FINAL REPORT

Trends in Hospital Inpatient Drug Costs: Issues and Challenges

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Preface

October 11, 2016

The price of prescription drugs has skyrocketed over the past several years. It seems that every day we hear a new report of how the cost of drugs hurts patients. When the price of a two-pack of Epipens jumped from $100 to $600 between 2007 and 2016 – an increase of 500 percent – parents around the country wondered if they would be able to acquire this life-saving medication for their children. When the cost of the infection-control drug Daraprim went from $13.50 to $750 a pill overnight, real patients ended up in the hospital when they could not follow their treatment regimens.

These price increases are extremely troublesome throughout the health care system. They not only threaten patient access to drug therapies, but also challenge providers' abilities to provide the highest quality of care. Drug costs also are a major factor in the rising cost of health care coverage.

Hospitals bear a heavy financial burden when the cost of drugs increases and must make tough choices about how to allocate scarce resources. One hospital put the challenge starkly: last year, the price increases for just four common drugs, which ranged between 479 and 1,261 percent, cost the same amount as the salaries of 55 full-time nurses. And while nearly everyone can agree that price increases in the hundreds or thousands of percent are unjustifiable, many hospitals report that annual price increases of 10 or 20 percent on widely-used older generic drugs can have an even greater effect, given the large quantities that a hospital must purchase. Managing these skyrocketing cost increases forces difficult choices between providing adequate compensation to employees, many of whom are highly skilled in professions facing shortages; upgrading and modernizing facilities; purchasing new technologies to improve care; or paying for drugs, especially when these price increases are not linked to new therapies or improved outcomes for patients.

The American Hospital Association and the Federation of American Hospitals commissioned this study to better understand how drug prices are changing in the inpatient hospital setting. Given that inpatient hospital services are generally reimbursed under a bundled payment model, there is no single source for information on how much hospitals spend on drugs and how that amount has changed over time. We intend for this study to help inform policymakers and other stakeholders about the challenges hospitals face in acquiring life-saving treatments, and serve as a basis for further evaluating how drug prices impact the patients we serve.

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EXECUTIVE SUMMARY

While there has been recent high profile media coverage of retail drug price increases, the hospital inpatient pharmaceutical market is often overlooked and is not systematically evaluated. This report presents recent trends in hospital inpatient drug prices and spending, providing policymakers and others with quantifiable information on challenges posed by recent increases in inpatient drug prices.

In conjunction with the American Hospital Association and the Federation of American Hospitals, NORC conducted a survey of all U.S. community hospitals and analyzed survey results of 712 responding to the survey. Additionally, two group purchasing organizations (GPOs) representing over 1,400 community hospitals contributed price and spending data on a subset of drugs. The drugs sampled were identified by expert hospital pharmacy workgroups as being high-spend due to volume, price, or both, or as having experienced substantial price increases in recent years.

Between FY2013 and FY2015, inpatient drug spending increased an average 23.4 percent annually, and on a per admission basis, by 38.7 percent. Over 90 percent of responding hospitals reported that recent inpatient drug price increases had a moderate or severe effect on their ability to manage the overall cost of patient care, with one-third of the respondents indicating that the impact was severe. Many of the sampled drugs that experienced substantial unit price increases in CY2014 and CY2015 were high volume drugs. In most cases, the sampled drugs were not new entrants. This report provides a valuable look at a section of the pharmaceutical market that affects hospitals and the patients they serve.

Key Findings

- Average annual inpatient drug spending increased by 23.4 percent between FY2013 and FY2015.
- Inpatient drug spending increased on a per admission basis by 38.7 percent during the same period.
- Growth in unit price – not volume - was primarily responsible for the increase in total inpatient drug spending.
- Over 90 percent of surveyed hospitals reported that inpatient drug price increases had a moderate or severe effect on their ability to manage costs.
- Due to delays in refreshing the pharmaceutical index, Medicare reimbursement cannot keep pace with rapidly increasing drug prices.
- The growth in spending on inpatient drugs exceeds the growth in spending on retail drugs.
- Price increases appear to be random, inconsistent, and unpredictable: large unit price increases occurred for both low- and high-volume drugs and for both branded and generic drugs. About half of the drugs sampled had no generic competition.

Background

Total net spending on prescription drugs, inclusive of discounts, has accelerated over the past year to $309.5 billion annually, making prescription drugs the fastest growing segment of the U.S. healthcare economy.[1,2] Growth in spending on drugs in 2014 (12.2 percent) dwarfs the overall rate of health care spending growth (5.3 percent) as well as the rate of spending growth on hospital and physician care (4.1 and 4.6 percent, respectively).[3] The price of drugs – not utilization – is the predominant contributor to increased drug spending. While spending on drugs rose 8.5 percent in 2015, total prescriptions dispensed increased by only 1 percent.[4] The Bureau of Labor Statistics (BLS) Producer Price Index (PPI) suggests that pharmaceutical price inflation was 7.2 percent in 2015, greatly outpacing both general inflation (0.7 percent) and medical inflation (2.7 percent). [5]

Healthcare purchasers, including federal and state governments, insurers, individual consumers, and providers, have identified the rising cost of drugs as a major challenge for retaining patient access to care. Hospitals bear a heavy financial burden when the cost of drugs increases. Hospitals are significant purchasers of prescription drugs, such as anesthesia and antibiotics to prevent infections during surgery. They also treat patients suffering the repercussions of being unable to afford or otherwise access their medications, often when these individuals return through the emergency department.

While existing studies have quantified the rate of increase in retail drug prices and spending, data limitations have prevented a more detailed examination of the impact of high and rising drug prices on hospitals and their patients.[6,7] This study sought to document the extent to which inpatient drug prices and spending have increased in the inpatient setting, allowing policymakers and others to examine the impact such changes may have on patients.

[1] IMS Health, "Medicines Use and Spending in the U.S. – A Review of 2015 and Outlook to 2020," http://www.imshealth.com/en/thought-leadership/ims-institute/reports/medicines-use-and-spending-in-the-us-a-review-of-2015-and-outlook-to-2020#form.

[2] Total spending on an invoice price basis in FY2015 was $425 billion.

[3] Centers for Medicare & Medicaid Services. "National health expenditure fact sheet." Baltimore, MD: US Department of Health & Human Services (2015).

[4] IMS Health, "IMS Health Study: U.S. Drug Spending Growth Reaches 8.5 Percent in 2015," April 14th, 2016, http://www.imshealth.com/en/about-us/news/ims-health-study-us-drug-spending-growth-reaches-8.5-percent-in-2015.

[5] U.S. Department of Labor, U.S. Bureau of Labor Statistics. PPI Detailed Report: December 2015, http://www.bls.gov/ppi/ppidr201512.pdf

[6] Leigh Purvis and Stephen Schondelmeyer, "Rx Price Watch Report: Trends in Retail Prices of Prescription Drugs Widely Used by Older Americans: 2006 to 2013," AARP Public Policy Institute, http://www.aarp.org/health/drugs-supplements/info-08-2010/rx_price_watch.html.

[7] Allan Coukell and Chuck Shih, "What's Driving Increased Pharmaceutical Spending?," The Pew Charitable Trust, 2016. http://www.pewtrusts.org/en/research-and-analysis/analysis/2016/05/26/whats-driving-increased-pharmaceutical-spending.

