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LABORATORY REPORTS OF HUMAN VIRAL AND SELECTED NON-VIRAL AGENTS IN CANADA — 1994 and 1995

Introduction

The Canadian Virus Reporting (CVR) program is a national surveillance system for documenting and analyzing trends in laboratory-diagnosed viral and selected non-viral infections across Canada. During 1994 and 1995, 37 diagnostic laboratories from across Canada contributed monthly data on the total number of specimens for confirmation of viral infection as well as the number and type of positive findings to the Surveillance, Influenza and Viral Exanthemata Section of the Laboratory Centre for Disease Control (LCDC). This report highlights and discusses some significant data for the 1994 and 1995 seasons in terms of annual and monthly rates of reporting of the agents surveyed.

Annual fluctuations in reporting the frequency of individual viruses may depend upon several factors: the number of laboratories testing for particular agents, their reporting of data to this surveillance system, the development or improvement of methods to quickly identify particular viruses, and the reporting of repeated test results from patients monitored for pathogen activity or success of antiviral therapy. Conversely, other fluctuations represent trends reflecting real changes in the incidence of particular viruses. Annual changes in data are discussed in light of these and other influencing factors.

1994 and 1995 Overviews

Total numbers of positive reports from all sources were 66,447 for 1993[1], 65,925 for 1994, and 72,881 for 1995. Total numbers of specimens for confirmation of viral infection were approximately 1.33 million for 1994 and 1.326 million for 1995, compared to 1.44 million for 1993[1]. Percentages of specimens received that were positive for any agent were 5.0% for 1994 and 5.5% for 1995, compared to 4.6% for 1993[1].

More than 95% of the total of positive reports came from laboratories which provided complete data on the total number of specimens received, and the numbers and types of positive diagnoses each month.

Table 1 shows the relationship between numbers of positive reports and total numbers of specimens received on a monthly basis for 1994 and 1995. Total numbers of specimens received per month for viral diagnosis fluctuated throughout the year, with a high of 121,170 in September to a low of 90,728 in July for 1994, and a high of 123,667 in November to a low of 90,957 in July for 1995. Numbers of positive reports also fluctuated from a high of 6,231 in March to a low of 4,155 in December for 1994, and from a high of 6,762 in May to a low of 5,138 in July for 1995. For 1994, percentages of specimens received with positive reports ranged from a high of 5.9% in June to a low of 3.9% in December, with a mean of 5%. For 1995, they varied between a high of 6.1% in March and a low of 4.8% in September, with a mean of 5.5%. Ratios of positive reports to specimens received were lowest from August to December for 1994, and from August to November for 1995. Positive reports between January and March accounted for 28% of the total of positive reports for 1994, which probably reflects the higher incidence of respiratory viruses at that time of year. Positive reports during the same period for 1995 accounted for 25.9% of the total for that year.

Table 1
Monthly trends of laboratory reports of human viral and selected non-viral agents in Canada, 1994* and 1995*

Month	Year	Total specimens **	Positive reports	% of monthly positive reports	% of annual positive reports ***
January	1994	114,689	6,087	5.3	9.2
	1995	111,556	6,179	5.5	8.5
February	1994	112,243	6,131	5.5	9.3
	1995	103,908	5,997	5.8	8.2
March	1994	113,757	6,231	5.5	9.5
	1995	110,463	6,707	6.1	9.2
April	1994	108,298	5,527	5.1	8.4
	1995	108,979	6,068	5.6	8.3
May	1994	112,266	5,628	5.0	8.5
	1995	122,805	6,762	5.5	9.3
June	1994	97,248	5,692	5.9	8.6
	1995	107,019	6,290	5.9	8.6
July	1994	90,728	5,035	5.5	7.6
	1995	90,957	5,138	5.6	7.1
August	1994	117,426	5,603	4.8	8.5
	1995	112,911	5,976	5.3	8.2
September	1994	121,170	4,935	4.1	7.5
	1995	115,431	5,486	4.8	7.5
October	1994	114,781	5,419	4.7	8.2
	1995	113,313	5,921	5.2	8.1
November	1994	120,321	5,482	4.6	8.3
	1995	123,667	6,275	5.1	8.6
December	1994	107,464	4,155	3.9	6.3
	1995	104,650	6,082	5.8	8.3
TOTAL	**1994**	**1,330,391**	**65,925**	**5.0**	**100.0**
	1995	**1,325,659**	**72,881**	**5.5**	**100.0**

* Represents 37 diagnostic laboratories.
** More than 95% of positive reports came from laboratories providing this information.
*** Monthly positive reports as a percent of annual total.

