



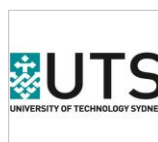
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Weight management for patients in general practice tailored to health literacy

Centre for Obesity Management and Prevention Research Excellence in Primary Health Care

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Background

Obesity in Australia increased from 19% to 27% in the period from 1995 to 2011-12.¹ Strongly correlated with lower socio-economic status, especially in women,² its high rates contribute to the increased prevalence of chronic diseases, such as cardiovascular disease (CVD), diabetes and cancers.³ Overweight and obesity are second only to smoking as a contributor to the burden of disease in Australia.³ People who are obese are often discriminated against in the workplace.⁴ Stigma in health care contributes to reluctance to seek treatment for weight management.⁵ This stigma is also associated with unhealthy eating behaviours and reduced physical activity (PA).^{5,6}

Obesity is common in general practice with the proportion of obese adults seeing general practitioners (GPs) increasing from 22% in 2005-06 to 28% in 2014-15.⁷ Primary health care (PHC), therefore, plays an important role in addressing obesity. Patients' health literacy has a significant impact on the management of obesity in PHC and is an important factor that has been shown to influence the frequency of preventive assessment, advice and referral.^{8,9}

The World Health Organization defines health literacy as "the cognitive and social skills which determine the motivation and the ability of individuals to gain access to, understand, and use information in ways which promote and maintain good health".¹⁰ Low health literacy affects 59% of the Australian population and contributes directly and indirectly to health disparities.¹¹ It has been found to explain a substantial proportion of the difference in the uptake of preventive programs and self-management of chronic diseases.^{12,13}

In clinical care, low health literacy is often viewed as a deficiency that needs to be identified and managed. However, it can also be thought of as an asset for patients that, if developed, can empower individuals to exert greater control over their own health.¹⁴ Health literacy has been theorised to influence the use of services, the quality of communication between patient and provider and self-management behaviours.¹⁵ We have demonstrated the link between health literacy and risk behaviours in our previous research.¹³ People with low health literacy miss opportunities for prevention and suffer adverse health outcomes as a result.^{15,16} Furthermore, low health literacy has significant impacts on health care utilisation and health outcomes.^{17,18}

The National Health and Medical Research Council (NHMRC) clinical practice guidelines for the management of overweight and obesity in adults, adolescents and children in Australia identify a role for PHC across the 5As in **A**sking about and **A**ssessing patient risk and motivation; providing **A**dvice on the benefits of a healthy lifestyle and discussing **A**greed goals and priorities; **A**ssisting patients to develop a weight management plan which often involves referral to other services; and **A**rranging follow-up in order to prevent weight gain.¹⁹ Multiple interventions targeting nutrition, PA and psychological approaches to behavioural change are more likely to be effective in addressing overweight and obesity than single component interventions.²⁰

However, there is evidence that these recommendations are not being adequately implemented in general practice. Less than a quarter of patients attending general practice had their body mass index (BMI) measured in the previous 12 months and less than 5% had their waist circumference measured.^{21,22} Few at-risk patients receive advice on diet or PA and even fewer have been referred to other services.^{23,24}

Patients' low health literacy may be one of the barriers to preventing and managing obesity in PHC. When patients do not ask questions or engage in a discussion about weight loss, providers often interpret this as lack of patient motivation. However, patients with low health literacy may not feel confident to ask questions or engage in a discussion about weight loss with their primary health care provider. Providers may incorrectly assume that obese patients are not interested in taking an active role in their health care.²⁵ Despite the potential impact of low health literacy on weight loss management for obese patients in PHC, it has

received little attention in research. It is not known how PHC providers should best manage obesity in the context of low health literacy.

RESEARCH OBJECTIVES

Our aim was to develop and evaluate the feasibility and impact of a PHC approach to weight management tailored to the level of health literacy of obese patients. There were three key activities undertaken in this regard: 1) a literature review; 2) a pilot study; and 3) a weight management trial called “Better Management of Weight in General Practice” (BMWGP).

In this report we describe the three activities and use the BMWGP baseline data to explore three issues. First, we look at the effectiveness of a screening tool to identify patients with low health literacy in general practice. Second, we describe the association between health literacy and a range of factors, behavioural intentions, lifestyle behaviours and quality of life to better understand the link between health literacy and health in a population of patients with obesity attending general practices. Third, we identify the groups most likely to experience weight stigma and how stigma relates to health literacy.

Literature review

A systematic review of the literature on obesity management in patients with low health literacy in general practice was undertaken with the aim of analysing the effectiveness of interventions in helping participants lose weight. Interventions that aimed to achieve weight loss by enhancing the knowledge and/or skills of individual patients were of particular interest.

Pilot study

To review the status in general practices in Australia, specifically in low socio-economic areas, a pilot study was undertaken to investigate the feasibility of screening for low health literacy and tailoring preventive care to this. The pilot study focussed on describing:

- > the implementation of screening in general practices.
- > the knowledge and behaviours of GPs and practice nurses (PNs) and how these changed over three months.

Weight management trial

Using findings from the pilot study and the literature review, the BMWGP trial was designed and conducted to evaluate the implementation and effectiveness of a practice-based intervention to assist general practices to support obese patients with low health literacy better manage their weight. We aimed to test a number of hypotheses about the management of obesity with patients with low health literacy in general practice and the effectiveness of PNs in supporting patients across the 5As. Outcome measures included changes in GPs’ and PNs’ practices, patient risk behaviours, health literacy and weight.

Literature review

The objective of this review was to evaluate the effectiveness of lifestyle interventions that aimed to achieve weight loss by enhancing individual's knowledge and/or skills for weight loss. This review was to help inform the BMWGP trial so an important criterion was that studies took place in a similar setting.

Further details are available in the published review,²⁶ and in Appendix 2.

METHODS

A systematic review with narrative synthesis was used to review the literature. Studies were eligible for inclusion if they met the criteria outlined below in Table 1.

Table 1: Study selection criteria for literature review

Publication language	English
Publication date	January 1990 to June 2013
Place of study	Organisation for Economic Cooperation and Development (OECD) countries
Setting	PHC providers or individuals who were referred to the study by PHC professionals
Study type	An intervention study with a minimum six month follow-up period
Participants	Adults, aged ≥ 18 years with a BMI ≥ 25 kg/m ² with no chronic disease or pregnancy, pharmaceutical or surgical interventions employed for weight loss or participants in treatment for weight reduction
Intervention	A trial where the intervention aimed to achieve weight reduction through influencing the knowledge and/or skills of participants with or without psychological approaches to behaviour-change
Outcomes	Change in weight and/or BMI

A range of sources informed the search, including 12 online databases, journals, experts in this area of research and relevant government, non-government and international bodies and organisations. A 10% random sample of excluded studies was reviewed to test the criteria and identify other possible studies of value.

The quality of each included study was assessed using a standard checklist rating in six sections,

- > selection bias
- > study design
- > confounders
- > blinding of researchers to the allocation of patients to intervention or control groups
- > data collection method, and
- > withdrawals and dropouts.

Further details are provided in Appendix 2.

Identifying studies to review

The process of identifying and selecting papers for inclusion included screening the titles and abstracts of 2,286 papers. This resulted in 255 papers being identified for full-text assessment. Of these 255 papers, 18 were eligible for data extraction. A secondary search

of these papers identified another 179 papers eligible for a full-text review. After excluding studies that did not meet the inclusion criteria, 13 papers were included in this review.²⁷⁻³⁹ A figure illustrating the process can be found in Appendix 3.

Study characteristics

Seven of the included studies were randomised controlled trials (RCTs),^{29,31,33,34,36,38,39} of which two were pilot studies,^{38,39} and one was a feasibility study using a delayed intervention control group.²⁹ Two studies had non-equivalent groups design,^{30,37} while four studies did not include a control group (pre-post single group designs).^{27,28,32,35}

In almost all the studies, patients were recruited from a PHC service, which was also the intervention setting. One exception was a study where participants were recruited from the community and the intervention was delivered in the public health care setting. Most of the studies were rated as 'weak' in quality with only four studies scoring as 'strong' and none as 'moderate'. The total number of participants across all studies was 2,089 (mean n=161) with retention rates from 45% to 100%.

Although all 13 studies included in our review had lifestyle interventions, these interventions varied in the number of contacts with participants, mode of delivery, intervention providers, behaviour-change techniques and duration of final follow-up (details are provided in Appendix 4). However, in every case, the focus was on changing diet and physical activity behaviours in conjunction with behaviour-change. Other key similarities featured in all studies were

The approach to health behaviour-change was multi-component focussed on diet, PA and behaviour modification.

They explicitly stated that they targeted participants' dietary knowledge (except one where the emphasis was on meal replacement).

They involved face-to-face contact except one that utilised the Internet and delivered the intervention through a website.

For details of the study's characteristics, refer to Table 9 in Appendix 4.

OUTCOMES

In 11 of the 13 studies (85%), there was significant weight reduction measured in weight or BMI.^{27-35,37,38} Among these 11 studies, two did not show significant changes at any of the follow-up periods.^{30,38} A third study reported significant weight loss in male, but not in female participants.²⁷ Of the studies with positive results, three were rated as 'strong' and the other eight were rated as 'weak' quality. There were no consistent differences in the effectiveness of interventions by their mode of delivery (except for the one Internet-only intervention, which was not effective), provider, behavioural intervention or intensity (Appendix 5). These findings confirmed those from an earlier systematic review that supported the efficacy of combining both dietary and PA interventions together with behaviour modification.^{40,41} Interventions of at least medium intensity delivered by a range of health practitioners, which addressed both diet and PA and used behavioural strategies, were found to be effective.

CONCLUSION

This review identified a limited number of studies reporting on the impact of health education interventions on weight loss in obese patients in PHC. Other reviews on the relationship between health literacy level and health outcomes have shown a consistent association between low health literacy and poorer health-related knowledge and comprehension.^{42,43} However, none of the studies included in this review reported on participants' health literacy. More research is needed to explore the pathway between the intervention components, health literacy, behaviour, weight loss and, in the longer term, maintenance of these losses. Further, no studies were found that specifically targeted disadvantaged groups. The lack of

studies specifically targeting socio-economically disadvantaged groups needs to be addressed in the future. Strengths and limitations of the review are presented in Appendix 6.

Pilot study to determine prevalence of low health literacy

The aims of this pilot study were to determine:

- > the prevalence of low health literacy and identify patients with low health literacy;
- > the extent to which providers in general practice were advising patients about preventive health measures and monitoring for risk factors with respect to obesity; and
- > how the knowledge and practices of GPs and PNs had changed as a result of an intervention that aimed to enhance preventive care for people with low health literacy.

This study was approved by the UNSW Human Research Ethics Committee (HC12151). Methods and results have been published.⁴⁴ A summary is provided below.

METHODS

Four general practices were recruited matching the following criteria:

- > employed a PN
- > used electronic records, and
- > were located in socio-economically disadvantaged areas of metropolitan Sydney (2006 Socio-Economic Indexes for Areas (SEIFA) score below 1000).

All practices had a significant proportion of non-English speaking migrants with the percentage of people from culturally and linguistically diverse (CALD) backgrounds varying from 45% to 99%.

Key intervention activities by clinicians in this pilot study were:

Screening patients to determine low health literacy.

Assessing the completeness of patient records with respect to preventive health measures and risk factors to determine the extent to which GPs or PNs were advising patients. This was conducted at baseline and repeated at four months.

