pricing is derived from list-prices of products as reported to IQVIA. Invoice-based pricing is derived from IQVIA proprietary information gathered from wholesalers and company direct sales. While IQVIA invoice prices reflect supply-chain price concessions included on the invoices between wholesalers and their customers, 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 (see Exhibit 35 below).

Estimated net price growth in this report is projected from a sample of large and mid-sized companies analyzed from 2011–2018. The sample includes between 225 to 299 product franchises, which represent between 75 to 93% of protected branded product sales in each of the years shown. Branded Products are included in the sample if their net sales amount is disclosed in financial filings with the Securities and Exchange Commission 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 sales 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.

Exhibit 36: 2018 Average Net Sales Adjustment By Product Type



Source: IQVIA Institute; IMS MIDAS; National Sales Perspectives; Public Company SEC filings, Dec 2018

OPIOID MARKET DEFINITIONS FOR ANALYSES

Prescription opioid use analyses have defined the market as treatments for pain management, and exclude treatments used exclusively to combat opioid use dependence, but does include medicines mostly used for pain treatment but have some use in opioid dependence. The Centers for Disease Control and Prevention (CDC) have defined factors to reflect the potency of different prescription opioids relative to one milligram of morphine.

Within the opioid pain analyses, some medicines are noted as abuse-deterrent or tamper-resistant, including Arymo ER, Embeda, Hysingla ER, MorphaBond ER, OxyContin, RoxyBond and Xtampza ER.

Separate analyses of drugs used in medication-assisted opioid use dependency treatment (MAT) are based on medicines used for that as described here:

MAT medicines: Bunavail, Buprenorphine/Naloxone, Buprenorphine (sublingual), Depade, Evzio, Naloxone, Naltrexone, Narcan, Probuphine, Revia, Sublocade, Suboxone, Subutex, Vivitrol and Zubsolv.

Exhibit 37: Morphine Equivalency Segments and Factors

Low Equivalency (ME factor <1)	
Anileridine	0.25
Codeine	0.15
Dihydrocodeine	0.25
Meperidine	0.10
Pentazocine	0.37
Propoxyphene	0.06
Tapentadol	0.40
Tramadol	0.10

High-Equivalency (ME factor 1.5 – 100+)	
Buprenorphine	10 or 75
Butorphanol	7
Fentanyl*	10–100+
Hydromorphone	4
Levorphanol	11
Methadone**	4–12
Oxycodone	1.5
Oxymorphone	3

Equivalent (ME factor = 1)	
Hydrocodone	1
Morphine	1
Nalbuphine	1
Opium	1

Notes:

*Fentanyl is commonly referred to as having an MME of 50 or higher, but the MME factors vary based on formulation for this drug. The most commonly prescribed fentanyl formulation (transdermal patch) has an MME factor of 100. Other forms, including injectables and oral formulations (spray, buccal, sublingual, lozenges) have MME factors with scale based on strength from 10 to over 200.

**Methadone MME factors vary based on the dosage with a factor of 4 for dosages up to 20mg per day, 8 if the dosage is between 21mg–40mg per day, 10 if the dosage is between 41mg–60mg per day, and 12 if the dosage is greater than 60mg per day.

Source: Centers for Disease Control and Prevention (CDC)

SPECIALTY PHARMACEUTICALS

IQVIA defines specialty medicines as those that treat chronic, complex or rare diseases, and which have a minimum of four out of seven additional characteristics related to the distribution, care delivery and/or cost of the medicines.

- Chronic diseases are long-lasting and often without direct cure, and treatments are intended to be used for more than six months.
- Complex diseases have both environmental and genetic components, meaning they may be hereditary and/or exacerbated by environmental factors (obesity, diet, etc.). Complex diseases can affect multiple organ systems and may be caused by or be the cause of secondary diseases (e.g., diabetes can cause renal failure such that both are considered complex diseases).
- Rare diseases are defined as those with fewer than 200,000 new cases annually, equivalent to the U.S. definition of orphan diseases but not exclusively linked to the granting of a FDA orphan drug designation.
- Additional product characteristics, where a product must exhibit four of the seven to be considered specialty are:
- Costly: list price in excess of $6,000 per year
- Initiated/maintained by a specialist
- Requiring administration by another individual or health care professional (i.e., not self-administered)
- Requiring special handling in the supply chain (i.e., refrigerated, frozen, chemo precautions, biohazard)
- Requiring patient payment assistance
- Distributed through non-traditional channels (i.e., 'specialty pharmacy')
- Medication has significant side effects that require additional monitoring/counselling (including, but not limited to REMS programs) and/or disease requires additional monitoring of therapy (e.g., monitoring of blood/cell counts to assess effectiveness/side effects of therapy).

