

The 2017-18 Economic Report on Pharmaceutical Wholesalers and Specialty Distributors

Adam J. Fein, Ph.D.

Pembroke Consulting, Inc., and
Drug Channels Institute

October 2017

Full report available for download at

http://drugchannelsinstitute.com/products/industry_report/wholesale/



COPYRIGHT

Copyright © 2017 by Pembroke Consulting, Inc. All rights reserved.

This report is protected by copyright law and may not be copied or otherwise reproduced, repackaged, further transmitted, transferred, disseminated, redistributed, or resold, in whole or in part, in any form or manner or by any means whatsoever, by any person without prior written consent. This report may be cited in commercial documents with full and appropriate attribution. This report is for informational purposes only and is provided “as is” without any express or implied warranty. The analyses in this report are based solely on information and data that are in the public domain. All conclusions, findings, opinions, and recommendations are based on our own experienced and professional judgment and interpretations given the information available. While all information is believed to be reliable at the time of writing, the information provided here is for reference use only and does not constitute the rendering of legal, financial, commercial, or other professional advice by Pembroke Consulting, Inc., Drug Channels Institute, or the author. Any reliance upon the information is at your own risk, and Pembroke Consulting, Inc., and the author shall not be responsible for any liability arising from or related to the use or accuracy of the information in any way. Pembroke Consulting, Inc., and Drug Channels Institute do not make investment recommendations in this report or otherwise. Nothing in this report should be interpreted as an opinion by Pembroke Consulting, Inc., Drug Channels Institute, or the author on the investment prospects of specific companies.

Drug Channels® is a registered trademark of Pembroke Consulting, Inc.



LICENSE TERMS

This report is protected by copyright law. Unauthorized reproduction or distribution of this report or any portion of it may result in severe civil and criminal penalties and will be prosecuted to the maximum extent of the law. This report may be cited in commercial documents with full and appropriate attribution. Nothing in the license is intended to reduce, limit, or restrict any rights arising from fair use under copyright law or other applicable laws.

Suggested citation: Fein, Adam J., *The 2017-18 Economic Report on Pharmaceutical Wholesalers and Specialty Distributors*, Drug Channels Institute, 2017.

The complete End User License Agreement is available at:

<http://drugchannelsinstitute.com/files/wholesaleEULA-2017-18.pdf>

ABOUT THE AUTHOR

Adam J. Fein, Ph.D., is the president of Pembroke Consulting, Inc., a management advisory and business research firm based in Philadelphia. He also is the CEO of Pembroke’s Drug Channels Institute, a leading management educator for and about the pharmaceutical industry.



Dr. Fein is one of the country’s foremost experts on pharmaceutical economics and the drug distribution system. Top manufacturers call on Dr. Fein’s insights and judgment to create successful commercial strategies and make better strategic decisions in our evolving healthcare environment.

Dr. Fein’s popular and influential Drug Channels website (www.DrugChannels.net) is the go-to source for definitive and comprehensive industry analysis, delivered with a witty edge. He has published hundreds of academic and industry articles, and is regularly quoted in such national publications as *The Wall Street Journal*, *The New York Times*, *Forbes*, and many others.

Dr. Fein earned his doctoral degree from the Wharton School of Business at the University of Pennsylvania and a B.A., *summa cum laude*, from Brandeis University. He lives in Philadelphia with his wife, Paula, and their two children.

Contact information

Adam J. Fein, Ph.D.
Pembroke Consulting, Inc.
1515 Market Street, Suite 960
Philadelphia, PA 19102
Phone: 215-523-5700
Website: www.PembrokeConsulting.com
Email: afein@pembrokeconsulting.com

Visit Dr. Fein’s Drug Channels blog for the latest industry updates!



DRUG CHANNELS

Expert Insights on Pharmaceutical Economics
and the Drug Distribution System

www.DrugChannels.net

ABOUT DRUG CHANNELS INSTITUTE

[Drug Channels Institute \(DCI\)](#), a division of Pembroke Consulting, Inc., is a leading provider of specialized management education for and about the pharmaceutical industry.



Drug Channels Institute combines Dr. Fein’s expertise and cutting-edge analysis—such as this *2017-18 Economic Report on Pharmaceutical Wholesalers and Specialty Distributors*—into comprehensive, interactive e-learning modules that offer your team a thorough grounding in crucial industry topics. These online learning tools explain highly complex economic and business data and concepts so you can:

- Make better decisions to achieve your business goals
- Improve relationships with key accounts
- Understand your customers, channels, and the economics of the U.S. pharmaceutical industry

View a module list at <http://drugchannelsinstitute.com/products/e-learning-modules/>.

