Preliminary Communications

Surveillance of Acute Respiratory Virus Infections in General Practice

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Summary: The ordinary postal system provides a simple method for the transportation of specimens for virus isolation to the laboratory. This was used to carry out an epidemiological survey, in general practice, of respiratory viruses in patients with acute respiratory disease. Three distinct outbreaks of myxovirus infections were recognized and most other types of respiratory viruses were isolated sporadically. After the initial "pilot" phase of the study an isolation rate of 24% was obtained over the months from October 1968 to June 1969 (20% isolations from adults' specimens and 29% from those of children).

INTRODUCTION

Virological surveys of respiratory illness in general practice, though of interest to the epidemiologist, involve certain practical difficulties. Thus serological diagnosis requires paired sera collected at intervals of one to two weeks, with the undoubted difficulty of trying to obtain a second specimen of blood from an individual no longer ill. Specimens for virus isolation are more easily obtained, but the reported lability of many of these viruses entails difficulties of swift, cool transit to the laboratory. Even if arrangements are made to inoculate specimens into tissue cultures at the time and place of collection there must still be organized transportation of the cultures to and from the laboratory.

We were interested in monitoring patients in general practice for respiratory viruses, particularly influenza, by a simple procedure, and speculated on the possibility of using the normal postal facilities for specimen transport. The laboratory did receive, from other hospitals in the area, some postal specimens for respiratory virus isolation, and from these we had reason to believe a number of viruses to be unexpectedly stable in the virus transport medium used; thus the labile respiratory syncytial virus was isolated from a specimen sent from Dumfries, 74 miles (119 km.) away. We further tested the stability of influenza A virus by posting to the laboratory specimens known to contain the virus and reisolating from two of the five specimens so tested. Encouraged by the possibility of isolating viruses from even a small proportion of cases sampled in this way, we applied the method in four Glasgow practices as described below.

MATERIALS AND METHODS

Virological methods used were as described by Grist *et al.* (1966); the virus transport medium was a balanced salt solution containing 2% bovine albumin, sodium bicarbonate, and antibiotics.

Throat swabs, transport medium, metal containers to protect the bottles, and strong envelopes were supplied by the laboratory. Each practitioner received four bottles of transport medium per fortnight to be used for specimens from cases of acute respiratory disease in adults and children. Throat swabs were collected from such patients, broken off into transport medium, and posted to the laboratory as soon as possible. When the survey

began near the end of January 1968 specimens were inoculated into rhesus monkey kidney tissue cultures only, primarily for the isolation of influenza virus, but at the end of February 1968 the range of tissues used for these specimens was extended to cover a wider variety of viruses.

Because of encouraging preliminary results, and in expectation of epidemic influenza, the supply of bottles of virus transport medium sent to each practitioner was doubled from October 1968. Since children were already appearing as a more rewarding source of virus, specimens from patients up to the age of 15 years continued to be inoculated into a full range of tissue cultures. Specimens from adults were tested only in rhesus monkey kidney cultures, these being sensitive to influenza, the virus of greatest epidemiological interest in adults.

From mid-February 1969 adult specimens were also inoculated into Bristol HeLa tissue cultures to increase the possibility of isolating respiratory syncytial virus, reported at that time to be causing outbreaks of acute respiratory disease in adults (Scottish Home and Health Department, 1969).

RESULTS

The results of the preliminary study from January to September 1968 are shown in Table I. Isolates include almost a complete range of viruses to be expected from respiratory specimens. Though the influenza epidemic was just ending as the study began, two strains of type A₂ were isolated in February and one of type B was isolated in May. The isolation rate from adult specimens was low (3%), but that from children's specimens (21%) justified extending the study.

TABLE I.—Virus Isolates: General Practice January to September 1968 (Preliminary Study)

Patients and Viruses				Age (Years)		Total
				≤ 15	≥ 16	
No. tested	..	..	..	61	74	135
No. positive	..	..	..	13	2	15
Influenza A ₂ and B	..	..	..	3	—	3
Parainfluenza 1	..	..	..	2	—	2
Parainfluenza 3	..	..	..	1	—	1
Adenovirus 2 and 3	..	..	..	3	—	3
Rhinovirus H	..	..	..	1	—	1
Herpes simplex	..	..	..	—	1	1
Enterovirus	..	..	..	3	1	4
Total isolates	..	..	..	13	2	15

The results of this second phase of the investigation are given in Table II. In October, November, and December there was an outbreak of parainfluenza type 1, mainly in children. Influenza A₂/Hong Kong was first isolated in January 1969, was maximally prevalent in February and March, and continued to be isolated until April, when it was succeeded by an outbreak of parainfluenza type 3. Isolations of adenovirus increased in May and June; three type 1, two type 2, one type 5, and one untyped strain being recovered from children's specimens.

