

Peer-Reviewed Article

Canadian Trends in Estimated Pharmaceutical Drug Purchases and Projections: 2023

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Abstract

Background: Comprehensive data identifying trends in the pharmaceutical market are limited. Last year, our group presented the first forecast. We report the first annual update of estimated pharmaceutical drug purchases in Canada. The goal is to identify factors that may influence future spending to support public and private decision-makers in predicting the growth of national drug purchases.

Methods: We conducted a time series analysis of annual estimated pharmaceutical drug purchases across Canada between 2001 and 2021 using IQVIA's Canadian Drugstore and Hospital Purchases Audit. We calculated total estimated pharmaceutical drug purchases and relative percentage change annually, stratified by sector (retail and hospital), and forecast annual spending to 2023. We also assessed recent drug approvals, policies, or legislation that may influence drug spending.

Results: Total drug purchases for 2021 were approximately \$35.4 billion, 8.3% higher than in 2020 (7.3% growth in the retail sector; 12.4% growth in the hospital sector). Overall, total spending for the top 25 drugs accounted for 31.2% and 52.3% of total spending in the retail and hospital sectors, respectively. Spending has grown over the past 2 decades, with an annual average growth of 5.4% and 7.4% for the retail and hospital sectors, respectively. The forecast for the retail sector is continued moderate levels of growth in drug spending (7% to 8% annually), with higher rates of growth (12% to 13% annually) in the hospital setting.

Interpretation: We project continued growth in overall drug purchases across the entire Canadian market. New approvals of specialty and oncology drugs and generic formulations of the top 25 drugs are expected to influence drug purchases in 2022–2023. If no action is taken to curb sustained growth in pharmaceutical spending in Canada, costs may necessitate a shift in spending from other public budgets or to private industry and directly to patients. The opportunity cost of continued increased spending on pharmaceuticals must be considered.

For author information, refer to Appendix 2.

Introduction

Total public health care spending in Canada was forecasted by CIHI to reach more than \$308 billion in 2021, representing 12.7% of the country's gross domestic product.¹ Public spending on prescription drugs was expected to account for 6.9% (\$16.5 billion) of national public health care purchases — a \$1.1 billion increase compared with the 2020 projections.¹ Public drug spending accounted for 44% of total drug spending in Canada in 2020.¹

In 2021, our group published the first of what we aim to be an annual report highlighting spending on drugs in Canada.² We found that between 2001 and 2020 drug spending increased on average by 5.3% annually in the retail sector and by 7.1% annually in the hospital sector, and we projected that spending was likely to continue increasing until at least 2023.² Although drug spending has been historically driven by medications for chronic conditions, our results highlighted that biologics and biosimilars had become the key contributors to drug spending.² Furthermore, based on the available information about novel treatments approved by Health Canada and the US FDA combined with the historical growth in spending,²⁻⁷ we projected that drug spending for the years 2021 to 2023 would increase by 3% to 4% annually in the retail sector and by 7% to 8% annually in the hospital sector.²

Budget planning for drug spending is an annual process and requires forecasting of potential growth. We aim to conduct this analysis annually to help inform decision-makers and formulary managers in developing their annual budgets and strategies. Approvals for novel pharmaceutical technologies with the potential to change budget trajectories are expected in the coming years; therefore, an annual update of both the spending forecast and a Horizon Scan are needed. External and independent assessments of drug spending across the country can help support public and private decision-makers better anticipate how various factors could influence drug spending as novel technologies driving spending are expected to continue. In this first update of our planned annual report, we present trends and forecasts of retail and in-hospital estimated pharmaceutical drug purchases across Canada. We also provide a Horizon Scan looking at new innovative drugs that could potentially change the spending trajectory.

Methods

Drug Purchases and Projection

We conducted a retrospective time series analysis of annual estimated pharmaceutical drug purchases (i.e., drug purchases) across Canada between January 1, 2001, and December 31, 2021, using IQVIA's Canadian Drugstore and Hospital (CDH) Purchases Audit. These data estimate purchasing costs and unit volumes of all pharmaceutical products purchased by the Canadian retail and hospital sectors.⁸ This audit is derived from a sample of outlets within these sectors (more than one-third of retail and 86% of hospital sectors) in each province and territory, which are projected to represent total pharmaceutical purchasing at the national level using proprietary methods. We included all pharmaceutical purchasing of all dosage forms and formulations over the study period. Purchasing may be made through a wholesaler or directly from the manufacturer, and therefore may include mark-ups, but does not capture discounts and rebates. Although CDH projections will not capture any subsequent rebates or volume discounts credited to the outlets afterward, it does reflect all up-front discounts

for each specific invoice. Due to the aggregated nature of the data provided, research ethics board approval was not required.

We describe total estimated pharmaceutical drug purchases across Canada annually (using calendar years) over the study period, stratified by sector (retail versus hospital). We calculated the annual growth in purchases as the relative percentage change from the previous year. We used exponential smoothing models, applying Holt's method, to forecast annual estimated pharmaceutical drug purchases in 2022 and 2023. Costs were reported as nominal annual costs, and nominal costs were used for projection models. In a sensitivity analysis, we inflated annual costs before 2021 to 2021 values using the all-items consumer price indexes.⁹ Finally, we identified the 25 medications with the highest total purchases in the calendar year 2021 in the retail and hospital sectors separately.

Horizon Scan

An Environmental Scan of global and national drug spending and pipeline reports was conducted to identify therapeutic classes with potentially major impacts on pharmaceutical spending.¹⁰⁻¹³ All medications approved by Health Canada in 2021 and the first quarter of 2022, as well as generic drugs and biosimilars currently under review, were assessed for anticipated budget impacts.¹⁴ New drug approvals by the US FDA in 2021 and the first quarter of 2022 were also reviewed to identify drugs that may soon enter the Canadian market.¹⁵

Drugs with potential high impact on future spending (via upward pressure or downward pressure) were flagged based on the following criteria: disease prevalence, current medication use and availability in the therapeutic area, anticipated cost, and public plan reimbursement recommendations by CADTH. Based on the list of drugs with the highest potential for impact on the Canadian market, the authors made a consensus recommendation on whether the projected spending might be more likely on the high, middle, or low end of the projected confidence interval (CI) range estimated from the forecast analysis for the next 2 years.

Results

Trends in Canadian drug purchases from 2001 to 2021 in the retail and hospital sectors are presented in [Figure 1](#) and [Figure 2](#), respectively. Graphs that include values accounting for inflation can be found in [Appendix 1](#) ([Figure 4](#) and [Figure 5](#)).

Overall Spending

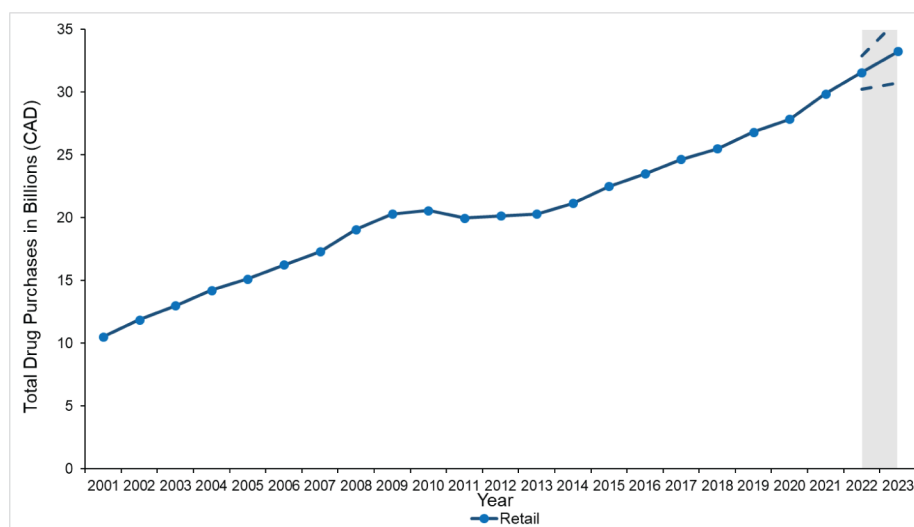
In 2021, total drug purchases in Canada grew 8.3%, reaching \$35.4 billion (versus \$32.7 billion in 2020). This was higher than our previous forecasted rate of 4.2%. The retail sector accounted for 84.5% of drug purchases in 2021 (\$29.9 billion), and the hospital sector accounted for 15.5% (\$5.5 billion). Retail and hospital purchases in 2021 increased from 2020 by 7.3% and 12.4%, respectively. The rates in both sectors were also higher than our forecasted rates of 6.9% and 3.8%, respectively. [Figure 3](#) illustrates the trends in the annual change in purchases across both sectors.

