

## Appendices (as supplied by the author)

### Appendix 2. Factors considered in the analyses

We considered the following factors at the market level: 1) market structure at baseline; 2) route/dosage form; 3) essential medicines or not; 4) proportion of DINs listed on formularies; and 5) Anatomical Therapeutic Chemical (ATC) classification. At the DIN level, we considered 1) market structure at baseline; 2) route/dosage form; 3) DIN age; 4) essential medicines or not; 5) ATC classification; 6) number of provincial formularies the DIN was listed on; 7) manufacturer characteristics determined by their number of DINs available in Canada (manufacturer size), whether they are top 50 manufacturers by drug cost from public drug plans in Canada, and whether they are mainly branded manufacturers, generic manufacturers or both (manufacturer type). The definitions of these variables were shown in Supplementary Table 1- Supplementary Table 4 below.

The Canadian Drug Shortage Database includes reasons for each shortage case (by DIN and package code), as reported by manufacturers. Manufacturers can select one reason from the following options: shortage of an active ingredient, shortage of an inactive ingredient or component, disruption of the manufacture of the drug, requirements related to complying with good manufacturing practices, delay in shipping of the drug, and demand increase for the drug. Otherwise, manufacturers can comment on other reasons and based on their comments, we categorized them into either one of the above reasons or into business (or economic) reason (e.g., discontinued and deactivated), insufficient supply, other reasons (including “on allocation” and the ones we could not categorize), and reason not provided. These reasons were considered as an additional factor in our analysis of the shortage duration among DINs in shortage. Please see details in Supplementary Table 5.

**Supplementary Table 1. Variable definitions**

Variable	Definition	Data Source
<b>Variable Level</b>		
Market structure	Based on the type and number of manufacturers for the DINs under each market at baseline (first 30 days of follow-up period)	Drug Product Database (DPD) <sup>1</sup>
B/G Single	Markets with branded manufacturers and a single generic manufacturer	
B/G Multiple	Markets with branded manufacturers and multiple generic manufacturers	
G single	Markets with a single generic manufacturer only	
G multiple	Markets with multiple generic manufacturers	
BIO	Markets with biological manufacturers	
B only	Markets with branded manufacturers only	
Route form	Route of administration and dose form	DPD <sup>1</sup>
Injection	Injection	
Oral non-solid	Oral non-solid	
Oral solid regular release	Oral solid regular release	
Oral solid special release	Oral solid special release	

Other	Routes/forms other than the above, such as topical cream/ointment, ophthalmic solution, inhalation solution, inhalation powder, transdermal patch, nasal spray, etc.	
Essential medicine	Whether markets/DINs are on essential medicine list	Patented Medicine Prices Review Board (PMPRB) <sup>2</sup>
Proportion of DINs listed On formularies	The proportion of DINs being listed on any of the nine provincial formularies for each market	DPD <sup>1</sup> and formulary data <sup>3</sup>
Anatomical Therapeutic Chemical (ATC) Classification (Level 1)	The ATC classification system divides drugs into different groups according to the organ or system on which they act and their chemical, pharmacological and therapeutical properties. Please see the Supplementary Table 2 below for drug examples for each ATC level.	DPD <sup>1</sup>
DIN Age	The market age of each DIN defined as the duration of time from the DIN came to market, i.e., “marketed” status shown on DPD to the start of follow up; Please see the data exploration results in Supplementary Table 3 that we used to determine whether a continuous variable or a categorical variable was used in our final analyses.	DPD <sup>1</sup>
N of provinces on formulary (weighted)	The number of provincial formularies a DIN was listed on and then weighted by the population size in each province	DPD <sup>1</sup>
<b>Manufacturer characteristics</b>	Detailed information for manufacturers with at least 5 DINs in shortage is reported in Supplementary Table 4	
Top 50 manufacturers	Based on drug cost data from public drug plans in Canada for each manufacturer in 2017/2018	PMPRB <sup>4</sup>
Manufacturer size	The total number of DINs available in Canada for each manufacturer	DPD <sup>1</sup>
Small	1-39	
Medium	40-99	
Large	≥100	
Manufacturer type	Defined based on the proportion of branded DINs by each manufacturer	DPD <sup>1</sup>
Generic	The proportion ≤5%	
Mixed	The proportion = (5%, 95%)	
Branded	The proportion ≥95%	
Listing price	The price listed in the provincial formularies	Formulary data in nine provinces from the Canadian Institute for Health Information <sup>3</sup>

## References

1. What is the DPD data extract?: Drug Product Database (DPD). Ottawa: Health Canada. Available from: <https://www.canada.ca/en/health-canada/services/drugs-health-products/drug-products/drug-product-database/what-data-extract-drug-product-database.html> (accessed 2018 Dec. 12).

