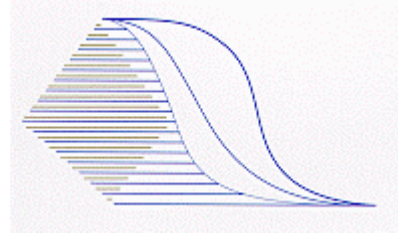


# **Centre for Health Services and Policy Research**



## **Supply of Hospital Pharmacists in B.C.**

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HHRU 02:02W

January 2002

## ***Health Human Resources Unit Research Reports***



THE UNIVERSITY OF BRITISH COLUMBIA



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Prepared for the  
Planning Methodologies Working Group,  
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## **Supply of Hospital Pharmacists in B.C.**

In order to examine concerns about the current and future supply of hospital pharmacists in British Columbia, the Health Human Resources Unit (HHRU) of the Centre for Health Services and Policy Research was asked by the B.C. Ministry of Health Planning to study the current supply of pharmacists employed in hospital pharmacy in B.C. and to prepare some preliminary projections of future supply.

This working paper explains the projections prepared, and discusses some of the background data that were examined in order to make the projections. Along the way, numerous revisions were made to the projections. Various assumptions were made and past supply data were examined for estimating future supply. We have attempted to document all the assumptions made in the projections and either explain our reasoning for making the assumptions or show the historic supply data that were used to develop the assumptions.

### **Background**

In order to practice as a pharmacist in British Columbia, it is necessary to be licensed by the College of Pharmacists of B.C. (CPBC).<sup>1</sup> A B.Sc. (Pharm) degree is required by the College for entry to practice in B.C. The Faculty of Pharmaceutical Sciences at the University of British Columbia is the only school in B.C. to offer the B.Sc. (Pharm) degree.

Pharmacists working in hospitals in B.C. may or may not have completed a residency in hospital pharmacy, as completion of a residency is not required for employment as a hospital pharmacist,<sup>2</sup> and the CPBC has no licensing requirements related specifically to employment in hospital pharmacy beyond basic licensure as a pharmacist in the province. Each hospital in the province sets their own policies regarding residency requirements, but generally pharmacists who have completed residencies are more likely to work in 'clinical' positions, while pharmacists who have not completed residencies are more likely to work in 'dispensing' positions in the hospitals.<sup>3</sup> The Faculty of Pharmaceutical Sciences at UBC offers a one-year residency program in hospital pharmacy for baccalaureate graduates.

### **Data Sources**

Permission from the College of Pharmacists of B.C. to use registration data which were originally collected by the HHRU for their series of ROLLCALL/ ROLLCALL UPDATE reports was obtained for the years 1995 to 2000. The data allowed us to examine in detail the past and current supply of pharmacists registered in B.C. who reported employment in hospital pharmacies.

Enrolment and graduate data for 1987 to 2000 for the UBC baccalaureate in pharmacy program were obtained from the 1988/89-2001/02 University of British Columbia Academic

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<sup>1</sup> Pharmacists, Pharmacy Operations and Drug Scheduling Act, R.S.B.C. 1996, Chapter 363.

<sup>2</sup> Personal communication with Dr. David Hill, Associate Dean, Professional Programs, Faculty of Pharmaceutical Sciences, UBC, December 18, 2001.

<sup>3</sup> Personal communication with Dr. David Hill, December 18, 2001.

Calendars (see Appendix I). Each UBC Calendar includes totals of the previous years' enrolments and graduates by degree and year of enrolment (where applicable). These data were used to determine the current class size, and calculate the average attrition rate from the program in the recent past.

The population data used were from the P.E.O.P.L.E. Projection Run #26, provided by the Population Section, B.C. Stats (July 2001).

## Past and Current Supply

Table 1 shows the number and percent of pharmacists by employment status and type of employer each year from 1995 to 2000. Approximately 19% of B.C. pharmacists are employed in hospital pharmacies. This compares to approximately 65% of pharmacists who work in community pharmacies.

