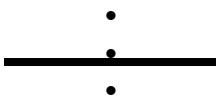
Hospital and Community Pricing Analysis

1995/96 - 1999/00



Prepared by the Patented Medicine Prices Review Board for the

Federal/Provincial/Territorial

Working Group on Drug Prices

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The report was produced under the direction of the Working Group on Drug Prices (WGDP), which is a working group of the F/P/T Pharmaceutical Issues Committee (PIC). The contribution of individual member of the WGDP was invaluable.

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Executive Summary

- Hospital pricing and the potential that manufacturers' may be using the hospital market to influence utilization in the community and potentially result in cost-ineffective prescribing has been identified as an issue of concern by the Pharmaceutical Issues Committee (PIC)/Advisory Committee on Health Services (ACHS).

- A case study analysis reviewed hospital and drug plan price and utilization data for three jurisdictions, British Columbia, Manitoba, and Nova Scotia. Prices in the community and the hospital setting were provided by each jurisdiction for ranitidine, omeprazole, lispro insulin and nitroglycerine. In all three jurisdictions, differences of similar magnitude existed for the nitroglycerine patches and sustained release formulation. The difference in price for ranitidine is similar in British Columbia and Nova Scotia and is smaller, but still significant in Manitoba. Price differences between hospital and community were marginal for omeprazole and lispro insulin.

- A more comprehensive analysis using data from the Patented Medicine Prices Review Board (PMPRB) was conducted on patented drugs to examine whether hospitals act as a "launching pad@ for more expensive Ame-too@ products in six jurisdictions: Nova Scotia, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia. For 110 or 65.48% of the DINs included in this analysis, there were no significant discounts in any of the provinces. There were 14 DINs (or 8.33%) that had a significant discount in only one province, 7 DINs (4.17%) that had a hospital discount in 2 provinces, and so on. There were only 14 DINs or 8.33% of all 168 DINs where a hospital discount greater than 10% was detected in all 6 provinces.

- In Nova Scotia, hospital discounts greater than 10% existed for 14.3% of the sample, in Ontario it was 10.1%, 8.90% in Manitoba, 8.30% in Saskatchewan, 12.50% in Alberta and 10.70% in British Columbia.

- In Nova Scotia and Ontario, Drugs for Treatment of Peptic Ulcer and Vasodilators Used in Cardiac Diseases represented the largest portion of the hospital discounts. Antidepressants and Decongestants and Other Nasal Preparations for Topical Use also had significant discounts in Ontario. In Manitoba and Saskatchewan, hospital discounts were also significant for Vasodilators Used in Cardiac Disease. In Alberta discounts were significant for Anti-Asthmatic Inhalants, Vasodilators Used in Cardiac Disease, and Hormonal Contraceptives for Systemic Use. In British Columbia, Drugs for Treatment of Peptic Ulcer, Vasodilators Used in Cardiac Diseases and Anti-Asthmatic Inhalants represented the largest portion of the hospital discounts.

- Although some hospital discounting was detected in both the case study of specific products identified and the broader analysis using PMPRB data, the discounts are not as wide spread as anticipated. The results suggest that if hospitals are being used to gain market share in the community, price discounts are but one of the tools used in the marketing mix of industry.

- On average, between 10%-14% of patented DINs included in this analysis had hospital discounts greater than 10%. The total value of these discounts for all six jurisdictions is approximately $22 million. Although discounts are not wide spread, the impact of these discounts warrants greater communication and coordination to improve system efficiency and encourage cost-effective utilization. Hospital formulary decisions may have system wide implications; the establishment of formal linkage between plan managers and hospital may be beneficial (e.g. in Nova Scotia provincial drug plan representatives are appointed to hospital boards).

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1. Introduction

Over the years, drug plan managers have been receiving anecdotal information regarding price differentials that exist between hospital and community settings. Understanding hospital pricing strategies and their impact on prescribing, utilization and pharmaceutical cost in the community have been identified as issues of concern by members of the Working Group on Drug Prices (WGDP).

A case analysis based on drugs that individual drug plan managers had some knowledge about was undertaken as an initial step in investigating this issue. The results of the case study and a further more comprehensive review of patented medicines is presented in this report. The analysis was undertaken in order to investigate whether hospitals receive price discounts and review the potential impact of using hospital markets as strategic launching pads to affect prescribing behavior in the community and thus have an impact on overall costs in drug benefit programs.

Concern was raised that the structure for health care funding, (ie. silo budgeting) was resulting in system wide inefficiencies by allowing drug manufacturers to segment markets for profit maximization. Hospitals often make formulary-listing decisions without taking into account the possible implications of those decisions on community prescribing and/or drug plan budgets. The hypothesis was that manufacturers provide hospitals with significantly lower prices in an attempt penetrate the non-hospital market. That is, patients leaving the hospital would be on the drug and would be much more likely to continue to use that drug in the community regardless of that drugs cost-effectiveness profile.

The purpose of this study is to examine whether hospitals act as a “launching pad@ for more expensive drug products. In particular, to examine whether significant price differentials exist between hospital and community settings, and review the possible implications this practice may have on provincial drug budgets.

The results of the case study are presented in Section 3, the results of a more systematic review of price differences between the hospital and the community are presented in Section 4, a more targeted analysis based on a therapeutic category stratification is presented in Section 5. And Section 6 contains some concluding remarks.

2. Methodology:

The case study analysis reviewed hospital and Pharmacare price and utilization data for three jurisdictions, British Columbia, Manitoba, and Nova Scotia. Prices in the community and the hospital setting were provided by each jurisdiction for ranitidine, omeprazole, lispro insulin and nitroglycerine. Drugs were chosen by WGDP members based on prior information regarding those drugs.

The PMPRB database was used to do a more comprehensive review of this issue on patented drugs for six jurisdictions: British Columbia, Alberta, Saskatchewan, Manitoba, Ontario and Nova Scotia. The database contains transaction information for patented drugs that are submitted by manufacturers to the PMPRB on a semi-annual basis. Price of a drug, both in the community and in the hospital sector was an average price of a DIN averaged across all available package sizes. Only drugs that were prescribed both in the hospital and community were included in the study. As well, the study is based on a common basket of drugs, i.e. the drug must be in use in all jurisdictions included in this study. Data[1] was restricted to positively defined drug prices in the hospital and pharmacy markets for all six provinces for the year 1999. A total of 168 DINs define the total market (hospital and pharmacy).

