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A POINT SOURCE DENGUE OUTBREAK IN CANADIAN TOURISTS IN BARBADOS

Dengue fever is emerging as a public-health problem in many countries in the American tropics (e.g. the Caribbean, Mexico, Central America, and northern South America) commonly visited by Canadian tourists[1,2]. Anecdotal single case reports of dengue in Canadians have been published in the past[2-7]. However, a better indication of incidence is dengue serology data from the National Arbovirus Laboratory, Laboratory Centre for Disease Control, Ottawa, and the Ontario Provincial Laboratory, Toronto. While dengue is not a reportable disease, the annual number of serologically diagnosed cases (confirmed and suspected) has increased considerably in this decade – 17 vs. 29.5 in the 1980s and 1990s, respectively[7]. The number is expected to rise in coming years[2].

We report here an unusual single source outbreak of dengue in a group of 13 tourists, 11 of whom were Canadian, sharing the same holiday accommodation on the west coast of Barbados during the 2-week period from 21 December 1997 to 4 January 1998. The outbreak is of interest because of the high attack rate over a very short period of time, as well as for the questions it raises concerning risks to tourists of second attacks of dengue and the associated risk of the serious consequences of dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS).

Description of the outbreak

From 21 December 1997 to 4 January 1998, 13 people stayed for 1 to 2 weeks at the Bellairs Research Institute residence on the west coast of Barbados. This residence normally houses Biology students associated with McGill University, but it is open for tourists during the Christmas holidays. The residence is a one-floor building, with bedrooms for two facing a common outside corridor on one side and a grassed yard on the other side.

In the week subsequent to their return to Canada, four of the 13 individuals sought medical help at the Montreal General Hospital because of febrile illnesses compatible with dengue. These four persons and three others from Montreal, who were sought out subsequently, were examined at the McGill Centre for Tropical Disease. Two others were interviewed by phone and E-mail.

A confirmed case of dengue was defined, for the purposes of this report, to be an individual who had a febrile illness during or in the 2 weeks subsequent to the holiday in Barbados and a seroconversion, or a high single titre (≥ 1:160) of IgG dengue antibody and a positive IgM dengue antibody. A probable case was an individual with a fever and other compatible symptoms but without serologic tests.

Of the 13 people, six were confirmed cases and four were probable cases. One of the probable cases was not available for any evaluation and is not included in Table 1. The three other probable cases did not develop any illness; two of these were tested and found not to have developed dengue antibodies, and one was not tested.

The clinical presentations of the confirmed and the probable cases were compatible with the standard descriptions of classic dengue. Detailed clinical presentations were available for nine of the 10 confirmed and probable cases. Fever lasted 7 days or less and was associated with headache (8/9), myalgia and/or bone pain (8/9), intestinal symptoms (7/9), and a rash (6/9) (Table 1). In the five cases who had hematologic tests, there was leucopenia (3/5) and, thrombocytopenia (4/5); atypical lymphocytosis was noted in those who had smears (2/3). Of note were the high IgG antibody titres in those acute sera not collected until day 8 following the onset of the illness.

Table 1/Tableau 1
Clinical and laboratory* manifestations**
Tableau clinique et résultats des épreuves biologiques***

Cases Cas	Age, Sex Âge, Sexe	Disease onset Début de la maladie	Symptoms Symptômes	Acute illness (days)/Maladie aiguë (jours)	Recovery phase (days)/Phase de rétablissement (jours)	WBC 10^9/L NL 10^9/L	Platelets 10^9/L Plaquettes 10^9/L	HCT Ht	Serology IgM ELISA Sérologie IgM ELISA	Serology acute Sérologie phase aiguë	Serology convalescent Sérologie phase de convalescence	Disease onset to serology (days) Intervalle début-sérol. (jours)
1	F, 49	01-06	H/C, M, N, D	6	6	2.0	81	.39	pos.	20	640	4
2	M, 61	12-31	H/C, M, N, D	4	10	2.9	154	.42	pos.	2,560	2,560	8
3	M, 59	01-04	H/C, M, N, D	4	21	4.5	124	.45	pos.	20	2,560	4
4	M, 58	01-02	M, N, D, R/E	6	28	3.9	16	.46	pos.	1,280	1,280	8
5	F, 57	01-04	H/C, M, N, D, R/E	7	21	6.7	90	.46	pos.	160	2,560	5
6	F, 49	01-06	H/C, M, R/E	3	0	–	–	–	pos.	–	160	–
7	F, 56	01-03	H/C, M, R/E	4	0	–	–	–	–	–	–	–
8	M, 43	12-22***	H/C, M, N, D, R/E	4	8	–	–	–	–	–	–	–
9	M, 49	01-01	H/C, N, D, R/E	7	35	–	–	–	–	–	–	–
10	M, 48	nil	nil	nil	–	–	–	–	neg./nég.	–	neg./nég.	–
11	M, 48	nil	nil	nil	–	–	–	–	neg./nég.	–	neg./nég.	–
12	F, ?	nil	nil	nil	–	–	–	–	–	–	–	–

