

Peer-Reviewed Article

Canadian Trends and Projections in Prescription Drug Purchases: 2001–2023

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Abstract

Background: Comprehensive data that provides knowledge of trends in the pharmaceutical market are limited. We report historical patterns of national pharmaceutical purchases and identify factors that may influence future spending to help predict growth in national drug spending.

Methods: We conducted a time series analysis of annual prescription drug purchases across Canada between 2001 and 2020 using the IQVIA Canadian Drugstore and Hospital Purchases Audit. We report total prescription purchases and relative percentage change annually, stratified by sector (retail and hospital), and forecast annual drug spending to 2023. We also assessed recent drug approvals, policies, or legislation that may influence drug spending.

Results: Total prescription purchases for 2020 were approximately \$32.7 billion, 4.3% higher than 2019 (3.8% growth in retail; 6.9% in hospital). Overall, the top 25 drugs accounted for 26.0% and 52.9% of total spending in hospital and retail sectors, respectively. Spending has grown over the last 2 decades, with annual average growth of 5.3% and 7.1% for the retail and hospital sectors, respectively. New approvals of specialty and oncology drugs and generic formulations of the top 25 drugs may influence drug purchases in 2021 to 2023.

Interpretation: We project continued growth in overall drug purchases across the entire Canadian market. Specifically, the forecast for the outpatient sector is continued moderate levels of growth in drug spending (3% to 4%), with higher rates of growth (7% to 8%) in the hospital sector. Action must be taken to curb sustained growth in pharmaceutical spending in Canada, otherwise increased costs may necessitate a shift in spending from other public budgets or to private industry and patients. The opportunity cost of continued increased spending in pharmaceuticals must also be considered.

For author information see Appendix 2

Introduction

Total public health care spending in Canada was \$265 billion in 2019, which represents 11.5% of the country's gross domestic product.¹ Public spending on prescription drugs accounts for 6% (\$15.9 billion) of national public health care expenditures, although total costs likely encompass a much larger portion of total drug spending when accounting for drug spending within the inpatient and private sector settings are included. Public spending on prescription drugs and the growing cost of prescription drugs for consumers and health systems is a leading issue for policy-makers; prescription drugs account for nearly half of total outpatient spending in Canada, and costs are increasing by 7.6% annually.¹⁻⁵ Currently, the government's health mandate prioritizes a national Pharmacare strategy and a national drug agency.⁶ The consistent increases in drug spending are superimposed on significant changes to the health care system, including modernization of drug price guidelines by the Patented Medicines Prices Review Board. The COVID-19 pandemic has also highlighted the importance of uninterrupted access to treatments.^{4,5}

Current estimates of Canadian drug spending are piecemeal in nature and limited to payer-specific outpatient expenditures or surveys.^{1,7-11} Little is known about drug costs across all payers, particularly when accounting for inpatient expenditures.¹ Comprehensive data that provide knowledge of current trends in the pharmaceutical market, including the anticipated impact of new molecular entities, biosimilars, and generic drugs, will assist decision-makers in planning for drug expenses and support evidence-informed policy. There is currently a gap in understanding of the full scope of drug spending in Canada and a lack of up-to-date insights on upcoming trends that may impact spending. Therefore, we report the historical trends in pharmaceutical purchases with insights on both inpatient and outpatient settings. We also report projected anticipated purchases growth for the next 3 years (2021 to 2023) and a horizon scan to identify factors that may influence future spending, including policies and new drugs, biosimilars, and generic products.

Methods

Drug Purchases and Projection

We conducted a retrospective time series analysis of annual prescription drug purchases across Canada between January 1, 2001, and December 31, 2020, using the IQVIA Canadian Drugstore and Hospital Purchases Audit. These data estimate the purchasing costs and unit volumes of all pharmaceutical products purchased by the Canadian retail and hospital sectors during that time period.¹² This audit is derived from a sample of outlets within these sectors (more than one-third of the retail sector and 86% of the hospital sector) in each province and territory; proprietary methods projected out these data to represent total pharmaceutical purchasing at the national level. We included all pharmaceutical purchasing of all dosage forms and formulations over the study period. This data includes over-the-counter drugs. Purchasing can be through a wholesaler or directly from the manufacturer; therefore, costs may include mark-ups but do not capture discounts. These data do not account for rebates or discounts given to payers as part of listing agreements. Data reflect all up-front discounts within each specific invoice and do not capture any subsequent rebates or volume discounts that could be credited to the outlets afterward. Due to the aggregated nature of the data provided, research ethics board approval was not required.

We describe total prescription medication purchases across Canada annually (using calendar years) over the study period, stratified by sector (retail versus hospital), and the calculated annual growth in purchases as the relative percentage change from the previous year. We used exponential smoothing models to forecast annual pharmaceutical purchases in 2021 to 2023. Costs are reported as nominal annual costs. Nominal costs were used for projection models; however, for a sensitivity analysis, we inflated the annual costs before 2020 to 2020 values using the all-items consumer price indexes.¹³ We also identified the 25 medications with the highest total purchases in calendar year 2020 in the retail and hospital sectors.

Horizon Scan

Environmental scans for national drug pipeline reports were conducted to estimate the therapeutic areas that will have major impacts on pharmaceutical spending in the next 3 years.¹⁴⁻¹⁷ Medications approved by Health Canada in 2020 and the first quarter of 2021, as well as generic drugs and biosimilars currently under review, were examined for potential budget impacts.^{14,18} The US Food and Drug Administration (FDA) new drug approvals in 2020 and early 2021 were also reviewed to identify drugs that may soon enter the Canadian market.¹⁹

The list of new and upcoming therapies was reviewed by a team of pharmacists and drug policy experts. Drugs with potential high impact on future spending (via upward pressure or downward pressure) were flagged based on the prevalence of the indication, current medication use in the therapeutic area, cost, and public plan reimbursement recommendations by CADTH. Based on the drugs with highest potential for impact, a consensus recommendation was made by authors on whether the projected spending might be more likely on the high, middle, or low end of the projected confidence interval (CI) range for the next 3 years.

