

Comparing Insulin Prices in the United States to Other Countries

Results from a Price Index Analysis

Andrew W. Mulcahy, Daniel Schwam, Nathaniel Edenfield



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Published by the RAND Corporation, Santa Monica, Calif.

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Preface

Insulin prices have increased dramatically over the past decade in the United States. This report presents results from a comparison of international prices for insulins using a price index approach. The report describes the shares of volume and sales for all insulins and different categories of insulin in the United States and 32 comparison Organisation for Economic Co-operation and Development countries. For the market basket of insulins sold in both the United States and comparison countries, it reports ratios of U.S. insulin prices to insulin prices in other countries.

This research was funded by the U.S. Department of Health and Human Services Office of the Assistant Secretary for Planning and Evaluation under Contract Number HHSP233201500038I and carried out within the Payment, Cost, and Coverage Program in RAND Health Care.

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RAND Health Care Communications

1776 Main Street

P.O. Box 2138

Santa Monica, CA 90407-2138

(310) 393-0411, ext. 7775

RAND_Health-Care@rand.org

Contents

Preface iii

Figures and Tables..... v

Acknowledgments vii

Abbreviations viii

1. Background and Analysis 1

 Background 1

 Data and Methods..... 1

2. Results 5

 Shares of Volume and Sales 5

 Average Prices per Standard Unit 10

 Price Index Comparisons 12

3. Summary of Findings 16

Appendix. Exhibits 18

References 25

Figures and Tables

Figures

Figure 2.1. Shares of Insulin Volume Versus Shares of Insulin Sales Among 33 OECD Countries, 2018.....	5
Figure 2.2. Insulin Volume Shares, by Insulin Type, Selected Comparisons, 2018	6
Figure 2.3. Insulin Sales Shares, by Insulin Type, Selected Comparisons, 2018	6
Figure 2.4. Insulin Volume Shares, by Insulin Timing Category, Selected Comparisons, 2018....	7
Figure 2.5. Insulin Sales Shares, by Insulin Timing Category, Selected Comparisons, 2018	8
Figure 2.6. Prescription Versus Nonprescription Insulin Volume Shares, by Category, 2018	9
Figure 2.7. Prescription Versus Nonprescription Insulin Sales Shares, by Category, 2018	9
Figure 2.8. Average Price per Standard Unit, by Insulin Type, Selected Comparisons, 2018.....	10
Figure 2.9. Average Price per Standard Unit, by Insulin Timing Category, Selected Comparisons, 2018	11
Figure 2.10. Price Index Comparison, by Insulin Type, Selected Comparisons, 2018.....	12
Figure 2.11. Price Index Comparison, by Insulin Timing Category, Selected Comparisons, 2018	13
Figure 2.12. Price Index Results Comparison, Presentation Level Versus Molecule Level, 2018	15

Tables

Table A.1. Insulin Active-Ingredient Mapping	18
Table A.2. Insulin Volume and Sales Shares, by Insulin Type, 33 Select OECD Countries, 2018	19
Table A.3. Average Price per Standard Unit, Overall and by Insulin Type, 33 Select OECD Countries, 2018.....	20
Table A.4. U.S. Prices Relative to Comparison Country Prices in Percentage Points, Overall and by Insulin Type, 33 Select OECD Countries, 2018.....	21
Table A.5. Share of Insulin Sales and Volume Contributing to Presentation-Level Bilateral Price Index Comparisons, 2018.....	22
Table A.6. U.S. Prices Relative to Comparison Country Prices in Percentage Points at the Active-Ingredient Level, Overall and by Insulin Type, 33 Select OECD Countries, 2018	23
Table A.7. Average U.S. Price per Standard Unit for Short-Acting Insulins, by Prescription Status, 2018	24

Table A.8. U.S. Prices Relative to Comparison Country Prices in Percentage Points for
Prescription Records, Overall and by Insulin Type, 33 Select OECD Countries, 201824

Acknowledgments

We thank Amber Jessup, Kenneth Finegold, and Zeid El-Kilani at the U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation, for their contributions during the course of our research and the development of this report. We thank Christine Eibner, Christine Buttorff, and Chris Whaley of the RAND Corporation for their suggestions and comments as peer reviewers of a draft of this report.

Abbreviations

ASPE	Office of the Assistant Secretary for Planning and Evaluation
I	intermediate-acting
L	long-acting
NFC	new form code
NPH	neutral protamine Hagedorn
OECD	Organisation for Economic Co-operation and Development
R	rapid-acting
RI	rapid–intermediate-acting
S	short-acting
SI	short–intermediate-acting
SU	standard unit
USD	U.S. dollars

1. Background and Analysis

Background

Insulin list prices in the United States have increased dramatically over the past decade. For example, in an analysis of the Center for Medicare & Medicaid Services' National Average Drug Acquisition Cost data, Cefalu et al. (2018) found that the average U.S. wholesale-acquisition price for rapid-acting, long-acting, and short-acting insulin increased by 15–17 percent per year from 2012 to 2016. They also found that average out-of-pocket costs between 2006 and 2013 for insulin-using Medicare Part D enrollees increased by 10 percent per year. In an analysis of individuals ages 18 to 64 with employer-sponsored health insurance, Fuglesten Biniek and Johnson (2019) found that insulin spending per person doubled between 2012 and 2016, increasing from \$1,432 to \$2,853 even after accounting for a 50-percent rebate.

The U.S. Department of Health and Human Services Office of the Assistant Secretary for Planning and Evaluation (ASPE) asked the RAND Corporation to compare U.S. and other-country prices for insulins, including for all insulins combined and for different categories of insulins.

Data and Methods

Source Data

ASPE provided us with a list of insulin active ingredients categorized on two dimensions. The first dimension—which we call an insulin *type*—concerns whether the insulin active ingredient is human or analog (i.e., a variant of human insulin). Analogs of human insulin, such as insulin lispro and insulin detemir, differ from human insulin in terms of uptake and duration of effect and can offer additional health benefits to patients. The second dimension—which we call insulin *timing*—concerns which of the following timing characteristics accurately describes the insulin's active ingredient:

1. rapid-acting
2. rapid–intermediate-acting
3. short-acting
4. short–intermediate-acting
5. intermediate-acting
6. long-acting.¹

¹ In figures and tables, we abbreviate these timing characteristics thus: rapid-acting (R), rapid–intermediate-acting (RI), short-acting (S), short–intermediate-acting (SI), intermediate-acting (I), and long-acting (L).

The onset, peak, and duration times of insulins in these timing categories vary. Some patients with diabetes follow a regimen of multiple insulins from different timing categories; for example, a patient may use a bolus rapid-acting insulin around meals and a basal (background) long-acting insulin. In this analysis, we treat insulin type and insulin timing separately. In other words, a single timing category can include both human and analog insulins, and a single type category can include insulins in different timing categories.

In our analysis, we used prescription-drug market data from IQVIA’s MIDAS database.² The data we examined cover the year 2018 and span 33 Organisation for Economic Co-operation and Development (OECD) countries, including the United States.³ We did not restrict our analysis to prescription drugs, as certain insulins are available over the counter in some countries (including the United States).

We matched the active ingredients on the ASPE-provided list to MIDAS active ingredients using a mix of string matching and manual crosswalking to resolve spelling differences (see Table A.1). We excluded animal insulin products from our analysis because they accounted for an extremely small share (less than a hundredth of a percent) of both total sales and volume across all countries and because they were not sold in the United States in 2018.

The MIDAS extracts we initially received from ASPE were provided at a very granular level, including different records for individual manufacturers, pack sizes, and other characteristics. We used the fields *nfc123* (“new form code”) and *intstrength* (“international dosage strength”) to collapse the MIDAS extract to the country–active ingredient–form–strength level, which we refer to as the *country-presentation level*.

Insulin Categories

After we mapped the insulin active ingredients from the ASPE list to our MIDAS extract, we assigned each MIDAS insulin ingredient to either a “human” or “analog” insulin type category and, separately, to one of the six insulin timing categories. We compared prices for all insulins combined and then for different groups of insulins along these two dimensions. As a sensitivity analysis, we compared prices by category, limiting to data from MIDAS on prescription insulin only.

² For more information, see IQVIA, undated. The run date for the extract we received from ASPE is October 29, 2019.

³ The 33 countries are Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States. ASPE did not supply MIDAS data for three OECD members: Denmark, Iceland, and Israel.

Price Index Methodology

In our price index results, we compared prices in the United States with those of each comparison country, holding an insulin market basket constant at U.S. volume shares by presentation. Separately, we compared prices in the United States relative to a volume-weighted price calculated across all 32 non-U.S. OECD countries combined. We compared prices first for a market basket covering all insulins and then for market baskets containing only those insulins in specific type and timing categories. For each comparison, we report ratios of U.S. prices to comparison country prices (or to prices in all non-U.S. OECD countries combined). Each comparison uses data only from those presentations with sales in both the United States and the comparison country. For example, the comparison of prices in the United States and the United Kingdom uses data only from those presentations of insulin that were sold in both countries.

Considerations Regarding Our Methodology

Our methods and results are subject to several important considerations and limitations.

First, the manufacturer prices available in the MIDAS data do not reflect rebates or other discounts that might have been applied after drugs left the factory; we expect that, in many countries (and particularly in the United States), the net price paid for drugs was lower than the reported manufacturer prices shown in our results tables. The difference between net and manufacturer prices is likely large: Across all drugs, recent studies estimate the difference between retail and net prices at 23 percent (e.g., Roehrig, 2018) and between wholesale and net prices at 28 percent (e.g., IQVIA Institute for Human Data Science, 2019). The average discount between transactional and net prices for insulins might be even greater because of the highly competitive insulin market, in which there can be several broadly substitutable products for most patients. Fuglesten Biniek and Johnson (2019) applied a 50-percent discount from manufacturer to net prices specifically for insulins, but this factor was an assumption used to describe an illustrative example of results at hypothetical net prices. In this analysis, we did not adjust for rebates, due to the lack of available insulin-specific estimates of rebate amounts.

Second, although many insulin products are sold in both the United States and comparison countries, the overlap is not perfect, leading to potentially uneven generalizability across comparisons. Relatedly, even for presentations that are sold in both the United States and comparison countries, there are likely underlying differences in the mix of presentations and distribution channels for individual active ingredients, both between countries and within a country, across insulin categories. These underlying differences might explain some of the differences in average prices.