DCI can code and brand any module for your company’s internal Learning Management System. Or you can get started quickly by letting us host your team via our online e-learning portal. DCI’s hosted e-learning modules are instantly viewable on all computer platforms, including iPads.

To learn more about how Drug Channels Institute can help your business, please contact:

Paula Fein, M.S.Ed.
V.P., Business Development
Drug Channels Institute
1515 Market Street, Suite 960
Philadelphia, PA 19102
Phone: 215-523-5700 x11
Website: www.drugchannelsinstitute.com
Email: paula@drugchannelsinstitute.com



INTRODUCTION AND GUIDE TO THIS REPORT

In 2017, pharmaceutical wholesalers confronted a deteriorating business environment. Many of the trends that we identified in previous editions of this report culminated in significant profit declines and loss of stock market value. Notable headwinds over the past year include:

- A slowdown in brand-name list price increases—and many manufacturers’ pledges to limit future increases
- Accelerating deflation in generic drug prices and the loss of excess profits earned during the generic inflation bubble
- Intense competition for the business of smaller pharmacies
- Ongoing concentration of dispensing market share for the traditional drugs dispensed by retail pharmacies and for the specialty drugs dispensed by specialty pharmacies
- Declining share of revenues from independent physician offices and clinics
- Lower-than-expected benefits from biosimilar drugs

Wholesalers have been trying to counter these negative trends with new pricing approaches, acquisitions, and other business strategies. Despite the profit pressures, the Big Three public wholesalers—AmerisourceBergen, McKesson, and Cardinal Health—remain among the largest U.S. corporations. We project that U.S. drug distribution revenues for these three companies will reach \$425 billion in 2017.

This *2017–18 Economic Report on Pharmaceutical Wholesalers and Specialty Distributors*—our eighth edition—remains the most comprehensive tool for analyzing the economic and business realities of U.S. pharmaceutical distribution. In this definitive, nonpartisan resource, I explore and explain the industry’s interactions with—and services for—other participants in our healthcare system.

In this report, I have synthesized a wealth of statistical data, research studies, financial information, and my own business consulting experience. This unique resource will benefit pharmaceutical manufacturers, wholesalers, pharmacists, pharmacy owners, hospital executives, pharmacy buyers, benefit managers, managed care executives, policy analysts, investors, consultants, and many others.

Structure of the 2017-18 Report

The 2017-18 Economic Report on Pharmaceutical Wholesalers and Specialty Distributors analyzes the industry in three major sections, comprising nine total chapters. It provides an up-to-date, fact-based analysis of this dynamic industry and how it works.

This year’s report retains the structure that we used in last year’s edition, and the chapters correspond to those of previous editions. Some sections and chapters have been expanded or reorganized to better cover the latest industry developments.



Here are some of the notable updates in the 2017-18 report:

- The Industry Overview (Chapter 1) has been reorganized and expanded to provide a more comprehensive introduction to the industry and its major participants.
- Our analysis and data on specialty drugs have been expanded to account for continued growth in this market segment. We have included additional data and analyses of specialty pharmacies operated by physician practices and hospitals.
- New analyses examine the payment relationships between the Big Three wholesalers and each of their larger customers.
- Our deconstruction of wholesaler buy-side and sell-side gross margins for drug distribution of brand-name drugs now includes separate estimates for: (1) wholesalers' largest six pharmacy customers, (2) all other retail, mail, and specialty pharmacy customers, and (3) healthcare providers. The presentation of the generic drug figures now reflects sell-side discounts from published list prices.
- Additional historical trending information has been added throughout the report.
- Chapter 6 offers a more integrated presentation of significant forces of change.

We have updated all market and industry data with the most current information available. The 2017-18 edition also contains the latest financial data and market positions of the largest public companies: AmerisourceBergen, Cardinal Health, and McKesson. It updates our annual analysis of each wholesaler's business segments and underlying business profitability, based upon our proprietary economic models. This information allows you to assess differences among the public wholesalers' business organizations, strategies, and financial performance.

Here is a summary of the report's main sections and chapters.

[**PREFACE: INDUSTRY TRENDS AND KEY REPORT THEMES**](#) provides an integrated overview of the major themes that recur throughout our analysis. Each theme includes links to relevant chapters and sections within the full report.

