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Encounters for common illnesses in general practice increased in obese patients

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\textbf{Background.} Obese patients are known to have more chronic medical conditions.

\textbf{Objective.} To compare the frequency of encounter for episodes of the 10 most common illnesses in general practice between obese and non-overweight patients.

\textbf{Methods.} Data were derived from the Continuous Morbidity Registration, containing data from four general practices in and around Nijmegen (The Netherlands). In this research and registration network, a matched cohort study was performed. Each obese patient (body mass index $\geq 30$ kg/m$^2$), aged 20–75 years, was matched for age, gender, socio-economic status and general practice, to approximately two patients without the diagnosis ‘overweight’ or ‘obesity’. Over a period of 5 years (January 1, 2000 to December 31, 2004), the frequency of encounter for episodes of the 10 most common illnesses was compared, taking chronic medical conditions into account.

\textbf{Results.} At the start, 550 patients with obesity could be identified and were matched to 954 controls. Obese patients presented more common illnesses than non-overweight patients (incidence rate ratio 1.28, 95% confidence interval 1.12–1.47), in particular common cold (without fever), myalgia of the upper girdle, dermatophytosis and bruise (contusion, haematoma).

\textbf{Conclusion.} Obese patients present more common illnesses to their GP, such as common cold (without fever), myalgia of the upper girdle, dermatophytosis and bruise (contusion, haematoma). This is in addition to their higher co-morbidity of chronic medical conditions.

\textbf{Keywords.} Common illness, encounter, general practice, obesity.

\section*{Introduction}

In industrialized countries, obesity is one of the greatest public health challenges of the 21st century. By 2010, one-fifth of Europe’s population will be obese. So far, obesity accounts already for up to 6% of direct health costs in adults and more than 12% of indirect costs (shortened lives, reduced productivity and lowered incomes). With the growing prevalence of obesity, these costs will rise.\textsuperscript{1}

At the age of 40 years, obese patients have a decreased life expectancy of about 7 years.\textsuperscript{2} Obesity even accounts for 5% of all annual deaths in the European Union.\textsuperscript{3} Excess weight is associated with number of other chronic medical conditions: hypertension, diabetes mellitus type 2 (DM 2), hyperlipidemia, heart diseases and certain types of cancer.\textsuperscript{4,5} Some share a common pathophysiology, but irrespective of the causal relation, they have an impact on functioning and health status.

A lower subjective health status and health-related quality of life have been reported in overweight and obese patients.\textsuperscript{6,7} This may (partly) explain why obese patients encounter the GP more often than non-overweight patients.\textsuperscript{6,8–10}
We analysed if obese patients presented more episodes of the 10 most common illnesses, not specifically obesity related, to the GP than non-overweight patients. Since obesity is linked to gender, age and social economic status (SES), which on their turn influence the use of health care, we wondered if there was an interaction within these variables.

**Patients and methods**

This study is a matched cohort analysis, comparing patients with obesity to non-overweight patients for the number of episodes of the 10 most common illnesses presented to the GP during 5 years (January 1, 2000 to December 31, 2004). Obese and control patients were recruited from the Continuous Morbidity Registration (CMR) in and around Nijmegen, The Netherlands.

The CMR is a general practice research and registration network, which has operated since 1971. This database contains all morbidity episodes of the patients of four general practices in and around Nijmegen (10 GPs). From the start, every episode is classified and coded according to the ‘E-list’, the only general practice morbidity classification available at that time. To guarantee longitudinal research, the classification system has been maintained despite new developments. In time, diagnostic criteria have been introduced from the International Classification of Health Problems for Primary Care, and other sources like guidelines.

The episodes are entered in the database linked to a patient-identity code, unique for every individual patient in the practices. The patient-identity code provides demographic characteristics: gender, age and SES. SES is grouped into low (unskilled and skilled manual workers), middle (lower employees) or upper class (higher employees), according to patient’s occupation.

The data collection follows the principles of the Dutch health care system, in which everyone is registered with a GP and receives all medical care through that GP—including that of medical specialists after referral. Specialists report their diagnoses back to the GP, which are also included in the CMR database. In case an initial diagnosis has been changed, on the basis of observation, additional testing and/or referral, the corrected diagnosis is inserted in the database instead of the initial one.