Finally, at ASPE's request, we estimated prices using data from all 33 OECD countries for which ASPE had IQVIA MIDAS data, including countries with markets and economic circumstances that are extremely different from those of the United States. An alternative

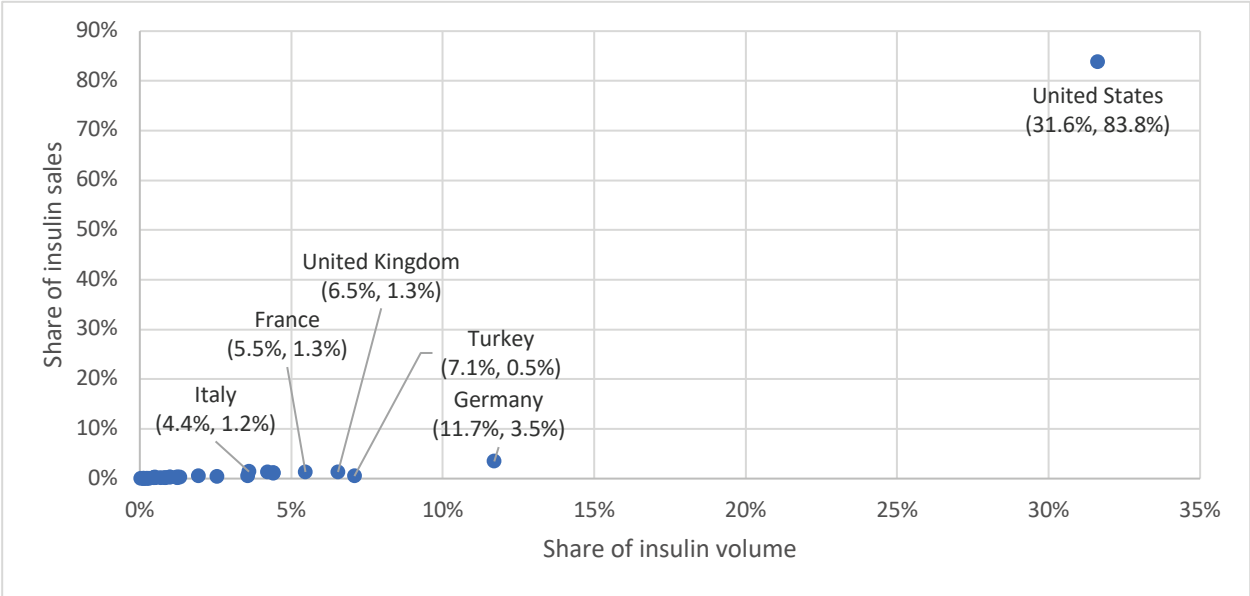
approach could focus on a smaller subset of countries that are more similar to the United States in terms of per capita gross domestic product, population, demographics, or other factors.

2. Results

Shares of Volume and Sales

The United States accounted for 31.6 percent of insulin volume measured in standard units and 83.8 percent of sales in U.S. dollars (Figure 2.1). Relative to the other OECD countries in our analysis, the United States is a clear outlier in terms of its share of both volume and (especially) sales.

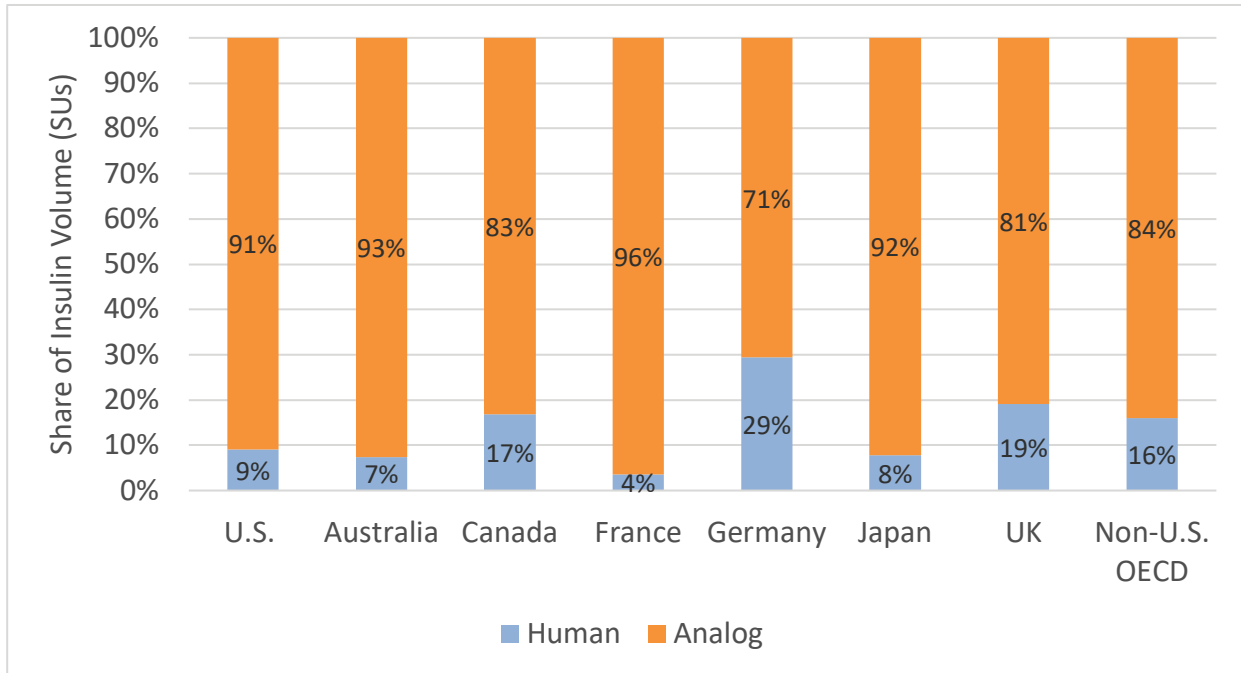
Figure 2.1. Shares of Insulin Volume Versus Shares of Insulin Sales Among 33 OECD Countries, 2018



SOURCE: Authors' analysis of IQVIA MIDAS data from an extract provided by ASPE (run date: October 29, 2019).
 NOTE: Shares were calculated across the 33 OECD countries included in the extract. The percentages in labeled points are the share of insulin volume followed by the share of insulin sales.

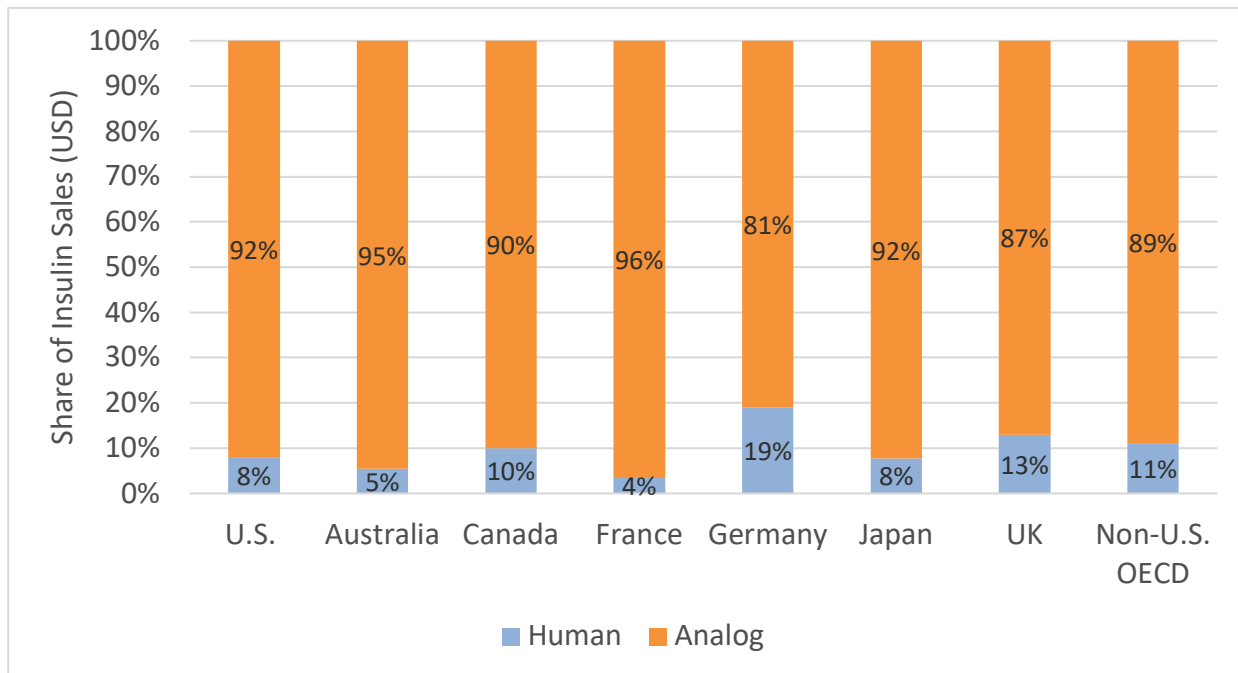
Analog insulins accounted for 91 percent of U.S. volume (Figure 2.2) and 92 percent of U.S. sales (Figure 2.3). In most higher-income countries, analog insulins accounted for more than 80 percent—and, in some cases, nearly 100 percent—of volume and sales. Some lower-income comparison countries, such as Hungary and Poland, had lower shares of volume and sales for analog insulins. (See Table A.2 for full results.)

Figure 2.2. Insulin Volume Shares, by Insulin Type, Selected Comparisons, 2018



SOURCE: Authors' analysis of IQVIA MIDAS data from an extract provided by ASPE (run date: October 29, 2019).
 NOTES: SU = standard unit. *Non-U.S. OECD* refers to all 32 non-U.S. OECD comparison countries combined. See Table A.2 for full results.