As large purchasers, hospitals appear to be particular targets for drug price increases. At least one pharmaceutical company, Valeant, specifically looked to increase prices for hospital-administered drugs.[8] These increases can be dramatic. In 2015, Valeant raised the list prices of Isuprel and Nitropress, common heart medications, by an average of more than 200 percent and 500 percent respectively.[9] These increases may be higher at individual hospitals: for example, the Cleveland Clinic reported price increases for these two drugs of 310 and 718 percent, respectively, and the hospital spent more than $5.3 million on them alone that year. These are just some examples of the price increases reflected in national data.[10]

> *From the beginning, a key selling point advanced by Marathon was data that it had accumulated showing that Nitropress and Isuprel were mispriced relative to their value to hospitals… we elected to implement significant price increases immediately upon purchasing the drugs. In retrospect, we relied too heavily on the industry practice of increasing the price of brand name drugs in the months before generic entry.*
> *-- J. Michael Pearson, Chief Executive of Valeant Pharmaceuticals*

The way in which hospitals are reimbursed compounds the impact of increasing drug costs. Most hospitals are not directly reimbursed for the drugs they purchase for use in the inpatient setting.[11] Instead, they generally receive a single payment for all non-physician services, including drugs, that they provide during an inpatient stay or, less commonly, each inpatient day (per diem). For example, Medicare, which accounts for a significant source of payments to hospitals for inpatient services nationally, uses a reimbursement system that cannot keep pace with changes in drug prices. Some commercial and other payers either use the Medicare payment model, called the Inpatient Prospective Payment System (IPPS),[12] or pay directly based on the Medicare rate, e.g., as a percentage of Medicare reimbursement. When reimbursement rates cannot keep up with input costs, such as drugs, hospitals must absorb the excess.

Each year, CMS evaluates changes in the prices of goods and services required to furnish acute inpatient care for purposes of updating the IPPS. For purposes of evaluating changes in drug prices, CMS uses the

[8] Committee on Oversight and Government Reform, "Memorandum Re: Documents Obtained by Committee from Valeant Pharmaceuticals," 2016, http://democrats.oversight.house.gov/sites/democrats.oversight.house.gov/files/documents/Memo%20on%20Valeant%20Documents0.pdf.

[9] Brady Dennis, "Rattled by Drug Price Increases, Hospitals Seek Ways to Stay on Guard," *The Washington Post*, March 13th, 2016, https://www.washingtonpost.com/national/health-science/rattled-by-drug-price-increases-hospitals-seek-ways-to-stay-on-guard/2016/03/13/1c593dea-c8f3-11e5-88ff-e2d1b4289c2f_story.html.

[10] Katie Thomas, "Valeant Promised Price Breaks on Drugs. Heart Hospitals are Still Waiting," *The New York Times*, May 11th, 2016, http://www.nytimes.com/2016/05/12/business/valeant-promised-price-breaks-on-drugs-heart-hospitals-are-still-waiting.html.

[11] Some small, rural hospitals, called Critical Access Hospitals, are reimbursed on a cost basis.

[12] Under the IPPS, hospitals are paid a single pre-determined amount that is based on a national base payment rate, which is adjusted to account for factors such as a patient's condition, the treatment provided, and local market conditions that affect hospitals' costs of providing care. The national base payment rate reflects the capital and operating costs that "efficient" hospitals are expected to incur for providing inpatient services. The capital and operating base payments are updated annually to account for changes in patient case mix, market conditions, and other factors.

BLS PPI prescription drug component, which in turn relies on manufacturers to provide timely information on prices. The BLS reviews a sample of drugs that it selects based on probability proportionate to size (dollar value). The BLS refreshes the pharmaceuticals index every five to seven years to allow entirely new products or new trends in the market to be incorporated into the sample.[13] To address the continuous introduction of new drugs, the BLS draws supplemental samples every year.[14] However, these annual samples do not include existing drugs that may have experienced significant price increases in a very short period of time. Thus, the delay in refreshing the pharmaceuticals index fails to capture sudden price increases. Rapid and unpredictable changes in drug prices adversely affect hospitals due to their reimbursement model.

Study Objectives

This study aims to evaluate trends in hospital inpatient drug prices and spending nationwide and assess the impact of such trends on hospitals. Because most payers reimburse hospitals for inpatient services using a predetermined, fixed payment model, data does not readily exist on the price of drugs or other services that are used in the inpatient setting. This study used a large sample survey design to obtain data on this largely unknown market. The study targeted the following research questions:

- Did inpatient drug spending increase between FY2013 and FY2015?
- To what extent was price – not volume – a contributor to changes in inpatient drug spending?
- To what extent have changing drug costs impacted hospitals' ability to manage costs within a predetermined, fixed-amount payment system?

Definitions

This study used the following definitions:

Inpatient drug spending per admission. This study includes hospital-based pharmacy spending on prescription drugs (injectable, non-injectable, and biological products) in inpatient settings during the fiscal year net of discounts. Radiopharmaceuticals are excluded from the estimates. Inpatient drug spending is divided by total admissions per year[15] to calculate inpatient drug spending per admission for each sampled hospital.

[13] Bureau of Labor Statistics (US). The Pharmaceutical Industry: an Overview of CPI, PPI, and IPP Methodology. 2011.

[14] The FDA Orange books list all new drugs approved for marketing in the United States.

[15] Number of hospital admissions are derived from the AHA annual survey.

Community hospitals: All nonfederal, short-term general, and other specialty hospitals. Other specialty hospitals include obstetrics and gynecology; eye, ear, nose, and throat; rehabilitation; orthopedic; and other individually described specialty services. Community hospitals include academic medical centers or other teaching hospitals if they are nonfederal short-term hospitals. Excluded are hospitals not accessible by the general public, such as prison hospitals or college infirmaries.

Price: Price in this report is typically referred to as unit cost or unit purchase cost. For average price, weighted averages were taken based on spending on a drug across different suppliers, formulations and dosages. Prices are inclusive of all discounts, including those offered as volume-based discounts as well as those rebates offered for drugs of varying market competitiveness and relative efficacy.

Total spending: The total amount spent on a drug across inpatient community hospitals responding to the survey.

METHODS

Study Population and Data Sources

The study population includes all U.S. community hospitals. According to the 2014 AHA Annual Survey, there are 4,369 community hospitals in the United States.

This study utilized several complementary data sources. First, we share data collected through a survey sponsored by the American Hospital Association (AHA) and the Federation of American Hospitals (FAH) that targeted all U.S. community hospitals (the Drug Survey). Second, we analyze aggregate prescription drug purchasing information from two group purchasing organizations (GPOs). Third, the study uses information on hospitals' characteristics from the 2014 AHA Annual Survey. Finally, NORC, the AHA and the FAH interviewed key stakeholders from a variety of inpatient settings to supplement the study with qualitative findings on changes in inpatient drug prices.

The Drug Survey was administered using the AHA's Annual Survey web-based platform, and was fielded for two months between April and June 2016. Of the sampled hospitals, 778 hospitals responded. Of the 778 responding hospitals, data from 712 hospitals remained in the survey after data cleaning and quality assurance processes (Table 1).

The GPO data include aggregate inpatient prescription drug purchase cost information for 28 selected drugs for more than 1,400 U.S. community hospitals. Approximately, 38% percent of these hospitals also responded to the Drug Survey. The sampled drugs were selected by expert pharmacist and hospital budget

workgroups because they are either drugs with high inpatient spend or drugs that have experienced substantial price increases in the past several years. Total spending for these drugs for all hospitals in the two GPO networks amounted to $972,208,384 in CY2015.

