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Common respiratory and gastrointestinal illness in paediatric student nurses and medical technology students

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SUMMARY

The aim of this study was to establish the risk of acquiring common respiratory and gastrointestinal illness for paediatric nurses. Using self-administered questionnaires, student nurses at two children's hospitals and students at one school of medical technology reported biweekly the number of minor illnesses, symptoms, and indicators of severity of infection over a 3-year period (1975–8). Although a systematic bias was evident with some symptoms, others appeared to be quite reliable. The following four syndromes were defined to estimate the risk: upper respiratory syndrome (URS), lower respiratory syndrome (LRS), respiratory and gastrointestinal syndrome (RGS), and gastrointestinal syndrome (GS). Surveillance days were allocated to groups with high- or low-intensity contact with children. The incidence of all illnesses was 2·9 per person-year in the low-intensity contact group and 4·4 per person-year in the high-intensity contact group. The reported incidence of LRS and RGS in the high-intensity contact group was 1·55 times higher than in the low-intensity group ($P < 0{\cdot}001$). LRS and RGS incidence was similar in nurses at both schools. During low contact periods it corresponded to that of the medical technologists.

INTRODUCTION

The risk of nosocomial spread of common respiratory and gastrointestinal infections is high, conditions being particularly favourable in paediatric wards. Several studies have been published on the spread of certain pathogens and on the role played by adults in their introduction and dissemination (Ditchburn *et al.* 1971; Mufson, Mocega & Krause, 1973; Gardner *et al.* 1973; Hall *et al.* 1975; Sims *et al.* 1975; Valenti *et al.* 1982; Meissner *et al.* 1984).

While the risk of acquiring nosocomial infections with specific bacteria and viruses has been established, and the modes of transmission have been demonstrated, no estimate of the additional overall risk of acquiring minor respiratory

and gastrointestinal infections in a hospital setting has, to the best of our knowledge, been reported to date.

This study compares the incidence of common respiratory and gastrointestinal illnesses reported by student nurses from two paediatric departments and students of medical technology. The data were obtained from questionnaires over a 3-year surveillance period. Presuming that contact with children represents an additional risk of common respiratory and gastrointestinal infections, we compared high-intensity contact periods with low-intensity contact periods within the student nurse group. The question of the consistency of reporting different symptoms was also addressed, a question which is of prime importance not only for the comparison of our information. Our findings indicate the presence of symptoms with a high reporting bias, which were unsuitable for our study; the reporting of other symptoms, however, was obviously reproducible.

The incidence of infection by some respiratory pathogens, as determined by serology in the same student groups, will be published in a second paper. The results support and qualify conclusions on the occupational risk of acquiring common respiratory and gastrointestinal illnesses drawn in this questionnaire-based study.

MATERIALS AND METHODS

Study population

Students at two schools of paediatric nursing and one school of medical technology were followed over a 3-year period (April 1975 – March 1978). The school of medical technology and one school of nursing are affiliated with the University Hospitals in Tübingen (FRG); the second school of nursing with a municipal hospital in Reutlingen, a city located approximately 15 km east of Tübingen.

In 1978 the paediatric department of the university hospital had 170 beds. It is subdivided in sections for general paediatrics, haematology, cardiology, neonatology and developmental neurology. There is but a general paediatric service at the municipal hospital (96 beds). The average stay in hospital in 1978 was 14·0 days and 13·1 days at the university and municipal hospital, respectively. The hinterland of both hospitals is partially overlapping and the socioeconomic structure of the patient population is similar.

Students are admitted to the schools of medical technology and paediatric nursing in Reutlingen at 6-month intervals (first week of April and first week of October), and to the school of paediatric nursing in Tübingen, once a year (first week of April). The number of students in training varied (see Table 1). Seven percent of the medical technology students, 9 % of the student nurses in Tübingen, and 1 % of the student nurses in Reutlingen dropped out of the study prematurely in most cases because training was discontinued.

