

Comparing the cost of community pharmacy and mail-order pharmacy in a US retirement system

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SUMMARY

Although community pharmacies have been the mainstay for drug distribution in the USA, plan members are encouraged to use mail-order pharmacies as a cost-containment strategy. Both channels differ with respect to reimbursement rates, utilization, and costs. We evaluated the differences in reimbursement rates and in ingredient costs between the two dispensing channels.

We used pharmacy claims from a large Midwestern retirement system for the period 2000–2005. A representative sample of drug products was selected. We estimated the aggregated gross reimbursement, the ingredient cost, dispensing fee, pharmacy incentives for drug substitution, professional fee for other services, sales tax, and reimbursement per payer.

The sample contained 1964 observations—four million claims. There were 58.5% observations for single source brands and 39.0% for generics. Observations with lower unit gross reimbursement rate in community pharmacy increased from 10.3% to 16.5%. Unit ingredient cost and dispensing fees were higher in community pharmacy than in mail-order pharmacy. Community pharmacy had a lower reimbursement rate per unit of medication (33.5–44.6% observations) compared with mail-order pharmacy. There were 87.3–98.1% observations with a higher patient co-financing per unit of medication in community pharmacy.

Gross pharmaceutical reimbursement rates and unit ingredient costs were higher in community pharmacy than in mail-order pharmacy; but in more than 10% of the observations, the costs were higher in mail-order pharmacy than in community pharmacy. Copyright © 2011 John Wiley & Sons, Ltd.

KEY WORDS: prescription drugs; mail-order pharmacy; pharmaceutical reimbursement; pharmaceutical utilization; drug prices

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BACKGROUND

Outpatient drug expenditures, which are driven by drug utilization and cost, increased from \$72.2bn to \$253.6bn in the period 1995–2008 (U.S. Census Bureau, 2009), representing an average annual growth rate of 11.6%. During this same period, outpatient prescriptions increased from 2.13 billion to 3.54 billion, and the average cost per outpatient prescription increased from \$33.98 to \$71.7. Expenditures for mail-order pharmaceuticals also increased from \$7.4bn to \$55.1bn from 1995 to 2008, while the number of prescriptions dispensed via mail-order increased from 86.0 million to 238.0 million. In 2008, mail-order pharmacy represented 21.7% of outpatient prescription expenditures, an up from 10.2% in 1995.

The USA has a complex system for drug distribution. Drugs prescribed to outpatients can be filled through two different channels: community pharmacy and mail-order pharmacy. Community pharmacies include independent pharmacies, pharmacy chains, supermarkets, and mass merchandisers. In mail-order operations, drugs are sent directly to the outpatient's residence. In an effort to control increasing prescription drug expenditures, outpatients are encouraged to use mail-order pharmacies through the conditions of their health plan.

In the USA, most pharmaceutical expenditures are paid by third-party payers (Centers for Medicaid and Medicare Services, 2010). Third-party payers rely heavily on pharmacy benefit managers (PBMs) to process prescription claims, reimburse pharmacies for drugs that are covered under a healthcare plan, and manage health plan benefits. Once reimbursement rates are negotiated for pharmaceuticals, utilization and costs of these pharmaceuticals are managed by several strategies including formularies established by providers, drug discounts and rebates through manufactures, member financing with copayments, coinsurance, deductibles, and the shift of members from community pharmacy to mail-order pharmacy services (Sroka, 2000; Federal Trade Commission, 2003; Haas *et al.*, 2005; Goldman *et al.*, 2007; Hoffman *et al.*, 2009). PBMs serve mail-order and community pharmacies, as well as operate their own mail-order pharmacies, and they may serve concurrently as representatives of the health plans in negotiations with community pharmacies.

The relationship among PBMs, providers, and manufactures is complex, and numerous issues relating to drug costs, selection, and utilization have surfaced, with cost containment recognized as a major force driving the shift in dispensing from community pharmacy to mail-order pharmacy (Wertheimer and Andrews, 1995; Johnson *et al.*, 1997; Parente *et al.*, 2008). From a cost perspective, mail-order pharmacy has lower dispensing and administrative cost per unit of medication, because more units are dispensed per prescription. Moreover, higher pharmacy discounts and manufacturer rebates could also contribute to lower unit costs in mail-order pharmacy as compared with community pharmacy (Wertheimer and Andrews, 1995; Cook, 1999; Office of health Policy, 2000). From a utilization standpoint, whereas more community pharmacies are offering a 90-day supply of medications to match mail-order pharmacies, mail-order pharmacies generally dispense a 90-day supply of medication as compared with a 30-day supply in community pharmacies. This difference results in larger amounts of medication being dispensed to the

patient via mail-order pharmacy as compared with community pharmacy, resulting in higher utilization in mail-order pharmacy (Thomas *et al.*, 2002; Wilson, 2002; Valluri *et al.*, 2007).