[**SECTION I: WHOLESALER AND CUSTOMER INDUSTRY ANALYSIS**](#)

- [**Chapter 1: Industry Overview**](#) (page 7) defines the industry, describes business differences between full-line wholesaling and specialty distribution, summarizes wholesalers' obligations under the Drug Supply Chain Security Act (DSCSA), explains wholesalers' channel roles, discusses and quantifies the products that wholesalers sell, and identifies the major industry participants and their revenues.

- [Chapter 2: Channel Role for Retail, Mail, and Specialty Pharmacies](#) (page 25) analyzes the pharmacy market—the customer group that accounts for the majority of wholesalers’ revenues. It covers wholesalers’ services for smaller pharmacies, wholesalers’ participation in the pharmacy-PBM relationship, and their interactions with pharmacy buying groups. The chapter then separately analyzes how wholesalers work with larger pharmacies, including our exclusive analysis of the large generic sourcing consortia between wholesalers and the largest pharmacies. [Section 2.4.](#) (page 49) analyzes wholesalers’ role in the distribution of patient-administered drugs that specialty pharmacies dispense. We also consider wholesaler-owned specialty pharmacies.
- [Chapter 3: Channel Role for Physician Office/Clinics and Hospitals](#) (page 56) examines channels for provider-administered medications, explains the buy-and-bill system for drugs administered in outpatient settings, and describes the role and functions that wholesalers perform for hospitals, including hospitals that participate in the 340B Drug Pricing Program. This chapter also provides an in-depth consideration of group purchasing organizations (GPOs) for both hospitals and physician practices. Chapter 3 has been expanded and reorganized from last year’s edition.

SECTION II: BUSINESS ECONOMICS AND INDUSTRY TRENDS

- [Chapter 4: Wholesaler Profitability](#) (page 82) delves into the industry’s income statement economics to explain the underlying sources of drug distribution profits. We deconstruct buy-side and sell-side gross margin components, distinguish sell-side profits from specialty and traditional drugs, and explain distribution service agreements (DSAs) with manufacturers. We analyze overall gross margins and operating profits. This chapter also explains how brand-name drug price inflation affects wholesalers’ profits.
- [Chapter 5: Financial Stability and Cash Management](#) (page 107) provides a detailed analysis of the key metrics that illustrate wholesalers’ overall financial health. These include capital structures, debt (leverage), balance sheet assets, cash flow, return on invested capital, and stock market valuation and performance.
- [Chapter 6: Forces of Change for Drug Distribution](#) (page 120) analyzes key industry trends that will impact the market structure and economics of the pharmaceutical wholesaling and specialty distribution industries. This chapter has been significantly revised and updated from last year’s edition.

SECTION III: BIG THREE WHOLESALER COMPANY PROFILES

In this section, we analyze the latest financial data and strategies of the largest public companies. Each chapter provides parallel examinations of the Big Three public wholesalers.

We scrutinize each company’s business history, acquisitions and divestitures, business mix, profitability, largest customers, and company-specific business trends.

- [Chapter 7: AmerisourceBergen Corporation](#) (page 151)
- [Chapter 8: Cardinal Health](#) (Page 168)
- [Chapter 9: McKesson Corporation](#) (page 181)

How to Use the 2017-18 Report

The chapters are self-contained and do not need to be read in order. We include extensive internal references to help you navigate the entire document and customize it to your specific needs. There are also more than [300 endnotes](#), most of which have hyperlinks to original source materials. The report also includes a list of the [Acronyms and Abbreviations](#) used within it.

Please note that highlighted internal references are clickable hyperlinks in the PDF document. After clicking a link, use the following shortcuts to return to your previous location in the document:

- Windows: **ALT+Left Arrow**
- Mac: **Command+Left Arrow**

To search the entire PDF document for every occurrence of a word or phrase, use the following keyboard shortcuts:

- Windows: **Shift+CTRL+F**
- Mac: **Shift+Command+F**

As always, I welcome your feedback. Please contact me if you have any questions or comments about *The 2017-18 Economic Report on Pharmaceutical Wholesalers and Specialty Distributors*.