The mean age at admission to the schools was 18·5 years for the student nurses and 20·1 years for the medical technology students.

Most of the student nurses at both schools were housed in single rooms in modern dormitories. The accommodation for the medical technology students, however, consisted of furnished single or double rooms in private homes scattered over

Tübingen. In general, the students had no social contact with students at the other schools.

The training of the medical technology students consists of lectures and laboratory courses as well as an 8-week clinical course on a hospital ward. The student nurses, however, spend most of their time on paediatric wards. Included in this training are periods ranging from several days to a few weeks in which the student nurses have no contact with children (e.g. block lectures, days off as compensation for working the night shift or in the dietary department).

Collection of data

At the beginning of surveillance, the general aim of the study and the individual questions on the questionnaires were explained to the students. This one-hour session was conducted by the same person for the Tübingen students and by a different instructor for the Reutlingen students. At this time, general personal data of the participants were obtained.

During the study, questionnaires were distributed to the medical technology students by their class representative before their first lecture after a 2-week surveillance period and collected after the lecture or returned to the class representative on the same day by the student. At the schools of nursing, the questionnaires were distributed and collected by a nursing instructor. Absent students were contacted by the representative at the earliest possible time; generally this resulted in a delay of no more than 3–5 days.

Longer delays were encountered during vacation periods and in cases of prolonged illness.

Construction of questionnaires and handling of data

The questionnaires were developed in cooperation with the Department of Medical Documentation and Data Processing of the University of Tübingen.

The questionnaires for recording illnesses and symptoms included the name, address, and personal code number of the student as well as the date of the surveillance period. The participants were then asked to note whether they had been on duty during the preceding 2 weeks, and if so, in which department. Three different entries with dates were provided to note any changes or transfers. Assignment to the different intensity contact categories was based on the answers to these questions. The next question concerned the presence or absence of respiratory or gastrointestinal illness. Participants who answered affirmatively were asked to date the onset and symptoms (for list of symptoms, see Table 1). The indicators of illness severity were as follows: confined to bed for...days, presence and duration of fever, missed working-days or duration of sick-leave. If fever was present, the participant was asked to record the highest axillary temperature. Due to inconsistent reporting, the fever data are not reported here. Because of the lack of clear-cut criteria for determining the end of a minor illness, no attempt was made to establish the duration of illness.

After the questionnaires had been returned, the observation days were assigned to the following exposure categories.

(1) High-intensity contact with children: days on duty on paediatric wards (not including the neonatal ward).

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(2) Vacation: 3 or more days absent from Tübingen or Reutlingen and other periods in which the intensity of contact was unknown.

(3) Low-intensity contact with children: lecture periods, duty in dietary department, compensation leave for night duty, neonatal ward duty.

In all evaluations of contact intensity, the date, 2 days before the reported onset of symptoms, was arbitrarily taken as the day of exposure. The evaluation was also made with a presumed 3-day incubation period; results, however, were essentially the same (not presented). Weekends and single days off were included in the preceding intensity contact period. According to the criteria mentioned above, 56·7 % of the student nurse surveillance time was classified as high-intensity contact, 34·8 % as low-intensity contact, and 8·5 % as vacation. Finally, the information from each questionnaire was punched on an IBM card and further analysed by electronic data processing.

Statistical evaluation

To compare infection rates in two populations, we assumed a Poisson distribution for the number of events observed in any given time interval. In the following equation n_i represents the number of events in the two samples; T_i, the observation times in the two samples, and $i = 1$ or 2, when events occur according to the rates λ_i in the two samples, then

$$T_i(n_2+0{\cdot}5)\,\lambda_1/T_2(n_1-0{\cdot}5)\;\lambda_2$$

has approximately an F distribution with $2n_1+1$ and $2n_2+1$ D.F. (Cox, 1953).

