GP documentation of obesity: what does it achieve?

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SUMMARY

Background. *Obesity is a major and increasing health problem in the United Kingdom, and, until recently, the government health promotion package for general practice reimbursed general practitioners for documenting obesity. Despite poor evidence for effectiveness of interventions in primary care, documentation of obesity could possibly improve patient awareness and knowledge, or provide public health information.*

Aim. *To assess patient perception of obesity and its health risk, and the accuracy of estimating obesity using patient information.*

Method. *Subjects were consecutive attenders to a general practitioner (GP) at a single urban practice in the South and West Region. Outcome measures were 'measured' body mass index (BMI) calculated from measured weight and height, 'estimated' BMI using patient information, and patient perception of obesity and the health risks of obesity.*

Results. *There is good correlation between 'estimated' and 'measured' BMI (intraclass correlation 0.91). Estimated BMI is lower than measured BMI (mean 0.77 lower), and the difference increases with age and level of BMI: for BMIs of < 20, 20–24.99, 25–29.99, and ≥ 30 the mean differences (estimated–measured) were –0.06, –0.46, –0.98 and –1.72 respectively. Estimated obesity (BMI >30) is reasonably sensitive (70%), specific (99%), and predictive (93% positive predictive value) of measured obesity (kappa 0.78). All obese subjects are aware that they are overweight, and most of them (78%, 95% confidence interval 66–88%) are aware that their weight is a health risk.*

Conclusion. *Obese patients attending GPs' surgeries are likely to know if they are overweight, or could easily estimate from their knowledge of height and weight that they were overweight with reasonable accuracy. Obese subjects also know that their weight carries health risks. Thus, measurement of obesity in the general population is not likely to improve risk assessment or patient knowledge significantly. Without evidence for effective intervention or improved decision-making in primary care, reimbursement guidelines linked to the documentation of obesity in the population are probably an inefficient use of resources.*

Keywords: general practitioner; obesity; body mass index.

Introduction

OBESITY is one of the most important and potentially preventable risk factors in primary care. Approximately 13% of 40- to 59-year-old men are obese (BMI >30), and the prevalence has doubled between 1980 and 1991.[1] Obesity is associated with increased total mortality, considerable morbidity, and is one of the best predictors for the development of hypertension and diabetes.[2] The importance of obesity has been recognized with the United Kingdom (UK) government setting population measurement targets for body mass index (BMI) in the recent contract for general practitioners (GPs).[3] However, for remuneration to be appropriate and efficient, some important assumptions should hold:

- that measurement and recording is necessary to allow accurate estimation of BMI in all subjects,
- that recording of obesity leads to effective treatment,[4] improved risk assessment, improved knowledge, or altered perceptions, and
- that more efficient interventions are not available.

Regarding efficacy of intervention, the management of obesity is still a source of considerable controversy.[5,6] The United States (US) National Task Force recently reviewed studies (from predominantly specialized settings) of low-calorie or very low-calorie diets, which demonstrated limited benefit in the longer term.[7] The benefit of such diets is greater with behavioural counselling and/or physical activity.[7] Similar benefit over the short term has been shown in a recent systematic review,[8] although the same issues arise regarding long-term benefit and lack of evidence from general practice. Group settings with committed volunteers under expert guidance can also be effective according to case series description,[9] although trial evidence for this approach is limited. In subjects at high risk of cardiovascular disease, individual studies and meta-analyses of studies in specialized settings demonstrate the likely short-term clinical benefits of weight loss[10-13] and modest longer-term benefit with intensive follow-up.[14] Given the doubts about the treatment of obesity even in optimal settings, and the absence of evidence and the time and training constraints in primary care, it is not clear whether current intervention in primary care is effective.

Despite doubts about intervention, measurement could perform other functions. It could provide public health information, improve risk assessment, or empower patients by improving awareness of obesity and its health risks. Is measurement necessary for public health information or risk assessment? There are limited data from atypical primary care populations and other settings that show that subjects may know their height and weight to allow a reasonable estimate of BMI.[15-17] Are patients aware of being overweight and of the risk to health? It has been argued that obesity is a visible risk factor that does not require measurement by health professionals, since subjects may know if they are overweight.[18] There is no evidence from routine primary care settings about awareness of obesity, and there is only limited evidence about perceived risks and reported height and weight in the unusual setting of the OXCHECK and Family Heart Studies.[19,20] The unusual setting of these studies, the non-response to such health check invitations, and very limited evidence about perception of obesity[19,20] suggests that more data are required from routine settings.

Thus, this study addresses three important issues, which inform the utility of measurement of obesity in primary care:

1. Is it necessary to measure height and weight or are estimates of BMI using patients' own information about height and weight accurate?