Table 1. Target Population and Study Sample

Population and Sample Definition	Number of Hospitals
All U.S. Community Hospitals*	4,369
U.S. Community Hospitals Responding to AHA-FAH Drug Survey^	712
All Community Hospitals Belonging to Two Sampled GPO Networks*~	More than 1,400

* Source: 2014 AHA Annual Survey
^ Source: AHA-FAH Drug Survey
~Source: 2014 AHA Annual Survey; GPO Rx Data

Analysis

The study used survey weights to account for overall selection probability of each responding community hospital in the Drug Survey and make the results nationally representative. We used Taylor series variance estimation to compute standard errors. We applied post-stratification weight adjustments to calibrate the survey weights so that they sum to known population totals for key hospital characteristics. We obtained the population totals from the recent census of U.S. community hospitals in the 2014 AHA Annual Survey data set. Post-stratification weight adjustments resulted in reduced variance and bias in the final survey estimates. As shown in Table 2, compared to all U.S. community hospitals, a larger proportion of hospitals responding to the survey were for-profit; belonged to a hospital system; participated in a GPO network; were located in an urban setting; lacked a critical access hospital designation; were designated as teaching hospitals; and were larger in size in terms of number of beds and total Medicare discharges. After post-stratification adjustments were made to the survey weights, survey respondents matched the census of U.S. community hospitals from the 2014 AHA Annual Survey, across all key characteristics.

To estimate inpatient drug spending per hospital admission, information on number of admissions for each surveyed hospital was sourced from the 2013 and 2014 AHA Annual Surveys. Information on number of admissions for FY2015 was not available at the time this report was published. Since volume of admissions was similar between 2013 and 2014, we assumed that volume of admissions in 2015 was similar to 2014. [16]

[16] 2013 AHA Annual Survey, 2014 AHA Annual Survey.

Table 2. Key Characteristics of Sampled Hospitals Compared to all U.S. Community Hospitals

Hospital Characteristic	All U.S. Community Hospitals	Sampled Community Hospitals	
		Unweighted	Weighted [95% CI]
Number of Hospitals	4,369	712	4,369
Ownership			
Government	22.5%	13.9%	22.5% [18.5% - 27.2%]
Not-for-profit	61.8%	57.3%	61.8% [57.3% - 66.1%]
For-profit	15.6%	28.8%	15.6% [13.3% - 18.2%]
Hospital System			
Yes	60.9%	75.4%	60.9% [56.2% - 5.4%]
No	39.1%	24.6%	39.1% [34.6% - 43.8%]
Group Purchasing Organization			
Yes	74.7%	76.3%	74.7% [70.5% - 78.5%]
No	1.8%	1.4%	1.8% [0.8% - 3.8%]
Not Available	23.5%	22.3%	23.5% [19.8% - 27.6%]
Geography (Core Based Statistical Area)			
Division	14%	14.9%	14.0% [11.5% - 16.9%]
Metropolitan	41.4%	48.7%	41.4% [37.3% - 45.7%]
Micropolitan	18.9%	21.2%	18.9% [15.8% - 22.4%]
Rural	25.7%	15.2%	25.7% [21.4% - 30.5%]
Critical Access Hospital			
Yes	29.6%	14.8%	29.2% [24.6% - 34.2%]
No	70.2%	85.3%	70.8% [65.8% - 75.4%]
Teaching Status			
Yes	26.3%	31.9%	26.3% [23.0% - 30.0%]
No	73.7%	68.1%	73.7% [70.0% - 77.0%]
Bed Size			
Up to 99	49.4%	35.0%	49.4% [44.9% - 53.8%]
100 to 399	40.4%	51.7%	40.4% [36.4% - 44.6%]
400 or more	10.2%	13.3%	10.2% [8.3% - 12.5%]
Medicare Discharges			
4th Quartile (highest)	25%	10.0%	25% [20.4% - 30.2%]
3rd Quartile	25%	23.7%	25% [21.5% - 28.8%]
2nd Quartile	25%	35.1%	25% [21.9% - 28.4%]
1st Quartile	25%	31.2%	25% [21.9% - 28.5%]

Source: AHA-FAH Drug Survey; 2014 AHA Annual Survey

To identify the drugs that had the greatest impact on hospital budgets due to changes in price and not volume, we analyzed the GPO data containing information on spending, price, and volume for the 28 selected drugs over a three-year period (CY2013 to CY2015). Total spending and pricing information was aggregated across dosage/strength combinations and branded/generic versions for each drug.[17] We then identified the 10 drugs that had the highest total inpatient drug spending by the GPOs during CY2015, and computed growth in total spending and unit price for these drugs. We also identified the 10 drugs with the largest unit price growth between 2013 and 2015. As shown in Table 3, compared to all U.S. community hospitals, a larger proportion of GPO hospitals were for-profit; belonged to a hospital system; were located in an urban setting; were not a critical access hospital; were designated as teaching hospitals; and were larger in size in terms of number of beds. The GPO hospital sample is a convenience sample; in other words, no sampling weights are used. Because the information from the GPOs was aggregated, we could not apply post-stratification weighting. However, as shown in Table 3, on aggregate, the characteristics of GPO hospitals are quite similar to that of all U.S. community hospitals.

[17] Prices are inclusive of all discounts, including those offered as volume based discounts as well as those rebates offered for drugs of varying market competitiveness and relative efficacy.

Table 3. Key Characteristics of Sampled GPO Hospitals Compared to all U.S. Community Hospitals

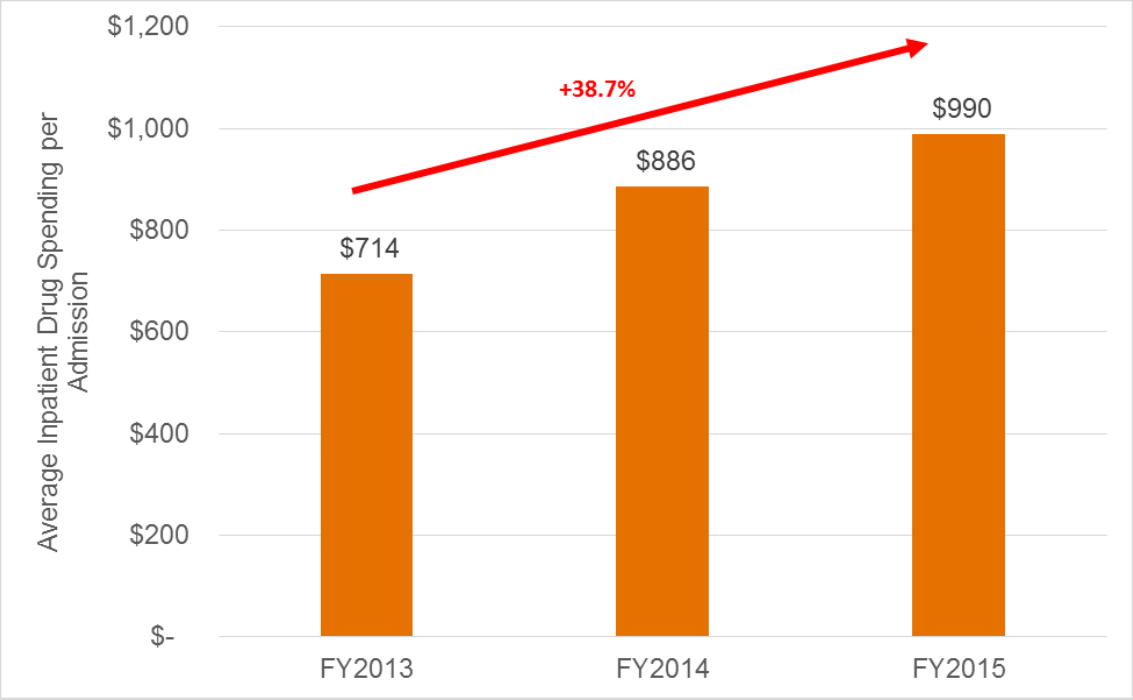
Hospital Characteristic	All Community Hospitals	Community Hospitals Belonging to the Two GPO Networks
Number of Hospitals	4,369	More than 1,400
Ownership		
Government	22.5%	19.2%
Not-for-profit	61.8%	64.3%
For-profit	15.6%	16.5%
Hospital System		
Yes	60.9%	67.1%
No	39.1%	32.9%
Geography (Core Based Statistical Area)		
Division	14%	11.4%
Metropolitan	41.4%	45.8%
Micropolitan	18.9%	22%
Rural	25.7%	20.9%
Critical Access Hospital		
Yes	29.6%	24.6%
No	70.2%	75.4%
Teaching Status		
Yes	26.3%	31.2%
No	73.7%	68.8%
Bed Size		
Up to 99	49.4%	46.4%
100 to 399	40.4%	40.7%
400 or more	10.2%	12.9%
Medicare Discharges		
4th Quartile (highest)	25%	18.7%
3rd Quartile	25%	27.4%
2nd Quartile	25%	25.8%
1st Quartile	25%	28.1%