RESULTS

The overall incidences of illness and symptoms reported over the 3-year surveillance period are summarized in Table 1. All returned questionnaires, even those from vacation days, were included in the study. The decline in the total number of reported illnesses over the course of the 3 years of all three student groups would tend to suggest decreasing cooperation on the part of the participants. On closer examination of the data, however, only the less characteristic, milder illnesses such as coryza (nasal congestion with discharge), headache, and fatigue ('mild symptoms') were possibly under-reported. By contrast, no such tendency in under-reporting was observed with respect to characteristic well-defined symptoms such as earache, hoarseness, cough, and vomiting ('hard symptoms'). The incidences of the 'hard symptoms' are also roughly the same in the two student nurse groups with presumed similar exposure. While cough can be considered a 'hard symptom', a systematic reporting bias was suggested with regard to cough with or without phlegm from the chest: it was reported 1·7 times more often by the Tübingen student nurses than by the Reutlingen student nurses. The Reutlingen nurses on the other hand reported cough without phlegm 1·5 times more often than did the Tübingen nurses.

Examples of 'indicators of severity', i.e. absenteeism due to minor illness, duration of absenteeism and incidence and duration of fever, are presented in Table 2. In contrast to the close agreement of results from the nurse groups with respect

Table 1. *Incidence of symptoms/person-year reported by paediatric student nurses at two different hospitals and medical technology students*

Observation period...	Medical technology students				Student nurses Tübingen				Student nurses Reutlingen				Student nurses Tübingen and Reutlingen			
	75/76	76/77	77/78	75–78	75/76	76/77	77/78	75–78	75/76	76/77	77/78	75–78	75/76	76/77	77/78	75–78
Person-years...	122·5	129·4	126·9	377·9	66·6	67·4	64·3	198·3	46·5	53·5	59·5	159·5	113·1	120·9	123·9	357·9
	3·3*	3·0	2·5	2·9	4·3	3·1	3·0	3·5	4·3	4·2	3·7	4·1	4·3	3·6	3·3	3·7
Symptoms																
Headache	1·9	1·7	1·5	1·7	2·7	1·8	1·7	2·1	1·7	1·5	1·5	1·6	2·1	1·7	1·6	1·8
Fatigue	2·2	1·9	1·7	1·9	2·5	2·1	2·0	2·2	2·0	1·7	1·5	1·7	2·3	1·9	1·7	2·0
Nausea	0·5	0·9	0·7	0·7	0·5	0·9	0·8	0·7	0·5	0·4	0·4	0·4	0·5	0·7	0·6	0·6
Coryza	2·6	2·1	1·9	2·2	3·2	2·3	2·3	2·6	3·4	3·4	3·0	3·3	3·3	2·8	2·6	2·9
Sore throat	2·6	1·8	1·6	2·1	2·8	1·7	2·0	2·2	2·4	2·5	2·2	2·3	2·6	2·2	2·1	2·3
Earache	0·3	0·6	0·3	0·4	0·4	0·7	0·7	0·6	0·4	0·6	0·4	0·5	0·4	0·6	0·6	0·5
Hoarseness	0·7	1·2	1·0	1·0	1·0	1·4	1·5	1·3	1·3	1·3	1·5	1·4	1·1	1·3	1·5	1·3
Cough	1·2	1·3	1·2	1·2	2·0	1·6	1·7	1·8	2·1	1·9	1·9	1·9	2·0	1·7	1·8	1·9
Fever	0·5	0·5	0·4	0·5	0·8	0·7	0·8	0·8	0·4	0·7	0·6	0·6	0·5	0·7	0·7	0·7
Vomiting	0·3	0·3	0·2	0·3	0·4	0·4	0·4	0·4	0·4	0·2	0·3	0·3	0·3	0·3	0·4	0·3
Diarrhoea	0·5	0·5	0·4	0·5	0·7	0·6	0·5	0·6	0·6	0·3	0·3	0·4	0·7	0·4	0·4	0·5

* Number of questionnaires reporting infections/person-year.