Conducting a survey of GPs and PNs on a range of health-literacy-related issues and barriers to the delivery of preventive care at both the provider-level and patient-level to determine if and how knowledge and behaviours of the GPs and PNs had changed during the trial.

Screening of patients to determine low health literacy

To determine the prevalence of low health literacy, patients within the four practices were invited to complete a self-administered questionnaire over a two-week period between September and October 2012. Patients aged 40-69 years who visited a participating GP during this period were eligible for screening for their level of health literacy using three validated questions.⁴⁵ These have been used in other studies with disadvantaged populations.^{46,47} The wordings of questions 1 and 2 were adapted to suit the Australian PHC setting. A fourth question designed to assess patients' language preference for reading medical or health care instructions was also included.⁴³ The survey was made available in English and also in the two most common languages spoken by patients attending the practices (Chinese and Russian). The questions were scored on a five-point (1-5) Likert scale,⁴⁷ and scores dichotomised into adequate (3-10) or low health literacy (>10), with the latter being the inclusion criterion. Each practice was given 100 hard copies of the survey.

Data to assess completeness of patient records

Clinical records were audited at baseline and again four months into the trial for patients who had seen the participating GP at least once in the last 12 months and did not have a chronic disease. The clinical audit was used to assess completeness of patients' records for information related to:

- > preventive health measures
- > CVD risk profile
- > management of patients with elevated risk of developing diabetes and/or CVD.

Patient records were audited for blood pressure (BP), fasting blood lipids and glucose, smoking status, alcohol consumption, waist circumference, BMI, and antihypertensive and lipid-lowering medication. Data were de-identified.

Following the baseline clinical audit, GPs were provided with a report that compared the completeness of assessments of their patients with the average results of the four enrolled practices.

Face-to-face discussions were held with individual GPs and PNs to discuss their report's findings. The results were discussed along with any concerns about their validity followed by a discussion of the barriers to preventive care, areas where improvements in the prevention of vascular disease could be made and ways of referring patients to appropriate programs and providers.

Based on the results of the completeness of patients' records, GPs were asked to set two to three targets for their practice related to increasing the assessment and recording of PA, diet and/or BMI.

Data to assess changes to GPs' and PNs' knowledge and behaviours

To understand if and how knowledge and behaviours of the GPs and PNs had changed during the trial, surveys and interviews were conducted with these groups at the beginning of the trial and again four months into the trial.

GPs and PNs completed a survey adapted from the Preventive Medicine Attitudes and Activities Questionnaire (PMAAQ).⁴⁸ The survey included a set of health-literacy-related questions and assessed providers' self-reported prevention behaviours, referrals, and management of risk factors for CVD, confidence in risk assessment and the importance of provider- and patient-level barriers to the delivery of preventive care.

Qualitative interviews were conducted with GPs and PNs before and after the intervention to ask about:

- > preventive care provision;
- > allowances or changes made for patients with low health literacy; and
- > skills and support needed to deliver preventive care to patients with low health literacy.

Interviews were audio-recorded, transcribed and thematically coded. The data were initially analysed using an inductive approach,⁴⁹ and a list of themes generated. A process of mapping and interpreting the data followed, which led to the development of a small list of cross-cutting themes charted into mind maps to extract relationships between themes.

Provider training for the intervention

As part of the intervention, face-to-face 2.5-hour long group education sessions were conducted using case studies, which included cases provided by the GPs.

One to two weeks after the meeting where the clinical audit reports were discussed. Two members of the research team presented and discussed the role of PHC in assessing and managing the risk factors for vascular disease and identification of and effective communication with low health literacy patients. This was demonstrated in simulated consultations.

These sessions focussed on providing GPs with current evidence on the management of patients with low health literacy in PHC settings. The GPs were given articles with current evidence.

Results

Patients with low health literacy

A total of 113 eligible patients completed the survey and 29% of the patients were shown to have low health literacy scores (based on a score greater than 10).

Improvement in recording of the risk factors

A total of 3,768 patient records were audited at the baseline and 2,225 at follow-up. In all practices, there were non-significant trends for improvement in the recording of risk factors.

Changes to GPs and PNs' knowledge and behaviours

The analysis of the health-literacy-related questions showed a non-significant trend to improvement in the frequency of each of the following practices (see Appendix 7 Table 11):

Tailoring advice according to health literacy levels

Using clear communication techniques

Asking patients to state key points in their own words

Encouraging patients to ask questions

Assisting patients to access community-based lifestyle programs

In qualitative interviews, GPs and PNs tended to equate English literacy levels with health literacy levels. When asked how they provided preventive care to patients with low health literacy, they tended to focus on the importance of overcoming language difficulties:

If we need an interpreter you can ring up and get that, sometimes give them information in their own language, (yep yep) that can help. (GP)

GPs overcame language difficulties by employing PNs and other staff who spoke the same language as their patients. Similarly, they referred patients' on to allied health providers (AHPs) who spoke the same language as them.

Markers of low health literacy reported by GPs and PNs included poor compliance with lifestyle advice, a manual occupation, ethnic background or nonverbal cues, such as body language.

The providers described three approaches to providing preventive care to patients with low health literacy: tailoring their management to the patient's level of health literacy; reinforcing or repeating preventive messages; or checking compliance and adherence. These approaches did not change significantly after the intervention. However, both GPs and PNs recognised the need to make a special effort to communicate with patients with low health literacy:

After I educate them... I try to ask them the questions about the things that I told them...if they can answer the questions well, it means that they understand. (PN)

After the intervention, both GPs and PNs also had a greater appreciation of the importance of printed materials as an additional communication tool:

I think this is a very important ...giving them literacy materials [to review] when [they] go back [home], most importantly ask them to come back to ask questions if they don't understand. (GP)

However, all GPs reported time constraints as a barrier to providing preventive care, especially for patients who required more time. GPs said that nurses, and to some extent AHPs, were helpful in enhancing the capacity of the practice to provide preventive care to patients with low health literacy:

the nurse and me have the dual role; we do it together. The great thing with this practice, I've got my own exercise physiologist and dieticians so people at higher risk can have these government-supported programs. (GP)

There was little change in their pattern of referral of patients with low health literacy. Except for one practice where there was good access to bilingual AHPs, they described significant barriers to access. Some providers recognised that those with poor health literacy also required assistance in navigating the referral process:

I think if they have low literacy you'll have to make the appointment for them. I think that's the best to help them, they will get confused, won't remember, probably won't make the appointment, but you make the appointment for them, this is when you got to go, where you got to go. (PN)

Conclusions and implications

Raising provider awareness of the prevalence of low health literacy among their patients was an important initial step in increasing access to preventive care for patients with low health literacy. Although the intervention appears to have contributed to increased recording of preventive care activity and some increased awareness of communication strategies for patients with low health literacy, providers continued to conflate English language literacy with health literacy after the intervention. This is understandable given the impact that both have on communication and continuity of clinical care.⁵⁰ However, different strategies are required to address poor language skills than low levels of health literacy.⁵¹

Some providers recognised that patients with low health literacy needed greater support in navigating referral options. However, this was far from universal and not recognised as a formal part of the role of nurses. Despite recognition of the importance of care navigation in the link between health literacy and health outcomes, there has been very little research on the most effective role for PNs in helping patients access and use other preventive services.⁵²

The implications of the key findings of the pilot study are presented in Table 2.

Table 2: Implications of key findings of the pilot study

Key Findings	Implications for our subsequent research
<p>It was feasible to screen patients for low health literacy in general practice, but only a small number of potentially eligible patients were given the health literacy screening forms to complete.</p> <p>29% of the screened patients were identified with low health literacy. In 2006 the Australian Bureau of Statistics reported that 59% of the Australian population had health literacy below what was required to manage their health.¹¹</p>	<p>More effort is needed to train administrative staff to ensure that a greater proportion of patients are screened and those with low literacy do not opt out. Use of a software program to identify potentially eligible patients would be of assistance to the reception staff.</p>
<p>The intervention had an impact on the recording of preventive care.</p> <p>Providers were more sensitive to low health literacy, however their approach to patient education and referral did not change as a result of the intervention.</p>	<p>Further provider training and practice support is needed and this needs to be tailored to practitioners' basic approaches to preventive care and address the capacity constraints faced by GPs and PNs. The training may be provided by professional organisations and Primary Health Networks (PHNs).</p>
<p>GPs recognised the value of PNs and the referral to AHPs. This was, however, limited by their availability and the languages they spoke.</p>	<p>Greater support needs to be provided to PNs by PHNs, especially in their role as prevention navigators and in developing links with referral services.</p>

Study: Better Management of Weight in General Practice (BMWGP)

BMWGP aimed to evaluate the implementation and effectiveness of prevention navigators supporting obese patients with low health literacy to better manage their weight. Using findings from our pilot study, we designed the BMWGP trial.

TRIAL HYPOTHESES

Primary hypotheses

1. Twelve months after the intervention, GPs and PNs in the intervention group will demonstrate greater improvement in their self-reported behaviour and confidence in assessing obese patients with low health literacy and providing advice and referral for weight loss compared with GPs and PNs in the control group.
2. Six months after completion of the intervention, obese patients with low health literacy attending intervention practices will be more likely than patients in control practices to report having
 - i. received assessment, advice and referral for weight loss, and
 - ii. attended or used community-based weight management lifestyle modification programs to which they were referred.
3. Six months after the intervention, obese patients with low health literacy attending intervention practices will be more likely to have improved their health literacy than patients in control practices.

Secondary hypotheses

1. Twelve months after the intervention, obese patients with low health literacy attending intervention practices will be more likely than those attending control practices to report:
 - i. an increased intake of dietary portions of fruit and vegetables per day;
 - ii. increased minutes of moderate and/or vigorous intensity PA per week;
 - iii. reduced consumption of high-fat food per day and hours of sedentary activity per day; and
 - iv. improved health-related quality of life.
2. Twelve months after the intervention, obese patients with low health literacy attending intervention practices will be more likely than those attending control practices to be assessed as having reduced and maintained their baseline weight by 5%

The qualitative interviews with GPs, PNs and patients explored factors influencing the implementation of the intervention and weight management—especially cultural and linguistic factors.

METHODS

The methods used in this trial have been published as a research protocol.⁵³ A summary is provided below and further information is included in Appendix 8.

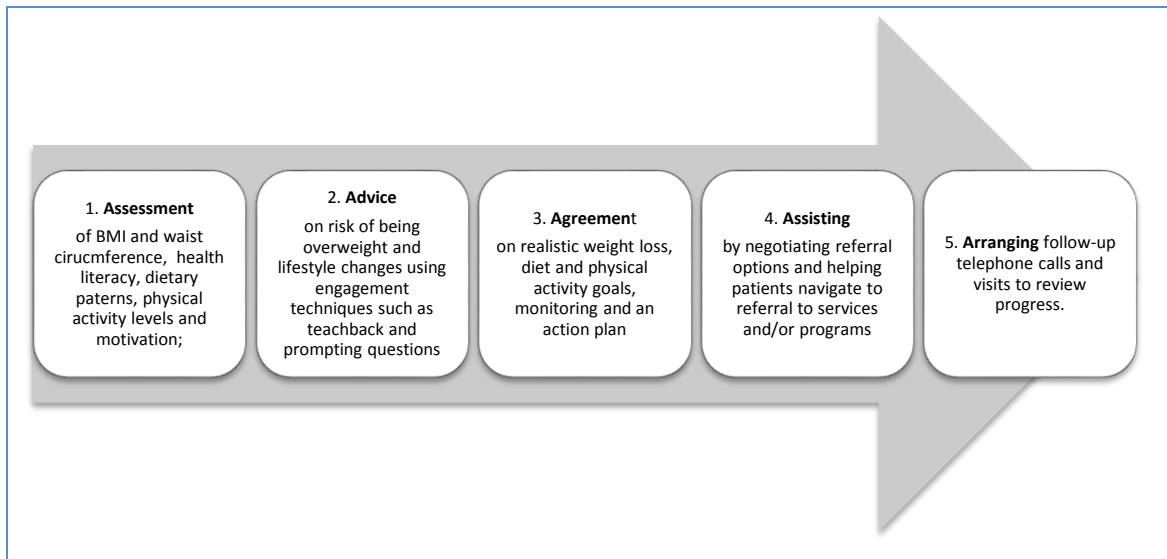
Research design

A pragmatic cluster-RCT was conducted with randomisation of practices to intervention and control groups. Randomisation was in permuted blocks and occurred across two states: New South Wales and South Australia. Due to the nature of the intervention, participating GPs and PNs were not blinded to the intervention.