There were four double infections: parainfluenza type 1 with respiratory syncytial virus and with an enterovirus; cytomegalovirus with respiratory syncytial virus and with influenza A₂. In view of its lability isolations of cytomegalovirus were interesting and unexpected; all three isolates were from infants in one practice.

Table III shows the drop in isolations with an increasing time interval between collection of a specimen and its receipt

TABLE II.—*Virus Isolates : General Practice October 1968 to June 1969*

Patients and Viruses	1968			1969						Age (Years)		Total
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	≤ 15	> 16	
No. tested	49	59	44	37	40	51	29	29	27	191	174	365
No. positive	12	5	6	7	16	15	8	10	11	55	35	90
Influenza A ₂	—	—	—	4	12	11*	2	—	—	6	23	29
Parainfluenza 1	6	4	4**	—	1	—	—	—	—	13	2	15
Parainfluenza 2	1	—	—	—	—	—	—	—	—	—	1	1
Parainfluenza 3	—	—	—	—	—	1	—	4	5	10	—	10
Adenovirus 1, 2, 3, 5, U/T	1	—	—	—	1	1	1	3	4	10	1	11
Rhinovirus H	1	—	1	—	—	—	4	—	1	5	2	7
Respiratory syncytial virus	—	—	2*	3*	—	—	—	—	—	5	—	5
Herpes simplex	1	1	—	—	1	1	1	2	—	2	5	7
Cytomegalovirus	—	—	—	1*	—	2*	—	—	—	3	—	3
Enterovirus	2	—	1*	—	1	—	—	1	—	4	1	5
Untyped	—	—	—	—	—	—	—	—	1	1	—	1
Total isolates ..	12	5	8	8	16	16	8	10	11	59	35	94

* Four patients with two viruses each.

in the laboratory. As the date of collection of seven was not recorded the analysis includes 358 of the 365 specimens received between October 1968 and June 1969. Almost two-thirds of the specimens arrived in the laboratory on the day after collection. Since the numbers received on the day of collection are so small the isolation rate of 50% may be misleading, but during the next two days the isolation rate averaged 26.7%. From the third day on there was a drop to about 10%. The single isolate after more than three days was of influenza A₂; the specimen was received four days after its collection. Two cytomegalovirus isolations were from 1-day-old specimens and the third from a 2-day-old specimen. Other viruses also appeared to be isolated equally readily from specimens which had spent one or two days in transit.

TABLE III.—*Isolation Rates from Specimens After Different Transit Times : October 1968 to June 1969*

Day after Collection when Received	No. Tested	Positive	
		No.	%
0 (day of collection)	6	3	50
1	226	63 (66 viruses)	28
2	85	20 (21 viruses)	24
3	28	3	11
> 3	13	1	8
Total	358	90	25

DISCUSSION

Whether a virus survives the postal journey from source to laboratory in sufficient quantity to be isolated in tissue culture probably depends on the number of viable particles originally present and the protection afforded by the suspending medium. During this continuing study specimens in transit have experienced the varying temperatures of the four seasons, and it seems that most respiratory viruses survive well in the virus transport medium used for two to three days without special precautions

or insulation. Isolation rates would probably be higher given freshly collected specimens, but for our purpose isolations from a representative small percentage provide a reasonable indication of viruses in the community. During the second phase of our survey the overall isolation rate was 24%, and the 29% rate from children's specimens alone compares well with a 32% isolation rate obtained by Blair *et al.* (1969) in a somewhat similar, though smaller, group of Glasgow children studied from 1962 to 1966.

The simplicity of the postal method for specimen transport leads us to hope that it might be useful for epidemiological surveys elsewhere. Our study continues and a more detailed analysis will be published later.

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