**Attendance and weight and waist circumference outcomes of patients with
type 2 diabetes receiving dietetic care through the Medicare Benefits Schedule
Primary Care Items for Allied Health Services Program**

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Abstract

The aim of this study was to investigate the participation and weight and waist circumference outcomes of patients with type 2 diabetes receiving dietetic care through the Medicare Benefits Schedule Primary Care Items for Allied Health Services program. A prospective observational study was conducted between January and September 2011, utilising three private practice dietitians who provided services at eleven medical centres in South East Queensland. All patients with type 2 diabetes who were referred to one of the dietitians through the Medicare Benefits Schedule Primary Care Items for Allied Health Services program were asked to participate in the study. Participants' attendance at consultations was recorded for the study duration. The dietitian collected weight and waist circumference measures at each consultation. One hundred and twenty-nine participants (58.9 ± 15.7 years, $32.2 \pm 5.6 \text{ kg/m}^2$) were included in the study. The most frequent number of consultations allocated to a dietitian was two. Small, but statistically significant reductions in body weight ($1.9 \pm 2.9 \text{ kg}$, $p < 0.05$) and waist circumference ($2.0 \pm 4.8 \text{ cm}$, $p < 0.05$) were observed from the initial to the final consultation. Participants who attended more than two consultations lost significantly more weight than those who only attended two consultations ($3.7 \pm 4.15 \text{ kg}$ vs $1.1 \pm 1.6 \text{ kg}$, $p < 0.05$). Almost one third of participants ($n=38$, 30%) did not complete the allocated number of consultations available through their referral. Modest weight and waist circumference reductions are achievable for patients with type 2 diabetes receiving dietetic care through the Medicare Benefits Schedule Primary Care Items for Allied Health Services program. However, the clinical significance of these reductions requires further investigation. Patients who attend more consultations with a dietitian may

81 experience further improvements in weight and waist circumference outcomes.
82 However, many patients do not complete the number of allocated consultations.
83 Further research is required to explore the determinants of attendance at
84 consultations in order to maximise the potential improvements in health outcomes for
85 patients receiving dietetic care through the Medicare Benefits Schedule Primary
86 Care Items for Allied Health Services program.

87

88 **Introduction**

89 Type 2 diabetes is a lifestyle-related chronic disease, with risk factors including
90 overweight and obesity, poor nutrition behaviour and low physical activity (Dietitians
91 Association of Australia (DAA), 2011). The prevalence of type 2 diabetes in Australia
92 is approximately 4% of the population (Australian Bureau of Statistics (ABS), 2012).
93 The cost associated with the treatment of type 2 diabetes is currently estimated to be
94 in excess of \$10.3 billion annually (Diabetes Australia, 2012). The presence of micro-
95 and macro-vascular complications significantly increases the burden of disease of
96 type 2 diabetes, and more than doubles the annual health cost per person (Colagiuri
97 et al., 2003).

98 Controlling the modifiable risk factors of type 2 diabetes including hyperglycaemia,
99 hypertension, dyslipidaemia and overweight and obesity can reduce the incidence of
100 micro- and macro-vascular complications (Shamoon et al., 1993). Lifestyle
101 intervention studies have demonstrated that intensive nutrition and physical activity
102 advice improves many modifiable risk factors for type 2 diabetes complications
103 (Dengel et al., 2006; Pi-Sunyer et al., 2007; Wing, 2010). Specifically, nutrition
104 advice provided by dietitians has been shown to result in improved weight and
105 glycaemic control in individuals with type 2 diabetes (Ash et al., 2003; Franz et al.,
106 1995; UKPDS, 1990). Furthermore, weight loss of 5-10% of initial body weight has
107 been associated with improvements in fasting plasma glucose, glycated
108 haemoglobin (HbA1c), and blood pressure (Manning et al., 1998; Wing, 2010).
109 Considering that 80-90% of individuals with type 2 diabetes are overweight or obese
110 (Ross et al., 2011), weight management is an essential component of the
111 management of type 2 diabetes.