Intervention

The objective of the intervention was to provide a comprehensive approach to the management of obese patients with low health literacy across the 5As (**A**sk, **A**ssess, **A**dvice, **A**gree/Assist and **A**rrange) modified from that outlined in the NHMRC clinical management guidelines.^{20,54-56} This was provided in a PN health check visit and subsequent telephone follow-up and review appointments. The intervention was delivered over six months by GPs and PNs.

Figure 1: The BMWGP intervention framework

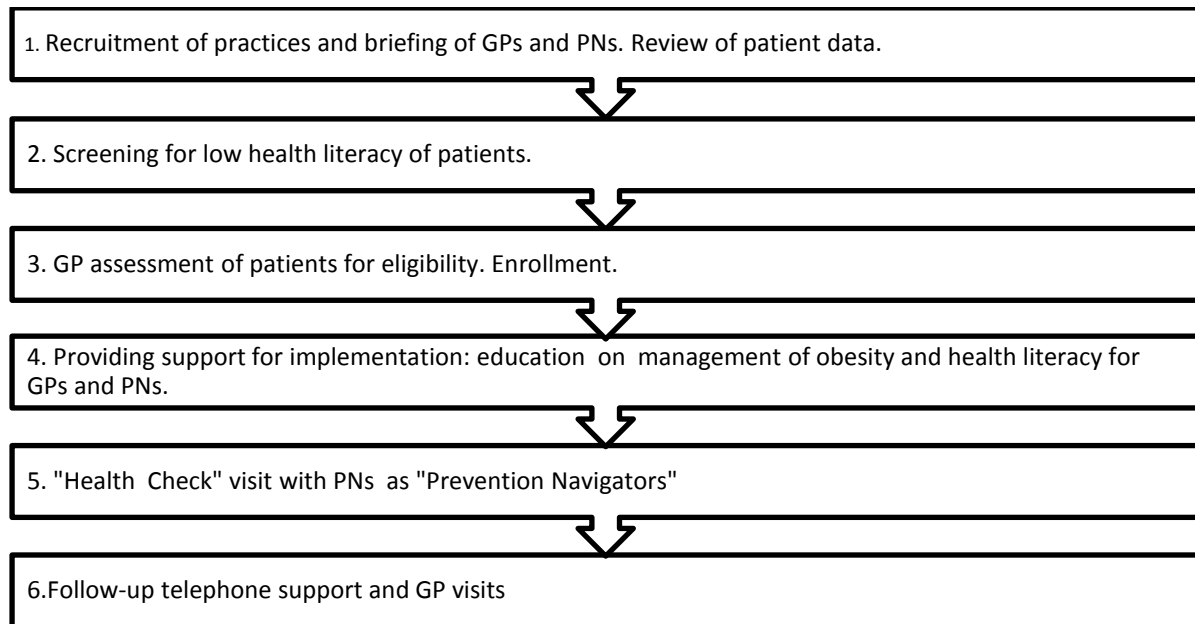


Modified from NHMRC clinical practice guidelines for the management of overweight and obesity in adults, adolescents and children in Australia 2013

TRIAL IMPLEMENTATION

This trial was conducted with ethical approval from the UNSW Australia Human Research Ethics Advisory Panel and the University of Adelaide Human Research Ethics Committee and registered with the Australian Clinical Trials Registry. All participants gave full written informed consent. The trial intervention was implemented in six stages as depicted in Figure 2 below.

Figure 2: Six stages of the BWMGP intervention



Stage 1: Recruitment of participants and audit of patient data

The trial was conducted in disadvantaged areas of Sydney and Adelaide, with 10 practices recruited in each area. These were randomised to intervention and control groups (10 in each group). Three practices subsequently withdrew – one in Sydney and two in Adelaide – leaving 17 practices. Each practice had at least one consenting GP and PN and used an appropriate electronic record system – a system which could be audited with the Pen Computer Systems Clinical Audit Tool (PENCAT) (<http://pencs.com.au>). 38 GPs and 25 PNs participated with all PNs and 35% of GPs being female. The GPs had worked on average 13 years and PNs an average of five years in general practice. In most practices, besides the GPs, the PNs delivered preventive care.

Stages 2 and 3: Screening and recruitment of patients

The eligibility criteria of the patients were:

- > aged 40-70 years
- > at least one practice attendance in the previous 12 months
- > their usual GP was a participant in the study
- > showed a low level of health literacy from the screening test
- > had a BMI ≥ 30 , and
- > willing to return for a health check.

Patients were excluded from the study if they had a chronic condition, previous stroke, were receiving current treatment with a weight loss medication or previous or planned bariatric surgery, in the next 12 months.

A software program specifically developed to help identify patient eligibility was used to print enrolment forms. Patients who had insufficient English language proficiency were provided with forms translated into their own language when available. The form included the Brief Health Literacy Screen (BHLS) with an additional question about language preference (as detailed in Table 3), a patient consent form, a page for the GP to confirm eligibility and data extracted from the patient's record. The patient's GP assessed whether the patient was

eligible to be enrolled in the trial. Table 12 in Appendix 7 has additional details about the characteristics of the patients recruited.

Table 3: Health literacy screening questions

Health literacy screening questions (questions A-C are from the BHLS)	Response options
A. How often do you have someone help you read health information materials?	1. Never 2. Occasionally 3. Sometimes
B. How often do you have problems learning about your medical condition because of difficulty understanding written information?	4. Often 5. Always
C. How confident are you filling in medical forms by yourself?	1. Extremely 2. Quite a bit 3. Somewhat 4. A little bit 5. Not at all
D. In which language do you prefer to read your health care information?	English or other

Of patients screened with the BHLS, 10% of patients had a score of more than 10 whereas 55% had a score of three or more on question C alone. 204 patients were recruited, with 45 excluded as they failed to match the eligibility criteria. This included patients without a positive BHLS because there were insufficient numbers of patients meeting that criterion. The BMI of the patients was between 30 and 52.9 kg/m², with an average of 36.2 (SD 5.2). There were no significant (NS) differences between intervention and control group patients in any of the baseline characteristics, which included gender, age, language spoken at home, education level and health risk factors (e.g. BMI, smoking status, alcohol consumption, BP and cholesterol). While the BHLS screening questions were positive for fewer patients than expected, they correlated well with four of the domains of the more extensive Health Literacy Questionnaire (HLQ), as detailed below and in Table 8: *Health literacy scores for intervention and control group* on page 24.

Stage 4: Support for implementation

Education on the management of weight and low health literacy was provided to GPs and PNs. This included:

- > reviewing results from the baseline clinical audit;
- > discussing strategies for improvement in assessment and management of obese patients based on the NMHRC clinical guidelines for the management of overweight and obesity in adults; and
- > tailoring the strategies for patients with low health literacy, including enhanced communication techniques, goal setting, referral navigation and follow-up.

Specific training was provided to the PNs to support and guide patients during the health check visit and also in follow-up support activities. Educational meetings were also held for the control group practices, but these focussed on cardiovascular risk assessment and management.

Stage 5 and 6: Health check visit with PN as ‘Prevention Navigator’ and follow-up

Supporting and helping patients were key to this intervention. The PNs were central to this, acting in a role called ‘Prevention Navigator’. A health check visit was organised for each patient with a prevention navigator where support was provided for activities such as setting goals, choosing appropriate referral options followed by telephone calls to check on patient

progress and arranging follow-up visits to the practice. The prevention navigators also provided patients with appropriate information on weight management. Of the 68 eligible patients in the intervention group, 50 patients (74%) received the health check where weight and waist circumference were measured and dietary fruit and vegetable intake, PA, readiness to change and barriers to changes in diet and PA were assessed. 74% were referred to a weight management program or specialist. Appendix 9 provides more details.

DATA COLLECTION

Data collected from GPs and PNs

GPs and PNs completed a questionnaire that was modified for our previous research and further adapted for this study.^{44,57} All participants were invited to participate in a qualitative interview. An overview of the data collected from GPs and PNs is provided in the following Table 4 and further details are provided in Table 13, Appendix 10.

Data collected from patients

Data collection from patients included screening, data extracted from the medical record and at health checks, questionnaires administered by telephone (in the language of the patient) and qualitative interviews administered by telephone to a sample of patients in intervention programs. An overview of the data collected from patients is provided in Table 5 and details of the tools used for the patient survey are provided in Appendix 11.

Table 4: Data collected from GPs and PNs

Variables	Collection method and frequency
Frequency of assessment and management of obesity	Questionnaire at baseline and 12 months in both groups
Levels of confidence in managing obese patients with low health literacy	Questionnaire at baseline and 12 months in both groups
GPs and PNs' attitudes, beliefs and practices regarding obesity management ⁵⁸	Questionnaire at baseline and 12 months in both groups
Their knowledge about obesity assessment	Questionnaire at baseline and 12 months in both groups
Their attitudes, beliefs and practices in assessment and management of preventive care to obese patients with low health literacy (including the perceived facilitators and barriers to obesity management)	Interviews at baseline and 12 months in both groups
How ethnicity influences weight management in obese patients with low health literacy	Interviews at baseline and 12 months in both groups
The roles of PNs in helping patients navigate community-based lifestyle referral services for weight loss and the perceived facilitators and challenges in doing so	Interviews with intervention group PNs (acting as prevention navigators) only at 12 months

Table 5: Data collected from patients

Variables	Collection method and frequency
Age, gender, BMI, waist circumference, BP, lipids, alcohol intake, smoking status, cardiovascular risk	Extracted from medical record and at health check at baseline and 12 months
Diet, PA, weight loss behaviours	Questionnaire at baseline, six and 12 months in both groups

Variables	Collection method and frequency
Patient attendance at GP, assessment, advice, referral and attendance in previous six months and hospitalisation in previous 12 months	Questionnaire at baseline, six and 12 months in both groups (hospitalisation data was collected at baseline and 12 months only)
Health Literacy Questionnaire	Questionnaire at baseline and six months in both groups
Quality of life and health status (IWQOL and SF12) (refer to Appendix 11)	Questionnaire at baseline and 12 months in both groups
How ethnicity influences weight management in obese patients with low health literacy	Qualitative interviews with patients in intervention practices only at baseline and six months
Attitudes to the intervention and weight management	Qualitative interviews with patients in intervention practices at baseline and six months

DATA ANALYSES

Data analyses were conducted to:

- > Test the hypotheses presented on page 16. This entailed testing for baseline differences between the intervention and control groups in outcomes of interest and testing for differences between the groups in changes in those outcomes.
- > Describe providers' experiences in relation to providing weight management services, particularly with patients with low health literacy
- > Describe patients' experiences of weight management services provided by general practices
- > Explore correlates of health literacy
- > Explore the patients' experience of weight stigma.