Adam J. Fein
October 2017

P.S. You can find post-publication errata here:

<http://drugchannelsinstitute.com/files/2017-18-PharmaceuticalWholesalers-errata.pdf>

CONTENTS

PREFACE: INDUSTRY TRENDS AND KEY REPORT THEMES	1
SECTION I: WHOLESALER AND CUSTOMER INDUSTRY ANALYSIS	6
Chapter 1: Industry Overview	7
1.1. Wholesale Industry Fundamentals	7
1.1.1. Defining Drug Wholesale Distribution	7
1.1.2. Full-Line Wholesalers.....	8
1.1.3. Specialty Distributors.....	10
1.1.4. Regulation and Supply Chain Security	11
1.2. The Products That Wholesalers Sell.....	13
1.2.1. Brand vs. Generic Drugs	13
1.2.2. Route of Administration	14
1.2.3. Specialty vs. Traditional Drugs.....	15
1.2.4. Specialty Product Distribution	15
1.3. Overview of Wholesalers’ Channel Roles	17
1.3.1. Physical Distribution	17
1.3.2. Financial Intermediation.....	18
1.3.3. Services for Pharmacies, Providers, and Manufacturers.....	19
1.3.4. Impact on Pharmacy and Provider Reimbursement	20
1.4. Industry Participants.....	21
1.4.1. Big Three Wholesalers: Revenue and Growth Trends.....	21
1.4.2. Other Wholesale Market Participants	22
Chapter 2: Channel Role for Retail, Mail, and Specialty Pharmacies.....	25
2.1. The Pharmacy Market.....	26
2.1.1. Outpatient Dispensing Formats.....	26
2.1.2. Pharmacy Market Size and Structure	27
2.1.3. Differences Among Outpatient Dispensing Formats	29
2.2. Independent Pharmacies.....	31
2.2.1. Industry Position and Wholesaler Market Shares	31
2.2.2. Wholesaler Services for Independent Pharmacies.....	33
2.2.3. Franchise Programs and Marketing Groups	35

2.2.4. PSAOs and the Wholesalers’ Role in the Pharmacy-Payer Relationship	36
2.2.5. Wholesaler Relationships with Pharmacy Group Purchasing Organizations	40
2.2.6. Wholesaler Generic Source Programs for Smaller Pharmacies.....	42
2.3. Retail Chains and Mail Pharmacies.....	43
2.3.1. Wholesale Suppliers to Largest U.S. Pharmacies	43
2.3.2. Physical Distribution Relationships Between Wholesalers and Retail Chains.....	45
2.3.3. Generic Sourcing Relationships Between Wholesalers and Large Pharmacies.....	46
2.4 Specialty Pharmacies	49
2.4.1. Specialty Pharmacy Market Participants.....	49
2.4.2. Wholesalers’ Specialty Pharmacies	51
2.4.3. Wholesalers’ Role in Manufacturer-Defined Limited Specialty Networks	52
Chapter 3: Channel Role for Physician Offices/Clinics and Hospitals	56
3.1. The Provider-Administered Drug Market	56
3.1.1. Spending and Sites of Care	56
3.1.2. The Buy-and-Bill System	59
3.1.3. Provider Reimbursement in the Buy-and-Bill System	60
3.1.4. Group Purchasing Organizations (GPOs)	63
3.1.5. Contract Management and Chargebacks	64
3.2. Physician Offices	65
3.2.1. Pharmaceutical Purchasing and Distributors’ Services	65
3.2.2. GPOs for Physician Practices	67
3.2.3. Specialty Drug Dispensing by Physician Practices	69
3.3. Hospitals	71
3.3.1. Pharmaceutical Purchasing and Wholesalers’ Services for Hospitals	71
3.3.2. Hospital GPOs	74
3.3.3. Specialty Pharmacies at Hospitals and Health Systems	76
3.3.4. Wholesalers and the 340B Drug Pricing Program	77
SECTION II: BUSINESS ECONOMICS AND INDUSTRY TRENDS	81
Chapter 4: Wholesaler Profitability	82
4.1. Sources of Wholesaler Gross Profits and Gross Margin	82
4.2. Components of Buy-Side Gross Margin.....	83
4.2.1. Distribution Service Agreements.....	84