A therapeutic analysis was also conducted using the World Health Organization (WHO) Anatomical Therapeutic Chemical (ATC) classification system. The Ontario Drug Benefit database was used to establish the size of the therapeutic market and determine therapeutic market characteristics, i.e. number of competing products and number of different manufacturers competing for a particular indication or therapeutic category.[2]

3. Case Study Results

Table 3-1 below summarizes the price information in the hospital and community (as submitted to Pharmacare) and reports on the percent differences where price information was available for both sectors. Data is based on best available information in 1999 and is a snap shot for that period.

In all three jurisdictions, differences of similar magnitude existed for the nitro-glycerine patches and sustained release formulation. The difference in price for ranitidine is similar in British Columbia and Nova Scotia and is smaller, but still significant in Manitoba. Price differences between hospital and community were marginal for omeprazole and insulin lispro.

Table 3-1

Community and Hospital Price Comparison for Select Products - 1999

ATC Name	Community Unit Price BC	Hospital Unit Price BC	% Difference	Community Unit Price MB	Hospital Unit Price MB	% Difference	Community Unit Price NS	Hospital Unit Price NS	% Difference
RANITIDINE 150MG TAB	0.40	0.09	-370%	0.44	0.24	-85%	0.42	0.12	-254%
RANITIDINE 300MG TAB	N/A	N/A	N/A	0.86	N/A	N/A	0.82	0.24	-249%
LOSEC 10MG TAB	N/A	N/A	N/A	1.84	N/A	N/A	1.73	1.73	0%
LOSEC 20MG TAB	2.28	2.20	-4%	2.27	2.20	-3%	2.19	2.19	0%
LOSEC 20MG CAP	N/A	N/A	N/A	N/A	N/A	N/A	2.21	N/A	N/A
INSULIN LISPRO 100 UNIT/ML (HUMALOG CARTRIDGE)	N/A	N/A	N/A	2.59	N/A	N/A	3.00	3.00	0%
INSULIN LISPRO 100 UNIT/ML (HUMALOG INSULIN)	N/A	N/A	N/A	2.22	N/A	N/A	2.90	2.90	0%
MINITRAN 0.2MG/HR PATCH	0.60	0.01	-5871%	0.57	N/A	N/A	0.63	0.01	-6167%
MINITRAN 0.4MG/HR PATCH	0.68	0.01	-6694%	0.70	N/A	N/A	0.71	0.01	-7003%
MINITRAN 0.6MG/HR PATCH	N/A	N/A	N/A	0.65	N/A	N/A	0.73	0.64	-14%
NITRO-DUR 0.2MG/HR PATCH	0.60	0.01	-5871%	0.57	0.01	-5641%	0.64	0.01	-6311%
NITRO-DUR 0.3MG/HR PATCH	0.68	0.01	-6694%	0.64	0.01	-6319%	0.63	0.01	-6177%
NITRO-DUR 0.4MG/HR PATCH	N/A	N/A	N/A	0.62	0.01	-6067%	0.74	0.01	-7306%
NITRO-DUR 0.6MG/HR PATCH	N/A	N/A	N/A	0.68	0.01	-6674%	0.84	0.01	-8304%

Community and Hospital Price Comparison for Select Products - 1999									
ATC Name	Community Unit Price BC	Hospital Unit Price BC	% Difference	Community Unit Price MB	Hospital Unit Price MB	% Difference	Community Unit Price NS	Hospital Unit Price NS	% Difference
NITRO-DUR 0.8MG/HR PATCH	N/A	N/A	N/A	1.21	0.01	-12020%	1.19	0.01	-11771%
TRANSDERM-NITRO 0.2MG/HR PATCH	N/A	N/A	N/A	0.60	N/A	N/A	0.74	0.01	-7250%
TRANSDERM-NITRO 0.4MG/HR PATCH	N/A	N/A	N/A	0.68	N/A	N/A	0.83	0.01	-8199%
TRANSDERM NITRO 0.6MG/HR PATCH	N/A	N/A	N/A	0.70	N/A	N/A	0.79	0.01	-7778%
TRANSDERM NITRO 0.8MG/HR PATCH	N/A	N/A	N/A	1.20	N/A	N/A	N/A	N/A	N/A
NITRONG SR 2.6MG TAB	0.35	0.02	-1627%	0.35	N/A	N/A	0.37	0.02	-1739%

4. General Results – Patented Drugs

The PMPRB database was used to test the hypothesis that drug manufacturers discount their products in the hospital sector in order to gain market share of these products in the pharmacy sector in Nova Scotia, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia. Information on patented drugs only was available and the results presented below are limited to patented drugs. It is important to keep in mind that patented medicines may not be representative of all drug market types. Caution should be used to form generalizations beyond the scope of this analysis.

The hypothesis was tested with an examination of[3]: the hospital to pharmacy price variations for each province (Table 4-1)[4].

The incidence of hospital by provinces (Table 4-2).

The provincial distribution of hospital to pharmacy discounts (Table 4-3).
The dollar impact of discounted hospital prices (Table 4-4).

The data has been restricted to the same set of DINs common across all 6 provinces and the results are a summary of the proportion of hospital to pharmacy discounts for each jurisdiction. Table 4-1 represents the percentage of the DINs where the average hospital drug price is less than, equal to or greater than the average pharmacy drug price. For example, the range of < 0.90 indicates that the average hospital drug price is 10% less than the average pharmacy drug price. For Nova Scotia, this occurs in 14.30% of the total number of DINs, 10.10% in Ontario, 8.90% in Manitoba, 8.30% in Saskatchewan, 12.50% in Alberta and 10.70% in British Columbia.[5]

Table 4-1

Hospital to Pharmacy Price Variations by Province
Proportion of DIN's (%) for each Province

Range	Nova Scotia	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
< 0.90	14.30	10.10	8.90	8.30	12.50	10.70
0.90 to 0.95	4.20	8.30	6.50	3.60	4.20	4.80
0.95 to 0.98	4.20	7.10	2.40	7.10	3.00	5.40
0.98 to 1.00	21.40	21.40	16.10	17.90	29.20	25.60
Equal	36.30	10.10	34.50	41.10	24.40	31.00
1.00 to 1.02	12.50	35.10	22.60	12.50	19.60	15.50
1.02 to 1.05	1.80	3.60	1.20	3.00	2.40	2.40
1.05 to 1.10	0.60	0.60	0.60	1.80	1.20	1.20
> 1.10	4.80	3.60	7.10	4.80	3.60	3.60
Total	100.00	100.00	100.00	100.00	100.00	100.00

The total number of DINs in the "<0.90" category ranges from 8.30% to 14.30%. Roughly 60%-70% of all DINs fall in the "0.98 to 1.02" range. This suggests that it may not make economic sense to provide explicit hospital price discounts in all drug markets.[6] For example, it may make more sense to provide a discount in the hospital if patients have the potential of being released on the drug, or if there is significant therapeutic competition in the community (i.e. "me-too" competition), and that the hospital market does not represent a large portion of the manufacturers' sales. A further analysis based on therapeutic markets is presented in section 5.