* Most abnormal laboratory results during acute illness./La plupart des résultats sérologiques anormaux ont été obtenus durant la phase aiguë de la maladie.
** Nine of 10 confirmed and probable cases were available for detailed evaluation; one case was not available for any evaluation and is not included in the table./Neuf des 10 cas confirmés et probables ont pu faire l'objet d'une évaluation détaillée; un cas n'a pu être évalué et n'est pas inclus dans le tableau.
*** Arrived in Barbados 27 Nov./Arrivée à la Barbade le 27 nov.
H/C: headache/céphalée, M: myalgia/arthralgia/myalgie/arthralgie, N: nausea/nausées, D: diarrhea/diarrhée, R/E: rash/éruption

Discussion

There are four distinct serotypes of dengue virus (DEN-1 through DEN-4). Immunity is serotype specific and lasts for life[2]. However, after a short period of cross-protection of about 6 to 8 months, humans infected with one serotype are fully susceptible to infections with the other serotypes[8]. Moreover, sub-neutralizing levels of heterotypic dengue antibodies place them at risk of developing DHF/DSS through an antibody-dependant enhancement of viral infection[8].

In the Western hemisphere, this phenomenon has been illustrated by the Cuban DHF/DSS epidemic of 1981[9]. In 1977-1978, a major outbreak of classic dengue caused by DEN-1 occurred in Cuba and resulted in infection of 44% of the total population. In 1981, 3 years after the first outbreak, a second outbreak caused by DEN-2 was unusually severe. A total number of 116,000 people required hospitalization (1% of the Cuban population) and, of these, 10,312 (including 158 fatal cases) were classified as DHF/DSS. A seroepidemiologic study showed a ratio of DHF/DSS hospitalizations to individuals with secondary infections to be 1/32 among children and 1/80 among adults. Other studies, done in Thailand, have found an incidence of DSS of 0.5% to 20% in children experiencing a secondary dengue infection with any serotype. The greatest risk appeared when the second infection occurred 6 months to 5 years after the primary one[8].

Recently, new data from Cuba are suggesting that DHF/DSS can occur even 16 years after a primary infection[10]. After the 1981 outbreak, strict measures of surveillance and controls eliminated dengue in Cuba for 16 years, until January 1997. Since then, there has been an epidemic of 2,946 serologically confirmed cases of dengue; 205 (including 12 fatal cases) were classified as DHF/DSS. Preliminary studies indicate that 98% of these DHF/DSS cases were due to secondary infection[10]. Of concern is the fact that, apart from one exception, all cases of DHF/DSS were ≥ 17 years of age, suggesting a longer period of antibody-dependant enhancement than previously proposed[1].

This is the first report of a single point outbreak of dengue in Canadian tourists. In this group of 13 tourists, living in a single building for 1 to 2 weeks, the attack rate for classic dengue was 77%. This attack rate is consistent with reports in the literature for dengue epidemics in large populations, but it is noteworthy for such a high attack rate over a relatively short period of exposure[8]. In fact, most of the tourists became sick within a 4-day period, suggesting that a single mosquito may have infected more than one person (Table 1). *Aedes aegypti* is known to be a "nervous feeder" and can feed on multiple individuals during the same blood meal[1,11].