FINDINGS

1. GPs' and PNs' self-reported attitudes, practices and confidence

More than half of the GPs and PNs reported that they often assessed diet, PA and BMI, but only a quarter reported doing so for waist circumference. Most providers, especially GPs, reported that they often advised patients to eat less fat and do regular exercise. Goal setting was reported by half of the GPs and PNs, but referral was reported as 'frequent' by only a third. At 12 months, there was no significant change in the reported frequency of assessment or advice in either the intervention or control groups. There was a small increase in the frequency of referral to weight management programs for those in the intervention group.

At baseline, only 21% of GPs and 35% of PNs reported frequently assessing patients' level of health literacy. Half reported tailoring advice to health literacy and two-thirds reported using clear communication techniques. Only a third of GPs and PNs reported asking patients to repeat the key points that they understood and less than half encouraged questions. Only a third reported assisting patients to access referral programs and followed

up their attendance. At 12 months, GPs and PNs in the intervention group, but not the control group, improved their frequency of asking patients to repeat key points, encouraging questions and assisting in access and follow-up after referrals. Details are provided in Table 6.

Barriers and enablers to obesity management

In qualitative interviews, GPs and PNs talked about being too time poor to actively manage obesity, especially on top of patients' presenting problems. They would find it useful to have referral services available that were familiar with their patients' culture and language. Often a patient's family member acted very well as an interpreter. GPs and PNs reported that obesity was sometimes considered to be culturally acceptable and that their patient's culturally-related food practices often prevented them from eating healthy food. Also, patients with families in which multiple members were obese did not consider obesity to be a problem. They believed that patients' ethnicity and their dietary traditions played an important role in obesity.

Table 6: Proportion of GPs and PNs reporting behaviours that assist patients with low health literacy[^]

Provider behaviours	Intervention		Control	
	Baseline	12 months	Baseline	12 months
	n=29	n=19	n=32	n=10
Assess your patients' level of health literacy	8 (28%)	6(32%)	8 (24%)	4(40%)
Tailor the way you provide advice according to a patient's level of health literacy	15 (52%)	13 (68%)	18 (55%)	8(80%)
Use clear communication techniques (e.g. plain words, limit to 3-5 main points, ensure information is specific and concrete)	23 (79%)	16 (84%)	19 (58%)	8 (80%)
Ask patients to state key points in their own words to assess their understanding of the care advice given ('Teach-back')	9 (31%)	13 (68%)*	11 (33%)	6 (60%)
Encourage patients to ask questions (by asking 'what questions do you have?' instead of 'do you have any questions?')	12 (41%)	14 (74%)*	14 (42%)	5 (50%)
Assist patients to access community-based programs (e.g. exercise programs)	12 (41%)	15 (79%)*	9 (27%)	5 (50%)
Follow-up patient referrals to community-based programs and preventive services	5 (17%)	11 (58%)*	8 (24%)	4 (40%)

* $p < 0.05$

[^] 'often' or >60% of the time at baseline and 12-month follow-up

GPs and PNs related how their patients' lack of motivation prevented them from losing weight, but often there were other issues behind the lack of motivation, such as depression, work stress or family issues. Dedicated 'obesity' staff, ongoing visits to local AHPs, good

communication skills and raising public awareness for obesity were cited as some enablers to managing obesity. GPs asserted that PNs had the skills to assist patients get to referral services. Similarly, PNs also perceived themselves in the role of a prevention navigator since they had a more familiar relationship and better opportunities to discuss obesity with patients than GPs. However, they acknowledged that they needed to learn more about the local referral services.

Further information from the provider survey is provided in Appendix 16. Qualitative data from interviews conducted with the providers on their roles, approaches and views around obesity management are presented in Appendix 12.

2. Patient report of assessment, advice and referral provided in general practice

At baseline, patients reported a mean of 3.8 (SD 3.3) GP visits in the previous three months. At six months follow-up, patients reported a mean of 4.5 (SD 3.7) GP visits in the previous three months. There were no differences between intervention and control groups.

Assess

At baseline, 82% of patients reported that their GP or PN weighed them and 46% that their waist circumference was measured (see Table 7). At six months there was a significant reduction in the control group, but not in the intervention group ($p < 0.05$). Waist circumference was measured more frequently in the intervention but less frequently in the control group ($p < .01$) (see Table 7).

In the clinical audit data, recording of BMI increased in both intervention (from 26% to 41%) and control groups (33% to 40%). Among patients with $BMI \geq 30$ recording of waist circumference increased in both intervention (from 19% to 48%) and control groups (from 17% to 35%) with the level of recording being higher in the intervention group at the second audit, which corresponded to the six months follow-up.

Advice

45% of patients recalled receiving education and there was no significant difference between intervention and control groups. At six months this had increased in the intervention group but not changed in the control group (see Table 7).

Assist

At baseline, 25% of patients reported that they had been referred for diet, PA or weight loss, with referral more likely in the intervention than the control group (see Table 7). At six months this had increased for intervention group patients but decreased in the control group.

Table 7: Percentage of patients reporting they were assessed, advised or referred in the last six months by group (intervention or control) at baseline and six months follow-up.

Service	Baseline				Six months follow-up			
	All	Intervention	Control	Significance*	All	Intervention	Control	Significance*
Assessment								
Weight	82%	97%	75%	0.01	71%	90%	58%	0.03
Waist circumference	46%	66%	37%	<0.01	43%	70%	26%	<0.01

Advice								
Advice for diet, PA or weight management	41%	47%	37%	NS	47%	71%	33%	0.01
Referral								
Referral for diet, PA or weight management	25%	46%	11%	<0.01	35%	67%	17%	<0.01

*Significance of between-group difference

3. Patient health literacy

Health literacy levels, as measured by the HLQ, were similar in the intervention and control group patients at baseline. Average scores for each of the nine domains of the HLQ were not different at baseline between intervention and control group patients. Scores were lowest for the domains relating to actively managing my health (AMH), critically appraising health information (CA), navigating the health care system (NHS); and ability to find good quality health information (FHI). Results are outlined in Table 8.

At six months, health literacy scores in two domains (AMH and reading and understanding health information (UHI)) improved in the intervention group but there was no significant change in the control group.

Table 8: Health literacy scores for intervention and control group

HLQ domain	Intervention group		Control group	
	Baseline	12 months	Baseline	12 months
Healthcare provider support (HPS)	3.31	3.38	3.16	3.12
Having sufficient health information (HSI)	3.01	3.06	2.96	2.96
Actively managing health (AMH)	2.58	2.88*	2.72	2.73
Social Support (SS)	3.08	3.03	3.06	3.07
Critical appraisal (CA)	2.72	2.71	2.79	2.76
Active engagement with health care (AE)	3.93	4.13	4.17	4.14
Navigating the health care system (NHS)	3.63	3.76	3.87	3.90
Ability to find good health information (FHI)	3.38	3.79	3.98	3.99
Reading and understand health information (UHI)	3.52	3.93*	4.17	4.18

P<0.05

In order to assess the specificity of the BHLS, we examined the association between BHLS score and each of the HLQ domain scores. We found that three HLQ domains were related to both the total BHLS score and question C only: Appraisal of health information, FHI and UHI well enough to know what to do. Having sufficient information to manage my health was associated with question C, but not the total score (see **Appendix 15**). 76% of the patients

interviewed at baseline reported that they were trying to lose weight. This was associated with two domains (AMH and CA with a borderline association with HSI). Among those trying to lose weight, those with higher HSI and CA reported having sufficient information to help them lose weight (see **Appendix 15**).

In order to examine the association between health literacy and socio-demographic factors, health behaviours and quality life, we conducted multilevel analysis (adjusting for clustering at the practice level). The independent variables included gender, age group, employment status, hospital admissions, post-secondary education, PA adequate, smoking status, BMI category, physical and mental health status (SF12 - PCS and MCS).

Having sufficient information to manage the patient's own health (HSI) was associated with BMI greater than or equal to 35 (β -0.223(0.096)) and better physical (PCS, β 0.037(0.017)) and mental health status (MCS; β 0.028(0.011)).

Feeling understood and supported by their health care provider (HPS) was negatively associated with current smoking (β -0.294 (0.134)) and positively with mental health status (MCS; β 0.022(0.009)).

Actively managing one's own health (AMH) was associated with better mental health (MCS; β 0.027(0.010)).

Having social support for health (SS) was negatively associated with current smoking (β -0.441(0.142)) and better mental health (MCS; β 0.038(0.010)).

Being able to critically appraise health information (CA) was not associated with any of the independent variables tested.

Actively engaging with health care providers (AE) was associated with better mental health (MCS; β 0.036(0.013)).

Being able to navigate the health care system (NHS) was associated with better physical and mental health (PCS; β 0.58(0.025). MCS; β 0.052(0.015)).

Ability to find good health information (FHI) was associated with better physical and mental health status (PCS; β 0.072(0.027), MCS; β 0.044(0.017)).

Ability to read and understand health information well enough to know what to do (UHI) was associated with post-secondary education (β 0.278(0.141)) and better mental health (MCS; β 0.030(0.014)).

4. Patient diet, PA and weight

At baseline, patients reported only eating an average of 3.4 portions of fruit and vegetables per day (range 0-7) and an average PA score of 2.7 (maximum 8) based on time spent on vigorous and moderate PA per week. There was no difference in the diet or PA scores between intervention and control patients and no correlation between diet and PA scores. There was no correlation between diet score and health literacy (HLQ).

There was a significant correlation between PA score and two HLQ domains: Actively managing health (AMH; $p < 0.01$) and having social support for health (SS; $p < 0.01$). 19% reported having lost weight in the previous three months and 80% reported that they were trying to lose weight, with no difference between intervention and control groups.

At six months, 62% of intervention and 35% of control group patients reported having increased their dietary fruit and vegetable intake ($p < 0.05$ single sided). 43% of intervention and 28% of control group patients reported increasing their PA (NS). 62% of intervention and 34% of control patients reported losing weight ($p < 0.05$ single sided).

In the clinical audit data, among all patients with a BMI of ≥ 30 at baseline, the mean BMI decreased in both the intervention (35.0 to 33.7 $p < 0.001$) and control groups (34.7 to 33.7, $p < 0.001$), but there was no significant difference between intervention and control groups.

Barriers and enablers

In qualitative interviews with the intervention group patients at baseline and six months, patients reported that they believed that cultural norms, such as 'hospitality' and 'generosity', fostered overeating in social situations and that this led to obesity. Patients believed that their traditional food influenced weight management. Family and household duties, including childcare, food preparation and other household chores, were found to be a priority for patients over adopting healthy lifestyles, particularly for women.

Coping with migration issues in Australia was reported to have negatively influenced patients' mental wellbeing, which in turn influenced their ability to follow a healthy diet and engage in PA. Depression seemed to be a major barrier to weight loss and many patients appeared to lack self-efficacy as evidenced by the expressions they used, such as "I tried, but it didn't work", "I can't", "I wanted to, but couldn't" and "it's too hard".

In describing their experience in their general practice, patients voiced concern about the lack of consultation time and receiving vague advice about the importance of exercise and healthy eating. They appeared to be reluctant to accept a referral to AHPs as they feared that they would not understand their cultural norms (see Appendix 14). Some patients could not understand their health care providers because of the medical jargon they used, which made it difficult for them to understand weight loss advice.