The results presented in Table 4-2 summarize the number of provinces with a hospital discount of greater than 10%. For example, for 110 or 65.48% of the DINs included in this analysis, there were no significant discounts in any of the

provinces. There were 14 DINs (or 8.33%) that had a significant discount in only one province, 7 DINs (4.17%) that had a hospital discount in 2 provinces, and so on. There were only 14 DINs or 8.33% of all 168 DINs where a hospital discount greater than 10% was detected in all 6 provinces.

Table 4-2

Incidence of Hospital Discounts at the DIN Level by Province				
Number of Provinces with >10% Hospital Discount	Number of DINs	Proportion of DINs (%)	Proportion of Hospital Expenditures (%)	Proportion of Pharmacy Expenditures (%)
0	110	65.48	79.16	54.13
1	14	8.33	4.81	7.74
2	7	4.17	2.68	1.61
3	5	2.98	1.22	4.60
4	8	4.76	2.93	6.84
5	10	5.95	4.47	12.82
6	14	8.33	4.74	12.27
All Cases	168	100.00	100.00	100.00

Table 4-2 also presents the relative market size of these DINs in the hospital and the community (pharmacy). DINs which were classified as not having a significant hospital discount represented 79% of hospital expenditures and 54% of pharmacy expenditures. One possible interpretation is that for drugs where the hospital market is relatively large, the incentive to discount is smaller. For the drugs that had a discount in all six provinces, hospital expenditures represented 5% of the market and 12% of the community pharmacy market. In summary, for 35% of DINs, at least one jurisdiction had a significant discount. These 58 DINs represented 21% of the hospital market and 46% of the pharmacy market.

Table 4-3 provides further information by jurisdiction. In the 14 cases presented in Table 4-2 where only one province had a discount, Ontario represented 43% if those cases. That is, in 1999, Ontario accounted for the majority of cases where only one jurisdiction had a hospital discount greater than 10%. Nova Scotia accounted for 21.40% of instances where one province was detected with a discount, 14.30% for Manitoba, 0% in Saskatchewan, 21.40% in Alberta and 0% in British Columbia. Overall, Ontario had the largest proportion of hospital discounts greater than 10% for the common basket of DINs analyzed 19.6%. Nova Scotia represented 17.20% of the total discounts detected; Saskatchewan and British Columbia were at 16.7%, Alberta at 15.3% and Manitoba at 14.40%.

Table 4-3

Provincial Distribution of Hospital Discounts						
Province:	Nova Scotia	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Number of Provinces with Discounts > 10%	Share in %	Share in %	Share in %	Share in %	Share in %	Share in %
1	21.40	42.90	14.30	0.00	21.40	0.00
2	21.40	21.40	14.30	14.30	7.10	21.40
3	20.00	26.70	6.70	20.00	13.30	13.30
4	18.80	15.60	12.50	18.80	12.50	21.90
5	14.00	18.00	14.00	20.00	16.00	18.00
6	16.70	16.70	16.70	16.70	16.70	16.70
All Cases	17.20	19.60	14.40	16.70	15.30	16.70

Table 4-4 provides the magnitude of the discounts provided in the hospital within the context of community expenditures. That is, if one assumes that the discounts provided in the hospital are reflective of the price of a potential competitor, then the difference between the hospital price and the community price may provide an estimate or a potential savings that could be achieved in the community if the hospital purchased the competing product or if hospital prices were provided in the community. The analysis presented in Table 4-4 is not restricted to the common basket of DINs and captures all discounts that exist for that particular jurisdiction for patented drugs.

Table 4-4

Community Cost with Hospital Discounts						
Province	Total Number of DINs	Number of Discounted DINs Discount of Any Size	Number of DINs with Discount Greater than 10%	Total Possible Savings in Community Pharmacy Expenditures by Applying Hospital Discounts ($)	% of Savings Accounted for by Discounts Greater than 10% (%)	Percent Savings to Total Community Pharmacy Expenditures (%)
Nova Scotia	265	124	39	1,735,116	92	3.83
Ontario	513	258	94	24,631,766	64	3.41
Manitoba	312	131	41	997,371	71	3.59
Saskatchewan	267	99	24	372,750	47	2.31
Alberta	338	167	48	3,056,219	63	2.69
British Columbia	367	175	59	2,974,138	57	3.10

Although a relatively large percentage of DINs are discounted for every jurisdiction, ranging from 37% in Saskatchewan to 50% in Ontario, a much smaller number of DINs with a greater than 10% discount accounted for most of the possible savings. As a proportion of possible savings relative to total pharmacy expenditures, Nova Scotia had the highest percent savings and Alberta had the lowest percent savings.

5. The Incidence of Discounting by General Therapeutic Groupings

An aggregate assessment of the PMPRB database revealed that some hospital discounts do exist, but that relative to the total number of DIN's the overall percentage of DINs with significant discounts, (defined as discounts greater than 10%), is not wide spread.

In order to get a better understanding of whether discounting is more prevalent in particular therapeutic markets, a more detailed analysis based on ATC classification is presented in this section. From a strategic marketing perspective, hospital discounting may be an optimal strategy in therapeutic markets where there are a greater number of competing, relatively interchangeable therapeutic choices. That is, a priori, one might expect that "me-too" competition may plan an important role in determining a manufacturer's hospital pricing strategy, particularly if the hospital market can influence prescribing in the community either through opinion leaders or patients being released from a hospital on a particular therapy which would be continued in the community.

Since the PMPRB database only contains patented drugs, the ODB database was used to define the size of the market as well as estimate the number of firms competing in each therapeutic market. A market was defined at ATC level 4. The fourth level of the ATC grouping categorize drugs according to their chemical/therapeutic and pharmacological grouping. ATC level 5 was used to determine the number of competing therapies. ATC level 5 is a subgroup of chemical substances.