In this study, all patients aged 20–75 years and registered with the diagnosis ‘obesity’ in the year 1999 were included. Obesity has been defined as a BMI $\geq$30 kg/m$^2$. Each case was matched to approximately two controls from the practice lists who had not been diagnosed as ‘obese’ or ‘overweight’ (BMI $\geq$25 but $<30$ kg/m$^2$) between January 1, 1995, and December 31, 1999. Matching was performed for gender, age ($\pm$4 years), SES and general practice of listing. We accepted changes in BMI class during follow-up in both the obese and control group.

Codes for chronic health problems are yearly automatically re-entered in the CMR database or removed/changed by GPs if not present any more during an (non-related) encounter. For this reason, we checked the diagnosis ‘obesity’ for the probability of misclassification in a random sample of the recruited patients ($n = 227$). In the medical records, we looked for recorded body weight and height to calculate BMI and categorized patients in ‘overweight’ and ‘obesity’. This was based on the recorded measurement closest to January 1, 2000.

**Statistical methods**

With SPSS (version 12.0.1), we tested possible differences within the main characteristics of the obese and overall CMR population by chi-square.

With the GENMOD procedure of SAS (version 9.1.3), we calculated incidence rate ratios (IRRs) for the 10 most frequently presented common illnesses within the CMR database. These common illnesses comprised 32% of all illness episodes presented in general practice by these age groups. They were in descending order: common cold (no fever), nervous functional complaints (complaints with no somatic basis, but a psychosocial or functional one), myalgia upper girdle, dermatitis other (e.g. solar dermatitis, dyshidrosis, rhagades), dermatophytosis (candida infection, tenia pedis, pityriasis versicolor, dermatophytosis other), cerumen (wax in ear canal), urinary tract infection, bruise (contusion, haematoma), muscular skeletal symptoms other (e.g. pelvic tilt of unknown origin, contractures of unknown origin, epiphysiolysis, symphysiolysis, exostoses, non-structural abnormalities of the spine) and lumbago no radiating symptoms. The IRR has been calculated by the number of new cases of a common illness per obese during follow-up divided by the number of new cases of a common illness per control during follow-up.

We assumed a negative binomial distribution. Confidence intervals (CIs) were corrected for over- and under-dispersion. Analyses were adjusted for matched factors (gender, age, SES, general practice) and co-morbidity of chronic medical conditions. The latter was done as there is a higher possibility to present a common illness during follow-up encounters for chronic medical conditions. These chronic medical conditions adjusted for included asthma, DM 2, heart failure, hypertension and chronic bronchitis (chronic obstructive pulmonary disease).

The analyses for the combined 10 most common illnesses presented were based on their cumulative episodes and were done separately for gender, age and SES group. Tests for interaction were performed to trace differences in IRRs within these groups.
Results

Five hundred fifty patients with the diagnosis ‘obesity’ were identified on January 1, 2000. They could be matched to 954 non-overweight patients. The mean age was 50.8 years in the obese (range 20–75 years) and 50.0 years in the control group (range 20–77 years).

Of the 1504 patients [mean follow-up 4.6 years (SD 1.1)], 1286 (86%) could be followed for 5 years. Reasons for follow-up of less than 5 years were death [21 (4%) in the obese versus 31 (3%) in the control group] and patients moving out of the practice region [49 (9%) versus 126 (13%)].

In 90% of the random sample in the obese group (n = 204), the BMI could be calculated from the available data in medical records. This sample comprised eight classified patients (4%), who were according to our calculations in fact overweight. The mean BMI was 34.8 kg/m² (SD 5.1, range 26.2–67.8). In 38 patients (7%) of the total obese group, the diagnosis had been reclassified as ‘overweight’ during follow-up, while 38 patients (4%) of the total control group were recoded as ‘overweight’ and 19 (2%) as ‘obese’.

Table 1 presents the main characteristics of the obese and control group in comparison to the total CMR population. The obese patients were more likely to be female, aged 40 years and older, and belong to the low SES class (P = 0.00, P = 0.01 and P = 0.00, respectively).

Table 1 presents the main characteristics of the obese and control group compared to the total CMR population. Obese patients presented more common colds (without fever), myalgia of the upper girdle, dermatophytosis and bruises (contusion, haematoma) than the controls. Taking the 10 most common illnesses all together, there was a 28% higher presentation by obese patients (95% CI 1.12–1.47).