**Table 1 - Pharmacists by Employment Status and Type of Employer, 1995-2000**

Year	Employed in Pharmacy			Not Employed	Total
	Community Pharmacy	Hospital Pharmacy	Other		
1995	1794 (65.6%)	516 (18.9%)	79 (2.9%)	344 (12.6%)	2733 (100%)
1996	1863 (66.9%)	528 (19.0%)	78 (2.8%)	317 (11.4%)	2786 (100%)
1997	1851 (64.7%)	537 (18.8%)	89 (3.1%)	384 (13.4%)	2861 (100%)
1998	2000 (66.8%)	565 (18.9%)	87 (2.9%)	342 (11.4%)	2994 (100%)
1999	1941 (64.5%)	560 (18.6%)	76 (2.5%)	431 (14.3%)	3008 (100%)
2000	2024 (65.4%)	589 (19.0%)	80 (2.6%)	401 (13.0%)	3094 (100%)

Source: Rollcall 95 to Rollcall Update 00 (College of Pharmacists of B.C. registration data). Please note the dates of record vary from year to year.

Table 2 presents the employment status, type of employer and age distribution of pharmacists in 2000. The table shows that pharmacists employed in hospital pharmacy tend to be slightly older than those employed in community pharmacy (32.7% of community pharmacists versus 29.5% of hospital pharmacists are 25-34 years old, while 36.8% of hospital pharmacists versus 25.7% of community pharmacists are 35-44 years old).

**Table 2 - Pharmacists by Employment Status, Type of Employer  
and Age Group, 2000**

Age Group	Employed in Pharmacy			Not Employed	Total
	Community Pharmacy	Hospital Pharmacy	Other		
<25	60 (3.0%)	10 (1.7%)	0 (0.0%)	63 (15.7%)	133 (4.3%)
25-34	662 (32.7%)	174 (29.5%)	11 (13.8%)	133 (33.2%)	980 (31.7%)
35-44	521 (25.7%)	217 (36.8%)	31 (38.8%)	91 (22.7%)	860 (27.8%)
45-54	518 (25.6%)	154 (26.1%)	26 (32.5%)	69 (17.2%)	767 (24.8%)
55-64	183 (9.0%)	28 (4.8%)	10 (12.5%)	29 (7.2%)	250 (8.1%)
65+	51 (2.5%)	0 (0.0%)	1 (1.3%)	12 (3.0%)	64 (2.1%)
Unknown	29 (1.4%)	6 (1.0%)	1 (1.3%)	4 (1.0%)	40 (1.3%)
Total	2024 (100%)	589 (100%)	80 (100%)	401 (100%)	3094 (100%)

Source: Rollcall Update 00 (College of Pharmacists of B.C. registration data).

As background for preparing the projections, we also considered potential sources of hospital pharmacists other than the UBC Pharmacy and/or Hospital Pharmacy residency programs (the main source assumed in the projections). We examined in more detail the past supply of pharmacists in B.C., focusing on those pharmacists who were new registrants of the College of Pharmacists of B.C. We determined the number of new registrants who were foreign graduates and compared them to the total group of new registrants with respect to their employment status, age, place of graduation or years since graduation.

For the purposes of this project, new registrants were defined as pharmacists who had registered for the first time in the previous year to the year being examined (e.g. for the 1999 data, registrants who had first registered in 1998), and who were still registered in the year being examined (e.g. still registered in 1999). This definition allowed us to look at the employment information for pharmacists in what was essentially their second year of registration while still considering the pharmacists 'new registrants'. (This was necessary since new pharmacists must first register with the CPBC, then seek employment. As a result, most new registrants show up as *not employed* in their first year of registration, thus making it impossible to examine new registrant pharmacists working in hospital pharmacy.). Table 3 shows these 'new registrant' pharmacists by employment status and type of employer for the years 1995 to 2000.