Retail and Hospital Spending

In the retail sector, total drug purchases increased by 184%, from \$10.5 billion in 2001 to \$29.9 billion in 2021. In the hospital sector, total drug purchases grew 309% from \$1.3 billion in 2001 to \$5.5 billion in 2021. Among retail purchases, the average annual growth was higher in earlier years (6.7% between 2001 and 2011) compared with 2012 onward (4.1% between 2012 and 2021); 2011 was the only year with a decrease in annual purchases (-2.9%). Over the entire period (2001 to 2021), the average annual growth was 5.4% and 7.4% for the retail and hospital sectors, respectively.

In the hospital sector, the average annual growth was similar to the retail environment between 2001 and 2011 (6.5%) but grew quicker between 2012 and 2021 (8.4%); there was no year with a reported decrease in annual spending. The drug purchases for hospital-administered drugs grew 12.7%, 18.4%, 6.9%, and 12.4% in 2018, 2019, 2020, and 2021, respectively. In comparison, drug purchases in the retail sector experienced a smaller growth of 3.4%, 5.2%, 3.8%, and 7.3% in 2018, 2019, 2020, and 2021, respectively.

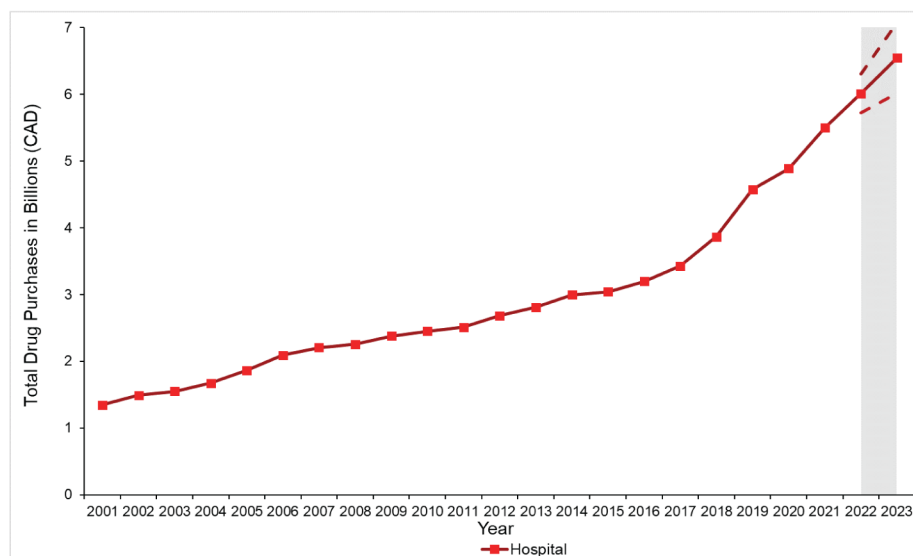
Figure 1: Total Estimated Pharmaceutical Drug Purchases in Canada for the Retail Sector From 2001 to 2021



Note: The grey zone illustrates forecasted purchases in the retail sector (solid line) with 95% confidence interval estimates (dashed lines) for 2022 and 2023.

Source: This figure is based on information licensed from IQVIA: Canadian Drugstore and Hospital Purchases Audit for 2001 to 2021 estimates of real-world activity. All rights reserved.

Figure 2: Total Estimated Pharmaceutical Drug Purchases in Canada for the Hospital Sector From 2001 to 2021



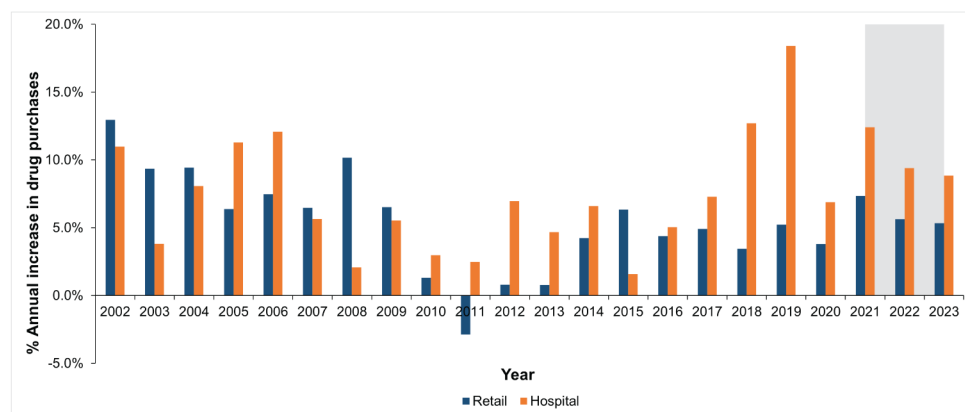
Note: The grey zone illustrates forecasted purchases in the hospital sector (solid line) with 95% confidence interval estimates (dashed lines) for 2022 and 2023.

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Drug Expenditure Forecast for 2022 and 2023

We forecast a yearly increase (all sectors combined) in drug purchases of 6.2% in 2022 and 5.9% in 2023 ([Figure 3](#)). We project that purchases for hospital-administered drugs will increase annually by 9.4% and 8.8% for 2022 and 2023, respectively; in the retail setting, purchases will increase between 5.6% and 5.3% annually for 2022 and 2023, respectively. When considered in absolute costs, we forecast an increase of \$33.2 billion (95% CI, \$30.7 billion to \$35.8 billion) for retail purchases and \$6.5 billion (95% CI, \$6.0 billion to \$7.0 billion) for hospital purchases by 2023 ([Figure 1](#) and [Figure 2](#)).

Figure 3: Annual Growth in Estimated Pharmaceutical Drug Purchases From the Previous Year (2002 to 2021) for the Retail and Hospital Sectors



Note: Blue bars represent the retail sector and orange bars represent the hospital sector. The grey zone illustrates forecasted annual growth for 2022 and 2023.

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Top 25 Drugs by Overall Purchases in 2021

[Table 1](#) provides the top 25 drugs by purchases in retail and hospital settings across the country for the year 2021. In terms of purchases, infliximab (\$1.3 billion), adalimumab (\$979 million), and ustekinumab (\$636.3 million) were the top 3 drugs in the retail setting, whereas pembrolizumab (\$518.8 million), daratumumab (\$254.2 million), and nivolumab (\$245.7 million) were the top 3 drugs in the hospital setting. Overall, total purchases for the top 25 drugs in both markets in 2021 accounted for \$12.2 billion (\$9.3 billion and \$2.9 billion in the retail and hospital sectors, respectively), which accounted for 31.2% and 52.3% of total spending in each sector, respectively. Only 3 drugs were in the top 25 of both lists: a vascular endothelial growth factor-A (VEGF-A) antagonist (aflibercept: number 4 in retail spending and number 17 in hospital spending) and 2 kinase inhibitors (ibrutinib: number 13 in retail spending and number 7 in hospital spending; palbociclib: number 24 in retail spending and number 10 in hospital spending).

Table 1: Top 25 Drugs by Purchases in Retail and Hospital Settings for the Calendar Year 2021 and Trends Compared With 2020

Rank	Retail			Hospital		
	Drug	Total estimated pharmaceutical drug purchases in 2021	Trend from 2020	Drug	Total estimated pharmaceutical drug purchases in 2021	Trend from 2020
1	Infliximab	\$1,273,113,789	Up	Pembrolizumab	\$518,807,002	Up
2	Adalimumab	\$978,987,507	Up	Daratumumab	\$254,230,664	Up
3	Ustekinumab	\$636,290,643	Up	Nivolumab	\$245,654,407	Down
4	Aflibercept	\$608,972,710	Up	Haemagglutinin (nonspecific)	\$164,311,416	Up
5	Semaglutide	\$576,044,914	Up	Rituximab	\$160,022,931	Down
6	Apixaban	\$410,725,793	Up	Pertuzumab: Trastuzumab	\$138,664,496	Up
7	Methylphenidate	\$340,706,844	Up	Ibrutinib	\$120,818,606	Up
8	Ranibizumab	\$325,530,299	Up	Trastuzumab	\$110,287,917	Down
9	Empagliflozin	\$320,537,190	Up	Durvalumab	\$106,020,619	Up
10	Metformin: sitagliptin	\$317,062,227	Down	Palbociclib	\$92,539,410	Up
11	Rivaroxaban	\$290,607,683	Up	Bevacizumab	\$90,680,807	Down
12	Lisdexamfetamine	\$288,792,626	Up	Vaccine, pneumococcal conjugate	\$88,725,538	Up
13	Ibrutinib	\$275,252,945	Up	Osimertinib	\$82,691,346	Up
14	Vedolizumab	\$274,476,001	Up	Ipilimumab	\$73,638,520	Up
15	Etanercept	\$268,976,817	Down	Darbepoetin alfa	\$71,675,858	Up
16	Budesonide: formoterol	\$251,975,825	Down	Nusinersen	\$62,287,791	Down
17	Paliperidone palmitate	\$234,005,797	Up	Aflibercept	\$61,455,247	Up
18	Rosuvastatin	\$233,956,220	Up	Erythropoietin alpha	\$60,796,021	Down
19	Golimumab	\$231,374,597	Up	Trastuzumab emtansine	\$59,868,119	—
20	Insulin glargine	\$224,952,661	Down	Alteplase	\$59,159,609	Up
21	Sofosbuvir: velpatasvir	\$219,433,495	Down	Vaccine, HPV types 6, 11, 16, 18, 3	\$56,676,885	Down
22	Sitagliptin	\$200,224,171	Down	Vaccine, rotavirus	\$54,616,577	Up

