Incidence of GP-diagnosed respiratory tract infections according to age, gender and high-risk co-morbidity: the Second Dutch National Survey of General Practice

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Background. Figures on GP-diagnosed respiratory tract infections (RTI) are outdated because of demographic changes and increase in co-morbid conditions, respiratory vaccination programmes and change in illness behaviour.

Objective. To determine the incidence of RTI in patients presenting to the GP according to age, gender and common high-risk co-morbidity in primary care.

Methods. In the Second Dutch National Survey of General Practice 90 computerized general practices with 358,008 patients recorded all consecutive patient contact by use of the ICPC coding system in a year. Incidences were calculated using the mid-year population in the denominator and RTI episodes as the nominator.

Results. In all, 4.2% of the patient population were diagnosed with RTI with an incidence rate of 144 per 1000 person-years. Upper RTI were more common in children of 0–4 years than in other year-cohorts [392 versus 80 per 1000; relative risk 4.9, 95% confidence interval (95% CI) 4.8–5.0]. An U-shape association was observed between age and lower RTI (78 and 70 per 1000 in children and persons aged 75 years or over, respectively, versus 23 per 1000 in other age-categories). Females had slightly higher incidence rates of URTI (relative risk 1.4, 95% CI 1.35–1.45) and similar rates for LRTI. Patients with chronic medical conditions as pulmonary and cardiac disease, and diabetes.

Discussion. A small proportion of the patient population present themselves to the GP with a RTI. RTI are more common among children, elderly persons and patients with pulmonary and cardiac disease, and diabetes of the ICPC coding system.

Keywords. Elderly, epidemiology, general practice, respiratory tract infection.

Introduction

Acute respiratory tract infections (RTI) have long been recognized as the major cause of morbidity and they rank among the most frequent causes of death among the elderly and very young. Accordingly, epidemiological studies on the occurrence of such illnesses in the community have been abundant. Milestone studies include among others the Hagerstown morbidity studies in 1926 and Tecumseh study by Monto et al. in 1971.¹ ² The majority of studies were set in communities or families. However, as shown by the authors, most persons are affected by infections without any complications from it and recover without medical treatment. Only, persons who experience more severe, prolonged, recurrent or complicated illnesses need to come to the attention of the GP.
Among children, upper RTI (URTI) such as rhinosinusitis or acute otitis media are common reasons for encounter in the medical practice. Since most such episodes are of viral origin, notably during epidemics, empiric treatment of such illnesses is usually symptomatic and antibiotics have not been demonstrated to be beneficial to most patients. \(^3\) \(^4\) Elderly patients who are affected are predominantly affected by lower RTI-like acute bronchitis, exacerbations of pre-existent chronic obstructive pulmonary disease (COPD) or, less often, pneumonia. Although Dutch antibiotic prescription rates are relatively low compared with other European countries and the USA, even in The Netherlands up to 50% of antibiotics prescribed for RTI can be assumed to be not indicated by national guidelines. \(^6\)

Careful differential diagnosis of these entities is important for evidence-based treatment by antibiotics.

Over the last decades, demographic changes such as ageing and increase in co-morbid conditions, the introduction of respiratory vaccination programs as well as changes in illness behaviour have made the reports on the occurrence of GP-diagnosed acute RTI in primary care out of date for most Western countries including The Netherlands. \(^7\) Prevention of at least part of RTI by vaccination against influenza virus or *Streptococcus pneumoniae*, for example, has been an option for decades now. It can be expected that new and improved respiratory vaccines will become available in the next few years. Since most of the burden by these respiratory agents are presented to primary care, knowledge is required on the occurrence of GP-diagnosed URTI and LRTI among different groups of patients presenting to the GP that are relatively easy to identify. The Second Dutch National Survey of General Practice provided the opportunity to determine the incidence of GP-diagnosed upper and lower (recurrent) RTI according to age, gender and common high-risk co-morbidity nationwide. \(^8\)

**Methods**

We analysed data for The Netherlands as part of the Second Dutch National Survey of General Practice. In the survey all 90 computerized general practices with 358 008 patients recorded consecutive patient contacts in a 12-month period between May 2000 and April 2002. \(^9\) Selection of practices was based on three stratification criteria as follows: region, level of urbanization and practice type. The participating GPs \((n = 195)\) are representative for all Dutch GPs \((n = 7217)\) since there were no statistically significant differences observed for age, gender, region of residence and urbanization as well as in practice style. GPs were trained during an intensive course on coding practices and problems by the LINH (Dutch Information Network GPs). Ongoing feedback on coding problems was supplied by email. In a validation study, more than 70% of a selected group of RTI diagnoses was accurately recorded in the GP information system (GPIS).

GPs recorded new episodes of illness according to the International Classification of Primary Care (ICPC) and medical drug prescriptions according to the Anatomical Therapeutically Classification (ATC) coding system. \(^9\) Presence of common high-risk co-morbid conditions was determined on the basis of diagnoses, medical drug prescriptions and tags integrated in an accurate search algorithm in the GPIS. \(^9\)

We defined URTI GP-diagnoses as the occurrence of acute otitis media (ICPC code H71), acute rhinitis (R74), acute sinusitis (R75), acute tonsillitis (R76) and acute laryngitis (R77). Lower RTI (LRTI) GP-diagnoses were defined as acute bronchitis (R78), influenza (R80), pneumonia (R81) or exacerbations of asthma or COPD. Asthma/COPD exacerbations were recorded by the use of R78 for those with asthma or COPD. In accordance with other reports we also examined the total burden of signs and symptoms of URTI presented to the GP (earache [H01], ear complaints [H02], sneezing [R07], other complaints of nose [R08], symptoms of sinuses [R09], symptoms of throat [R21] and symptoms of tonsils [R22]) and LRTI (dyspnoea [R02], wheezing [R03], other respiratory problems [R04], coughing [R05] and abnormal sputum [R25]). Medical drug prescriptions and referrals were registered in a direct link to episodes: prescriptions according to the ATC coding system and referrals according to medical specialty.

