VALIDITY AND RECALL OF INFORMATION FROM QUESTIONNAIRES CONCERNING RESPIRATORY INFECTIONS AMONG SCHOOLCHILDREN

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SUMMARY

The aim of the study was to assess the reliability of questionnaire information on visits to a physician and the use of antibiotics taken for respiratory infections among schoolchildren attending a water-damaged school and a reference group of schoolchildren attending an undamaged school. Two similar questionnaires on respiratory morbidity in two consecutive years were sent to the parents. The information given on the questionnaires was compared with the patient's records of the local health centre. Although the overall total numbers of ambulatory visits in the patients' records and questionnaires seemed to indicate good reliability, a more detailed individual investigation showed poor recall validity from the questionnaires, including a high percentage of unreported visits to the local health centre from both schools. Underreporting was commoner in the control school than in index school. Recall was best for the children who had no visits to a doctor. Use of antibiotics had a better recall than ambulatory visits in both schools. The study indicates that information on health services in questionnaires is not reliable, at least when occurrences in a period of one year or more are evaluated. The use of patient records as a reference of accuracy is also unreliable, unless all the health care services available to the people in the community are covered.

Key words: recall bias, validation, respiratory infections, children, patients' records, questionnaire

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INTRODUCTION

Self-administered questionnaires on exposure, morbidity or the use of health services are commonly used in epidemiological studies. The reliability of the information collected from questionnaires has been shown to be inaccurate, at least for some variables in many studies (1–8). The accuracy of recall has been studied by comparing data obtained from another source of information, usually medical records (1–7). The visits to a physician, inpatient hospital nights and medication have been used. The reliability of inpatient hospital nights seems to be better than that of data on ambulatory care (1, 2, 4). The validity of ambulatory care is good when the visits are made within a few weeks of the questionnaire, but it decreases to only fair within a year (2, 4, 6, 7). The results of the studies showed both underreporting and overreporting of ambulatory visits (2, 6, 7). The recall of admissions to a hospital was found to be excellent when self-reported admissions were compared with data in a national computerized record of all hospital admissions (6). The reliability of reported medication was good for long-lasting medication but worse for periodic medication such as antibiotics or analgesics (1, 4). When the recall of prescription medication was studied among patients listed in a pharmacy database and a comparison was made between information from questionnaires and that in the database, there was significant underreporting, whereas overreporting was not significant (9). Some studies have tested the reliability of recall by repeating the questions after a certain period of time. The repeatability was good for inpatient hospital nights, regular medication and chronic diseases, but worse for other diseases, ambulatory visits and periodic or irregular medication (1, 4).

We did a study on the effect of water damage in a school building on respiratory morbidity among children (10). Within the sphere of this pragmatic study design, we surveyed respiratory morbidity among the children before and after the renovation of the school. It was possible to assess the reliability of the questionnaire data on respiratory infections treated by a physician and, in addition, to consider the potential recall bias caused by the known exposure by comparing the information to patient records in the local health centre and, on the group level, to statistics from the Social Insurance Institution on visits of 7 to 12-year-olds to private physicians in this community.

MATERIALS AND METHODS

Subjects

The study population consisted of 397 children who were between the ages of 7 and 12 years and who attended a water-damaged school (index school) in a suburban community and a control group of 192 unexposed children of the same age in a control school situated 5 km from the index school (Table1). The health board of the community approved the study.

Table 1. Characteristics of the exposed and unexposed groups

	Index school	Control school
Number (Q1)	365	176
Boys / Girls	183/182	86/90
Number (Q2)	303	175
Boys / Girls	147/156	80/85
Age range (Q1), years	7–12	7–12
Average age (Sept. 1994)	8.24	8.73
Pets at home, %	47	51
Moisture damage at home, %	9.6	9.3
Visible mould at home	7 (0.2%)	4 (0.2%)
Daily exposure to tobacco, %	3.6	3.4
Children in families, mean	2.1	3.3
Residence in apartment building, %	30	0

Questionnaire

A questionnaire about respiratory diseases and symptoms was sent to all parents of the entire study population in the early autumn of 1995 (10). In all, 92% of both the exposed and unexposed groups responded, 365 from the index school and 175 from the control school. At the end of the spring semester of 1996 a second questionnaire was sent to the parents who responded to the first questionnaire. Altogether 83% (305) of the exposed group and 100% (175) of the parents of the control group responded. The first questionnaire covered morbidity during the school year 1994–1995, and the second covered the school year 1995–1996, after the renovation of the school building. The questionnaires covered respiratory symptoms, respiratory diseases (common cold, tonsillitis, otitis, sinuitis and bronchitis or pneumonia), ambulatory visits to a physician and prescribed antibiotics.

