

Health and the Urban Environment

XII. The Incidence and Burden of Minor Illness in a Healthy Population: Duration, Severity, and Burden¹⁻⁴

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SUMMARY

A longitudinal study of Manhattan residents involving weekly observations of a set of acute symptoms (1) showed some surprising results concerning the burden of minor illness that these people experienced. The average length of illness was one week. Persons were ill (had symptoms) from none to 90 per cent of the time; adults who were ill at any time during the study reported illness at an average of 25 per cent of the time whereas children were ill at an average of 60 per cent of the time.

Duration of illness varied from one type of illness to another and from one person or group to another, with very few illnesses lasting more than 6 weeks. Duration of illness varied directly with the number of symptoms present.

Average durations, as well as incidence rates, varied with age, approximating the J-shaped mortality curve. Females had higher rates and longer durations of illness than males, and whites had higher rates than Negroes or Puerto Ricans, although Puerto Ricans usually reported longer illnesses than either whites or Negroes.

In general, this study found a remarkably high burden of illness in a healthy urban population, in fact, far more than normally imagined.

Introduction

Studies by other investigators (2-10) provide most of the current knowledge of the frequencies of minor illnesses. Most of these studies examined incidence, secondary at-

tack rates, seasonal patterns, recurrences, and age and sex differences.

These epidemiologic studies have been somewhat complemented by information concerning incubation periods, differences among minor illnesses, and intervals be-

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TABLE 1
ILLNESSES OF DIFFERENT DURATIONS BY BROAD TYPE

Type of Illness	Total	No. of Episodes			Total	No. of Days			Average Duration (days)
		<3 Days	3-30 Days	>30 Days		<3 Days	3-30 Days	>30 Days	
Total	8,885	3,147	5,565	173	61,893	4,393	48,949	8,551	6.97
%	100	35.4	62.6	2.0	100	7.1	79.1	13.8	
URI	5,462	794	4,501	167	51,253	1,280	41,701	8,262	9.38
%	100	14.5	82.4	3.1	100	2.5	81.4	16.1	
"Common cold"	3,971	360	3,460	151	41,333	622	33,133	7,568	10.41
%	100	9.1	87.1	3.8	100	1.5	80.2	18.3	
Rhinitis	727	165	549	13	5,597	247	4,761	589	7.70
%	100	22.7	75.5	1.8	100	4.4	85.1	10.5	
Cough and/or sore throat	764	269	492	3	4,323	411	3,807	105	5.66
%	100	35.2	64.4	0.4	100	9.5	88.1	2.4	
Gastrointestinal and other	3,423	2,353	1,064	6	10,640	3,113	7,248	289	3.11
%	100	68.7	31.1	0.2	100	29.3	68.1	2.7	
Gastrointestinal symptoms	1,385	1,017	364	4	4,558	1,363	3,007	188	3.29
%	100	73.4	26.3	0.3	100	29.9	66.0	4.1	
Other	2,038	1,336	700	2	6,082	1,750	4,831	101	2.98
%	100	65.6	34.3	0.1	100	28.8	79.4	1.7	

tween successive illnesses by the experimental studies of Andrewes (11) and Tyrell (12) in England, and those of Jackson and associates (13) in the United States.

The two major questions that have not been adequately explored are: (1) what is the actual burden of minor illness borne by an average person? (2) what is an accurate delineation of the duration of such an illness? Studies of illness patterns have usually been limited in their scope. Familial spread has probably received the most attention whereas individual differences in illness experience have often received little attention. Severity of illness has also rarely been considered.

The purpose of this study was to examine individual experiences of common acute illness. The major emphasis was on duration, severity, and individual burden of illness. Severity of illness was defined by both the number of symptoms and the number in combination with duration. Comparisons with other studies were made when possible.

The methods used in this study and some comparisons with other studies were presented in a previous paper (14). Because the results were quite similar to those of the

other studies and therefore appeared valid, further analysis was pursued.

Results

Duration and burden of illness: Duration of acute illness has rarely been studied. Besides its intrinsic interest, when combined with frequency of illness, it was taken to determine the burden of disease experienced by the population.

Most of the acute illnesses lasted between 3 and 30 days (table 1). There were more upper respiratory illnesses that lasted more than 30 days (3 per cent); many gastrointestinal and other illnesses lasted fewer than 3 days (69 per cent). Because the upper respiratory illnesses were far more frequent when all illnesses were examined together, the conclusions drawn were primarily based on upper respiratory illness experience.