2. Alignment among public formularies in Canada — Part 1: General overview. Ottawa: Patented Medicine Prices Review Board; 2017, modified 2019 Mar. 5. Available: [www.pmprb-cepmb.gc.ca/view.asp?ccid=1327&lang=en](http://www.pmprb-cepmb.gc.ca/view.asp?ccid=1327&lang=en) (accessed 2018 Sept. 13).
3. National Prescription Drug Utilization Information System metadata. Ottawa: Canadian Institute for Health Information. Available: [www.cihi.ca/en/national-prescription-drug-utilization-information-system-metadata](http://www.cihi.ca/en/national-prescription-drug-utilization-information-system-metadata) (accessed 2018 Jan. 30).
4. CompassRx, 5th edition: Annual Public Drug Plan Expenditure Report, 2017/18. Cat no H79-6E-PDF. Ottawa: Patented Medicine Prices Review Board; 2019. Available: [www.pmprb-cepmb.gc.ca/view.asp?ccid=1474&lang=en#a23](http://www.pmprb-cepmb.gc.ca/view.asp?ccid=1474&lang=en#a23) (accessed 2019 Oct. 23).

**Supplementary Table 2. Drug shortage by Anatomical Therapeutic Chemical (ATC) Classification**

ATC	Description	N	Percent	Examples
A	Alimentary tract and metabolism	136	6.1%	
A01	Stomatological preparations	5	0.2%	Apo Benzydamine Oral Rinse 0.15% Sol, Apo Chlorhexidine Oral Rinse 0.12% Sol, Perichlor 0.12% Mouthwash/Gargle
A02	Drugs for acid related disorders	49	2.2%	Ran Pantoprazole 20mg Tab Dr, Ran Rabeprazole 20mg Tab Dr, Ranitidine 300mg Tab
A03	Drugs for functional gastrointestinal disorders	8	0.4%	Mar Domperidone 10mg Tab, Modulon 200mg Tab, Ran Domperidone 10mg Tab
A04	Antiemetics and antinauseants	22	1.0%	Cesamet 0.25mg Cap, Cesamet 1mg Cap, Ondansetron Injection Usp 2mg/ML Sol
A05	Bile and liver therapy	2	0.1%	Pms Ursodiol C 500mg Tab
A07	Antidiarrheals, intestinal antiinflammatory/antiinfective agents	5	0.2%	Cortifoam 10% Aero, Difucid 200mg Tab, Entocort 2.3mg, 115ml Kit
A09	Digestives, incl. enzymes	1	<0.1%	Cotazym Ecs 8 10800unit, 45000unit, 42000unit Cap Dr
A10	Drugs used in diabetes	39	1.8%	Accel Pioglitazone 30mg Tab, Apo Glimepiride 1mg Tab, Apo Repaglinide 2mg Tab
A11	Vitamins	3	0.1%	Euro-D 50000 Iu, Pharma D 10000unit Cap
A16	Other alimentary tract and metabolism products	2	0.1%	Carnitor 330mg Tab, Carnitor Iv 200mg/ML Sol
B	Blood and blood forming organs	20	0.9%	
B01	Antithrombotic agents	17	0.8%	Arixtra 5mg/ML Sol, Coumadin 10mg Tab, Coumadin 6mg Tab
B02	Antihemorrhagics	1	<0.1%	Trasylol 10000u/ML Sol
B03	Antianemic preparations	2	0.1%	Apo Folic Acid 5mg Tab
C	Cardiovascular system	498	22.5%	
C01	Cardiac therapy	29	1.3%	Bretylium Tosylate Injection Usp 50mg/ML, Midodrine 2.5mg Tab, Myl Propafenone 150mg Tab
C02	Antihypertensives	20	0.9%	Apo Clonidine 0.2mg Tab, Apo Doxazosin 4mg Tab, Apo Hydralazine 25mg Tab
C03	Diuretics	27	1.2%	Aldactazide 25 25mg, 25mg Tab, Furosemide Special 250mg/25ml Sol, Inspira 25mg Tab
C04	Peripheral vasodilators	2	0.1%	Arlidin 6mg Tab, Niodan Time Release 500mg Tab Er
C05	Vasoprotectives	7	0.3%	Proctodan Hc 10mg, 20mg, 10mg Sup, Rectogel Hc

