A Cross-Sectional Study Examining Australian General Practitioners' Identification of Overweight and Obese Patients

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BACKGROUND: Overweight and obese patients attempt weight loss when advised to do so by their physicians; however, only a small proportion of these patients report receiving such advice. One reason may be that physicians do not identify their overweight and obese patients.

OBJECTIVES: We aimed to determine the extent that Australian general practitioners (GP) recognise overweight or obesity in their patients, and to explore patient and GP characteristics associated with non-detection of overweight and obesity.

METHODS: Consenting adult patients (n=1,111) reported weight, height, demographics and health conditions using a touchscreen computer. GPs (n=51) completed hard-copy questionnaires indicating whether their patients were overweight or obese. We calculated the sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) for GP detection, using patient self-reported weight and height as the criterion measure for overweight and obesity. For a subsample of patients (n=107), we did a sensitivity analysis with patient-measured weight and height. We conducted an adjusted, multivariable logistic regression to explore characteristics associated with non-detection, using random effects to adjust for correlation within GPs.

RESULTS: Sensitivity for GP assessment was 63 % [95 % CI 57–69 %], specificity 89 % [95 % CI 85–92 %], PPV 87 % [95 % CI 83–90 %] and NPV 69 % [95 % CI 65–72 %]. Sensitivity increased by 3 % and specificity was unchanged in the sensitivity analysis. Men (OR: 1.7 [95 % CI 1.1–2.7]), patients without high blood pressure (OR: 1.8 [95 % CI 1.2–2.8]) and without type 2 diabetes (OR: 2.4 [95 % CI 1.2–8.0]) had higher odds of non-detection. Individuals with obesity (OR: 0.1 [95 % CI 0.07–0.2]) or diploma-level education (OR: 0.3 [95%CI 0.1–0.6]) had lower odds of not being identified. No GP characteristics were associated with non-detection of overweight or obesity.

CONCLUSIONS: GPs missed identifying a substantial proportion of overweight and obese patients. Strategies to support GPs in identifying their overweight or obese patients need to be implemented.

KEY WORDS: overweight; obesity; general practice; family physician; validity; add detection; risk factor assessment.
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INTRODUCTION

Obesity and overweight is a prevalent public health issue.[1] More than half the population in the United States (US)[2] and Australia[3] are overweight or obese. Excess weight is associated with increased risk of chronic diseases, including type 2 diabetes, cardiovascular disease, osteoarthritis and some cancers.[4–7] Early recognition and treatment of obesity can reduce progression of the condition and prevent the development of secondary complications that arise from excess weight.[8]

General practitioners (GPs) are well placed to identify and subsequently initiate weight management strategies in overweight and obese patients. GPs in Australia have access to the majority of the population annually.[9] Peak primary care organizations, including the US Preventive Services Taskforce and the Royal Australian College of General Practitioners, recommend that GPs calculate body mass index (BMI) to screen for obesity in their patients.[10,11] Individuals who have been told by their physicians that they are overweight or obese have a more realistic perception of their own weight and report desiring a lower body weight.[12] A number of studies have reported that physician advice is associated with more frequent and more recent attempts to lose weight.[13,14] Despite this, only a small proportion of overweight and obese patients report receiving weight management advice from their physicians.[15,16]

Barriers to GPs providing weight loss advice include perceived poor patient motivation, lack of confidence in providing treatment and perceived lack of treatment effectiveness.[17,18] Another possibility may be that GPs do

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not identify overweight and obesity in their patients. Some studies report that patients who are identified and told by their GP that they are overweight are more likely to have been advised on how to lose weight and increase their exercise levels,[19] and a diagnosis of obesity by a GP was the strongest predictor of having an obesity management plan.[20]

Audits of medical records suggest that GPs do not identify a large proportion of their overweight or obese patients.[21,22] Studies conducted in the US, Denmark and Germany report that between 20 % and 87 % of overweight or obese patients are identified by their GPs.[23,25] An Australian study published in 1994 found that GP identification of overweight and obesity had a sensitivity of 59 % and specificity of 92 %, relative to patient self-report.[26] Since then, both attention to the use of primary care for providing preventive care[27] and the prevalence of overweight and obesity[3] have markedly increased. This study presents updated information on how well Australian GPs identify their overweight and obese patients, and provides novel data on GP demographic characteristics associated with non-detection.