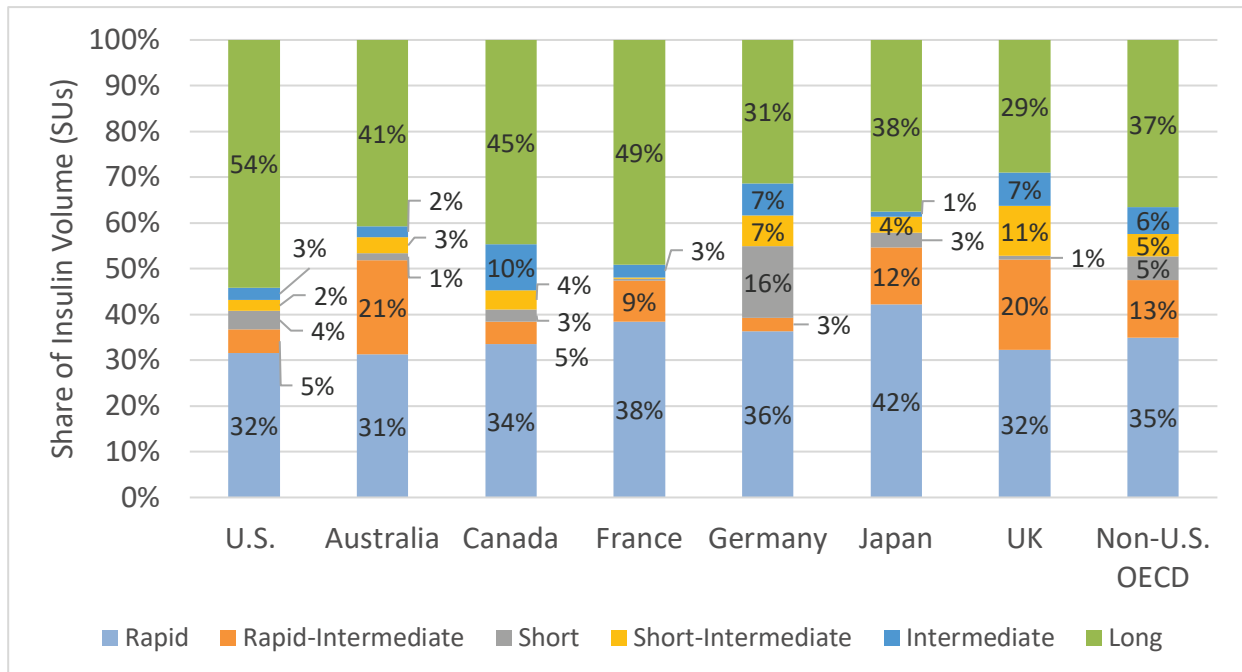
Figure 2.3. Insulin Sales Shares, by Insulin Type, Selected Comparisons, 2018



SOURCE: Authors' analysis of IQVIA MIDAS data from an extract provided by ASPE (run date: October 29, 2019).
 NOTE: USD = U.S. dollars. See Table A.2 for full results.

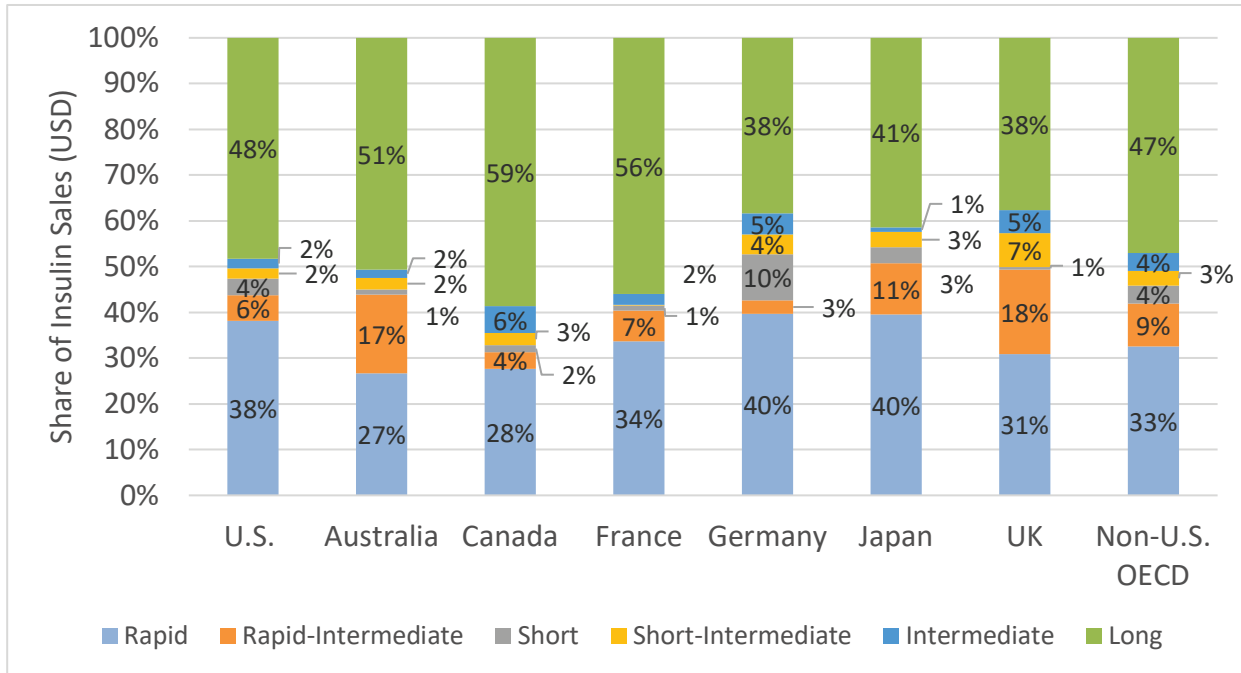
Long-acting insulins represented a higher share of volume in the United States than in any comparison country except Finland and Chile (Figure 2.4). Long-acting insulins accounted for a smaller share of sales than of volume in the United States (Figure 2.5): The United States is in the middle of comparison countries in terms of the share of sales for long-acting insulins. Combined, rapid–intermediate-acting, short-acting, short–intermediate-acting, and intermediate-acting insulins accounted for a smaller share of both volume and sales in the United States than in many comparison countries. (See Table A.2 for full results.)

Figure 2.4. Insulin Volume Shares, by Insulin Timing Category, Selected Comparisons, 2018



SOURCE: Authors' analysis of IQVIA MIDAS data from an extract provided by ASPE (run date: October 29, 2019).
 NOTE: See Table A.2 for full results.

Figure 2.5. Insulin Sales Shares, by Insulin Timing Category, Selected Comparisons, 2018

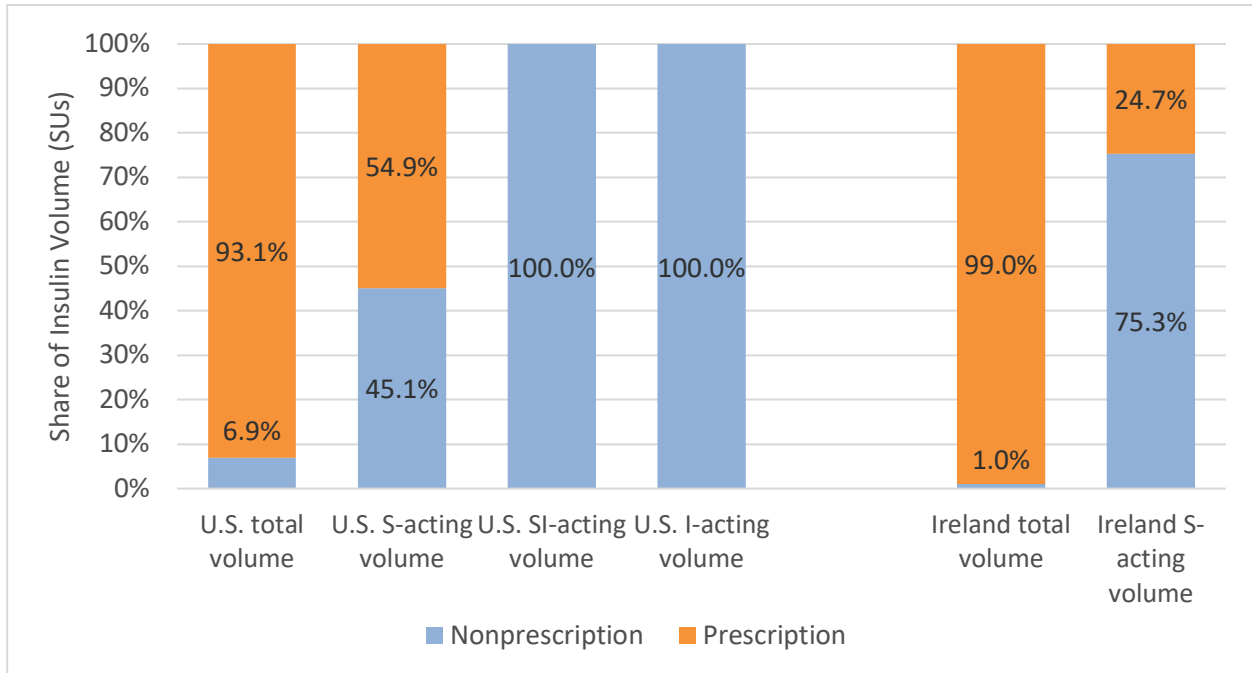


SOURCE: Authors' analysis of IQVIA MIDAS data from an extract provided by ASPE (run date: October 29, 2019).
 NOTE: See Table A.2 for full results.