Source: 2014 AHA Annual Survey; GPO Rx Data

KEY FINDINGS

Inpatient drug spending increased significantly between FY2013 and FY2015. Average annual inpatient drug spending at U.S. community hospitals increased by 23.4 percent between FY2013 and FY2015 (from $5.2 million to $6.5 million).[18] Over the same period, average inpatient drug spending increased 38.7 percent on a per admission basis (from $714 to $990, see Figure 1).[19]

Figure 1. Inpatient Drug Spending per Admission Has Increased Substantially Since 2013



Source: AHA-FAH Drug Survey; 2012-2014 AHA Annual Survey

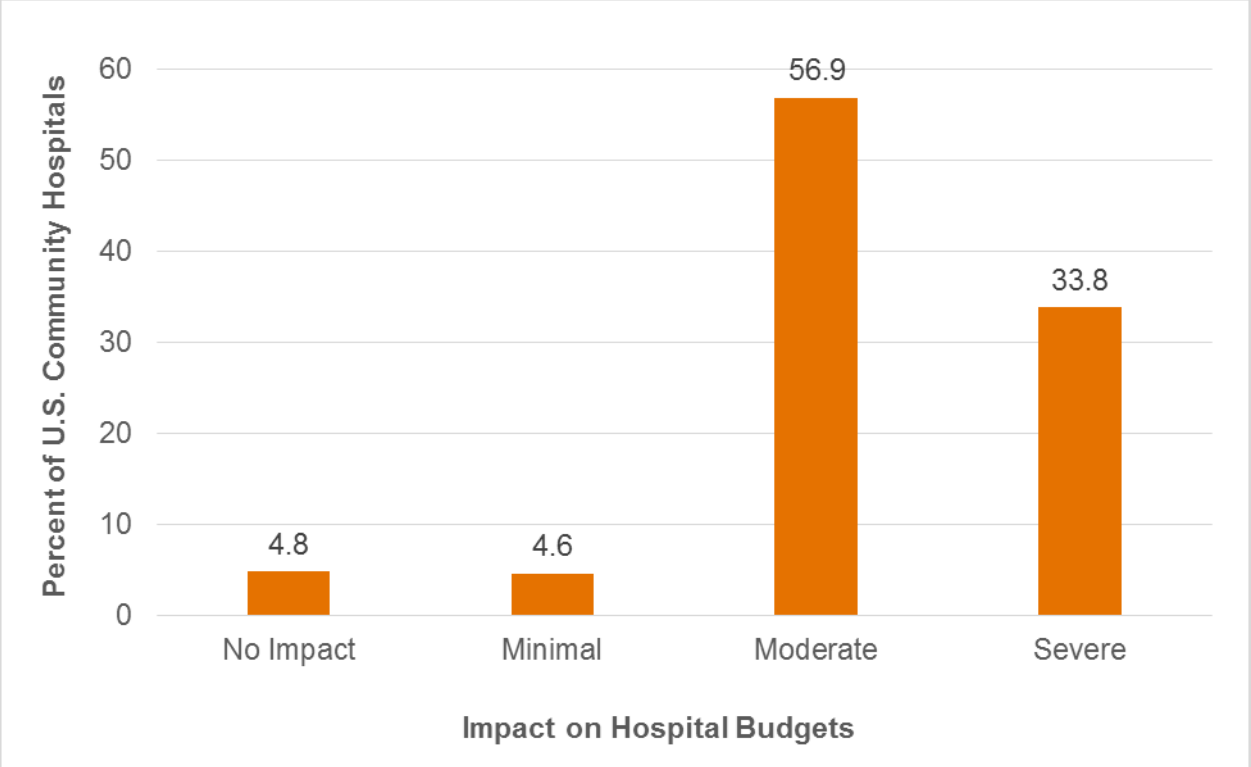
[18] Average annual spending was estimated to increase 11.5 percent between FY2013 and FY2014 from $5.2 million to $5.8 million. Between FY2014 and FY2015, average annual spending increased by 10.7 percent to $6.5 million.

[19] On a per-admission basis, average inpatient drug spending was estimated to be $714 during FY2013. Between FY2013 and FY2014, spending increased by 24 percent to $886 [$795 - $976]. Between FY2014 and FY2015, spending increased by 12 percent to $990 [$893 - $1086].

Changes in inpatient drug spending impacted hospitals' ability to manage costs within a fixed payment system between FY2013 and FY2015. Over 90 percent of the hospitals responding to the Drug Survey reported that recent changes in drug prices had a moderate or severe impact on their budgets, with a third of hospitals rating the impact as "severe" (Figure 2). These observations are reinforced by the fact that growth in inpatient drug spending during this period exceeded the Medicare hospital rate update (IPPS market basket plus/minus adjustments), the pharmaceutical price inflation rate, as well as the spending in the retail drug market (Figures 3 and 4).[20]

> *"There might be upgrades you were trying to do, but there is only [so much] budget to do those things. Is it mandated? Can we duct tape this equipment? If it breaks in six months, we'll buy it out of contingency. These are the tough choices that a small community hospital needs to make…. Drug volume has gone down while dollars [prices] have gone up…. We'll do anything to drive costs down, even [cut] costs like gas and electricity. It's really like a household budget."*
>
> -- Pharmacy Administrator