Rank	Retail			Hospital		
	Drug	Total estimated pharmaceutical drug purchases in 2021	Trend from 2020	Drug	Total estimated pharmaceutical drug purchases in 2021	Trend from 2020
23	Denosumab	\$186,499,982	—	Bictegravir, emtricitabine, and tenofovir alafenamide	\$51,108,504	—
24	Palbociclib	\$180,998,587	—	Antipoliomyelitic vaccine, diphtheria toxoid, <i>Haemophilus influenzae</i> B, pertussis, and tetanus purified toxoid	\$49,942,835	—
25	Ocrelizumab	\$178,010,209	—	Enoxaparin	\$40,336,899	—
Total of top 25	\$9,327,509,532			\$2,875,018,024		
Total 2021 spending	\$29,877,770,437			\$5,498,567,931		
Top 25% of total	31.20%			52.30%		

Note: The drugs with a dash are new entries to the top 25 drugs in 2021.

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Horizon Scan

Fifteen global reports were reviewed to determine trends for drug spending in Canada ([Appendix 1, Table 3](#)). In [Table 2](#), we present the drugs that are anticipated to have the most impact on drug purchases in 2022 and 2023. Here, we summarize major themes for new and upcoming therapies in Canada. We first highlight treatments we believe will have the largest impact on increased spending (“upward pressure”) then discuss potential mitigating factors (“downward pressure”). A complete list of drug approvals for Health Canada and the US FDA in 2021 and the first quarter of 2022 are presented in [Table 4](#), and [Table 5](#), respectively. The FDA approved 50 novel drugs in 2021 compared with 53 in 2020.⁷ Health Canada approved 78 drugs in 2021 compared with 84 new drugs in 2020, of which 40 were novel drugs.¹⁶

Table 2: Selected Drugs and Biologicals That Received Health Canada and/or FDA Approval in 2021 and Early 2022 and Are Expected to Affect Drug Spending

Category	Drug	Brand name or reference product	Indication	Health Canada approval date	FDA approved
Diabetes	Insulin aspart biosimilar	Kirsty and Trurapi (for NovoRapid)	Diabetes	October 2021	No
	Insulin lispro biosimilar	Lyumjev, Liprelog, and Admelog (for Humalog)	Diabetes	January 2021	Lyumjev: yes Liprelog: no Admelog: yes
	Canagliflozin, dapagliflozin, empagliflozin, combinations generics	NA	SGLT2 inhibitors for diabetes with additional indications (established cardiovascular disease, nephropathy, heart failure)	Under review	No (tentative approval)
	Sitagliptin, linagliptin, combinations generics	NA	DPP-4 inhibitors for diabetes	Under review	No (tentative approval)
	Liraglutide generic	NA	GLP-1 receptor agonist for diabetes and established cardiovascular disease	Under review	No
Weight management	Semaglutide	Wegovy	GLP-1 receptor agonist for chronic weight management in adults	November 2021	Yes
	Liraglutide	Saxenda	GLP-1 receptor agonist for chronic weight management in adolescents aged 12 and older	February 2021	Yes
Migraine	Eptinezumab	Vyepti	CGRP antagonist for prevention of migraine	January 2021	Yes
	Lasmiditan	Reyvow	5-HT _{1F} receptor agonist for the treatment of acute migraine	Not under review	Yes
Cystic fibrosis	Elexacaftor, ivacaftor, tezacaftor	Trikafta	Cystic fibrosis with F508del mutation in adolescents and adults 12 years and older	June 2021	Yes
HIV	Abacavir, dolutegravir, and lamivudine generic	NA	HIV	Under review	No
	Dolutegravir generic	NA	HIV	Under review	No (tentative approval)

Category	Drug	Brand name or reference product	Indication	Health Canada approval date	FDA approved
	Emtricitabine, rilpivirine, and tenofovir alafenamide generic	NA	HIV	Under review	No
Macular degeneration	Ranibizumab biosimilar	Byooviz (for Lucentis)	Age-related macular degeneration, diabetic macular edema, diabetic retinopathy	March 2022	Yes
ALS	Sodium phenylbutyrate and ursodexicoltaurine	Albrioza	ALS	Under review	No
Spinal muscular atrophy	Risdiplam	Evrysdi	SMA, infants aged 2 months and older up to adults aged 25 years	April 2021	Yes
Anticoagulant	Apixaban generic	NA	Prevention and treatment of VTE, prevention of stroke in atrial fibrillation	Under review	No
Immune diseases	Tofacitinib generic	NA	JAK inhibitor for rheumatoid arthritis, psoriatic arthritis, ulcerative colitis	Under review	No (tentative approval)
	Adalimumab, multiple biosimilars	NA	Multiple indications (e.g., rheumatoid arthritis, Crohn disease, ulcerative colitis)	2021	Yes
Multiple sclerosis	Teriflunomide generic	NA	Relapsing remitting MS	May 2022	Yes
	Ofatumumab	Kesimpta	Relapsing remitting MS	January 2021	Yes
	Ponesimod	Ponvory	Relapsing remitting MS	April 2021	Yes
	Diroximel fumarate	Vumerity	Relapsing remitting MS	Not under review	Yes
Schizophrenia	Paliperidone long-acting injection generic	NA	Schizophrenia and related psychotic disorders	Under review	Yes
Oncology	Brexucabtagene autoleucel	Tecartus	CAR T-cell therapy for relapsed or refractory mantle cell lymphoma	June 2021	Yes
	Ciltacabtagene autoleucel	Carvykti	CAR T-cell therapy for relapsed or refractory multiple myeloma	Under review	Yes
	Encorafenib	Braftovi	Additional indication of metastatic colorectal cancer	March 2021	Yes

Category	Drug	Brand name or reference product	Indication	Health Canada approval date	FDA approved
	Trastuzumab deruxtecan	Enhertu	Unresectable or metastatic HER2-positive breast cancer after treatment with trastuzumab emtansine	April 2021	Yes
	Daratumumab	Darzalex	Additional indications in multiple myeloma and amyloidosis	April 2021	Yes
	Sacituzumab govitecan	Trodelvy	Advanced or metastatic triple negative breast cancer	September 2021	Yes
	Isatuximab	Sarclisa	Relapsed and refractory multiple myeloma	September 2021	Yes
	Venetoclax	Venclexta	Additional indications for first-line CML and AML	January 2021	Yes
	Selinexor	Xpovio	First oral selective inhibitor of nuclear export for multiple myeloma	Under review	Yes
	Ibrutinib generic	Imbruvica	Multiple indications	Under review	Yes
	Carfilzomib generic	Kyprolis	Relapsed multiple myeloma	Under review	Yes
	Pomalidomide generic	Pomalyst	Relapsed multiple myeloma	Under review	Yes

ALS = amyotrophic lateral sclerosis; AML = acute myeloid leukemia; CAR = chimeric antigen receptor; CGRP = calcitonin gene-related peptide; CML = chronic myelogenous leukemia; DPP-4 = dipeptidyl peptidase-4; GLP-1 = glucagon-like peptide-1; MS = multiple sclerosis; NA = not applicable; SGLT2 = sodium-glucose cotransporter-2; SMA = spinal muscular atrophy; VTE = venous thromboembolism.

Potential for Upward Pressure

In oncology, chimeric antigen receptor (CAR) T-cell therapies are anticipated to make the largest impact on spending. A new CAR T-cell therapy was recently approved for the treatment of mantle cell lymphoma, and another is under review by Health Canada for multiple myeloma, a relatively common cancer. Daratumumab (Darzalex) is the number 2 ranked drug in the hospital sector, and purchases have increased over the past 2 years. It will likely impact spending even more in coming years because it has now been approved for additional indications of multiple myeloma and amyloidosis therapy.