**Table 3 – New Registrant Pharmacists by Employment Status  
and Type of Employer, 1995-2000**

Year	Employed in Pharmacy			Not Employed	Total
	Community Pharmacy	Hospital Pharmacy	Other		
1995	95 (66.9%)	12 (8.5%)	3 (2.1%)	32 (22.5%)	142 (100%)
1996	103 (75.7%)	15 (11.0%)	1 (0.7%)	17 (12.5%)	136 (100%)
1997	116 (68.6%)	25 (14.8%)	3 (1.8%)	25 (14.8%)	169 (100%)
1998	111 (70.3%)	29 (18.4%)	0 (0.0%)	18 (11.4%)	158 (100%)
1999	101 (64.3%)	19 (12.1%)	0 (0.0%)	37 (23.6%)	157 (100%)
2000	106 (74.1%)	17 (11.9%)	2 (1.4%)	18 (12.6%)	143 (100%)

Source: Rollcall 95 to Rollcall Update 00 (College of Pharmacists of B.C. registration data). Please note the dates of record vary from year to year.

The percentage of new registrant pharmacists employed in hospital pharmacy was less than the percentage of all pharmacists employed in hospital pharmacy (see Table 1) in each of the years examined (mean percentage of only 12.8% for the new registrants).

The new registrants were also examined by age, place of graduation and years since graduation. Not surprisingly, the majority of new registrants were <35 years of age, Canadian graduates, and had graduated within the last 4 years (data not shown, but available on request).

The subgroup of new registrants who were foreign graduates was quite small, ranging from 11 to 19 pharmacists between 1995 and 2000, thus detailed tables will not be shown. It is notable however, that only in 1998 were there any foreign-graduated new registrants who were employed in hospital pharmacy (3 out of 18 foreign-graduated new registrants). The majority of foreign-educated new registrants were employed in community pharmacy (mean percentage of 70.9% versus 70.0% for all new registrants), or were unemployed (mean percentage of 25.0% versus 16.2% for all new registrants). As might be expected, the foreign-educated new registrants were older than the total group of new registrants and tended to have graduated more than 5 years ago.

## Projections

In order to project the future supply of pharmacists employed in hospital pharmacies in B.C. several data elements were needed:

- 1) the actual age distribution of the current supply
  - see the hospital pharmacy column in Table 2 above. Age was unknown for 6 pharmacists employed in hospital pharmacy. These six were redistributed, based on the known percentages of pharmacists in each age group (see rows 2 and 3 in the projections in Tables 5-7).
- 2) an estimation method for aging the workforce
  - for the purposes of these projections, several assumptions were made with regard to aging the workforce. Since a minimum of 5 years of university education is needed prior to becoming a pharmacist (1 year prior to entry in the pharmacy program, plus 4 years in the



pharmacy program), any pharmacists reported to be under the age of 25 are likely to be either 23 or 24 years old. Thus, half of the pharmacists in the <25 age group (those who would be 24 years old) were then aged into the next age group each year. For the ten-year age groups, we assumed that in any given year, 1/10<sup>th</sup> of each ten-year age group (or one-year's worth) would age into the next age group, thus 10% of the pharmacists in each of the 10-year age groups are aged into the following age group each year. Our final assumption was that all pharmacists would retire at age 65.

3) an estimate of the average number of pharmacists leaving employment in hospital pharmacy each year (attrition)

- an attrition rate from hospital pharmacy was estimated by averaging the annual attrition rates from hospital pharmacy between 1995 to 2000, using the CPBC registration data. The average attrition rate was calculated as 8.0%.

4) an estimate of the average number of pharmacists reentering employment in hospital pharmacy each year (reactivations)

- a reactivation rate for hospital pharmacy was calculated by averaging the annual reactivation rates into hospital pharmacy between 1995 to 2000, using the CPBC registration data. The average reactivation rate was calculated as 7.6%.

5) an estimate of the average number of new pharmacists (new grads)<sup>4</sup> entering employment in hospital pharmacy each year by age group

- the numbers of new graduates employed in hospital pharmacy by age group between 1995 and 2000 were averaged separately for each age group to create an average age distribution for the new grads employed in hospital pharmacy. Table 4 shows the average age distribution for the new grads.