This outbreak points to an increasing health risk for tourists in popular vacation destinations of the Americas. It also points out the need for better education of tourists regarding classic dengue avoidance, and equally importantly a clearer definition of the risks of haemorrhagic dengue in tourists who have had classic dengue in the past and wish to return to dengue endemic regions of the world.

The tourist's first line of attack in dengue prevention is the avoidance of the day-biting *Ae. aegypti* mosquito. Standard insect repellents, long sleeves and trousers, and the use of insecticides in screened accommodations can have an impact. *Ae. aegypti* breeds in the still clean water of discarded tires, cans, water storage containers, and flower pots, and travels from its site only 100

metres during its life. The removal of such breeding sites in the vicinity of tourist accommodation may reduce the risk of dengue. Breeding sites that can not be removes can be treated with larvicides[1,11,12]. At present, there is no effective vaccine against dengue.

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Source: *M-M Bellon, MD, JD MacLean, MD, McGill University Centre for Tropical Disease, Montreal General Hospital, Montreal, QC.*

International Notes

IMPORTED DENGUE – UNITED STATES, 1996

Dengue is a mosquito-transmitted acute disease caused by any of four dengue virus serotypes (DEN-1, DEN-2, DEN-3, and DEN-4) and characterized by the suddent onset of fever, headache, myalgia, arthralgia, rash, nausea, and vomiting. This disease is endemic in most tropical areas of the world and has occurred in American residents returning from travel to such areas. The United States Centers for Disease Control and Prevention (CDC) maintains a laboratory-based passive surveillance system for imported dengue among American residents. This report summarizes information about cases of imported dengue among American residents for 1996, which indicated that most persons for whom travel history was known probably acquired infection in the Caribbean islands or Asia.

Serum samples from 179 persons who had suspected dengue with onset of symptoms in 1996 were submitted to CDC for diagnostic testing from 32 states and the District of Columbia. From these samples, 43 (24%) cases from 18 states and the District of Columbia were diagnosed serologically as dengue (single high titres of IgG in acute serum samples or by IgM detection in early convalescent samples) or by isolation of dengue virus. A diagnosis of dengue infection was negative in 102 (57%) patients and could not be determined in 34 (19%) patients because of unavailability of con- valescent samples for serologic testing[1].

Of the 43 persons with laboratory-diagnosed dengue, gender was known in 39; 22 (56%) were male. Age was reported for 30 persons and ranged from 5 to 69 years (median: 33 years). The virus serotype (DEN-1 and DEN-2) was identified for five cases. Travel histories, available for 37 persons, indicated that infections probably were acquired in the Caribbean islands (19 cases), Asia (11), Africa (three), the Pacific islands (two), Central America (one), and South America (one).

Clinical information was available for 28 patients with laboratory-diagnosed dengue. The most commonly reported symptoms were consistent with classic dengue fever (e.g. fever, 93%; headache, 61%; myalgia, 57%; rash, 57%; and arthralgia, 18%. Less frequently reported manifestations included diarrhea (five); eye pain (four); skin hemorrhages (two); and jaundice and depression (one each); low platelet counts (61 x 10^9/L to 127 x 10^9/L, average 98 x 10^9/L [normal: 150 x 10^9/L to 450 x 10^9/L]) (eight); low white blood cell count (1.9 x 10^9/L to 3.1 x 10^9/L, average 2.55 x 10^9/L [normal: 3.2 x 10^9/L to 9.8 x 10^9/L]) (six); and elevated liver enzymes (one). At least two patients were hospitalized, and no deaths were reported.

MMWR Editorial Note: Dengue is transmitted by the mosquito *Aedes aegypti*, which is present in most tropical urban areas of the world. In the United States, the mosquito can be found during the summer in southeastern states, including parts of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas. Dengue transmission in the United States is rare.

The incubation period of dengue is 4 to 7 days (range: 3 to 14 days). Most cases are characterized by mild manifestations, but infections in some persons can result in the more severe forms of the disease. Dengue hemorrhagic fever (DHF) is characterized by fever, low platelet count (≤ 100 x 10^9/L), hemorrhagic manifestations, and evidence of increased vascular permeability e.g. hemoconcentration (hematocrit increased by ≥ 20% from baseline), pleural or abdominal effusions, or hypoalbuminemia. Dengue shock syndrome (DSS) is DHF plus narrow pulse pressure (≤ 20 mm Hg), hypotension, or shock[2]. The fatality rate for patients with DSS can be as high as 44%[3].