Frequently Diagnosed Agents

A total of 92 different agents were reported for 1994 (Table 2) and 96 for 1995 (Table 3). The five most frequently laboratory-diagnosed agents for both these years are compared with those for 1993 in Table 4. For 1994, herpes simplex virus (HSV) was the most frequently identified agent with 14,448, or 22% of, positive reports. Hepatitis C virus (HCV) was the second most frequently identified agent with 11,702, or 18% of, positive reports — a 52% increase from 1993. For 1995, HCV was the most frequently identified agent with 16,031 positive reports — a 37% increase from 1994. This might have resulted, in part, from increased awareness of HCV and the more widespread use of recently developed diagnostic methods. For 1993, only 19 laboratories were reporting HCV; for 1994 and 1995, 23 laboratories were reporting HCV. Furthermore, the average number of positive reports of HCV per laboratory increased from 406 for 1993 to 509 for 1994, and to 697 for 1995. As for 1993, the relative numbers of both HSV and *Chlamydiae trachomatis* (CT) may have been underestimated since a large number of the "herpesvirus not typed" (herpes NT) specimens (1,611 for 1994 and 1,501 for 1995) and "*Chlamydiae* not typed" (Chl. NT) specimens (2,773 for 1994 and 1,633 for 1995) may actually have been HSV and CT, respectively. Moreover, many more cases of genital *Chlamydiae* are identified in laboratories other than the general virology laboratories participating in this reporting system. This is suggested by a comparison of the number of positive specimens reported through this program for 1993 (13,796, CT and Chl. NT)[1] compared with the notifiable diseases data for 1993 (44,296 genital *Chlamydiae*)[2].

The herpes virus group (herpes NT, HSV, Epstein-Barr virus, varicella-zoster virus, herpesvirus type 6, and cytomegalovirus) is still the largest group of identified agents. These agents were responsible for 22,485, or 34% of, positive reports for 1994 (Table 2) and for 23,191, or 32% of, positive reports for 1995 (Table 3). The next largest group was the *Chlamydiae* group (CT, Chl. NT, *C. pneumoniae*, and *C. psittaci*) with 12,419, or 19% of, positive reports for 1994. For 1995, they accounted for 10,845, or 15% of, positive reports, after HCV which accounted for 22%. The herpesvirus and *Chlamydiae* groups constitute 53% of the total positive reports for 1994. These results differ only slightly from the 1993 totals; 23,107, or 35% of, positive reports for the herpesvirus group and 13,796, or 21%, for the *Chlamydiae* group. Identified agents of sexually transmitted diseases (hepatitis B, herpes NT, HSV, HIV-1, papovavirus group, Chl. NT, and CT), although not exclusively transmitted sexually, comprised 52% of all positive specimens for 1994 (34,405/65,925) and 47% for 1995 (34,139/72,881) compared to 54% for 1993 (36,177/66,447)[1], 63% for 1992 (42,973/68,325)[3], 65% for 1990 (39,713/61,468), and 63% for 1985 (24,969/39,662). These figures suggest a recent, relative decrease in positive reports of this group of diseases since 1992.

Other Agents with Large Changes in Numbers of Positive Reports

Other agents that showed large changes in numbers of positive reports from 1992 to 1995 are listed in Table 5; enteroviruses increased sporadically. Characteristically, the majority of positive reports may originate from outbreaks within a particular province or region: for 1994, 91 of the 113 reports of coxsackievirus type A9 came from Quebec; for 1993, 57 of the 59 reports of echovirus type 4 came from Manitoba; and, for 1994, 97 of the 109 reports of echovrius type 4 came from Saskatchewan and Manitoba (70 and 27, respectively). This is also illustrated in Table 6, which lists information on positive reports of coxsackievirus type B5 from 1993 to 1995.