Results

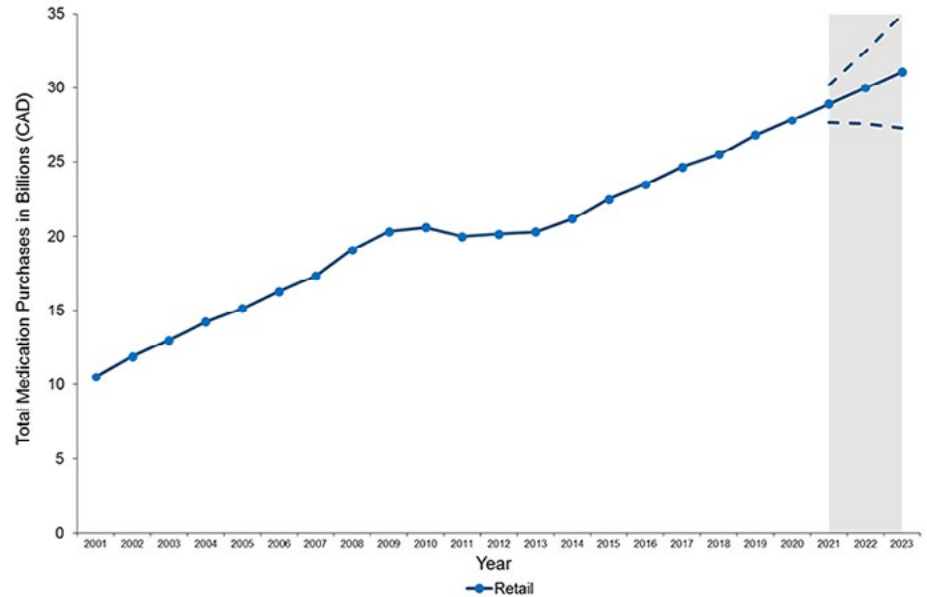
Historical Trends in Prescription Purchases

Figure 1 and Figure 2 illustrate the trends in Canadian prescription drug purchases from 2001 to 2020 in the retail and hospital sectors, respectively (values accounting for inflation can be found in Appendix 1, Figure 4 and Figure 5).

Overall Spending

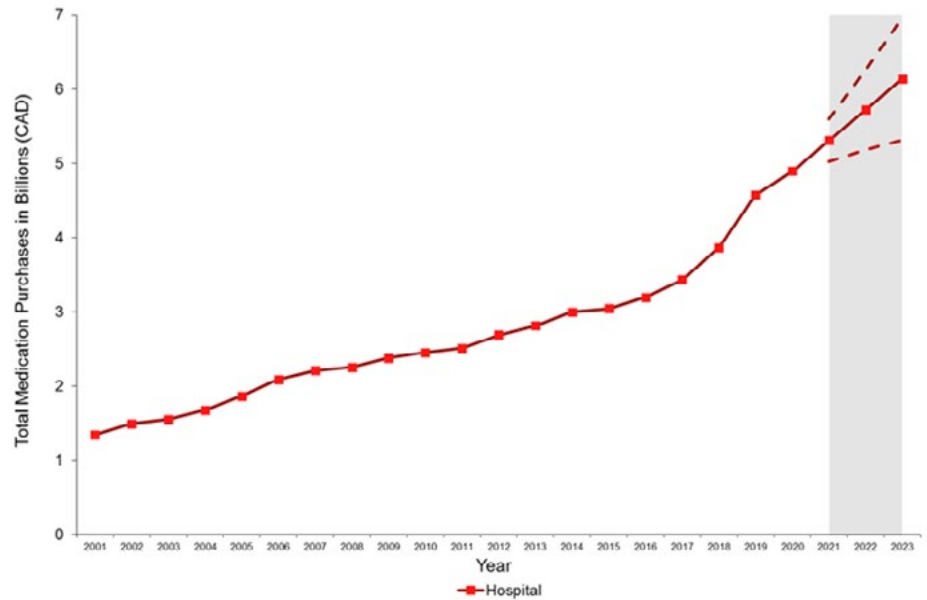
In 2020, total prescription purchases in Canada grew 4.3% from the previous year, reaching \$32.7 billion (compared with \$31.4 billion in 2019). The retail sector accounted for 85.1% of prescription purchases in 2020 (\$27.8 billion), and the hospital sector accounted for 14.9% (\$4.9 billion). Retail and hospital purchases in 2020 increased by 3.8% and 6.9%, respectively, from 2019. Figure 3 illustrates the trends in annual change in purchases across both sectors. Over the entire time period (2001 to 2020), the average annual growth was 5.3% for the retail sector and 7.1% for the hospital sector.

Figure 1: Total Medication Purchases in Canada for the Retail Sector From 2001 to 2020



Note: The grey zone illustrates forecasted purchases in the retail sector (solid line) with 95% confidence interval estimates (dashed lines) for the years 2021 to 2023.

Figure 2: Total Medication Purchases in Canada for the Hospital Sector From 2001 to 2020



Note: The grey zone illustrates forecasted purchases in the hospital sector (solid line) with 95% confidence interval estimates (dashed lines) for the years 2021 to 2023.

Retail and Hospital Spending

In the retail sector, total drug purchases increased by 165% over the study period, from \$10.5 billion in 2001 to \$27.8 billion in 2020. In the hospital sector, total drug purchases grew 264% during this time, from \$1.3 billion in 2001 to \$4.9 billion in 2020. Among retail purchases, the average annual growth was higher in earlier years (6.7% between 2001 and 2011) compared with 2012 onward (3.8% between 2012 and 2020), with 2011 representing the only year with a decrease in annual purchases (-2.9%).

Among hospitals, the average annual growth was similar to the retail sector between 2001 and 2011 (6.5%) but continued to grow more quickly between 2012 and 2020 (7.8%); no year had a decrease in annual purchases. Compared with 2019 spending, purchases for hospital-administered drugs grew 12.7%, 18.4%, and 6.9% in 2018, 2019, and 2020, respectively. In comparison, prescription purchases in retail experienced a smaller positive growth of 3.4%, 5.2%, and 3.8% in 2018, 2019, and 2020, respectively.

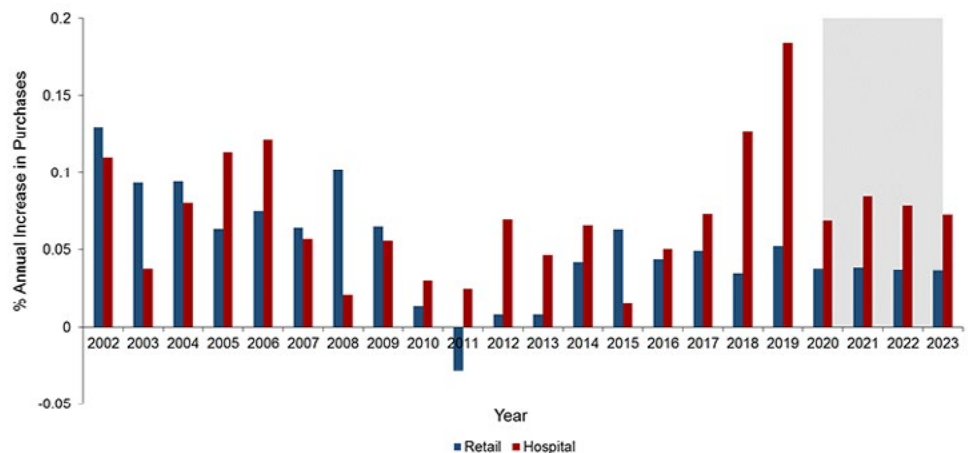
Drug Purchase Forecast for 2021 to 2023

We forecast a yearly increase (all sectors combined) in pharmaceutical purchases of 4.2% to 4.6% in each of the years of 2021 to 2023 (Figure 3). We project that purchases for hospital-administered drugs will increase annually by 7.2% to 8.5% for the 2021 to 2023 period and increase 3.6% to 3.9% in the retail setting. In terms of absolute growth, the forecasted percent increase for 2023 translates to \$31.1 billion (95% CI, \$27.3 billion to \$34.9 billion) for retail purchases and \$6.1 billion (95% CI, \$5.3 billion to \$7.0 billion) for hospital purchases (Figure 1 and Figure 2).