Table 2. *Indicators of infection severity*

Observation period...	Medical technology students				Student nurses Tübingen				Student nurses Reutlingen				Student nurses Tübingen and Reutlingen
	75/76	76/77	77/78	75–78	75/76	76/77	77/78	75–78	75/76	76/77	77/78	75–78	75–78
Sick-leave (days)/ person-year	2·0	1·9	2·3	2·0	4·5	6·0	5·5	5·3	2·2	3·6	2·5	2·7	4·1
Incidence of absence/ person-year	0·7	0·7	0·7	0·7	1·1	1·3	1·1	1·2	0·6	0·7	0·7	0·7	1·0
Duration of sick leave (days)	2·9	2·7	3·2	2·9	4·9	4·6	5·0	4·5	3·6	5·0	3·6	4·1	4·4
Fever (days)/ person-year	1·5	1·2	1·1	1·3	1·9	1·9	2·7	2·2	0·9	2·3	1·3	1·5	1·9
Incidence of fever/ person-year	0·5	0·5	0·4	0·5	0·8	0·7	0·8	0·8	0·4	0·7	0·5	0·6	0·7
Average duration of fever(days)	2·9	2·6	2·5	2·7	2·3	2·9	3·6	2·9	2·2	3·1	2·4	2·6	2·8
Days of sick-leave/ days of fever	1·4	1·5	2·1	1·6	2·3	3·1	2·0	2·4	2·4	1·6	1·9	1·9	2·2

to 'hard symptoms' reports on the number of sick-leave days per person-year by students nurses at the two hospitals differed considerably. Absenteeism was 1·6–2·0 times higher in Tübingen in each investigated year than in Reutlingen, due to both a higher number of absences and a longer duration of the absences. Moreover, the Tübingen student nurses reported 1·5 times more days of fever than did the

Table 3. *Definition of syndromes*

I Upper respiratory syndrome (URS)
- (1) Coryza with headache and/or malaise
- (2) Sore throat
- (3) Earache

II Lower respiratory syndrome (LRS)
- (1) Cough
- (2) Hoarseness
- (3) Chest pain during breathing: URS symptoms may be present

III Respiratory and gastrointestinal syndrome (RGS)

Any GS symptoms plus any URS and/or RS symptoms

IV Gastrointestinal syndrome (GS)
- (1) Diarrhoea
- (2) Nausea
- (3) Vomiting

Reutlingen nurses. It should, however, be borne in mind that only a small percentage of the reported 'fevers' was based on actual temperature measurement; most of the student nurses stated that they felt 'feverish'. In addition to reporting more days of fever, the Tübingen nurses were absent 1·3 times longer for each day of fever than were the Reutlingen nurses. Since neither other reported symptoms nor serological findings presented in the accompanying paper showed a higher frequency or greater severity of illness in the Tübingen student nurses groups, both indicators of severity, i.e. fever and sick-leave, seem to be subject to considerable reporting bias. The categories 'confined to bed' and 'seen by a doctor', which are not presented in this paper, seemed even less reliable.

For easier handling of data, the leading symptoms were combined in four mutually exclusive syndromes: upper respiratory syndrome (URS), lower respiratory syndrome (LRS), combined respiratory-gastrointestinal syndrome (RGS), and gastrointestinal syndrome (GS) (see Table 3). It should be noted that coryza without any accompanying symptoms was not included in URS, since its relation to infection seemed questionable in many instances.

