Assessing Drug Price Changes Over 1 Year and Their Influence on Budget Impact

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BACKGROUND

- Budget impact models (BIMs) help healthcare decision makers evaluate the financial impact of shifts in market share for a selection of pharmaceutical products within the same therapeutic area.[1]
- BIMs can be highly sensitive to the model assumptions and inputs used, including those related to utilization and costs.[1]
- Methodological guidelines are available, but there is no consensus on the appropriate frequency of updating model costs and market-share values.
- Recent drug trend analyses have reported average drug prices change by a modest amount each year.
  - Annual prescription drug price changes were consistently higher on average than inflation rates from 2006 to 2015, with variances as high as 11% from inflation.[2]
  - Drugs in the top 3 most expensive therapy classes of 2016 had an average unit cost change of 9.6% to 15.1% from 2015.[3]
- Human immunodeficiency virus-1 (HIV-1) is associated with high pharmacy costs that are increasing annually (16.2% increase in 2016).[3]
- Using HIV-1 as an example, cost scenario analyses can be conducted with a pharmacy BIM to assess how variations in drug prices over 1 year influence the budget impact.

OBJECTIVES

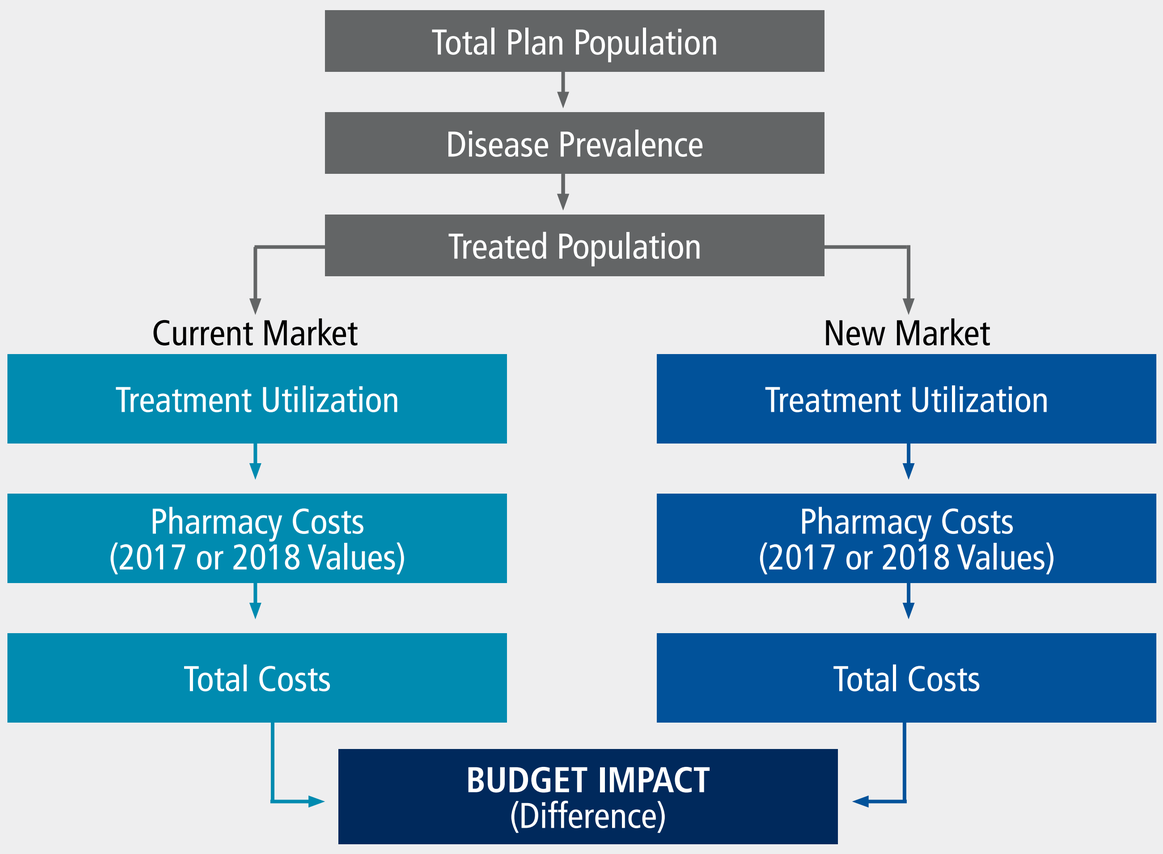
- To assess the percent change in the average wholesale prices (AWPs) of HIV-1 therapies compared to the top 50 branded drugs from 2017 to 2018.
- To investigate the effect of drug price updates on the results of an HIV-1 pharmacy BIM, holding other inputs constant.

METHODS

Model Design

- An Excel-based pharmacy BIM was developed to test how changes in drug prices alone can alter the model results.
- The model estimated the total pharmacy costs associated with treating stable adults with HIV-1 and the impact of market-share fluctuations over 1 year for a hypothetical 1 million-member US health plan (**Figure 1**).