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2. Are subjects aware of being overweight?
3. Do subjects think that they are at risk from obesity?

Method

Subjects, setting, and context

The 755 subjects aged 14–90 years were consecutive attenders to one GP at a single urban non-fundholding training practice in the South and West Region. Subjects were recruited at the time when GPs had been given targets for documenting the measurement of BMI under the current contract for general practice.[3] This work was performed before the targets were reached so that previous documentation of obesity by health professionals would have a minimal effect on the results: a minority of the subjects (20%) had their weight and height documented in the notes at the time of recruitment to the study.

Subject characteristics

The study sample approximated national figures for social class (non-manual 43%) and sex (male 50%), and were similar in age (38% aged 45 and over; comparable OPCS national figures 49%).

Measurement

After the presenting problem had been dealt with, subjects were asked to estimate their height and weight. Answers were recorded to the nearest centimetre and kilogram — after conversion if appropriate. Subjects were weighed to the nearest kilogram, without shoes and in light clothing, using Seca scales calibrated to the nearest kilogram. The scale's calibration was checked twice during the study. Height was measured to the nearest centimetre using a fixed wall stadiometer. The last 500 subjects were also asked 'Do you think you are overweight, underweight or normal weight?', and 'Do you think your weight is any risk to your health, or not?'

Data entry and analysis

Data were entered using SPSS and analysed using SPSS and Stata for Windows. Agreement for continuous data was assessed using scatter plots, intraclass correlation, and the Bland Altman plot. Chi-square tests of association were used to compare nominal and ordinal variables. Cut-offs were used in the continuous data to generate 2 × 2 tables comparing BMI estimated from reported weight and height and measured BMI. Agreement in these tables was estimated by the kappa coefficient, and the sensitivity, specificity, and positive predictive value of the estimated BMI was calculated. The predictive value of socio-demographic variables for the difference between measured and estimated BMI, and for patients' perceptions of obesity, was assessed by the likelihood ratio test (LRT) using logistic regression, after controlling for other predictive or confounding variables.

Sample size

The author assumed that the obese (BMI >30) were approximately 13% of the population[1] and that estimated BMI might have a sensitivity of 75% in predicting measured BMI in obese individuals. For sensitivity to be estimated with 95% confidence intervals of ± 10%, a sample size of 700 was needed for the comparison of estimated and measured BMI (CIA, BMA Publications).

Reliability

The reliability of patient responses was assessed by telephoning 20 consecutive patients two weeks after their initial consultation, and repeating the questions blind to the original responses: estimated BMI calculated from reported height and weight showed excellent agreement comparing the two responses (intraclass correlation = 0.99) as did perception of obesity (20/20: 100% agreement; Kappa = 1.0) and perception of the health risk of obesity (18/20: 90% agreement; Kappa = 0.74).

Results

Agreement between estimated and measured body mass index

Figure 1 shows the scatter plot of BMI estimated using subjects' reported weight and height, and BMI calculated from the height and weight measurements. The correlation between 'estimated' and 'measured' BMI is good (intraclass correlation coefficient 0.91). Estimated height was higher than measured height (1.2 cm; 95% CI 1.0–1.4 cm; standard deviation of the difference 2.9 cm), and estimated weight was lower than measured weight (–1.16 kg; 95% CI –0.93 to –1.40; standard deviation of the difference 3.26 kg). Thus, estimated BMI was on average 0.77 lower than measured BMI (95% CI –0.67 to –0.88; standard deviation of the difference 1.41). This is more pronounced at higher levels of BMI, as shown by the negative slope of the regression line in the Bland Altman plot (Figure 2), which cannot

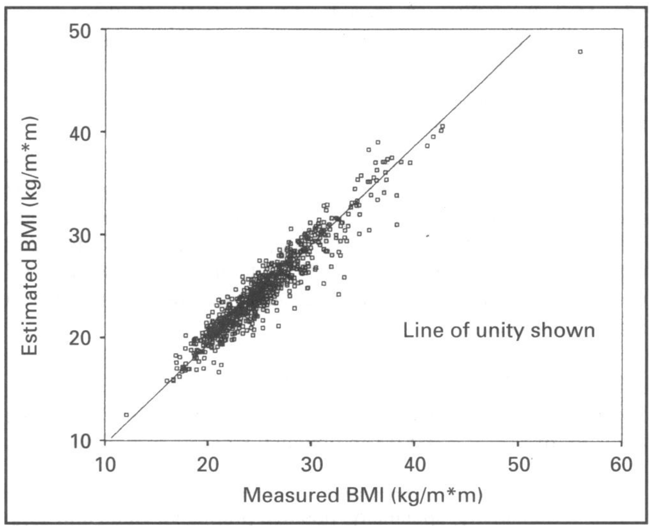

Figure 1. Scatter plot. Estimated BMI: using patient reported data. Measured BMI: using staiometer and scales.