Top Drugs Overall

Table 1 provides the top 25 drugs by spending in retail and hospital settings across the country for the year 2020. Infliximab (\$1.2 billion), adalimumab (\$970.1 million), and ustekinumab (\$527.8 million) were the top 3 drug purchases in the retail setting, while pembrolizumab (\$361.6 million), nivolumab (\$253.0 million), and daratumumab

Figure 3: Annual Growth in Drug Purchases From the Previous Year for Retail and Hospital Sectors From 2002 to 2020



Note: The grey zone illustrates forecasted annual growth for 2021 to 2023.

(\$218.0 million) were the top 3 in the hospital setting. Overall, total spending by the top 25 drugs in both markets accounted for \$9.8 billion (\$7.2 billion in the retail sector and \$2.6 billion in the hospital sector), which accounted for 26.0% and 52.9% of total spending in the retail and hospital sectors, respectively. Only 2 drugs were in the top 25 of both lists: the vascular endothelial growth factor-A antagonist aflibercept was ranked number 4 in retail spending and number 20 in hospital spending and the kinase inhibitor ibrutinib was ranked number 17 in retail spending and number 7 in hospital spending.

Table 1: Top 25 Drugs by Spending in the Retail and Hospital Sectors for the 2020 Calendar Year

Rank and total spending	Retail		Hospital	
	Drug	2020 spending	Drug	2020 spending
1	Infliximab	\$1,233,935,545	Pembrolizumab	\$361,570,389
2	Adalimumab	\$970,100,321	Nivolumab	\$252,958,078
3	Ustekinumab	\$527,810,031	Daratumumab	\$217,993,880
4	Aflibercept	\$522,913,776	Rituximab	\$181,603,360
5	Apixaban	\$349,701,882	Trastuzumab	\$163,216,816
6	Metformin-sitagliptin	\$320,429,792	Pertuzumab-trastuzumab	\$137,078,503
7	Semaglutide	\$301,960,693	Ibrutinib	\$112,681,112
8	Ranibizumab	\$301,492,979	Durvalumab	\$104,723,480
9	Methylphenidate	\$297,520,869	Bevacizumab	\$96,354,069
10	Etanercept	\$286,159,405	Vaccine, pneumococcal conjugate	\$87,296,479
11	Rivaroxaban	\$272,302,154	Palbociclib	\$74,652,436
12	Sofosbuvir-velpatasvir	\$271,840,011	Haemagglutinin (non-specific)	\$72,728,489
13	Budesonide-formoterol	\$259,625,312	Darbepoetin alfa	\$71,553,992
14	Empagliflozin	\$256,387,093	Ipilimumab	\$71,379,295
15	Lisdexamfetamine	\$241,195,933	Osimertinib	\$67,838,951
16	Insulin glargine	\$238,962,564	Nusinersen	\$64,769,505
17	Ibrutinib	\$237,298,370	Vaccine, HPV type 6, 11, 16, 18, 3	\$62,384,064
18	Rosuvastatin	\$228,483,742	Erythropoietin alpha	\$61,006,027
19	Paliperidone palmitate	\$219,016,155	Alteplase	\$59,020,858
20	Golimumab	\$210,390,784	Aflibercept	\$49,213,706
21	Sitagliptin	\$201,800,638	Bendamustine	\$49,112,605
22	Vedolizumab	\$190,491,057	Vaccine, rotavirus	\$47,469,261
23	Fluticasone-salmeterol	\$188,988,335	Abacavir-dolutegravir-lamivudine	\$39,945,636

Rank and total spending	Retail		Hospital	
	Drug	2020 spending	Drug	2020 spending
24	Glecaprevir-pibrentasvir	\$175,055,487	Palivizumab	\$39,639,915
25	Atorvastatin	\$172,285,626	Factor viii	\$39,324,727
Total of top 25	\$7,242,213,009		\$2,585,515,633	
Total 2020 spending	\$27,834,688,609		\$4,891,690,777	
% of total spending for top 25	26.0%		52.9%	

Horizon Scan

The drugs that are anticipated to have the highest impact, either via upward or downward pressure, are listed in Table 2. A complete list of drug approvals for Health Canada and the US FDA in 2020 and early 2021 are presented in Appendix 1 (Table 3 and Table 4). In this section, we also summarize the major themes related to new and upcoming therapies in Canada and highlight those we believe may have the largest impact on spending growth.

Potential for Upward Pressure

In oncology, 3 new drug approvals are expected to dominate this category due to either disease prevalence (B-cell lymphoma and multiple myeloma) or lack of other treatment options (small-cell lung cancer).

Table 2: Selected Drugs and Biologicals That Have Received Health Canada and/or FDA Approval in 2020 and Early 2021 and Are Expected to Affect Drug Spending

Category	Drug	Brand name	Indication	Health Canada approval date	FDA approved
Chronic heart failure	Vericiguat	Verquvo	Symptomatic chronic heart failure and ejection fraction less than 45%	Under review	Yes
COVID-19	Remdesivir	Veklury	COVID-19 with pneumonia requiring supplemental oxygen	October 2020	Yes
Cystic fibrosis	Elexacaftor-tezacaftor-ivacaftor	Trikafta	Cystic fibrosis and at least 1 f508del mutation in the <i>CFTR</i> gene	June 2021	Yes
Diabetes	Semaglutide (oral)	Rybelsus	Type 2 diabetes mellitus as monotherapy when metformin is considered inappropriate due to intolerance or contraindications, or in combination with other drugs	April 2020	Yes