C07	Beta blocking agents	70	3.2%	Apo Bisoprolol 10mg Tab, Apo Carvedilol 6.25mg Tab, Inderal La 120mg Cap Er
C08	Calcium channel blockers	54	2.4%	Apo Verap Sr 120mg Tab Er, Diltiazem Cd 120mg Cap Er, Diltiazem Cd 240mg Cap Er
C09	Agents acting on the renin-angiotensin system	203	9.2%	Altace Hct 10mg, 25mg Tab, Apo Cilazapril/Hctz 5mg, 12.5mg Tab, Jamp Candesartan 8mg Tab
C10	Lipid modifying agents	86	3.9%	Apo Lovastatin 40mg Tab, Gd Amlodipine/Atorvastatin 5mg, 10mg Tab, Pms Amlodipine Atorvastatin 10mg, 10mg Tab
D	Dermatologicals	69	3.1%	
D01	Antifungals for dermatological use	7	0.3%	Ketoderm 2% Crm, Taro Ciclopirox 8% Sol, Terbinafine 250mg Tab
D06	Antibiotics and chemotherapeutics for dermatological use	8	0.4%	Noritrate 1% Crm, Podofilm 250mg/MI Sol, Soframycin Skin 50mcg/G, 15mg/G Ointment
D07	Corticosteroids, dermatological preparations	39	1.8%	Lyderm 0.05% Ointment, Rolene Lotion 0.05%, Topactin Emollient Cream 0.05% 0.05%
D09	Medicated dressings	1	<0.1%	Sofra Tulle 1% Dressing
D10	Anti-acne preparations	11	0.5%	Clarus 10mg Cap, Clarus 40mg Cap, Retin A 0.025% Gel
D11	Other dermatological preparations	3	0.1%	Lustra-Af, Propecia 1mg
G	Genito-urinary system and sex hormones	111	5.0%	
G01	Gynecological antiinfectives and antiseptics	5	0.2%	Dalacin Vaginal 20mg/G Crm, Flagyl 10% Crm, Flagystatin 22222.22u/G, 111.11mg/G Crm
G02	Other gynecologicals	4	0.2%	Dostinex 0.5mg Tab, Norprolac 0.025mg Tab, Norprolac 0.05mg Tab
G03	Sex hormones and modulators of the genital system	44	2.0%	Brevicon 0.5/35 0.5mg, 0.035mg Tab, Divigel 0.1% Gel, Estalis 2.7mg, 0.62mg Patch Er
G04	Urologicals	58	2.6%	Levitra, Pms Terazosin 2mg Tab, Pms Terazosin 5mg Tab
H	Systemic hormonal preparations, excluding sex hormones and insulins	37	1.7%	
H01	Pituitary and hypothalamic hormones and analogues	10	0.5%	Cetrotide, Orgalutran 500mcg/MI
H02	Corticosteroids for systemic use	20	0.9%	Apo Prednisone 50mg Tab, Pms Dexamethasone 0.1mg/MI Sol, Pms Dexamethasone Sod Phosphate Inj 10mg/MI Sol
H03	Thyroid therapy	6	0.3%	Apo Methimazole 5mg Tab, Cytomel 5mcg Tab, Eltroxin 200mcg Tab
H05	Calcium homeostasis	1	<0.1%	Calcimar Inj 200u/MI Sol
J	Anti-infectives for systemic use	244	11.0%	
J01	Antibacterials for systemic use	165	7.5%	Amoxi-Clav 875mg, Apo Cefaclor 75mg/MI Pdr, Erythro S 500mg Tab