We found that nonprescription insulins—which may serve as a way for patients without prescription drug coverage to access insulin at a lower cost—were sold in only two countries in 2018: the United States and Ireland. Figures 2.6 and 2.7, respectively, illustrate the share of insulin volume and sales that were nonprescription (both overall and by category) for the United States and Ireland. Nonprescription insulin accounted for only 6.9 percent of total U.S. insulin volume and 5.3 percent of total U.S. insulin sales. However, the shares of nonprescription insulin volume and sales were higher within individual categories of insulin. More specifically, nonprescription insulins accounted for about 45 percent of short-acting insulin volume in the United States and all of short-intermediate-acting and intermediate-acting volume. Although short-acting insulins are primarily nonprescription in Ireland, these insulins accounted for only 1 percent of total insulin volume and 1.2 percent of total insulin sales.⁴

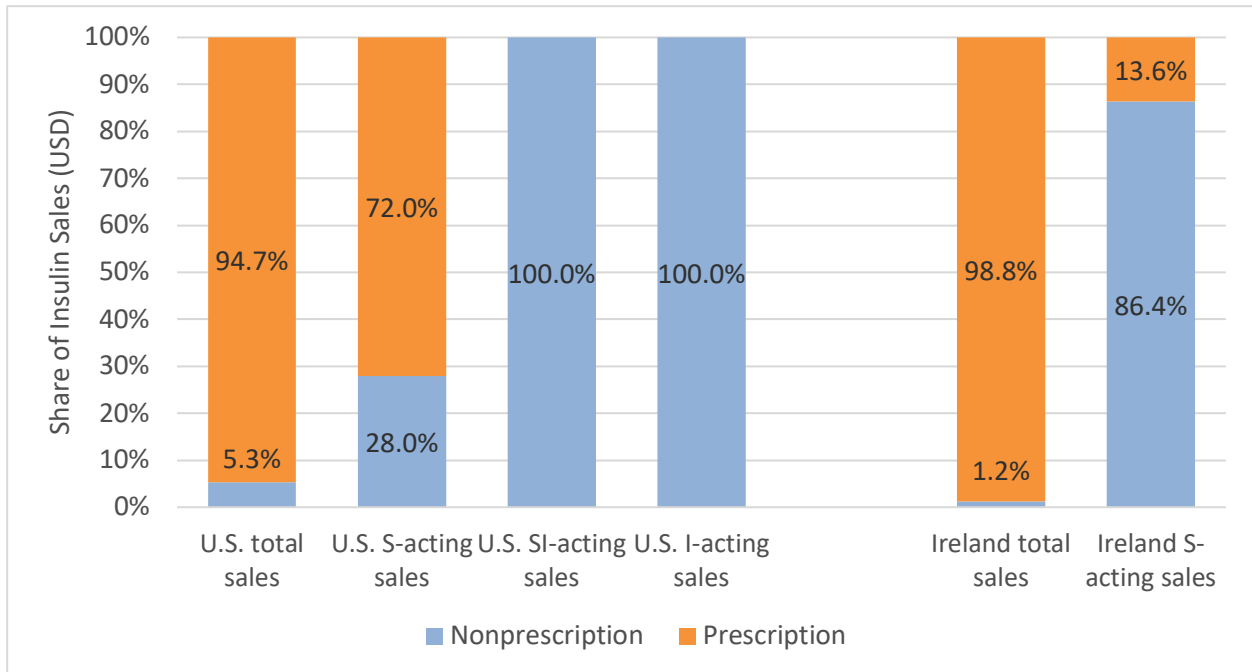
⁴ Short-intermediate-acting and intermediate-acting insulins sold in Ireland are entirely prescription-based.

Figure 2.6. Prescription Versus Nonprescription Insulin Volume Shares, by Category, 2018



SOURCE: Authors' analysis of IQVIA MIDAS data from an extract provided by ASPE (run date: October 29, 2019).

Figure 2.7. Prescription Versus Nonprescription Insulin Sales Shares, by Category, 2018

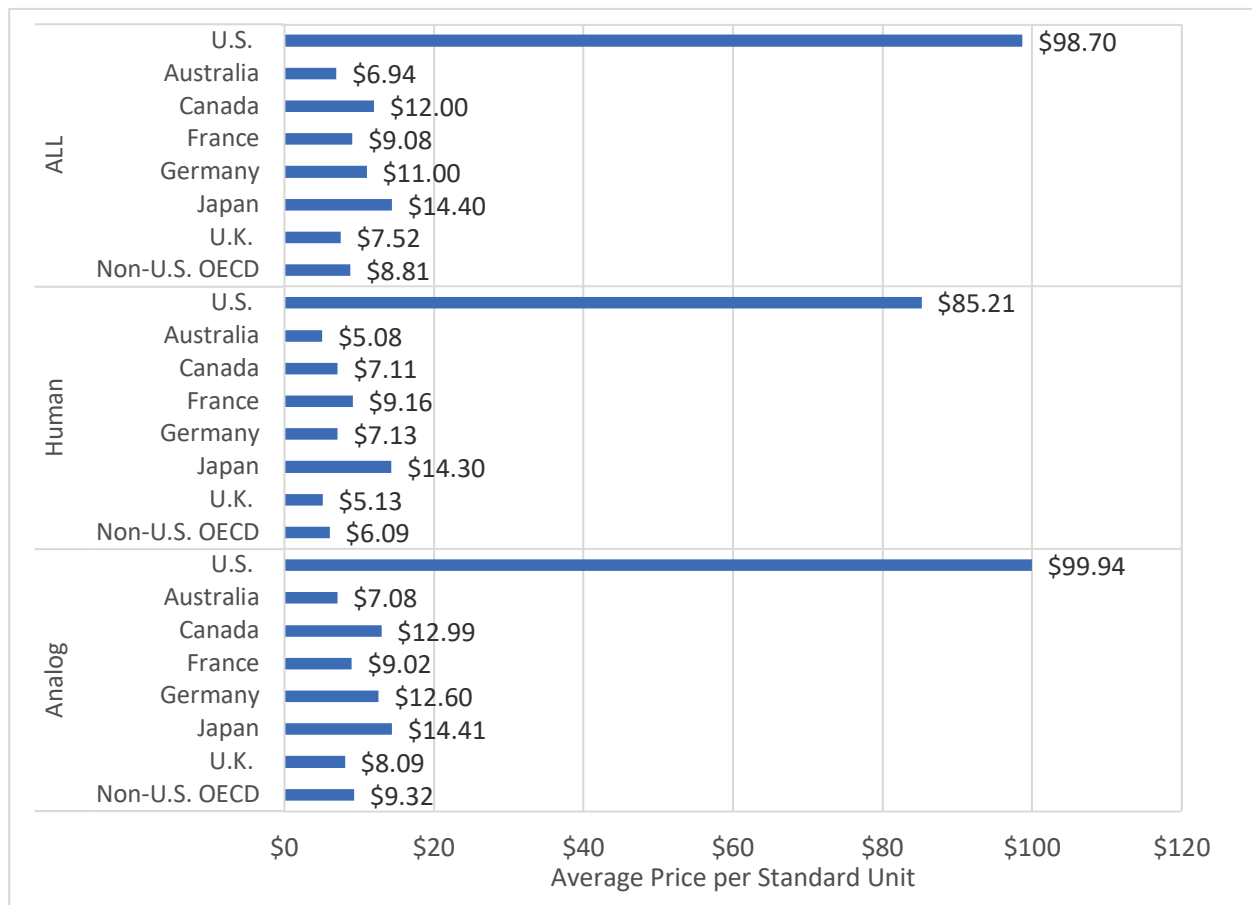


SOURCE: Authors' analysis of IQVIA MIDAS data from an extract provided by ASPE (run date: October 29, 2019).

Average Prices per Standard Unit

Compared with other countries, and in each insulin category, the United States had dramatically higher prices. The average U.S. manufacturer price per standard unit across all insulins was \$98.70, compared with \$6.94 in Australia, \$12.00 in Canada, \$7.52 in the United Kingdom, and \$8.81 across all non-U.S. OECD countries combined (Figure 2.8). Average prices in the United States and most comparison countries were higher for analog insulins than for human insulins. As Figure 2.9 shows, average prices in the United States were highest for rapid-acting insulins (at \$119.36 per standard unit, versus \$8.19 in non-U.S. OECD countries) and lowest for intermediate-acting insulins (at \$73.56 per standard unit, versus \$5.98 in non-U.S. OECD countries). (See Table A.3 for full results.)

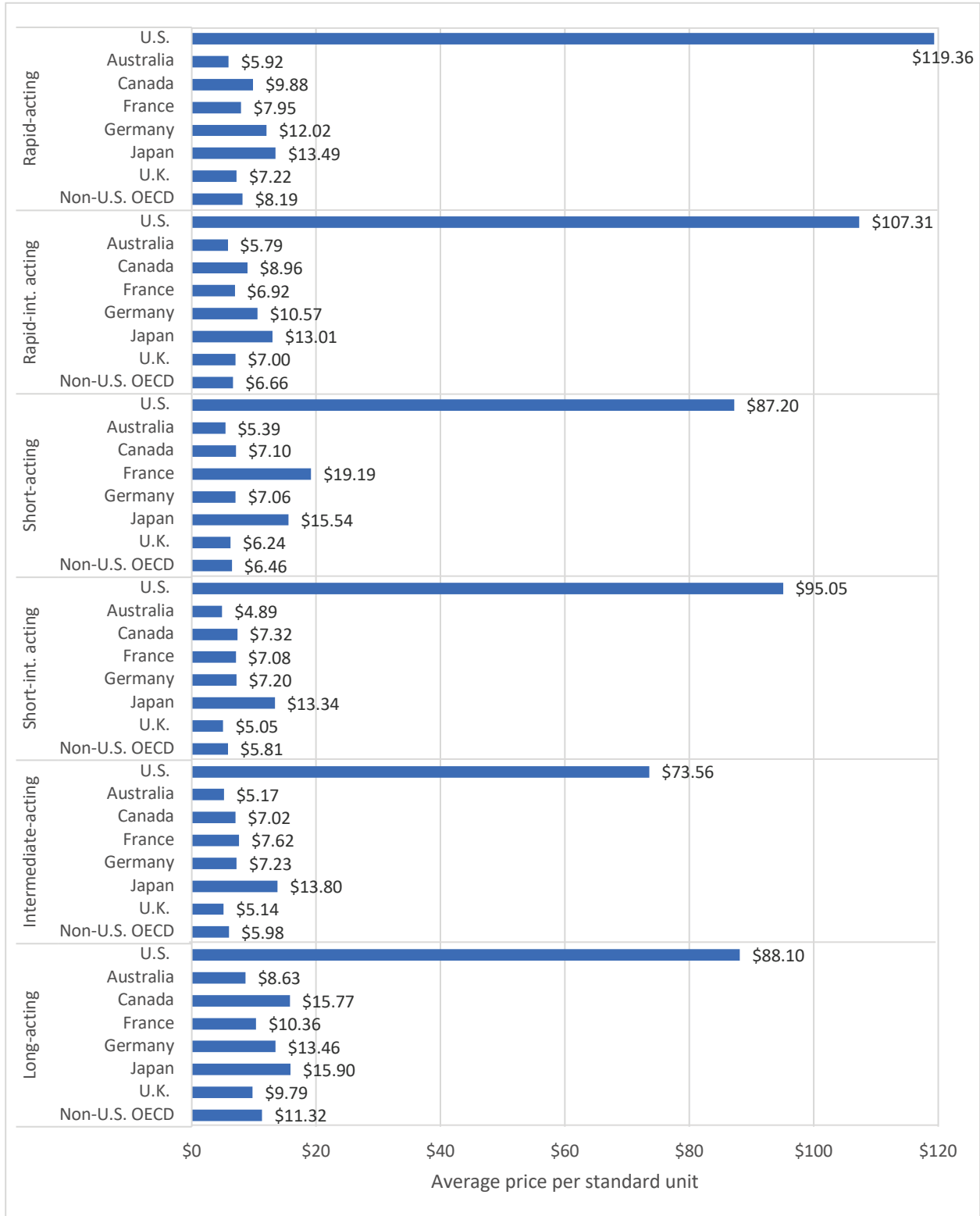
Figure 2.8. Average Price per Standard Unit, by Insulin Type, Selected Comparisons, 2018



SOURCE: Authors' analysis of IQVIA MIDAS data from an extract provided by ASPE (run date: October 29, 2019).