Medical records

A physician (RS) studied the medical records of the local health centre from the autumn of 1994 to the summer of 1996 for data on children whose parents had answered the first questionnaire in both schools. The diagnoses and the number of antibiotic courses for a respiratory disease of each child in both schools were recorded for the study. In Finland antibiotic medication can be obtained from a pharmacy only with a physician's prescription. The health centre of the community in our study was open at all times for acute illnesses.

We compared the data of the medical records of the local health centre to the individual replies concerning respiratory infections on the two questionnaires from the same time periods (1994–1995 and 1995–1996). Overreporting in this study means that more infections or medication are reported in the questionnaires than found in the medical records at the individual or school level. Underreporting is the opposite, fewer reported infections or less medication than found in medical records.

Private Sector

According to the statistics of the Social Insurance Institution on visits of 7' to 12-year-olds to private physicians in this community, there would have been altogether about 140 visits (115 in the index school and 25 in the control school in the first semester and 112 and 32 visits, respectively, in the second semester) to the private sector because of respiratory infections among the study groups. These visits were included in answers in the questionnaires, but not included to the patients' records in the health centre.

In our study, visits to hospitals were not taken into account because of an agreement between the nearest hospital of the community and all surrounding communities requiring that acute respiratory diseases be treated, at least primarily, in the local health centres.

RESULTS

Physicians' Visits

In the first questionnaire 460 visits to a physician because of respiratory infection were reported, 7% more than the number found in the patients' records. For the second questionnaire, the corresponding number was 309 visits, 14% more than the number recorded in the health centre. The numbers of reported visits and recorded visits to the health centre are shown in Table 2. There was a clear difference in reporting between the schools, underreporting being commoner in the control school (Table 2).

Comparison at the individual level revealed that the number of reported visits to a physician because of respiratory infection in the questionnaire equalled the number of recorded visits to a local health centre for 61% of the children in the first questionnaire and 66% of the children in the second questionnaire. Eighty percent of these children had no reported visits in the first questionnaire,

Table 2. Reported visits in the first and second questionnaires and recorded visits to the health centre according to school because of respiratory infection and the percentage of reported visits compared with recorded visits

First questionnaire	Children	Visits reported in questionnaire	Visits, recorded at the health centre	Reported visits /recorded visits (%)
Index school	365	362	313	116
Control school	176	98	115	85
All	541	460	428	107
Second questionnaire				
Index school	305	233	179	130
Control school	176	76	92	83
All	481	309	271	114

Table 3. *Number of visits to the health centre not reported in the first and second questionnaires and their percentage of the total number of recorded physicians' visits in the health center and the number and percentage of children who reported fewer visits than were found in the patients records (forgotten visits)*

First questionnaire	Children	Forgotten visits		Children with forgotten visits	
	N	N	%	N	%
Index school	365	139	44.4	85	23.3
Control school	176	60	52.2	27	15.3
All	541	199	46.5	112	20.7
Second questionnaire					
Index school	305	75	41.9	52	17.0
Control school	176	48	52.2	32	18.2
All	481	123	45.4	84	17.5

Table 4. Reported use of antibiotics in the first and second questionnaires, recorded use of antibiotics in patients' records of the health centre and the number and percentage of courses of antibiotics recorded by the health centre but not reported in the questionnaires (forgotten medication)

First questionnaire	Medication reported in questionnaire	Medication recorded in patients' records	Reported medication /recorded medication	Forgotten medication	
	N	N	(%)	N	(%)
Index school	241	158	153	53	33
Control school	73	66	111	24	36
All	314	224	140	77	34
Second questionnaire					
Index school	148	88	168	26	29
Control school	58	57	102	27	47
All	206	145	142	53	37

and the patients' records showed no visits to a physician in the health centre because of respiratory infection. The corresponding percentage in the second questionnaire was 87%.