Figure 1. Model Structure



Model Inputs

- Target population was US adults living with HIV-1 who are stable on anti-retroviral therapy (ART).
  - Target population size was estimated using published US disease prevalence and treatment rates.[4,5]
- Model comparators included Genvoya®, Triumeq®, Atripla®, Prezista®, Tivicay®, Sustiva®, Stribild®, and Isentress®.
  - Comparators were selected based on highest sales for branded HIV-1 therapies in the US according to Datamonitor.[6]
  - For some regimens, emtricitabine/tenofovir and ritonavir were included with therapy based on current treatment guidelines.[7]
- Pharmacy costs were based on AWP from 1/1/2017 and 1/1/2018, according to RED BOOK®.[8]
- The market-share values for the "current market" and "new market" were based on the relative drug sales for each product from 2 recent years of data.[6]

Cost Analyses

- Unit drug costs from 2017 and 2018 were compared to calculate an average percent change in price.
  - One-year price changes for the HIV-1 agents were estimated; the top 50 branded drugs with the highest sales in 2017 were similarly evaluated for reference.[6]
- Two cost scenarios were conducted where the BIM was populated using pharmacy costs from 2017 and 2018.
  - Population size, market share, and other non-cost inputs between the scenarios remained constant.
  - The total and per-member-per-month (PMPM) budget impact results for each cost scenario were compared to assess the absolute and percent change in budget impact from 2017 to 2018.

RESULTS

- A total of 1,406 adults living with HIV-1 and stabilized on ART were estimated (0.14% of the total health plan).
- AWPs for the HIV-1 agents included in the model increased by a mean of 11.5% from 2017 to 2018, while the top 50 branded drugs increased by a mean of 10.0% (**Table 1**).

Table 1. Pharmacy Cost Comparison

Therapeutic Area (# of Agents)	Total Average Unit Costs (1/1/2017)	Total Average Unit Costs (1/1/2018)	Average % Change
HIV-1 (11)	**$65.16**	**$72.62**	**11.5%**
Top Branded Agents (50)	**$2,980.30**	**$3,276.98**	**10.0%**
Cardiovascular (2)	$11.08	$11.95	7.9%
Hematology (1)	$1,787.52	$1,857.60	3.9%
Immunology & Inflammation (7)	$3,989.52	$5,736.68	43.8%
Infectious Diseases (7)[a]	$508.00	$520.72	2.5%
Metabolic (7)	$34.97	$37.21	6.4%
Neurology (7)	$562.26	$595.19	5.9%
Oncology (13)	$1,469.62	$1,630.90	11.0%
Ophthalmology (2)	$45,600.00	$45,600.00	0.0%
Respiratory (4)	$309.25	$334.29	8.1%

[a] Includes 3 HIV-1 agents.
Key: HIV-1 – human immunodeficiency virus-1.

- The budget impact results for the 2 drug cost scenarios are presented in **Table 2**.
  - The absolute difference in PMPM cost between the 2017 and 2018 models was $0.041 (a 136.3% change).

Table 2. BIM Cost Scenario Analysis

Tool	Current Market	New Market	Total Budget Impact	PMPM Budget Impact
Scenario 1: 2017 Costs	$53,856,720	$53,495,489	-$361,230	-$0.030
Scenario 2: 2018 Costs	$60,161,828	$60,292,924	$131,095	$0.011
Difference (Scenario 2 vs 1)	**$6,305,109**	**$6,797,435**	**$492,326**	**$0.041**

Key: BIM – budget impact model; PMPM – per member per month.

LIMITATIONS

- The model does not include rebates or discounts when estimating costs, which may not reflect real-world pricing.
- Findings from the model are specific to HIV-1 and the comparators and inputs used, which limits the generalizability of the results.
- Further research is recommended to assess how price changes influence budget impact analyses for other therapeutic areas.

CONCLUSION

- While HIV-1 drug costs on average changed by <12% in 1 year, updating the costs in the model led to a substantial change in budget impact.
- This analysis highlights the importance of regularly updating cost inputs for models, as pharmacy BIMs can be sensitive to changes in drug price.
- Caution should be exercised with using extended time horizons in BIMs when pharmacy costs are anticipated to change during the model time horizon.

1. Sullivan SD, Mauskopf JA, Augustovski F, et al. Budget impact analysis—principles of good practice: report of the ISPOR 2012 Budget Impact Analysis Good Practice II Task Force. *Value Health*. 2014;17:5-14. **2.** Schondelmeyer SW, Purvis L. Trends in retail prices of prescription drugs widely used by older Americans: 2006 to 2015. Rx Price Watch Report. AARP Public Policy Institute. December 2017. https://www.aarp.org/ppi/info-2016/trends-in-retail-prices-of-drugs.html. Accessed December 28, 2017. **3.** Express Scripts. 2016 Drug Trend Report. February 2017. http://lab.express-scripts.com/lab/drug-trend-report. Accessed December 13, 2017. **4.** Bradley H, Hall HI, Wolitski RJ, et al. Vital signs: HIV diagnosis, care, and treatment among persons living with HIV—United States, 2011. *CDC MMWR*. 2014 Nov 28;63(47):1113-1117. **5.** United States Census Bureau. US and World Population Clock. https://www.census.gov/popclock/. Accessed December 28, 2017. **6.** Datamonitor Healthcare, PharmaVitae Drug Sales Analytics. Pharma Intelligence, Informa PLC. Accessed December 28, 2017. **7.** Department of Health and Human Services. Guidelines for the Use of Antiretroviral Agents in Adults and Adolescents Living with HIV. http://aidsinfo.nih.gov/contentfiles/lvguidelines/AdultandAdolescentGL.pdf. Accessed December 28, 2017. **8.** RED BOOK®. IBM Micromedex®, IBM Watson Health™. Accessed January 3, 2018.

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