NOTE: See Table A.3 for full results.

Figure 2.9. Average Price per Standard Unit, by Insulin Timing Category, Selected Comparisons, 2018

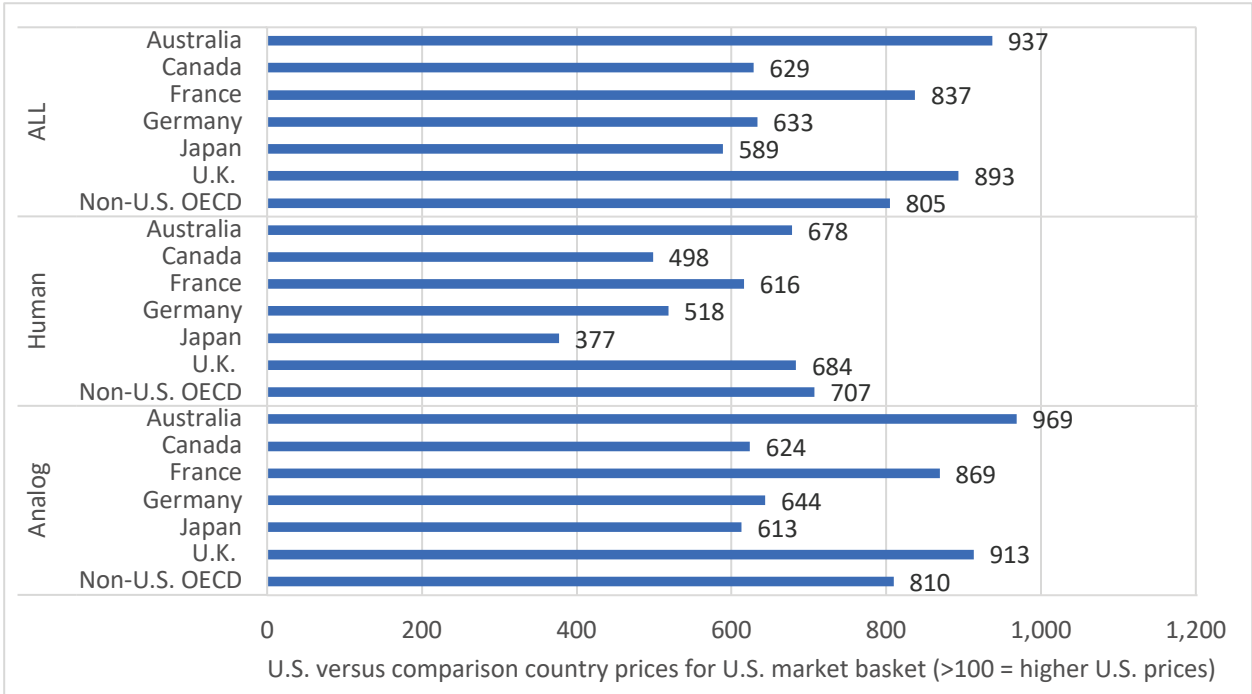


SOURCE: Authors' analysis of IQVIA MIDAS data from an extract provided by ASPE (run date: October 29, 2019).
 NOTE: See Table A.3 for full results.

Price Index Comparisons

In our price index results, we compared prices in the United States with those in each comparison country, holding the market basket constant at U.S. volume shares by presentation. As we noted earlier, these comparisons are necessarily limited to those presentations that are sold both in the United States and in each comparison country. U.S. prices for all insulin types combined ranged from 5.9 to 9.4 times those in the selected countries shown in Figure 2.10, and they were 8.1 times those in all non-U.S. OECD countries combined. As the full results presented in Table A.4 show, across all 32 non-U.S. OECD countries, for all insulin types combined, U.S. prices were closest to those in Chile (with U.S. prices 3.8 times those in Chile) and furthest from those in Turkey (with U.S. prices 27.7 times those in Turkey). U.S. prices were higher for analog insulins than for human insulins in 31 of 32 comparison countries (Hungary was the exception).

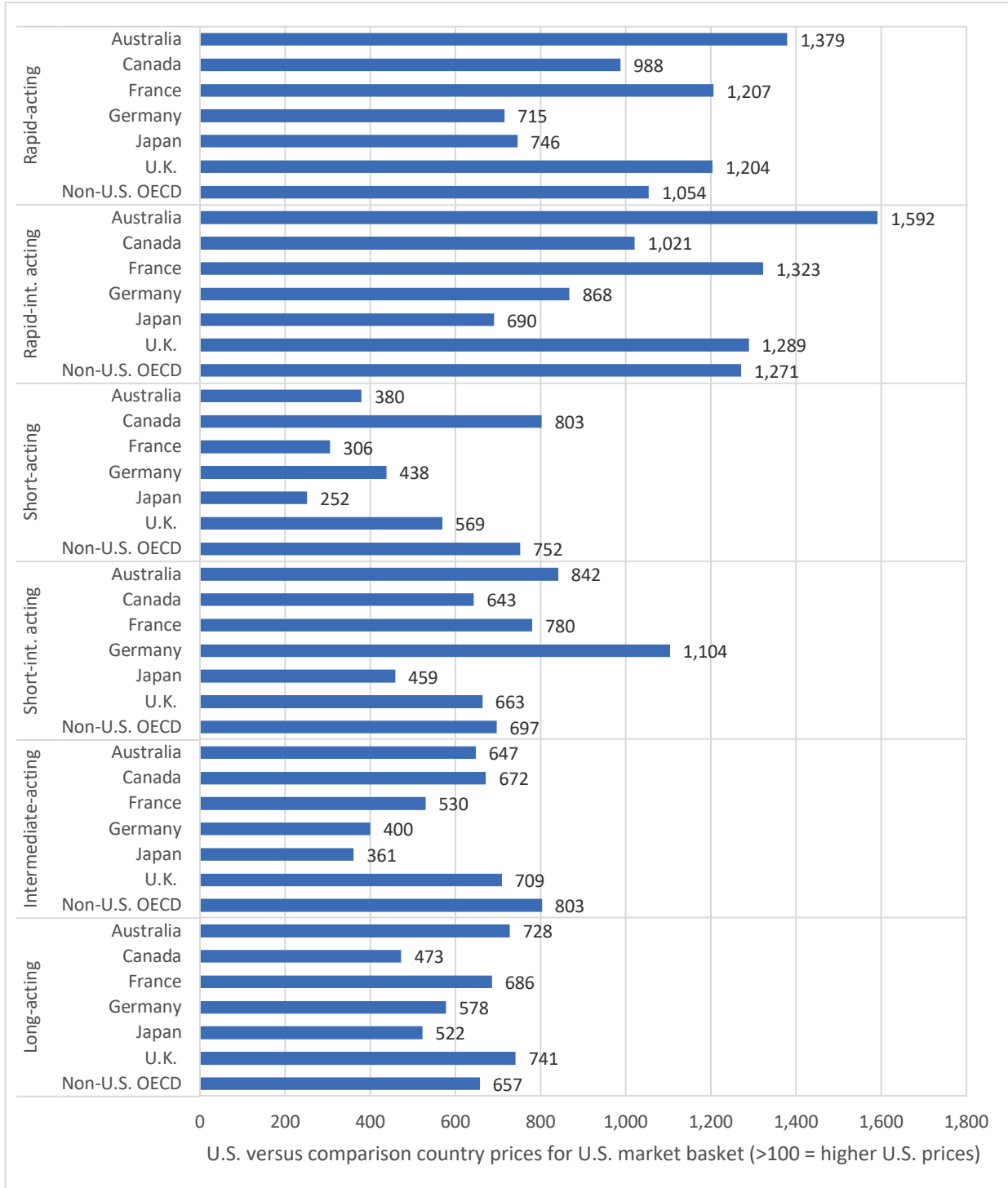
Figure 2.10. Price Index Comparison, by Insulin Type, Selected Comparisons, 2018



SOURCE: Authors' analysis of IQVIA MIDAS data from an extract provided by ASPE (run date: October 29, 2019).
 NOTE: A value of 100 means that the U.S. price was the same as the other-country price. A higher number means that the U.S. price was higher than the other-country price. The reported magnitudes are differences in percentages between U.S. and other-country prices (e.g., a value of 500 means that U.S. prices were 500 percent of prices in the comparison country). See Table A.4 for full results.

U.S. prices were dramatically higher than those in comparison countries across different timing categories of insulins (Figure 2.11). In general, U.S. prices were closer to, but still much higher than, prices in other countries for short-acting, intermediate-acting, and long-acting insulins than to prices in other countries for rapid-acting insulins.