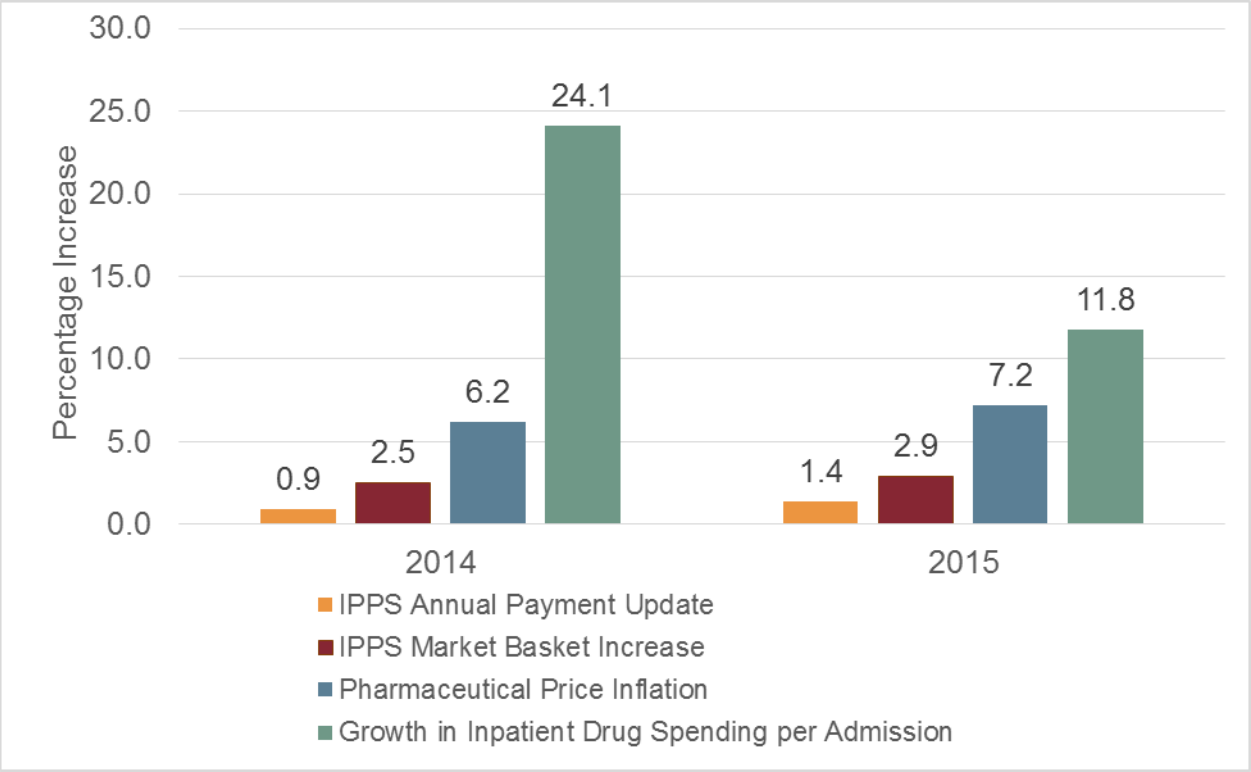
Figure 2. Over 90% of Hospital Administrators Reported That Higher Drug Prices Had a Moderate or Severe Impact on Their Budgets



Source: AHA-FAH Drug Survey

[20] Medicare payments are adjusted annually based on changes to the cost of goods and services ("market basket") plus or minus any other adjustments as a result of other policy changes, such as coding adjustments.

Figure 3. Growth in Inpatient Drug Spending Has Far Outpaced Payer Reimbursement and Pharmaceutical Price Inflation

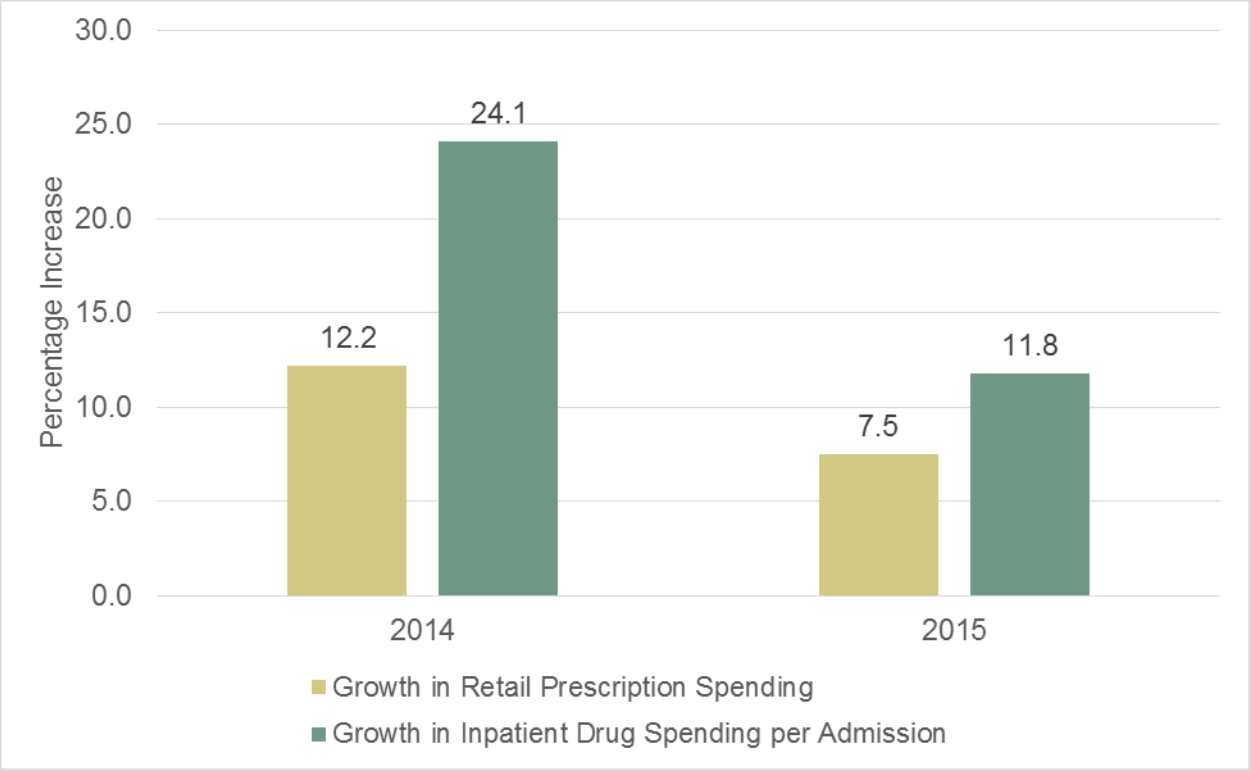


Source: CMS, Bureau of Labor Statistics, National Health Expenditure Data, AHA-FAH Drug Survey

Note: Pharmaceutical Price Inflation refers to the pharmaceutical preparation manufacturing Producer Price Index. Alternative measures include the pharmaceutical indexes for the Consumer Price Index (CPI) and the Import/Export Price Index (IPP).

Note: Adding growth in annual inpatient drug spending per admission in FY2014 and FY2015 (i.e. 24.1% + 11.8%) will not equal the compounded growth rate during the two period (38.7%)

Figure 4. Inpatient Drug Spending Growth Eclipsed Retail Prescription Drug Spending Growth



Source: CMS, Bureau of Labor Statistics, National Health Expenditure Data, AHA-FAH Drug Survey

Note: Data for the 2015 retail prescription price increase is provided by DHHS Office of the Assistant Secretary for Planning and Evaluation (ASPE) projections of NHE data. Medical inflation refers to medical component of the CPI (Consumer Price Index).

Note: Adding growth in annual inpatient drug spending per admission in FY2014 and FY2015 (i.e. 24.1% + 11.8%) will not equal the compounded growth rate during the two period (38.7%)

Drug price increases had a larger impact on hospital drug spending than utilization between CY2013 and CY2015. The data from the two GPOs included information on total inpatient spending, unit price, and change in unit price between CY2013 and CY2015 for the selected drugs. From this data, we were able to calculate total utilization for each year and evaluate how utilization changed over the three year period. By comparing changes in drug prices and changes in utilization on total spend for a drug, we were able to identify where spending was more significantly impacted by price or volume. Consistently, changes in prices drove increases in spending. Figure 5 and Appendix Table A.1 presents information for the 10 drugs with the highest spending; Figure 6 and Appendix Table A.2 presents information for the 10 drugs with the greatest change in unit cost.