5. Patient experience of stigma

In the patient survey, we found that 33% of patients reported that they had experienced ridicule, teasing, unwanted attention or discrimination because of their weight in the previous week. Multivariate analyses identified that the odds of experiencing these types of stigma were significantly greater for patients with obesity category 2-3 relative to obesity category 1 (OR=1.9) or who spoke a language other than English at home relative (OR=1.5), were not in the workforce relative to those in the workforce (OR=2.1). It was also associated with a number of domains of the HLQ: It was more likely in patients who reported feeling understood and supported by health care providers (OR=2.0), but less likely in those who had sufficient information to manage their health (OR= -1.7) or were able to actively engage with health care providers (OR= -2.0).

DISCUSSION

Main findings

Only a third of GPs and PNs reported frequently assessing their patients' health literacy and tailoring communication, referral and follow-up to this at baseline. At follow-up, GPs and PNs in the intervention, but not the control group, reported that they more frequently asked patients to repeat key points, encouraged questions and assisted patients to access referral and follow-up afterwards. Extending the role of PNs might have facilitated this. While GPs and PNs were generally positive about weight management, they were frustrated by what they saw as a lack of success and patient motivation.

GP assessment of weight improved especially in the intervention group. Most patients enrolled in the study recalled having had their weight measured by their GP and this did not change at six months follow-up in the intervention group but decreased in the control group. Waist circumference was reported as having been measured in less than half of the patients increasing to most of the intervention group, but decreasing to less than a third of the control group by six months.

Patient-reported GP advice and referral also improved only in the intervention group. Just under half of the patients recalled having been given advice on diet, PA and/or weight management by the GP at baseline. This increased in the intervention but decreased in the control group over the six months. Only a quarter of patients reported having been referred and a tenth attended referral at baseline. By six months this had increased to two-thirds of

intervention group patients who were referred with one in seven attending these referrals. By comparison one in six control group patients were referred and less than one 30 attended.

This improvement in advice and referral is encouraging. In previous research, we found that improvements in the assessment of risk factors were not accompanied by significant changes in advice giving or referral.²¹ The relatively small impacts on attendance at referral services suggest the need for greater emphasis on referral navigation.

Health literacy was strongly related to the physical and mental health status of patients. Health literacy facilitates patient motivation to lose weight and lifestyle behaviours (PA). Our findings on the link between health literacy and health behaviour are in accordance with previous research and theoretical models.^{17,59} In the intervention group, health literacy improved over six months in two domains: AMH and reading and UHI. There was no change in the control group. A small number of studies on interventions targeting health literacy in relation to behavioural risk factors have demonstrated improvements.⁶⁰ However, this is one of the first studies to demonstrate improvements in measured health literacy in primary care patients with obesity.

Intervention group patients were more likely to report having improved their diet and lost weight than control group patients at six months. However, recorded BMI improved in both groups (albeit for the entire population of the GP who met the audit selection criteria) and there was no significant change in PA. Patients reported negative influences from their social networks, especially related to cultural factors and that depression or lack of self-efficacy sapped their motivation. They also reported frustration with the lack of GP time with them and non-specific advice provided or jargon used. These point to the challenges of providing effective advice during brief consultations and in translating this into a sustained change in behaviour.⁶¹

A third of patients reported having experienced stigma associated with obesity. This was more frequent in patients with category 2 or 3 obesity, who spoke a language other than English at home relative and patients who were not in the workforce relative. It was also related to health literacy. This is an important issue affecting not only the quality of life, but also patients' ability to successfully engage with primary care providers and participate in referral services.^{62,63}

Study limitations

This study has a number of limitations. The general practices included in this project were located in low socio-economic areas of Sydney and Adelaide only and, thus, the findings may not be generalisable to other Australian geographical areas. However, previous research has found similar levels of reported preventive activities.²¹ Some of the data relied on practitioners' or patients' self-reported frequency of preventive activities. As confirmed by data collected from the clinical audits and the patient survey, practitioners' tended to overestimate the frequency of these activities. Also, small changes were difficult to detect because of the low number of patients participating in the study and the problem in recruiting sufficient patients who had low health literacy at screening using the BHLS. However, we analysed the specificity of BHLS against the more comprehensive and validated HLQ. Finally, difficulty recruiting general practices and patients delayed the completion of the 12-month follow-up to the second half of 2016. Therefore while 12-month provider data is presented in this report, 12-month patient data could not be reported here.

Implications

The intervention impacted on the frequency of both provider use of health literacy techniques and patient recall of receiving advice and referral from providers. This success may have been due to the focus on processes of care and behavioural techniques used across the 5As (see Figure 1) rather than specific diet or PA information. Similarly, the achievement of changes in facets of health literacy related to learnt capabilities for self-

management and understanding of health information may have been due to the emphasis on active engagement of patients in each of these steps. This has implications for the approach to educating and supporting primary care practitioners in preventive care, especially PNs.

This sort of approach does not lend itself well to brief interventions in a consultation already crowded with other presenting problems and conditions to review. In this study, nurses arranged a specific visit in which they walked through each of the A's with an emphasis on advice, agree and arrange. This allowed a more comprehensive approach to preventive care, including negotiating and helping patients navigate to a referral service or program. This role was seen as feasible for PNs (see Appendix 13), but is not currently funded under Medicare.

In this study, practices did not need a large number of referral options (usually three was sufficient). However, these did need to be appropriate to the language and cultural needs of patients and be provided in different modes to suit the needs of different patients. PHNs have invested large amounts of resources in developing pathways that better integrate care from general practice to secondary medical care. A similar effort is needed to provide referral pathways for obese patients to access evidence-based behavioural interventions whether on the telephone, online, one-to-one or in groups. These local pathways need to clearly articulate the program details, including the services provided, criteria for accessing the program or service, languages available, cost, availability in time and place, and other participants.

This study underlines the importance of health literacy in preventive care. It is not a deficiency that can simply be addressed by speaking more slowly, using simpler language and repeating messages. Health care places such demand on our capacity to deal with complex information that at some point we all become health illiterate. Health literacy is a capability that can be developed to allow us to actively engage in decisions about our own health.

Finally, the experience of stigma by the study's participants is an issue of concern, highlighting the need for primary health professionals to be aware of and empathic towards the stigma experienced by their patients and avoid inadvertently reinforcing this in their language.

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Appendix 1: Abbreviations

AHP	Allied health providers
AMH	Actively managing my health
BHLS	Brief Health Literacy Screen
BMI	Body mass index
BMWGP	Better Management of Weight in General Practice
BP	Blood pressure
CA	Critical appraisal
CALD	Culturally and linguistically diverse
CVD	Cardiovascular disease
FHI	Find good quality health information
GP	General Practitioners
HL	Health Literacy
HLQ	Health Literacy Questionnaire
HPS	Healthcare provider support
HSI	Having sufficient health information
NHS	Navigating the health care system
NHMRC	National Health and Medical Research Council
NS	Not significant
OECD	Organisation for Economic Cooperation and Development
PA	Physical activity
PENCAT	Pen Computer Systems Clinical Audit Tool
PHC	Primary health care
PHN	Primary Health Networks
PN	Practice nurses
RCT	Randomised controlled trial
SEIFA	Socio-Economic Indexes for Areas
SS	Social Support
UHI	Understanding health information

Appendix 2: Literature review – Details

Types of studies

Intervention studies (experimental or quasi-experimental trials with or without a control group) with a minimum six month follow-up published in English between 1990 and the end of June 2013 within OECD member countries.

Setting

The intervention needed to be delivered in PHC, by PHC professionals outside a PHC setting, or to individuals who were referred to the study by PHC professionals. The definition of PHC used was:

Socially appropriate, universally accessible, scientifically sound first level care provided by health services and systems with a suitably trained workforce comprised of multi-disciplinary teams supported by integrated referral systems in a way that: gives priority to those most in need and addresses health inequalities; maximises community and individual self-reliance, participation and control; and involves collaboration and partnership with other sectors to promote public health.⁶⁴

Types of participants

Men and women (≥ 18 years) with a BMI ≥ 25 kg/m² at baseline and without chronic disease who were in 'treatment' for weight reduction.

Types of interventions

Interventions aiming to achieve weight reduction through a change of diet and/or PA, with or without psychological approaches to behaviour-change, by improving participants' knowledge and/or skills for weight loss.

Outcomes

Measured change in body weight or BMI between baseline and follow-up, at least once, at six months or beyond post-intervention. For controlled studies, these outcomes are compared between intervention and comparison groups. The outcomes were classified as statistically significant if the weight or BMI reduction reported was $p < 0.05$.

Excluded studies

Studies were excluded if they included pregnant women or individuals diagnosed with CVD, diabetes, cancer or other chronic conditions or where pharmaceutical or surgical interventions were employed for weight loss.

Online databases

Twelve online journal databases (Medline, CINAHL, PsycINFO, APAIS-Health, Scopus, Embase, Cochrane Library, Web of Science, Australian Medical Index, PAIS International, Joanna Briggs Institute Library, and Google Scholar) were searched using a comprehensive search strategy (available upon request). These databases were searched for studies published between 1990 and June 2013.

Search strategy

We complemented this online database search by searching for references in five journals: *Patient Education and Counselling*; *American Journal of Preventive Medicine*; *Preventive Medicine*; *International Journal of Obesity*; and *Health Education & Behavior*. The selected studies were also used for identifying earlier and more recent publications.

Several relevant websites of key government, international bodies and non-government organisations were searched for grey literature. Experts in this area of research were also contacted for any relevant literature.

Identification of relevant studies

Four members of the review team (“reviewers”) independently carried out the initial screening of the retrieved titles and abstracts (where available) against agreed a priori criteria summarised in Table 1 (Step 1). A 10% random sample of excluded studies was reviewed by two reviewers (Step 2). Full-text copies of potentially eligible papers were obtained and independently assessed (Step 3) by seven reviewers. Data were independently extracted by three reviewers into a summary table (Step 4). Any disagreements in the inclusion of specific studies and/or data extraction were resolved by reaching a consensus through discussion.

The quality of each study included was assessed by two reviewers using a standard checklist,⁶⁵ and checked by another reviewer. An overall methodological rating of ‘strong’, ‘moderate’ or ‘weak’ was achieved in six sections: 1) selection bias; 2) study design; 3) confounders; 4) blinding; 5) data collection methods; and 6) withdrawals and dropouts.

Data extraction

Data were systematically extracted for the following domains:

1. Study characteristics: year of publication, design, recruitment method, location (country and setting), number of participants, study duration and length of follow-up (points of follow-up measurement), proportion of subjects lost to follow-up and appropriate control or ‘usual care’ group (where applicable).
2. Intervention intensity: categorised as ‘low’, ‘medium’, ‘high’ or ‘very high’ depending on the duration of contact between the provider and the participant or the number of points of contact between the two during the intervention period:

low intensity: ≤four hours of contact or six points of contact between the provider(s) and the participants;

medium intensity: >four hours and <eight hours of contact or ten points of contact between the provider(s) and the participants;

high intensity: ≥eight hours and <12 hours or 12 points of contact between the provider(s) and the participants; and

very high intensity: ≥12 hours of contact or 14 points of contact between the provider(s) and the participants.

