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Investigation of Cases of Acute Gastroenteritis in Passengers on a flight from London to Bermuda

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INTRODUCTION

On the evening of Saturday October 23, 2004, the Nurse Epidemiologist in the Department of Health in Bermuda was notified of several cases of diarrhoea and vomiting in passengers who had travelled from London to Bermuda on the same flight on Thursday October 21, 2004. Six service crew members from the flight also reported ill to the Airline's local physician. Two additional crew members reported symptoms on Sunday October 24, 2004. By Tuesday October 26, 2004, a total of forty-six (46) passengers who travelled on the flight had reported symptoms to the Department of Health. By November 2, 2004, the total number of persons reporting ill was fifty-five (55); forty-seven (47) passengers plus eight (8) service crew.



METHODS

The Department of Health began an investigation of the reported cases on October 23, 2004. An appeal was made to the public via the television and print media for passengers to report any related illness to the Epidemiology and Surveillance Unit. Details of affected passengers were obtained by Public Health Nurses using a simple questionnaire, through telephone interviews conducted between Monday October 25 and Wednesday October 27, 2004. Information on gender, age of passenger, symptoms, time of onset of symptoms, foods eaten before and during the flight, beverages, ice and type of water consumed as well as contact information was obtained on a total of seventy (70) passengers. Sixty-seven (67) of these travelled in the Economy and World Traveller Plus sections of the aircraft. Neither the service or flight crew were available for interview. (None of the flight crew reported illness). Information was also obtained on six (6) contacts, possibly secondary cases.

Stool samples were obtained from three (3) affected passengers and three (3) possible secondary cases. These were sent for examination by the Microbiology Department, King Edward Memorial Hospital for pathogens such as *salmonella*, rotavirus and *campylobacter*. Tests for Norwalk anti viral agent were forwarded to a Laboratory in the USA.

FINDINGS

Description of illness and time of onset

Symptoms reported included acute onset of vomiting, diarrhoea with stomach cramps, high fever, headache and general malaise. These symptoms can collectively be described as acute gastroenteritis. Most affected persons said symptoms lasted 24 hours followed by a further 24 hours of general malaise. One person required re-hydration at the King Edward Memorial Hospital. The majority of affected passengers and crew developed symptoms in the early hours of October 23, about 36 hours after disembarkation. One infant was reported ill (vomiting) during the latter part of the flight. By November 2, six (6) cases were reported among close contacts (family members and others) of affected passengers. None of these individuals had travelled on the flight. On November 4, one elderly family contact with symptoms required hospitalisation for possible pneumonia.

There were a total of 221 passengers listed on the official passenger list and a total of fourteen (14) crew members. A total of fifty (50) passengers reported some kind of illness. Forty seven (47) passengers reported acute onset of diarrhoea, vomiting with stomach cramps, high fever, headache and general malaise. Two (2) passengers in Club Class reported having headache and one (1) had headache and flu like symptoms. Eight (8) service crew reported gastroenteritis illness.

Analysis of exposures

The following factors were examined:

1. **Location in aircraft:** There was a strong relationship between the location of the passengers and development of subsequent illness. Preliminary analyses of the passengers' interview data and passenger flight information indicated that all forty-seven (47) passengers reporting vomiting and diarrhoea were located in the Economy and Traveller Plus sections of the aircraft. No passengers in Club or First Class reported symptoms of vomiting or diarrhoea. A total of forty seven (29.3%) of passengers in the combined Economy and World Traveller Plus sections were affected. There were 120 passengers in the Economy section of which a total of thirty eight (31.6%) were affected. There were 40 passengers in World Traveller Plus, of which nine (22.5%) of were affected.
2. **Age of passengers:** There was no relationship between the age of passengers and the occurrence of illness. A number of passengers were adolescents returning home from schools in the United Kingdom. Of the passengers reporting illness, 21 (46%) were school age (7 – 17 years of age) and 20 (44%) were adults (>17 years of age). Four (4) others or 8% were infants or young children.
3. **Foods consumed:** There was no relationship between foods consumed and the occurrence of illness. Analyses of passengers' interview data failed to show any significant relationship between any of the food items consumed on the flight and development of illnesses.
4. **Beverages consumed:** There was no relationship between reports of illness and the type of water drunk (i.e. own bottled water, bottled water or potable water provided on the aircraft, tea or coffee).
5. **Ice consumed:** There was a significant relationship between passengers reporting consumption of ice and the occurrence of illness (odds ratio = 3.4, p-value = 0.029). A total of forty-four (44) passengers reported having had ice. Thirty four (77%) of these reported subsequent illness. Twenty passengers did not report having ice and 10 (22%) of these became ill.