J02	Antimycotics for systemic use	11	0.5%	Apo Voriconazole 50mg Tab, Pms Fluconazole 100mg Tab, Posanol 40mg/MI Susp
J04	Antimycobacterials	4	0.2%	Rofact 150mg Cap, Rofact 300mg Cap
J05	Antivirals for systemic use	33	1.5%	Apo Acyclovir 400mg Tab, Apo Acyclovir 800mg Tab, Apo Famciclovir 125mg Tab
J06	Immune sera and immunoglobulins	1	<0.1%	Imogam Rabies Pasteurized
J07	Vaccines	30	1.4%	Avaxim, Havrix 720 Junior, Rabavert
L	Antineoplastic and immunomodulating agents	89	4.0%	
L01	Antineoplastic agents	56	2.5%	Docetaxel Injection, Fludarabine Phosphate For Injection, Leukeran 2mg Tab
L02	Endocrine therapy	18	0.8%	Apo Bicalutamide 50mg Tab, Casodex 50mg Tab, Pms Anastrozole 1mg Tab
L03	Immunostimulants	4	0.2%	Intron A 15000000u/MI Sol, Intron A 25000000u/MI Sol, Intron A 50000000u/MI Sol
L04	Immunosuppressants	11	0.5%	Apo Leflunomide 10mg Tab, Sandoz Cyclosporine 100mg Cap, Sandoz Mycophenolate Mofetil 250mg Cap
M	Musculoskeletal system	88	4.0%	
M01	Antiinflammatory and antirheumatic products	48	2.2%	Apo Indomethacin 25mg Cap, Apo Naproxen Ec 500mg Tab Dr, Sandoz Diclofenac Sr 75mg Tab Er
M02	Topical products for joint and muscular pain	1	<0.1%	Zuacta
M03	Muscle relaxants	13	0.6%	Dantrium 25mg Cap, Pal Tizanidine 4mg Tab, Pms Baclofen 20mg Tab
M04	Antigout preparations	2	0.1%	Sulfinpyrazone 200mg Tab
M05	Drugs for treatment of bone diseases	24	1.1%	Etidrocal 400mg, 500mg Tab, Fosavance 70mg, 5600unit Tab, Mylan Alendronate 70mg Tab
N	Nervous system	710	32.1%	
N01	Anesthetics	3	0.1%	Suprane
N02	Analgesics	132	6.0%	Apo Almotriptan 6.25mg Tab, Apo Sumatriptan 100mg Tab, Pms Fentanyl Mtx 100mcg Patch Er
N03	Antiepileptics	126	5.7%	Apo Levetiracetam 750mg Tab, Divalproex 125mg Tab Dr, Lamictal 150mg Tab
N04	Anti-parkinson drugs	52	2.4%	Bromocriptine 5mg Cap, Pms Pramipexole 1mg Tab, Pramipexole 0.25mg Tab
N05	Psycholeptics	202	9.1%	Olanzapine 5mg Tab Od, Oxpan 15mg Tab, Pms Olanzapine 5mg Tab
N06	Psychoanaleptics	179	8.1%	Levate 75mg Tab, Mar Galantamine Er 24mg Cap Er, Parnate 10mg Tab
N07	Other nervous system drugs	16	0.7%	Apo Tetrabenazine 25mg Tab, Duvoid 25mg Tab, Metadol 10mg Tab