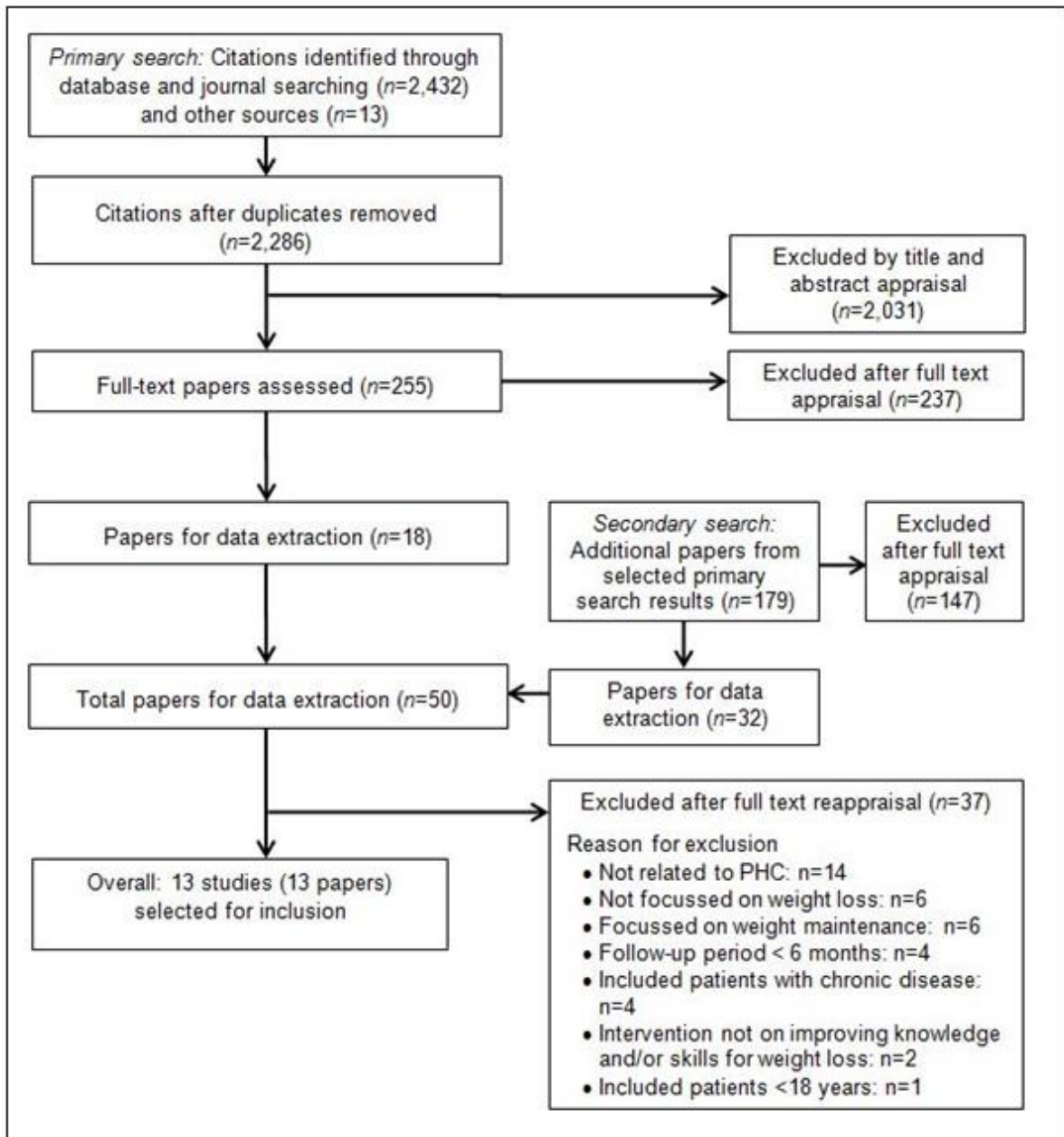
3. Participant characteristics: baseline socio-demographic variables (gender, mean age, education, socio-economic status, employment), ethnicity and risk factors.
4. Intervention characteristics: professional background of individuals delivering the intervention, mode of administration, component, dose of delivery (frequency and duration) and focus (knowledge, skills, behavioural change).

Analysis

Change in measured weight and/or BMI was compared over six and/or 12 months. A meta-analysis could not be performed due to the small number of studies identified and heterogeneity among the studies. A narrative synthesis approach was used.

Appendix 3: Literature review – Process for selection of studies

Figure 3: Process for selection of studies for the literature review



Appendix 4: Literature review – Characteristics of studies

Table 9: Characteristics of the studies in the literature review

Features of the study	Specialised
Provider training	Over 50% provided training to the health professionals and educators to deliver the intervention. However, not all provided details of the training. Educators were drawn from different professional backgrounds and included both health and non-health professionals. The duration of the training sessions ranged from three hours to 54 hours, with nine sessions of six hours each.
Time frame and number of sessions	The most common period of intervention delivery was six months and ranged from three to 12 months. The number of sessions ranged between five and 104 over the intervention period. The final follow-up was mostly at 12 months.
Specialised information	Some studies provided specialised information to specific patients. For example, patients with risk of developing type 2 diabetes were provided information on diabetes prevention.
Delivery	<p>All studies (except one delivered via the Internet) involved face-to-face contact:</p> <ul style="list-style-type: none"> > 25% used a combination of one-to-one and group sessions > 25% individual contacts only > some included telephone and mail > one utilised the Internet and delivered the intervention through a website <p>50% had group face-to-face sessions. This kind of social support was further emphasised in two studies that encouraged participants to seek support from their own social networks.</p>
Exercise and PA	In 75% of the studies, PA education was given. One study also provided individualised advice on exercise. In 50% of studies, participants could attend PA session(s).
Providers	<p>50% of the studies had one main provider and, of these, 25% used providers other than public health care professionals:</p> <ul style="list-style-type: none"> > one intervention was delivered in the public health care setting by non-National Health Service staff (health promotion counsellors); > one used an Internet-based weight-control package in a community setting; and > one study evaluated the effectiveness of medical assistants as weight loss counsellors. <p>50% of studies had two or three providers.</p>
Lifestyle change or personal goal	<p>A lifestyle change or personal goal setting approach was used by a number of studies to motivate participants to progress from intention to actual behaviour-change, with one study featuring one of the following:</p> <ul style="list-style-type: none"> > motivational interviewing; > group motivational discussions; > telephone motivation sessions along with motivation letters;

Features of the study	Specialised
	<ul style="list-style-type: none"> > website generated motivational statements used to modify participants' behaviour and achieve weight loss; > development of cognitive and behavioural skills for managing diet and PA or to self-manage weight; and > regular self-assessment to empower participants to take responsibility for own decisions and make informed choices. <p>Other behaviour techniques included planning and problem solving and environmental control and encouragement to self-monitor behaviour.</p>
Educational resources/tools for patients	<p>In about 50% of the studies, participants were provided educational resources/tools.</p> <p>Participants in at least one study</p> <ul style="list-style-type: none"> > attended supervised cooking classes; > were encouraged to keep food records; > were given diaries; > had PA logbooks; > were provided with analysed nutritional data and brief comments on food diaries; and > given the opportunity to review their completed food diaries and PA records with education providers.

Appendix 5: Literature review – Summary of findings on interventions

Table 10: Summary of findings on interventions

Summary of finding on interventions	Comment
Combining both dietary and PA interventions together with behaviour modification is effective for losing weight.	This reinforces the findings of earlier systematic reviews. These earlier reviews also included lifestyle interventions that did not specifically aim to impact individual's knowledge and skills for weight loss.
There is evidence to support the role of lifestyle interventions aiming to change an individuals' knowledge and/or skills in weight loss.	Despite the diversity in the types of interventions included in this review, 11 of the 13 studies reported positive intervention effects.
Not one type or component of lifestyle intervention emerged as the most effective model.	We were unable to determine what constituted the successful aspect of the intervention due to the small number of studies identified for use in our review. Our review could not determine why the interventions in two studies failed to accomplish their objectives ^{36,39}
There is a need for programs to more explicitly describe the training provided to the intervention providers.	Only seven of 13 studies mentioned training the educators in the intervention delivery.
None of the studies included in this review reported on participants' health literacy.	Reviews on the relationship between health literacy level and health outcomes have shown a consistent association between low health literacy and poorer health-related knowledge and comprehension. ^{42,43} There is a need to address this gap in research and to develop weight loss interventions that specifically target people's health literacy.
None of the included studies had specifically targeted or measured outcomes in disadvantaged socio-economic population.	Despite obesity being particularly prevalent among those in the most disadvantaged socio-economic groups, ²⁰ and disadvantaged populations struggling most with limited health literacy, ⁶⁶ none of the included studies had specifically targeted or measured outcomes in disadvantaged socio-economic population.

Appendix 6: Literature review – Strengths and limitations of the review

The review included the following strengths and limitations:

The small number of studies that met our selection criteria made it not only difficult to confidently identify the effectiveness of the weight loss interventions, but it was also not possible to identify individual intervention components associated with success.

The inclusion of a large number of countries (including Australia, USA, UK and other European countries) with different health systems, obesity issues and population characteristics.

Our inability to access studies that tested participants' health literacy for weight loss at baseline due to a lack of studies in this area. This meant that we could not ascertain if participants initially had low health literacy.

A lack of explicit measurements of improvements in health literacy. Though the vast majority of studies did lead to weight loss, we were unable to report specifically on health literacy improvements.

Obesity often coexists with other chronic conditions; however, our review excluded patients with existing chronic diseases, thus limiting the scope of the review findings to people who are in otherwise good health.

Our limited capacity to understand the generalisability of our findings to people with different socio-economic status and ethnic backgrounds due to the fact that most of the studies did not state the participants' ethnicity, education and socio-economic status.

The fact that our review excluded patients with existing chronic diseases limited the scope of the review findings to people who are in otherwise good health. The review, therefore, did not examine the reality that obesity often coexists with other chronic conditions.

A lack of reasons for participant dropout.

More than half of the studies did not conduct the analysis on an intention-to-treat basis.

We included studies where the minimum follow-up period was six months and used outcome data only for six and 12 months. This is a limitation as weight loss achieved in the first six months after intervention is often regained in the subsequent months as demonstrated by one of the reviewed studies.³⁸ Thus, for studies where the final follow-up was at six months, the possibility of weight regain over longer follow-up periods could not be excluded.

Appendix 7: Pilot study – Details

The mean frequency (from 0 = never to 6 = always) of activities that identify and address patient health literacy, as reported by the providers (n = 8) before and after intervention, is presented in Table 11.

Table 11: Provider-stated frequency of assessment, advice and assistance to patients with low health literacy before and after the intervention (n=8)

Provider behaviour	Baseline Mean (95%CI)	After intervention Mean (95%CI)
Assess patients' health literacy	3.13 (1.77-4.49)	4.00 (2.66-5.43)
Tailor advice according to health literacy	4.13 (3.26-5.00)	4.75 (3.94-5.56)
Use clear communication techniques	4.75 (4.03-5.47)	4.88 (4.10-5.66)
Ask patients to state key points in their own words	2.75 (1.43-4.07)	3.88 (2.47-5.29)
Encourage patients to ask questions	2.75 (1.38-4.12)	3.63 (2.20-5.06)
Assist patients to access community-based lifestyle programs	2.38 (1.10-3.66)	3.25 (1.98-4.52)
Follow-up on patients referred to community-based lifestyle programs	2.38 (1.10-3.66)	3.25 (1.69-4.81)

Appendix 8: BMWGP – Recruitment of general practices and patients for the trial

Recruitment of practices

The BMWGP trial ran for six months with 20 general practices recruited –10 each in Sydney and Adelaide with intervention and control groups. The details of the methods are available in the publication.⁴⁴ The criteria for inclusion included having a PN, using an appropriate electronic record system, with at least one consenting GP and PN and with patients from a low socio-economic group.