Category	Drug	Brand name	Indication	Health Canada approval date	FDA approved
	Insulin aspart biosimilar	Trurapi	Diabetes mellitus for patients who require insulin for the control of hyperglycemia	March 2021	No
	Sitagliptin generic	—	Diabetes	Under review	Tentative approval
	Linagliptin generic	—	Diabetes	Under review	Tentative approval
	Saxagliptin generic	—	Diabetes	March 2021	Tentative approval
	Dapagliflozin generic	—	Diabetes	Under review	Tentative approval
Inflammatory disorders	Adalimumab biosimilar	Amgevita, Hadlima, Hulio, Hyrimoz, Idacio	Rheumatoid arthritis, polyarticular juvenile idiopathic arthritis, psoriatic arthritis, ankylosing spondylitis, Crohn disease, ulcerative colitis, hidradenitis suppurativa, psoriasis, or uveitis	October 2020	Yes
	Tofacitinib generic	—	Rheumatoid arthritis, psoriatic arthritis, ulcerative colitis	Under review	Tentative approval
Migraine	Rimegepant sulphate	Nurtec ODT	Acute treatment of migraine	Not submitted	Yes
	Fremanezumab	Ajovy	Prevention of chronic migraine	August 2020	Yes
	Eptinezumab	Vyepti	Prevention of chronic migraine	January 2021	Yes
Multiple sclerosis	Ofatumumab	Kesimpta	Relapsing-remitting multiple sclerosis	April 2021	Yes
	Ozanimod hydrochloride	Zeposia	Relapsing-remitting multiple sclerosis	November 2020	Yes
	Siponimod	Mayzent	Secondary progressive multiple sclerosis	April 2020	Yes
	Ponesimod	Ponvory	Clinically isolated syndrome, relapsing-remitting and secondary progressive multiple sclerosis	April 2021	Yes
	Diroximel fumarate	Vumerity	Clinically isolated syndrome, relapsing-remitting and secondary progressive multiple sclerosis	Under review	Yes
	Dimethyl fumarate generic	—	Multiple sclerosis	October 2021	Yes
	Teroflunomide generic	—	Multiple sclerosis	Under review	Yes

Category	Drug	Brand name	Indication	Health Canada approval date	FDA approved
Obesity	Liraglutide	Saxenda	Chronic weight management for obesity or overweight with at least 1 weight-related comorbidity and who have failed a previous intervention	February 2021	Yes
Oncology	Lurbinectedin	Zepzelca	Metastatic small-cell lung cancer with disease progression on or after platinum-based chemotherapy	Under review	Yes
	Polatuzumab vedotin	Polivy	Relapsed or refractory diffuse large B-cell lymphoma	November 2020	Yes
	Isatuximab	Sarclisa	Relapsed and refractory multiple myeloma for patients who have received at least 2 prior therapies	July 2020	Yes
	Rituximab biosimilar	Riabni, Riximyo, Ruxience, Truxima	Non-Hodgkin lymphoma, chronic lymphocytic leukemia, rheumatoid arthritis, and other inflammatory conditions	December 2019	Yes
	Abiraterone generic	—	Metastatic prostate cancer	January 2021	Yes
	Lenalidomide generic	—	Transfusion-dependent anemia due to myelodysplastic syndrome, multiple myeloma	September 2021	Tentative approval
	Pomalidomide generic	—	Multiple myeloma	Under review	Tentative approval
	Bendamustine generic	—	B-cell non-Hodgkin lymphoma, chronic lymphocytic leukemia	February 2021	Tentative approval
Osteoporosis	Teriparatide biosimilar	Osnuvo	Severe osteoporosis in postmenopausal women, primary or hypogonadal severe osteoporosis in men, osteoporosis associated with sustained systemic glucocorticoid therapy	May 2020	Yes
Spinal muscular atrophy	Onasemnogene abeparvovec	Zolgensma	Gene therapy for the treatment of pediatric patients with 5q spinal muscular atrophy	February 2021	Yes
	Risdiplam	Evrysdi	Spinal muscular atrophy in patients 2 months of age or older	April 2021	Yes
Venous thromboembolic disease	Enoxaparin sodium biosimilar	Inclunox, Noromby, Redesca	Prevention and treatment of venous thromboembolic disease, unstable angina, and myocardial infarction	October 2020	Yes
	Apixaban generic	—	Venous thromboembolic disease	Under review	Yes
	Rivaroxaban generic	—	Venous thromboembolic disease	September 2020	Tentative approval

Outside of oncology, recent or upcoming therapies for migraine, diabetes, and weight loss will likely have the largest impacts because of the high disease prevalence in the population. Calcitonin gene-related peptide (CGRP) receptor antagonists (CGRP-RAs) for the prevention of chronic migraine are expected to greatly impact budget spending. Two recently approved CGRP-RAs, fremanezumab and eptinezumab, join erenumab and galcanezumab in this class. Erenumab and fremanezumab were both recommended for reimbursement by CADTH in July 2020 and April 2021, respectively. Another CGRP-RA approved for use in the US, rimegepant, has the potential to increase costs for the acute treatment of migraine but it is not currently under review by Health Canada.

A new indication of weight loss was approved for the injectable glucagon-like peptide-1 (GLP-1) receptor agonist liraglutide in February 2021, which was previously approved for the treatment of type 2 diabetes mellitus. This broadened indication will likely increase liraglutide's utilization and the broader appeal of GLP-1 receptor agonist therapies. Injectable semaglutide is presently ranked number 7 for retail; the oral dosage form was approved in April 2020, which may also have high uptake. Remdesivir, approved in late 2020 for the treatment of pneumonia secondary to COVID-19 infection requiring supplemental oxygen, will likely have sustained use in Canada due to the ongoing pandemic and increased supply from the US. For rare indications, recently approved therapies for cystic fibrosis, multiple sclerosis, and spinal muscular atrophy will likely exert upward pressure due to high annual costs and few other treatment options. Indeed, Ontario and other provinces added the medication to its public drug formulary shortly after the Notice of Compliance for elexacaftor-ivacaftor-tezacaftor in Canada in June 2021.

Potential for Downward Pressure

Several generic formulations and biosimilars for frequently used therapies will likely place robust downward pressure on spending. Biosimilar formulations for adalimumab (number 2 in retail spending) were approved by Health Canada in late 2020. Next, there are recently available or forthcoming generic formulations of the direct-acting anticoagulants apixaban (number 5 in retail spending) and rivaroxaban (number 11 in retail spending). Generic formulations for several oral therapies for type 2 diabetes mellitus are expected, of which the dipeptidyl peptidase-4 inhibitor sitagliptin (number 21 of top 25 retail medications; number 6 in combination with metformin) will have the greatest potential effect. Finally, in oncology, the generic drug bendamustine (approved February 2021) is anticipated to decrease spending given its ranking in the top 25 drugs list (number 21 in retail).

Interpretation

Spending on pharmaceuticals has grown considerably over the last 2 decades in Canada, leading to a total market size of nearly \$33 billion in 2020. With an annual average growth in spending of 5.3% and 7.1% for the retail and hospital sectors, respectively, this equates to absolute spending increases of \$1 billion each year and is outpacing overall market inflation. The expansion is likely largely driven by new product approvals, higher market entry prices for new drugs, and growing utilization. Thus, we anticipate continued increases in these sectors, with greater growth in the hospital sector. As the number of new therapies continues to grow, important decisions on the opportunity cost of continued growth in spending in pharmaceuticals will need to be considered.