Laboratory Test Results

The six samples (three from passengers and three from possible secondary contacts) were negative for rotavirus and *campylobacter*. One passenger tested positive for *Salmonella* Group C2, but the three affected family members were salmonella negative. Two samples (one passenger and one contact) were positive for Norwalk-like Virus (NLV) Antigen Genotype 2. The passenger was positive for both *Salmonella* and NLV Antigen Genotype 2. Additional tests are being carried out on the *salmonella* sample to try to identify the type. This may provide information on the geographic source of this (not uncommon) infection.

Summary of investigation findings

The outbreak of gastroenteritis was confined to passengers located in the rear two sections of the aircraft, Economy and World Traveller Plus. There was a significant association between consuming ice during the flight and the occurrence of illness. There was not association between the consumption of other foods or beverages. Norwalk like Virus Antigen Genotype 2 was isolated from two out of six stool samples examined - one from a passenger and from a one direct contact. The outbreak of gastroenteritis on October 21, 2004 was due to NLV Antigen Genotype 2.

Possible mechanisms of the outbreak:

1. An ill, or recovering but still infectious passenger boarded the plane in London and subsequently infected other passengers via contaminated surfaces (faecal-hand-oral) contact within the timeframe of the flight. Residual contamination on the plane could account for cases on the return Bermuda to London flight.
2. Passengers were infected via contaminated ice and person to person contact. This would not explain how only passengers in the two rear sections were affected as there is a common source of ice for all passengers. Also, since this presupposes a prior source for the contamination, it is likely that outbreaks would have been experienced on other flights departing from London.

Number 1 is considered the most likely scenario.

Report on Selected Communicable Diseases

DENGUE FEVER

During weeks 40-52, 2004, there were 196 cases of dengue fever reported to CAREC, compared to 1,434 cases in the corresponding period in 2003 [Table 1]. This decrease was primarily due to decreased numbers of cases reported by Bahamas, Barbados and Trinidad and Tobago, with data from Trinidad and Tobago also being incomplete.

During 2004, CAREC's laboratory identified dengue virus type 3 as the circulating serotype in 2004, in Aruba, Barbados, Belize and Suriname. Additionally, dengue virus types 2 and 4 were identified in Belize. No other virus types were identified in any other member countries.

GASTROENTERITIS <5 YEARS

During weeks 40-52, 2004, there was a small increase in the number of reported cases of gastroenteritis (<5 years) compared to the corresponding period in 2003 [Table 1]. This was primarily due to an outbreak reported in Grenada and a sizeable increase in the number of cases reported from Belize. It is also noted that Trinidad and Tobago did not report age specific gastroenteritis in 2003. The outbreak in Grenada followed hurricane Ivan and occurred during weeks 41-48, with a peak in week 45. Water was suspected as the vehicle of transmission and as a result there was increased dissemination of bottled water to affected areas. While stool specimen collection containers were disseminated to the Accident and Emergency department of the Hospital in the capital and health centres in affected areas, no specimens were collected.

INFLUENZA

While the overall number of influenza cases reported during the period under review decreased (8,820 cases) compared to the corresponding period in 2003 (19,562 cases), the following countries reported an increase – Antigua and Barbuda, Bahamas, Belize, Dominica and St Lucia and Turks and Caicos [Table 2]. Incomplete data from Trinidad and Tobago contributed greatly to the overall decrease in reported numbers of cases.

MALARIA

During weeks 40-52, 2004, there was approximately one-tenth as many cases of malaria reported to CAREC compared to the corresponding period last year [Table 2]. This was mainly due to fewer cases being reported from Suriname (data from Suriname was incomplete as not all sites reported and data was not reported for some weeks) and no report being received from Guyana. However, Belize reported an increased number of cases during the period under review compared to the corresponding period in 2003.

MENINGOCOCCAL INFECTION

During the period under review one case of meningococcal infection was reported from Bermuda [Table 1]. This case was fully investigated with a laboratory confirmed diagnosis of *Neisseria Meningitidis* serogroup C. The patient was a 3 year old child with no travel history. Prophylaxis was provided to close contacts, including children and teachers at the nursery school the case attended, and all contacts were requested to monitor for symptoms. No further cases were identified.