While these endpoints are useful measures of utilization and cost, a comparison of reimbursement rates between mail-order and community pharmacies would also be useful, as reimbursement rates are negotiated for drugs dispensed through either channel. However, there is a paucity of studies that have compared reimbursement rates or examined the components of drug utilization and reimbursement between community pharmacy and mail-order pharmacy (Olson, 2003; Johnsrud *et al.*, 2007). Thus, the objective of this study was to compare the average reimbursement rate per unit of medication by using a representative sample of pharmaceutical products dispensed in community pharmacy and in mail-order pharmacy from the perspective of the healthcare payer. Specifically, this study evaluated the differences between gross pharmaceutical reimbursement, individual components of reimbursement, and reimbursement rate per unit by type of payer between community and mail-order pharmacy.

METHODS

Data for this analysis were derived from a pharmacy claims database from a large public retirement system in the Midwestern USA from January 2000 to September 2005. The retirement system had a pharmacy benefit plan that applied to all members. We reconciled debit and credit adjustments and excluded claims with irregularities and errors (e.g., missing transaction identifications, erroneous drug identifiers, zero quantity claims) prior to analysis. Because price changes could affect reimbursement of the products dispensed in both channels, separate reimbursement comparisons were conducted on an annual basis for each year of follow-up (2000–2005). In order to create a representative sample of drugs, we selected drug products that had at least one claim dispensed in either channel in each of the years of follow-up. Because each drug product may have had a different price depending on its formulation, strength, and generic status (i.e., single source brand, generic, multi-source brand), the combination of generic name, formulation, strength, and generic status was used as the unit of analysis.

The analysis was conducted from the perspective of the prescription drug payer (i.e., retirement system, other third-party payers, plan members). Gross reimbursement represented the total reimbursement of the drug therapy provided regardless of the payer. Gross reimbursement was defined as the sum of the amount paid by the retirement system, the amount paid by plan members, and other payments made by other third-party payers such as Medicaid.

In terms of reimbursement components, the breakdown of gross reimbursement includes ingredient cost, dispensing fee, pharmacy incentive for drug substitution, professional fee for other services, and sales tax. The reimbursement breakdown by payer includes payments made by the retirement system, the member, and other third-party payers. The member co-financing includes copayment, coinsurance, deductible, amount exceeding benefit maximum, and amount attributed to product selection.

We aggregated the gross reimbursement, reimbursement components, and reimbursement per payer for each unit of analysis by year. The reimbursement rate per unit (e.g., tablet, vial) for each channel for each year in the analysis was determined by dividing the total annual reimbursement or reimbursement component for that channel by the total annual quantity of units dispensed in that channel. Then, gross reimbursement per unit of medication by year, by component of gross reimbursement, and by type of payer was compared between the two dispensing channels to evaluate differences in unit reimbursement rates.

RESULTS

The pharmacy claims database contained a total of 26.0 million claims, of which 24.2 million (96.8%) valid and adjusted claims from 2000 to September 2005 were used for further analysis. The sample contained 1964 observations of the unit of analysis (i.e., unique combination of drug product, formulation, strength, generic status) corresponding to 1686 drug products that were dispensed in both channels in each year of the study period. All mail-order prescriptions were dispensed by a PBM-owned mail-order operation; pharmacy prescriptions were dispensed by 3500 different community pharmacies. The sample included four million claims and 511 million dispensed units of medication. A total of 1149 (58.5%) observations were for single source brand name products, and 765 (39.0%) observations were for generic products (Table 1).