DISPENSED PRESCRIPTIONS ADJUSTED FOR 90-DAY PRESCRIPTIONS

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.

CHANGES IN THE COLLECTION AND REPORTING OF DISPENSED PRESCRIPTIONS

IQVIA has changed its projections of prescriptions to better measure the true demand of prescriptions that reach the patient. IQVIA's projection methodology now adjusts to account for prescriptions which, upon initial dispensing, may have been subsequently voided or reversed as part of the payment adjudication process. With the increase in high-dollar specialty products and e-prescribing causing more voids, reversals, and rejections at the pharmacy, this enhancement to IQVIA prescription data offerings (Xponent, National Prescription Audit) has been implemented beginning with January 2019 and includes a revision of data from January 2017. The resulting decrease in demand has, on average, represented a decrease for total dispensed prescriptions of approximately 5% across all markets with a greater impact to brand and branded-generic products and lesser impact to generics.

Appendix

Top Therapeutic Classes by Descriptions

DISPENSED PRESCRIPTIONS MN		2017	2018
Total U.S. Market		4,237	4,214
1	Antihypertensives	680	674
2	Pain	424	400
3	Mental Health	381	387
4	Lipid Regulators	250	249
5	Antibacterials	258	247
6	Antidiabetics	214	214
7	Nervous System Disorders	371	367
8	Respiratory	170	172
9	Anti-Ulcerants	163	160
10	Thyroid Therapies	130	128
11	Dermatologics	101	105
12	ADHD	90	91
13	Hormonal Contraceptives	86	81
14	Anticoagulants	79	80
15	Corticosteroids	72	72
16	Vitamins & Minerals	72	70
17	GI Products	61	63
18	Vaccines	34	46
19	Other Cardiovasculars	45	45
20	Benign Prostate Hyperplasia	43	44

Source: IQVIA National Prescription Audit, Jan 2019

Notes: Therapy areas are based on proprietary IQVIA definitions. Includes prescription-bound products including insulins dispensed through chain and independent pharmacies, food store pharmacies, mail service pharmacies, and long-term care facilities. Excludes OTC products. IQVIA routinely updates its national audits, which may result in changes to previously reported market size and growth rates. Prescriptions are not adjusted for length of therapy; 90-day and 30-day prescriptions are both counted as one prescription.

APPENDIX

Top Therapeutic Classes by Non-Discounted Spending

	NON-DISCOUNTED SPENDING US$BN	2014	2015	2016	2017	2018
Total U.S. Market		380.2	426.7	446.5	454.7	482.0
1	Antidiabetics	33.7	43.6	49.7	54.2	60.6
2	Oncologics	33.2	39.1	45.1	50.2	58.4
3	Autoimmune Diseases	23.4	30.7	38.3	46.0	54.1
4	Respiratory Agents	21.4	23.7	25.6	27.0	29.2
5	HIV Antivirals	14.0	16.1	18.7	20.6	22.5
6	Nervous System Disorders	14.7	16.8	18.9	20.5	22.1
7	Multiple Sclerosis	15.0	17.5	17.7	18.8	18.8
8	Anticoagulants	8.5	9.9	12.1	14.3	17.1
9	Mental Health	21.2	19.7	17.0	15.9	16.6
10	Pain	20.9	20.3	19.7	17.4	16.1
11	Vaccines	8.4	10.2	10.6	10.3	11.4
12	Other Cardiovasculars	6.4	7.4	8.3	9.4	10.5
13	ADHD	10.6	11.2	11.0	9.9	9.2
14	Dermatologics	9.4	10.7	11.1	9.5	8.7
15	GI Products	5.8	7.1	8.0	8.4	8.7
16	Viral Hepatitis	12.2	18.8	14.9	10.8	7.5
17	Antihypertensives	12.0	10.3	9.5	7.5	7.1
18	Sex Hormones	6.0	6.4	6.4	6.3	6.2
19	Antibacterials	8.3	8.0	7.6	6.4	5.7
20	Hormonal Contraception	5.1	5.4	5.4	5.6	5.4

Source: IQVIA. National Sales Perspectives, Jan 2019

Notes: Therapy areas are based on proprietary IQVIA definitions. Includes prescription and insulin products sold into chain and independent pharmacies, food store pharmacies, mail service pharmacies, long-term care facilities, hospitals, clinics, and other institutional settings. Excludes OTC. IQVIA routinely updates its national audits, which may result in changes to previously reported market size and growth rates.