55 general practices were approached of which 41 were eligible and 14 ineligible. Of the 41 eligible practices, 20 practices were initially recruited: 10 from disadvantaged areas in Sydney and Adelaide respectively. Ten each were randomised to the intervention or control group. Three practices subsequently withdrew – one in Sydney and two in Adelaide - leaving 17 practices of which 9 were randomised to the intervention and 8 to the control group.

In these practices, 63 providers (38 GPs and 25 PNs) participated. One third (35%) of the GPs and all of the PNs were female. 16% of the GPs and 75% of the PNs worked part-time. 35% of the GPs and 17% of the PNs were aged 55 years or more. The GPs had worked an average 13 years in general practice and 12 years in their current practice. The PNs had worked an average of five years in general practice and four in their current practice.

Most practices had one PN either in a part-time or full-time position. Fourteen practices had a full-time and four had a part-time practice manager. Practices were asked who, besides the GP(s), delivered preventive care. In most instances, it was the PN who carried out this role. For example, in 19 practices, PNs conducted clinical examinations, provided counselling and lifestyle advice on weight management (n=15), and organised health assessments, arranged referrals and raised patient awareness about preventive services available in the practice (n=11 each). Most practices used the Medicare Items for the 45-49 health check (n=14) and type 2 diabetes check and Aboriginal and Torres Strait Islanders health assessments (n=15 each).

Recruitment of patients

There were no significant differences between intervention and control group patients in any of the baseline characteristics (see Table 12).

Table 12: Characteristics of recruited patients at baseline – intervention and control

Characteristics of recruited patients at baseline	Intervention % (n=68)	Control % (n=95)	Total % (n=163)	Significance
Female	76.5	62.1	68.1	NS
Born in Australia	53.7	53.0	53.3	NS
English only spoken at home	35.2	27.7	30.7	NS
Employed	48.1	49.4	48.9	NS
Post-secondary education	55.6	54.2	54.7	NS
Current smoker	7.4	7.4	7.4	NS
Mean age (years)	57.4	55.3	56.2	NS
Mean BMI >34 kg/m ²	44.1	52.6	49.2	NS
Mean Systolic BP mmHg	129.2	129.5	129.4	NS
Mean Total Cholesterol mmol/L	5.13	5.07	5.09	NS

Appendix 9: BMWGP – Results of health check

As part of the BMWGP trial, a health check visit was organised for each patient with a prevention navigator where support was provided for activities such as setting goals, choosing appropriate referral options, overcoming barriers to attendance at referral and arranging follow-up. This was done two weeks after enrolment in the trial. The prevention navigators also provided patients with appropriate information on weight management.

Of the 68 eligible patients in the intervention group, 50 patients (74%) received the health check where weight and waist measurements were taken and dietary fruit and vegetable intake, PA, readiness to change and barriers to health literacy were assessed. 74% were referred to a weight management program or specialist.

98% of patients had their BMI, sugary drink intake, high-fat dietary intake and sedentary behaviour assessed.

All discussed moderate weight loss goals (5-10%).

96% received some dietary advice and 94% some PA advice.

94% were given a date for a follow-up visit.

74% were referred to a weight management program or specialist:

- > 34% to a group program run by Medicare Local/PHN
- > 22% to Get Healthy telephone coaching
- > 28% to dietician
- > 46% to an exercise physiologist
- > 8% to other programs

Appendix 10: BMWGP – Method for GP and PN qualitative interviews and survey

GP and PN survey

A validated self-completed questionnaire⁵⁷ was modified for our previous research⁴⁴ and further adapted for this study. The questions related to the assessment and management of CVD risk factors, and GP and PN confidence in managing obese patients with low health literacy. We included questions to assess GP and PN's attitudes, beliefs and practices regarding obesity management⁵⁸ and their knowledge about obesity assessment. These were administered at baseline, six and 12 months.

GP and PN qualitative interviews

GPs and PNs in the intervention practices were invited to participate in qualitative interviews. The interviews assessed their provision of preventive care to obese patients with low health literacy, including the perceived facilitators and barriers and educational needs for effective management of obesity. In addition to that, we explored how ethnicity affects patients' weight management.

Other data collection

Besides data collected from general practice staff and patients, data was collected as outlined in Table 13.

Table 13: Additional data collected

Information of interest	Collection method and comments
CVD risk factors: weight, height, BMI, waist circumference, smoking status, alcohol consumption, BP, lipids and 5-year absolute cardiovascular event risk	Extracted from client records at the baseline and 12 months in all practices for patients aged 40-70 years under the care of participating GPs.
Health literacy levels	To make health professionals aware of the prevalence of low health literacy among their patients, highlighting the need for them to pay special attention to these patients. Screening took place in all practices and was used in discussions.
Data on risk assessment, including weight, BMI, waist circumference, dietary habits and PA. Patients were assessed for their readiness to change their weight and barriers to change diet and PA were determined. Weight, diet and PA goals were set and recorded	This 'Health Check' data was collected by prevention navigators at intervention practices only. The assessment data was used to help prevention navigators tailor advice to the needs of their patients and to help patients decide about their referral to community-based lifestyle modification programs and services. Data on goal setting was used to determine patients' progress against the goals at follow-up visits.

Appendix 11: BMWGP – Tools used for the patient surveys

In addition to questions developed by the study team, the patient surveys included the following validated tools.

Brief health literacy screen

The BHLS was used at enrollment for health literacy screening. This tool was used to identify patients with low health literacy.

Health literacy questionnaire

The HLQ covers areas related to health literacy, especially around the wide range of lived experiences of people attempting to engage in understanding, accessing and using health information and health services.⁶⁷ The domains assessed by the HLQ are presented in Table 14.

Table 14: Domains of the Health Literacy Questionnaire

	Abbreviation	Scale description
1	HPS	Feeling understood and S upported by H ealthcare P roviders
2	HSI	H aving S ufficient I nformation to manage my health
3	AMH	A ctively M anaging my H ealth
4	SS	S ocial S upport for health
5	CA	C ritical A ppraisal of health information
6	AE	Ability to actively E ngage with health care providers
7	NHS	N avigating the H ealthcare S ystem
8	FHI	Ability to F ind good quality H ealth I nformation
9	UHI	U nderstanding H ealth I nformation well enough to know what to do

SF-12® Health Survey

The SF-12® Health Survey, a 12-item short form with a 4-week recall, was used to collect data on eight health-related quality of life domains: physical functioning; role-physical; bodily pain; general health; vitality; social functioning; role-emotional; and mental health.⁶⁸

Lite (IWQOL-Lite)

The Lite (IWQOL-Lite) was used to assess the impact of weight on quality of life.⁶⁹ This is a validated, 31-lite self-report measure of obesity-specific quality of life. In addition to a total score, there are scores on five domains: physical function; self-esteem; sexual life; public distress; and work.

Appendix 12: BMWGP – Findings from baseline qualitative provider interviews for intervention group

Findings from GPs and PNs' interviews are presented below.

Interviewees cited the following enablers to managing obesity: dedicated obesity staff; ongoing visits to local AHPs; good communication skills; and raising public awareness for obesity. GPs expressed the desire to have more trained PNs, but were prevented to do so because of a lack of funding.

GPs acknowledged that PNs were trained to be care navigators and could play an important role, especially in care planning. Similarly, the PNs also saw themselves in the role of a care navigator, especially since they had more opportunity to discuss obesity with patients and patients were more 'personal' with them than they were with doctors. PNs acknowledged the need to learn more about local referral services and what would suit their patients.

Practitioners also reported that:

Their approach to managing obese patients with low health literacy was individualised.

In some practices, obesity management was solely the GP's responsibility with PNs playing a lesser role.

They were too time poor to actively manage obesity.

It was easier to manage obesity if patients were already motivated, but often there were other issues behind their lack of motivation, such as depression, work stress or family issues.

They were frustrated not to have access to resources in patients' own language.

Referral services familiar with patients' culture and language would be useful.

Obesity was sometimes considered to be culturally acceptable.

In families where multiple members were obese, patients did not consider obesity to be a problem.

Patients' ethnicity and their traditions related to dietary habits played an important role in obesity.

Practitioners reported that their approach to managing obese patients with low health literacy was individualised. If the patient had co-morbidities, they arranged care plans and referred patients to AHPs, such as dieticians and exercise physiologists, but not necessarily all patients availed this opportunity. However, if the patient did not qualify for a care plan, patients were still referred and provided information. In some practices, PNs conducted the initial assessment of the patient, followed by the GP acting on the PN's assessment and providing advice and information to the patient. In other practices, PNs took a secondary role or played no role in obesity management and it was solely the GP's responsibility to do so. Health practitioners found it easier to manage obesity if patients were already motivated and some believed in taking an opportunistic approach to managing obesity.

Health practitioners talked about being too time poor to actively manage obesity, especially on top of on the patient's presenting problems. For those patients who did not speak English, some found it frustrating not to have access to resources in the patient's own language, whereas other health practitioners were able to access information in languages their patients needed. Health practitioners would find it useful to have referral services familiar with patients' culture and language and community-based programs to refer patients to, provided the patients had the desire to attend referrals. Often patient's family members acted very well as interpreters. In practices where PNs had an active role in patient management, GPs desired to have more trained PNs employed, but a lack of funding prevented them from doing so.

Health practitioners reported that obesity was sometimes considered to be culturally acceptable and their patient's culturally-related food practices often prevented them from eating healthy food. Also, in families where multiple members were obese, patients did not consider obesity to be a problem. Health practitioners believed that patients' ethnicity and their traditions related to dietary habits played an important role in obesity. People from some cultures relied on a high carbohydrate diet and some others consumed large quantities of fried food.

A lack of motivation prevented patients from losing weight, but often there were other issues, such as depression, work stress or family issues. Where practices were located in semi-rural areas, a lack of public transport was a problem for patients accessing referral services or having the opportunity to buy healthy food.

Dedicated obesity staff, ongoing visits to local AHPs, good communication skills and raising public awareness for obesity were cited as some enablers to managing obesity. As a result of participation in the study, one of the practices had hired a dietician and an exercise physiologist who ran weekly group classes. Health practitioners who wanted training in obesity management mentioned motivational interviewing, communicating with people with poor literacy, exercise and nutrition as key areas of professional development.

When health practitioners were asked about the role PNs could play as a care navigator and in assisting patients to get to referral services and community-based lifestyle modification programs, GPs acknowledged PNs were trained to be care navigators and could play an important role, especially in care planning. Similarly, PNs also saw themselves in the role of care navigator, especially since they had more opportunities to discuss obesity with patients and patients were more 'personal' with them than they were with GPs. However, they acknowledged that they needed to learn more about the local referral services first and what suited their patients most.

Appendix 13: BMWGP – PNs’ feedback on their role as prevention navigators

The interviews with the PNs who acted as prevention navigators revealed a range of impact and observations. Their experience was largely positive, with some PNs changing their approach to managing obesity as a result of participating in the study.

To make their role sustainable as prevention navigators, they felt that their GP needed to take a leading role in providing advice to patients, with the prevention navigator providing ongoing support and the administration staff also being involved in following up with patients by phone.

Other feedback from PNs on the impact of the intervention on PNs, the practice and the patients is presented in Table 15.