In 1996, the number of dengue and DHF cases reported to the Pan American Health Organization (n = 276,758) was lower than the total for 1995 (n = 316,187). Among persons in the United States with imported cases in 1996, five persons with history of travel to India reflect the DEN-2 epidemic that occurred in India[4]. Among the imported infections acquired in the Caribbean islands during 1996, seven were diagnosed in persons from Maryland and Pennsylvania who travelled to the Caribbean during January[5].

The number of cases in this report represents a minimum estimate of the number of American travellers with dengue. Because dengue is not a notifiable disease nationally or in most states, diagnostic samples may not be sent for testing or they may be sent to laboratories other than CDC; therefore, many imported cases may not be counted. To provide a better estimate of the total number of cases, state epidemiologists were asked to provide a listing of all dengue cases reported in their state with onset of illness in 1996. Nineteen states reported 51 cases; 22 (43%) cases had not been reported previously.

Ae. aegypti is an urban mosquito usually found in or near human dwellings. In domestic settings, the mosquito can be found resting in dark areas including closets, bathrooms, behind curtains, and under beds. The species bites usually during the early morning and late afternoon[6]. The risk for exposure is higher in urban residential areas, but may be lower for tourists in some settings (e.g. beaches, hotels with well-kept grounds, and areas away from human habitation).

The incidence and geographic distribution of dengue have increased greatly in recent years, and health-care providers should consider dengue in the differential diagnosis of illness in all patients who have fever and a history of travel to tropical areas within 2 weeks of onset of symptoms. Because of the anticoagulant properties of acetylsalicylic acid (i.e. aspirin) and other nonsteroidal anti-inflammatory agents, only acetaminophen products are recommended for the management of pain and fever.

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Source: *Morbidity and Mortality Weekly Report, Vol 47, No 26, 1998.*

Erratum

STATEMENT ON INFLUENZA VACCINATION FOR THE 1998-1999 SEASON Vol. 24 (ACS-2), Table 2, Page 9

Please note that there was an error in **Table 2, Recommended amantadine hydrochloride dosage by age and renal status**. Under **Recognized renal disease, Creatinine clearance of 60-79 mL/min**, the **Dosage for those ≥ 65 years** should read "Alternating daily doses of **100 mg** and 50 mg."

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New Cases Reported from 1 April - 30 June 1998 - Nouveaux cas déclarés du 1 avril - 30 juin 1998