The data presented in Tables 5-1 – 5-6 is jurisdiction specific and provides a therapeutic summary of those classes of drug where a hospital discount greater than 10% were detected in 1999. For each jurisdiction a dollar value associated with the hospital discount in the community, as well as the percentage share that difference represents relative to the total patented community pharmacy market is presented. That is, the difference is the possible savings that one could expect in the community if hospital prices were available. In a sense, this amount represents an estimated cost of hospitals being used as launching pads for influencing community utilization, if the hospital price represents a more competitive or cost-effective price for that therapeutic market. The cost (or possible savings in the community) are calculated by the difference between the hospital price and the community price and multiplied by the community volume. The percent that difference represents relative to the total patented market represents estimates the relative magnitude of the hospital discount. It is important to keep in mind that these numbers are estimated based on the assumption that hospital prices are held constant while community prices are reduced. This is an unlikely scenario in the market place, and any policy aimed at attaining hospital prices in a broader market sector should be evaluated carefully, assessing fully the possible implications on both hospital and drug plan budgets.

In Nova Scotia and Ontario, Drugs for Treatment of Peptic Ulcer and Vasodilators Used in Cardiac Diseases represented the largest portion of the hospital discounts. Antidepressants and Decongestants and Other Nasal Preparations for Topical Use also had significant discounts in Ontario. In Manitoba and Saskatchewan, hospital discounts were also significant for Vasodilators Used in Cardiac Disease. In Alberta discounts were significant for Anti-Asthmatic Inhalants, Vasodilators Used in Cardiac Disease, and Hormonal Contraceptives for Systemic Use. In British Columbia, Drugs for Treatment of Peptic Ulcer, Vasodilators Used in Cardiac Diseases and Anti-Asthmatic Inhalants represented the largest portion of the hospital discounts.

In total, for those patented drugs that are discounted by more than 10%, had those prices been available in the community, total savings for the six jurisdictions would be approximately $22 million.

Table 5-1

Incidence by ATC4 (All DINs) for Nova Scotia – 1999							
ATC4	ATC4 Name	Average Hospital to Pharmacy Price Ratio (%)	Number of Patented DINs	Number of ATC5's	Patented Discount Incidence (% of DINs)	Subtotal by ATC4 of Pharmacy Revenues Saved	% Savings to Total Pharmacy Expenditures for Those Markets with Discounts
A02B	DRUGS FOR TREATMENT OF PEPTIC ULCER	84.85	5.00	5.00	40.00	$252,271.00	18.19
A04A	ANTIEMETICS AND ANTINAUSEANTS	62.07	4.00	2.00	75.00	$63,209.00	29.10
A12B	POTASSIUM	44.37	3.00	1.00	100.00	$72,479.00	50.37
B01A	ANTITHROMBOTIC AGENTS	81.68	5.00	3.00	60.00	$18,234.00	18.23
C01D	VASODILATORS USED IN CARDIAC DISEASES	0.02	4.00	1.00	100.00	$357,858.00	99.98
C10A	CHOLESTEROL AND TRIGLYCERIDE REDUCERS	76.89	11.00	3.00	9.09	$17,397.00	23.11
J01D	OTHER BETA-LACTAM ANTIBACTERIALS	61.87	10.00	1.00	30.00	$221,292.00	24.53
J02A	ANTIMYCOTICS FOR SYSTEMIC USE	84.93	4.00	3.00	25.00	$616.00	15.07
J05A	DIRECT ACTING ANTIVIRALS	81.25	17.00	5.00	5.88	$4,791.00	18.75
L03A	CYTOKINES AND IMMUNOMODULATORS	66.14	4.00	3.00	75.00	$11,367.00	32.88
N02A	OPIOIDS	48.10	8.00	5.00	25.00	$2,559.00	49.33
N02C	ANTIMIGRAINE PREPARATIONS	55.18	5.00	3.00	40.00	$51,454.00	44.55
N03A	ANTIEPILEPTICS	25.73	6.00	7.00	16.67	$58,012.00	74.27
N05C	HYPNOTICS AND SEDATIVES	52.81	2.00	4.00	50.00	$45,298.00	47.19
N06A	ANTIDEPRESSANTS	79.60	17.00	5.00	17.65	$44,041.00	11.49
R03A	ADRENERGICS, INHALANTS	37.23	6.00	4.00	16.67	$25,583.00	62.77
R03B	OTHER ANTI-ASTHMATICS, INHALANTS	78.89	14.00	3.00	21.43	$332,885.00	20.84
R03C	ADRENERGICS FOR SYSTEMIC USE	76.48	1.00	2.00	100.00	$293.00	23.52
S01B	ANTIINFLAMMATORY AGENTS	50.63	2.00	2.00	50.00	$12,812.00	49.37
						Grand Total	Average
						$1,592,451.00	38.47