Figure 2.11. Price Index Comparison, by Insulin Timing Category, Selected Comparisons, 2018



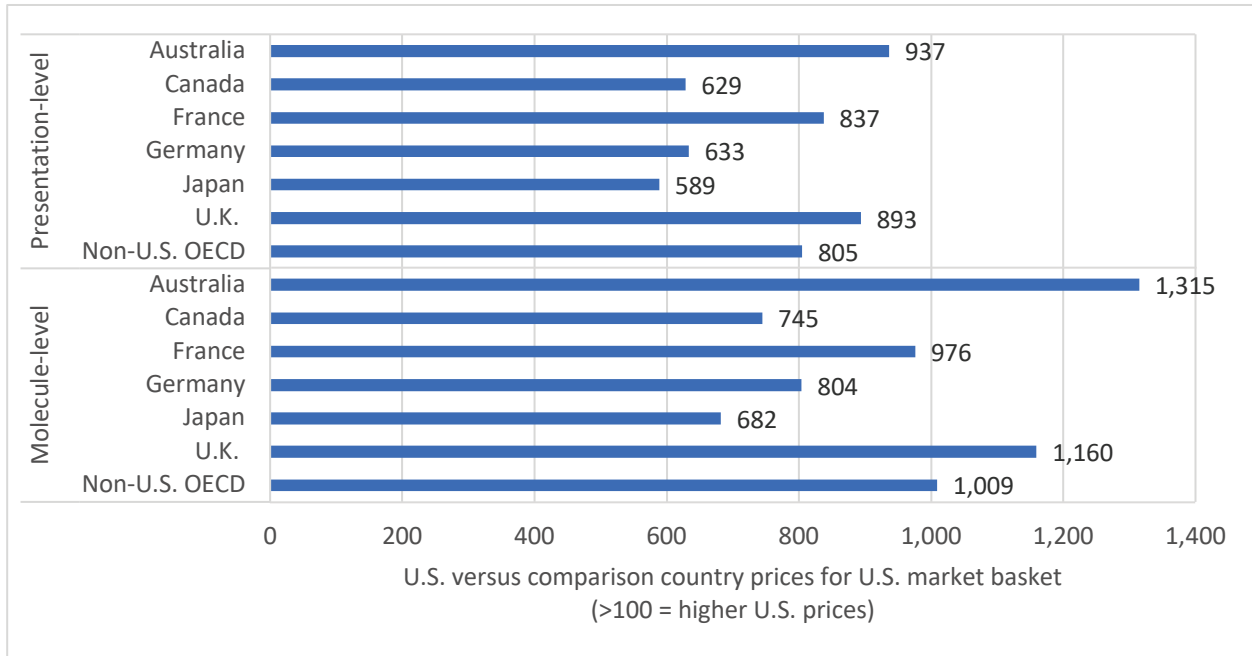
SOURCE: Authors' analysis of IQVIA MIDAS data from an extract provided by ASPE (run date: October 29, 2019).
 NOTE: A value of 100 means that the U.S. price was the same as the other-country price. A higher number means that the U.S. price was higher than the other-country price. The reported magnitudes are differences in percentages between U.S. and other-country prices (e.g., a value of 500 means that U.S. prices were 500 percent of prices in the comparison country). See Table A.4 for full results.

We found considerable overlap in the insulin presentations sold in the United States and comparison countries that contributed to the price index calculations. Ninety-six percent of U.S. insulin sales were for presentations sold in at least one comparison country, and 97 percent of sales in the comparison countries combined were for presentations also sold in the United States. (See Table A.5 for full results.) The shares of overlapping volume in terms of standard units were lower but still above 80 percent. Some individual comparison countries—for example, Hungary and Poland—used a mix of insulin presentations that differed from those in the United States, and, as a result, the price index comparison is based on presentations accounting for relatively small shares of U.S. insulin sales and volume (less than 50 percent of sales and volume in some cases).

Between two-thirds and three-quarters of insulin sales and volume in Canada and Germany did not align with presentations available in the United States. This is largely due to differences in the formulations of insulin available in those countries compared with those available in the United States. Specifically, insulins coded as having an NFC of *GRA* (parenteral retard or long-acting cartridges)—which include insulin glargine, insulin detemir, and insulin human isophane in Canada and Germany—were not available in the United States. In the United States, these same insulins are available only as prefilled pens (coded under an NFC of *GRF*).

As a way to assess whether the lack of complete overlap in insulin presentations could be driving our results, we also compared price indexes using prices and volumes aggregated at the MIDAS active-ingredient (i.e., molecule, or *moleculelist*) level rather than presentation level (i.e., for more-granular combinations of active ingredient, form, and dosage strength). We found that U.S. prices were even higher than comparison country prices when price indexes were calculated at the active-ingredient level rather than presentation level (Figure 2.12; see Table A.6 for full results). This suggests that other countries use a less-expensive mix of insulins and have lower prices for each presentation separately.

Figure 2.12. Price Index Results Comparison, Presentation Level Versus Molecule Level, 2018



SOURCE: Authors' analysis of IQVIA MIDAS data from an extract provided by ASPE (run date: October 29, 2019).
 NOTE: A value of 100 means that the U.S. price was the same as the other-country price. A higher number means that the U.S. price was higher than the other-country price. The reported magnitudes are differences in percentages between U.S. and other-country prices (e.g., a value of 500 means that U.S. prices were 500 percent of prices in the comparison country).

Table A.7 reports average prices per standard unit for short-acting insulins, and Table A.8 reports price index results where we have restricted the analysis to prescription insulin records only. The resulting price index ratios were very similar to ratios calculated for all records.

3. Summary of Findings

Manufacturer prices in the United States were considerably higher than those in other countries for all insulins combined and for different types of insulin. When comparing prices for a U.S. market basket of insulins, we found that U.S. manufacturer prices ranged from 3.8 times those in Chile to 27.7 times those in Turkey and 8.1 times those in all non-U.S. OECD countries combined. Although the ratio of U.S. to other-country prices varied depending on the comparison country and insulin category, U.S. prices were always higher and often five to ten times those in other countries. U.S. prices were higher for analog versus human insulins in nearly all comparison countries. U.S. prices were even higher when we used active-ingredient-level data rather than presentation-level data, suggesting that the United States had higher prices at the presentation level and offered a more-expensive mix of insulin presentations.

The overlap between the presentations of insulin sold in the United States and in comparison countries was generally high, although there were differences in market shares across categories of insulin. Given our presentation-level price index approach, our results likely highlight differences in prices rather than differences in the mix of insulins sold in the United States versus other countries.

There are, however, some compositional differences worth noting. The United States was unusual among comparison countries in permitting distribution of several types of insulin over the counter. The availability of over-the-counter insulin in the United States is likely driven by access concerns. Some patients without prescription-drug coverage, with coverage but with high cost-sharing, or without access to prescribers can face barriers to filling insulin prescriptions (Tribble, 2015). At least one U.S. state (Indiana) does not allow the sale of over-the-counter insulin because of safety concerns (Tribble, 2015). Despite the availability of some insulins over the counter in the United States, U.S. manufacturer prices were still much higher than those in comparison countries even in categories in which U.S. distribution is entirely over the counter (and distribution in most other countries is prescription-only, with the exception of Ireland). The average U.S. manufacturer price for over-the-counter short-acting insulins was \$54.09, compared with \$114.40 for prescription short-acting insulins. Although this difference in U.S. prescription versus over-the-counter prices is large, the U.S. over-the-counter price of \$54.09 was several times the price of short-acting insulins in other countries (\$6.46) and of the over-the-counter price in Ireland (\$12.24).

One key limitation of this analysis is that we used manufacturer prices, not net prices after rebates and other discounts are applied. Given the generally competitive insulin market, rebates in the United States could be substantial. One of our main findings is that insulin prices in the United States are about eight times higher than those in non-U.S. OECD countries combined. Even with a 50-percent rebate amount as assumed in one prior study (Fuglesten Biniek and Johnson,

2019), our findings suggest that U.S. insulin prices would have been considerably higher (about four times higher) than those in other countries.

Appendix. Exhibits

Table A.1. Insulin Active-Ingredient Mapping

ASPE-Provided Active Ingredient	MIDAS “moleculelist” Active Ingredient	Insulin Type	Human/Analog/Animal
Insulin Aspart	INSULIN ASPART	Rapid	Analog
Insulin Aspart Protamine & Aspart (Human)	INSULIN ASPART!INSULIN ASPART PROTAMINE (CRYSTALLINE)	Rapid–intermediate	Analog
Insulin Degludec	INSULIN DEGLUDEC	Long	Analog
Insulin Detemir	INSULIN DETEMIR	Long	Analog
Insulin Glargine	INSULIN GLARGINE	Long	Analog
Insulin Glulisine	INSULIN GLULISINE	Rapid	Analog
Insulin Isophane	— ^a	Intermediate	Human
Insulin Isophane (Pork)	INSULIN PORCINE ISOPHANE	Intermediate	Animal ^b
Insulin Lispro	INSULIN LISPRO	Rapid	Analog
Insulin Lispro Protamine & Lispro	INSULIN LISPRO!INSULIN LISPRO PROTAMINE	Rapid–intermediate	Analog
Insulin NPH (Human) (Isophane)	INSULIN HUMAN ISOPHANE	Intermediate	Human
Insulin NPH Isophane & Reg (Human)	INSULIN HUMAN BASE!INSULIN HUMAN ISOPHANE	Short–intermediate	Human
Insulin Reg (Human) Buffered	INSULIN HUMAN BASE	Short	Human
Insulin Regular	— ^b	Short	Animal ^b
Insulin Regular (Human)	INSULIN HUMAN BASE	Short	Human
Insulin Regular (Pork)	INSULIN PORCINE BASE	Short	Animal ^b
Insulin Zinc	— ^b	Intermediate	Animal ^b
Insulin Zinc (Human)	INSULIN HUMAN ZINC SUSPENSION (COMPOUND/CRYSTALLINE)	Intermediate	Human ^c
Insulin Zinc (Pork)	INSULIN PORCINE ZINC SUSPENSION (COMPOUND)	Intermediate	Animal ^b
Insulin Zinc Extended (Human)	— ^c	Long	Human ^c

NOTE: NPH = neutral protamine Hagedorn.

^a No MIDAS moleculelist was identified. We excluded this insulin product from our analysis.

^b We excluded animal insulins from our analysis. We did not find MIDAS moleculelist matches for some animal insulins.

^c Insulin Zinc (Human) and Insulin Zinc Extended (Human) are not sold in the United States; we therefore excluded them from our analysis. Furthermore, it is not clear whether Human Zinc Extended (Human) should map to the MIDAS INSULIN HUMAN ZINC SUSPENSION (COMPOUND/CRYSTALLINE) moleculelist.