Major shifts in available therapies identified in the pipeline are likely to impact the degree of change in spending in the coming years. Overall, we believe the growth of spending will be on the lower end of the predicted range in the outpatient retail setting due to new generics or biosimilar formulations of several of the top 25 therapies, including adalimumab, 2 direct-acting anticoagulants, and dipeptidyl peptidase-4 inhibitors. However, the impact of adalimumab costs will depend on increased biosimilar uptake in Canada. Presently, most Canadian provincial public drug plans require biologic-naïve patients to initiate a biosimilar formulation when available; however, British Columbia, Alberta, and New Brunswick mandate switching to biosimilars for most patients currently on therapy.²⁰ Other provinces are anticipated to follow suit for mandated switching among all patients. These policy and regulatory changes, including those within the Patented Medicines Prices Review Board, may mitigate this projected growth and encourage the addition of more biosimilars to the Canadian market, yet their impact on overall cost growth remains unknown.^{21,22} The impact of biosimilar uptake is particularly important to understand given that the top 25 drugs in terms of retail and hospital spending have several biosimilars on or about to enter the market. With a number of public and private payers moving toward mandatory switching, we anticipate greater uptake over the coming years across Canada. Finally, despite this downward pressure, CGRP-RA therapies have particular potential to be “blockbuster” retail pharmacy drugs due to the prevalence of migraine and the recent CADTH recommendations for public drug plan reimbursement.²³

We are among the first to quantify drug spending within the hospital sector. There are well-developed pan-Canadian processes to support cost-efficient formulary development within the outpatient setting. However, the process within the hospital setting is inconsistent. Our findings suggest that greater support is needed within the hospital sector in the context of overall drug purchases growth because it accounts for 15% of total national spending. The degree of growth on the inpatient side is less certain; based on the horizon scan, it is likely that spending will be in the moderate to high end of the prediction range because oncology therapies, either novel agents for rare conditions or new indications for existing treatments, will likely increase spending. Conversely, biosimilar formulations for enoxaparin and rituximab, in conjunction with generic formulations of bendamustine, lenalidomide, and abiraterone, may help to curb spending.

Our analysis has limitations that warrant discussion. First, we do not have information on the confidential rebates that manufacturers provide to public and private drug plans or to hospital purchasers. These discounts can be substantial; for example, negotiations on brand name medications through the pan-Canadian Pharmaceutical Alliance resulted in \$1.24 billion in savings to public payers in 2017–2018.²⁴ Our results represent the total spending in the current drug system, and we do not anticipate major differences in the proportion of rebates to total spending in recent year. It is also unknown if the level of rebates differs between the hospital and outpatient setting. Moreover, many rebates are re-invested by public payers by paying for future drug spending. Importantly, rebate structures and rising prices have important consequences on patient co-pays depending on payment method and plan structure.²⁵ Second, our data had no information on how payment for these medicines was distributed among payers (i.e., public insurance, private insurance, or out-of-pocket), but instead characterizes global spending and future impact to all payers. Lastly, because IQVIA has a robust process to update and verify data, the data we used in this analysis could be revised in the future. Such revisions are likely minor and would not influence the trends and projections that we have reported.

Conclusion

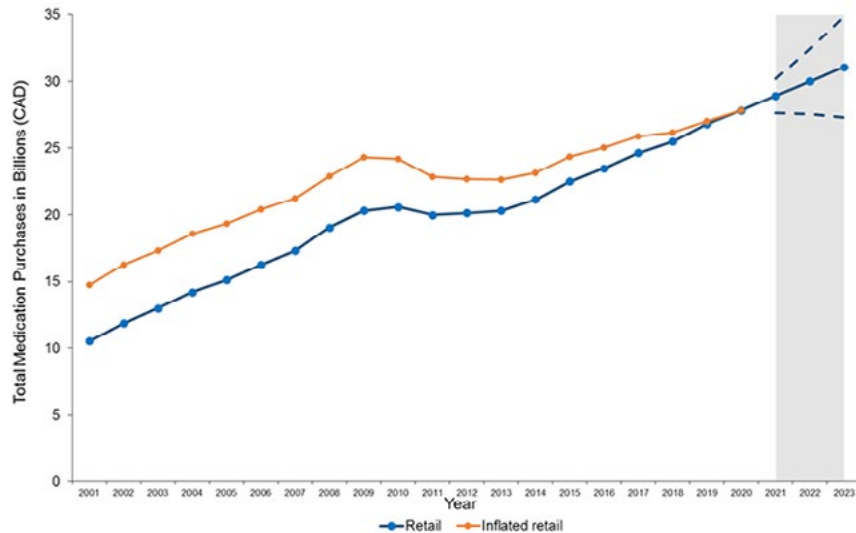
We predict continued moderate growth in overall drug purchases across the entire Canadian market. Specifically, we expect the outpatient sector to continue to experience moderate levels of increased growth in drug spending by 3% to 4% annually from 2021 to 2023. We anticipate the inpatient setting to continue to have higher rates of growth in the range of 7% to 8% per year. Given a fixed social budget, increases in pharmaceutical spending will, by necessity, lead to decreases in other public budgets, increased shifting of spending from the public budget to private industry or directly to patients, or increased revenue requirements for the government. The opportunity cost of continued increased spending in pharmaceuticals must therefore be considered.

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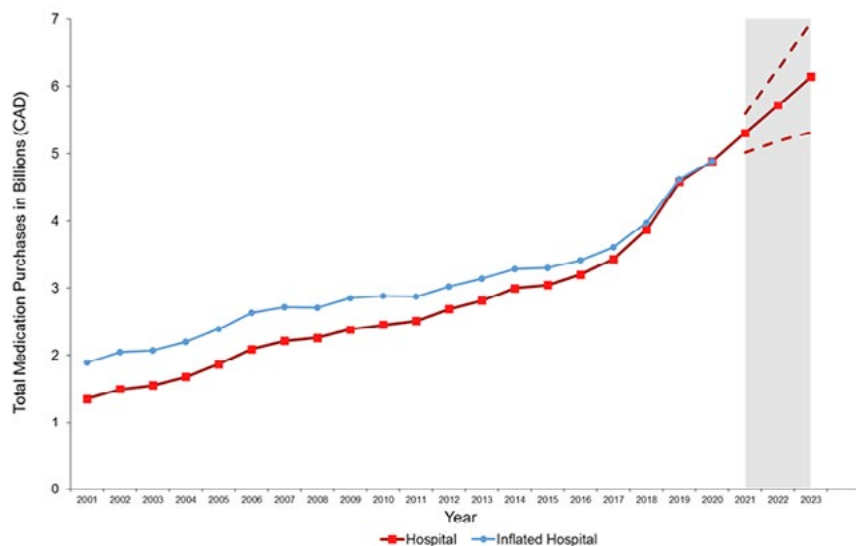
Appendix 1: Additional Figures and Tables

Figure 4: Total Medication Purchases in Canada for the Retail Sector From 2001 to 2020



Note: The grey zone illustrates forecasted purchases in the retail sector (solid line) with 95% confidence interval estimates (dashed lines) for the years 2021 to 2023. Blue line = non-inflated-adjusted purchases; orange line = inflated-adjusted purchases.