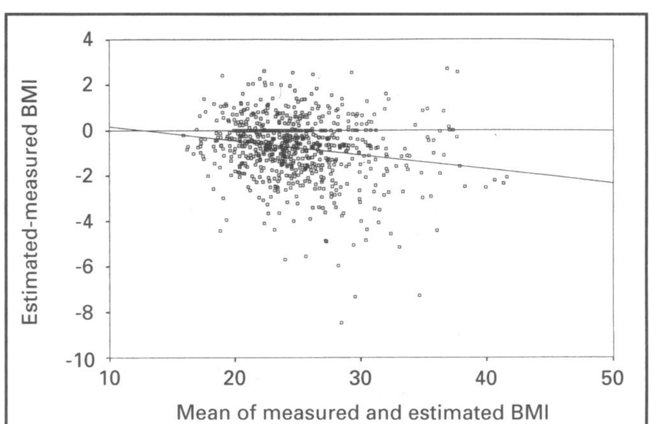

Figure 2. Bland Altman plot. Regression line y = –0.063 + 0.80. Two outliers (BMI >50, <15) excluded due to significant effect on slope.

be explained by heterogeneity of variance since the standard deviations of estimated and measured BMI are similar (4.1 and 4.4 respectively). The increasing difference with higher BMIs is modest: the differences between estimated and measured BMI (standard deviation of the differences) for measured BMIs of <20, 20–24.99, 25–29.99, and ≥30 were –0.06 (0.93), –0.46 (1.11), –0.98 (1.31), and –1.72 (2.10) respectively; i.e. the change only becomes clinically meaningful at BMI measurements above 30.

Estimated BMI was also compared with measured BMI using cut-offs for the different levels of obesity (BMIs of 25, 30, and 35) to generate 2 × 2 tables. The estimates generated from such 2 × 2 tables show good agreement (kappa coefficients >0.76) and that estimated BMI is reasonably sensitive (>70%), specific (>95%), and predictive (positive predictive value >90%) compared with measured BMI at all levels of obesity (Table 1). The likelihood ratio for a positive test is ⩾20 no matter what cut off is used.

Predictors of disagreement between estimated and measured body mass index

Older subjects were more likely to have an estimated BMI one unit or less than measured BMI (odds ratio for age groups <45, 45–64 and >64, years respectively, 1.00, 1.35 (95% CI 0.96–1.90), and 2.80 (95% CI 1.68–4.66), LRT $\chi^2 = 16.7$, $P < 0.001$; z for trend = 4.0, $P < 0.01$). Neither sex nor social class predicted the difference or confounded the association of age with difference.

Perceptions of obesity

There was a significant association between patients' subjective perception of obesity and risks of obesity and measured BMI (Table 2). Some 85% (203/238, 95% CI 81–90) of overweight subjects (BMI >25) and all obese subjects (BMI > 30) knew that they were overweight. A total of 78% of subjects (50/64, 95% CI 66–88) with BMI greater than 30 thought that their weight was a risk to their health.

Predictors of perception of obesity

Females were more likely (odds ratio 5.78, 95% CI 3.11–10.71; LRT 36, df = 1, $P < 0.001$) and manual workers less likely (odds ratio 0.51, 95% CI 0.29–0.92, LRT 5.25, $P = 0.02$) to perceive themselves as overweight, after additionally controlling for measured BMI. There was no significant interaction between sex and social class (LRT $\chi^2 = 0.00$, $P = 0.97$). Age did not significantly predict the perception of obesity or confound the association of perception with the other predictors.

Females were more likely to perceive health risks from their weight (odds ratio 2.01, 95% CI 1.22–3.35; LRT 7.52, df = 1, $P < 0.001$) and older subjects less likely (odds ratio for age groups <45, 45–64, and >64 years respectively = 1.00 , 0.70 (95% CI 0.40–1.21), and 0.27 (95% CI 0.09–0.79); LRT χ^2 = 7.3, $P = 0.03$; z for trend –2.5, $P = 0.01$), having additionally controlled for measured BMI. Social class neither predicted perception of risk nor confounded the association between other predictors and the perception of risk. There was no significant interaction between sex and age group (LRT $\chi^2 = 1.42$, $P = 0.49$).