According to the patients' records there were 199 visits among 112 (21%) children that were not reported in the first questionnaire and 123 among 84 (18%) in the second questionnaire. In other words, for the preceding year 46% (first questionnaire) and 45% (second questionnaire) of the visits to a health centre were not reported in the questionnaire (Table 3). The percentage of forgotten visits was higher for the control school in both questionnaires.

Use of Antibiotics

In both schools the use of antibiotic medication was overreported, as were visits to a physician when the data were compared only with information from patients' records in the local health centre. The antibiotics prescribed by private physicians were reported in the questionnaires, but they were not found in the patients' records of the health centre. Again the overreporting was higher in the index school than in the control school for both questionnaires (Table 4).

According to the individual comparison, 34% of the antibiotic medication recorded in patients' records was not reported in the first questionnaire of the same child, the corresponding figure being 36% for the second questionnaire. The percentages of those who reported less antibiotic medication than recorded in the patients' records were lower than the underreporting of ambulatory visits (Table 4). The percentage of forgotten antibiotics was higher in the control school for both questionnaires.

DISCUSSION

According to the questionnaire results of our study, the study groups were comparable with regard to age, passive smoking, previous allergic diseases, and ownership of pets (Table 1) (9). In an earlier report based on a logistic regressional analysis we showed children in the index school had a significantly increased risk of having to visit a physician (OR 1.82, 95% Cl 1.23–2.69) (9). The other predictors (sex, age, earlier allergic diseases, pets, passive smoking, moisture damage at home, number of siblings and residence in apartment building) did not prove to be significant. There was no indication of selection with regard to allergic heredity in any of the study groups (9). Accordingly there was no marked comparability bias. On the other hand, when the first questionnaire was sent, the water damage in the index school was obvious, and the parents were aware of it. This situation could have caused recall bias and could have weakened the comparability of the questionnaire concerning ambulatory visits and the use of antibiotics between the index school and the control school.

In earlier epidemiological studies concerning the effects of water damage on the respiratory health of residents or workers, no corresponding recall bias validation has been done. Strachan compared the prevalence of respiratory symptoms in relation to the subjective assessment of exposure and objective findings of the respiratory system (11). He concluded that the awareness of dampness or mould at home may be a determinant of parental reporting of symptoms.

Our study illustrates the difficulties in assessing the reliability

of information in the use of health care services. We found evidence of recall bias since the questionnaire recall of visits to a physician and the use of antibiotics was better among the exposed group than among the unexposed group. This difference could indicate a tendency towards better recall among the parents of children exposed to health risks in the water damaged school building than among parents of the children with no obvious health risk. However, this tendency towards recall bias did not affect the results in our earlier studies because a statistical difference in respiratory diseases was found for both the patients' records and the diseases reported in the questionnaires (10).

The estimation of overreporting in our study was not accurate because the information on individual visits in the private sector or hospitals was not available because of Finnish legislation on privacy. The limitation of estimating overreporting for ambulatory visits because of a lack of information from the private sector has been discussed earlier (2). With our study design visits reported in the questionnaires but not shown in patients' records represented either overreporting or visits to private physicians. If the estimated visits to the private sector because of respiratory infections would be included, there would have been 14% underreporting in the index school, 30% underreporting in the control school and altogether 19% overreporting on the first questionnaire instead of 7%. The corresponding percentages for the second questionnaire would have been 20% for the index school and 39% for the control school and 25% altogether instead of 14%. The same problem in our study applies to the use of antibiotics. The problem of possible overreporting exists for all countries with at least two parallel health service systems. In our study, recall based only on the total numbers of visits seemed to be satisfactory only because both under- and overreporting occurred, as the individual analyses showed.

The number of forgotten visits to the health centre was reliably obtained from patients' records. There was less underreporting of both ambulatory visits and the use of antibiotics in the index school than in the control school. This result may indicate a tendency towards better recall among the parents of exposed children. The best agreement, according to our study, occurred for those who reported no visits and who had no visits recorded in the patients' records.

Our findings agree with those of earlier studies in that information based only on questionnaires may not be reliable, at least when occurrences in a period of one year or more are studied (2, 4, 6, 7). Despite certain limitations, questionnaire studies are widely used because of their cost-effectiveness and relatively good repeatability. The use of medical records as a reference of accuracy is also unreliable when overreporting is estimated if all the patients' records, including those in the private sector, are not available.

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