Certain therapeutic areas are likely to increase spending due to the prevalence of these conditions in the Canadian population. Drugs for migraine treatment continue to increase drug spending as the new calcitonin gene-related peptide inhibitors take over a higher market share for the prevention of chronic migraine. Lasmiditan (Reyvow), a first-in-class medication indicated for acute treatment of migraine that was approved by the FDA in 2019, is not yet under review by Health Canada. Semaglutide (Wegovy), the number 5 ranked drug in the retail sector, has been approved for chronic weight management in adults and is currently under review by CADTH for this indication. Liraglutide (Saxenda) has an expanded indication for weight management in adolescents 12 years and older; however, CADTH did not recommend reimbursement by public plans. New medications for multiple sclerosis continue to be

approved, such as ofatumumab (a once-monthly injection) and ponesimod, both of which are expected to increase the cost of treatment overall. Of note, ocrelizumab, which is a treatment for multiple sclerosis that is infused every 6 months, is a new addition to the top 25 in retail spending this year. Finally, aducanumab (Aduhelm) received FDA approval for the treatment of Alzheimer disease in 2021. Approximately 76,000 Canadians are diagnosed with dementia each year,¹⁷ and aducanumab costs approximately US\$28,000 annually. The medication is presently under review by Health Canada, but it remains unclear whether it will be approved and funded in Canada.

For rare diseases, the increasing number of therapies with high price tags are expected to drive costs, particularly in diseases that previously had no or few treatment options available. Notable examples include sodium phenylbutyrate and ursodiol for amyotrophic lateral sclerosis and risdiplam for spinal muscular atrophy. In addition, elexacaftor, ivacaftor, and tezacaftor (Trikafta) was approved in 2021 for cystic fibrosis and received a positive recommendation for reimbursement by CADTH for adults and adolescents aged 12 years and older. Trikafta received an expanded indication for pediatric patients aged 6 years and older in 2022 and another positive recommendation to reimburse by CADTH, indicating continued growth for this product.

Potential for Downward Pressure

A limited number of approved or upcoming generic medications and biosimilars have been identified as having the potential to exert downward pressure on drug spending. In oncology, 2 new generic medications have been approved for multiple myeloma (carfilzomib and pomalidomide) and are expected to have an impact. Generic ibrutinib may impact both retail (ranked number 13) and hospital (ranked number 7) spending, but savings will be partially blunted by the expected replacement with a new kinase inhibitor, zanubrutinib. Among medications for diabetes, insulin aspart and lispro have new biosimilar market entries to join Trurapi (insulin aspart biosimilar for NovoRapid) and Admelog (insulin lispro biosimilar for Humalog), which could lead to reduced spending on insulin.¹⁸ Furthermore, several generic drugs in the sodium-glucose cotransporter-2 (SGLT2) inhibitor, dipeptidyl peptidase-4 (DPP-4) inhibitor, and glucagon-like peptide-1 (GLP-1) receptor agonist classes are under review and expected to significantly decrease costs for diabetes treatment overall. Although several generic antiretroviral products for HIV are also under review, it is anticipated the abacavir, dolutegravir, and lamivudine combination will exert the highest impact because it is 1 of the recommended initial therapies in HIV treatment guidelines.¹⁹ Based on market share, generic apixaban (number 6 in retail spending) for venous thromboembolism and generic tofacitinib for immune diseases such as rheumatoid arthritis and ulcerative colitis will likely reduce costs. Finally, the first market entry for a ranibizumab biosimilar (number 8) and the availability of several adalimumab biosimilars (number 2) are expected to decrease spending substantially in the retail sector.²⁰

Interpretation

Spending on pharmaceuticals has grown considerably over the past 2 decades in Canada, leading to a total market size of more than \$35 billion in 2021. In 2021, the annual growth compared to the previous year in spending reached 7.3% for retail drug purchases and 12.4% for hospital drug purchases, far surpassing growth rates seen the year prior and our

previous forecast in 2021. This is particularly apparent in the retail sector where the annual growth in spending between 2020 and 2021 was higher than has been observed for the past decade. This expansion is likely driven by new product approvals, higher market entry prices for new drugs, and growing utilization. Thus, we anticipate continued increases in the retail sector combined with accelerated growth in the hospital sector, leading to projected total annual drug purchases nearing \$40 billion by 2023. Importantly, the anticipated growth in the number of new therapies and associated costs will continue to put pressure on constrained government budgets across the country, leading to a need for strategies that balance access to novel therapeutics against limited resources.

It is expected that the pressure from growth in the available therapies identified in the pipeline are likely to continue to affect the degree of change in spending in the coming years. We did note fewer approvals in comparison to 2021, which was a record-breaking year. Overall, we believe the growth in spending will be on the lower end of the predicted range in the outpatient retail setting due to the introduction of new generics or biosimilar formulations for several top 25 therapies, including adalimumab, ranibizumab, 2 direct oral anticoagulants, DPP-4 inhibitors, SGLT2 inhibitors, GLP-1 agonists, and insulin biosimilars. However, much of the effect of biosimilars will depend on their uptake in Canada. Presently, most Canadian provincial public drug plans require biologic-naïve patients to initiate a biosimilar formulation, and half of these drug plans have introduced mandatory non-medical biosimilar switching policies over the past several years.²¹ If a large province, such as Ontario, implemented similar policies, we anticipate this would have a large effect on total national spending projections. Finally, despite this downward pressure, diabetes therapies have particular potential to be “blockbuster” retail pharmacy drugs due to the high prevalence of diabetes and the expanded scope of many diabetes drugs to include weight loss. Therefore, it will be important to monitor the ongoing use of these medications to ensure appropriate use and manage spending.²²

Importantly, the validity of our projections remains uncertain since they were mostly based on data collected before the COVID-19 pandemic. This also explains why our current projections for 2023 are higher than our previous forecast. The pandemic has substantially impacted health care across the country, including drug spending. For example, at the time of publishing our first report, only 1 treatment, remdesivir, was approved by Health Canada and the FDA for a COVID-19 indication but spending on this drug had yet to occur. Since then, many treatments, including a series of COVID-19 vaccines, were not only developed but are approved and being used across the country. Spending on these new treatments may dramatically increase drug spending across Canada, maybe even beyond the upper bound of our projections for 2022 and 2023. However, other factors directly and indirectly related to the COVID-19 pandemic may have the opposite impact. The second, third, fourth, and fifth waves of COVID-19 have caused various levels of delayed treatments within hospitals across the country and have led to reduced screening of chronic conditions and cancers, potentially reducing the use of health care resources, including pharmaceuticals, at least in the short-term. We did observe that 16 of the top 25 drugs experienced expansion in their total purchases compared with last years’ report in 2020.

Our analysis has limitations that warrant discussion. First, we do not have information on the rebates that manufacturers provide to public and private drug plans or hospital purchasers because these contracts are kept confidential. These discounts can be sizable — for example, pan-Canadian Pharmaceutical Alliance (pCPA) negotiations yielded \$1.24billion in savings in 2017–2018.²³ However, our results still represent the total purchases in the current drug system, and we do not anticipate major differences in the proportion of rebates to total

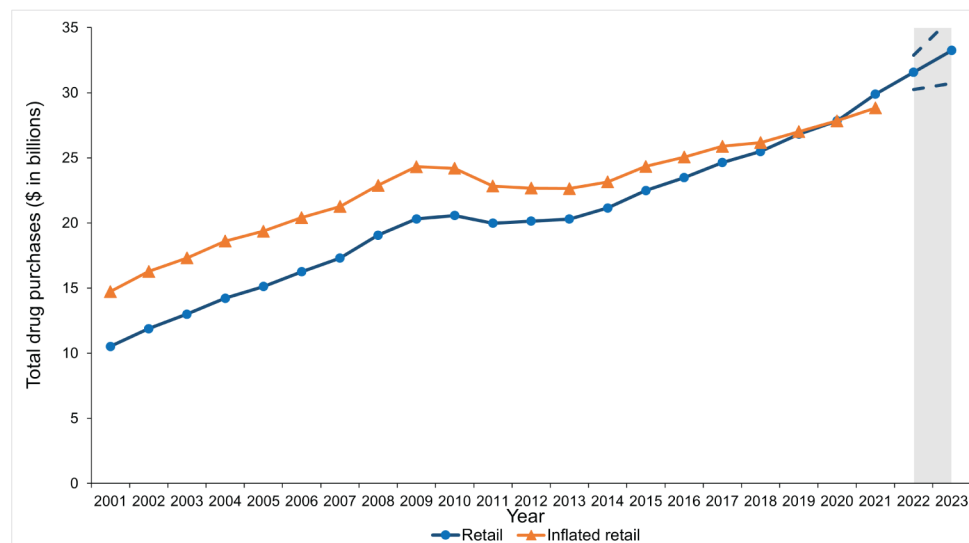
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Appendix 1: Additional Figures and Tables

Note that this appendix has not been copy-edited.