TB ALL FORMS

During weeks 40-50, 2004, there was a four-fold decrease in the number of cases of TB reported to CAREC compared to the corresponding period in 2003 [Table 3]. This was due to decreased numbers of cases reported by Belize, Jamaica, Suriname and Trinidad and Tobago (data from Trinidad and Tobago was not complete) and the absence of a report from Guyana.

TABLE 1: DISEASES OF INTEREST IN THE CARIBBEAN (cont'd)

COUNTRY	LAST REPORTING WEEK IN 2004	MENINGOCOCCAL INFECTION			LEPROSY			DENGUE FEVER			DENGUE HAEMORRHAGIC FEVER/SHOCK SYNDROME			SALMONELLOSIS		
		Weeks 40-52, 2004	Weeks 40-52, 2003	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 40-52, 2003	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 40-52, 2003	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 40-52, 2003	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 40-52, 2003	Weeks 1-52, 2004
ANGUILLA	52	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0
ANTIGUA & BARBUDA	52	-	-	-	0	-	1	0	0	0	0	-	-	0	0	2
ARUBA	52	0	-	0	0	-	0	9	-	146	0	-	0	7	-	47
BAHAMAS	52	0	0	4	0	0	0	1	179	1	-	-	6	12	20	
BARBADOS	52	0	0	0	2	0	2	67	465	349	-	-	34	5	116	
BELIZE	52	0	0	0	-	-	1,045	0	0	2	0	0	0	0	0	3
BERMUDA	52	1	0	1	0	0	0	0	0	0	0	0	18	30	51	
BR. VIRGIN ISLANDS	52	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
CAYMAN ISLANDS	50	0	0	0	0	0	0	0	0	0	0	0	0	0	2	10
DOMINICA	52	0	0	0	0	0	1	0	0	4	-	-	-	-	-	-
GRENADA	52	0	0	0	0	0	0	6	8	7	0	0	-	-	-	-
GUYANA	27	-	0	0	-	0	0	-	3	47	-	0	0	-	0	1
JAMAICA	52	0	0	0	2	2	7	3	21	9	-	-	0	0	1	
MONTserrat	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAINT LUCIA	52	-	-	-	3	1	12	2	1	11	0	0	2	5	6	
ST. KITTS/NEVIS	34	-	-	-	-	-	-	-	0	1	-	-	-	-	0	0
ST. VINCENT & GRENADINES	52	0	0	0	0	0	0	1	1	4	0	0	0	0	1	
SURINAME	52	0	0	0	0	0	0	75	60	368	0	0	22	66	73	
TRINIDAD & TOBAGO	43	0	0	0	1	12	23	41 ^a	696 ^a	546 ^a	5 ^a	30 ^a	13	7	66	
TURKS & CAICOS IS.	52	0	0	0	0	0	0	0	0	1	-	-	0	0	2	
TOTAL		1	0	5	8	15	1092	261	1434	1676	5	30	102	127	399	

Source: Weekly Communicable Disease Reports submitted to the CAREC Epidemiology Division as of February 17, 2005

Notes

^{*} = No reports received

^a = The Weekly Dengue Report issued by the National Surveillance Unit of the Ministry of Health.

During October - December 2005, Netherlands Antilles reported 56 confirmed dengue fever cases, 189 suspect/probable dengue fever cases and zero dengue haemorrhagic fever cases.

TABLE 1: DISEASES OF INTEREST IN THE CARIBBEAN (cont'd)