In 2004 the Australian government introduced the Medicare Benefits Schedule (MBS) Primary Care Items for Allied Health Services program (previously referred to as the Enhanced Primary Care program) to promote the coordination of healthcare for individuals with chronic conditions, including type 2 diabetes (Australian Government Department of Health and Ageing, 2012). Under this program, eligible patients can access up to five subsidised consultations per calendar year from any of the 14 registered allied health professions. The fee for each consultation is set by individual providers, and is either bulk billed (no out-of-pocket cost to the patient), or charged at a higher rate than the rebate provided by Medicare. General Practitioners (GPs) develop and manage each referral, and receive upfront financial remuneration for this work. The remuneration for allied health professionals is provided after of each consultation through Medicare Benefits Schedule Primary Care item numbers.

The MBS Primary Care Items for Allied Health Services program has been the subject of recent debate (Cant, 2010; Foster et al., 2009; Foster et al., 2008). The number of subsidised consultations available to patients, and the remuneration for allied health professionals has been criticised. In addition, allied health professionals have reported making compromises to best practice to accommodate the funding model (Foster, et al., 2009). Although recent studies have described the utilisation of services and the practices of health professionals under the program, patients' health outcomes have not been evaluated.

Dietitians are the third most utilised allied health profession within the MBS Primary Care Items for Allied Health Services program, conducting 251 781 services in the 2011-2012 financial year (Australian Government Department of Health and Ageing and Medicare Australia, 2012). However, Medicare collects data on the use of the program by recording completed, billed consultations. As a result, this data does not

137 identify the attendance rates of patients at allocated consultations, so does not
138 completely describe the participation of patients within the program. As the value of
139 the MBS Primary Care Items for Allied Health Services program to the Australian
140 public has been recently questioned (Webber, 2012), it is important to understand
141 the rate of participation by patients in the program.

142 The aim of this study was to investigate the attendance and weight and waist
143 circumference outcomes of patients with type 2 diabetes receiving dietetic care
144 through the MBS Primary Care Items for Allied Health Services program. This
145 investigation will assist in evaluating the effectiveness of Australian government
146 funding provided for dietetic services to confront this national health priority area.

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Methods

Study Design

This study utilised a prospective observational approach to document the weight and waist circumference outcomes of patients with type 2 diabetes receiving dietetic care through the MBS Primary Care Items for Allied Health Services program. Three private practice dietitians consulting at eleven medical centres in south-east Queensland were involved in the study. The dietitians were Accredited Practising Dietitians (APDs) registered with the Dietitians Association Australia (DAA) and eligible to provide services through the MBS Primary Care Items for Allied Health Services program. Each dietitian was aware of the study being undertaken. The dietitians provided services under one business enterprise, and consultation fees were equal to the Medicare rebate available to patients (bulk-billed). Ethics approval was obtained from the Griffith University Human Research Ethics Committee (Reference PBH/37/10/HREC).

Participants

Between January and September 2011, all patients with type 2 diabetes who attended at least one consultation with a dietitian through the MBS Primary Care Items for Allied Health Services program were asked to participate in the study. To ensure usual practice was followed, the referring GPs were not specifically informed of the study while data was being collected. At the initial consultation, all eligible patients were asked to participate in the study regardless of current medications or other treatment plans.

171

172 *Data Collection*

173 Data were recorded by the three dietitians involved in the study during participating
174 patients' consultations. Data were recorded in each patient's paper-based medical
175 file. Dependent measures of weight and waist circumference were collected at each
176 consultation. Independent variables including gender and time since diagnosis of
177 type 2 diabetes were recorded. At the conclusion of the data collection period, data
178 from the patient's file were collected and analysed. Each participant's progress
179 through the program was recorded according to the following criteria.

- 180 1. Completed: the patient had attended all consultations allocated within the
181 referral.
- 182 2. Ongoing: the patient had not attended all consultations allocated within the
183 referral, however the next consultation was scheduled.
- 184 3. Not completed: the patient had not completed all consultations within the referral,
185 and no future appointment was scheduled.