4.2.2. Payment Discounts	85
4.2.3. Specialty Distribution Service Agreements	86
4.2.4. Generic Sourcing Formularies	88
4.2.5. Wholesaler Compensation and Bona Fide Service Fees.....	88
4.3. Sell-Side Gross Margins and Cost-Minus Discounts.....	90
4.4. Estimates of Overall Buy-Side and Sell-Side Gross Margins	91
4.5. Gross Profits of Brand vs. Generic Drugs	94
4.5.1. Lifecycle Profits for Traditional Generic Drugs	95
4.5.2. Lifecycle Profits for Provider-Administered Generic Drugs.....	98
4.5.3. Private Label Generic Drugs	99
4.6. The Profit Impact of Brand-Name Drug Price Inflation.....	100
4.6.1. Brand-Name Drug Inflation and Wholesaler Fees.....	100
4.6.2. Inventory Appreciation and Revaluation.....	102
4.7. Operating Expenses and Operating Profit	104
Chapter 5: Financial Stability and Cash Management	107
5.1. Debt, Coverage, and Liquidity Ratios.....	107
5.2. Balance Sheet Assets	109
5.3. Cash Conversion Cycle	110
5.3.1. Inventory Levels and Days Inventory Outstanding.....	113
5.3.2. Accounts Receivable and Days Sales Outstanding	114
5.3.3. Accounts Payable and Days Payable Outstanding.....	115
5.4. Uses of Cash.....	116
5.5. Return on Invested Capital	117
5.6. Stock Market Performance.....	118
Chapter 6: Forces of Change for Drug Distribution	120
6.1. The Outlook to 2021	121
6.1.1. The Outlook for U.S. Pharmaceutical Spending and Wholesaler Revenues.....	121
6.1.2. The Outlook for Brand-Name Drug Prices	122
6.2. Deflation of Generic Drug Prices	124
6.3. Evolution of Traditional and Specialty Dispensing Channels.....	126
6.3.1. Pharmacy Market Evolution	126
6.3.2. Retail Pharmacies	127

6.3.3. Specialty Pharmacies	128
6.3.4. Provider-Operated Specialty Pharmacies.....	130
6.4. Challenges to Physician Buy-and-Bill	132
6.4.1. Hospital Acquisition of Physician Practices and Shifting Sites of Drug Administration.....	132
6.4.2. Specialty Pharmacy Displacement of Buy-and-Bill Channels	136
6.5. The Impact of Biosimilars.....	142
6.5.1. Update on the Biosimilar Market	142
6.5.2. Biosimilars Under the Pharmacy Benefit.....	142
6.5.3. Biosimilars Under the Medical Benefit.....	145
SECTION III: BIG THREE WHOLESALER PROFILES	150
Chapter 7: AmerisourceBergen Corporation	151
7.1. Business Overview	151
7.1.1. Company Information	151
7.1.2. Company History	151
7.1.3. Acquisitions and Divestitures	152
7.1.4. Business Segments	153
7.2. Profitability	156
7.2.1. Overall Pharmaceutical Distribution	156
7.2.2. Profitability by Business Sub-Segment.....	157
7.3. Customers.....	158
7.3.1. The 10 Largest Customers	158
7.3.2. Walgreens Boots Alliance	160
7.3.3. Express Scripts	162
7.4. Growth Trends.....	163
7.4.1. Distribution Company Growth Trends.....	164
7.4.2. Specialty Group Trends.....	165
7.4.3. MWI Animal Health	166
Chapter 8: Cardinal Health.....	168
8.1. Business Overview	168
8.1.1. Company Information	168
8.1.2. Company History	168
8.1.3. Recent Acquisitions	168

8.1.4. Business Segments	169
8.2. Profitability	171
8.2.1. Overall Pharmaceutical Distribution	171
8.2.2. Profitability by Business Sub-Segment	172
8.3. Customers	173
8.3.1. The 10 Largest Customers	173
8.3.2. CVS Health	175
8.4. Growth Trends	176
8.4.1. U.S. Distribution Growth Trends	176
8.4.2. Specialty Solutions	178
8.4.3. Cardinal Health China and Chinese Pharmaceutical Distribution	179
Chapter 9: McKesson Corporation	181
9.1. Business Overview	181
9.1.1. Company Information	181
9.1.2. Company History	181
9.1.3. Acquisitions and Divestitures	182
9.1.4. Business Segments	183
9.2 Profitability	185
9.2.1. Overall Distribution	185
9.2.2. Profitability by Business Sub-Segment	186
9.3. Customers	188
9.3.1. The Top 10 Customers	188
9.3.2. CVS Health	189
9.3.3. Rite Aid	191
9.4. Growth Trends	192
9.4.1. U.S. Drug Distribution Growth Trends	192
9.4.2. McKesson Specialty Health	194
9.4.3. McKesson Europe	194
Acronyms and Abbreviations	197
Endnotes	198