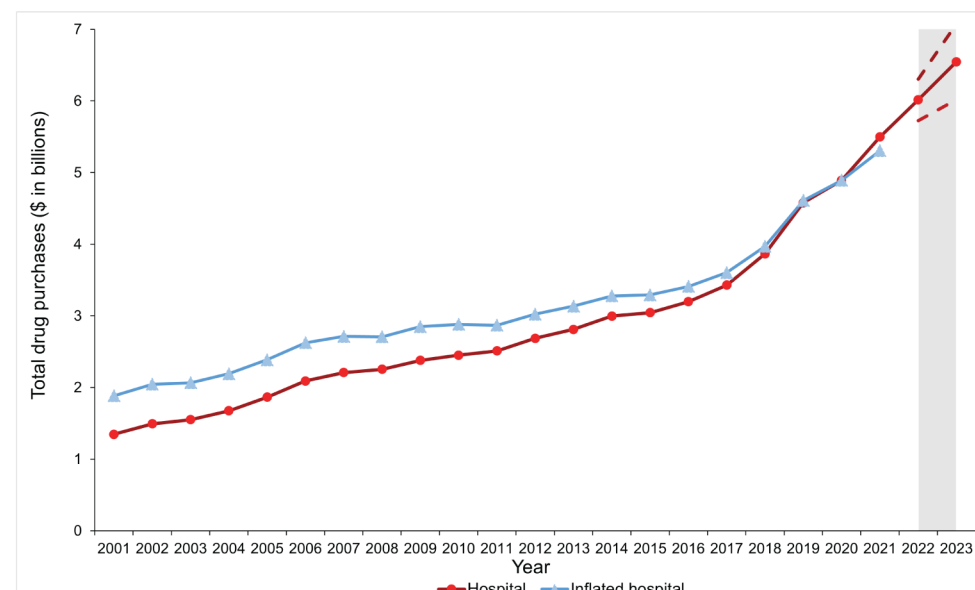
Figure 4: Total Estimated Pharmaceutical Drug Purchases in Canada for the Retail Sector From 2001 to 2021



Note: The grey zone illustrates forecasted purchases in the retail sector (solid line) with 95% confidence interval estimates (dashed lines) for 2022 and 2023. Blue line with circles = non-inflated-adjusted purchases; orange line with triangles = inflated-adjusted purchases.

Source: This figure is based on information licensed from IQVIA: Canadian Drugstore and Hospital Purchases Audit for the period of 2001 to 2021 estimates of real-world activity. All rights reserved.

Figure 5: Total Estimated Pharmaceutical Drug Purchases in Canada for the Hospital Sector From 2001 to 2021



Note: The grey zone illustrates forecasted purchases in the hospital sector (solid line) with 95% confidence interval estimates (dashed lines) for the years 2022 and 2023. Red line with circles = non-inflated-adjusted purchases; light blue line with triangles = inflated-adjusted purchases.

Source: This figure is based on information licensed from IQVIA: Canadian Drugstore and Hospital Purchases Audit for the period of 2001 to 2021 estimates of real-world activity. All rights reserved.

Table 3: Fifteen Global Reports Reviewed to Determine Trends for Drug Spending in Canada

Report	Link
Advancing Health Through Innovation: New Drug Therapy Approvals 2021	Advancing Health Through Innovation: New Drug Therapy Approvals 2021 (fda.gov)
2022 Drug Plan Trends Report: High-cost drugs, DEI shaping drug plans	2022 Drug Plan Trends Report: High-cost drugs, DEI shaping drug plans Benefits Canada.com
Biosimilars approved in Canada February 2022	Biosimilars approved in Canada (smartbiggar.ca)
CADTH Policy Intel	Not available
2021 US FDA New Drug Therapy Approvals: A Summary	
2022 Biosimilars Report: The US Journey and Path Ahead	2022 Biosimilars Report (cardinalhealth.com)
2022 Prescription Drug Trend Report	ExpressScriptsCanada2022DrugTrendReport.pdf (express-scripts.ca)
Drug and Medical Device Highlights, 2020	drug-medical-device-highlights-2020.pdf (canada.ca)
Global Trends in R&D Overview Through 2021	Global Trends in R&D 2022 - IQVIA
2021 Category watch: The Impact of New Drugs. A closer look at diabetes, migraine and multiple sclerosis	Category watch: The impact of new drugs (telushealth.co)
2021 TELUS Health Drug Data Trends and National Benchmarks	https://www.healthrisk.ca/wp-content/uploads/2021/06/2021-Drug-Data-Trends-and-National-Benchmarks-Report.pdf
The Drug Pipeline: What private plans can expect in 2021	Drug Pipeline Report - Spring 2021 (telushealth.co)

Table 4: Health Canada Drug Approvals Between January 1, 2021, and March 31, 2022

Generic name	Therapeutic area	Approval date	Submission outcome
Acetylsalicylic acid, atorvastatin calcium, ramipril	Cardiac therapy	March 2021	Cancelled by sponsor
Ad26.COV2.S (recombinant)	Vaccines	November 2021	Issued NOC
Adalimumab	Immunosuppressants	January 2022	Issued NOC
Adalimumab	Immunosuppressants	December 2021	Issued NOC
Adalimumab	Immunosuppressants	January 2021	Issued NOC
Alfa 1-proteinase inhibitor (human)	Antihemorrhagics	November 2021	Issued NOC
Amifampridine	Other nervous system drugs	June 2021	NOC invalid
Amisulpride	Psycholeptics	February 2021	Cancelled by sponsor
Amivantamab	Antineoplastic agents	March 2022	Issued NOC under the NOC/c Guidance
Anifrolumab	Immunosuppressants	November 2021	Issued NOC
Aprotinin	Antihemorrhagics	February 2022	Cancelled by sponsor
Avalglucosidase alfa	Other alimentary tract and metabolism	November 2021	Issued NOC
Avanafil	Urologicals	October 2021	Issued Notice of Non-compliance - Withdrawal
Azacitidine	Antineoplastic agents	January 2021	Issued NOC
Belumosudil mesylate	Immunosuppressants	March 2022	Issued NOC
Bendamustine hydrochloride	Antineoplastic agents	January 2022	Issued NOC
Bevacizumab	Antineoplastic agents	November 2021	Issued NOC
Bevacizumab	Antineoplastic agents	November 2021	Issued NOC
Bevacizumab	Antineoplastic agents	November 2021	Issued NOC
Bevacizumab	Antineoplastic agents	September 2021	Cancelled by sponsor
Bevacizumab	Antineoplastic agents	September 2021	Issued NOC
Bevacizumab	Antineoplastic agents	January 2021	Issued NOC
Bimekizumab	Immunosuppressants	February 2022	Issued NOC
Binimetinib	Antineoplastic agents	March 2021	Issued NOC
Brexucabtagene autoleucel	Antineoplastic agents	June 2021	Issued NOC
Brilliant blue G	Ophthalmologicals	January 2021	Issued NOC
Budesonide, formoterol fumarate dihydrate, glycopyrronium bromide	Drugs for obstructive airway diseases	July 2021	Issued NOC
Bupivacaine	Anesthetics	August 2021	Cancelled by sponsor
Bupivacaine, meloxicam	Anti-inflammatory and antirheumatic products	March 2022	Issued NOC

Generic name	Therapeutic area	Approval date	Submission outcome
ChAdOx1-S (recombinant)	Vaccines	November 2021	Issued NOC
Chlormethine	Antineoplastic agents	June 2021	Issued NOC
Colchicine	Antigout preparations	August 2021	Issued NOC
Copanlisib dihydrochloride	Antineoplastic agents	December 2021	Cancelled by sponsor
Corynebacterium diphtheria CRM-197 protein, pneumococcal polysaccharide serotypes 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 22F, 23F, and 33F	Vaccines	November 2021	Issued NOC
Cyclosporine	Ophthalmologicals	February 2021	Issued NOC
Cytarabine, daunorubicin hydrochloride	Antineoplastic agents	April 2021	Issued NOC
Dequalinium chloride	Gynecological anti-infectives and antiseptics	July 2021	Issued NOC
Diamorphine hydrochloride	Other nervous system drugs	February 2022	Issued NOC
Dostarlimab	Antineoplastic agents	December 2021	Issued NOC under the NOC/c Guidance
Drospirenone	Sex hormones and modulators of the genital system	November 2021	Issued NOC
Drospirenone, estetrol monohydrate	Sex hormones and modulators of the genital system	March 2021	Issued NOC
Elasomeran	Vaccines	September 2021	Issued NOC
Elexacaftor, ivacaftor, tezacaftor	Other respiratory system products	June 2021	Issued NOC
Emapalumab	Immunosuppressants	February 2021	Cancelled by sponsor
Encorafenib	Antineoplastic agents	March 2021	Issued NOC
Encorafenib	Antineoplastic agents	March 2021	Issued NOC
Enfortumab vedotin	Antineoplastic agents	October 2021	Issued NOC
Eptinezumab	Analgesics	January 2021	Issued NOC
Favipiravir	Antivirals for systemic use	February 2022	Cancelled by sponsor
Ferric pyrophosphate citrate	Antianemic preparations	April 2021	Issued NOC
Fibrinogen (human), thrombin (human)	Antihemorrhagics	March 2021	Issued NOC
Filgotinib	Immunosuppressants	January 2021	Cancelled by sponsor
Filgrastim (r-metHuG-CSF)	Immunostimulants	October 2021	Issued NOC
Finerenone	Diuretics	October 2021	Cancelled by sponsor
Fostemsavir tromethamine	Antivirals for systemic use	October 2021	Issued NOC
Gallium oxodotereotide	Diagnostic radiopharmaceuticals	February 2022	Issued NOC
Goserelin acetate	Endocrine therapy	October 2021	Cancelled by sponsor