Table A.2. Insulin Volume and Sales Shares, by Insulin Type, 33 Select OECD Countries, 2018

Country	Share of Volume (SUs)								Share of Sales (USD)							
	Human	Analog	R	RI	S	SI	I	L	Human	Analog	R	RI	S	SI	I	L
Australia	7%	93%	31%	21%	1%	3%	2%	41%	5%	95%	27%	17%	1%	2%	2%	51%
Austria	16%	84%	37%	31%	2%	3%	11%	16%	14%	86%	33%	28%	2%	3%	9%	25%
Belgium	18%	82%	37%	17%	9%	3%	6%	28%	12%	88%	35%	15%	6%	2%	4%	39%
Canada	17%	83%	34%	5%	3%	4%	10%	45%	10%	90%	28%	4%	2%	3%	6%	59%
Chile	12%	88%	27%	6%	2%	0%	10%	55%	10%	90%	19%	4%	1%	0%	8%	67%
Czech Rep.	21%	79%	34%	13%	13%	3%	4%	32%	12%	88%	31%	11%	8%	2%	3%	46%
Estonia	1%	99%	39%	8%	0%	0%	1%	53%	0%	100%	33%	6%	0%	0%	0%	60%
Finland	3%	97%	31%	1%	0%	0%	2%	65%	2%	98%	25%	1%	0%	0%	2%	72%
France	4%	96%	38%	9%	0%	0%	3%	49%	4%	96%	34%	7%	1%	0%	2%	56%
Germany	29%	71%	36%	3%	16%	7%	7%	31%	19%	81%	40%	3%	10%	4%	5%	38%
Greece	7%	93%	28%	13%	2%	4%	1%	52%	4%	96%	23%	11%	1%	2%	1%	63%
Hungary	48%	52%	26%	4%	24%	9%	14%	22%	30%	70%	23%	4%	15%	6%	9%	42%
Ireland	6%	94%	43%	11%	1%	3%	1%	41%	4%	96%	39%	9%	1%	2%	1%	48%
Italy	1%	99%	55%	3%	1%	0%	0%	41%	1%	99%	42%	2%	1%	0%	0%	55%
Japan	8%	92%	42%	12%	3%	4%	1%	38%	8%	92%	40%	11%	3%	3%	1%	41%
Korea	7%	93%	20%	23%	1%	1%	4%	51%	5%	95%	18%	19%	1%	1%	3%	58%
Latvia	14%	86%	40%	17%	1%	0%	14%	28%	11%	89%	38%	15%	0%	0%	10%	36%
Lithuania	0%	100%	30%	36%	0%	0%	0%	33%	0%	100%	25%	34%	0%	0%	0%	41%
Luxembourg	4%	96%	38%	11%	2%	1%	1%	47%	2%	98%	29%	8%	1%	0%	0%	61%
Mexico	26%	74%	7%	16%	2%	2%	22%	51%	15%	85%	6%	16%	2%	2%	11%	63%
Netherlands	6%	94%	41%	15%	1%	1%	5%	38%	3%	97%	34%	11%	0%	0%	3%	51%
New Zealand	20%	80%	25%	19%	1%	8%	12%	36%	12%	88%	21%	14%	1%	5%	6%	53%
Norway	32%	68%	40%	5%	1%	0%	32%	22%	23%	77%	40%	5%	0%	0%	23%	32%
Poland	50%	50%	26%	15%	13%	25%	13%	8%	41%	59%	28%	17%	10%	20%	11%	14%
Portugal	20%	80%	16%	21%	2%	6%	12%	43%	13%	87%	14%	18%	2%	4%	8%	55%
Slovakia	31%	69%	28%	15%	17%	6%	8%	27%	19%	81%	28%	15%	11%	4%	5%	38%
Slovenia	13%	87%	33%	36%	1%	2%	10%	18%	10%	90%	30%	33%	1%	1%	8%	27%
Spain	8%	92%	24%	14%	2%	2%	4%	53%	6%	94%	20%	12%	1%	1%	3%	63%
Sweden	20%	80%	37%	15%	0%	1%	19%	28%	12%	88%	32%	13%	0%	1%	11%	43%
Switzerland	4%	96%	40%	4%	1%	0%	4%	52%	2%	98%	31%	3%	0%	0%	2%	63%
Turkey	2%	98%	37%	25%	1%	1%	0%	36%	2%	98%	34%	25%	1%	0%	0%	40%
UK	19%	81%	32%	20%	1%	11%	7%	29%	13%	87%	31%	18%	1%	7%	5%	38%
Non-U.S. OECD	16%	84%	35%	13%	5%	5%	6%	37%	11%	89%	33%	9%	4%	3%	4%	47%
U.S.	9%	91%	32%	5%	4%	2%	3%	54%	8%	92%	38%	6%	4%	2%	2%	48%

NOTE: The "Human" and "Analog" columns in each panel sum to 100 percent. The six timing categories in each panel also sum to 100 percent. However, exact sums might not total 100 percent due to rounding.

Table A.3. Average Price per Standard Unit, Overall and by Insulin Type, 33 Select OECD Countries, 2018

Country	Total	Human	Analog	R	RI	S	SI	I	L
Australia	\$6.94	\$5.08	\$7.08	\$5.92	\$5.79	\$5.39	\$4.89	\$5.17	\$8.63
Austria	\$7.92	\$6.63	\$8.17	\$7.17	\$7.09	\$6.96	\$6.60	\$6.58	\$12.61
Belgium	\$8.30	\$5.43	\$8.92	\$7.86	\$7.29	\$5.73	\$5.70	\$4.86	\$11.26
Canada	\$12.00	\$7.11	\$12.99	\$9.88	\$8.96	\$7.10	\$7.32	\$7.02	\$15.77
Chile	\$21.48	\$17.77	\$21.99	\$15.01	\$14.94	\$16.57	\$25.47	\$17.92	\$26.19
Czech Rep.	\$8.18	\$4.69	\$9.11	\$7.48	\$6.94	\$4.69	\$4.70	\$4.72	\$11.68
Estonia	\$9.61	\$5.57	\$9.63	\$8.21	\$8.12	\$5.41	NA	\$5.58	\$10.90
Finland	\$8.94	\$5.84	\$9.01	\$7.23	\$7.25	\$4.98	NA	\$5.95	\$9.92
France	\$9.08	\$9.16	\$9.02	\$7.95	\$6.92	\$19.19	\$7.08	\$7.62	\$10.36
Germany	\$11.00	\$7.13	\$12.60	\$12.02	\$10.57	\$7.06	\$7.20	\$7.23	\$13.46
Greece	\$8.65	\$4.53	\$8.95	\$6.84	\$7.00	\$4.25	\$4.59	\$4.71	\$10.61
Hungary	\$6.14	\$3.92	\$8.16	\$5.48	\$6.08	\$3.91	\$3.95	\$3.91	\$11.73
Ireland	\$9.85	\$7.51	\$9.99	\$8.84	\$7.89	\$10.67	\$6.61	\$6.47	\$11.76
Italy	\$10.03	\$6.88	\$10.07	\$7.69	\$7.25	\$6.34	\$10.36	\$10.18	\$13.47
Japan	\$14.40	\$14.30	\$14.41	\$13.49	\$13.01	\$15.54	\$13.34	\$13.80	\$15.90
Korea	\$10.30	\$7.66	\$10.50	\$9.35	\$8.81	\$9.80	\$6.50	\$7.44	\$11.69
Latvia	\$8.39	\$6.20	\$8.76	\$7.96	\$7.33	\$4.07	NA	\$6.28	\$10.75
Lithuania	\$7.89	\$4.40	\$7.90	\$6.44	\$7.40	\$4.11	NA	\$4.78	\$9.79
Luxembourg	\$10.15	\$4.93	\$10.40	\$7.69	\$7.28	\$4.67	\$5.59	\$5.02	\$13.29
Mexico	\$16.48	\$9.45	\$18.91	\$14.30	\$15.92	\$12.21	\$16.87	\$8.57	\$20.54
Netherlands	\$9.98	\$5.86	\$10.24	\$8.25	\$7.68	\$6.37	\$5.70	\$5.81	\$13.37
New Zealand	\$8.89	\$5.08	\$9.86	\$7.52	\$6.67	\$8.00	\$6.01	\$4.24	\$13.18
Norway	\$7.79	\$5.55	\$8.87	\$7.75	\$7.05	\$5.42	NA	\$5.55	\$11.29
Poland	\$5.28	\$4.27	\$6.30	\$5.53	\$5.98	\$4.22	\$4.31	\$4.24	\$9.47
Portugal	\$8.03	\$5.25	\$8.71	\$6.98	\$6.93	\$5.88	\$5.02	\$5.26	\$10.23
Slovakia	\$6.91	\$4.28	\$8.09	\$6.86	\$7.06	\$4.30	\$4.15	\$4.35	\$9.92
Slovenia	\$7.43	\$5.82	\$7.68	\$6.74	\$6.85	\$6.49	\$5.84	\$5.73	\$11.04
Spain	\$9.04	\$6.04	\$9.32	\$7.37	\$7.39	\$6.85	\$5.78	\$5.81	\$10.71
Sweden	\$7.71	\$4.68	\$8.49	\$6.65	\$6.77	\$6.28	\$5.66	\$4.59	\$11.82
Switzerland	\$12.36	\$6.86	\$12.60	\$9.60	\$9.34	\$8.47	\$6.94	\$6.60	\$15.18
Turkey	\$2.64	\$1.97	\$2.66	\$2.39	\$2.63	\$2.14	\$1.74	\$1.83	\$2.95
UK	\$7.52	\$5.13	\$8.09	\$7.22	\$7.00	\$6.24	\$5.05	\$5.14	\$9.79
Non-U.S. OECD	\$8.81	\$6.09	\$9.32	\$8.19	\$6.66	\$6.46	\$5.81	\$5.98	\$11.32
U.S.	\$98.70	\$85.21	\$99.94	\$119.36	\$107.31	\$87.20	\$95.05	\$73.56	\$88.10

NOTE: "NA" indicates that no volume/sales information was available in MIDAS.