Disease Maladie	ICD-9 CIM-9	Ontario			Manitoba			Saskatchewan			Alberta			British Columbia Colombie-Britannique			Yukon			Northwest Territories Territoires du Nord-ouest		
		A-J A-J	Cum. 98	Cum. 97	A-J A-J	Cum. 98	Cum. 97	A-J A-J	Cum. 98	Cum. 97	A-J A-J	Cum. 98	Cum. 97	A-J A-J	Cum. 98	Cum. 97	A-J A-J	Cum. 98	Cum. 97	A-J A-J	Cum. 98	Cum. 97
AIDS-Sida	042-044	_	_	78	_	_	_	_	_	2	_	_	28	_	_	15	_	_	_	_	_	_
Amoebiasis - Amibiase	006	150	290	229	16	28	16	5	22	27	18	27	34	85	157	208	_	1	1	3	3	_
Botulism - Botulisme	005.1	_	_	_	1	1	_	_	_	_	_	_	4	_	_	_	_	_	_	_	_	1
Brucellosis - Brucellose	023	2	3	1	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	1	1	1
Campylobacteriosis - Campylobactériose	008.41*	975	1680	1404	43	93	84	73	114	110	274	407	303	708	1026	1080	2	2	7	1	4	6
Chancroid - Chancre mou	099.0	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
Chickenpox - Varicelle	052	2137	4480	3623	711	1353	1263	548	1175	1085	2409 1224	4592 2534	3471 2621	_	_	_	14 46	34 78	90 92	88 222	280 511	145 470
Chlamydia, genital - Chlamydiose génitale	099.81*																					
Cholera - Choléra	001	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
Diphtheria - Diphtérie	032	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	1	_	_	_
Giardiasis - Giardiase	007.1	327	683	675	40	74	_	46	99	102	104	178	198	248	381	527	1	2	10	2	8	3
Gonococcal Infections - Infections gonococciques[1]	098	411	810	639	121	218	221	62	164	150	116	218	281	129	268	236	2	3	_	23	57	76
Gonococcal Ophthalmia neonatorum - Ophtalmie gonococcique du nouveau-né	098.4	3	9	24	_	_	_	_	_	_	_	_	7	_	_	_	_	_	_	_	_	_
Haemophilus influenzae B (all invasive) - (invasive) à H. Influenzae B[2]	320.0,038.41*	1	4	3	_	1	1	5	8	19	2	4	2	_	_	_	_	_	_	_	_	_
Hepatitis A - Hépatite A	070.0,070.1	68	125	215	7	23	34	16	21	159	32	52	138	120	207	148	1	1	2	_	5	_
Hepatitis B - Hépatite B	070.2,070.3	20	35	47	_	10	6	29	40	23	14	41	36	190	316	438	1	1	_	3	4	2
Hepatitis C - Hépatite C		1355	2652	2215	_	_	_	216	384	293	606	1068	643	1583	2617	4139	18	50	31	8	18	9
Hepatitis non-A, non-B - Hépatite non-A, non-B		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
Legionellosis - Legionellose	482.41	1	14	8	_	_	1	_	_	_	2	5	7	_	_	_	_	_	_	_	1	_
Leprosy - Lèpre	030	_	1	3	_	_	_	_	_	_	_	1	1	_	_	_	_	_	_	_	_	_
Listeriosis (all types) - Listériose (tous genres)	027.0,771.22	6	15	8	_	_	_	2	2	_	_	_	_	_	_	_	_	_	_	_	_	_
Malaria - Paludisme	084	34	54	134	3	5	8	_	1	3	6	13	27	13	18	150	_	_	_	_	1	_
Measles - Rougeole	055	1	4	16	_	_	_	_	1	21	_	1	187	2	2	261	_	1	_	_	_	_
Meningitis, pneumococcal - Méningite à pneumocoques	320.1	_	_	_	1	3	1	2	3	1	3	6	7	3	5	6	_	_	1	1	1	_
Meningitis, other bacterial - Autres méningites bactériennes[3,4]		1	9	27	_	_	1	_	3	5	6	10	9	_	_	_	_	_	_	_	2	1
Meningitis/Encephalitis viral - Méningite/encéphalite virale[5]		_	1	_	9	12	5	5	13	1	21	32	16	5	9	5	_	_	_	_	_	_
Meningococcal Infections - Infections à méningocoques	036	7	26	39	1	4	4	1	1	9	4	12	15	_	1	_	_	1	_	_	_	5
Mumps - Oreillons	072	7	19	27	_	_	1	8	11	3	7	12	20	2	9	118	1	1	1	_	_	_
Paratyphoid - Paratyphoïde	002.1-002.9	_	1	2	_	1	2	_	_	_	_	_	3	_	_	_	_	_	_	_	_	_
Pertussis - Coqueluche	033	122	268	182	47	87	30	27	126	105	91	167	352	49	99	356	_	_	7	1	2	15
Plague - Peste	020	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
Poliomyelitis - Poliomyélite	045	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
Rabies - Rage	071	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
Rubella - Rubéole	056	4	12	14	9	19	3184	_	_	11	8	23	21	1	3	3	_	_	2	_	_	_
Congenital Rubella - Rubéole congénitale	771.0	_	_	_	_	1	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
Salmonellosis - Salmonellose[6]	003	671	1267	723	43	73	84	62	104	103	203	287	258	174	253	294	1	3	4	6	11	7
Shigellosis - Shigellose	004	55	161	121	70	101	50	26	37	60	30	46	48	44	44	151	_	1	1	1	2	1
Syphilis, Congenital - Syphilis, congénitale	090	_	_	_	_	_	_	_	_	_	_	1	_	_	_	_	_	_	_	_	_	_
Syphilis, Early Latent - Syphilis, latente récente	092	1	2	1	_	_	_	_	_	_	_	_	2	_	_	_	_	_	_	_	_	_
Syphilis, Early Symptomatic - Syphilis, symptomatique récente	091	1	1	8	_	_	_	_	_	_	1	1	5	38	62	5	_	_	_	_	_	_
Other Syphilis - Autres syphilis	090,092-097	40	61	72	_	_	_	_	_	_	8	15	44	_	_	_	_	1	_	_	_	_
Tetanus - Tétanos	037	1	1	1	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
Trichinosis - Trichinose	124	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	3	6	_
Tuberculosis - Tuberculose	010-018	67	121	102	_	1	1	_	_	_	2	2	2	93 2	146 2	199	1	1	_	9	20	19
Typhoid - Typhoïde	002.0	6	14	5	_	1	1	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
Verotoxigenic E. coli - E. coli vérotoxinogènes	008.01*	103	126	83	24	32	24	8	11	11	26	33	28	21	21	_	_	_	_	_	_	6
Yellow Fever - Fièvre jaune	060	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_