COUNTRY	LAST REPORTING WEEK IN 2003	SHIGELLOSIS			TYPHOID			GASTRO-ENTERITIS (<5yrs. old)			VIRAL HEPATITIS A			VIRAL HEPATITIS B		
		Weeks 40-52, 2003	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 40-52, 2003	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 40-52, 2003	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 1-52, 2004	Weeks 40-52, 2003	Weeks 1-52, 2004	Weeks 40-52, 2003	Weeks 1-52, 2004	
ANGUILLA	52	-	-	0	0	0	0	9	3	41	-	-	0	0	1	
ANTIGUA & BARBUDA	52	0	0	0	0	0	0	65	86	741	-	-	0	0	0	
ARUBA	52	3	-	13	0	-	0	0	-	0	0	-	11	2	17	
BAHAMAS	52	2	6	12	0	1	1	187	249	1285	1	0	2	0	0	
BARBADOS	52	0	0	0	0	0	0	23	3	65	-	-	-	-	-	
BELIZE	52	0	0	1	0	0	6	220	26	1681	1	2	13	1	0	
BERMUDA	52	1	0	1	0	0	0	55	27	188	0	0	1	0	2	
BR. VIRGIN ISLANDS	52	0	0	0	0	0	0	7	15	91	0	0	0	0	0	
CAYMAN ISLANDS	50	0	0	5	0	0	0	42	85	397	0	0	0	0	0	
DOMINICA	52	3	1	7	0	0	0	23	12	148	0	-	1	0	0	
GRENADA	52	0	0	0	0	0	0	255	50	470	0	0	0	0	1	
GUYANA	27	-	0	2	-	70	393	-	345	3132	-	0	3	-	0	
JAMAICA	52	0	0	0	0	0	10	5187	5363	23628	0	0	0	12	7	
MONTserrat	52	0	0	0	0	0	1	3	1	22	0	0	0	2	5	
SAINT LUCIA	52	0	1	0	0	1	0	81	96	346	0	0	0	0	1	
ST. KITTS/NEVIS	34	-	0	0	-	-	-	-	8	63	-	-	-	-	-	
ST. VINCENT & GRENADINES	52	0	1	0	0	0	0	114	204	980	-	-	-	6	12	
SURINAME	52	12	57	72	2	0	2	405	673	2684	3	0	11	15	38	
TRINIDAD & TOBAGO	43	0	3	24	0	0	0	911	-	6658	0	0	0	0	0	
TURKS & CAICOS IS.	52	0	0	0	0	0	0	57	58	197	0	0	1	1	2	
TOTAL		21	69	137	2	72	413	7644	7304	42817	5	2	43	39	68	

Source: Weekly Communicable Disease Reports submitted to the CAREC Epidemiology Division as of February 17, 2005

Notes

- = No reports received



Table 2: DISEASES UNDER INTERNATIONAL SURVEILLANCE

COUNTRY	LAST REPORTING WEEK IN 2004	MALARIA INDIGENOUS			INFLUENZA		
		Weeks 40-52, 2004	Weeks 40-52, 2003	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 40-52, 2003	Weeks 1-52, 2004
ANGUILLA	52	0	0	0	0	0	0
ANTIGUA & BARBUDA	52	0	0	0	147	77	271
ARUBA	52	2	-	2	10	-	10
BAHAMAS	52	0	0	2	1215	454	4143
BARBADOS	52	0	0	0	-	-	-
BELIZE	52	57	0	1,045	933	170	3499
BERMUDA	52	0	0	0	132	195	639
BR. VIRGIN ISLANDS	52	0	0	0	12	154	139
CAYMAN ISLANDS	50	0	0	0	32	81	259
DOMINICA	52	0	0	0	9	0	9
GRENADA	52	0	0	0	25	86	69
GUYANA	27	-	2307	13151	-	310	3783
JAMAICA	52	0	0	0	86	177	290
MONTserrat	52	0	0	0	70	133	339
SAINT LUCIA	52	0	0	0	477	282	682
ST. KITTS/NEVIS	34	-	0	0	-	0	86
ST. VINCENT & GRENADINES	52	0	0	0	733	1067	2150
SURINAME	52	1122	9488	16181	2564	4262	17699
TRINIDAD & TOBAGO	43	0	0	0	2207	11969	23997
TURKS & CAICOS IS.	52	0	0	0	168	145	787
TOTAL		1181	11795	30381	8820	19562	58851

Source: Weekly Communicable Disease Reports submitted to the CAREC Epidemiology Division as of February 17, 2005

Notes

During the period under review in 2003 and the corresponding period in 2004, there were zero cases of Plague, Cholera and Yellow Fever reported to CAREC. A total of 872 AIDS cases were reported from Bahamas, British Virgin Islands, Cayman Islands, Guyana, Jamaica, St. Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, Bermuda, Belize and Trinidad & Tobago for the first quarter of 2004.