**Table 4 – Average Number of ‘New Grads’  
Employed in Hospital Pharmacy by Age Group, 1995-2000**

Age Group	Average Number of ‘New Grads’ Employed in Hospital Pharmacies (%)
<25	4.17 (29.76)
25-34	9.00 (64.24)
35-44	0.67 (4.78)
45-54	0.17 (1.21)
55-64	0.00 (0.00)
65+	0.00 (0.00)
Unknown	--
Sum Total	14.01 (100.00)

Source: College of Pharmacists of B.C. registration data.

6) an estimate of the average percentage of new pharmacists (new grads) who enter employment in hospital pharmacy each year

- the percentages of new grads who went into hospital pharmacy between 1995 and 2000 were averaged. The average was calculated to be 12.14%.

7) the current UBC B.Sc.(Pharm) class size

<sup>4</sup> For the purposes of this report we defined “new grads” as pharmacists who graduated within 2 years of their initial year of registration in B.C., i.e. registration year = 1999 and graduation year = 1999 or 1998.

- the 1<sup>st</sup> year enrolment was 140 in 2000<sup>5</sup>

8) an estimate of the average attrition from the UBC B.Sc.(Pharm) program

- the program attrition rates (i.e. the total attrition over the 4 years of the program) for the six most recent classes for which data<sup>6</sup> were available (1991-95 to the 1996-00 classes) were averaged to calculate an average attrition rate from the UBC B.Sc.(Pharm) program. The average attrition rate was calculated as 10.11% (see Appendix I – Table2).

Tables 5 to 7 show the projections for the future supply of pharmacists employed in hospital pharmacy in British Columbia. Table 5 presents the projections if there is no change in to the number enrolled in the UBC Pharmacy program (Scenario 1), while Tables 6 and 7 show what would happen *if* the number of enrollments in the UBC Pharmacy program were increased in 2002 by 5% (Scenario 2) and 10% (Scenario 3), respectively (leading to increased graduates in the Spring of 2006).

The first column in each table briefly describes what is contained in each row. Columns 2-8 show the age distribution of the pharmacists employed in hospital pharmacy. Column 9 shows the projected number of attritions each year, i.e. the number of pharmacists leaving employment in hospital pharmacy each year (total # employed in hospital pharmacy in a given year times the average attrition rate of 8% (see above)). Column 10 similarly shows the number of reactivations each year, i.e. the number of pharmacists reentering employment in hospital pharmacy each year (total # employed in hospital pharmacy in a given year times the average reactivation rate of 7.6% (see above)). Column 11 shows the NET number of pharmacists employed in hospital pharmacy each year (equal to the total minus the attritions plus the reactivations). Column 12 shows the B.C. total population each year, and column 13 shows the number of pharmacists employed in hospital pharmacy per 10,000 population (equal to the NET/population times 10,000).

In order to explain how the projections were done, a row by row account will be given. Using Table 5 (Scenario 1 - no change) as the first example, row 1 in the projections shows the actual age distribution of pharmacists employed in hospital pharmacy in 2000. Row 2 then shows the adjusted percentages in each age group with the six unknowns removed, e.g. for the 25-34 year age group,  $174/(589-6) = 29.85\%$ . Row 3 then shows the adjusted number of pharmacists employed in hospital pharmacy, e.g. for the 25-34 year age group,  $0.2985 \times 589 = 176$ . Row 4 then shows the estimates for the aging of the workforce. As explained above, 50% of the <25 year age group is projected to age into the 25-34 year old age group, 10% of each of the 10-year age groups are expected to age into the following age group, and pharmacists 65+ are projected to retire. Rows 1-4 are identical in Tables 5-7.