APPENDIX

Top Medicines by Prescription

	DISPENSED PRESCRIPTIONS MN	2017	2018
Total U.S. Market		4,237	4,214
1	atorvastatin	108	114
2	lisinopril	101	98
3	levothyroxine	98	96
4	amlodipine	85	87
5	acetaminophen/hydrocodone	79	68
6	gabapentin	64	67
7	omeprazole	69	63
8	metformin	65	62
9	amoxicillin	56	55
10	losartan	49	54
11	sertraline	48	49
12	metroprolol	44	47
13	simvastatin	52	46
14	hydrochlorothiazide	46	45
15	prednisone	44	44
16	furosemide	44	43
17	montelukast	38	40
18	azithromycin	43	40
19	alprazolam	43	39
20	pantoprazole	37	39

Source: IQVIA National Prescription Audit, Jan 2019

Notes: Includes prescriptions and insulins dispensed through chain and independent pharmacies, food store pharmacies, mail service pharmacies, and long-term care facilities. Excludes OTC. IQVIA routinely updates its national audits, which may result in changes to previously reported market size and growth rates. Prescriptions are not adjusted for length of therapy; 90-day and 30-day prescriptions are both counted as one prescription. Table shows leading active-ingredients or fixed combinations of ingredients and includes both branded and generic products.

APPENDIX

Top Medicines by Non-Discounted Spending

	NON-DISCOUNTED SPENDING US$BN	2014	2015	2016	2017	2018
Total U.S. Market		380.2	426.7	446.5	454.7	482.0
1	Humira	7.4	10.1	13.5	16.3	18.3
2	Enbrel	5.9	7.2	7.6	7.9	8.0
3	Harvoni	0.6	1.6	3.0	4.6	7.0
4	Remicade	3.5	4.1	4.7	5.0	5.7
5	Januvia	3.1	3.8	4.3	4.9	5.5
6	Lyrica	4.5	5.0	5.3	5.5	5.2
7	Lantus Solostar	2.1	2.8	3.5	4.3	5.2
8	Eliquis	1.6	2.0	2.6	3.7	5.0
9	Advair Diskus	0.0	0.0	1.6	3.6	4.5
10	Neulasta	0.0	0.3	1.2	2.7	4.5
11	Xarelto	3.5	3.7	3.9	4.0	4.3
12	Copaxone	4.8	5.8	5.5	4.8	4.3
13	Rituxan	0.1	0.4	0.7	2.2	4.3
14	Tecfidera	3.8	4.2	4.2	4.2	4.2
15	Stelara	4.7	4.7	4.5	4.3	4.2
16	Genvoya	0.0	0.8	2.7	3.1	4.2
17	Vyvanse	2.2	2.6	3.0	3.3	3.6
18	Novolog Flexpen	2.9	3.5	3.4	3.6	3.5
19	Opdivo	1.5	2.0	2.4	2.9	3.5
20	Symbicort	2.2	2.7	3.0	3.1	3.5

Source: IQVIA. National Sales Perspectives, Jan 2019

Notes: Spending is based on IQVIA National Sales Perspectives and is not adjusted for estimates of off-invoice discounts and rebates.
Includes prescription and insulin products sold into chain and independent pharmacies, food store pharmacies, mail service pharmacies, long-term care facilities, hospitals, clinics, and other institutional settings. Excludes OTC. IQVIA routinely updates its national audits, which may result in changes to previously reported market size and growth rates. Copaxone includes both 20mg and 40mg strengths.