LIST OF EXHIBITS

Exhibit 1: Full-Line Wholesale Revenues, by Type of Customer, 2015	8
Exhibit 2: Full-Line Wholesalers, Inventory Levels vs. Product Sales, by Product Type, 2015.....	9
Exhibit 3: Full-Line Wholesalers, Inventory Levels vs. Product Sales, by Product Type, 2011 vs. 2015	9
Exhibit 4: Specialty Distributor Revenues, by Type of Customer, 2015.....	10
Exhibit 5: Specialty Distributor Sales, by Therapeutic Area, 2015	11
Exhibit 6: Timeline of DSCSA Requirements for Wholesale Distributors, 2013-2023.....	11
Exhibit 7: Unbranded and Branded Generics, Share of U.S. Prescriptions, 2005-2021F	14
Exhibit 8: Allowance for Doubtful Accounts, by Company, 2017	19
Exhibit 9: U.S. Drug Distribution and Related Revenues at Big Three Wholesalers, Calendar Year 2016	21
Exhibit 10: U.S. Drug Distribution and Related Revenues, Big Three Wholesalers, 2012-2017E	22
Exhibit 11: The U.S. Pharmacy Distribution and Reimbursement System for Patient-Administered, Outpatient Brand-Name Drugs.....	25
Exhibit 12: Total U.S. Pharmacy Industry Revenues, Prescriptions, and Locations, by Dispensing Format, 2016	28
Exhibit 13: Average Annual Number of Prescriptions per Pharmacy, by Retail Dispensing Format, 2016	30
Exhibit 14: Average Annual Prescription Revenue per Pharmacy Outlet, by Retail Dispensing Format, 2016 ..	30
Exhibit 15: Number of Independent Pharmacies, 1991-2016	31
Exhibit 16: Estimated Drug Sales and Market Share with Independent Pharmacies, by Wholesaler, 2016	33
Exhibit 17: U.S. Pharmacy Franchise and Marketing Programs, 2016.....	35
Exhibit 18: Consumer Satisfaction with Wholesalers’ Pharmacy Group vs. Other Dispensing Formats, 2017 ..	36
Exhibit 19: Wholesaler-Owned Pharmacy Services Administration Organizations, by Members and Ownership, 2017	39
Exhibit 20: Pharmacy Buying Groups and Primary/Preferred Wholesaler Relationships, by Number of Pharmacies, 2017.....	41
Exhibit 21: Wholesaler Generic Source Programs, Number of SKUs and Manufacturers, 2011-2015.....	42
Exhibit 22: Largest U.S. Pharmacies and Their Primary Wholesale Suppliers, 2016.....	44
Exhibit 23: Alignment Between the Big Three Wholesalers and Top Five Pharmacies	44
Exhibit 24: Full-Line Wholesaler Sales to Retail Chain Warehouses, 2008 to 2016E.....	45
Exhibit 25: Share of U.S. Generic Purchasing Volume, by Organization, 2017	47
Exhibit 26: Specialty Drug Prescription Revenues, by Dispensing Format, 2016.....	50
Exhibit 27: Prescription Revenues and Market Share from Specialty Pharmaceuticals, by Company, 2016	51
Exhibit 28: Alternative Channels to Specialty Pharmacies in Limited Dispensing Networks.....	53
Exhibit 29: Diplomat Pharmacy, Drug Purchases, by Supplier, 2012-2016.....	54
Exhibit 30: Medical Benefit Spending on Provider-Administered Drugs, by Drug Category and Payer, 2015 ...	57