Among respiratory and exanthem viruses, positive reports of influenza B, parainfluenza type 1, and rubella were down markedly for 1994 compared with 1993 (Table 5). Positve reports of measles increased for 1994 (208) and 1995 (1,009) from the low level in 1993 (39), following a previous peak for 1991 (1,940) and a decline for 1992 (891)[1]. Rises in measles reports for 1994 and 1995 were mainly due to increased reports from Ontario.

Table 2
Laboratory evidence of human viral* infections in Canada, 1994

Virus	Canada			Virus	Canada		
	I	D	S		I	D	S
Adeno NT	783	367	104	Hepatitis C		246	11,456
Adeno type 1	36			Hepatitis Delta-HDV			28
Adeno type 2	49		1	Herpes NT	1,288	298	25
Adeno type 3	45			Herpes simplex NT	509	20	353
Adeno type 4	6			Herpes simplex type 1	6,398	50	1
Adeno type 5	8			Herpes simplex type 2	7,089	21	7
Adeno type 6	5			Herpes type 6			12
Adeno type 7	5			HIV-1		40	1,944
Adeno type 41		5		HTLV-I			45
Alpha NT			1	HTLV II			4
Astro		49		Influenza A NT	375	98	398
Calici		17		Influenza A (H_3N_2)	51		42
California encephalitis			1	Influenza B	10	14	7
Corona		3		Measles			208
Coxsackie A NT	2			Molluscum contagiosum	2	41	
Coxsackie type A2	2			Mumps	4	2	43
Coxsackie type A4	3			Norwalk-like agent		343	7
Coxsackie type A9	112		1	Papova group		14	
Coxsackie type A16	2			Parainfluenza NT	3		
Coxsackie B NT			3	Parainfluenza type 1	43	7	4
Coxsackie type B1	14			Parainfluenza type 2	59	9	
Coxsackie type B2	20			Parainfluenza type 3	342	184	34
Coxsackie type B3	23			Parainfluenza type 4	11		
Coxsackie type B4	27			Parvo B19		17	397
Coxsackie type B5	50			Polio vaccine strain	8		
Coxsackie type B6	9			Polio vaccine type 1	21		
Cytomegalo	1,605	22	707	Polio vaccine type 2	18	1	
Echo NT	2		2	Polio vaccine type 3	14	3	
Echo type 3	3			Reo (All)	6	2	
Echo type 4	108		1	Respiratory syncytial	822	2,231	14
Echo type 5	1			Rhino (All)	116	3	
Echo type 6	5			Rota	3	1,950	
Echo type 7	4			Rubella	4		83
Echo type 9	3			Toro		2	
Echo type 11	12			Varicella-zoster	418	110	306
Echo type 17	2						
Echo type 18	1			*Chlamydiae NT*	326	2,406	41
Echo type 20	6			*C. pneumoniae*			86
Echo type 21	2			*C. trachomatis*	335	9,130	26
Echo type 22	10			*C. psittaci*		47	22
Echo type 25	4			*Coxiella burnetii*			19
Echo type 27	2			*Mycoplasma pneumoniae*	5		1,389
Echo type 30	1			*Rickettsia rickettsi*			2
Echo type 31	3						
Entero NT	730	222	59	**TOTAL**	**21,988**	**21,577**	**22,360**
Epstein-Barr	3	9	3,234				
Flavi			18				
Hanta		2	3				
Hepatitis A			1,130				
Hepatitis B		3,592	92				

* Some non-viral agents traditionally diagnosed in virus laboratories are included.
I= isolation, D = detection, S = serology, NT = non typed.