Generic name	Therapeutic area	Approval date	Submission outcome
Haemagglutinin, neuraminidase antigen	Vaccines	January 2021	Issued NOC
Hyaluronidase (human recombinant), immunoglobulin (human),	Immune sera and immunoglobulins	January 2022	Issued NOC
Idecabtagene vicleucel	Antineoplastic agents	May 2021	Issued NOC under the NOC/c Guidance
Inclisiran sodium	Lipid modifying agents	July 2021	Issued NOC
Infigratinib phosphate	Antineoplastic agents	September 2021	Issued NOC under the NOC/c Guidance
Infliximab	Immunosuppressants	December 2021	Issued NOC
Insulin aspart	Drugs used in diabetes	October 2021	Issued NOC
Insulin lispro	Drugs used in diabetes	September 2021	Issued NOC
Lasmiditan	Analgesics	January 2021	Cancelled by sponsor
Leuprolide mesylate	Endocrine therapy	November 2021	Issued NOC
Lumasiran	Other alimentary tract and metabolism products	March 2022	Issued NOC
Lurbinectedin	Antineoplastic agents	September 2021	Issued NOC under the NOC/c Guidance
Luspatercept	Antianemic preparations	February 2021	Issued NOC
Macitentan, tadalafil	Antihypertensives	October 2021	Issued NOC
Mesalazine	Antidiarrheals, intestinal anti-inflammatory/anti-infective agents	January 2022	Issued NOC
Mesalazine	Antidiarrheals, intestinal anti-inflammatory/anti-infective agents	May 2021	Issued NOC
Methylene blue	Diagnostic agents	May 2021	Issued Notice of Non-compliance - Withdrawal
Nirmatrelvir, ritonavir	Antivirals for systemic use	January 2022	Issued NOC
Ofatumumab	Antineoplastic agents	January 2021	Issued NOC
Ospemifene	Sex hormones and modulators of the genital system	July 2021	Issued NOC
Palovarotene	Other drugs for disorders of the musculoskeletal system	January 2022	Issued NOC
Pegfilgrastim	Immunostimulants	July 2021	Cancelled by sponsor
Pegvaliase	Other alimentary tract and metabolism products	March 2022	Issued NOC
Pemigatinib	Antineoplastic agents	September 2021	Issued NOC under the NOC/c Guidance
Pertuzumab, trastuzumab	Antineoplastic agents	March 2021	Issued NOC

Generic name	Therapeutic area	Approval date	Submission outcome
Pitolisant	Other nervous system drugs	May 2021	Issued NOC
Ponesimod	Immunosuppressants	April 2021	Issued NOC
Pralsetinib	Antineoplastic agents	June 2021	Issued NOC under the NOC/c Guidance
Progesterone	Sex hormones and modulators of the genital system	April 2021	Issued NOC
Ranibizumab	Ophthalmologicals	March 2022	Issued NOC
Recombinant haemagglutinin-strain A (H1N1) virus-like particles, Recombinant haemagglutinin-strain A (H3N2) virus-like particles, Recombinant haemagglutinin-strain B (Victoria lineage) virus-like particles, Recombinant haemagglutinin-strain B (Yamagata lineage) virus-like particles	Vaccines	September 2021	Cancelled by sponsor
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
Risdiplam	Other drugs for disorders of the musculoskeletal system	April 2021	Issued NOC
Rituximab	Antineoplastic agents	March 2021	Issued NOC
Roxadustat	Antianemic preparations	October 2021	Cancelled by sponsor
Sacituzumab govitecan	Antineoplastic agents	September 2021	Issued NOC
SARS-CoV-2 recombinant spike protein	Vaccines	February 2022	Issued NOC
Selpercatinib	Antineoplastic agents	June 2021	Issued NOC under the NOC/c Guidance
Semaglutide	Drugs used in diabetes	November 2021	Issued NOC
Solriamfetol hydrochloride	Psychoanaleptics	May 2021	Issued NOC
Somatogon	Pituitary, hypothalamic hormones, and analogues	October 2021	Issued NOC
Sotorasib	Antineoplastic agents	September 2021	Issued NOC under the NOC/c Guidance
Tafamidis	Other nervous system drugs	July 2021	Issued NOC
Tafasitamab	Antineoplastic agents	August 2021	Issued NOC
Tazarotene	Antipsoriatics	July 2021	Issued NOC
Tecovirimat monohydrate	Antivirals for systemic use	November 2021	Issued NOC

Generic name	Therapeutic area	Approval date	Submission outcome
Tepotinib	Antineoplastic agents	May 2021	Issued NOC under the NOC/c Guidance
Tildrakizumab	Immunosuppressants	May 2021	Issued NOC
Tozinameran	Vaccines	September 2021	Issued NOC
Tralokinumab	Other dermatological preparations	October 2021	Issued NOC
Trastuzumab	Antineoplastic agents	January 2022	Issued NOC
Trastuzumab deruxtecan	Antineoplastic agents	April 2021	Issued NOC under the NOC/c Guidance
Treosulfan	Antineoplastic agents	June 2021	Issued NOC
Treosulfan	Antineoplastic agents	June 2021	Issued a Notice of Deficiency - Withdrawal
Trientine hydrochloride	All other therapeutic products	April 2021	Issued NOC
Triheptanoin	Other alimentary tract and metabolism	February 2021	Issued NOC
Virus-like particles (VLP) of SARS-CoV-2 spike protein	Vaccines	February 2022	Issued NOC
Vitamin D3	Vitamins	February 2021	Issued NOC
Vitamin K1	Antihemorrhagics	June 2021	Issued a Notice of Deficiency - Withdrawal
Zanubrutinib	Antineoplastic agents	July 2021	Issued NOC
Zanubrutinib	Antineoplastic agents	March 2021	Issued NOC

Table 5: FDA Drug Approvals Between January 1, 2021, and March 31, 2022

Generic name	Brand name	Indication	Sponsor	Approval date
Abacavir sulphate; dolutegravir sodium; lamivudine	Triumeq PD	HIV	Viiv Hlthcare	March 30, 2022
Abrocitinib	Cibinqo	Atopic dermatitis	Pfizer	January 14, 2022
Acetaminophen	Acetaminophen	Pain	Rising	January 15, 2021
Acetaminophen	Acetaminophen	Pain	B Braun Medical Inc.	February 18, 2021
Aducanumab-AVWA	Aduhelmbla	Alzheimer disease	Biogen Inc.	June 7, 2021
Amifampridine	Ruzurgi	Congenital myasthenic syndromes, Lambert-Eaton myasthenic syndrome	Jacobus Pharm Co Inc.	February 1, 2022
Amivantamab-VMJW	Rybrent	Non-small cell lung cancer	Janssen Biotech	May 21, 2021
Amlodipine besylate	Norliqva	Multiple indications	Cmp Dev Llc	February 24, 2022