Exhibit 31: Commercial Medical Benefit Spending for Outpatient Specialty Drugs, by Site of Care, 2011 vs. 2015	58
Exhibit 32: Commercial Medical Benefit Claims for Outpatient Provider-Administered Drugs, by Site of Care and Therapy Class, 2015	58
Exhibit 33: Buy-and-Bill System for Distribution and Reimbursement of Provider-Administered Outpatient Drugs	59
Exhibit 34: Reimbursement Method for Provider-Administered Drugs Paid Under the Commercial Medical Benefit, by Site of Care, 2016	62
Exhibit 35: Medical Benefit Cost per Claim for Outpatient Specialty Drugs, by Site of Care, 2015.....	63
Exhibit 36: Full-Line Wholesaler Chargebacks As a Percentage of Net Sales, 2009-2015	65
Exhibit 37: Revenue Mix at Oncology Practices, by Category, 2014.....	66
Exhibit 38: Most Important Services Offered by Community Practice GPOs	67
Exhibit 39: Specialty Physician Practice GPOs and Ownership, 2017	68
Exhibit 40: Percentage of Practices With In-Practice Oral Oncology Drug Dispensing, 2014-2017	70
Exhibit 41: Patient-Administered Oncology Volume, by Dispensing Channel, 2016	70
Exhibit 42: Share of Community Hospitals, by Health System Affiliation, 1999-2015.....	72
Exhibit 43: Hospital Costs, by Type of Expense, 2015.....	72
Exhibit 44: Prescription Drug Costs As a Percentage of Hospital Expense, 2006- 2015	73
Exhibit 45: Hospital Pharmaceutical Expenses per Staffed Bed, by Ownership and IDN Affiliation, 2016.....	74
Exhibit 46: Largest Group Purchasing Organizations, by Acute Care Members, 2017	75
Exhibit 47: Hospital Ownership of Specialty Pharmacy, by Number of Staffed Beds, 2016.....	76
Exhibit 48: Hospitals’ 340B Drug Purchases As a Percentage of Total Hospital Drug Purchases, 2007-2016	78
Exhibit 49: Key Elements on a Wholesaler Income Statement.....	82
Exhibit 50: Sources of Wholesalers’ Gross Margin from Brand-Name Drugs.....	83
Exhibit 51: Estimated Buy-Side and Sell-Side Contributions to Wholesalers’ Gross Margin, 2017	91
Exhibit 52: Estimated Drug Distribution Gross Margins, 2014 to 2017	93
Exhibit 53: Estimated Drug Distribution Gross Margins, Brand-Name vs. Generic Drugs, 2017	94
Exhibit 54: Big Three Wholesalers, Revenues and Gross Profits, Brand vs. Generic Drugs, 2017	95
Exhibit 55: Typical Path of Wholesaler Gross Profits, Brand vs. Multi-Source Generic Drug	96
Exhibit 56: Average Sell-Side Discount for Generic Drugs Sold to Retail Pharmacies, by Number of Manufacturers, 2017	98
Exhibit 57: Example of Channel Profits from a Provider-Administered Generic Drug.....	99
Exhibit 58: Annual Invoice Price Increases for Brand-Name Drugs, 2011 to 2016	101
Exhibit 59: Illustrative Value of a Wholesaler’s Fees with Brand-Name Pharmaceutical Price Inflation	101
Exhibit 60: Illustrative Effect of Inventory Revaluation on a Wholesaler’s Gross Profit.....	103
Exhibit 61: Full-line Wholesalers, Operating Expenses by Category, 2015.....	105

Exhibit 62: Big Three Wholesalers, Drug Distribution Operating Margin As a Percentage of Revenues, 2013-2017	105
Exhibit 63: Big Three Wholesalers, Distribution Operating Profits As a Percentage of Gross Profits, 2016 vs. 2017	106
Exhibit 64: Big Three Wholesalers, Total Short-Term and Long-Term Debt, 2017	107
Exhibit 65: Big Three Wholesalers, Debt-to-EBITDA Ratio, FY2015-FY2017	108
Exhibit 66: Big Three Wholesalers, Liquidity Ratios, FY2017	109
Exhibit 67: Big Three Wholesalers, Composition of Current Assets, 2017	110
Exhibit 68: Illustrative Wholesaler Cash Conversion Cycle for Brand-Name Drugs Sold to a Pharmacy Customer	111
Exhibit 69: Big Three Wholesalers, Cash Conversion Cycle, 2017	111
Exhibit 70: Big Three Wholesalers, Cash Conversion Cycle, 2010-2017	112
Exhibit 71: Big Three Wholesalers, Days of Sales in Inventory, 2013-2017	113
Exhibit 72: Percentage of Wholesalers' Trade Accounts Receivable and DSO for Largest Customers, 2016-2017	114
Exhibit 73: Big Three Wholesalers, Days Payable Outstanding, 2013-2017	115
Exhibit 74: Big Three Wholesalers, Dividends and Share Repurchases As a Percentage of Operating Cash Flow, FY2015-FY2017	116
Exhibit 75: Big Three Wholesalers, Return on Invested Capital, 2013-2017	117
Exhibit 76: Forward Price-to-Earnings Ratio, Big Three Wholesalers vs. S&P 500, 2013-2017	118
Exhibit 77: One- and Five-Stock Price Performance, Big Three Wholesalers vs. Manufacturers and Overall Market, 2017	119
Exhibit 78: Total U.S. Drug Purchases, Annual Total, 2012 to 2021F.....	121
Exhibit 79: Average Year-Over-Year Change in Pricing of Mature Generic Drugs, 2014-2017.....	124
Exhibit 80: Total Change in 30-Day Equivalent Prescriptions Dispensed and Prescription Purchase, by Pharmacy Format, 2012-2016	126
Exhibit 81: Pharmacy Industry Prescription Revenues, Traditional vs. Specialty Drugs, 2011-2021.....	128
Exhibit 82: Oral Oncology Agents, by Dispensing Channel, 2009 vs. 2016.....	130
Exhibit 83: Share of Specialty Distributor Revenues from Independent Physician-Owned/Operated Clinics, 2011-2015	132
Exhibit 84: Percentage of Oncology Practices Owned by a Hospital or Health System, 2003-2015	133
Exhibit 85: Medicare Part B Spending on Provider-Administered Outpatient Drugs, by Location of Service, 2005-2015	134
Exhibit 86: Change in Medicare Part B Spending on Outpatient Drugs, by Location of Service, 2005-2015 ...	135
Exhibit 87: Health Plans' Perceived Pricing Competitiveness for Specialty Pharmacy Medications, by Site of Care, 2017	137
Exhibit 88: Oncology Drug Sourcing for In-Practice Administration, by Practice Type and Source, 2015.....	138