Table 3
Laboratory evidence of human viral* infections in Canada, 1995

Virus	Canada I	Canada D	Canada S	Virus	Canada I	Canada D	Canada S
Adeno NT	792	351	61	Hepatitis B		4,105	50
Adeno type 1	36	1		Hepatitis C		894	15,137
Adeno type 2	58			Hepatitis Delta-HDV			13
Adeno type 3	64			Herpes NT	1,280	160	61
Adeno type 4	3			Herpes simplex NT	823	21	308
Adeno type 5	13			Herpes simplex type 1	6,452	63	21
Adeno type 6	9			Herpes simplex type 2	6,972	25	3
Adeno type 10	15	11	1	Herpes type 6			6
Adeno type 41	5	12		HIV-1			3,378
Astro		53		HTLV-I			19
Calici		43		HTLV II			11
Corona	1	7		Influenza A NT	734	225	259
Coxsackie A NT	1			Influenza A (H_3N_2)	53		16
Coxsackie type A1	2			Influenza A (H_1N_1)	127		7
Coxsackie type A2	1			Influenza B	231	10	118
Coxsackie type A3	1			Measles	2		1,007
Coxsackie type A4	2			Molluscum contagiosum	5	23	
Coxsackie type A5	1			Mumps	4		129
Coxsackie type A9	3		3	Norwalk-like agent	1	389	12
Coxsackie type A16	17			Papova group		17	
Coxsackie type A18	1			Parainfluenza NT	36	6	
Coxsackie type A24	12			Parainfluenza type 1	163	7	9
Coxsackie type B1	24			Parainfluenza type 2	88	6	1
Coxsackie type B2	47			Parainfluenza type 3	357	397	27
Coxsackie type B3	7			Parainfluenza type 4	5		
Coxsackie type B4	9			Parvo B19			329
Coxsackie type B5	91			Polio vaccine strain	9		
Coxsackie type B6	1			Polio vaccine type 1	3		
Cytomegalo	1,522	38	824	Polio vaccine type 2	5		
Echo NT	10			Polio vaccine type 3	2		
Echo type 1	1			Reo (All)	5	1	
Echo type 3	7			Respiratory syncytial	1,086	1,845	19
Echo type 4	2			Rhino (All)	115	4	1
Echo type 5	1			Rota		1,891	
Echo type 6	55			Rubella	3		104
Echo type 7	1			Toro		4	
Echo type 9	8			Varicella-zoster	446	174	417
Echo type 11	8						
Echo type 14	1			*Chlamydiae* NT	196	1,313	124
Echo type 15	1			*C. pneumoniae*			162
Echo type 16	1			*C. trachomatis*	456	8,306	5
Echo type 18	4			C. *psittaci*		267	16
Echo type 22	4			*Coxiella burnetii*			41
Echo type 25	5			*Mycoplasma pneumoniae*	24		1,415
Echo type 27	1			*Rickettsia Rickettsi*			4
Echo type 30	5						
Echo type 31	1			**TOTAL**	**23,024**	**20,838**	**29,019**
Echo type 33	1						
Entero NT	486	148	17				
Epstein-Barr		21	3,554				
Flavi/Dengue NT			33				
Hepatitis A			1,297				

* Some non-viral agents traditionally diagnosed in virus laboratories are included.
I= isolation, D = detection, S = serology, NT = non typed.

Table 4
The five most frequently laboratory-diagnosed agents in 1995, 1994, and 1993

Rank	1995			1994			1993		
	Agent	Number	% of total	Agent	Number	% of total	Agent	Number	% of total
1	HCV	16,031	22	HSV	14,448	22	HSV	15,713	24
2	HSV	14,688	20	HCV	11,702	18	CT	10	817
3	CT	8,767	12	CT	9,491	14	HCV	7,705	12
4	HBV	4,155	6	HBV	3,684	6	HBV	3,970	6
5	EBV	3,575	5	EBV	3,246	5	EBV	3,346	5
	All others	25,683	35	All others	23,354	35	All others	24,896	37
	TOTAL	**72,881**		**TOTAL**	**65,925**		**TOTAL**	**66,447**	

HCV = hepatitis C virus; **HSV** = herpes simplex virus; **CT** = *Chlamydia trachomatis*; **HBV**= hepatitis B virus; **EBV** = Epstein-Barr virus.

Table 5
Other agents with large changes in the number of laboratory-reported diagnoses in 1995 and 1994, compared with 1993 and 1992

Agent	Number of Positive Reports and Year			
	1995	1994	1993	1992
Coxsackie type A9	6	113	8	16
Coxsackie type B2	47	20	6	14
Coxsackie type B3	7	23	6	12
Coxsackie type B4	9	27	6	32
Echo type 4	2	108	59	0
Echo type 9	8	3	62	31
Echo type 11	8	12	59	17
Echo type 25	5	4	18	1
Influenza B	359	31	867	87
Measles	1,009	208	39	891
Parainfluenza type 1	179	54	253	91
Rubella	107	87	759	1,651
Chlamydia psittaci	283	69	15	16
HIV-1	3,378	1,984	2,687	5,148

Table 6
Year, province, number, and percent of positive reports of coxsackie virus type B5 originating in one province

Year	Province	Number*	Percent
1995	Saskatchewan	88/91	97%
1994	Quebec	45/50	90%
1993	Saskatchewan	30/38	79%

* Number of positive reports from the indicated province over the total positive reports from across Canada.