Generic name	Brand name	Indication	Sponsor	Approval date
Amphetamine; amphetamine aspartate/ dextroamphetamine sulphate	Dyanavel XR 10	Attention deficit disorder	Tris Pharma Inc.	November 4, 2021
Amphetamine; amphetamine aspartate/ dextroamphetamine sulphate	Dyanavel XR 15	Attention deficit disorder	Tris Pharma Inc.	November 4, 2021
Amphetamine; amphetamine aspartate/ dextroamphetamine sulphate	Dyanavel XR 20	Attention deficit disorder	Tris Pharma Inc.	November 4, 2021
Amphetamine; amphetamine aspartate/ dextroamphetamine sulphate	Dyanavel XR 5	Attention deficit disorder	Tris Pharma Inc.	November 4, 2021
Anifrolumab-FNIA	Saphnelo	Lupus	Astrazeneca Ab	July 30, 2021
Argatroban	Argatroban in sodium chloride	Thrombocytopenia	Accord Hlthcare	June 7, 2021
Asciminib hydrochloride	Scemblix	Oncology	Novartis	October 29, 2021
Asparaginase erwinia chrysanthemi (recombinant)-RYWN	Rylaze	Oncology	Jazz Pharms	June 30, 2021
Atogepant	Qulipta	Migraine prevention	Abbvie Inc.	September 28, 2021
Atropine sulphate	Atropine	Multiple indications	Paragon Biotech	March 15, 2022
Avacopan	Tavneos	Anti-neutrophil cytoplasmic autoantibody- associated vasculitis	Chemocentryx	October 7, 2021
Avalglucosidase alfa- NGPT	Nexvazyme	Late-onset Pompe disease	Genzyme Corp	August 6, 2021
Azelastine hydrochloride	Astepro Allergy	Allergy	Bayer Hlthcare	June 17, 2021
Azelastine hydrochloride	Children's Astepro Allergy	Allergy	Bayer Hlthcare	June 17, 2021
Baclofen	Lyvispah	Muscle relaxant	Saol Theraps Res Ltd.	November 22, 2021
Baclofen	Fleqsuvy	Muscle relaxant	Azurity	February 4, 2022
Belumosudil mesylate	Rezurock	Chronic graft vs. host disease	Kadmon Pharms Llc	July 16, 2021
Belzutifan	Welireg	Von Hippel–Lindau disease-associated renal cell carcinoma	Merck Sharp Dohme	August 13, 2021
Bendamustine hydrochloride	Bendamustine	Oncology	Dr Reddys Labs Ltd.	November 12, 2021

Generic name	Brand name	Indication	Sponsor	Approval date
Bendamustine hydrochloride	Vivimusta	Oncology	Slayback Pharma Llc	March 16, 2022
Benzoyl peroxide; tretinoin	Twynéo	Acne	Sol-Gel Technologies	July 26, 2021
Bortezomib	Bortezomib	Multiple myeloma	Intas Pharms USA	August 20, 2021
Brincidofovir	Tembexa	Smallpox	Chimerix	June 4, 2021
Brincidofovir	Tembexa	Smallpox	Chimerix	June 4, 2021
Budesonide	Tarpeyo	Steroid	Calliditas	December 15, 2021
Bupivacaine	Posimir	Multiple indications	Durect	February 1, 2021
Bupivacaine; meloxicam	Zynrelef	Postsurgical pain	Heron Theraps Inc.	May 12, 2021
Cabazitaxel	Cabazitaxel	Oncology	Accord Hlthcare	December 29, 2021
Cabotegravir	Apretude	HIV	Viiv Hlthcare	December 20, 2021
Cabotegravir sodium	Vocabria	Long-acting HIV	Viiv Hlthcare	January 21, 2021
Cabotegravir; rilpivirine	Cabenuva kit	Long-acting HIV	Viiv Hlthcare	January 21, 2021
Carbidopa; levodopa	Dhivy	Parkinson disease	Avion Pharms	November 12, 2021
Carbon dioxide	Carbon dioxide	Multiple indications	Middlesex Gases Technologies, Inc.	October 18, 2021
Carbon dioxide	Carbon	Multiple indications	Continental Carbonic Products, Inc.	February 25, 2022
Casimersen	Amondys	Duchenne muscular dystrophy	Sarepta Theraps Inc.	February 25, 2021
Celecoxib; tramadol hydrochloride	Seglentis	Pain	Kowa Pharms	October 15, 2021
Citalopram hydrobromide	Citalopram	Multiple indications	Almatica	January 31, 2022
Clindamycin phosphate	Xaciató	Antibiotic	Dare	December 7, 2021
Cyclophosphamide	Cyclophosphamide	Oncology	Eugia Pharma SpecLts	August 25, 2021
Cyclosporine	Verkazia	Immunosuppressant	Santen	June 23, 2021
Dabigatran etexilate mesylate	Pradaxa	Anticoagulant	Boehringer Ingelheim	June 21, 2021
Daptomycin	Daptomycin	Antibiotic	Hospira Inc.	June 21, 2021
Daptomycin	Dapzura Rt	Antibiotic	Baxter Hlthcare Corp	January 25, 2022
Daridorexant hydrochloride	Quviviq	Insomnia	Idorsia Pharmaceuticals Ltd.	January 7, 2022
Dasiglucagon hydrochloride	Zegalogue	Severe hypoglycemia	Zealand Pharma	March 22, 2021

Generic name	Brand name	Indication	Sponsor	Approval date
Dasiglucagon hydrochloride	Zegalogue (autoinjector)	Severe hypoglycemia	Zealand Pharma	March 22, 2021
Dexmethylphenidate hydrochloride; serdexmethylphenidate chloride	Azstarys	Attention deficit disorder	Commave Therap	March 2, 2021
Dextroamphetamine	Xelstrym	Attention deficit disorder	Noven Pharms Inc.	March 22, 2022
Difelikefalin acetate	Korsuva	Itching in chronic kidney disease	Cara Therap	August 23, 2021
Dihydroergotamine mesylate	Trudhesa	Migraine	Impel Neuropharma	September 2, 2021
Diltiazem hydrochloride	Diltiazem hydrochloride in dextrose 5%	Multiple indications	Exela Pharma	October 28, 2021
Dolutegravir lamivudine tenofovir alafenamide	Dolutegravir lamivudine tenofovir alafenamide	HIV	Cipla Usa Inc.	March 30, 2022
Dolutegravir sodium	Dolutegravir	HIV	Macleods Pharms Ltd.	March 16, 2021
Dolutegravir; lamivudine; tenofovir disoproxil fumarate	Dolutegravir, lamivudine and tenofovir disoproxil fumarate	HIV	Lupin Pharms	June 25, 2021
Donepezil hydrochloride	Adlarity	Alzheimer disease	Corium	March 11, 2022
Dostarlimab-GXLY	Jemperlibla	Endometrial cancer	Glaxosmithkline	April 22, 2021
Dostarlimab-GXLY	Jemperli	Oncology	Glaxosmithkline Llc	August 17, 2021
Drospirenone; estetrol	Nextstellis	Oral contraceptive	Mayne Pharma	April 15, 2021
Efgartigimod alfa	Vyvgart	Generalized myasthenia gravis	Argenx Bv	December 17, 2021
Ephedrine hydrochloride	Rezipres	Multiple indications	Eton	June 14, 2021
Estradiol; norethindrone acetate; relugolix	Myfembree	Heavy menstrual bleeding due to fibroids	Myovant Sciences	May 26, 2021
Evinacumab-DGNB	Evkeeza	Homozygous familial hypercholesterolemia	Regeneron Pharmaceuticals	February 11, 2021
Ezetimibe; rosuvastatin calcium	Roszet	Hyperlipidemia	Althera Pharms	March 23, 2021
Faricimab-SVOA	Vabysmobla	Neovascular (Wet) age-related macular degeneration, diabetic macular edema	Genentech Inc.	January 28, 2022
Fexinidazole	Fexinidazole	Trypanosoma brucei gambiense sleeping sickness	Sanofi	July 16, 2021
Filgrastim-AYOW	Releukobla	Neutropenia	Kashiv Biosciences Llc	February 25, 2022

Generic name	Brand name	Indication	Sponsor	Approval date
Finasteride; tadalafil	Entadfi	Benign prostatic hypertrophy	Veru	December 9, 2021
Finerenone	Kerendia	Chronic kidney disease	Bayer Hlthcare	July 9, 2021
Fingolimod lauryl sulphate	Tascenso ODT	Multiple sclerosis	Handa	October 18, 2021
Fosdenopterin hydrobromide	Nulibry	Molybdenum cofactor deficiency type A	Origin	February 26, 2021
Gallium GA-68 gozetotide	Locametz	Diagnostic agent for prostate cancer	Aaa Usa Novartis	March 23, 2022
Ganaxolone	Ztalmy	Cyclin-dependent kinase-like 5 deficiency seizures	Marinus Pharamceuticals, Inc.	March 18, 2022
Glecaprevir; pibrentasvir	Mavyret	Hepatitis C	Abbvie Inc.	June 10, 2021
Glycopyrrolate	Dartisla ODT	Peptic ulcer	Edenbridge Pharms	December 16, 2021
Helium	Helium, USP	Multiple indications	General Air Service and Supply Company	July 26, 2021
Hydroxychloroquine sulphate	Hydroxychloroquine	Multiple indications	Novitium Pharma	January 14, 2022
Ibrexafungerp citrate	Brexafemme	Vaginal candidiasis	Scynexis	June 1, 2021
Inclisiran sodium	Leqvio	Hypercholesterolemia	Novartis	December 22, 2021
Infigratinib phosphate	Truseltiq	Oncology	Helsinn Hlthcare	May 28, 2021
Ketotifen fumarate	Acuvue	Allergy	Johnson Johnson Visn	February 25, 2022
Lanreotide acetate	Lanreotide	Gastroenteropancreatic tumours	Invagen Pharms	December 17, 2021
Leuprolide mesylate	Camcevi	Prostate cancer	Foresee Pharms	May 25, 2021
Levoketoconazole	Recorlev	Antifungal	Strongbridge	December 30, 2021
Levothyroxine sodium	Levothyroxine	Hypothyroidism	Custopharm Inc.	May 17, 2021
Lonapegsomatropin-TCGD	Skytrofa	Endogenous growth hormone insufficiency	Ascendis Pharma Encocrinology Div A/S	August 25, 2021
Loncastuximab tesirine-LPYL	Zynlontabla	B-cell lymphoma	Adc Therapeutics Sa	April 23, 2021
Lorazepam	Loreev	Multiple indications	Almatica	August 27, 2021
Lutetium LU-177 vipivotide tetraxetan	Pluvicto	Prostate-specific membrane antigen-positive metastatic castration-resistant prostate cancer	Aaa Usa Novartis	March 23, 2022