Table 5-2

Incidence by ATC4 (All DINs) for Ontario - 1999							
ATC4	ATC4 Name	Average Hospital to Pharmacy Price Ratio (%)	Number of Patented DINs	Number of ATC5's	Patented Discount Incidence (% of DINs)	Subtotal by ATC4 of Pharmacy Revenues Saved	Pharmacy Pricing Share Saved (%)
A02B	DRUGS FOR TREATMENT OF PEPTIC ULCER	60.76	13.00	5.00	38.46	$3,123,416.00	16.99
A04A	ANTIEMETICS AND ANTINAUSEANTS	62.72	4.00	2.00	75.00	$562,686.00	23.66
A12B	POTASSIUM	47.84	3.00	1.00	100.00	$254,095.00	57.97
B01A	ANTITHROMBOTIC AGENTS	80.89	12.00	3.00	33.33	$188,197.00	21.84
C01D	VASODILATORS USED IN CARDIAC DISEASES	4.77	5.00	1.00	100.00	$5,897,427.00	93.24
C08D	SELECTIVE CALCIUM CHANNEL BLOCKERS WITH DIRECT CARDIAC EFFECTS	82.67	5.00	2.00	100.00	$253,376.00	17.38
C10A	CHOLESTEROL AND TRIGLYCERIDE REDUCERS	70.17	16.00	3.00	6.25	$149,268.00	29.83
G03A	HORMONAL CONTRACEPTIVES FOR SYSTEMIC USE	12.66	2.00	3.00	100.00	$597,040.00	91.29
H02A	CORTICOSTEROIDS FOR SYSTEMIC USE, PLAIN	48.93	4.00	2.00	50.00	$2,875.00	51.65
J01C	BETA-LACTAM ANTIBACTERIALS, PENICILLINS	63.33	9.00	4.00	44.44	$19,236.00	32.84
J01D	OTHER BETA-LACTAM ANTIBACTERIALS	65.86	34.00	1.00	38.24	$169,931.00	36.73
J02A	ANTIMYCOTICS FOR SYSTEMIC USE	81.47	4.00	3.00	25.00	$4,413.00	18.53
J07B	VIRAL VACCINES	68.95	7.00	1.00	42.86	$4,489.00	12.72
L01D	CYTOTOXIC ANTIBIOTICS AND RELATED SUBSTANCES	19.23	1.00		100.00	$637.00	80.77
L01X	OTHER ANTINEOPLASTIC AGENTS	72.78	1.00	2.00	100.00	$526.00	27.22
L03A	CYTOKINES AND IMMUNOMODULATORS	71.82	11.00	3.00	45.45	$575,412.00	28.43
M01A	ANTIINFLAMMATORY AND ANTIRHEUMATIC PRODUCTS, NON-STEROIDS	88.30	20.00	6.00	5.00	$3,100.00	11.70
M03A	MUSCLE RELAXANTS, PERIPHERALLY ACTING AGENTS	88.67	2.00	1.00	50.00	$637.00	11.33
N01B	ANESTHETICS, LOCAL	83.06	6.00	1.00	50.00	$2,583.00	11.92
N02A	OPIOIDS	69.28	12.00	5.00	25.00	$19,283.00	32.26
N02B	OTHER ANALGESICS AND ANTIPYRETICS	88.41	1.00	3.00	100.00	$1,023.00	11.59
N02C	ANTIMIGRAINE PREPARATIONS	67.26	12.00	3.00	33.33	$311,192.00	17.30

Incidence by ATC4 (All DINs) for Ontario - 1999							
ATC4	ATC4 Name	Average Hospital to Pharmacy Price Ratio (%)	Number of Patented DINs	Number of ATC5's	Patented Discount Incidence (% of DINs)	Subtotal by ATC4 of Pharmacy Revenues Saved	Pharmacy Pricing Share Saved (%)
N06A	ANTIDEPRESSANTS	82.31	21.00	5.00	19.05	$1,563,356.00	12.85
P01A	AGENTS AGAINST AMOEBIASIS AND OTHER PROTOZOAL DISEASES	86.58	1.00	3.00	100.00	$13,934.00	13.42
R01A	DECONGESTANTS AND OTHER NASAL PREPARATIONS FOR TOPICAL USE	78.41	7.00	2.00	14.29	$1,143,719.00	21.59
R03A	ADRENERGICS, INHALANTS	50.68	11.00	4.00	45.45	$376,269.00	52.10
R03B	OTHER ANTI-ASTHMATICS, INHALANTS	65.12	19.00	3.00	31.58	$228,125.00	28.01
R03C	ADRENERGICS FOR SYSTEMIC USE	48.36	1.00	2.00	100.00	$35,791.00	51.64
R07A	OTHER RESPIRATORY SYSTEM PRODUCTS	34.83	2.00		50.00	$56,664.00	65.17
S01A	ANTIINFECTIVES	87.71	3.00	4.00	33.33	$7,019.00	12.29
S01B	ANTIINFLAMMATORY AGENTS	65.23	2.00	2.00	100.00	$217,051.00	29.28
V03A	ALL OTHER THERAPEUTIC PRODUCTS	81.79	2.00	5.00	50.00	$19,556.00	18.21
						Grand Total	Average
						$15,782,770.00	33.61

Table 5-3

Incidence by ATC4 (All DINs) for Manitoba - 1999							
ATC4	ATC4 Name	Average Hospital to Pharmacy Price Ratio (%)	Number of Patented DINs	Number of ATC5's	Patented Discount Incidence (% of DINs)	Subtotal by ATC4 of Pharmacy Revenues Saved	Pharmacy Pricing Share Saved (%)
A02B	DRUGS FOR TREATMENT OF PEPTIC ULCER	69.16	8.00	5.00	12.50	$435.00	30.84
A04A	ANTIEMETICS AND ANTINAUSEANTS	69.55	3.00	2.00	100.00	$29,739.00	28.14
A12B	POTASSIUM	84.54	2.00	1.00	50.00	$1,529.00	15.46
B01A	ANTITHROMBOTIC AGENTS	84.41	7.00	3.00	42.86	$1,134.00	14.86
C01D	VASODILATORS USED IN CARDIAC DISEASES	0.02	5.00	1.00	100.00	$331,134.00	99.98
C08D	SELECTIVE CALCIUM CHANNEL BLOCKERS WITH DIRECT CARDIAC EFFECTS	78.15	1.00	2.00	100.00	$257.00	21.85
D06B	CHEMOTHERAPEUTICS FOR TOPICAL USE	86.92	2.00	3.00	50.00	$6,150.00	13.08
H02A	CORTICOSTEROIDS FOR SYSTEMIC USE, PLAIN	35.51	4.00	2.00	50.00	$1,013.00	65.20
J01C	BETA-LACTAM ANTIBACTERIALS, PENICILLINS	58.81	4.00	4.00	50.00	$974.00	42.93
J01D	OTHER BETA-LACTAM ANTIBACTERIALS	43.59	13.00	1.00	7.69	$342.00	56.41
J05A	DIRECT ACTING ANTIVIRALS	71.22	18.00	5.00	11.11	$448.00	23.23
J07A	BACTERIAL VACCINES	80.49	1.00	1.00	100.00	$125.00	19.51
J07B	VIRAL VACCINES	86.41	2.00	1.00	50.00	$879.00	13.59
L03A	CYTOKINES AND IMMUNOMODULATORS	48.44	5.00	3.00	100.00	$135,773.00	54.08
N02C	ANTIMIGRAINE PREPARATIONS	70.78	7.00	3.00	28.57	$22,735.00	29.02
N06A	ANTIDEPRESSANTS	88.64	15.00	5.00	13.33	$63,289.00	11.28
P01A	AGENTS AGAINST AMOEBIASIS AND OTHER PROTOZOAL DISEASES	62.16	1.00	3.00	100.00	$7,599.00	37.84
R03A	ADRENERGICS, INHALANTS	83.56	7.00	4.00	14.29	$3,211.00	16.44
R03B	OTHER ANTI-ASTHMATICS, INHALANTS	69.43	16.00	3.00	18.75	$59,651.00	14.99
R03C	ADRENERGICS FOR SYSTEMIC USE	71.13	1.00	2.00	100.00	$4,733.00	28.87
S01B	ANTIINFLAMMATORY AGENTS	78.38	1.00	2.00	100.00	$35,900.00	21.62
V03A	ALL OTHER THERAPEUTIC PRODUCTS	83.70	1.00	5.00	100.00	$2,234.00	16.30
						Grand Total	Average
						$709,284.00	38.52