186 *Outcome measures*

187 Weight was measured using digital scales and waist circumference was measured
188 using a metallic tape measure. Specific training in anthropometric measurement was
189 not provided because all data was collected by Accredited Practising Dietitians who
190 had significant previous experience in conducting these measurements. Where a
191 clinic provided a stadiometer, height was measured and recorded. Alternatively,
192 height was taken from the patients' medical file. Body mass index (BMI) was
193 calculated from collected weight and height.

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196 *Data Analysis*

197 Statistical analyses were performed using SPSS version 21.0 (IBM Corporation,
198 2012). Analysis of the change in weight and waist circumference measures was only
199 conducted for patients who attended two or more consultations. Given the high
200 number of participants not attending allocated consultations, an intention to treat
201 model was not used, and the actual change in outcomes were described. A paired t-
202 test was used to compare initial and final body weight and waist circumference of
203 participants. Independent t-tests were used to determine the effect of the number of
204 consultations attended (two versus more than two) on weight and waist
205 circumference changes. Statistical significance was accepted at the $p<0.05$ level.
206 The World Health Organisation cut-off points for BMI and waist circumference were
207 used to assess risk of metabolic complications (World Health Organisation, 2008,
208 2011). Clinical significance for weight lost was set at 5% of initial weight in
209 accordance with the NHMRC recommendations (National Health And Medical
210 Research Council, 2003)

Results

Between January and September 2011, 173 individuals with type 2 diabetes presented with a referral through the MBS Primary Care Items for Allied Health Services program to the one of the dietitians involved in the study. Of these potential participants, 129 individuals (80 male, 49 female; mean age 59.8 ± 15.9 years) consented to participate in the study and completed their first consultation. The number of dietitian consultations attended by each patient varied as a result of differences in the number of consultations allocated in the referral, and the number of allocated consultations actually attended by the patient. Figure 1 outlines the overall participation of patients throughout the study. A limited rate of participation was observed with only 60 of the 129 consenting participants attending two or more dietitian consultations.

INSERT FIGURE ONE ABOUT HERE

The number of consultations allocated to a dietitian through the referral, and rates of completion, are shown in Table 1. The most frequent number consultations allocated to a dietitian was two ($n=67$, 52%). Nearly half of the participants ($n=60$, 47%) completed the number of allocated consultations within their referral during the data collection period. A quarter of participants ($n=36$, 24%) had not completed the number of allocated consultations but had scheduled the next consultation, and the remainder ($n=39$, 30%) had not completed the number of allocated consultations and did not have any future consultation scheduled.

INSERT TABLE ONE ABOUT HERE

At baseline, the mean weight, BMI and waist circumference of the 129 consenting participants was 94.1 ± 20.4 kg, 32.2 ± 5.6 kg/m² and 111.8 ± 12.9 cm respectively. The proportion of participants with an increased risk of metabolic complications was 91% based on BMI measures, and 97% based on waist circumference measures.

Table 2 shows participants' changes in body weight, BMI and waist circumference between baseline measurements and the final consultation for participants who attended two or more consultations (n=60) and had weight (n=51), height (n=45) and waist circumference (n=45) recorded on each occasion. Weight and waist circumference measures were both significantly lower at the final consultation compared to the initial consultation. The overall percentage of body weight lost was $1.8 \pm 2.7\%$, and five participants lost more than 5% body weight.

INSERT TABLE TWO ABOUT HERE

Table 2 also shows participants' change in BMI and waist circumference categories after their final consultation with a dietitian. No participants experienced an improvement in their BMI category, however a small number of participants (n=2, 4%) experienced an improvement in their waist circumference category.

Participants who attended more than two consultations lost significantly more weight than those who only attended two consultations (-3.7 ± 4.2 kg vs -1.1 ± 1.6 kg; $p=0.002$). However, participants who attended more than two consultations lost significantly more weight from consultation one to two, compared with those who only attended two consultations (-2.3 ± 2.4 kg vs. -1.1 ± 1.6 kg; $p=0.038$). No associations were found between the number of consultations attended and changes in waist circumference.