- = No reports received

Table 3: DISEASES OF THE EXPANDED PROGRAMME ON IMMUNIZATION

COUNTRY	LAST REPORTING WEEK IN 2004	ACUTE FLACCID PARALYSIS			FEVER AND RASH ¹			RUBELLA			TB ALL FORMS			TETANUS			PERTUSSIS		
		Weeks 40-52, 2004	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 1-52, 2004	Weeks 40-52, 2004	Weeks 1-52, 2004
ANGUILLA	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANTIGUA & BARBUDA	52	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
ARUBA	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BAHAMAS	52	0	0	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0
BARBADOS	52	0	0	0	7	1	27	0	0	0	0	1	0	3	0	0	0	0	0
BELIZE	52	0	0	1	44	16	1,045	0	0	0	0	5	69	16	0	0	0	0	0
BERMUDA	52	0	0	0	0	0	0	0	0	0	0	2	0	3	0	0	0	0	0
BR. VIRGIN ISLANDS	52	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
CAYMAN ISLANDS	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOMINICA	52	0	0	0	0	0	1	0	0	0	0	2	2	5	0	0	0	0	0
GRENADA	52	0	0	0	0	0	1	0	0	0	0	0	0	3	0	0	0	0	0
GUYANA	27	3	3	12	1	6	10	0	0	0	0	0	0	91	187	0	0	0	0
JAMAICA	52	2	10	7	18	30	112	0	0	0	0	18	55	53	0	1	4	0	2
MONTERRAT	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAINT LUCIA	52	0	0	0	0	1	4	0	0	0	0	0	0	20	0	1	0	0	0
ST. KITTS/NEVIS	34	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0
ST. VINCENT & GRENADINES	52	0	0	1	0	1	0	0	0	0	0	3	3	11	0	0	0	0	0
SURINAME	52	0	0	3	5	5	15	0	0	0	0	50	57	177	0	0	0	0	1
TRINIDAD & TOBAGO	43	1	1	3	5	3	21	0	0	0	0	10	85	121	0	0	0	0	0
TURKS & CAICOS IS.	52	0	0	0	0	0	0	0	0	0	0	1	1	4	0	0	0	0	0
TOTAL		6	14	28	80	65	1243	0	0	0	92	364	615	0	2	4	0	3	2

Sources:

¹ = Acute Flaccid Paralysis and Fever & Rash - Expanded Programme on Immunization reports as of February 11, 2004

² = Weekly Communicable Disease Reports submitted to the CAREC Epidemiology Division as of February 17, 2004.

Notes

- = No reports received

During the period under review, there were zero cases of Diphtheria, Measles, Polio and Tetanus neonatorum reported to CAREC.

News and Announcements

The Caribbean Outbreak Response Toolkit (CORT) is now available on-line at:

<http://www.carec.net/outbreak/>

This site offers information and tools to assist with preparedness and response to communicable disease outbreaks. Below is a screen shot of the 'Tools' page. You can also download the Caribbean Outbreak Summary Report Template from this site.



NEWS FROM THE EXPANDED PROGRAMME ON IMMUNISATION [EPI]

The EPI Unit-CAREC would like to extend congratulations to all EPI Managers, National Epidemiologists and all health practitioners in the public and private health sectors for their excellent performance during 2004. We also take this opportunity to wish them all the best for this New Year and we know that they will continue and improve on their excellent performance in 2005.

Congratulations to Suriname which received the 2004 Surveillance Award for the Caribbean region. Awards for second and third place went to Trinidad and Tobago and Bahamas respectively. This award was presented at the 21st EPI Managers' Meeting in Belize.

The Henry C. Smith Immunization Award- was presented this year to Belize. The award is in honor of Mr. Henry Smith who was the first PAHO-EPI technical officer for the Caribbean sub-region. Belize was the recipient of the award being the country with the most improved immunization coverage over the past years, successfully conducting a male Measles, Mumps and Rubella (MMR) vaccination programme, and implementing activities to boost coverage for the second dose of MMR vaccine.

UPCOMING MEETINGS:

- ◆ The Project for Strengthening of Medical Laboratories in the Caribbean: Distance Education Advisory Sub-Committee Meeting in Trinidad, March 21 – 23, 2005.
- ◆ The Project for Strengthening of Medical Laboratories in the Caribbean: Sixth Training Session for Laboratory and Quality Assurance Managers in Jamaica, April 3 – 8, 2005.
- ◆ World Health Organization (WHO) Global Salm-Surv Level III Workshop in Trinidad, May 2 – 6, 2005.
- ◆ The Project for Strengthening of Medical Laboratories in the Caribbean: Microbiology Level of Laboratories Working Group in Trinidad, May 2 – 6, 2005.
- ◆ The Project for Strengthening of Medical Laboratories in the Caribbean: Laboratory Information Network Advisory Sub-Committee Meeting in Trinidad, May 24-25 2005.

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*The CAREC Surveillance Report (CSR) is available on CAREC's Website:
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