APPENDIX

Dispensing Location by Non-Discounted Spending

NON-DISCOUNTED SPENDING US$BN	2014	2015	2016	2017	2018
Total U.S. Market	380.2	426.7	446.5	454.7	482.0
Retail and Mail	273.2	306.7	322.0	322.7	336.4
Chain Stores	122.2	131.1	138.4	135.4	140.0
Mail Service	82.3	98.6	105.8	111.5	120.7
Independent	42.2	48.2	49.8	49.5	50.1
Food Stores	26.6	28.9	28.0	26.3	25.7
Non-Retail	106.9	120.0	124.5	132.1	145.6
Clinics	49.2	57.2	64.1	71.3	80.8
Non-Federal Hospitals	30.4	33.5	34.4	34.2	36.4
Long-term Care	16.3	16.6	16.5	16.6	16.8
HMO	3.9	4.9	1.7	1.8	2.0
Home Health Care	3.4	3.9	3.8	4.2	5.6
Federal Facilities	2.8	2.7	2.8	2.6	2.7
Miscellaneous	1.0	1.2	1.3	1.4	1.3

Source: IQVIA. National Sales Perspectives, Jan 2019

Notes: Spending is based on IQVIA National Sales Perspectives and is not adjusted for estimates of off-invoice discounts and rebates.
Includes prescription-bound products including insulin products and excluding other products such as OTC. IQVIA routinely updates its national audits, which may result in changes to previously reported market size and growth rates.

APPENDIX

Prescriptions by Location Unadjusted Prescription Length

DISPENSED PRESCRIPTIONS MN	2017	2018
Total U.S. Market	4,237.1	4,213.8
Retail and Mail	3,848.4	3,818.5
Chain Stores	2,397.4	2,370.5
Mail Service	211.6	213.7
Independent	706.9	702.9
Food Stores	532.5	531.4
Non-Retail	388.8	395.3
Long-Term Care	388.8	395.3

Source: IQVIA National Prescription Audit, IQVIA Institute, Jan 2019

Prescriptions by Location Adjusted for Prescription Length

ADJUSTED DISPENSED PRESCRIPTIONS MN	2017	2018
Total U.S. Market	5,620.3	5,769.6
Retail and Mail	5,224.6	5,366.5
Chain Stores	3,132.5	3,230.7
Mail Service	561.5	562.4
Independent	846.4	863.5
Food Stores	684.2	709.8
Non-Retail	395.7	403.1
Long-Term Care	395.7	403.1

Source: IQVIA National Prescription Audit, IQVIA Institute, Jan 2019

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.

APPENDIX

Dispensing by Payment Type for Retail Prescriptions

DISPENSED PRESCRIPTIONS MN	2017	2018
Retail Prescriptions	3,848.4	3,818.5
Commercial Third Party	51.1%	51.4%
Medicare Part D	27.4%	27.0%
Medicaid	16.4%	16.2%
Cash	5.1%	5.3%

Source: IQVIA National Prescription Audit, US SMART, Managed Care, Apr 2019

Notes: Report reflects prescription-bound products including insulins and excluding other products such as OTC.
Medicaid includes both Fee for Service and Managed Medicaid.

Non-Discounted Spending and Dispensing by Product Type

NON-DISCOUNTED SPENDING US$BN	2017	2018
Total U.S. Market	454.7	482.0
Branded	76.7%	78.7%
Unbranded Generic	13.2%	11.7%
Branded Generic	10.1%	9.6%

DISPENSED PRESCRIPTIONS MN	2017	2018
Total U.S. Market	4,237.1	4,213.8
Branded	10.0%	10.1%
Unbranded Generic	85.3%	85.6%
Branded Generic	4.6%	4.3%

Source: IQVIA National Prescription Audit, National Sales Perspectives, Jan 2019

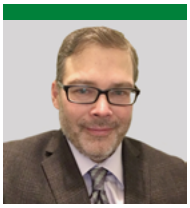
Notes: Includes prescriptions and insulins dispensed by chain and independent pharmacies, food store pharmacies, mail service pharmacies, and long-term care facilities. Spending figures also include sales into hospitals, clinics, and other institutional settings. IQVIA routinely updates its national audits, which may result in changes to previously reported market size and growth rates.

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 U.S. 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.

About the IQVIA 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 IMS Institute is now the IQVIA™ INSTITUTE for Human Data Science

CONTACT US

info@iqviainstitute.org

iqviainstitute.org

LOCATION

100 IMS Drive

Parsippany, NJ 07054

USA

Copyright © 2019 IQVIA. All rights reserved. 05.19.ENT