The aims of this study were to examine (1) GPs' accuracy in identification of overweight and obesity in patients presenting for care, compared with patient self-reported weight and height; and (2) to explore GP and patient characteristics associated with non-detection of overweight and obesity.

METHODS

This study was conducted as part of a larger cross-sectional study with twelve general practices in three urban cities in two Australian states.[28] Practices within a pre-defined region in each city were randomly invited to participate, until four in each city consented. Practice managers and GPs from each practice provided consent to participate.

Eligible patients were aged at least 18 years, and able to provide informed consent and complete the touchscreen computer questionnaire.

A research assistant approached consecutive patients presenting for their appointments and invited them to complete a questionnaire administered using a touchscreen tablet. GPs completed a hard copy questionnaire for each patient before, during or after consultation with the patient, on the day of the visit. Patients provided their name and date of birth to facilitate their survey results being linked with GP assessments.

Within a larger health questionnaire, we asked the patients to report the following information. Patients reported their sex, age, ethnicity, highest level of education, and whether they had private health insurance. They also reported the number of times they had seen this GP in the previous 12 months, and whether a doctor or nurse had previously told them they had high blood pressure, high cholesterol, type 2 diabetes and/or heart problems. Patients reported their weight in kilograms (kg) or stones and self-reported height in feet and inches, or centimetres (cm). Patients' BMI was calculated using weight (kilograms) divided by height (meters) squared. Patients were categorised as 'overweight' if they had a BMI of ≥ 25 kg/m^2 and <30/kgm^2 and 'obese' if they had a BMI of ≥ 30 kg/m^2.[29]

GPs were asked to indicate whether the patient had the following health risks: current cigarette smoker, overweight, obese, clinical depression, risky alcohol consumption and inadequate exercise; and whether the patient was appropriately screened for high blood pressure, high cholesterol, type 2 diabetes and cancer, with response options of "Yes", "No", "Unsure" or "Not applicable". When completing the questionnaire, GPs could refer to their medical records if they chose. A one-page information sheet with brief definitions for each risk factor was provided to GPs, and the following definition for overweight or obese was included: "Overweight is defined as having a body mass index of 25–29.9 kg/m^2. Obese is defined as having a body mass index $\geq$ 30 kg/m^2. Body mass index is calculated using weight (in kilograms) divided by height in metres squared". GPs also reported whether they completed this questionnaire "before the consultation", "during the consultation", "after the consultation" or "at the end of the session". GPs reported their age, sex, number of years worked in general practice and number of sessions worked per week.

A sub-sample of patients (n=107) from this study had their weight and height measured by a trained anthropometrist (SLY).[30]

Statistical Analysis

Data analyses were conducted using STATA 11.0. Weight reported as < 30 kg or > 250 kg, and height reported as < 130 cm or > 220 cm were replaced with "missing". To provide an indication of sample representativeness, GP and patient characteristics were provided for our sample as well as for a sample of 988 GPs and 95,839 patients participating in the Bettering the Evaluation of Care (BEACH) study in 2009/2010, an ongoing Australian general practice study.[9]

For our study, response were grouped into overweight, obese and non-overweight (including normal weight and underweight). Where GPs reported "unsure", these were coded as "non-overweight", as it is expected that assistance with weight management is unlikely to be offered to those patients. The percentages and 95 % confidence intervals [CIs] of overweight and obese patients reported by patients and GPs were calculated. Patient self-reported weight and

height was used as the criterion for assessment of accuracy of GP detection of overweight and obesity. The sensitivity, specificity, positive predictive values (PPV) and negative predictive values (NPV) of GP relative to patient self-report were calculated with 95 % CIs. Sensitivity is the proportion of overweight and obese patients who were identified as overweight and obese by their GPs. Specificity is the proportion of patients who were non-overweight and whom GPs identified as non-overweight. All 95 % CIs were adjusted for clustering within GPs, using the svy jackknife command.