Drug price increases appear to be random and inconsistent from one year to the next. The unit price of many of the drugs changed significantly and unpredictably. Many of these drugs – but not all – were high-volume drugs (e.g., calcitonin, nitroprusside, isoproterenol, neostigmine methylsulfate, phytonadione, and glycopyrrolate; Figures 5 and 6). Most were not innovator drugs, that is, brand name

drugs under patent protection. While some drugs increased at similar rates each year (e.g., glucagon), others varied dramatically one year to the next (e.g., acetaminophen, calcitonin).

The rationale for changes in price is not immediately clear. For some, it appears that the instigator for the price change was simply a change in the drug's ownership. For example, the leukemia drug Oncaspar (pegaspargase) was originally approved in 1994. The price of the drug increased by nearly $10,000 last year after Baxalta Inc.'s purchase. The antiparasitic Daraprim (pyrimethamine) was originally approved in 1953, yet cost hospitals substantially more in CY2015 after new owner Turing Pharmaceuticals increased the price by more than 3,000 percent. As previously noted, Valeant increased the prices of Isuprel and Nitropress by hundreds of percent between CY2013 and CY2015 after they purchased the rights to those drugs from Marathon Pharmaceuticals. [21]

> *"You can pretty much ballpark medications that were already high priced, but it's for the ones that were $5 last year and $300 this year. Those are the ones that make it very difficult to budget. These types of increases are being more commonly found for generics. It used to be you could buy these generics and save, now all of a sudden these generics are not cheap anymore. For Isuprel, which is in all your crash carts and increased 500 percent overnight, there is no way to budget ahead of time. It's taking up pretty much the entire DRG reimbursement on cases."*
>
> -- Pharmacy Vice President

> *We did a presentation on nitroprusside and other old drugs to our CEO and our executive team. Our CEO was a former surgeon so he was familiar with the drug. He couldn't believe the magnitude of the increases - he knew it's been around forever."*
>
> -- Chief Pharmacy Officer

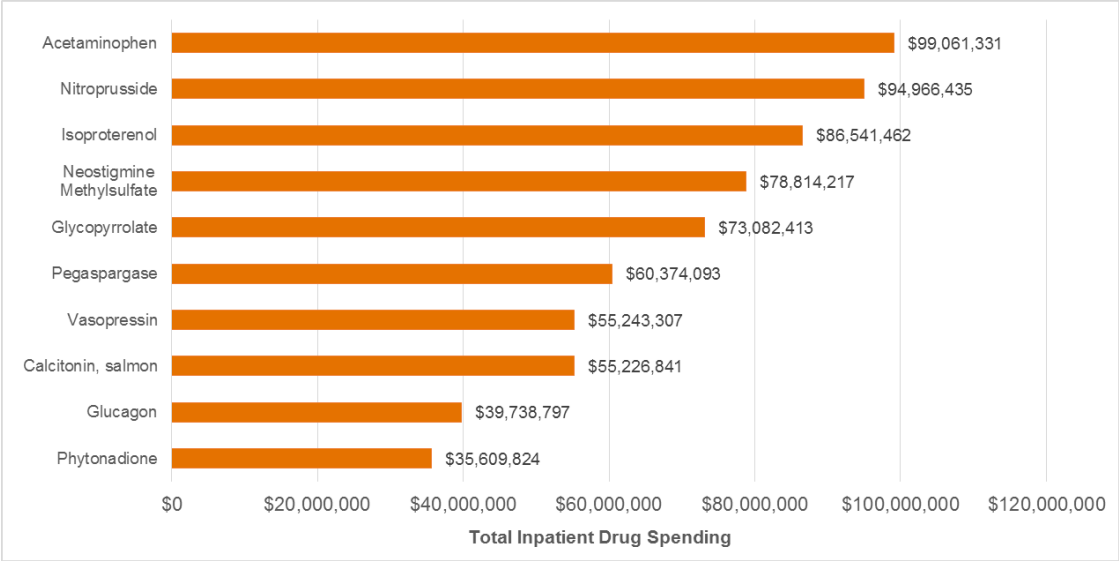
Temporary market failures also appear to impact drug pricing, sometimes with lasting consequences. In 2012 Luitpold Pharmaceuticals, one of only two makers of glycopyrrolate (a drug used to dry secretions prior to surgery) temporarily closed its factory to fix quality control problems.[22] Hikma Pharmaceuticals, the other manufacturer, then raised its prices of the injectable version in 2013. As a result, GPOs experienced a 334 percent increase in the drug's price in CY2014. However, once both manufacturers were making it again, its price decreased by just 5 percent in CY2015.

[21] These figures still reflect aggregated GPO data and represent the price change across two years, see Table A.2.

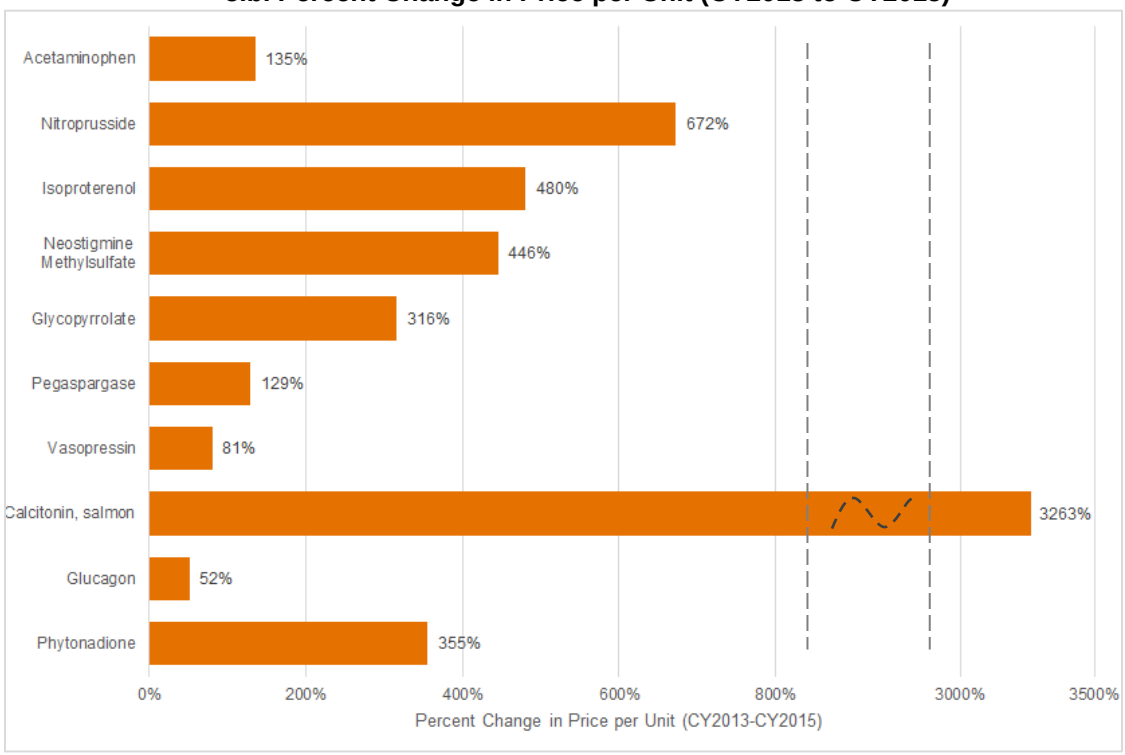
[22] Cynthia Koons, "Broken Markets for Old Drugs Means Price Spikes Are Here to Stay," *Bloomberg,* November 18th, 2015, http://www.bloomberg.com/news/articles/2015-11-18/the-law-of-pharma-pricing-physics-what-goes-up-often-stays-up.