Generic name	Brand name	Indication	Sponsor	Approval date
Maralixibat chloride	Livmarli	Cholestatic pruritus in people with Alagille syndrome	Mirum	September 29, 2021
Maribavir	Livtency	Post-transplant cytomegalovirus	Takeda Pharms Usa	November 23, 2021
Melphalan flufenamide hydrochloride	Pepaxto	Multiple myeloma	Oncopeptides Ab	February 26, 2021
Micafungin sodium	Micafungin	Antifungal	Par Sterile Products	June 16, 2021
Micafungin sodium	Micafungin	Antifungal	Teva Pharms Usa Inc.	July 30, 2021
Midazolam	Midazolam in 0.9% sodium chloride	Sedative	Inforlife	March 22, 2021
Mirabegron	Myrbetriq granules	Overactive bladder	Apgdi	March 25, 2021
Mitapivat sulphate	Pyrukynd	Hemolytic anemia	Agios Pharms Inc.	February 17, 2022
Mobocertinib succinate	Exkivity	Non-small cell lung cancer	Takeda Pharms Usa	September 15, 2021
Mometasone furoate	Nasonex 24hr Allergy	Allergy	Perrigo Pharma Intl	March 17, 2022
Mometasone furoate; olopatadine hydrochloride	Ryaltris	Allergy	Glenmark Specialty	January 13, 2022
Naloxone hydrochloride	Kloxxado	Opioid overdose	Hikma	April 29, 2021
Naloxone hydrochloride	Zimhi	Opioid overdose	Adamis Pharms Corp	October 15, 2021
Naloxone hydrochloride	Naloxone	Opioid overdose	Kaleo Inc.	February 28, 2022
Nivolumab;relatlimab-RMBW	Opdualag	Oncology	Bristol Myers Squibb	March 18, 2022
Norepinephrine bitartrate	Norepinephrine bitartrate in 5% dextrose	Multiple indications	Baxter Hlthcare Corp	January 15, 2021
Odevixibat	Bylvay	Itching in progressive familial intrahepatic cholestasis	Albireo	July 20, 2021
Olanzapine; samidorphan l-malate	Lybalvi	Bipolar disorder, schizophrenia	Alkermes Inc.	May 28, 2021
Oritavancin diphosphate	Kimyrsa	Antibiotic	Melinta Therap	March 12, 2021
Paclitaxel	Paclitaxel	Oncology	Hbt Labs Inc.	June 30, 2021
Pacritinib citrate	Vonjo	Myelofibrosis	Cti Biopharma Corp	February 28, 2022
Pafolacianine sodium	Cytalux	Imaging agent for ovarian cancer	On Target Labs	November 29, 2021
Pegcetacoplan	Empaveli	Paroxysmal nocturnal hemoglobinuria	Apellis Pharms	May 14, 2021

Generic name	Brand name	Indication	Sponsor	Approval date
Pemetrexed	Pemetrexed	Oncology	Hospira Inc.	January 8, 2021
Pemetrexed	Pemetrexed	Oncology	Hospira Inc.	February 23, 2021
Pemetrexed	Pemetrexed	Oncology	Sandoz Inc.	May 6, 2021
Piflufolastat F-18	Pylarify	Diagnostic imaging in prostate cancer	Progenics Pharms Inc.	May 26, 2021
Pilocarpine hydrochloride	Vuity	Presbyopia	Abbvie Inc.	October 28, 2021
Ponesimod	Ponvory	Multiple sclerosis	Janssen Pharms	March 18, 2021
Posaconazole	Noxafil Powdermix kit	Antifungal	Msd Merck Co	May 31, 2021
Ranibizumab	Susvimobla	Age-related macular degeneration	Genentech Inc.	October 22, 2021
Ranolazine	Aspruzo sprinkle	Angina	Spil	February 28, 2022
Rivaroxaban	Xarelto	Anticoagulant	Janssen Pharms	December 20, 2021
Ropeginterferon alfa-2b-NJFT	Besremi	Polycythemia vera	Pharmaessentia Corp	November 12, 2021
Ruxolitinib phosphate	Opzelura	Myelofibrosis	Incyte Corp	September 21, 2021
Selexipag	Upravi	Pulmonary arterial hypertension	Actelion	July 29, 2021
Semaglutide	Wegovy	Weight management	Novo	June 4, 2021
Sertraline hydrochloride	Sertraline	Multiple indications	Almatica	October 4, 2021
Sirolimus	Fyarro	Immunosuppressant	Aadi	November 22, 2021
Sirolimus	Hyftor	Immunosuppressant	Nobelpharma	March 22, 2022
Sitagliptin	Sitagliptin	Diabetes	Zydus Worldwide Dmcc	September 2, 2021
Sodium benzoate; sodium phenylacetate	Sodium phenylacetate and sodium benzoate	Hyperammonemia	Maia Pharms Inc.	June 10, 2021
Sofosbuvir; velpatasvir	Epclusa	Hepatitis C	Gilead Sciences Inc.	June 10, 2021
Sotorasib	Lumakras	Oncology	Amgen Inc.	May 28, 2021
Succinylcholine chloride	Succinylcholine	Skeletal muscle relaxant	Hikma	August 20, 2021
Sutimlimab-JOME	Enjaymo	Cold agglutinin disease	Bioverativ Therapeutics Inc.	February 4, 2022
Tebentafusp-TEBN	Kimmtrak	T-cell therapy for unresectable or metastatic uveal melanoma	Immunocore Ltd.	January 25, 2022
Technetium TC-99m succimer	Nephroscan	Renal diagnostic agent	Theragnostics	February 18, 2022
Tepotinib hydrochloride	Tepmetko	Metastatic non-small cell lung cancer	Emd Serono Inc.	February 3, 2021

Generic name	Brand name	Indication	Sponsor	Approval date
Testosterone undecanoate	Tlando	Multiple indications	Antares Pharma Inc.	March 28, 2022
Tezepelumab-EKKO	Tezspire	Asthma	Astrazeneca Ab	December 17, 2021
Tisotumab vedotin-TFTV	Tivdakbla	Cervical cancer	Seagen	September 20, 2021
Tivozanib hydrochloride	Fotivda	Renal cell carcinoma	Aveo Pharms	March 10, 2021
Topiramate	Eprontia	Epilepsy	Azurity	November 5, 2021
Torsemide	Soaanz	Diuretic	Sarfe Pharms	June 14, 2021
Tralokinumab	Adbrybla	Atopic dermatitis	Leo Pharma As	December 27, 2021
Treprostinil	Yutrepia	Pulmonary arterial hypertension	Liquidia Technologies, Inc.	November 4, 2021
Triamcinolone acetonide	Xipere	Steroid	Bausch And Lomb Inc.	October 22, 2021
Trilaciclib dihydrochloride	Cosela	Chemotherapy-induced myelosuppression	G1 Therap	February 12, 2021
Umbralisib tosylate	Ukoniq	Lymphoma	Tg Theraps	February 5, 2021
Vancomycin	Vancomycin	Antibiotic	Xellia Pharms Aps	August 26, 2021
Varenicline tartrate	Tyrvaya	Smoking cessation	Oyster Point Pharma	October 15, 2021
Vericiguat	Verquvo	Heart failure	Merck Sharp Dohme	January 19, 2021
Viloxazine hydrochloride	Qelbree	Attention deficit disorder	Supernus Pharms	April 2, 2021
Voclosporin	Lupkynis	Lupus	Aurinia	January 22, 2021
Vosoritide	Voxzogo	Achondroplasia	Biomarin Pharm	November 19, 2021
Voxelotor	Oxbryta	Sickle cell anemia	Global Blood Theraps	December 17, 2021

Appendix 2: Author Information

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