A multiple logistic regression analysis, using random effects to adjust for clustering within GPs, was conducted to identify patient and GP characteristics associated with non-detection of overweight and obesity. Only overweight and obese patients as defined by self-reported BMI were included in this analysis. Patient and GP characteristics with p values < 0.25 on the univariate analysis were included in a multiple logistic regression model, and backward stepwise methods used to exclude variables with p values > 0.1 on the Adjusted Wald test. The intra-cluster correlation (ρ) is reported, with 95 % CI, from the final model, as an indication of the level of variation among GPs in their identification of overweight and obesity.[31]

A sensitivity analysis was conducted using measured weight and height obtained from the sub-sample of patients. The sensitivity, specificity, NPV and PPV of GPs' assessment of overweight and obesity compared with these measured values were calculated.

A sample size justification for this study is included in Appendix 1 (available online from <insert URL>).

RESULTS

For the larger study assessing the acceptability of touchscreen computer assessment in general practice,[28] 86 % of patients consented to completing the questionnaire. GPs from twelve practices were included in the current study. All but one of the practices (91 %) had electronic medical records and ten (83 %) employed at least one practice nurse. GPs completed 1,720 questionnaires. Of these, 412 did not assess overweight and obese separately and were excluded. GPs did not complete 43 questionnaires, and a further 154 patients provided invalid weight and height responses. GPs reported being unsure of the weight status of 39 patients, and these were coded as "non-overweight". Overall, the included sample consisted of responses from 1,111 patients and 51 GPs. Of these, information on when GPs completed the questionnaire was available for 927 responses. GPs completed more than half the questionnaires (67 %) at the end of the session, 19 % immediately after, 14 % during and 0.5 % before seeing the patient.

Table 1. Participating General Practitioner (n=51) Characteristics in Twelve Practices Compared with the BEACH Data Set (n=988)

	Study participants n (%)	BEACH participants n (%)*
Sex		
Males	32 (63)	557 (56)
Age		
25–44	12 (24)	280 (28)
45–54	20 (39)	360 (37)
≥ 55	19 (37)	342 (35)
Years in general practice		
≤ 5	4 (7.8)	98 (10)
6–19	14 (27)	350 (26)
≥20	33 (65)	533 (54)
Direct patient hours		
≤ 20	13 (25)	103 (11)
21–40	37 (73)	547 (56)
41–60	1 (2.0)	300 (31)
>60	0 (0)	23 (2.4)

BEACH Bettering the Evaluation and Care of Health study
**Number less than total (n= 988) due to missing data*

While GPs in our sample worked fewer direct patient hours than those in the BEACH data set, other patient and GP characteristics were broadly similar (Tables 1 and 2).

Table 2. Comparison of Participant Characteristics (n=1,111) with Those of Participants in the BEACH Study Sample (n=95,839)

	Study participants n (%)	BEACH sample n (%)
Sex		
Males	601 (39)	40,717 (43)
Age (years)		
18–24*	75	Not available
25–44	287 (28)	21,654 (29)
45–64	389 (38)	26,298 (35)
≥ 65	360 (34)	27,523 (36)
Ethnicity		
Aboriginal and Torres Strait Islander	6 (0.5)	1,042 (1.2)
Non-indigenous	1,105 (99)	90,684 (99)
Number of times seen GP in last 12 months (n=1,079)†		
0–3	526 (49)	
4–6	333 (31)	
6–10	102 (9.5)	
> 10	118 (11)	
Education (n=1,024)		
High school education and below	449 (44)	
Technical certificate/Diploma	145 (14)	
University	348 (34)	
Postgraduate	82 (8.0)	
Has private health insurance (n=1,045) †	688 (66)	
Has high blood pressure (n=1,111)	362 (33)	
Has high cholesterol (n=1,111)	270 (24)	
Has type 2 diabetes (n=1,111)	69 (6.2)	
History of heart disease (n=1,111)	107 (10)	