P	Antiparasitic products, insecticides and repellents	6	0.3%	
P01	Antiprotozoals	5	0.2%	Apo Quinine 200mg Cap, Apo Quinine 300mg Cap, Mepron 150mg/ML Susp
P02	Anthelmintics	1	<0.1%	Biltricide 600mg Tab
R	Respiratory system	79	3.6%	
R01	Nasal preparations	12	0.5%	Apo Mometasone 50mcg/Act Spray Md, Mylan Beclio Aq 50mcg/Act Md Aero, Mylan Budesonide Aq 64mcg/Act Spray Md
R03	Drugs for obstructive airway diseases	57	2.6%	Aminophylline Inj 50mg/ML, Apo Salvent 100mcg/Act Md Aero, Pms Ipratropium 125mcg/ML Sol
R05	Cough and cold preparations	6	0.3%	Dalmacol Syrup, Tussionex 10mg, 5mg Tab Er, Tussionex 2mg/ML, 1mg/ML Susp
R06	Antihistamines for systemic use	3	0.1%	Panectyl 2.5mg Tab, Pms Cetirizine 20mg Tab
R07	Other respiratory system products	1	<0.1%	Survanta
S	Sensory organs	105	4.7%	
S01	Ophthalmologicals	101	4.6%	Chloramphenicol 1% Ointment, Gentamicin 0.3% Sol, Nevanac 0.1% Susp
S02	Otologicals	1	<0.1%	Odan Spor Hc 10mg/ML, 1.19mg/ML, 3.5mg/ML Susp
S03	Ophthalmological and otological preparations	3	0.1%	Dexamethasone 0.1% Sol, Odan Dexamethasone 0.1% Sol, Sofracort Sterile Ear/Eye 0.5mg/ML, 5mg/ML, 0.05mg/ML Sol
V	Various	20	0.9%	
V01	Allergens	6	0.3%	Pharmalgen Honey Bee Venom 120mcg Pdr Sol, Pharmalgen Wasp Venom Protein, Pharmalgen Yellow Hornet Venom Protein
V03	All other therapeutic products	12	0.5%	Fasturtec, Fosrenol 250mg Tab (Chewable), Leucovorin Calcium Injection Usp
V04	Diagnostic agents	2	0.1%	Relefact Trh Injection 200mcg/ML 200mcg/ML, Tubersol 50tu/ML Sol

### Supplementary Table 3. Data exploration of DIN age and the cut-off value determination for categorization

We first calculated the probability of being in shortage by the DIN age in 1- year increment for those  $\leq 5$  years and 5-year increment for those over 5 and examined if it is reasonable to model the relationship as linear. Based on the results shown below, it was decided to model the DIN age as a continuous variable for branded DINs and dichotomize the variable at 3 years for generic DINs. Also, the new pan-Canadian tiered pricing framework was implemented on April 1, 2014 for new generic drugs (<http://formulary.drugplan.ehealthsask.ca/PanCanadianGenerics>), which was about 3 years before the start of our study period.

DIN age	Branded		Generic	
	Total	N (%) in shortage	Total	N (%) in shortage
1:<1	97	2 (2.1%)	304	24 (7.9%)
2:1-2	77	2 (2.6%)	385	66 (17.1%)
3:2-3	76	4 (5.3%)	465	103 (22.2%)
4:3-4	94	7 (7.4%)	508	184 (36.2%)
5:4-5	63	10 (15.9%)	691	206 (29.8%)
6:5-10	343	54 (15.7%)	1553	419 (27.0%)
7:10-15	320	49 (15.3%)	867	270 (31.1%)
8:15-25	802	168 (20.9%)	1145	319 (27.9%)
9:>25	450	130 (28.9%)	609	139 (22.8%)



**Supplementary Table 4. Manufacturer characteristics and drug shortage status among those with at least 5 DINs in shortages**