In Table 2, community pharmacy is compared with mail-order pharmacy with respect to gross reimbursement rate, cost component, and type of payer. In the year 2000, 10.3% observations had lower gross reimbursement rates per unit of medication in community pharmacy compared with mail-order pharmacy, and 89.7% of the observations had higher reimbursement rates in community pharmacy compared with mail-order pharmacy (Table 2). By year-to-date (YTD) September 2005, 16.5% of the observations had lower gross reimbursement rates per unit of medication in community pharmacy compared with mail-order pharmacy, and 83.5% of the observations had higher reimbursement rates in community pharmacy compared with mail-order pharmacy. From 2000 to YTD September 2005, the gross reimbursement rates per unit that were lower in community pharmacy compared with mail-order pharmacy varied from 10.3% to 16.5% of the observations, and the gross reimbursement rates per unit that were higher in community pharmacy compared with mail order varied from 83.5% to 89.7%.

Table 1. Study sample by type of product and generic status, 2000–2005

Type of product	Count	%
Non-drug item	44	2.2
Generic drug	765	39.0
Brand name drug	1149	58.5
Multi-source drug	6	0.3
Total	1964	100.0

Table 2. Comparison between community and mail-order average reimbursement per unit as percentages of total observations, 2000–2005 ($n = 1964$)

Year	Community vs mail-order (%)	Gross reimbursement (%)	Reimbursement by cost component (%)					Reimbursement by type of payer (%)			
			Ingredient cost	Dispensing fee	Pharmacy incentive	Professional fee	Sales tax	Retirement system reimbursement	Patient co-financing	Other payers' reimbursement	
2000	Lower	10.3	16.8	0.0	0.0	0.0	6.8	43.0	3.6	0.0	
	Same	0.0	0.0	100.0	100.0	0.0	70.9	0.2	0.3	98.9	
	Higher	89.7	83.2	99.9	0.0	0.0	22.3	56.8	96.1	1.1	
2001	Lower	10.4	16.5	0.0	0.0	0.0	10.5	40.1	2.1	0.0	
	Same	0.0	0.0	100.0	100.0	0.0	61.4	0.2	0.1	96.1	
	Higher	89.6	83.5	100.0	0.0	0.0	28.1	59.8	97.9	3.9	
2002	Lower	12.1	19.2	0.0	0.0	0.0	10.5	40.8	1.8	0.9	
	Same	0.0	0.0	100.0	100.0	0.0	63.6	0.1	0.1	95.8	
	Higher	87.9	80.8	100.0	0.0	0.0	25.9	59.2	98.1	3.3	
2003	Lower	15.9	22.8	0.0	0.0	0.0	13.0	44.6	1.7	1.2	
	Same	0.0	0.0	100.0	100.0	0.0	68.8	0.0	0.2	95.4	
	Higher	84.1	77.2	100.0	0.0	0.0	18.2	55.4	98.1	3.4	
2004	Lower	16.0	24.2	0.0	0.0	0.0	11.7	33.5	11.2	1.6	
	Same	0.0	0.0	100.0	100.0	0.0	70.5	1.3	0.0	96.6	
	Higher	84.0	75.8	100.0	0.0	0.0	17.9	65.2	88.8	1.7	
2005	Lower	16.5	22.4	0.1	0.0	0.0	7.9	35.4	12.6	0.9	
	Same	0.0	0.1	100.0	100.0	0.0	74.7	1.8	0.1	98.4	
	Higher	83.5	77.5	99.9	0.0	0.0	17.4	62.8	87.3	0.7	

Note: Table 2 represents the percentage of observations with reimbursement rate per unit that is lower, the same, or higher in community pharmacy in comparison with mail-order pharmacy for each reimbursement component and type of payer. Data for 2005 include claims for the months of January to September. Information for drug rebates was not available.

In terms of cost components, there were differences between the two channels with respect to ingredient cost, dispensing fee, and sales tax per unit of medication. The percentage of observations where ingredient cost was higher in community pharmacy as compared with mail-order pharmacy varied from 75.8% to 83.5% from 2000 to YTD September 2005. The percentage of observations where ingredient cost was lower in community pharmacy compared with mail-order pharmacy varied from 16.5% to 24.2% during the same period. Nearly all observations had higher dispensing fees per unit of medication in community pharmacy compared with mail-order pharmacy during the period of analysis. Differences were not observed between either dispensing channels in the pharmacy incentives for drug substitution paid or professional fees during any year covering the period of analysis, as most claims did not include these fees. Overall, 61.4–74.7% of all observations had the same sales tax per unit. An estimated 6.8–13.0% observations had lower sales tax per unit of medication in community pharmacy compared with mail-order pharmacy, and 17.4–28.1% of the observations were higher in community pharmacy compared with mail-order pharmacy during the study period (Table 2).