Table 3 shows the frequency of encounter for the combined 10 most common illnesses presented, separately for gender, age and SES group. There was no difference within gender, age and SES group (P = 0.39, P = 0.11 and P = 0.85, respectively).

Discussion

Obese patients presented 28% more of the 10 most common illnesses to their GP, in particular common cold (without fever), myalgia of the upper girdle, dermatophytosis and bruise (contusion, haematoma). There was no difference within gender, age and SES group.

Comparison of literature

Our results are confirmed by literature. Frost and Lyons also found an increase of encounter by obese patients of 30% (P = 0.005), after adjustment for the number of co-morbidities among others. Van Dijk et al. additionally reported the most profound diseases by organ systems this accounted for, of which musculoskeletal and skin problems were common illnesses. They also reported higher prescription rates for dermatologicals and drugs for musculoskeletal and respiratory system (e.g. antibiotics). Another study of the Counterweight Project Team draws equal conclusions.

Our study, however, focused specifically on the most presented common illnesses, which has never been described before. Even in children, these trends are also observed.

The underlying relation between obesity and the common illnesses found in this study remains obscure. In literature, a link between obesity and immune function alterations has been reported. However, in this study obese patients only presented more common colds (without fever), but not more other infectious diseases as urinary tract infections. Therefore, this pathophysiological phenomenon does not totally explain these results. Also the higher presentation of musculoskeletal pain of the neck and shoulder remains unclear, since it is questioned if obese patients present more pain in general. Perhaps only the lower suboptimal subjective health objectified in obese patients plays a role in the increased GP consultation, since this consequently results in obtaining more diagnoses for one or other (common) illness. But whether weight reduction in obese patients leads to better subjective health remains unknown.

Methodological reflections

This study was performed in a longitudinally constructed database, the CMR, which facilitates
longitudinal research of individual patients’ medical history. Within the CMR, GPs organize regular feedback meetings to optimize inter-GP agreement in coding morbidity. The validity of long-term CMR morbidity recording has been satisfactory. The check for misclassification of the diagnosis ‘obesity’, in which little mistakes occurred. The prevalence of obesity within the CMR (6.5%) was equal to that reported by other data from in and around Nijmegen. In 1977, within the CMR general practices, the BMI of 80% of all patients aged 20–50 years had been routinely measured for research purposes. In 1994, a follow-up study took place, in which BMI again was measured. Normally, body weight is measured on request of patient or GP and routinely in known high-vascular risk groups. So it cannot totally be ruled out that some controls wrongfully have no ‘overweight’ or ‘obesity’ diagnose. Case finding in daily practice is initially performed ‘at sight’ and then objectified. This likely skews the overweight distribution towards obesity. If a GP measures body weight, a patient is more likely to be too thin or too fat. Also in 1977, higher cutoff points for overweight were used (BMI > 26 kg/m² for women and BMI > 27 kg/m² for men); therefore, we did not include patients with overweight in our analyses.

Some patients who were initially obese eventually became overweight during follow-up, and those non-obese were diagnosed later on as overweight or obese. Exclusion of ‘borderline’ obese or weight cycling patients might influence results, since the effect on the consultation for common illnesses is unknown. As shown in our data, it concerns a minority of patients. Moreover, it is more representable for common practice to include these patients.

In the control group though, more people left the general practice and this might have overestimated the reported frequency, since a shorter follow-up time subsequently might have decreased the number of the presented episodes of illnesses.

**Workload GP and prevention**

In the Netherlands, 10% of the adult population was obese between 2000 and 2003. From this data, we assume that an average Dutch GP took care of 248