<b>Manufacturer</b>	<b>Total N. of DINs</b>	<b>% of branded DINs</b>	<b>Total N of markets</b>	<b>N of DINs in shortage</b>	<b>% of DINs in shortage</b>	<b>Shortage Days: Mean (SD)</b>	<b>Shortage Days: Median (Q1, Q3)</b>
Apotex Inc.	748	0.0%	718	410	54.8%	176.5 (135.5)	143.0 (88.0, 221.0)
Pharmascience Inc.	659	1.5%	604	257	39.0%	237.5 (171.3)	200.0 (91.0, 376.0)
Teva Canada Ltd.	827	2.2%	738	161	19.5%	198.6 (181.5)	132.0 (59.0, 338.0)
Mylan Pharmaceuticals Ulc.	320	0.3%	312	158	49.4%	93.1 (97.9)	71.5 (21.0, 126.0)
Sandoz Canada Incorporated.	567	0.7%	529	124	21.9%	104.4 (90.5)	72.0 (42.0, 137.5)
Marcan Pharmaceuticals Inc.	109	0.0%	109	65	59.6%	267.8 (162.3)	239.0 (134.0, 439.0)
Pro Doc Ltée	361	0.3%	357	60	16.6%	112.6 (109.8)	75.5 (22.5, 183.0)
Pfizer Canada Inc.	280	83.7%	256	59	21.1%	84.3 (89.6)	40.0 (23.0, 141.0)
Glaxosmithkline Inc.	126	100.0%	124	54	42.9%	137.2 (135.5)	97.5 (23.0, 222.0)
Valeant Canada Lp Valeant Canada S. E. C.	159	83.6%	139	53	33.3%	97.6 (103.7)	66.0 (21.0, 154.0)
Jamp Pharma Corporation	220	0.0%	205	48	21.8%	188.6 (141.3)	144.0 (83.0, 226.0)
Merck Canada Inc.	141	100.0%	136	47	33.3%	64.9 (63.7)	50.0 (14.0, 90.0)
Sanis Health Inc.	273	0.0%	270	47	17.2%	102.2 (96.4)	65.0 (26.0, 145.0)
Sivem Pharmaceuticals Ulc.	210	0.0%	200	46	21.9%	165.7 (120.7)	142.5 (57.0, 284.0)
AA Pharma Inc.	147	17.0%	142	33	22.4%	107.5 (134.8)	59.0 (19.0, 136.0)
Laboratoire Riva Inc.	200	1.5%	194	31	15.5%	182.3 (156.8)	113.0 (95.0, 245.0)
Ranbaxy Pharmaceuticals Canada Inc.	182	0.0%	181	31	17.0%	199.0 (185.2)	107.0 (52.0, 420.0)
Vanc Pharmaceuticals Inc.	67	0.0%	67	30	44.8%	119.1 (41.0)	105.0 (102.0, 106.0)
Paladin Labs Inc.	72	95.8%	69	28	38.9%	196.5 (174.0)	133.0 (43.5, 341.0)
Sanofi-Aventis Canada Inc.	111	100.0%	98	28	25.2%	85.8 (108.2)	37.0 (26.5, 115.0)
Novartis Pharmaceuticals Canada Inc.	193	97.3%	187	27	14.0%	85.3 (122.3)	34.0 (20.0, 127.0)
BGP Pharma Ulc.	59	100.0%	57	23	39.0%	83.7 (124.1)	33.0 (14.0, 124.0)
Actavis Pharma Company	224	0.0%	223	22	9.8%	153.3 (127.7)	135.0 (45.0, 259.0)
Pendopharm Inc.	56	41.1%	56	22	39.3%	191.0 (170.2)	127.5 (47.0, 315.0)

Odan Laboratories Ltd.	42	2.4%	41	21	50.0%	110.1 (72.2)	100.0 (100.0, 100.0)
Auro Pharma Inc.	177	0.0%	177	19	10.7%	105.9 (151.3)	49.0 (42.0, 87.0)
Eberth Pharmaceuticals Inc.	20	15.0%	20	18	90.0%	276.2 (192.2)	126.0 (126.0, 454.0)
Taro Pharmaceutical Inc.	75	0.0%	74	18	24.0%	101.1 (133.8)	39.5 (29.0, 90.0)
Biomed Pharma	75	16.0%	65	17	22.7%	169.9 (124.7)	143.0 (143.0, 143.0)
Mint Pharmaceuticals Inc.	129	0.0%	123	17	13.2%	90.3 (69.3)	58.0 (38.0, 117.0)
Erfa Canada 2012 Inc.	38	97.4%	37	16	42.1%	110.8 (44.6)	132.0 (103.0, 132.0)
Accord Healthcare Inc.	72	0.0%	69	15	20.8%	95.3 (73.2)	77.0 (42.0, 115.0)
Sanofi Pasteur Limited	26	100.0%	25	14	53.8%	187.6 (159.2)	160.0 (57.0, 310.0)
Sterimax Inc.	64	3.1%	64	13	20.3%	135.4 (129.5)	64.0 (43.0, 218.0)
Bayer Inc.	66	100.0%	61	11	16.7%	93.9 (65.4)	75.0 (44.0, 127.0)
Boehringer Ingelheim (Canada) Ltd.	50	100.0%	50	11	22.0%	64.8 (42.5)	59.0 (25.0, 104.0)
Fresenius Kabi Canada Ltd.	67	3.0%	66	10	14.9%	154.8 (140.0)	110.0 (41.0, 237.0)
Astrazeneca Canada Inc.	89	100.0%	89	9	10.1%	86.6 (79.4)	45.0 (31.0, 168.0)
Baxter Corporation	25	66.7%	24	9	36.0%	66.0 (59.7)	43.0 (20.0, 144.0)
Aspen Pharmacare	29	85.0%	20	8	27.6%	85.5 (53.5)	84.0 (39.0, 127.0)
Pfizer Canada Ulc	53	74.2%	53	8	15.1%	62.0 (43.8)	48.5 (26.5, 94.0)
Hospira Healthcare Corporation	65	9.2%	60	7	10.8%	104.0 (76.8)	83.0 (37.0, 190.0)
Omega Laboratories Ltd.	51	0.0%	44	7	13.7%	270.9 (217.2)	285.0 (22.0, 500.0)
Alk - Abello A/S	31	100.0%	31	6	19.4%	538.3 (13.4)	547.0 (521.0, 547.0)
Bristol-Myers Squibb Canada	71	100.0%	69	5	7.0%	47.0 (29.4)	35.0 (32.0, 67.0)
Genmed A Division Of Pfizer Canada Inc.	35	0.0%	35	5	14.3%	148.8 (180.1)	37.0 (34.0, 226.0)
Purdue Pharma	70	100.0%	68	5	7.1%	32.6 (10.6)	31.0 (23.0, 42.0)