BEACH Bettering the Evaluation and Care of Health study
**Not comparable as BEACH data assess from age 15–24 years; total percentage recalculated excluding this age group*
†Number less than overall due to missing data

Validity of General Practitioner Detection of Overweight and Obesity

GPs' estimated prevalence of overweight (33 % [95 % CI 30–36 %]) and obesity (20 % [95 % CI 16–25 %]), was 7 % and 8 % lower respectively than estimates based on patient self-report (26 % [95 % CI 22–30 %] for overweight and 12 % [95 % CI 9.1–17 %] for obesity). Sensitivity for GP assessment of overweight and obesity was 63 % [95 % CI 57–69 %] and specificity was 89 % [95 % CI 85–92 %]. The PPV was 87 % [95 % CI 83–90 %] and NPV was 69 % [95 % CI 65–72 %]. Of obese patients, GPs identified 46 % as obese and 42 % as overweight (Table 3).

Patient and General Practitioner Characteristics of Non-Detection of Overweight and Obesity

Males (OR: 1.7 [95 % CI 1.1–2.7]), those without high blood pressure (OR: 1.8 [95 % CI 1.2–2.8]) and those without type 2 diabetes (OR: 2.4 [95 % CI 1.2–8.0]) had significantly higher odds of not being identified as overweight or obese (Table 4). Those who were obese (OR: 0.1 [95 % CI 0.07–0.2]) and reported a trade or diploma level of education (OR: 0.3 [95 % CI 0.1–0.6]) had significantly lower odds of non-detection. We did not identify any significant associations between GP characteristics and non-detection. The ρ was estimated as 0.06 [95 % CI 0.01–0.2], indicating some variability among GPs in their assessment of whether patients were overweight or obese.

For the sensitivity analyses (comparing GP assessment with measured data), sensitivity of GP assessments increased by 3 % to 66 % [95 % CI 63–70 %], and specificity was similar to self-reported estimates. The PPV increased by 2 % to 89 % [95 % CI 86–92 %], and NPV reduced by 6 % to 63 % [95 % CI 58–65 %].

Table 3. Percentage Agreement of Non-Overweight, Overweight and Obesity Based on General Practitioner Assessment and Patient-Reported Body Mass Index (n=1,111)

	Body mass index category based on patient-reported weight and height		
General practitioner reported BMI category	Non-overweight (n=522) n (%) [95 % CI]*	Overweight (n=364) n (%) [95 % CI]*	Obese (n=225) n (%) [95 % CI]*
Non-overweight (n=682)	465 (89) [85–92]	190 (52) [45–59]	27 (12) [7.4–19]
Overweight (n=291)	47 (9.0) [6.2–13]	150 (41) [35–48]	94 (42) [33–51]
Obese (n=138)	10 (1.9) [0.8–4.3]	24 (6.6) [4.0–11]	104 (46) [36–56]