The mean incidence of these syndromes in the different student groups over the 3-year surveillance period is shown in Table 4. The difference for URS between the student nurse groups ($P < 0{\cdot}01$) is probably due to reporting bias. URS being determined mainly by 'mild symptoms'. In actuality, URS accounted for 30·3% of all illnesses reported by the Tübingen student nurses, and 45·0% of those reported by the Reutlingen nurses. The differences with respect to LRS, by contrast, appear to be due mainly to different exposure. Significant differences

Table 4. *Incidence of syndromes/person-year during total surveillance period*

	Medical technology Students	% of total illnesses	Student nurses Tübingen	% of total illnesses	Student nurses Reutlingen	% of total illnesses
Person-years...	374	—	196	—	157	—
Percentage of high-intensity contact...	7·6	—	51·8	—	62·8	—
Incidence of all illnesses/person-year	2·8	—	3·3	—	4·0	—
URS	1·1	36·1	1·0	30·3	1·8	45·0
LRS	1·0	42·8	1·5	45·4	1·6	40·0
RGS	0·2	7·1	0·3	9·1	0·2	5·0
GS	0·3	10·7	0·3	9·1	0·2	5·0

Note: Coryza without any additional symptoms was not included in one of the syndromes.

were found between the medical technology students and each of the student nurse groups ($P < 0{\cdot}01$).

In order to estimate the additional risk of acquiring a minor respiratory or intestinal illness more accurately, the total observation time was divided into high- and low-intensity contact periods (Fig. 1). The high-intensity contact group

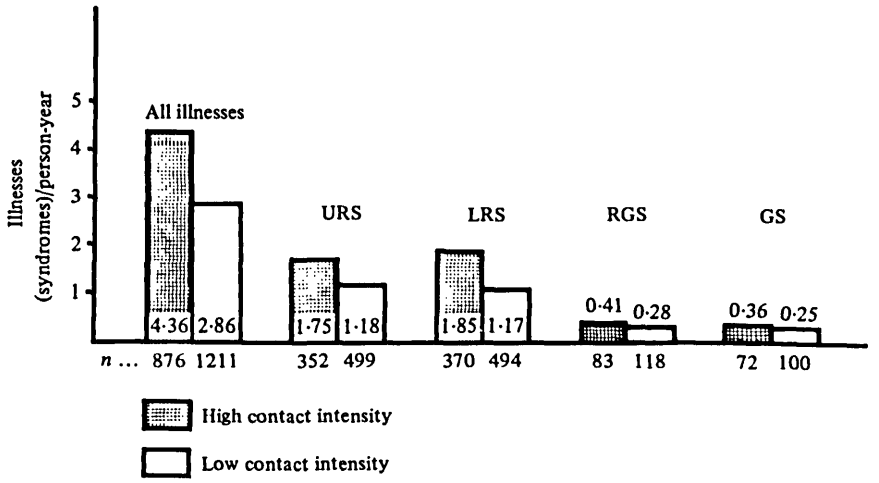

Fig. 1. Incidence of reported syndromes according to contact intensity category.

Table 5. *Incidence of lower respiratory tract syndrome and respiratory–gastrointestinal syndrome in different exposure groups according to year*

Year	Incidence/person-year				
	Low intensity-contacts			High intensity-contacts	
	Medical technology students	Student nurses Tübingen	Student nurses Reutlingen	Student nurses Tübingen	Student nurses Reutlingen
1975–1976	1·3 (142/112)*	1·4 (42/29)	1·3 (18/14)	2·4 (82/36)	2·1 (68/32)
1976–1977	1·8 (174/98)	1·5 (40/27)	1·5 (24/16)	2·1 (75/35)	2·1 (65/32)
1977–1978	1·2 (112/91)	1·8 (41/23)	1·3 (19/15)	2·4 (80/33)	2·4 (83/35)
1975–1978	1·4 (428/301)	1·6 (123/79)	1·4 (61/45)	2·3 (237/104)	2·2 (216/99)

* Number of illnesses/number of person-years.

regularly reported total illnesses as well as all single syndromes approximately 1·5 (range for single syndromes 1·44–1·58) times more often than did the low-intensity contact group ($P < 0{\cdot}01$).

As Table 5 shows, approximately the same difference for LRS and RGS, both of which are determined by 'hard symptoms', were present between the high- and the low-intensity contact groups in each of the 3 years surveyed. Even more important is the close similarity of syndrome incidence for the medical technology students and the student nurses in the same exposure category. The data for student nurses and medical technology students therefore can be analysed together.