**Supplementary Table 5. Shortage by reported reasons at the DIN level**

<b>Reason(s)</b>	<b>N</b>	<b>Percent</b>
disruption of the manufacture	1266	57.3%
delay in shipping	323	14.6%
demand increase	146	6.6%
requirements related to complying with good manufacturing practices	75	3.4%
not provided	72	3.3%
shortage of ingredient	65	2.9%
business or economic reasons	43	1.9%
insufficient supply	36	1.6%
delay in shipping   disruption of the manufacture	32	1.4%
delay in shipping   demand increase	28	1.3%
disruption of the manufacture   demand increase	26	1.2%
delay in shipping   requirements related to complying with good manufacturing practices	17	0.8%
disruption of the manufacture   shortage of ingredient	16	0.7%
other	11	0.5%
demand increase   requirements related to complying with good manufacturing practices	6	0.3%
disruption of the manufacture   not provided	5	0.2%
delay in shipping   disruption of the manufacture   demand increase	5	0.2%
disruption of the manufacture   requirements related to complying with good manufacturing practices	4	0.2%
delay in shipping   other   not provided	4	0.2%
business or economic reasons   disruption of the manufacture	3	0.1%
requirements related to complying with good manufacturing practices   other   not provided	3	0.1%
demand increase   shortage of ingredient	3	0.1%
delay in shipping   shortage of ingredient	3	0.1%
delay in shipping   demand increase   requirements related to complying with good manufacturing practices	2	0.1%
delay in shipping   insufficient supply	2	0.1%
requirements related to complying with good manufacturing practices   other	1	<0.1%
demand increase   not provided	1	<0.1%
demand increase   insufficient supply	1	<0.1%
demand increase   insufficient supply   requirements related to complying with good manufacturing practices	1	<0.1%
disruption of the manufacture   requirements related to complying with good manufacturing practices   other   not provided	1	<0.1%
disruption of the manufacture   demand increase   shortage of ingredient	1	<0.1%

disruption of the manufacture   shortage of ingredient   not provided	1	<0.1%
disruption of the manufacture   other   not provided	1	<0.1%
disruption of the manufacture   insufficient supply	1	<0.1%
shortage of ingredient   not provided	1	<0.1%
shortage of ingredient   other   not provided	1	<0.1%
delay in shipping   disruption of the manufacture   demand increase   requirements related to complying with good manufacturing practices	1	<0.1%
delay in shipping   not provided	1	<0.1%
insufficient supply   other   not provided	1	<0.1%

Business or economic reasons: discontinuation, deactivation etc.; other: include “on allocation” and the ones we could not categorize; not provided: the ones without any comments