Figure 5. Drugs with the Highest Spending Experienced Significant Price Increases in 2014 and 2015

5.a. Total Inpatient Spending (CY2015)



5.b. Percent Change in Price per Unit (CY2013 to CY2015)

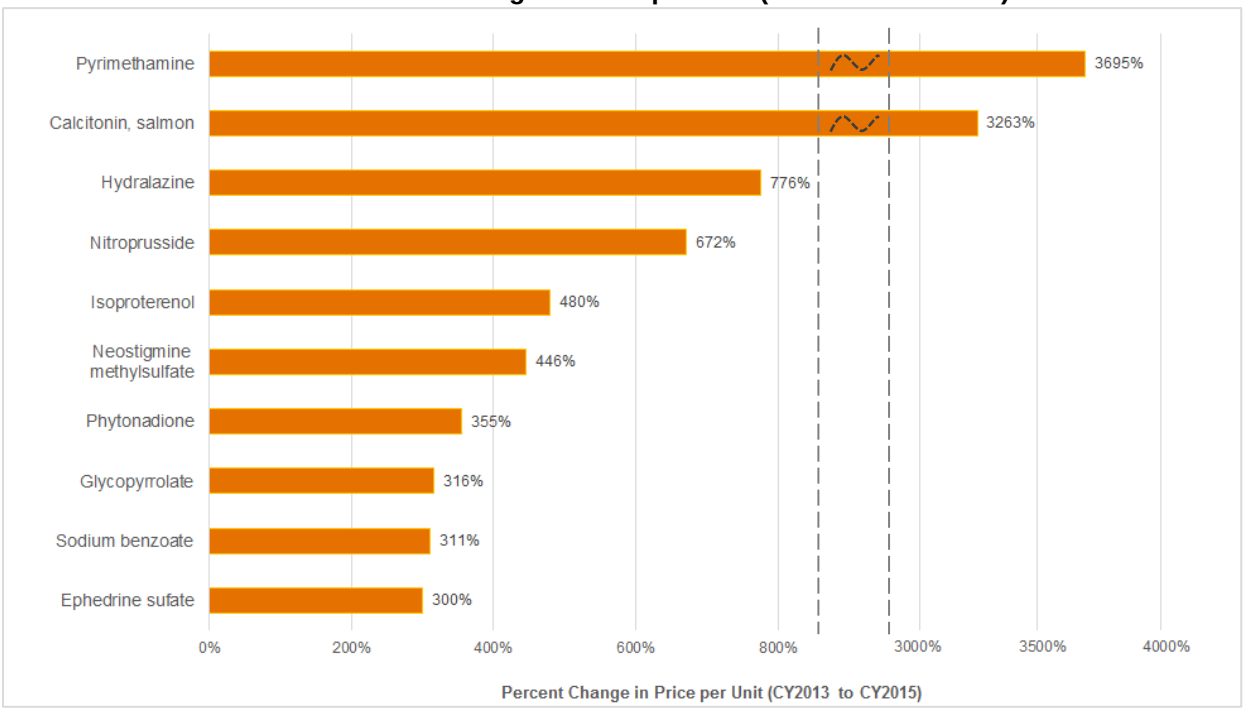


Source: GPO Rx Data

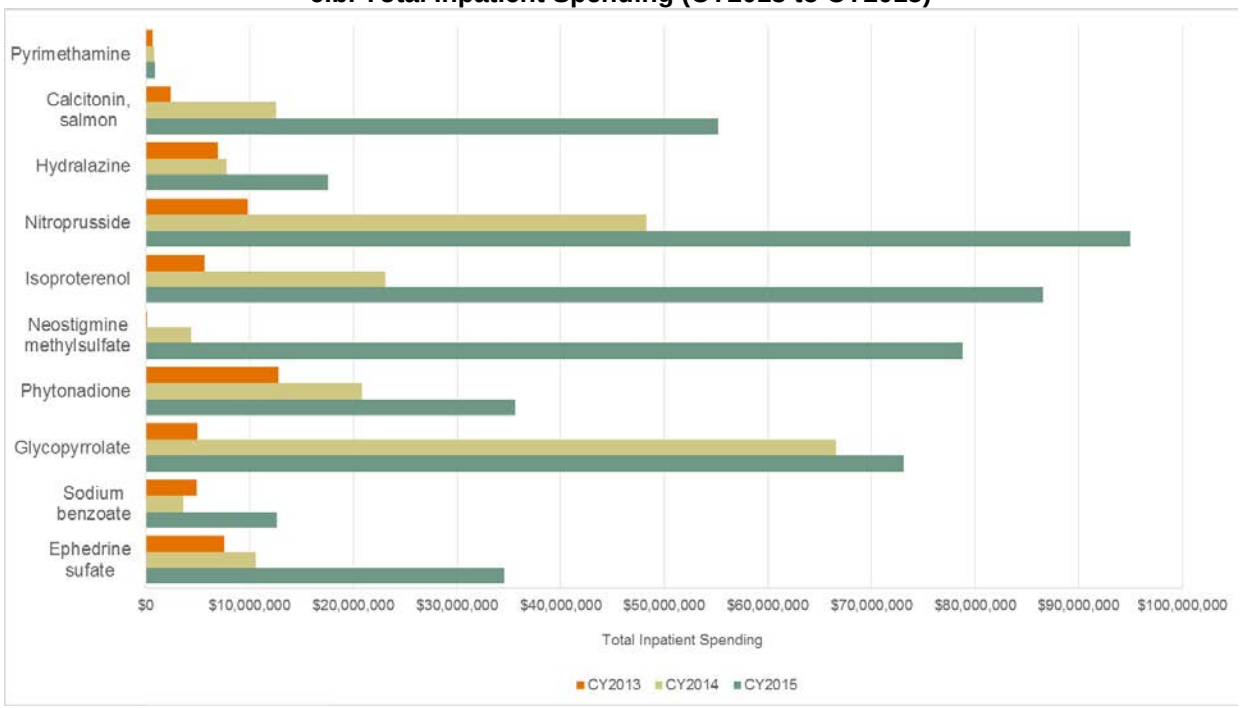
Note: Spending and price increases do not necessary correlate exactly due to changes in volume. In other words, a 100 percent price increase may not result in a 100 percent spending increase due to changes in patient mix, prescribing patterns, and whether the hospital was able to find an alternative drug.

Figure 6. Drugs with the Highest Price Increases between 2013 and 2015 Also Experienced Significant Spending Increases

6.a. Percent Change in Price per Unit (CY2013 to CY2015)



6.b. Total Inpatient Spending (CY2013 to CY2015)



Source: GPO Rx Data

Note: Spending and price increases do not necessary correlate exactly due to changes in volume. In other words, a 100 percent price increase may not result in a 100 percent spending increase due to changes in patient mix, prescribing patterns, and whether the hospital was able to find an alternative drug.