In terms of payers, the analysis revealed differences between dispensing channels in reimbursement rates paid by the retirement system, patients, and other third-party payers during the period 2000 to YTD September 2005. We found that 33.5–44.6% observations had a lower retirement system reimbursement rate per unit of medication in community pharmacy compared with mail-order pharmacy, and 55.4–65.2% of the observations had a higher retirement system reimbursement rate per unit of medication in community pharmacy compared with mail-order pharmacy. We also found that 1.7–12.6% observations had lower patient co-financing per unit of medication in community pharmacy compared with mail-order pharmacy, and 87.3–98.1% observations had higher patient co-financing per unit of medication in community pharmacy compared with mail-order pharmacy. Finally, 95.4% and 98.9% of observations had the same other (third party) payers' reimbursement due per unit of medication during the period of analysis. The percentage of observations where other (third party) payers' reimbursement rate per unit of medication was lower in community pharmacy compared with mail-order pharmacy varied from 0.0% to 1.6%, and the percentage that was higher in community pharmacy compared with mail-order pharmacy varied from 0.7% to 3.9% during the period of analysis (Table 2).

DISCUSSION

This study used claims data from a large public retirement system to examine reimbursement rates for mail-order and community pharmacies from the perspective of the payer. Findings from this study revealed the differences between the two channels with respect to retirement system reimbursement, patient co-financing, and other (third party) payers' reimbursement. Gross reimbursement rates per unit were higher in community pharmacy compared with mail-order pharmacy. The retirement system reimbursement rate per unit of medication in community pharmacy was higher compared with mail-order pharmacy. Regarding other (third party) payers'

reimbursement rate per unit of medication, reimbursement rates based on the percentage of observations were higher in community pharmacy compared with mail-order pharmacy.

In general, it might be expected that the gross reimbursement rate in mail-order pharmacy would be lower than in community pharmacy. Mail-order pharmacies typically dispense three times the days' supply of medication per prescription dispensed in community pharmacy; therefore, dispensing and administrative costs are expected to be lower in mail-order pharmacy than in community pharmacy despite recent trends in community pharmacies to accommodate a 90-day medication supply. Additionally, the ingredient cost is also expected to be lower in mail-order pharmacy than in community pharmacy because the latter includes independent pharmacies and small chains that cannot always access volume discounts and incentives available to large-volume purchasers such as mail-order pharmacy and large community pharmacy chains. Mail-order pharmacies may also use fewer services from wholesalers by purchasing large volumes of pharmaceutical products directly from the manufacturer.

Health plans negotiate drug reimbursement rates with PBMs based on fixed and variable elements. Fixed cost elements such as dispensing and administrative fee are transparent; variable elements such as the drug ingredient cost and rebates are often unknown to health plans. This study found that more than one-fifth of all observations had higher drug ingredient costs per unit in mail-order pharmacy than in community pharmacy in the period 2003–2005. Thus, the PBM may have selected higher drug prices for estimating the reimbursement rates in mail-order pharmacy than in community pharmacy. Given that PBMs have complete information about prices and reimbursement rates in both dispensing channels, the findings of this study indicate that PBMs are able to set reimbursement rates in either dispensing channel, irrespective of their actual drug acquisition costs.

This study also found that dispensing fees per unit of medication were higher in community pharmacy than in mail-order pharmacy. However, this finding should be interpreted with caution. Dispensing fees set by the PBMs, in general, do not represent the true cost of dispensing pharmaceutical products. Typically, the dispensing fee charged in community pharmacy is below the average cost of dispensing, and mail-order pharmacy does not charge any dispensing fee. Both channels use the spread between the drug reimbursement amount and the actual drug acquisition cost to recover dispensing costs when no reimbursement for dispensing fee exists or when reimbursement is below the actual cost of dispensing.

The results of this study highlight the challenges associated with the use of listed prices, such as the average wholesaler price, to determine the amount of reimbursement for pharmaceutical products. Typically, PBMs negotiate acquisition costs and reimbursement based on a per cent markdown from the average wholesaler price or other listed prices, adding dispensing and administrative fees to their clients. However, these listed prices set by individual pharmaceutical manufacturers may not represent the actual drug acquisition cost. In addition, large PBMs with integrated mail-order pharmacy operations may increase their revenue by using different listed prices in mail-order pharmacy and in community pharmacy and by offering a higher markdown in mail-order pharmacy, giving mail-order

pharmacy the appearance of being more efficient and less expensive than community pharmacy. Prices reflecting the actual acquisition cost net of discounts and rebates, such as the Medicaid average manufacturer price or the Medicare Part B average sales price should be used as a reference point to estimate the reimbursement rates for healthcare payers to PBMs.