Row 5 shows the average number of new pharmacists (new grads)<sup>7</sup> entering employment in hospital pharmacy each year by age group. As explained above, the numbers of new graduates by age group between 1995 and 2000 were averaged separately for each age group to calculate the average age distribution for the new grads. Row 6 shows the projected number of pharmacists employed in hospital pharmacy in 2001. The values in row 6 were calculated as

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<sup>5</sup> Personal communication with Dr. David Hill, December 18, 2001.

<sup>6</sup> Source: Enrolment and graduate data published in the UBC Academic Calendars from 1992/93 to 2001/02. See Appendix I.

<sup>7</sup> For the purposes of this report we defined “new grads” as pharmacists who graduated within 2 years of their initial year of registration in B.C., i.e. reg year = 1999 and grad year = 1999 or 1998.

follows: adjusted number of pharmacists employed in hospital pharmacy (row 3 value, same column) minus the number expected to age out of the age group (row 4 value, same column) plus the number expected to age into the age group (row 4 value, previous column) plus the average number of new grads employed in hospital pharmacy (row 5 value, same column). So for example, the projected number of pharmacists 35-44 years old employed in hospital pharmacy in 2001 would be  $219 - 21.92 + 17.58 + 0.67 = 216$ . Row 7 is again an estimate of the aging of the workforce, and is calculated in the same way as row 4 was. Rows 5-7 are identical in Tables 5-7.

In Table 5, the projections for each consecutive year were calculated in a similar fashion to the projections for 2001. In tables Table 6 and 7, an additional row appears above the 2002 projections showing the anticipated size of the UBC Pharmacy class entering in 2002 if a projected enrollment increase was applied (Table 6 shows the effects of a 5% increase – Scenario 2, and Table 7 shows the effects of a 10% increase – Scenario 3). The projections for 2002 to 2005 in Tables 6 and 7 are identical to those in Table 5, as the first class with the increased enrollment will not graduate until the Spring of 2006. The projections for 2006 to 2009 in Tables 6 and 7 take into account the anticipated increase in the number of graduates from the UBC Pharmacy program if the projected enrollment increases to the program were to happen.

Row 21 (1<sup>st</sup> row in the 2006 projections) in Tables 6 and 7 shows the expected number of graduates from the UBC Pharmacy program for each of Scenarios 2 and 3 after the average program attrition rate of 10.11% (see Appendix I – Table 2) was applied. For Scenario 2 we would expect 132 graduates, while for Scenario 3 we would expect to see 138 graduates. In order to forecast how many of these graduates could then be expected to go into employment in hospital pharmacy, we applied the estimate of the average percentage of new pharmacists (new grads) who enter employment in hospital pharmacy each year (12.14%) to the number of expected graduates, giving us a total of 16 new graduates expected to go into employment in hospital pharmacy for Scenario 2 in Table 6, and 16.75 for Scenario 3 in Table 7 (see the total column in row 22). These new graduates were then distributed across the age groups based on the average percentages in each age group (see Table 4) to give the adjusted average number of new grads employed in hospital pharmacy (row 22). Row 23 in Tables 6 and 7 is calculated in a similar fashion to row 6 except that the adjusted average number of new grads employed in hospital pharmacy is used. The remainder of the projections in Tables 6 and 7 for 2007 to 2009 were calculated in a similar fashion to the projections for 2006.

**Table 5 – Projected Numbers of Pharmacists Employed in Hospital Pharmacy, 2001-2009**  
**(Scenario 1 - No change in the number of UBC Pharmacy program enrollments from the 2000 level)**