All illnesses studied averaged 7.0 days in length; the respiratory illnesses averaged 9.4 days (table 2), which is longer than commonly reported (4-6, 10). Although most of the respiratory illnesses were of one week's duration or less (59 per cent), 25 per cent lasted more than 11 days; 16 per cent, more than 14 days; 3 per cent, more than 30

TABLE 2
AVERAGE DURATION IN DAYS OF ILLNESS BY TYPE,
SEX, AGE, AND RACE

	Total	Respiratory		Gastro- Intestinal	Other
		Total	"Cold"		
Sex					
Male	6.8	8.9	9.8	2.8	3.3
Female	7.1	9.8	10.9	3.6	3.5
Age, years					
0-4	8.5	9.6	10.3	3.1	2.6
5-9	6.9	8.2	9.0	2.3	2.9
10-19	6.4	8.4	9.2	2.3	3.0
20-29	5.7	8.6	9.7	3.2	2.8
30-39	6.5	9.6	10.7	3.7	3.0
40-49	7.0	10.6	11.7	4.2	3.6
50-59	7.6	11.3	13.2	3.8	4.6
60+	7.9	11.9	14.7	3.6	4.4
Race					
White	6.6	9.5	10.9	3.1	3.4
Negro	6.8	8.6	9.6	3.2	3.0
Puerto Rican	7.5	9.5	10.1	3.8	3.6
Total	7.0	9.4	10.4	3.3	3.4

days, and 1 per cent of all illnesses lasted more than 6 weeks. Surprisingly, 14 per cent of the person-days of illness were illnesses lasting longer than 30 days. Roden (15) indicated that viral strains with shorter incubation periods were often associated with illnesses of longer lengths, and vice versa. He reported an over-all proportion of 65 per cent of illnesses that lasted 7 or more days, and 29 per cent that lasted 14 or more days, compared to the 56 per cent and 20 per cent, respectively, reported herein. Miller and co-workers (6) and Brimblecombe and associates (5) also reported that coughs and the nasal discharge of severe colds could last several weeks.

The average durations of all illnesses, respiratory illness, and "common cold" were high for those less than 5 years old, declined, and then increased in subjects more than 40 years old (table 2). Respiratory illnesses lasted longer for subjects more than 40 years of age than for those less than 5 years old (figure 1). Gastrointestinal and other illnesses generally showed increases in duration with age for subjects more than 30 years of age. Females had more and somewhat longer illnesses than males. Differences in lengths of illness by race were dependent on

the type of illness; when all illnesses were considered, Puerto Ricans tended to report somewhat longer episodes than other

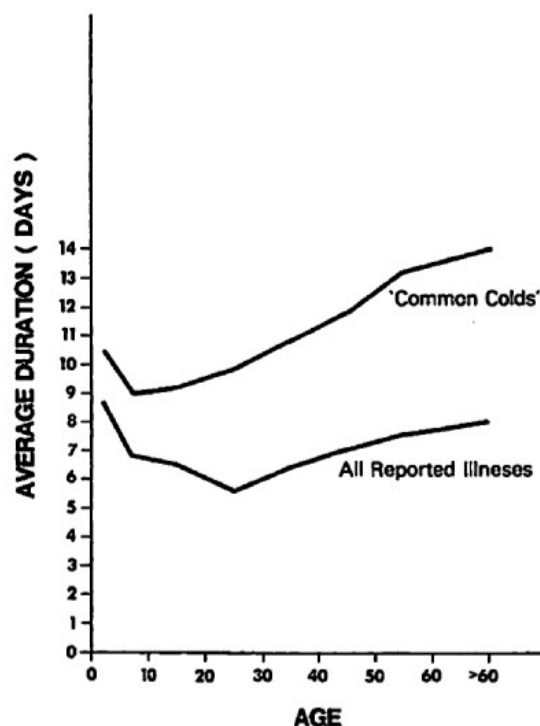


Fig. 1. Average duration of illness as a function of age for all illnesses and "common colds."

groups. The race and sex differences were not large.

The duration of illness was directly related to the number of symptoms present in the illness (table 3). Because 50 per cent of the illnesses included only 1.6 symptoms, and 59 per cent included 2 or less, most episodes were apparently not very severe. One half of the person-days of illness were associated with 3 or fewer symptoms.