Exhibit 89: Oncology Drug Sourcing for In-Practice Administration, Use of External Specialty Pharmacies, 2014-2016	139
Exhibit 90: Number of U.S. Biosimilar Development Programs, 2013 to 2016	142
Exhibit 91: Medicare Payment Rate Per Unit, Remicade vs. Biosimilars, 2016-2017	147
Exhibit 92: AmerisourceBergen, Pharmaceutical Distribution, Profitability Metrics, 2013-2017	157
Exhibit 93: AmerisourceBergen, Estimated Revenues and Operating Profit, by Segment, FY2017E	158
Exhibit 94: AmerisourceBergen, Top 10 U.S. Drug Distribution Customers, FY2017	159
Exhibit 95: AmerisourceBergen, Revenues from Walgreens Boots Alliance, 2014-2017E	160
Exhibit 96: AmerisourceBergen, Days Sales Outstanding from Walgreens vs. All Other Customers, 2014-2017	161
Exhibit 97: AmerisourceBergen, Revenues from Express Scripts vs. Express Scripts Pharmacy Revenues, 2013-2017	163
Exhibit 98: AmerisourceBergen, Revenues by Major Business Segment and Customer, FY2012 vs. FY2017E	164
Exhibit 99: AmerisourceBergen Distribution Company, Revenues and Growth, 2013-2017:Q2	164
Exhibit 100: AmerisourceBergen Specialty Group, Revenues and Growth, 2012-2017E	165
Exhibit 101: Animal Health Market, Distributor Market Share, by Company, 2017	166
Exhibit 102: Cardinal Health, Profitability Metrics, 2013-2017	171
Exhibit 103: Cardinal Health, Estimated Revenues and Operating Profit, by Segment, FY 2017	172
Exhibit 104: Cardinal Health, Top 10 U.S. Drug Distribution Customers, FY 2017	173
Exhibit 105: Cardinal Health, Revenues from CVS Health, 2013-2017	175
Exhibit 106: Cardinal Health, Days Sales Outstanding from CVS Health vs. All Other Customers, 2013-2017	176
Exhibit 107: Cardinal Health, U.S. Pharmaceutical Distribution, Revenues and Growth, 2013-2017:Q2	177
Exhibit 108: Cardinal Health China, Revenues, 2011-2017	179
Exhibit 109: McKesson, Distribution Solutions, Gross and Segment Operating Profitability Metrics, 2013-2017	186
Exhibit 110: McKesson, Estimated Revenues and Operating Profit, by Segment, FY 2017	187
Exhibit 111: McKesson, Top 10 U.S. Drug Distribution Customers, FY2017	188
Exhibit 112: McKesson, Revenues from CVS Health, 2013-2017	189
Exhibit 113: McKesson, Days Sales Outstanding from CVS Health vs. All Other Customers, 2013-2017	191
Exhibit 114: McKesson, U.S. Distribution, Revenues and Growth, 2013-2017:Q2	192
Exhibit 115: McKesson Health Mart, Store Count and Change, 2007 to 2017	193
Exhibit 116: McKesson’s OneStop Generic Program, Revenue Growth Rate, 2010-2017E	193
Exhibit 117: McKesson Europe, Revenues and Gross Profit, by Operating Segment, 2017	195