No significant differences in reported syndromes were found within the high-intensity contact groups between the years or between the student nurse groups from the two hospitals; the medical technology students, however, reported a significantly higher incidence of LRS and RGS ($P < 0{\cdot}01$) in 1976–7 than in the other 2 years. This higher incidence was not reflected in the results of the serologic examination for some common respiratory pathogens reported in the companion paper, and influenza A infections which were common in patients of our hospital and all over the country were probably not responsible for the increased reporting of more severe respiratory symptoms. It may reflect a community outbreak with some unknown agents, but we lack data on this.

DISCUSSION

The aim of the investigation was to estimate the risk of nosocomial minor respiratory and gastrointestinal infections for highly exposed paediatric student nurses. This was done by comparing the risk of infection of groups of paediatric student nurses with that of a group of students of similar age and with similar social background but without particular exposure to children (i.e. medical technology students) and by comparing the incidence of illnesses within the student nurses group during periods with and without high contact-intensity with children.

Given the major role played by pre-school- and school-children in the spread of many pathogens in general, and the frequent reports on hospital infections originating from and spread by children in particular, the existence of such a risk is obvious. Obtaining reasonable estimates of the actual risk, however, is hampered by problems associated with the reporting of minor, often ill-defined symptoms and with the setting up of adequate control groups. We constructed a relatively simple self-reporting system utilising bi-weekly questionnaires that were distributed and collected by nursing instructors or class-representatives. The reliability of the data was controlled to a certain extent by comparing the data obtained from student nurses at two different hospitals over a long surveillance period (3 years). The medical technology students, who lived all over the town in Tübingen and usually spent the weekend at their parents' homes which are scattered over the southern part of the state Baden-Württemberg, can be considered as sentinel group reflecting the acute infectious disease experience of the age group in our area. In addition, it was possible to compare the disease experience of the control group, i.e. the medical technology students, with that of the paediatric student nurses during periods without high-intensity contact with children (40–50% of total training time).

The incidences of reported symptoms for each of the two student nurse groups and the medical technology student group over a 3-year period are summarized in Table 1. This summary, in addition to presenting the incidence of symptoms, also facilitated the identification of reliably reported symptoms. The criteria for the reliability of any symptom were: (i) approximately the same frequency in each of the student nurse groups and (ii) no steady decrease in the frequency with which a symptom was reported during the course of the observation period.

Table 6. *Comparison of respiratory symptoms in members of Baltimore families 1929–30 and in paediatric student nurses and medical technology students in Tübingen 1975–78*

	Baltimore families*		Medical technology students		Student nurses	
	Incidence/ person-year	% of respiratory infections‡	Incidence/ person-year	% of respiratory infections	Incidence/ person-year	% of respiratory infections
All respiratory infections...	2·7		2·6 (2·3–3·0†)		3·4 (3·0–4·0)	
Symptoms (events)						
Aching (limbs, joints, general)	0·7	25	0·6 (0·6–0·7)	23	0·8 (0·7–0·9)	24
Cough	1·7	61	1·2 (1·2–1·3)	46	1·8 (1·1–2·0)	53
Hoarseness	1·1	40	1·0 (0·7–1·2)	38	1·3 (1·1–1·5)	38
Nasal discharge	2·3	85	2·2 (1·9–2·6)	85	2·9 (2·6–3·3)	85
Raw or sore throat	1·8	67	2·1 (1·6–2·6)	81	2·3 (2·1–2·6)	68
Soreness or tightness of chest	0·3	12	0·4 (0·3–0·4)	15	0·5 (0·5–0·6)	15
Fever	0·5	17	0·3 (0·3–0·4)	11	0·4 (0·4–0·5)	12
Confined to bed for one or more days	0·5	20	0·5 (0·4–0·5)	19	0·5 (0·5–0·6)	15

* Group is composed of women 15 years of age and older.
† Lowest and highest yearly incidence.
‡ Percentage of respiratory infections in which the symptom (event) was reported.