256

257 **Discussion**

258 The aim of this study was to investigate the attendance and weight and waist
259 circumference outcomes of patients with type 2 diabetes receiving dietetic care
260 through the MBS Primary Care Items for Allied Health Services program. This study
261 is important because there is limited understanding of the outcomes of individuals
262 with type 2 diabetes receiving dietetic care through this program. In the present
263 study, modest reductions in weight and waist circumference were observed, with
264 greater reductions in weight achieved by participants who attended more than two
265 consultations with a dietitian. Overall participation of patients in the program was
266 limited with less than half of the participants attending two or more consultations with
267 a dietitian within the study period.

268 Allied health professionals report that that the number of consultations currently
269 included in the MBS Primary Care Items for Allied Health Services program is
270 inadequate and is not conducive to providing the optimal service to patients with
271 complex care needs (Foster, et al., 2009). However, approximately one third of
272 patients in the present study did not complete all consultations that were allocated to
273 them within the study period. Notably, data was unable to be captured on the
274 number of patients who were provided with a referral from their GP for a dietitian, but
275 did not attend their initial consultation. Therefore, the current data is prone to
276 underestimate actual attendance in the program. Regardless of the precise
277 attendance figure, it is reasonable to conclude that participation in the program is
278 limited.

279 The limited participation in the program by patients suggests that many patients feel
280 that the allocation of dietetic consultations is actually more than adequate for the

management of their condition. Interestingly, Grimmer-Somers et al. (2010) report high levels of satisfaction from patients with type 2 diabetes receiving integrated GP/allied health care despite only receiving an average of 2.3 visits to allied health professionals over an eight-month period. Patients in the Grimmer-Somers et al. (2010) study felt that the integrated care improved knowledge and awareness of their condition and encouraged them to self-manage. The limited participation by patients found in the present study may not necessarily be due to any dissatisfaction with the service provided by the dietitians. Conversely, it could be speculated that the service provided was actually perceived to be very good and that patients did not feel they needed to attend all allocated consultations because they had already developed sufficient knowledge and understanding of dietary management for their condition. Clearly further research is required to understand the reasons for the limited participation by patients in the MBS Primary Care Items for Allied Health Services program.

Patients attending two or more consultations with the dietitian in the present study lost an average of 1.9kg (or 1.8% of initial body weight), which is a similar amount as found in other studies using a similar number of dietitian consultations (Franz, et al., 1995; Manning, et al., 1998). The National Health and Medical Research Council (NHMRC) recommends a target weight loss of 5-10% of initial body weight in overweight or obese individuals in order to support long-term metabolic improvements including reduction in blood pressure, blood lipids, fasting plasma glucose and HbA1c (Australian Government Department of Health and Ageing, 2003). Therefore the average weight loss observed in the present study may not be associated with improvements in other markers of metabolic control. In addition, there was very little change in the number of patients at increased risk of metabolic

complications as assessed by World Health Organisation cut-off points for BMI or waist circumference. Conversely, Andrews et al (2011) have recently shown that a 12-month dietary counselling intervention can reduce HbA1c and insulin resistance in type 2 diabetes patients despite a weight loss of only 1.7% of initial body weight. Other studies which have reported small changes in the body weight of type 2 diabetes patients have also demonstrated significant reductions in HbA1c (Coppell et al., 2010; Miller et al., 2012) Further research is warranted to determine if the modest, but statistically significant, weight loss observed in this study could be associated with changes in metabolic control and risk of diabetes related complications.

The weight loss observed in the present study is somewhat less than observed in other dietary intervention studies in patients with type 2 diabetes. Following 12 weeks of intensive dietetic counselling Ash and colleagues (2003) observed an average participant weight loss of 6.5% (Ash, et al., 2003). Interestingly, this study involved three groups receiving different dietary prescriptions all designed to elicit an energy deficit. As there was no difference in weight loss between groups, the authors concluded that it was the intensive weekly contact with the dietitian that facilitated the successful weight loss. The lack of a clinically significant weight loss in the present study may be due to the low frequency of consultations with a dietitian. If this is the case, the limited participation in the program by patients is somewhat perplexing. Many patients did not to attend the full allocation of consultations with a dietitian. However, it may be necessary to attend many more consultations than allocated to actually achieve clinically meaningful changes in weight, waist circumference and possibly other health outcomes.