Row # Pharmacists		Age Distribution						Number/					
		< 25	25-34	35-44	45-54	55-64	Unk	Total	# Attrition	# Reactiv.	NET	B.C. Popul.	10,000 Pop
1	actual # empl in hosp phm 2000	10	174	217	154	28	6	589					
2	adjusted % empl in hosp phm 2000	1.72	29.85	37.22	26.42	4.8	--	100.01					
3	adjusted # empl in hosp phm 2000	10	176	219	156	28	--	589				4,063,760	1.45
4	# expected to age into next age group	5.07	17.58	21.92	15.56	2.83	--						
5	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00	--	14.01					
6	# empl hosp phm 2001	9	172	216	162	41	--	600	48	46	598	4,096,894	1.46
7	# expected to age into next age group	4.6	17.2	21.6	16.2	4.1	--	63.7					
9	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00							
10	# empl in hosp phm 2002	9	169	212	168	53	--	610	49	46	608	4,144,313	1.47
11	# expected to age into next age group	4.4	16.9	21.2	16.8	5.3							
12	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00							
13	# empl in hosp phm 2003	9	165	208	172	65	--	619	50	47	616	4,203,035	1.47
14	# expected to age into next age group	4.3	16.5	20.8	17.2	6.5							
15	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00							
16	# empl in hosp phm 2004	8	162	205	176	75	--	626	50	48	624	4,263,280	1.46
17	# expected to age into next age group	4.2	16.2	20.5	17.6	7.5							
18	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00							
18	# empl in hosp phm 2005	8	159	201	179	85	--	633	51	48	630	4,321,939	1.46
20	# expected to age into next age group	4.2	15.9	20.1	17.9	8.5							
22	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00							
23	# empl in hosp phm 2006	8	156	197	181	95	--	638	51	49	636	4,383,004	1.45
24	# expected to age into next age group	4.2	15.6	19.7	18.1	9.5							
25	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00							
26	# empl in hosp phm 2007	8	154	194	183	103	--	643	51	49	640	4,447,390	1.44
27	# expected to age into next age group	4.2	15.4	19.4	18.3	10.3							
28	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00							
29	# empl in hosp phm 2008	8	152	191	184	111	--	647	52	49	644	4,513,790	1.43
30	# expected to age into next age group	4.2	15.2	19.1	18.4	11.1							
31	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00							
32	# empl in hosp phm 2009	8	150	187	185	119	--	649	52	49	647	4,580,828	1.41
33	# expected to age into next age group	4.2	15.0	18.7	18.5	11.9							

**Table 6 - Projected Numbers of Pharmacists Employed in Hospital Pharmacy, 2001-2009**  
**(Scenario 2 - 5% increase in the number of UBC Pharmacy program enrollments in 2002, leading to increased grads in 2006)**