The drugs selected in this study represented those products that were dispensed in both community and mail-order pharmacy dispensing channels throughout the study period. Therefore, switching between dispensing channels is likely, and any change in policy or pharmacy benefit that influences channel selection would primarily affect the products selected in the study. Moreover, this analysis did not include information about drug rebates shared by PBMs with the health plan. Without the information regarding rebates, we can only surmise about how the two channels could differ with respect to drug net cost. Drug rebates are typically negotiated with the pharmaceutical manufacturers based on formulary placement and achievement of a specific market share for the rebatable products (Medco Inc., 2009). Formulary placement rebates were expected to be equal in both dispensing channels. However, any difference in market share rebates between both channels is most likely related to mail-order pharmacy carrying a higher proportion of rebatable drugs, such as drugs for chronic conditions. Although market share rebates may be contingent on the volume of drug product dispensed, which may be higher in mail-order pharmacy than in community pharmacy, dispensing the same quantity of medication per prescription in mail-order and community pharmacies should eliminate any difference in drug rebates between both channels. Thus, PBMs with integrated mail-order pharmacies have an incentive to increase utilization in mail-order pharmacy, even at the cost of increased utilization and overall expenditures to their client health plans.

The results of the study also show that the percentage of observations where patient co-financing per unit was higher in community pharmacy than in mail-order pharmacy decreased by 10% during the period of analysis. Thus, the advantage of lower co-financing in mail-order pharmacy for patients was reduced during the period of analysis. The lower co-financing in mail-order pharmacy is one of the main factors explaining the shift of prescriptions to mail-order pharmacy. A previous study of changes in prescription drug spending revealed that increasing copayments in community pharmacy increased the use of mail-order pharmacy under various pharmacy benefit designs (Landon *et al.*, 2007). Another study found that an increase in the ratio of mail-order pharmacy to community pharmacy out-of-pocket costs was associated with lower mail-order utilization rate (Roebuck and Liberman, 2009).

The results of this study are applicable only to large PBMs with integrated mail-order pharmacy operations. Smaller mail-order operations may not be eligible for direct sales from pharmaceutical manufacturers, requiring them to use more intermediaries and precluding them from obtaining the best volume-based discounts. Additionally, the study results are applicable to a pharmaceutical program for a retiree population because health plans with a different population (e.g., children, families with young children) would use a different mix of drug products. Thus, potential differences in reimbursement by therapeutic class and targeted populations could be assessed to improve the information available for managing pharmacy channel selection.

Mail-order pharmacy may not be more efficient at offering lower drug prices to healthcare payers in all product assessments. In fact, compared with mail-order pharmacy, community pharmacy had lower ingredient cost per unit of medication for about 16% to 24% of the observations during the period of analysis. Additionally, PBMs owning mail-order pharmacy operations face a potential conflict of interest in the selection of the dispensing channel. Healthcare payers would benefit from more transparency in the drug acquisition cost, discounts, and rebates available in both dispensing channels. Moreover, the results of this study confirm the challenges associated with the use of listed drug prices that do not represent the actual drug acquisition cost. Prices reflecting the actual acquisition cost net of discounts and rebates would be a better proxy to estimate the reimbursement rates paid to PBMs by healthcare payers.

CONCLUSIONS

In a comparable set of products, we found that 10.3–16.5% of the observations for gross reimbursement rate per unit were lower in community pharmacy compared with mail-order pharmacy and that 83.5–89.7% of the observations for gross reimbursement rate per unit of medication were higher in community pharmacy as compared with mail-order pharmacy. This finding contradicts the common perception that the reimbursement rate per unit in mail-order pharmacy is always lower than in community pharmacy. The patient co-financing per unit was higher in community pharmacy than in mail-order pharmacy, but there was a trend toward increased patient co-financing in mail-order pharmacy during the period of analysis.