SYMBOLS

- Not reportable
. Not available
_ No cases reported

SIGNES

. À déclaration non obligatoire
.. Non disponible
_ Aucun cas déclarés

SOURCE:
Division of Disease Surveillance
Laboratory Centre for Disease Control
Health Canada
Ottawa, Ontario K1A 0L2
Tel.: (613) 957-0334

SOURCE:
Division de la surveillance des maladies transmissibles
Laboratoire de lutte contre la maladie
Santé Canada
Ottawa (Ontario) K1A 0L2
Tél.: (613) 957-0334

Disease / Maladie	ICD-9 / CIM-9	Canada†			Newfoundland / Terre-Neuve			Prince Edward Island / Île-du-Prince-Édouard			Nova Scotia / Nouvelle-Écosse			New Brunswick / Nouveau-Brunswick			Quebec / Québec		
		A-J / A-J	Cum. 98	Cum. 97	A-J / A-J	Cum. 98	Cum. 97	A-J / A-J	Cum. 98	Cum. 97	A-J / A-J	Cum. 98	Cum. 97	A-J / A-J	Cum. 98	Cum. 97	A-J / A-J	Cum. 98	Cum. 97
AIDS-Sida	042-044			206						1			3			1			78
Amoebiasis - Amibiase	006	331	635	640			4		1		7	16	11			1	47	90	109
Botulism - Botulisme	005.1	1	2	1														1	
Brucellosis - Brucellose	023	3	4	6															
Campylobacteriosis - Campylobactériose	008.41	2972	4932	4251	53	76	33	11	15	21	57	95	92	65	130	80	710	1290	1031
Chancroid - Chancre mou	099.0																		
Chickenpox - Varicelle	052	2787	5256	4501	269	330	492				7	20	302			1			
Chlamydia, genital - Chlamydiose génitale	099.81*	7113	14507	13165	96	180	159	35	71	68	302	608	560	249	444	378	1543	3073	2846
Cholera - Choléra	001																		
Diphtheria - Diphtérie	032			1															
Giardiasis - Giardiase	007.1	1025	1917	2041	16	26	17	1	2	1	23	38	41	20	41	88	197	385	379
Gonococcal Infections - Infections gonococciques[1]	098	989	1994	1935	1	2	1		1		27	49	48	3	8	25	94	196	258
Gonococcal Ophthalmia neonatorum - Ophtalmie gonococcique du nouveau-né	098.4	3	10	31														1	
Haemophilus influenzae B (all invasive) - (invasive) à H. Influenzae B[2]	320.0,038.41*	12	27	31													4	10	6
Hepatitis A - Hépatite A	070.0,070.1	290	558	967		1	3		1		1	8	10	2	3	2	43	111	256
Hepatitis B - Hépatite B	070.2,070.3	447	788	977	1	1	2				11	16	19	3	6	3	175	318	401
Hepatitis C - Hépatite C		4714	8505	7990	7	18	16		2		102	202	168	46	82	61	773	1412	415
Hepatitis non-A, non-B - Hépatite non-A, non-B																			
Legionellosis - Legionellose	482.41	10	28	21							2	2	1				5	6	4
Leprosy - Lèpre	030		2	4															
Listeriosis (all types) - Listériose (tous genres)	027.0,771.22*	8	17	9						1									
Malaria - Paludisme	084	70	143	390								1			1		14	49	68
Measles - Rougeole	055	5	13	497			8						1	1	1	1	1	3	2
Meningitis, pneumococcal - Méningite à pneumocoques	320.1	10	18	19			1			2									
Meningitis, other bacterial - Autres méningites bactériennes[3,4]		7	29	119		3	2					1	1		1	3			70
Meningitis/Encephalitis viral - Méningite/encéphalite virale[5]		46	83	66				1	1		1	3					4	12	39
Meningococcal Infections - Infections à méningocoques	036	25	70	110	1	1	3		1			1	1	1	2	1	10	20	33
Mumps - Oreillons	072	29	58	191							1	1	2		1	2	3	4	17
Paratyphoid - Paratyphoïde	002.1-002.9	1	5	9													1	3	2
Pertussis - Coqueluche	033	772	1553	1448	11	20	24	4	4	35	5	13	54	66	103	28	349	664	260
Plague - Peste	020																		
Poliomyelitis - Poliomyélite	045																		
Rabies - Rage	071																		
Rubella - Rubéole	056	22	58	3243									2			1		1	5
Congenital Rubella - Rubéole congénitale	771.0		1																
Salmonellosis - Salmonellose[6]	003	1655	2857	2103	81	111	13	12	19	16	58	89	57	39	72	58	305	568	486
Shigellosis - Shigellose	004	301	565	686			2			7	3	6	6	3	7	8	69	160	231
Syphilis, Congenital - Syphilis congénitale	090		1																
Syphilis, Early Latent - Syphilis, latente récente	092	1	3	5														1	2
Syphilis, Early Symptomatic - Syphilis, symptomatique récente	091	40	65	21								1	1						2
Other Syphilis - Autres syphilis	090,092-097	58	101	140							3	5	3	1	4	3	6	15	18
Tetanus - Tétanos	037	1	1	1															
Trichinosis - Trichinose	124	3	6																
Tuberculosis - Tuberculose	010-018	230	418	452	2	3	4					3	1				58	124	127
Typhoid - Typhoïde	002.0	12	26	17													2	7	9
Verotoxigenic E. coli - E. coli vérotoxinogènes	008.01*	334	423	234				5	7	1	47	49	3	10	11	5	90	133	73
Yellow Fever - Fièvre jaune	060																		