Figure 5: Total Medication Purchases in Canada for the Hospital Sector From 2001 to 2020



Note: The grey zone illustrates forecasted purchases in the hospital sector (solid line) with 95% confidence interval estimates (dashed lines) for the years 2021 to 2023. Red line = non-inflated-adjusted purchases; green line = inflated-adjusted purchases.

Table 3: Health Canada Drug Approvals Between January 1, 2020, and October 21, 2021

Generic name	Therapeutic area	Approval date	Submission outcome
5-Aminolevulinic acid	Antineoplastic agents	September 2020	Issued NOC
Acetylsalicylic acid, atorvastatin calcium, ramipril	Cardiac therapy	March 2021	Cancelled by sponsor
Adalimumab	Immunosuppressants	January 2021	Issued NOC
Adalimumab	Immunosuppressants	November 2020	Issued NOC
Adalimumab	Immunosuppressants	November 2020	Issued NOC
Adalimumab	Immunosuppressants	October 2020	Issued NOC
Alpelisib	Antineoplastic agents	March 2020	Issued NOC
Amifampridine	Other nervous system drugs	August 2020	Issued NOC
Amifampridine phosphate	Other nervous system drugs	July 2020	Issued NOC
Amisulpride	Psycholeptics	February 2021	Cancelled by sponsor
Amoxicillin sodium, clavulanic acid	Antibacterials for systemic use	January 2020	Issued NOC
Apomorphine hydrochloride	Anti-Parkinson drugs	June 2020	Issued NOC
Azacitidine	Antineoplastic agents	January 2021	Issued NOC
Bacillus Calmette-Guerin BCG – Strain Russian BCG-I	Immunostimulants	December 2020	Issued NOC under the NOC/c Guidance
Baloxavir marboxil	Antivirals for systemic use	February 2020	Issued NOC
Betula verrucosa extract	Nasal preparations	April 2020	Issued NOC
Bevacizumab	Antineoplastic agents	January 2021	Issued NOC
Binimetinib	Antineoplastic agents	March 2021	Issued NOC
Bisoprolol fumarate	Beta blocking agents	September 2020	Cancelled by sponsor
Bivalirudin	Antithrombotic agents	September 2020	Issued NOC
Brilliant blue G	Ophthalmologicals	January 2021	Issued NOC
Brolucizumab	Ophthalmologicals	March 2020	Issued NOC
Budesonide	Antidiarrheals, intestinal anti-inflammatory/anti-infective agents	April 2020	Issued NOC
Cabotegravir, rilpivirine	Antivirals for systemic use	March 2020	Issued NOC
Caffeine citrate	Psychoanalectics	March 2020	Issued NOC
Caplacizumab	Antithrombotic agents	February 2020	Issued NOC
Cedazuridine, decitabine	Antineoplastic agents	July 2020	Issued NOC
Chromic chloride, cupric chloride, ferric chloride, manganese chloride, potassium iodide, sodium fluoride, sodium molybdate, sodium selenite, zinc chloride	Blood substitutes and perfusion solutions	April 2020	Issued NOC

Generic name	Therapeutic area	Approval date	Submission outcome
Cyclosporine	Ophthalmologicals	February 2021	Issued NOC
Darolutamide	Endocrine therapy	February 2020	Issued NOC
<i>Dermatophagoides farinae</i> , <i>Dermatophagoides pteronyssinus</i>	Allergens	July 2020	Cancelled by sponsor
Drospirenone, estetrol monohydrate	Sex hormones and modulators of the genital system	March 2021	Issued NOC
Emapalumab	Immunosuppressants	February 2021	Cancelled by sponsor
Encorafenib	Antineoplastic agents	March 2021	Issued NOC
Enoxaparin sodium	Antithrombotic agents	December 2020	Issued NOC
Enoxaparin sodium	Antithrombotic agents	November 2020	Issued NOC
Enoxaparin sodium	Antithrombotic agents	October 2020	Issued NOC
Entrectinib	Antineoplastic agents	May 2020	Issued NOC
Entrectinib	Antineoplastic agents	February 2020	Issued NOC under the NOC/c Guidance
Eptinezumab	Analgesics	January 2021	Issued NOC
Esketamine hydrochloride	Psychoanaleptics	May 2020	Issued NOC
Estradiol hemihydrate, progesterone	Sex hormones and modulators of the genital system	September 2020	Issued NOC
Etomidate	Anesthetics	July 2020	Issued NOC
Etonogestrel	Sex hormones and modulators of the genital system	May 2020	Issued NOC
Fedratinib dihydrochloride monohydrate	Antineoplastic agents	July 2020	Issued NOC
Fibrinogen (human), thrombin (human)	Antihemorrhagics	March 2021	Issued NOC
Filgotinib	Immunosuppressants	January 2021	Cancelled by sponsor
Filgrastim (r-metHuG-CSF)	Immunostimulants	April 2020	Issued NOC
Foscarnet sodium	Antivirals for systemic use	October 2020	Issued NOC
Fostamatinib disodium	Antihemorrhagics	November 2020	Issued NOC
Fremanezumab	Analgesics	April 2020	Issued NOC
Gallium (68Ga) chloride, germanium (68Ge) chloride	Diagnostic radiopharmaceuticals	August 2020	Issued NOC
Givosiran	Bile and liver therapy	October 2020	Issued NOC
Glasdegib	Antineoplastic agents	April 2020	Issued NOC
Glycine, histidine, L-alanine, L-arginine, L-isoleucine, L-leucine, L-lysine acetate, L-methionine, L-phenylalanine, L-proline, L-threonine, L-tryptophan, L-tyrosine, L-valine, serine, taurine	Blood substitutes and perfusion solutions	December 2020	Issued NOC

Generic name	Therapeutic area	Approval date	Submission outcome
Glycopyrronium bromide, indacaterol acetate, mometasone furoate	Drugs for obstructive airway diseases	July 2020	Issued NOC
Hemagglutinin, neuraminidase antigen	Vaccines	January 2021	Issued NOC
Hemagglutinin-strain A(H1N1), hemagglutinin-strain A(H3N2), hemagglutinin-strain B(Victoria), hemagglutinin-strain B(Yamagata)	Vaccines	November 2020	Cancelled by sponsor
Halobetasol propionate, tazarotene	Corticosteroids, dermatological preparations	June 2020	Issued NOC
Indacaterol acetate, mometasone furoate	Drugs for obstructive airway diseases	May 2020	Issued NOC
Infliximab	Immunosuppressants	March 2020	Issued NOC
Insulin aspart	Drugs used in diabetes	October 2020	Issued NOC
Isatuximab	Antineoplastic agents	April 2020	Issued NOC
Lasmiditan	Analgesics	January 2021	Cancelled by sponsor
Lefamulin acetate	Antibacterials for systemic use	July 2020	Issued NOC
Lemborexant	Psycholeptics	November 2020	Issued NOC
Levothyroxine sodium	Thyroid therapy	November 2020	Issued NOC
Luspatercept	Antianemic preparations	February 2021	Issued NOC
Luspatercept	Antianemic preparations	September 2020	Issued NOC
Mecasermin	Pituitary, hypothalamic hormones and analogues	December 2020	Issued NOC
Meningococcal group A polysaccharide-tetanus toxoid conjugate, meningococcal group C polysaccharide-tetanus toxoid conjugate, meningococcal group W polysaccharide-tetanus toxoid conjugate, meningococcal group Y polysaccharide-tetanus toxoid conjugate	Vaccines	October 2020	Issued NOC
Mesalazine	Antidiarrheals, intestinal anti-inflammatory/anti-infective agents	August 2020	Cancelled by sponsor
Naproxen sodium, sumatriptan succinate	Analgesics	February 2020	Issued NOC
Nicardipine hydrochloride	Calcium channel blockers	April 2020	Issued Notice of Non-compliance – Withdrawal
Obiltoxaximab	Immune sera and immunoglobulins	July 2020	Issued NOC
Ofatumumab	Antineoplastic agents	January 2021	Issued NOC