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JV conceptualized and designed the study, performed the statistical analysis, and drafted the manuscript. ESV, SLS, and RRM collaborated in the conceptualization and design of the study, the statistical analysis, and drafting the manuscript. All authors approved the manuscript.

REFERENCES

- Centers for Medicaid and Medicare Services. 2010. National Health Expenditure Data. Baltimore, MD. [<http://www.cms.gov/NationalHealthExpendData>]
- Cook AE. 1999. Strategies for containing drug costs: implications for a Medicare benefit. *Health Care Financ R* 20(3): 29–37.
- Federal Trade Commission. 2003. FTC-DOJ Hearings on Health Care and Competitive Law and Policy. Panel Discussion: Pharmacy Benefit Managers. Washington, D.C. [<http://www.ftc.gov/ogc/healthcare/hearings/030626ftctrans.pdf>]
- Goldman DP, Joyce GF, Zheng Y. 2007. Prescription drug cost sharing: associations with medication and medical utilization and spending and health. *J Am Med Assoc* 298(1): 61–69.
- Haas JS, Phillips KA, Gerstenberger EP, Seger AC. 2005. Potential savings from substituting generic drugs for brand-name drugs: medical expenditure

- panel survey, 1997–2000. *Ann Intern Med* **142**(11): 891–897.
- Hoffman JM, Shah ND, Vermeulen LC, et al. 2009. Projecting future drug expenditures--2009. *Am J Health Syst Pharm* **66**(3): 237–257.
- Johnson JA, Coons SJ, Hays RD, Sabers D, Jones P, Langley PC. 1997. A comparison of satisfaction with mail versus traditional pharmacy services. *J Manag Care Pharm* **3**(3): 327–337.
- Johnsrud M, Lawson KA, Shepherd MD. 2007. Comparison of mail-order with community pharmacy in plan sponsor cost and member cost in two large pharmacy benefit plans. *J Manag Care Pharm* **13**(2): 122–134.
- Landon BE, Rosenthal MB, Normand SL, et al. 2007. Incentive formularies and changes in prescription drug spending. *Am J Manag Care* **13**(6 Pt 2): 360–369.
- Medco Inc. 2009. Annual Report 2008. Medco Health Solutions, Inc.: Franklin Lakes, NJ.
- Office of Health Policy. 2000. Report to the President on Prescription Drug Coverage, Spending, Utilization and Price. 2000. Department of Health and Human Services: Washington, D.C. [<http://aspe.hhs.gov/health/reports/drugstudy/index.htm>]
- Olson BM. 2003. Approaches to pharmacy benefit management and the impact of consumer cost sharing. *Clin Therapeut* **25**(1): 250–272.
- Parente ST, Feldman R, Chen S. 2008. Effects of a Consumer Driven Health Plan on Pharmaceutical Spending and Utilization. *Health Serv Res* **43**(5): 1542–1556.
- Roebuck MC, Liberman JN. 2009. Impact of pharmacy benefit design on prescription drug utilization: a fixed effects analysis of plan sponsor data. *Health Serv Res* **44**(3): 988–1009.
- Sroka C. 2000. Pharmacy Benefit Managers. Congressional Research Service report to Congress. Washington, D.C. [<http://www.law.umaryland.edu/marshall/crsreports/crsdocuments/RL30754.pdf>]
- Thomas CP, Wallack SS, Lee S, Ritter GA. 2002. Impact of health plan design and management on retirees' prescription drug use and spending, 2001. *Health Aff (Millwood)* Suppl Web Exclusives: W408–W419.
- U.S. Census Bureau. 2009. *Statistical Abstract of the United States: 2010* (129th edn) U.S. Census Bureau: Washington, D.C. [<http://www.census.gov/compendia/statab/>]
- Valluri S, Seoane-Vazquez E, Rodriguez-Monguio R, Szeinbach SL. 2007. Drug utilization and cost in a Medicaid population: a simulation study of community vs. mail order pharmacy. *BMC Health Serv Res* **7**: 122.
- Wertheimer AI, Andrews KB. 1995. The economics of mail service pharmacy. *Pharmacoeconomics* **7**(2): 111–118.
- Wilson M. 2002. Fiscal Note. LR No. 3446-01. Bill No. HB 1294. Committee on Legislative Research, Oversight Division. Missouri General Assembly. Jefferson City, MO [<http://www.moga.mo.gov/oversight/OVER02/fispdf/3446-01N.ORG.PDF>]