(1) Includes all 098 categories except 098.4.
(2) Includes buccal cellulitis or epiglottitis 464.3 in a child <5 years with no other causative organisms isolated.
(3) Includes encephalitis.
(4) All other categories except Haemophilus 320.2, Listeriosis 027.0, Meningococcal 036, Pneumococcal 320.1. and Tuberculosis 013.0.
(5) All categories except Measles 055, Mumps 072, Poliomyelitis 045, Rubella 056 and Yellow Fever 060.
(6) Excludes Typhoid 002.0 and Paratyphoid 002.1 to 002.9.
* ICD-9 codes used in the list may be incomplete. All 5 digit codes are unofficial and are for LCDC surveillance purposes only.
† May not represent national total if data from the provinces are incomplete.

(1) Comprend toutes les rubriques 098, sauf 098,4.
(2) Comprend cellulite buccale ou épiglottite 464,3 chez un enfant < 5 ans chez qui aucun autre microorganisme causal n'a été isolé.
(3) Comprend encéphalite.
(4) Toutes les autres rubriques sauf à Haemophillus 320,2, listériose 027.0, à méningocoques 036, à pneumocoques 320,1 et tuberculeuse 013,0.
(5) Toutes les rubriques, sauf rougeole 055, oreillons 072, poliomyélite 045, rubéole 056 et fièvre jaune 060.
(6) Sauf typhoïde 002,0 et paratyphoïde 002,1 à 002,9.
* Les codes de la CIM-9 figurant dans la liste ne sont peut-être pas pomplets. Quant aux codes à 5. chiffres, ils ne sont pas officiels, ayant été établis uniquement aux fins de la surveillance du LLCM.
† Il se peut que ce chiffre ne représente pas le total national si les données provenant des provinces sont incomplètes.