Generic name	Therapeutic area	Approval date	Submission outcome
Onasemnogene abeparvovec	Other drugs for disorders of the musculoskeletal system	December 2020	Issued NOC
Ozanimod hydrochloride	Immunosuppressants	October 2020	Issued NOC
Pegfilgrastim	Immunostimulants	October 2020	Issued NOC
Pegfilgrastim	Immunostimulants	April 2020	Issued NOC
Pertuzumab, trastuzumab	Antineoplastic agents	March 2021	Issued NOC
Polatuzumab vedotin	Antineoplastic agents	July 2020	Issued NOC under the NOC/c Guidance
Ranolazine	Cardiac therapy	December 2020	Issued NOC
Recombinant influenza strain A H1N1 HA protein, recombinant influenza strain A H3N2 HA protein, recombinant influenza strain B (Victoria lineage) HA protein, recombinant influenza strain B (Yamagata lineage) HA protein	Vaccines	January 2021	Issued NOC
Remdesivir	Antivirals for systemic use	July 2020	Issued NOC under the NOC/c Guidance
Ripretinib	Antineoplastic agents	June 2020	Issued NOC
Risperidone	Psycholeptics	November 2020	Issued NOC
Rituximab	Antineoplastic agents	March 2021	Issued NOC
Rituximab	Antineoplastic agents	May 2020	Issued NOC
Rituximab	Antineoplastic agents	April 2020	Issued NOC
Satralizumab	Immunosuppressants	June 2020	Issued NOC
Semaglutide	Drugs used in diabetes	March 2020	Issued NOC
Siponimod	Immunosuppressants	February 2020	Issued NOC
Sodium chloride, sodium citrate	Blood substitutes and perfusion solutions	March 2020	Issued NOC
Sodium pertechnetate Tc-99m	Diagnostic radiopharmaceuticals	November 2020	Issued NOC
Sonidegib	Antineoplastic agents	June 2020	Issued NOC
Tafamidis meglumine	Other nervous system drugs	January 2020	Issued NOC
Tenapanor	Drugs for constipation	April 2020	Issued NOC
Teriparatide	Calcium homeostasis	January 2020	Issued NOC
Trastuzumab	Antineoplastic agents	February 2020	Issued NOC
Trientine hydrochloride	Other alimentary tract and metabolism products	September 2020	Issued NOC
Triheptanoin	Other alimentary tract and metabolism	February 2021	Issued NOC
Tucatinib	Antineoplastic agents	June 2020	Issued NOC

Generic name	Therapeutic area	Approval date	Submission outcome
Vitamin D3	Vitamins	February 2021	Issued NOC
Voretigene neparvovec	Ophthalmologicals	October 2020	Issued NOC
Zanubrutinib	Antineoplastic agents	March 2021	Issued NOC

NOC = Notice of Compliance; NOC/c = Notice of Compliance with conditions.

Table 4: FDA Drug Approvals Between January 1, 2020, to March 15, 2021

Generic name	Brand name	Indication	Sponsor	Approval date	Approval type
Abacavir sulphate; lamivudine	Abacavir Sulphate and Lamivudine	HIV	Lupin Ltd.	February 24, 2020	Manufacturing (CMC)
Artesunate	Artesunate	Malaria	Amivas	May 26, 2020	Type 1: New Molecular Entity
Avapritinib	Ayvakit	Gastrointestinal tumour with mutation	Blueprint Medicines	January 9, 2020	Type 1: New Molecular Entity
Azacitidine	Onureg	Post-remission acute myeloid leukemia	Celgene Corp	September 1, 2020	Type 3: New Dosage Form
Baloxavir marboxil	Xofluza	Influenza	Genentech Inc.	November 23, 2020	Type 3: New Dosage Form
Bertralstat hydrochloride	Orladeyo	Hereditary angioedema	BioCryst	December 3, 2020	Type 1: New Molecular Entity
Bimatoprost	Durysta	Open angle glaucoma	Allergan Inc.	March 4, 2020	Type 3: New Dosage Form
Cabotegravir sodium	Vocabria	HIV-1	ViiV Healthcare	January 21, 2021	Type 1: New Molecular Entity
Cabotegravir; rilpivirine	Cabenuva Kit	HIV-1	ViiV Healthcare	January 21, 2021	Type 1: New Molecular Entity and Type 4: New Combination
Capmatinib hydrochloride	Tabrecta	NSCLC	Novartis Pharmaceuticals	May 6, 2020	Type 1: New Molecular Entity
Casimersen	Amondys 45	Duchenne muscular dystrophy	Sarepta Therapeutics Inc.	February 25, 2021	Type 1: New Molecular Entity
Cedazuridine-decitabine	Inqovi	Chronic myelomonocytic leukemia	Otsuka	July 7, 2020	Type 1: New Molecular Entity
Clascoterone	Winlevi	Acne	Cassiopea SpA	August 26, 2020	Type 1: New Molecular Entity
Dolutegravir; lamivudine; tenofovir disoproxil fumarate	Dolutegravir; Lamivudine; Tenofovir Disoproxil Fumarate	HIV-1	Celltrion Inc.	April 13, 2020	Type 4: New Combination