Several symptoms fulfilled these criteria and the agreement of certain symptoms like cough and hoarseness in the two student nurse groups was surprisingly good. On the other hand, mild ill-defined symptoms like those of coryza had to be excluded from the reliable symptoms, and a systemic reporting bias for symptoms like cough with or without phlegm from the chest was also suggested between the student nurses at the two hospitals.

This discrepancy may well be explained by the influence of the nursing instructors who collected the questionnaires. Different frequencies in reporting 'fever', which included fever certified by actual measurement of temperature and feeling feverish as well as different periods of sick-leave per day of fever may be due to different infection control policies at the municipal (Reutlingen) and the university (Tübingen) hospital. Whatever the reason, these data were obviously too unreliable to be used to estimate the relative risk of infection. While it could be argued that the differences between the reports from the two hospitals were real, this is highly unlikely given the close agreement of the severe symptoms in the student nurse groups and the surprisingly similar incidence of serologically demonstrated viral infections (see companion paper, Gerth *et al.* 1987).

To facilitate easier handling of the data, we summarized the symptoms in 'syndromes'. To simplify comparison, we initially followed the definitions used in the New York Virus Watch Program (Fox *et al.* 1966). This system, however, was abandoned once reporting of cough with or without phlegm from the chest, key symptoms for the allocation of illness to the upper or lower respiratory tract syndrome, was strongly suspected to be systematically biased. Among our four syndromes the upper respiratory tract syndrome reflected the possible reporting bias of coryza, the lower respiratory syndrome, however, appeared reliable and its frequency of reporting was significantly higher in the student nurses than in the medical technology students.

Comparison of the entire student groups revealed no distinct differences in the reporting of the two other syndromes, i.e. respiratory plus gastrointestinal syndrome and gastrointestinal syndrome, between the student nurses and the medical technology students (Table 4). Grouping the students according to the intensity of their contact with children, however, yielded much clearer results. The students in the high-intensity contact group reported approximately 1·5 times more symptoms for each of the four syndromes than did those in the low-intensity contact group. Analysis of the lower respiratory tract syndromes combined with respiratory plus gastrointestinal symptoms also showed a higher incidence in the high-intensity contact group for each of the 3 years examined. A comparison of student nurses with low-intensity contact and high-intensity contact from the same hospital for each single year of observation revealed a similar difference (Table 5).

Finally, the incidence of these syndromes in the low-intensity contact for each of the student nurse groups was very similar to that of the medical technology students, thus justifying the criteria used to establish the exposure groups.

Even though our study was not designed to establish the symptomatology of minor infectious illnesses, it is tempting to compare the results with those obtained in family studies. Differences in data acquisition and presentation, however, limit the comparability of such studies. Nevertheless, we compared our results with data

obtained in one of the earliest family studies conducted by Volkenburgh & Frost (1933). This study was undertaken in the epidemiological year 1929/30 in 91 families with different sociological background in Baltimore, Maryland (Table 6). Illnesses were reported immediately either by postcard or telephone; the symptoms were entered on a form by a physician. In this study the total incidence of respiratory diseases obtained for women between the ages of 15 and 29 years was 2·8 per person-year of observation.

For the preparation of Table 6, the reported incidences from women 15 years of age and older had to be used. 'Schnupfen' was taken as synonymous with 'running or stuffed nose', other similar minor adaptations were also necessary, and it can be seen that there is a high degree of agreement between these two studies concerning the total incidence of illnesses as well as the single symptoms. It should be borne in mind that the Baltimore data were obtained from families with children.

The close agreement of the results shows that neither incidence nor symptomatology of minor respiratory illness has changed appreciably over the last 50 years, a fact which in and of itself is not surprising. It also demonstrates, however, that the reproducibility of results obtained with simple surveillance methods is good.

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