We calculated incidences per 1000 person-years using the mid-year population in the denominator and the occurrence of a new or first-time RTI episode as the nominator. We further estimated relative risks and corresponding 95% confidence intervals (95% CIs) by use of EPISHEET (K. Rothman. Spreadsheets for the analysis of epidemiologic data, 2002).

**Results**

Median age of the patients presenting to the GP with at least one episode RTI was 31 years (range 0–105 years) and 44% were male. In all, 15 106 patients (42 per 1000 of total patient population) had three episodes of GP-diagnosed RTI per patient on average with 51 538 GP contacts for RTI in 1 year. The overall incidence of GP-diagnoses of RTI was 144 per 1000 person-years due to URTI and 44 per 1000 person-years due to LRTI. If signs and symptoms were added to the total incidence figures, 77 069 RTI visits were made in 17 254 patients with an overall incidence of 215 per 1000 person-years.

The top-five highest incidences of URTI diagnoses presented to the GP were acute rhinitis, acute sinusitis,
acute bronchitis, acute otitis media and acute tonsillitis (51, 23, 20, 16 and 10 per 1000, respectively) (Table 1). In all, incidence rates of URTI were significantly higher among children of 0–4 years (392 per 1000 child-years) than in other year-cohorts (80 per 1000; relative risk 4.9, 95% CI 4.8–5.0) (Fig. 1). Incidence rates of all URTI were higher for females than for males (103 versus 74 per 1000; relative risk 1.4, 95% CI 1.35–1.45), except for acute otitis media (15 versus 16 per 1000; relative risk 0.9, 95% CI 0.85–0.95). URTI were more presented to the GP among patients with chronic lung disease than in the total patient population (209 versus 144 per 1000; relative risk 1.5, 95% CI 1.3–1.7).

An U-shape association was observed between age and LRTI with highest incidences among children and the elderly (78 and 70 per 1000 in children and persons aged 75 years or over versus 23 per 1000 in other age categories; relative risks 3.4, 95% CI 3.2–3.5 and 3.0, 95% CI 2.8–3.1, respectively). No differences were observed between females and males. LRTI were significantly more common among patients with lung diseases, diabetes mellitus and cardiovascular diseases than in the total patient population (156, 67, 70 versus 30 per 1000, respectively; relative risks 5.2, 2.2 and 2.2, all 95% CIs excluded a relative risk of 1). In 50% of the cases an antibiotic was prescribed and 4% led to a referral to the specialist.

Discussion

This contemporary study among a large representative patient population in primary care showed that only a small part of the patient population (4%) were diagnosed with a RTI by the GP with a high average number of three episodes per year. In addition to these visits, GP’s are visited for minor RTI illness as ear complaints, cough, sinus and throat complaints and for medical control of health status and repeat medication in case of patients with chronic respiratory disease. Totally, ~15% of all episodes in general practice relate to RTI illness.
Young children were at highest risk to present with an URTI, whereas both young children and the elderly were at increased risk for presenting with a LRTI. Patients with chronic medical conditions run more than two times higher risks for LRTI diagnoses, notably those with chronic lung disease. As we have recently shown, both groups visit the GP much more often than adults, but in proportion they do not receive more antibiotics. These patient populations should therefore be prioritized in therapeutic and preventive strategies as well as in patient education programmes.

The presented data refer to physician-diagnosed RTI, hence incidence rates of community-acquired RTI might be many-fold higher than observed in our study and differentially distributed between groups of patients because of self-selection. Fleming and colleagues conducted a general practice-based survey in the UK and observed similar figures and trends in increased GP-diagnosed RTI occurrence among children and elderly persons. However, in contrast to our finding, 20% of the population consulted the GP for RTI. The difference might be due to difference in coding practices or self-presenting behaviour. In the present study, only diagnostic codes (in contrast to symptom or sign codes) were used for the incidence calculations. As we have shown in a sensitivity analysis, the total incidence increases when all relevant signs and symptoms are added to the GP-diagnosed RTI list. Obviously, a considerable larger part of the population consults a GP for RTI signs and symptoms. Importantly, we decided to include severe exacerbations of chronic pulmonary disease into the definition of LRTI, since reports have shown that the aetiology in many cases is viral or bacterial. Relatively to the other LRTI diagnoses, only few persons suffered from such an exacerbation and results were not substantially influenced by including these diagnoses.

For the UK and The Netherlands a lowered incidence of GP-diagnoses of RTI have been shown for children as well as for adults in the last decade, while it is unclear whether this decrease has been caused by a reduction of respiratory illness in the population or by a reduced inclination of patients to present respiratory illness to the GP. Till now, however, information on RTI among patients with co-morbid conditions was not available whereas a large proportion of general practice resources is consumed by such patient groups at high risk for RTI. In The Netherlands with ~16 million inhabitants, for example, 800 000 (5.0%) persons have chronic lung disease, 500 000 (3.0%) diabetes mellitus and 400 000 (2.5%) cardiovascular disease. A limitation of our study is that we had too low numbers of patients with immune compromised conditions such as cancer that have been described as high-risk groups for development of RTI and complications thereof to demonstrate reliable patterns of RTI episodes. The results of our study emphasize the importance of knowledge on diagnosis and prognosis of RTI and the potential impact of preventive and therapeutic measures among these high-risk groups in general practice.

Declaration

Funding: University Medical Center Utrecht.
Conflict of interest: none

References