**95 % confidence intervals adjusted for clustering within general practitioners*

DISCUSSION

Previous studies reported that the percentage agreement between GP-reported presence of overweight and obesity, compared with patient self-report, ranged from 20 % to 87 %.[23,25] Our study overcomes limitations of previous studies, including reliance on patients to report on whether they thought they were overweight (rather than classifying overweight and obesity based on reported weight and height as was done in our study).[23] We also asked GPs to report on several health risks, including obesity and overweight. This approach may have minimized reporting bias that may occur if GPs are asked about overweight and obesity alone,[24] or if they are asked additional questions about weight management.[25] Low sensitivity (63 %) and high specificity (89 %) of GP-reported overweight and obesity compared with patient self-report was identified in the current study, similar to that reported in Australia 20 years ago (sensitivity of 59 % and specificity of 92 %).[26] This suggests that identification of overweight and obesity has not improved, despite increases in prevalence of overweight and obesity,[3] increased use of electronic medical records,[9] establishment of financial reimbursements for lifestyle risk factor assessment by GPs[32] and publication of guidelines that recommend routine assessment of weight and height.[10,33]

GP-reported prevalence of overweight and obesity was lower than patient-reported prevalence (38 % versus 53 %). A potential reason for this is that GPs may perceive the presence of excess weight to be "normal", due to the high prevalence of this condition.[25,34] As overweight and obese patients may be seen and managed by the same GPs over an extended period, progressive weight gain may not be easily identified.

A consequence of GPs' under-recognition of overweight and obesity is that a substantial proportion of overweight and obese individuals are unlikely to receive advice and assistance with weight management. Additionally, GPs may miss opportunities to address health risk with increased body weight, and this may be a key reason for overweight and obese patients not attempting to lose weight.[35–37] Of particular concern is that 12 % of obese patients were categorised as non-overweight by GPs. Although at substantially elevated risk,[29] these patients are unlikely to be offered assistance with managing their weight, given GP perceptions that these patients are normal weight.

Similar to a previous study,[25] males had lower odds of being detected by GPs as overweight and obese. The use of BMI to define overweight and obesity may have contributed to some under-recognition among males, as classification using BMI may result in miscategorisation of those with high muscle mass as overweight or obese.[38] Females are also less satisfied with their weight than males[39] and may have previously consulted their GPs for help with changing weight; thus, increasing GPs' awareness. Identification of

Table 4. Patient and General Practitioner Characteristics Associated with Non-Identification of Overweight and Obesity

Variables	Unadjusted analyses (n=589)			Final model (n=589) ‡		
	Crude odds ratio	95 % CI	p value	Odds ratio	95 % CI	p value
Patient characteristics						
Body mass index (n=589)			< 0.001			
Overweight	1.0			1.0		
Obese	0.1	[0.07–0.1]		0.1	[0.07–0.2]	< 0.001*
Age (n=589)			0.6			
18–29	1.0					
30–44	1.0	[0.5–2.2]				
45–64	0.8	[0.4–1.6]				
≥ 65	0.8	[0.4–1.6]				
Sex (n=589)			0.02			
Female	1.0			1.0		
Male	1.6	[1.1–2.3]		1.7	[1.1–2.7]	0.02*
Presence of heart disease (n=589)			0.67			
Yes	1.0					
No	1.1	[0.6–2.0]				
Presence of high blood pressure (n=589)			< 0.001			
Yes	1.0			1.0		
No	1.9	[1.3–2.8]		1.8	[1.2–2.8]	0.009*
Presence of cholesterol (n=589)			0.006			
Yes	1.0					
No	1.8	[1.2–2.7]				
Presence of type 2 diabetes (n=589)			0.002			
Yes	1.0			1.0		
No	3.7	[1.6–8.6]		2.4	[1.2–8.0]	0.05*
Ethnicity (n=589)			0.63			
Caucasian	1.0					
Non-Caucasian	1.1	[0.7–1.9]				
Had private health insurance (n=551) †			0.85			
No	1					
Yes	1	[0.7–1.5]				
Number of time seen GP (n=569) †						
0–3	1		0.08			
4–6	0.8	[0.5–1.2]				
7–10	0.8	[0.4–1.5]				
> 10	0.4	[0.2–0.8]				
Education (n=538) [a]			0.003			
HSC and below	1.0			1.0		
Trade qualification/Diploma	0.4	[0.2–0.8]		0.3	[0.1–0.6]	0.001*
Tertiary	1.5	[1.0–2.3]		1.3	[0.8–2.1]	0.27
Postgraduate	0.8	[0.4–1.8]		0.8	[0.5–2.2]	0.54
GP completion (n=*480*) †			0.8962			
At the end of the session	1.0					
Immediately after the consult	1.2	[0.6–2.5]				
During the consult	1.1	[0.6,2.0]				
GP sex (n=589)			0.19			
Male	1.0			1.0		
Female	0.7	[0.4–1.2]		0.6	[0.4–1.1]	0.11
GP age (n=589)			0.36			
< 50	1.0					
≥ 50	0.8	[0.5–1.3]				
Years worked in general practice (n=589)			0.56			
< 20	1.0					
≥ 20	0.8	[0.5–1.5]				
Works full time (n=589)			0.68			
No	1.0					
Yes	0.9	[0.5–1.6]				