Table A.4. U.S. Prices Relative to Comparison Country Prices in Percentage Points, Overall and by Insulin Type, 33 Select OECD Countries, 2018

Country	Total	Human	Analog	R	RI	S	SI	I	L
Australia	937	678	969	1,379	1,592	380	842	647	728
Austria	764	560	769	1,021	1,265	467	NA	1,050	590
Belgium	861	579	881	1,122	1,223	501	603	763	680
Canada	629	498	624	988	1,021	803	643	672	473
Chile	386	315	395	571	628	182	401	275	301
Czech Rep.	844	604	853	1,233	1,265	475	1,429	766	638
Estonia	858	631	856	1,141	1,151	NA	NA	1,268	732
Finland	938	690	936	1,204	1,262	NA	NA	1,170	752
France	837	616	869	1,207	1,323	306	780	530	686
Germany	633	518	644	715	868	438	1,104	400	578
Greece	917	655	930	1,266	1,307	542	909	712	728
Hungary	824	1,831	817	1,449	NA	NA	NA	1831	679
Ireland	803	596	813	1,044	1,163	442	1,189	680	651
Italy	763	670	763	1,052	1,235	571	985	733	618
Japan	589	377	613	746	690	252	459	361	522
Korea	871	702	874	1,104	1,043	552	1,057	806	726
Latvia	908	675	906	1,312	1,249	NA	NA	1,122	724
Lithuania	985	725	982	1,453	1,244	NA	NA	1,481	797
Luxembourg	875	554	875	1,117	1,221	NA	NA	NA	680
Mexico	531	398	531	708	709	347	499	873	423
Netherlands	797	626	796	1,081	1,157	719	NA	1,203	617
New Zealand	616	397	617	1,013	1,269	NA	584	609	457
Norway	958	674	956	1,206	1,317	NA	NA	1,268	800
Poland	922	557	951	2,022	NA	401	NA	1,724	780
Portugal	773	617	769	1,296	1,274	NA	NA	1,355	650
Slovakia	912	686	901	1,195	1,263	1,072	NA	1,420	718
Slovenia	862	622	876	1,333	1,348	356	1,263	1,227	712
Spain	879	633	890	1,191	1,245	470	984	746	703
Sweden	853	632	857	1,303	1,367	508	NA	1,539	650
Switzerland	659	506	665	868	943	377	NA	650	531
Turkey	2,774	1,634	2,857	3,495	3,496	1,258	NA	1,716	2,315
UK	893	684	913	1,204	1,289	569	663	709	741
Non-U.S. OECD	805	707	810	1,054	1,271	752	697	803	657
U.S.	100	100	100	100	100	100	100	100	100

NOTE: "NA" indicates that there were no matching presentations in MIDAS on which to compare prices.

Table A.5. Share of Insulin Sales and Volume Contributing to Presentation-Level Bilateral Price Index Comparisons, 2018

Country	Share of U.S. Sales	Share of Other-Country Sales	Share of U.S. Volume	Share of Other-Country Volume
Australia	85%	89%	90%	88%
Austria	80%	60%	88%	59%
Belgium	79%	81%	87%	75%
Canada	91%	70%	93%	66%
Chile	86%	96%	92%	92%
Czech Rep.	70%	78%	83%	69%
Estonia	66%	100%	79%	99%
Finland	89%	95%	90%	95%
France	85%	97%	89%	97%
Germany	84%	77%	89%	69%
Greece	87%	96%	92%	93%
Hungary	28%	55%	39%	44%
Ireland	93%	99%	96%	99%
Italy	79%	99%	87%	98%
Japan	87%	95%	93%	94%
Korea	87%	99%	92%	98%
Latvia	59%	99%	74%	99%
Lithuania	61%	100%	76%	99%
Luxembourg	77%	60%	84%	69%
Mexico	87%	95%	91%	92%
Netherlands	91%	88%	94%	85%
New Zealand	69%	70%	73%	61%
Norway	89%	97%	90%	96%
Poland	42%	37%	53%	32%
Portugal	52%	78%	62%	71%
Slovakia	79%	73%	88%	64%
Slovenia	68%	93%	82%	92%
Spain	88%	97%	93%	95%
Sweden	92%	95%	94%	94%
Switzerland	83%	85%	90%	83%
Turkey	75%	98%	83%	98%
UK	96%	83%	97%	81%
Non-U.S. OECD	96%	85%	97%	81%

Table A.6. U.S. Prices Relative to Comparison Country Prices in Percentage Points at the Active-Ingredient Level, Overall and by Insulin Type, 33 Select OECD Countries, 2018

Country	Total	Human	Analog	R	RI	S	SI	I	L
Australia	1,315	1,061	1,291	1,992	1,854	1,619	1,944	1,423	942
Austria	972	822	953	1,612	1,510	1,253	1,440	1,118	698
Belgium	995	875	962	1,377	1,467	1,522	1,666	1,515	725
Canada	745	649	721	1,195	1,204	1,228	1,298	1,047	530
Chile	464	419	466	753	738	526	373	411	347
Czech Rep.	1,011	915	971	1,459	1,549	1,861	2,022	1,559	713
Estonia	1,022	778	1,017	1,457	1,342	NA	NA	1,317	803
Finland	1,121	948	1,103	1,604	1,476	1,750	NA	1,236	865
France	976	751	1,013	1,435	1,552	455	1,343	966	796
Germany	804	804	782	972	1,014	1,235	1,321	1,017	662
Greece	1,133	996	1,096	1,599	1,527	2,050	2,069	1,561	855
Hungary	1,133	1,046	1,089	2,122	1,765	2,232	2,404	1,883	762
Ireland	961	799	956	1,277	1,359	818	1,438	1,136	775
Italy	959	836	956	1,536	1,485	1,376	917	722	714
Japan	682	509	691	920	819	561	713	533	569
Korea	949	857	942	1,225	1,215	890	1,462	988	780
Latvia	1,001	946	976	1,278	1,457	2,140	NA	1,171	771
Lithuania	1,223	1,021	1,198	1,778	1,453	2,120	NA	1,538	938
Luxembourg	1,023	892	989	1,477	1,474	1,869	1,700	1,466	762
Mexico	566	503	557	796	767	714	563	858	439
Netherlands	934	900	907	1,323	1,397	1,368	1,667	1,265	704
New Zealand	857	586	829	1,513	1,610	1,090	1,582	1,734	558
Norway	1,066	923	1,048	1,520	1,553	1,610	NA	1,324	817
Poland	1,286	1,065	1,245	2,158	1,798	2,065	2,204	1,734	866
Portugal	1,140	915	1,113	1,733	1,555	1,483	1,892	1,398	811
Slovakia	1,118	951	1,077	1,549	1,512	2,030	2,290	1,693	845
Slovenia	1,121	933	1,102	1,736	1,577	1,344	1,628	1,284	833
Spain	1,058	865	1,038	1,563	1,452	1,274	1,644	1,265	799
Sweden	1,074	934	1,048	1,787	1,574	1,389	1,680	1,601	767
Switzerland	835	752	817	1,187	1,144	1,029	1,370	1,114	638
Turkey	3,627	2,580	3,569	4,941	4,081	4,081	5,457	4,026	2,797
UK	1,160	1,025	1,136	1,619	1,526	1,398	1,884	1,431	898
Non-U.S. OECD	1,009	943	986	1402	1597	1351	1635	1230	771
U.S.	100	100	100	100	100	100	100	100	100

NOTE: "NA" indicates that there were no matching presentations in MIDAS on which to compare prices. "NR" indicates that price comparisons are not reported for SI and I insulins that were available only over the counter in the United States.

Table A.7. Average U.S. Price per Standard Unit for Short-Acting Insulins, by Prescription Status, 2018

	All Records	Prescription Records	Nonprescription Records
U.S. average price per standard unit	\$87.20	\$114.40	\$54.09
Irish average price per standard unit	\$10.67	\$5.87	\$12.24

Table A.8. U.S. Prices Relative to Comparison Country Prices in Percentage Points for Prescription Records, Overall and by Insulin Type, 33 Select OECD Countries, 2018

Country	Total	Human	Analog	R	RI	S	SI	I	L
Australia	969	714	969	1,379	1,592	NA	NR	NR	728
Austria	769	555	769	1,021	1,265	NA	NR	NR	590
Belgium	881	553	881	1,122	1,223	NA	NR	NR	680
Canada	625	437	624	988	1,021	728	NR	NR	473
Chile	395	341	395	571	628	NA	NR	NR	301
Czech Rep.	853	570	853	1,233	1,265	NA	NR	NR	638
Estonia	856	610	856	1,141	1,151	NA	NR	NR	732
Finland	936	672	936	1,204	1,262	NA	NR	NR	752
France	869	684	869	1,207	1,323	NA	NR	NR	686
Germany	644	549	644	715	868	NA	NR	NR	578
Greece	930	626	930	1,266	1,307	NA	NR	NR	728
Hungary	817	NA	817	1,449	NA	NA	NR	NR	679
Ireland	813	582	813	1,044	1,163	NA	NR	NR	651
Italy	763	632	763	1,052	1,235	NA	NR	NR	618
Japan	613	385	613	746	690	NA	NR	NR	522
Korea	874	643	874	1,104	1,043	NA	NR	NR	726
Latvia	906	657	906	1,312	1,249	NA	NR	NR	724
Lithuania	982	700	982	1,453	1,244	NA	NR	NR	797
Luxembourg	875	554	875	1,117	1,221	NA	NR	NR	680
Mexico	531	355	531	708	709	NA	NR	NR	423
Netherlands	796	597	796	1,081	1,157	NA	NR	NR	617
New Zealand	617	352	617	1,013	1,269	NA	NR	NR	457
Norway	956	653	956	1,206	1,317	NA	NR	NR	800
Poland	951	NA	951	2,022	NA	NA	NR	NR	780
Portugal	769	595	769	1,296	1,274	NA	NR	NR	650
Slovakia	901	588	901	1,195	1,263	NA	NR	NR	718
Slovenia	876	635	876	1,333	1,348	NA	NR	NR	712
Spain	890	578	890	1,191	1,245	NA	NR	NR	703
Sweden	857	625	857	1,303	1,367	NA	NR	NR	650
Switzerland	665	499	665	868	943	NA	NR	NR	531
Turkey	2,857	1,678	2,857	3,495	3,496	NA	NR	NR	2,315
UK	913	700	913	1,204	1,289	NA	NR	NR	741
Non-U.S. OECD	815	737	810	1,054	1,271	1,598	NR	NR	657
U.S.	100	100	100	100	100	NA	NR	NR	100

NOTE: "NA" indicates that there were no matching presentations in MIDAS on which to compare prices. "NR" indicates that price comparisons are not reported for SI and I insulins that were available only over the counter in the United States.

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