CONCLUSIONS

This study examines trends in inpatient drug spending for hospitals nationwide in order to determine the quantitative impact and to discover how such changes may have impacted hospitals' ability to manage costs. Findings show:

- Drug spending in the hospital inpatient setting is quickly increasing. Growth in annual inpatient drug spending between FY2013 and FY2015 increased on average 23.4 percent, and on a per admission admission basis, 38.6 percent. Growth in spending in the inpatient setting exceeded the growth in retail spending, which increased 9.9 percent during this period. In contrast, CMS's update to hospital rates through the IPPS increased by only 2.7 percent. Large and unpredictable increases in the price of drugs used in the inpatient setting significantly impacted hospitals' ability to manage costs within a fixed price based payment system.
- Many of the sampled drugs that accounted for a substantial proportion of total inpatient drug spending experienced dramatic unit price increases in CY2014 and CY2015. In most cases, the identified top ten drugs were not new entrants.[23] About half of the 28 drugs had no active generic competition, leaving hospitals no lower cost alternatives. For most of the drugs, growth in unit price – not volume – was primarily responsible for the increase in total inpatient drug spending.
- Stakeholder interviews suggest that significant budgetary accommodations are needed to keep up with rising drug prices. Most of those interviewed raised concerns about older generic drugs whose prices have increased unpredictably and the lack of alternatives available in order to provide high quality care to their patients.

[23] The drugs received FDA approval prior to CY2013.

Limitations

The conclusions of this study should be considered in the context of the following limitations:

- The information on total spending for inpatient drugs between FY2013 and FY2015 gathered from the Drug Survey was self-reported.
- Of the 4,369 hospitals that met the criteria to participate in the survey, only 778 responded and the data from only 712 was sufficiently clean to be used.
- Although the survey solicited responses from individual hospitals, some hospitals systems reported aggregate information for the entire system. The analysis took account such responses where it was readily evident that the response was at the system level.
- Not all hospitals participate in GPOs (the GPO data include information on 1,409 of 4,369 U.S. community hospitals), which allow hospitals to consolidate their collective purchasing power. As such, the GPO data may not be reflective of the experience of all hospitals, and likely understates the actual rate of growth.

APPENDIX

Table A1. Change in Unit Cost for Top Ten Drugs with Highest Total Spending in CY2015 (GPO Data)

Generic name	Total Inpatient Spending CY2013	Total Inpatient Spending CY2014	Total Inpatient Spending CY2015	Unit Price CY2013	Unit Price CY2014	Unit Price CY2015	Percent Change in Unit Price (CY2013 - CY2014)	Percent Change in Unit Price (CY2014 - CY2015)
Acetaminophen	43,156,542.02	87,113,521.07	99,061,331.23	12.94	27.64	30.46	114%	10%
Nitroprusside	9,802,140.32	48,278,606.78	94,966,434.83	102.34	150.31	790.46	47%	426%
Isoproterenol	5,602,447.81	23,066,826.13	86,541,461.54	278.67	804.16	1,617.62	189%	101%
Neostigmine methylsulfate	56,818.46	4,311,153.48	78,814,217.26	15.69	16.44	85.59	5%	421%
Glycopyrrolate	4,932,748.72	66,606,577.06	73,082,412.98	5.46	23.83	22.70	337%	-5%
Pegaspargase	32,142,583.64	34,337,561.15	60,374,093.00	5,605.44	5,617.24	12,858.14	0%	129%
Vasopressin	1,923,293.58	3,698,147.36	55,243,306.86	-	48.76	88.16	-	81%
Calcitonin, salmon	2,372,551.94	12,529,284.26	55,226,841.19	67.98	923.51	2,286.23	1259%	148%
Glucagon	23,427,876.25	26,041,923.88	39,738,796.65	109.66	132.91	166.80	21%	25%
Phytonadione	12,731,141.91	20,809,335.38	35,609,824.48	549.84	1,241.61	2,502.80	126%	102%

Source: GPO Rx Data

Table A2. Top Ten Drugs with Highest Unit Price Increases in CY2015 (GPO Data)

Generic name	Total Inpatient Spending CY2013	Total Inpatient Spending CY2014	Total Inpatient Spending CY2015	Unit Price CY2013	Unit Price CY2014	Unit Price CY2015	Percent Change in Price per Unit (CY2013 - CY2015)
Pyrimethamine	595,748.81	801,690.28	812,109.32	919.10	1,045.52	34,882.24	3695%
Calcitonin, salmon	2,372,551.94	12,529,284.26	55,226,841.19	67.98	923.51	2,286.23	3263%
Hydralazine	6,951,150.65	7,725,372.30	17,568,936.99	4.72	5.02	41.32	776%
Nitroprusside	9,802,140.32	48,278,606.78	94,966,434.83	102.34	150.31	790.46	672%
Isoproterenol	5,602,447.81	23,066,826.13	86,541,461.54	278.67	804.16	1,617.62	480%
Neostigmine methylsulfate	56,818.46	4,311,153.48	78,814,217.26	15.69	16.44	85.59	446%
Phytonadione	12,731,141.91	20,809,335.38	35,609,824.48	549.84	1,241.61	2,502.80	355%
Glycopyrrolate	4,932,748.72	66,606,577.06	73,082,412.98	5.46	23.83	22.70	316%
Sodium benzoate	4,857,185.90	3,559,993.22	12,651,343.86	11,118.66	5,192.88	45,665.71	311%
Ephedrine sulfate	7,533,234.15	10,528,689.87	34,552,474.48	5.98	8.90	23.96	300%

Source: GPO Rx Data

Table A3. Glossary

Generic Name	Therapeutic Class	Medical Use	Approval in Past Four Years	Any Generic Competition
Acetaminophen	Analgesic	Treats minor aches and pains, and reduces fever	No	Yes
Calcitonin, salmon	Calcitonin	Treats bone pain and other symptoms of Paget's disease, hypercalcemia, and osteoporosis	No	Yes
Ephedrine sulfate	Sympathomimetics; decongestants, vasopressors	Used to prevent low blood pressure during spinal anesthesia	No	Yes
Glucagon	Hormone, hyperglycemic agent	Treats severe low blood sugar	No	Yes
Glycopyrrolate	Synthetic anticholinergic	Reduces secretions in the mouth, throat, airway and stomach before surgery	No	Yes
Hydralazine	Vasodilator, arteriolar vasodilator	Direct-acting smooth muscle relaxant used to treat high blood pressure	No	Yes
Isoproterenol	Nonselective beta-agonist; sympathomimetic	Used to improve breathing while a patient is under anesthesia, or to treat certain types of heart problems	No	No
Neostigmine methylsulfate	Antianginal, antihypertensive	Reversal agent of certain kinds of muscle relaxants used in surgery	May 31st, 2013 Approval	No
Nitroprusside	Vasodilator	Used to treat congestive heart failure and life threatening high blood pressure, or to keep blood pressure low during a surgery	No	No
Pegaspargase	Chemotherapy, asparaginase	Leukemia treatment	No	No
Phytonadione	Vitamin K	Aids blood clotting	No	Yes
Pyrimethamine	Antiparasitic, antimalarial agent	Treats toxoplasmosis, can also prevent malaria and other infections	No	No
Sodium benzoate	Metabolic Agent	Treatment of urea cycle disorders and hyperammonemia	No	Yes
Vasopressin	Hormone, vasoconstrictor	A blood vessel constricting agent used in emergencies, also used to treat diabetes insipidus, after stomach surgery or before stomach x-rays	April 17th, 2014 Approval	Yes