Row #	Pharmacists	Age Distribution						Total	# Attrition	# Reactiv.	NET	Number/	
		< 25	25-34	35-44	45-54	55-64	Unk					B.C. Popul	10,000 Pop
1	actual # empl in hosp phm 2000	10	174	217	154	28	6	589					
2	adjusted % empl in hosp phm 2000	1.72	29.85	37.22	26.42	4.8	--	100.01					
3	adjusted # empl in hosp phm 2000	10	176	219	156	28	--	589				4,063,760	1.45
4	# expected to age into next age group	5.07	17.58	21.92	15.56	2.83	--	58.91					
5	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00	--	14.01					
6	# empl in hosp phm 2001	9	172	216	162	41	--	600	48	46	<b>598</b>	4,096,894	1.46
7	# expected to age into next age group	4.6	17.2	21.6	16.2	4.1	--	63.7					
8	<b>increase enrollment at UBC by 5% from 2000 level (140 seats in 2000)</b>							<b>147</b>					
9	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00	--	14.01					
10	# empl in hosp phm 2002	9	169	212	168	53	--	610	49	46	<b>608</b>	4,144,313	1.47
11	# expected to age into next age group	4.4	16.9	21.2	16.8	5.3	--	64.5					
12	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00	--	14.01					
13	# empl in hosp phm 2003	9	165	208	172	65	--	619	50	47	<b>616</b>	4,203,035	1.47
14	# expected to age into next age group	4.3	16.5	20.8	17.2	6.5	--	65.3					
15	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00	--	14.01					
16	# empl in hosp phm 2004	8	162	205	176	75	--	626	50	48	<b>624</b>	4,263,280	1.46
17	# expected to age into next age group	4.2	16.2	20.5	17.6	7.5	--	66.0					
18	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00	--	14.01					
18	# empl in hosp phm 2005	8	159	201	179	85	--	633	51	48	<b>630</b>	4,321,939	1.46
20	# expected to age into next age group	4.2	15.9	20.1	17.9	8.5	--	66.6					
21	<b>expected # of grads after seat increase and 10.11% attrition</b>							<b>132</b>					
22	adjusted avg # of new grads empl in hosp phm	4.77	10.29	0.77	0.19	0.00	--	16.02					
23	# empl in hosp phm 2006	9	158	198	181	95	--	640	51	49	<b>638</b>	4,383,004	1.46
24	# expected to age into next age group	4.5	15.8	19.8	18.1	9.5	--	67.6					
25	adjusted avg # of new grads empl in hosp phm	4.77	10.29	0.77	0.19	0.00	--	16.02					
26	# empl in hosp phm 2007	9	157	194	183	103	--	647	52	49	<b>644</b>	4,447,390	1.45
27	# expected to age into next age group	4.6	15.7	19.4	18.3	10.3	--	68.4					
28	adjusted avg # of new grads empl in hosp phm	4.77	10.29	0.77	0.19	0.00	--	16.02					
29	# empl in hosp phm 2008	9	156	191	185	111	--	653	52	50	<b>650</b>	4,513,790	1.44
30	# expected to age into next age group	4.7	15.6	19.1	18.5	11.1	--	69.0					
31	adjusted avg # of new grads empl in hosp phm	4.77	10.29	0.77	0.19	0.00	--	16.02					
32	# empl in hosp phm 2009	9	155	189	185	119	--	657	53	50	<b>655</b>	4,580,828	1.43
33	# expected to age into next age group	4.7	15.5	18.9	18.5	11.9	--	69.5					

**Table 7 - Projected Numbers of Pharmacists Employed in Hospital Pharmacy, 2001-2009**  
**(Scenario 3 - 10% increase in the number of UBC Pharmacy program enrollments in 2002, leading to increased grads in 2006)**

Row #	Pharmacists	Age Distribution						# Attrition	# Reactiv.	NET	Number/	
		< 25	25-34	35-44	45-54	55-64	Unk				B.C.Popul	10,000 Pop
1	actual # empl in hosp phm 2000	10	174	217	154	28	6					
2	adjusted % empl in hosp phm 2000	1.72	29.85	37.22	26.42	4.8	--					
3	adjusted # empl in hosp phm 2000	10	176	219	156	28	--				4,063,760	1.45
4	# expected to age into next age group	5.07	17.58	21.92	15.56	2.83	--					
5	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00	--					
6	# empl in hosp phm 2001	9	172	216	162	41	--	48	46	<b>598</b>	4,096,894	1.46
7	# expected to age into next age group	4.6	17.2	21.6	16.2	4.1	--					
8	<b>increase enrollment at UBC by 10% from 2000 level (140 seats in 2000)</b>											
9	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00	--					
10	# empl in hosp phm 2002	9	169	212	168	53	--	49	46	<b>608</b>	4,144,313	1.47
11	# expected to age into next age group	4.4	16.9	21.2	16.8	5.3	--					
12	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00	--					
13	# empl in hosp phm 2003	9	165	208	172	65	--	50	47	<b>616</b>	4,203,035	1.47
14	# expected to age into next age group	4.3	16.5	20.8	17.2	6.5	--					
15	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00	--					
16	# empl in hosp phm 2004	8	162	205	176	75	--	50	48	<b>624</b>	4,263,280	1.46
17	# expected to age into next age group	4.2	16.2	20.5	17.6	7.5	--					
18	avg # of new grads empl in hosp phm	4.17	9.00	0.67	0.17	0.00	--					
18	# empl in hosp phm 2005	8	159	201	179	85	--	51	48	<b>630</b>	4,321,939	1.46
20	# expected to age into next age group	4.2	15.9	20.1	17.9	8.5	--					
21	<b>expected # of grads after seat increase and 10.11% attrition</b>											
22	adjusted avg # of new grads empl in hosp phm	4.99	10.76	0.80	0.20	0.00	--					
23	# empl in hosp phm 2006	9	158	198	181	95	--	51	49	<b>639</b>	4,383,004	1.46
24	# expected to age into next age group	4.6	15.8	19.8	18.1	9.5	--					
25	adjusted avg # of new grads empl in hosp phm	4.99	10.76	0.80	0.20	0.00	--					
26	# empl in hosp phm 2007	10	158	194	183	103	--	52	49	<b>646</b>	4,447,390	1.45
27	# expected to age into next age group	4.8	15.8	19.4	18.3	10.3	--					
28	adjusted avg # of new grads empl in hosp phm	4.99	10.76	0.80	0.20	0.00	--					
29	# empl in hosp phm 2008	10	157	192	185	111	--	52	50	<b>652</b>	4,513,790	1.44
30	# expected to age into next age group	4.9	15.7	19.2	18.5	11.1	--					
31	adjusted avg # of new grads empl in hosp phm	4.99	10.76	0.80	0.20	0.00	--					
32	# empl in hosp phm 2009	10	157	189	185	119	--	53	50	<b>658</b>	4,580,828	1.44
33	# expected to age into next age group	4.9	15.7	18.9	18.5	11.9	--					