Table 5-4

Incidence by ATC4 (All DINs) for Saskatchewan – 1999							
ATC4	ATC4 Name	Average Hospital to Pharmacy Price Ratio (%)	Number of Patented DINs	Number of ATC5's	Patented Discount Incidence (% of DINs)	Subtotal by ATC4 of Pharmacy Revenues Saved	Pharmacy Pricing Share Saved (%)
A02B	DRUGS FOR TREATMENT OF PEPTIC ULCER	78.26	6.00	5.00	16.67	$16.00	21.74
A04A	ANTIEMETICS AND ANTINAUSEANTS	50.61	2.00	2.00	50.00	$181.00	49.39
A12B	POTASSIUM	44.01	3.00	1.00	66.67	$9,290.00	41.70
B01A	ANTITHROMBOTIC AGENTS	49.30	5.00	3.00	60.00	$1,259.00	54.52
C01D	VASODILATORS USED IN CARDIAC DISEASES	0.02	4.00	1.00	100.00	$90,864.00	99.98
J01C	BETA-LACTAM ANTIBACTERIALS, PENICILLINS	54.10	2.00	4.00	50.00	$173.00	45.90
J01D	OTHER BETA-LACTAM ANTIBACTERIALS	85.17	14.00	1.00	7.14	$267.00	14.83
L03A	CYTOKINES AND IMMUNOMODULATORS	57.39	3.00	3.00	66.67	$1,059.00	51.96
N02C	ANTIMIGRAINE PREPARATIONS	77.66	5.00	3.00	20.00	$16,112.00	22.34
N05C	HYPNOTICS AND SEDATIVES	87.83	2.00	4.00	50.00	$2,885.00	12.17
N06A	ANTIDEPRESSANTS	88.60	16.00	5.00	12.50	$23,081.00	11.39
R03A	ADRENERGICS, INHALANTS	53.99	8.00	4.00	25.00	$15,912.00	48.77
R03B	OTHER ANTI-ASTHMATICS, INHALANTS	44.83	12.00	3.00	8.33	$12,361.00	55.17
R03C	ADRENERGICS FOR SYSTEMIC USE	67.09	1.00	2.00	100.00	$839.00	32.91
						Grand Total	Average
						$174,299.00	48.94

Table 5-5

Incidence by ATC4 (All DINs) for Alberta - 1999							
ATC4	ATC4 Name	Average Hospital to Pharmacy Price Ratio (%)	Number of Patented DINs	Number of ATC5's	Patented Discount Incidence (% of DINs)	Subtotal by ATC4 of Pharmacy Revenues Saved	Pharmacy Pricing Share Saved (%)
A02B	DRUGS FOR TREATMENT OF PEPTIC ULCER	76.17	7.00	5.00	14.29	$11.00	23.83
A04A	ANTIEMETICS AND ANTINAUSEANTS	60.80	5.00	2.00	100.00	$153,085.00	30.31
A12B	POTASSIUM	36.46	3.00	1.00	66.67	$81,618.00	64.85
B01A	ANTITHROMBOTIC AGENTS	78.63	8.00	3.00	50.00	$9,240.00	23.71
C01D	VASODILATORS USED IN CARDIAC DISEASES	4.73	5.00	1.00	100.00	$342,096.00	94.49
C08D	SELECTIVE CALCIUM CHANNEL BLOCKERS WITH DIRECT CARDIAC EFFECTS	81.94	2.00	2.00	100.00	$665.00	18.91
C10A	CHOLESTEROL AND TRIGLYCERIDE REDUCERS	61.81	11.00	3.00	9.09	$15,221.00	38.19
G03A	HORMONAL CONTRACEPTIVES FOR SYSTEMIC USE	29.35	2.00	3.00	100.00	$238,824.00	70.65
H02A	CORTICOSTEROIDS FOR SYSTEMIC USE, PLAIN	34.13	4.00	2.00	50.00	$568.00	66.16
J01D	OTHER BETA-LACTAM ANTIBACTERIALS	51.78	14.00	1.00	14.29	$817.00	50.09
J07B	VIRAL VACCINES	89.80	8.00	1.00	12.50	$638.00	10.20
N01A	ANESTHETICS, GENERAL	85.83	1.00	1.00	100.00	$255.00	14.17
N02A	OPIOIDS	33.65	13.00	5.00	23.08	$13,849.00	68.06
N02C	ANTIMIGRAINE PREPARATIONS	70.72	8.00	3.00	37.50	$164,725.00	28.33
N03A	ANTIEPILEPTICS	60.90	6.00	7.00	16.67	$11,815.00	39.10
N05C	HYPNOTICS AND SEDATIVES	88.57	2.00	4.00	50.00	$3,670.00	11.43
N06A	ANTIDEPRESSANTS	88.59	18.00	5.00	11.11	$153,661.00	11.42
R03A	ADRENERGICS, INHALANTS	65.80	7.00	4.00	28.57	$83,255.00	33.92
R03B	OTHER ANTI-ASTHMATICS, INHALANTS	80.26	18.00	3.00	27.78	$635,640.00	14.87
R03C	ADRENERGICS FOR SYSTEMIC USE	78.26	1.00	2.00	100.00	$7,164.00	21.74
R03D	OTHER ANTI-ASTHMATICS FOR SYSTEMIC USE	85.01	3.00	2.00	33.33	$17,166.00	14.99
S01C	ANTIINFLAMMATORY AGENTS AND ANTIINFECTIVES IN COMBINATION	81.65	3.00	1.00	33.33	$22.00	18.35
						Grand Total	Average
						$1,934,005.00	39.72