HSC Higher School Certificate
**p< 0.05 significant characteristics in final model*
†Number less than total overweight and obese due to incomplete patients survey
‡Final model adjusted for patient characteristics (body mass index category, sex, presence of high blood pressure, presence of type 2 diabetes, education) and GP sex

excess weight in men is particularly important, as men are at increased risk of developing cardiovascular disease[1] and are more likely to perceive themselves as being of ideal weight when they are overweight or obese.[35]

GPs had higher odds of not detecting overweight and obesity in those without type 2 diabetes and high blood pressure.[25,40] GPs may perceive these patients as being healthier and thus not needing weight management intervention. GPs may also be more likely to assess weight in patients with hypertension and type 2 diabetes, as lifestyle modifications including weight reduction is a key component in managing these conditions.[41,42] There

is, however, strong evidence that modest weight loss in those who are overweight and obese can delay or prevent the development of diabetes and hypertension, highlighting the need for early intervention with this group.[8] Consistent with findings from other studies,[25,43,44] obese individuals had higher odds of being identified, compared with those with overweight.

None of the examined GP characteristics were associated with non-detection of patient overweight and obesity; however, only a limited number of variables were available for analyses. While not examined in this study, physicians' BMI, lifestyle behaviors,[43] and attitudes towards weight management may also affect the level of care provided.[45] Additionally, organisational structures within primary care can also impact on the level of preventive care provided by practitioners.[46,47]

In order for GPs to play a role in weight management, it is crucial to identify strategies to improve identification of at-risk patients. Other staff can play an important role in measuring patients, updating patients' weight records and flagging those who are overweight and obese. Provision of feedback and reminders may be effective in improving physicians' delivery of preventive care;[48,49] however, the effect on provider behaviour varies with the type of behaviour targeted.[50] Thus, there is a need to examine the use of these interventions in improving GP detection and management of overweight and obesity. These mechanisms need to incorporate ways of initiating effective follow-up such as referrals to dietitians,[51] as the benefits of identification are contingent upon the initiation of interventions. While interventions to improve GP identification of overweight and obese patients may be useful, it is acknowledged that other factors, including time pressures, lack of organizational infrastructure, limited subsidized referral options and complexity of management of weight may impede weight management in this setting.[52]

This study was conducted with only 51 Australian GPs. Nevertheless, we compared our sample with the BEACH study, and did not find substantial differences in patient or GP characteristics. This study, however, had a slightly lower proportion of patients with type 2 diabetes compared to the BEACH study, which may have modestly increased GPs' non-detection. The study did not assess setting characteristics, including the extent to which GPs used electronic medical records or practice staff to assess the presence of overweight and obesity (either routinely or for the purposes of this study). Participating GPs may have a greater interest in the provision of preventive care than non-consenters. Therefore, results reported here may provide a conservative estimate of GPs' failure to identify overweight and obesity.

Despite the role that GPs play in managing overweight and obesity, identification of these conditions is poor. Strategies to help improve GP's identification of overweight and obesity need to be implemented.

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