### TABLE 2

<table>
<thead>
<tr>
<th>Common illnesses</th>
<th>n&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Corrected&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Corrected&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Obese</td>
<td>Controls</td>
<td>IRR</td>
</tr>
<tr>
<td>1. Common cold (no fever)</td>
<td>352</td>
<td>396</td>
<td>1.51&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>2. Nervous functional complaints</td>
<td>160</td>
<td>255</td>
<td>1.07</td>
</tr>
<tr>
<td>3. Myalgia upper girdle</td>
<td>236</td>
<td>257</td>
<td>1.45&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>4. Dermatitis other&lt;sup&gt;e&lt;/sup&gt;</td>
<td>207</td>
<td>264</td>
<td>1.28&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>5. Dermatophytosis&lt;sup&gt;f&lt;/sup&gt;</td>
<td>98</td>
<td>83</td>
<td>1.75&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>6. Cerumen (wax in ear canal)</td>
<td>156</td>
<td>254</td>
<td>1.06</td>
</tr>
<tr>
<td>7. Urinary tract infection</td>
<td>225</td>
<td>235</td>
<td>1.33</td>
</tr>
<tr>
<td>8. Bruise (contusion, haematoma)</td>
<td>151</td>
<td>175</td>
<td>1.47&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>9. Muscular skeletal symptoms other&lt;sup&gt;g&lt;/sup&gt;</td>
<td>129</td>
<td>187</td>
<td>1.17</td>
</tr>
<tr>
<td>10. Lumbago no radiating symptoms</td>
<td>126</td>
<td>178</td>
<td>1.21</td>
</tr>
<tr>
<td>Cumulative</td>
<td>1840</td>
<td>2284</td>
<td>1.31&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup>Number of episodes.

<sup>b</sup>Corrected for gender, age, SES and general practice.

<sup>c</sup>Corrected for gender, age, SES, general practice and the presence of chronic medical conditions (asthma bronchial, DM 2, heart failure, hypertension, chronic bronchitis).

<sup>d</sup>Significant.

<sup>e</sup>For example: solar dermatitis, dyshydrosis, rhagades.

<sup>f</sup>For example: candida infection, tenia pedis, pityriasis versicolor, dermatophytosis other.

<sup>g</sup>For example: pelvic tilt e cansa ignota (e.c.i.), contractures c.c.i., epiphysiolysis, syphymolysis, exostoses, non-structural abnormalities of the spine.

### TABLE 3

<table>
<thead>
<tr>
<th>Common illnesses</th>
<th>n&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Corrected&lt;sup&gt;b&lt;/sup&gt;</th>
<th>P-value&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Obese</td>
<td>Controls</td>
<td>IRR</td>
</tr>
<tr>
<td>Gender Male</td>
<td>500</td>
<td>674</td>
<td>1.19</td>
</tr>
<tr>
<td>Female 1340</td>
<td>1610</td>
<td>1.34&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1.15–1.56</td>
</tr>
<tr>
<td>Age (years) 20–39</td>
<td>430</td>
<td>563</td>
<td>1.45&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>40–64 1070</td>
<td>1195</td>
<td>1.43&lt;sup&gt;d&lt;/sup&gt;</td>
<td>1.18–1.73</td>
</tr>
<tr>
<td>65+ 340 526</td>
<td>1.00</td>
<td>0.77–1.30</td>
<td></td>
</tr>
<tr>
<td>SES Low 1156</td>
<td>1340</td>
<td>1.21</td>
<td>1.00–1.46</td>
</tr>
<tr>
<td>Middle 614 818</td>
<td>1.37&lt;sup&gt;d&lt;/sup&gt;</td>
<td>1.13–1.67</td>
<td></td>
</tr>
<tr>
<td>Upper 70 126</td>
<td>1.43</td>
<td>0.84–2.45</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Number of episodes.

<sup>b</sup>Test for interaction.

<sup>c</sup>Significant.
obese patients. In that case, our results suggest that a GP had an increased workload of 33 episodes every year due to common illnesses presented by obese patients, besides the routine encounters for obesity-related co-morbidity of chronic conditions, such as hypertension and DM 2. The increase in workload of the GP has also been stated by others.8–10

According to our findings, GPs have more opportunities to weigh obese patients regularly and intervene. But GPs believe that obesity management is primarily the responsibility of the patient.30 Nevertheless, obesity eventually affects their own workload, and therefore prevention and timely treatment may have benefits for the GPs as well as the patients. Regular weight measurements might give a warning signal.

Conclusion
Obese patients present more common illnesses to their GP, in particular common cold (without fever), myalgia of the upper girdle, dermatophytosis and bruise (contusion, haematoma). This is in addition to the higher prevalence of chronic medical conditions related to obesity.

Acknowledgements

Declaration
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