Discussion

This study documents the agreement between patient perceptions of obesity, BMI estimated using reported weight and height, and BMI calculated from measurement in a primary care setting. Although subjects attended a single GP in an urban training practice, measurements were made in a standardized way during routine surgeries, and the age, social class, and sex distribution of the study population are not dissimilar to national figures. Thus, the current results should be generalizable to other settings. The main expected difference is that the national population is slightly older. This would be expected to result in a marginally greater difference between estimated and measured BMI than reported here, since age did predict the difference in the current study. The generalizability of the measurements and relevance to the recent reimbursement guidelines[3] was maximized by performing measurements in conditions of routine surgeries; i.e. pragmatic measurements made opportunistically using standard calibrated scales and a stadiometer in lightly clothed patients. The likely error in such measurements means that these results probably provide an underestimate of the true agreement between estimated and measured BMI.

There is reasonable agreement between BMI estimated from reported weight and height and BMI calculated from measured

Table 1. Sensitivity, specificity, positive predictive value and kappa coefficient (95% confidence intervals) of estimated BMI (calculated from patient information) compared with measured BMI.

BMI cut-off (kg m^{-2})	Sensitivity(%)	Specificity (%)	Positive predictive value (%)	Kappa
25	80 (76–84)	96 (93–97)	94 (91–97)	0.76 (0.71–0.81)
30	71 (60–79)	99 (98–100)	93 (85–98)	0.78 (0.71–0.85)
35	78 (58–91)	100 (99–100)	91 (72–99)	0.83 (0.72–0.94)

Table 2. Patient perceptions of being overweight and of perceived risk to health of their weight according to measured BMI.

Perception	BMI				Pearson chi-square (*P*)	Mantel–Haenzel linear chi-square (*P*)
	< 25	25–29.99	30–34.99	≥ 35		
Overweight	72/247 (29%)	134/169 (79%)	50/50 (100%)	19/19 (100%)	164 (< 0.001)	143 (< 0.001)
Health risks of weight	21/228 (9%)	64/158 (41%)	33/46 (72%)	17/18 (94%)	129 (< 0.001)	128 (< 0.001)

weight and height, which supports previous work.[5,6] Estimated BMIs are slightly lower than measured BMIs, and this increases at higher levels of BMI and with age, consistent with previous data sets reporting underestimation of weight and overestimation of height in obese subjects.[17,20] No matter what definition of overweight is used, estimated BMI is reasonably sensitive, specific, and predictive with good kappa values compared with measured BMI. All obese patients (BMI >30) are aware that they are overweight. A minority of obese patients were optimistic about health risks, which supports previous research on optimistic perceptions of risk.[21] However, the predominant finding was that the majority of obese subjects are aware that their weight is a health risk. This accords with the overlap between epidemiologists and the public's perception of risk,[22] and the evidence from primary care that subjects may more readily acknowledge the risk of 'visible' factors, such as smoking, weight, and family history.[19] Self-assessment of risk has also been shown to be an important and independent predictor of mortality in a review of six large prospective studies.[23]

If obese patients know that they are obese — or could estimate from their own information using currently available cards — and are mostly aware of a risk to health, then why is it important for health professionals to medicalize the measurement of obesity for the population? Unless it can be shown that population measurement in general practice provides important extra benefits in improving patients' knowledge or motivation, or improves risk assessment by health professionals, or that intervention following measurement is effective, then targeting payments related to the measurement of obesity in the population is likely to be an inefficient use of resources. From these data, it is difficult to justify population measurement for risk assessment, public health information, patient knowledge, or patient perceptions.

Not only is the documentation of obesity in the population likely to have limited benefit but, as with all screening, there are potential costs, particularly time/opportunity costs, and the possibility of screening causing anxiety unless it is handled carefully.[24] More specifically, what are the opportunity costs of such use of resources? Effective interventions have been proven in a general practice setting for smoking,[25-30] high blood pressure,[31,32] and heavy alcohol intake.[33,34] It is also likely that intervention in individuals with established ischaemic heart disease is effective.[2] Furthermore, it is very likely that current assessment and intervention in these areas is suboptimal.[35] Thus, resources should be directed to maximizing the impact in these proven and cost-effective interventions[36] before turning to less proven areas where cost-effectiveness in a primary care setting is doubtful.

In conclusion, obese patients attending general practice know that they are overweight — or could easily estimate from their own information — and most know that obesity carries health risks. The extra accuracy from measurement over and above using reported patient information for the general population is probably not worth reimbursement, since estimated BMI is reasonably sensitive, specific, and predictive of measured BMI. There may be a stronger argument for measurement in selected high-risk individuals (e.g. hypertension or diabetes patients) to help multiple risk factor assessment, monitoring, or decision-making, although even here the evidence for effective intervention in primary care is very limited. A priority for research should be to develop effective intervention strategies for obesity in general practice. Until intervention strategies are proven in primary care, linking reimbursement to the documentation of measurement in the general practice population is likely to be an inefficient use of resources.

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