Table 5-6

Incidence by ATC4 (All DINs) for British Columbia - 1999							
ATC4	ATC4 Name	Average Hospital to Pharmacy Price Ratio (%)	Number of Patented DINs	Number of ATC5's	Patented Discount Incidence (% of DINs)	Subtotal by ATC4 of Pharmacy Revenues Saved	Pharmacy Pricing Share Saved (%)
A02B	DRUGS FOR TREATMENT OF PEPTIC ULCER	75.77	9.00	5.00	44.44	$255,176.00	18.14
A04A	ANTIEMETICS AND ANTINAUSEANTS	58.92	6.00	2.00	66.67	$350,860.00	46.67
A12B	POTASSIUM	9.08	3.00	1.00	33.33	$1,820.00	90.92
B01A	ANTITHROMBOTIC AGENTS	73.92	7.00	3.00	71.43	$9,323.00	17.82
C01D	VASODILATORS USED IN CARDIAC DISEASES	2.64	5.00	1.00	100.00	$190,780.00	97.67
C08D	SELECTIVE CALCIUM CHANNEL BLOCKERS WITH DIRECT CARDIAC EFFECTS	79.45	5.00	2.00	100.00	$4,739.00	19.90
C09A	ACE INHIBITORS, PLAIN	70.98	21.00	1.00	4.76	$1,525.00	29.02
G03A	HORMONAL CONTRACEPTIVES FOR SYSTEMIC USE	29.40	1.00	3.00	100.00	$97,395.00	70.60
H02A	CORTICOSTEROIDS FOR SYSTEMIC USE, PLAIN	58.55	5.00	2.00	60.00	$1,065.00	27.10
J01C	BETA-LACTAM ANTIBACTERIALS, PENICILLINS	44.90	1.00	4.00	100.00	$32.00	55.10
J01D	OTHER BETA-LACTAM ANTIBACTERIALS	62.62	14.00	1.00	28.57	$3,459.00	29.72
J01F	MACROLIDES AND LINCOSAMIDES	84.36	8.00	2.00	12.50	$125.00	15.64
J07A	BACTERIAL VACCINES	57.25	1.00	1.00	100.00	$1,159.00	42.75
J07B	VIRAL VACCINES	44.86	3.00	1.00	33.33	$95.00	55.14
L01C	PLANT ALKALOIDS AND OTHER NATURAL PRODUCTS	62.85	3.00	2.00	33.33	$13,829.00	37.15
L03A	CYTOKINES AND IMMUNOMODULATORS	71.26	8.00	3.00	25.00	$31,346.00	28.84
M01A	ANTIINFLAMMATORY AND ANTIRHEUMATIC PRODUCTS, NON-STEROIDS	86.84	10.00	6.00	20.00	$23,484.00	13.07
N02C	ANTIMIGRAINE PREPARATIONS	75.85	8.00	3.00	25.00	$67,433.00	19.64
N06A	ANTIDEPRESSANTS	86.80	18.00	5.00	16.67	$140,189.00	11.30
R03A	ADRENERGICS, INHALANTS	81.74	9.00	4.00	33.33	$42,439.00	19.76
R03B	OTHER ANTI-ASTHMATICS, INHALANTS	67.24	19.00	3.00	36.84	$409,520.00	15.59
R03C	ADRENERGICS FOR SYSTEMIC USE	83.66	1.00	2.00	100.00	$1,685.00	16.34
S01B	ANTIINFLAMMATORY AGENTS	7.10	2.00	2.00	50.00	$49,143.00	92.90
						Grand Total	Average
						$1,696,621.00	33.34

Conclusion/Recommendations:

The small case study of community and hospital prices as well as a more systematic review of patented prices does seem to suggest that the hospital market are able to command lower prices in situations where lower cost therapeutic equivalents are available. The number of therapeutic markets where there was evidence of significant hospital discounts ranged from 14 in Saskatchewan to 32 in Ontario. On average, between 10%-14% of patented dins included in this analysis had hospital discounts greater than 10%.

The total value of these discounts for all six jurisdictions is approximately $22 million. Although discounts are not wide spread, the impact of these discounts warrants greater communication and coordination to improve system efficiency and encourage cost-effective utilization. Hospital formulary decisions may have system wide implications; the establishment of formal linkage between plan managers and hospital may be beneficial (e.g. in Nova Scotia provincial drug plan representatives are appointed to hospital boards).

Appendix 1: Hospital Pharmacy Price Variations by Jurisdiction:

The following tables expand on the information revealed in table A-1. Each of the following tables reveals further information for Nova Scotia, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia. As well as presenting the proportion of DINs, each table also presents the average price ratio in each category, the number of DINs, and the proportion of pharmacy and hospital expenditures for each category of the range.

Table A -1

1999 Hospital Pharmacy Price Variations for Nova Scotia					
Range	Average Price Ratio	Number of DINs	Proportion of DINs (%)	Proportion of Pharmacy Expenditures (%)	Proportion of Hospital Expenditures (%)
< 0.90	0.61	24.00	14.30	12.70	7.60
0.90 to 0.95	0.92	7.00	4.20	3.00	4.10
0.95 to 0.98	0.96	7.00	4.20	1.40	1.00
0.98 to 1.00	1.00	36.00	21.40	35.10	19.80
Equal	1.00	61.00	36.30	25.30	50.50
1.00 to 1.02	1.00	21.00	12.50	10.20	4.70
1.02 to 1.05	1.03	3.00	1.80	10.30	4.80
1.05 to 1.10	1.07	1.00	0.60	0.00	0.50
> 1.10	1.33	8.00	4.80	2.00	6.90
Total	0.96	168.00	100.00	100.00	100.00

Table A-2

1999 Hospital Pharmacy Price Variations for Ontario					
Range	Average Price Ratio	Number of DINs	Proportion of DINs (%)	Proportion of Pharmacy Expenditures (%)	Proportion of Hospital Expenditures (%)
< 0.90	0.64	17.00	10.10	7.40	9.60
0.90 to 0.95	0.92	14.00	8.30	20.70	12.10
0.95 to 0.98	0.97	12.00	7.10	5.90	32.90
0.98 to 1.00	1.00	36.00	21.40	13.30	15.10
Equal	1.00	17.00	10.10	4.60	5.50
1.00 to 1.02	1.00	59.00	35.10	47.30	13.50
1.02 to 1.05	1.03	6.00	3.60	0.50	3.40
1.05 to 1.10	1.06	1.00	0.60	0.00	0.00
> 1.10	1.57	6.00	3.60	0.30	7.80
Total	0.98	168.00	100.00	100.00	100.00