The timing of these symptoms was important; if 2 or more illnesses followed one another without a break, the number of symptoms was greater. A review of the distribution of symptoms showed that the number of symptoms was distributed unimodally, not bimodally. Therefore, the illnesses as defined apparently did not represent 2 or more different illnesses succeeding one another without a break. Some long illnesses, however, might have been multiple, but symptom intensity was not measured and could not be used to determine this. Also, only large changes (2 or more symptoms) were sought in this examination.

Approximately one fourth of the episodes included 4 or more symptoms, and these had durations of 14 days or more; only 2 per cent of the illnesses had 8 or more symptoms, with an average duration of 22 days or more.

The burden of illness experienced was ex-

tremely variable among subjects. There were 210 persons in the study (12 per cent) who reported no illness in a total of 3,249 observed weeks (62.5 person-years) of observed exposure. Among persons who reported one or more illness, those 15 or more years old reported symptoms and illnesses an average of 25.3 per cent of the time (18.8 per cent with "common cold") and those less than 15 years old reported symptoms and illnesses an average of 60 per cent of the time (37.4 per cent with "common colds" and 17.8 per cent with rhinitis). Both percentages were in terms of person-years (e.g., person-years of symptom information/person-years in study). Both percentages included "illnesses" lasting fewer than 3 days, although there were relatively few of these. It is possible that this was where rhinitis without "cold" occurred, for instance, when a mother said that her child had only a "runny nose." These figures would be greatly reduced if all subjects were included, as shown below.

At least 2 per cent of the subjects in the study were ill for more than two thirds of their observed time. The curve of the proportion of time ill geometrically decreased for both age groups (figure 2). Twenty-two per cent of adults were ill more than one fourth of the time, and 6.5 per cent were ill more than one half of the time. Among chil-

TABLE 3
AVERAGE DURATION OF ILLNESS BY NUMBER
OF SYMPTOMS PRESENT

No. of Symptoms	Episodes		Person-days		Average Duration (days)
	(no.)	(%)	(no.)	(%)	
1	3,149	35.4	9,862	15.9	3.13
2	2,118	23.8	12,005	19.4	5.67
3	1,576	17.7	12,902	20.8	8.19
4	913	10.3	9,106	14.7	9.97
5	507	5.7	6,110	9.9	12.05
6	274	3.1	3,961	6.4	14.45
7	167	1.9	2,936	4.7	17.58
8	108	1.2	2,337	3.8	21.63
9	40	0.4	1,052	1.7	26.30
10	15	0.2	493	0.8	32.86
11-13	18	0.2	1,118	1.8	62.11
Total	8,885	100.0	61,882	100.0	6.96

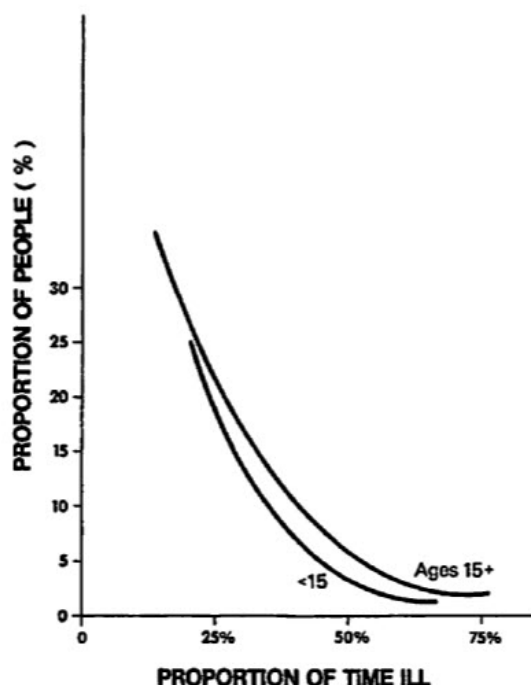


Fig. 2. Proportion of subjects who were ill for given proportions of the time of observation and for subjects less than and more than 15 years of age.

dren, 20 per cent were ill more than one fourth of the time and 3.5 per cent were ill more than one half of the time.

The median interval between "common colds" for those ill at any time during the study was 36 days; for other respiratory illnesses, it was 42 days. It was calculated that the average person in the study who reported any illness, in 35 known weeks of observation might have had, on the average, as many as 6 "common colds" or 5 other respiratory illnesses in that time with no intervening illness.

McNamara (7) also reported a surprisingly high frequency of minor symptoms and concluded that, "...the burden of minor disease is perhaps greater than previously suspected." The present data support this conclusion very well.