## Discussion

The projections show that the number of pharmacists working in hospital pharmacy could be expected to increase from the current level of 589 in 2000 to between 647 and 658 by 2009. The differences projected between the three scenarios were very small. Scenario 1, no change in the number of enrollments in the UBC Pharmacy program, would lead to an overall increase of 9.85% of the number of pharmacists working in hospital pharmacy to 647 in 2009. Scenarios 2 (5% increase) and 3 (10% increase) would only lead to slightly larger increases in the expected number of pharmacists working in hospital pharmacy, 11.21% (655 in 2009) and 11.71% (658 in 2009), respectively.

As discussed throughout this working paper, numerous assumptions were made in order to prepare the projections included, and we have tried to explain why we made the assumptions we did, or at least provide a basis for the assumptions using past supply data. Also, as noted above, these projections only included the UBC pharmacy program as a potential source of new pharmacists entering employment in hospital pharmacy. The final numbers projected would surely change if we expanded the projections to include the various potential sources for pharmacists entering employment in hospital pharmacy, such as new registrants from elsewhere in Canada, the foreign-graduated new registrants, and licensed pharmacists switching employment types. Since the projections prepared here were meant to be simple and to illustrate what might happen if there was an increase in enrollment, no attempts were made to include these other potential sources of pharmacists entering employment in hospital pharmacy.

## Appendix I

**Table 1**  
**Enrolment and Graduate data for the UBC B.Sc.(Pharm) program,**  
**and the Residency program, 1991-2000<sup>8</sup>**

Year	Enrolment				Grads	Pharmacy Residents
	1st	2 <sup>nd</sup>	3 <sup>rd</sup>	4th		
1991	124	118	116	111	118	—
1992	134	113	114	110	111	23
1993	138	122	111	107	107	17
1994	140	125	124	107	103	17
1995	136	132	122	119	108	13
1996	144	131	129	119	119	16
1997	144	141	133	123	119	16
1998	149	131	141	130	122	18
1999	136	150	125	140	130	18
2000	140	132	147	123	136	15

**Table 2**  
**Calculated Attrition Rates from UBC B.Sc.(Pharm) program,**  
**1991-95 class to 1996-00 class**

Class	Calculated 4-year Attrition Rate (%)
1991-95	12.90
1992-96	11.19
1993-97	13.77
1994-98	12.86
1995-99	4.41
1996-00	5.56
<b>Average</b>	<b>10.11</b>

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<sup>8</sup> Source: Enrolment and graduate data published in the UBC Academic Calendars from 1992/93 to 2001/02.



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