Table A-3

1999 Hospital Pharmacy Price Variations for Saskatchewan					
Range	Average Price Ratio	Number of DINs	Proportion of DINs (%)	Proportion of Pharmacy Expenditures (%)	Proportion of Hospital Expenditures (%)
< 0.90	0.52	14.00	8.30	2.70	1.80
0.90 to 0.95	0.92	6.00	3.60	13.90	8.60
0.95 to 0.98	0.96	12.00	7.10	5.20	7.20
0.98 to 1.00	1.00	30.00	17.90	14.50	33.90
Equal	1.00	69.00	41.10	37.80	25.50
1.00 to 1.02	1.00	21.00	12.50	20.10	13.30
1.02 to 1.05	1.03	5.00	3.00	3.60	0.90
1.05 to 1.10	1.08	3.00	1.80	2.00	1.10
> 1.10	1.41	8.00	4.80	0.20	7.70
Total	0.98	168.00	100.00	100.00	100.00

Table A-4

1999 Hospital Pharmacy Price Variations for Manitoba					
Range	Average Price Ratio	Number of DINs	Proportion of DINs (%)	Proportion of Pharmacy Expenditures (%)	Proportion of Hospital Expenditures (%)
< 0.90	0.64	15.00	8.90	5.60	6.90
0.90 to 0.95	0.92	11.00	6.50	9.40	12.80
0.95 to 0.98	0.97	4.00	2.40	14.20	23.70
0.98 to 1.00	1.00	27.00	16.10	16.60	21.30
Equal	1.00	58.00	34.50	19.60	18.20
1.00 to 1.02	1.00	38.00	22.60	33.00	0.10
1.02 to 1.05	1.03	2.00	1.20	0.00	0.80
1.05 to 1.10	1.07	1.00	0.60	0.10	7.60
> 1.10	2.01	12.00	7.10	1.50	100.00
Total	1.04	168.00	100.00	100.00	6.90

Table A-5

1999 Hospital Pharmacy Price Variations for Alberta					
Range	Average Price Ratio	Number of DINs	Proportion of DINs (%)	Proportion of Pharmacy Expenditures (%)	Proportion of Hospital Expenditures (%)
< 0.90	0.66	21.00	12.50	7.30	9.30
0.90 to 0.95	0.94	7.00	4.20	5.10	4.10
0.95 to 0.98	0.96	5.00	3.00	18.50	5.10
0.98 to 1.00	1.00	49.00	29.20	27.60	13.70
Equal	1.00	41.00	24.40	9.90	31.20
1.00 to 1.02	1.00	33.00	19.60	30.30	20.10
1.02 to 1.05	1.03	4.00	2.40	0.30	2.00
1.05 to 1.10	1.06	2.00	1.20	0.70	8.20
> 1.10	2.02	6.00	3.60	0.20	6.40
Total	0.99	168.00	100.00	100.00	100.00

Table A-6

1999 Hospital Pharmacy Price Variations for British Columbia					
Range	Average Price Ratio	Number of DINs	Proportion of DINs (%)	Proportion of Pharmacy Expenditures (%)	Proportion of Hospital Expenditures (%)
< 0.90	0.64	18.00	10.70	8.20	3.50
0.90 to 0.95	0.93	8.00	4.80	19.80	4.20
0.95 to 0.98	0.96	9.00	5.40	2.20	4.40
0.98 to 1.00	1.00	43.00	25.60	18.10	27.40
Equal	1.00	52.00	31.00	19.90	13.40
1.00 to 1.02	1.00	26.00	15.50	27.90	22.40
1.02 to 1.05	1.04	4.00	2.40	1.10	0.10
1.05 to 1.10	1.08	2.00	1.20	2.60	0.10
> 1.10	2.24	6.00	3.60	0.30	24.50
Total	1.00	168.00	100.00	100.00	100.00

Appendix 2: Inter-jurisdictional Hospital Price Comparison

To examine whether significant price differentials for patented drugs exist between provinces the further analysis was undertaken. Information on hospital prices were extracted from PMPRB=s database for the year 1998. There were 11,642 DIN, pack size and province combinations in 1998. Prices listed are transaction prices. Analysis was done for the year 1998. In order to check for price differentials, the maximum price and its corresponding province and the minimum price with its corresponding province was identified. The standard deviation was calculated to give an idea of the variability in prices of each DIN across provinces.

Results:

1. There were 1071 DIN's - pack size combinations when provinces were collapsed to keep the maximum priced province and the minimum priced province.

2. In 31% of cases (i.e., 331 out of 1071 DIN-pack size combinations) there were price differentials across provinces.

3. For 52 DINs standard deviation was greater than 5.

4. For 73 DINs standard deviation was greater than 1 and less than 4.9.

5. For 206 DINs standard deviation was less than 1.

6. British Columbia was the highest priced province for 56 DIN pack size combinations followed by Alberta (52), Quebec (51), Ontario (40), Manitoba (35), Nova Scotia (22), Newfoundland (21), North West Territory (18) and Yukon (5).

Endnotes

[1] Data source is the Patented Medicine Prices Review Board's (PMPRB) Block-4 database.

[2] A regression model was also developed and tested in order to determine how wide spread market segmentation is, and identify any possible factors that may predict the likelihood of hospital discounts. The results of the model did not produce significant evidence that hospital discounts are wide spread or can be well predicted (a very low R-Squared) thus the results were not included in the final report.

[3] Various regression models were used to test the hypothesis. Specifically, the hospital to pharmacy price ratio was regressed on several market criteria and drug class. The results of the analysis revealed very low degrees of explanatory power for the models. The results of the regressions are revealed in Appendix-II.

[4] Please refer to Appendix-I for detailed information of by province.

[5] Price is defined as an average price for each DIN across different package sizes. For products where larger package sizes are discounted the hospital and community differences may be a reflection of volume rather than actual unit differences for identical package sizes, however, to the extent that manufacturers may set price based on the assumption that one package size will serve a particular market segment, differences in price based on package size may also be interpreted as market segment discounts.

[6] Price competition may not be the only method used to gain a competitive advantage; promotional activities not translated into price competition are not captured in this analysis.