Discussion

Individual subjects did have different illness experiences, primarily dependent on age (4, 9, 16) and family composition (4, 8, 10, 17). Buck (4) and Brimblecombe and co-

workers (5) also indicated that the number of colds per year was person-specific and constant over a period of time. The present data agree; the yearly illness experiences of long-term panel members were fairly constant.

If the interval between successive illnesses of the same broad type is used as an estimate of immunity to specific illnesses, there is little knowledge of very short-term periods. Lefkowitz and associates (18) showed for specific viral types of colds that neutralizing antibody after illnesses usually developed slowly; it was still low at one month, maximal between 6 and 12 months, still measurable at 18 months, but nearly gone at 24 months. For very short intervals, the present report showed that similar broad syndromes (sets of symptoms herein called illnesses) could occur again, although there was no evidence of the agents involved and no reason to suggest that they might have been due to the same agent. If it is assumed that longer intervals between different infections are due to immunity (13), and if long intervals are included among criteria for determining the illnesses, some episodes will be missed in analysis. On the other hand, short intervals do not preclude the existence of short-term immunity in some persons or groups (4).

RESUMEN

La salud y el medio ambiente urbano. XII. Incidencia y molestias de enfermedades menores en una población sana: duración, gravedad y molestias

Un estudio longitudinal de residentes en Manhattan envolviendo observaciones semanales de una serie de síntomas agudos mostró algunos resultados sorprendentes en lo que concierne a las molestias de enfermedades menores que esta gente experimentó. La duración en promedio de la enfermedad fué de una semana. Las personas estaban enfermas (tenían síntomas) desde cero hasta 90 por ciento del tiempo; los adultos que estaban enfermos en cualquier momento durante el estudio reportaron una enfermedad un promedio de 25 por ciento del tiempo, mientras que los niños estuvieron enfermos un promedio de 60 por ciento del tiempo.

La duración de la enfermedad varió de un tipo de enfermedad a la otra, de una persona a la otra, con muy pocas enfermedades durando más de 6 semanas. La duración de la enfermedad varió directamente con el número de síntomas presentes.

Duraciones promedio, así como el ritmo de incidencia, variaron con la edad, aproximando la curva de mortalidad en forma de J. Las mujeres tuvieron proporciones más altas y una duración de las enfermedades más larga que los hombres, y los blancos tuvieron una proporción más alta que los negros o los puertorriqueños, aunque los puertorriqueños habitualmente reportaron una enfermedad más larga que los negros o los blancos.

En general, este estudio encontró una carga remarcablemente alta de enfermedades en una población urbana sana, en efecto, mucho más de lo imaginado normalmente.

RESUME

Environnement urbain et santé. XII. Incidence et importance des affections mineures dans une population saine. Durée, gravité, et importance

Une étude longitudinale des habitants de Manhattan, basée sur les observations hebdomadaires d'une série de symptômes aigus, a révélé certains résultats surprenants en ce qui concerne l'importance que représente les affections mineures auxquelles les personnes étudiées étaient exposées. La durée moyenne des maladies relevées a été d'une semaine. La durée pendant laquelle un individu pouvait être malade, ou présenter des symptômes, pouvait être nulle, ou atteindre 90 pour cent du temps. Les adultes qui ont été malades à un moment quelconque au cours de cette étude, ont rapporté des maladies en moyenne 25 pour cent du temps, tandis que les enfants étaient malades en moyenne pendant 60 pour cent de cette période.

La durée de la maladie variait d'un type d'affection à l'autre, et d'une personne ou d'un groupe, à une autre personne ou à autre groupe, avec très peu de maladies ayant duré plus de 6 semaines. La durée de la maladie variait directement avec le nombre de symptômes qui étaient présents.

Les durées moyennes, de même que les taux d'incidence, ont varié avec l'âge, donnant approximativement une courbe de mortalité avec un profil en J. Les femmes ont présenté des taux plus élevés, et des durées de maladie plus

longues, que les hommes. Les blancs avaient des taux plus élevés que les noirs ou les Porto-Ricains quoique les Porto-Ricains aient généralement souffert de maladies de plus longue durée que les blancs ou les noirs.

En général, cette étude a mis en évidence l'importance très considérable de la morbidité dans une population par ailleurs saine, importance qui dépasse en fait de loin celle que l'on aurait normalement imaginée.

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