Generic name	Brand name	Indication	Sponsor	Approval date	Approval type
Elagolix sodium-estradiol-norethindrone acetate; elagolix sodium	Oriahnn (copackaged)	Uterine fibroids	AbbVie Inc.	May 29, 2020	Type 4: New Combination
Empagliflozin-linagliptin-metformin hydrochloride	Trijardy XR	Type 2 diabetes mellitus	Boehringer Ingelheim	January 27, 2020	Type 4: New Combination
Enzalutamide	Xtandi	Advanced prostate cancer	Astellas	August 4, 2020	Type 3: New Dosage Form
Flortaucipir F-18	Tauvid	Diagnostic agent for Alzheimer disease	Avid Radiopharmaceuticals Inc.	May 28, 2020	Type 1: New Molecular Entity
Fluoroestradiol F-18	Cerianna	Recurrent/metastatic breast cancer	Zionexa	May 20, 2020	Type 1: New Molecular Entity
Fosaprepitant dimeglumine	Fosaprepitant Dimeglumine	Post-operative nausea and vomiting	MSN Laboratories	February 10, 2020	Manufacturing (CMC)
Fosdenopterin	Nulibry	Molybdenum cofactor deficiency	Origin Biosciences Inc.	February 26, 2021	Type 1: New Molecular Entity
Fostemsavir tromethamine	Rukobia	HIV-1	ViiV Healthcare	July 2, 2020	Type 1: New Molecular Entity
Heparin sodium	Heparin Sodium	Anticoagulation	Hikma Pharmaceuticals	January 14, 2020	Manufacturing (CMC)
Lonafarnib	Zokinvy	Progeria	Eiger Biopharmaceuticals	November 20, 2020	Type 1: New Molecular Entity
Lumasiran sodium	Oxlumo	Primary hyperoxaluria type 1	Alnylam Pharmaceuticals Inc.	November 23, 2020	Type 1: New Molecular Entity
Lurbinectedin	Zepzelca	SCLC	Jazz	June 15, 2020	Type 1: New Molecular Entity
Melphalan flufenamide	Pepaxto	Multiple myeloma	Oncopeptides AB	February 26, 2021	Type 1: New Molecular Entity
Mitomycin	Jelmyto	Upper tract urothelial cancer	UroGen Pharma	April 15, 2020	Type 5: New Formulation or New Manufacturer
Monomethyl fumarate	Bafiertam	Multiple sclerosis	Banner Life Sciences	April 28, 2020	Type 2: New Active Ingredient
Oliceridine	Olinvyk	Acute pain	Trevena	August 7, 2020	Type 1: New Molecular Entity
Opicapone	Ongentys	Parkinson disease	Neurocrine Biosciences	April 24, 2020	Type 1: New Molecular Entity
Osilodrostat phosphate	Isturisa	Cushing disease	Recordati Rare	March 6, 2020	Type 1: New Molecular Entity

Generic name	Brand name	Indication	Sponsor	Approval date	Approval type
Ozanimod hydrochloride	Zeposia	Multiple sclerosis	Celgene Intl.	March 25, 2020	Type 1: New Molecular Entity
Pemetrexed	Pemfexy	NSCLC, pleural mesothelioma	Eagle Pharmaceuticals	February 8, 2020	Type 5: New Formulation or New Manufacturer
Pemigatinib	Pemazyre	Bile duct cancer	Incyte Corp.	April 17, 2020	Type 1: New Molecular Entity
Pralsetinib	Gavreto	RET fusion-positive NSCLC	Blueprint Medicines	September 4, 2020	Type 1: New Molecular Entity
Relugolix	Orgovyx	Advanced prostate cancer	Myovant Sciences	December 18, 2020	Type 1: New Molecular Entity
Remdesivir	Veklury	COVID-19 infection requiring hospitalization	Gilead Sciences Inc.	October 22, 2020	Type 1: New Molecular Entity
Rimegepant sulphate	Nurtec ODT	Acute treatment of migraine	Biohaven Pharmaceuticals	February 27, 2020	Type 1: New Molecular Entity
Ripretinib	Qinlock	Advanced gastrointestinal stromal tumour	Deciphera Pharmaceuticals	May 15, 2020	Type 1: New Molecular Entity
Risdiplam	Evrysdi	Spinal muscle atrophy	Genentech Inc.	August 7, 2020	Type 1: New Molecular Entity
Romidepsin	Romidepsin	T-cell lymphoma	Teva Pharmaceuticals USA, Inc.	March 13, 2020	Type 5: New Formulation or New Manufacturer
Selpercatinib	Retevmo	NSCLC, thyroid tumours	Loxo Oncology Inc.	May 8, 2020	Type 1: New Molecular Entity
Selumetinib sulphate	Koselugo	Neurofibromatosis type 1	AstraZeneca	April 10, 2020	Type 1: New Molecular Entity
Semaglutide	Rybelsus	Type 2 diabetes mellitus	Novo Nordisk Inc.	January 16, 2020	Type 9: New Indication submitted as distinct NDA, consolidated with original NDA after approval
Setmelanotide acetate	Imcivree	Obesity due to genetic deficiencies	Rhythm Pharmaceuticals	November 25, 2020	Type 1: New Molecular Entity
Solifenacin succinate	Vesicare LS	Pediatric neurogenic detrusor overactivity	Astellas Pharma	May 26, 2020	Type 3: New Dosage Form
Tasimelteon	Hetlioz LQ	Smith-Magenis syndrome	Vanda Pharmaceuticals Inc.	December 1, 2020	Type 3: New Dosage Form
Tazemetostat hydrobromide	Tazverik	Epithelioid sarcoma, follicular lymphoma	Epizyme Inc.	January 23, 2020	Type 1: New Molecular Entity
Tepotinib hydrochloride	Tepmetko	NSCLC	EMD Serono Inc.	February 3, 2021	Type 1: New Molecular Entity
Tirbanibulin	Klisyri	Actinic keratosis	Almirall	December 14, 2020	Type 1: New Molecular Entity

Generic name	Brand name	Indication	Sponsor	Approval date	Approval type
Tofacitinib citrate	Xeljanz	Rheumatoid arthritis, psoriatic arthritis, ulcerative colitis, juvenile idiopathic arthritis	Pfizer	September 25, 2020	Type 3: New Dosage Form
Triheptanoin	Dojolvi	Long-chain fatty acid oxidation disorders	Ultragenyx Pharm Inc.	June 30, 2020	Type 1: New Molecular Entity
Trilaciclib dihydrochloride	Cosela	Chemotherapy-induced myelosuppression	G1 Therapeutics	February 12, 2021	Type 1: New Molecular Entity
Tucatinib	Tukysa	HER2-positive breast cancer	Seagen	April 17, 2020	Type 1: New Molecular Entity
Umbralisib tosylate	Ukoniq	Relapsed/refractory follicular lymphoma	TG Therapeutics	February 5, 2021	Type 1: New Molecular Entity
Vericiguat	Verquvo	Heart failure	Merck Sharp & Dohme	January 19, 2021	Type 1: New Molecular Entity
Vibegron	Gemtesa	Overactive bladder	Urovant Sciences	December 23, 2020	Type 1: New Molecular Entity
Viltolarsen	Viltepso	Duchenne muscular dystrophy	Nippon Shinyaku Co.	August 12, 2020	Type 1: New Molecular Entity
Voclosporin	Lupkynis	Lupus nephritis	Aurinia Pharmaceuticals Inc.	January 22, 2021	Type 1: New Molecular Entity

CMC = Chemistry, Manufacturing and Controls; NDA = new drug application; NSCLC = non-small-cell lung cancer.

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