Intensive dietary interventions led by dietitians have been shown to produce positive changes in measures of glycaemic control in patients with type 2 diabetes after 12 months (Andrews, et al., 2011; Coppel, et al., 2010; Pi-Sunyer, et al., 2007). Each of these trials included interventions involving many more dietary counselling sessions (range from eight to 40) than the maximum of five that is subsidised under the MBS Primary Care Items for Allied Health Services program. Interestingly, most patients in the present study were only allocated two consultations with a dietitian. The reason for such a low allocation of dietitian sessions is not clear. A referral can include any number of allied health sessions, however, only five of these are subsidised by Medicare. Therefore the GPs developing management plans for the patients in the current study may be aware of the likely attendance of patients to allied health appointments and this may have been a key consideration when developing management plans for these patients. Nevertheless, there appears to be a clear discrepancy between the evidence for the required number of dietitian consultations for optimal management of type 2 diabetes and the actions by both GPs and patients regarding referral and attendance at these consultations.

The present study demonstrated that patients who attend more than two consultations with a dietitian lose significantly more weight than patients who attend only two consultations. It is likely that the frequency of sessions with a dietitian is an important component to successful weight loss (Ash et al., 2003). Therefore greater weight loss in patients with a higher number of consultations with the dietitian was expected. However, the patients in the present study who attended more than two consultations also experienced greater weight loss between their first and second consultation compared to patients who only attended two consultations. Patients experiencing a greater magnitude of weight loss after their first consultation may

have a greater commitment to dietary modification which is reflected by a willingness to return for additional consultations. Patients who experience poor results may not feel as motivated to return to the dietitian. Therefore, the association between a greater number of visits to the dietitian and a greater weight loss may not necessarily be causal in one direction.

The present study had two noteworthy limitations. Firstly, data was collected by dietitians during consultations. As a result of time constraints and patient refusal, some weight and waist circumference data were unable to be collected. Furthermore, the time between consultations was not uniform for all patients, so the outcomes were measured at variable time points. Although this limits comparability to more structured intervention trials, the aim of this study was to describe the changes experienced by patients actually participating in the MBS Primary Care Items for Allied Health Services program.

Overall, this study has demonstrated that patients with type 2 diabetes receiving dietetic care through the MBS Primary Care Items for Allied Health Services program experience modest reductions in weight and waist circumference. However, the clinical significance of these reductions requires further investigation. Patients who attend more consultations with a dietitian may experience further improvements in weight and waist circumference outcomes. However, participation in the program is limited with many patients not completing the number of consultations allocated through the MBS Primary Care Items for Allied Health Services program. Further research is required to explore the determinants of attendance at consultations in order to maximise the potential health outcomes for patients receiving dietetic care through this program.

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460 Table 1: Number of consultations allocated to a dietitian through an EPC referral,
 461 and rates of completion.

Number of allocated consultations	Number of participants	Completed ^a	Ongoing ^b	Not completed ^c
1	19	19 (100%) ^d	-	-
2	67	33 (49%)	9 (13%)	25 (37%)
3	26	4 (15%)	15 (58%)	7 (27%)
4	8	4 (50%)	1 (12%)	3 (38%)
5	9	0 (0%)	6 (67%)	3 (33%)
Total	129	60 (46%)	31 (24%)	38 (30%)

462 ^a*Completed* was defined as a participant that had attended all consultations
 463 allocated within the EPC referral.

464 ^b*Ongoing* was defined as a participant that had not attended all the consultations
 465 allocated within the EPC referral, but had scheduled the next consultation.

466 ^c*Not Completed* was defined as a participant that had not completed all consultations
 467 allocated within the EPC referral and did not have a future appointment scheduled.

468 ^dData was not collected on the number of patients referred to a dietitian who did not
 469 attend the first consultation.