Positive reports of *C. psittaci* increased from 15 for 1993 to 69 for 1994, and to 283 for 1995. Manitoba reported 267 of these for 1995. In Saskatchewan, about 80% of respiratory specimens positive for *C. psittaci* by complement fixation were determined to be *C. pneumoniae* by further testing (Dr. Greg Horsman, Public Health Laboratory, Regina; personal communication, 1996). The number of positive laboratory reports of HIV-1 fell from 5,148 for 1992 and 2,687 for 1993 to 1,984 for 1994 (Table 5). However, this drop may reflect the policies of some provinces to report only new HIV-1 cases and not include results that are confirmed as positive for specimens from patients previously diagnosed as HIV-1 positive. The HIV-1 figures for Ontario show an increase in numbers between 1994 and 1995, but this is a reflection of inadequate reporting by individual laboratories for 1994. Positive reports for 1995 were obtained from the HIV-1 Reference Laboratory in Ontario and these 1,386 reports are believed to be new HIV-1 infected cases. This number of specimens is only about half of the total number of specimens received that were confirmed positive by the Reference Laboratory (Carol Major, Central Public Health Laboratory, Etobicoke; personal communication, 1996). Nevertheless, the incidence of new HIV-1 cases in Ontario did show a 35% decrease between 1990 and 1995 (ibid).

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Source: *S Zou, PhD and J Weber, PhD, Surveillance, Influenza and Viral Exanthemata, National Laboratory for Special Pathogens, Bureau of Microbiology, LCDC, Ottawa, Ontario.*

International Notes

ANTIBIOTIC RESISTANCE — JOINT WHO/IFPMA MEETING

The threat of the growing resistance of common infectious diseases to antibiotics was the key subject of discussion at a meeting in Geneva organized jointly on 12-13 November 1996 by WHO and the International Federation of Pharmaceutical Manufacturers Associations (IFPMA). The discussions centred around the developing resistance of bacteria to frequently-used antibiotics: as resistant bacteria spread, many common infectious diseases are becoming more difficult and expensive to treat.

The meeting resulted in an agreement on a framework for future collaborative efforts between WHO and the pharmaceutical industry to contain the spread of antibiotic-resistant bacteria. The partnership outlined in this framework is expected to improve opportunities for successful, cost-effective treatment of infections and to encourage research and development of new antibiotics.

The meeting heard about progress in the development of a global network of laboratories using reliable methods for testing bacteria for antibiotic resistance (WHONET). WHO will make data available on the resistance of bacteria to antibacterial agents in different parts of the world. International experts, including those from the pharmaceutical industry, will be consulted on potential strategies for further development of the network, on priorities for research and development, as well as on data evaluation and publication.

As its contribution to the partnerhip, WHO has made WHONET software available to laboratories in the global network to input antibiotic resistance data. This will be used:

- to generate reports locally to guide the appropriate choice of therapy for the individual patient;
- to aid in local infection control efforts by providing an early warning on the emergence of new and multiply-resistant bacteria;
- to assist national surveillance programmes and antibiotic policies;
- to contribute to the global monitoring of antibiotic-resistant bacteria.

The industry has already shown its commitment to this partnership through its Association in the United States of America, providing support for laboratories in Africa, which will introduce monitoring of antibiotic resistance (WHONET) on this continent for the first time.

Stringent quality control is essential to ensure that laboratory test results are reliable. The results of a pilot project reported by the Centers for Disease Control and Prevention, Atlanta, United States, showed that the majority of current WHONET users are generating antibiotic resistance data that are both accurate and reproducible.

Source: *WHO Weekly Epidemiological Record, Vol 71, No 47, 1996.*

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