Table 15: Impact of the study according to prevention navigators

Impact of the study	Details
Impact on patients of prevention navigators’ role	Prevention navigators consulted with patients to tailor referrals to the community-based lifestyle modification programs based on their needs. Thus, for example, when referring patients to PA groups, prevention navigators chose classes appropriate to their patient’s age. For eligible patients, prevention navigators were able to arrange five referral visits with a private AHP as part of a Team Care Arrangement. Prevention navigators opted, whenever possible, for within-practice AHPs and local community-based lifestyle modification programs to cater for patients’ who relied on public transport to get to referrals.
Impact on PN of being in the role of prevention navigators	Involvement in the BMWGP study helped prevention navigators actively involved in obesity management change their practice. For example, they started to use ‘teach-back’ to assess their communication with patients and to more frequently follow up with patients to provide reinforcement and support. PNs became more confident in managing obesity and aware of local services their patients could benefit from. PNs became more aware and more focussed on obese patients with low health literacy than before. In one practice, though, the PN reported that involvement in the study did not change their management of obesity.
Impact on the practice of being in the BMWGP study	One prevention navigator mentioned that the practice’s involvement in the study was the catalyst for employing an exercise physiologist and psychologist to help manage obesity. Other practices decided to send recall letters to all patients with a BMI over 30 and routinely noting patients’ BMI and waist circumference.

Barriers to the implementation of the study

The prevention navigators identified several barriers to the implementation of the study:

There were few options left for referral in one area after the closure of the HEAL Program.

Prevention navigators cited patients' low motivation, cost and distance to referral services as barriers for referrals.

For patients who were socially active, travelling or busy with work and family commitments, time was a barrier in attending referrals.

With elderly people, mobility in their use of public transport was an issue.

Recommendation from PNs in relation to prevention navigators

To make their role sustainable, prevention navigators felt that their GP needed to take a leading role in providing advice to patients, while the prevention navigator would provide ongoing support and administration staff routinely recall obese patients. Other prevention navigators thought they did not have enough time to devote to obesity management and that, in the absence of an obesity-specific Medicare item number, this new role would not be sustainable.

Prevention Navigator is a potential role for PNs in Australian in general practice as evidenced by this trial and some other successful examples of the use of community navigators in screening and prevention.⁷⁰⁻⁷²

Data analysis

Data was analysed to determine the different outcomes between intervention and control groups.

Appendix 14: BMWGP – Findings from qualitative patient interviews with Arabic-speaking patients

About the interviews

Interviews were conducted with a subset of Arabic-speaking patients.

Culture

Patients believed that cultural norms, such as ‘hospitality’ and ‘generosity’, fostered overeating in social situations, which led to obesity. Patients believed that their traditional food influenced weight management. Family and household duties, including childcare, food preparation and other household chores, were found to be a priority for patients over adopting healthy lifestyles, in particularly for women. Attempts to adhere to a healthy diet tended to decline when children were present. Some women, however, viewed the presence of children as a motivation to cook healthier meals. However, when it came to exercising, women were more likely to indicate that caring for children was a barrier to participating in PA due to a lack of energy and time.

Religious celebrations

Some patients discussed the association between religious celebrations and weight gain. Some believed that fasting was a barrier to weight loss because it meant they were less likely to participate in PA.

Acculturation

Patients reported changes in diet-related behaviours after immigrating to Australia. Many patients acknowledged that they took great interest in trying new food, particularly take-away foods, although they continued to cook their traditional food. On the other hand, some patients maintained their eating pattern following migration.

Psychological barriers to weight loss

Coping with migration to Australia negatively influence patients’ mental wellbeing, which in turn influenced their ability to follow a healthy diet and engage in PA. Patients believed that their obesity was a result of their migration experience. They felt depressed due to being separated from their original home and family, being lonely and isolated and having relocated to a ‘strange’ country. Thus, depression seemed to be a major barrier to weight loss.

Self-efficacy and cognitive abilities

When probed about their previous weight management experience, patients constantly used expressions such as “I tried, but it didn’t work”, “I can’t”, “I wanted to, but couldn’t” and “it’s too hard”. These expressions suggested that patients did not believe they were capable of managing their weight.

Health practitioners

Patients preferred seeing GPs from an Arabic-speaking background because they believed they would be more likely to understand their experience of weight loss and because of their shared cultural and linguistic background. A lack of English proficiency was not considered a barrier when interacting with their health care providers because patients used a professional interpreter, a family member or a friend to translate for them. They also preferred a verbal mode of information delivery as opposed to reading written information. Others favoured visual demonstrations for learning about food preparation and exercise techniques.

Patients’ reported that their GPs often failed to give enough information about self-management techniques. When patients were asked about the weight loss advice they had received, they voiced frustration about continually receiving vague advice about the

importance of exercising and eating healthily for weight loss. Patients appeared to be reluctant to take on advice from AHPs as they would not understand the cultural norms around weight loss and eating in Arabic cultures. Some patients also found it difficult to understand weight loss advice because of the medical jargon used by their health care providers.

The limited amount of time during consultations was a common factor that hindered patients' ability to understand the behaviour-change required to lose weight. Some felt let down by their GP in terms of the length of the consultation, even though they generally reported a good relationship with them.

Patients reported receiving information from various sources. Some patients mentioned formal support received from GPs, dieticians and diabetes specialists. Other patients received information from GPs, but did not report receiving referrals for weight management.

Social support

Many patients mentioned the influence of family and support on weight loss. Some patients reported that household commitments interfered with exercising and healthy food preparation. Other patients demonstrated a sense of personal responsibility in managing their diet. Some patients who did not have this support described it as a barrier to effective weight management.

Motivation

Patients with Type 2 Diabetes Mellitus (T2DM) reported that they were more concerned about their general health after the initial diagnosis of diabetes, which motivated them to lose weight. Issues relating to body image motivated the majority of patients to lose weight. Some women were motivated to lose weight for upcoming social occasions (e.g. weddings). Some patients valued their health and felt weight loss was important for healthy living. Others reported that they were motivated to lose weight to control medical conditions, such as hypertension or to reduce the number of medications they consumed.

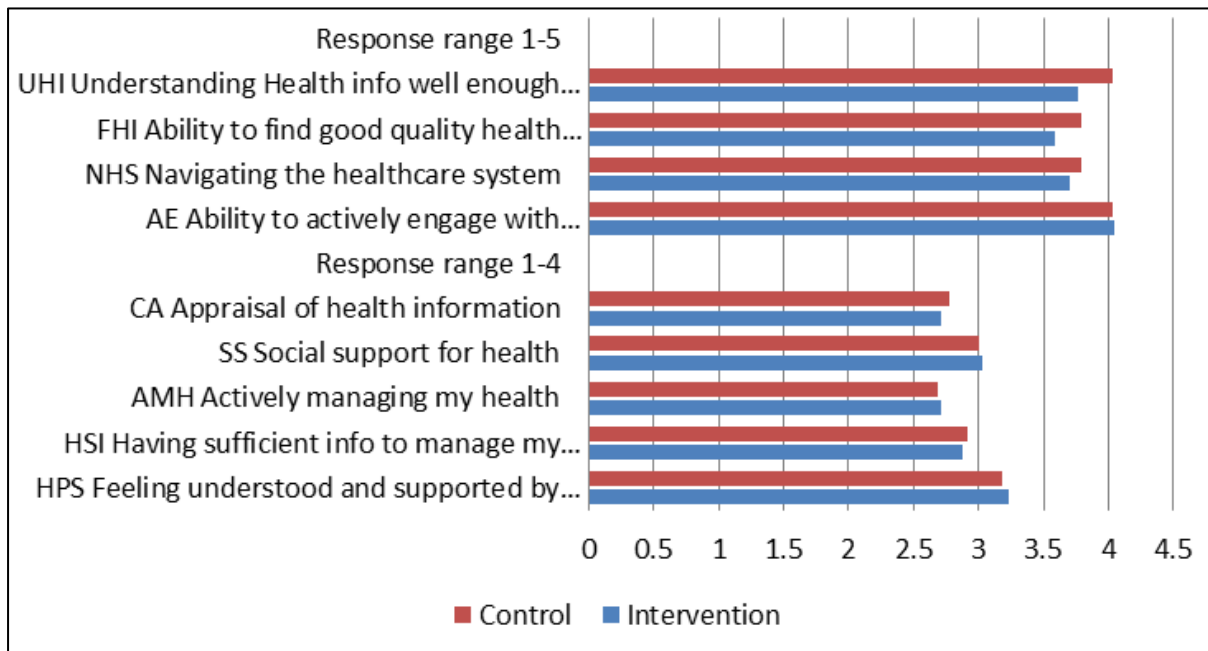
Beliefs

Most patients were aware of the connection between unhealthy eating habits and weight. Many patients with T2DM considered their weight gain as the cause of their diabetes. In contrast to that, some patients with T2DM underestimated the potential consequences of obesity and found it difficult to understand the importance of weight loss.

Appendix 15: BMWGP – Patient scores on the Health Literacy Questionnaire

Figure 4 illustrates baseline HLQ data available for 127 patients. The average scores for each of the nine domains of the HLQ were not different at baseline between intervention and control group patients. Scores were lowest for the domains: actively managing my health (AMH); critically appraise health information (CA); navigating the health care system (NHS); and ability to find good quality health information (FHI).

Figure 4: Baseline HLQ domain scores (means)



The HLQ domain scores were related to the BHLS scores (see Table 16). Both the total and question C scores were associated with

- > critical appraisal of health information (CA)
- > ability to find good quality health information (FHI), and
- > understanding health information well enough to know what to do (UHI).
- > Having sufficient information to manage my health (HSI) was associated with question C, but not the total score.

Table 16: Mean HLQ domains for patients with high or low health literacy on BHLS scores

HLQ domain	Total score >10	Total score <10	p	Question C 3+	Question C <3	p
	Low	High		Low	High	
Response range 1-4						
HPS	3.29	3.29	NS	3.19	3.20	NS
HSI	2.67	2.93	NS	3.02	2.81	0.03
AMH	2.60	2.72	NS	2.66	2.74	NS
SS	3.03	3.02	NS	3.03	3.01	NS
CA	2.46	2.79	0.02	2.91	2.64	0.003
Response range 1-5						
AE	4.05	4.03	NS	4.03	4.04	NS
NHS	3.44	3.80	NS	3.91	3.65	0.047
FHI	3.07	3.82	0.001	4.03	3.52	0.000
UHI.	3.35	4.02	0.002	4.21	3.75	0.000

76% of the patients interviewed at baseline reported that they were trying to lose weight. As presented in

Table 17, this was significantly associated with three domains (CA, FHI, UHI). People trying to lose weight were less likely than those not trying to lose weight to report being able to:

- > actively managing their own health (AMH);
- > critically appraisal health information (CA); and
- > having sufficient information to manage their own health (HSI).

Table 17: HLQ mean scores at baseline by intention to lose weight

HLQ domain	Trying to lose weight	Not trying to lose weight	p
	n=107	n=27	
Response range 1-4			
HPS	3.06	3.24	NS
HSI	2.70	2.94	0.04
AMH	2.38	2.78	0.000
SS	2.87	3.05	NS
CA	2.53	2.80	0.01
Response range 1-5			
AE	3.94	4.06	NS
NHS	3.71	3.77	NS
FHI	3.77	3.69	NS
UHI	3.85	3.94	NS

Appendix 16: BMWGP – Findings from the provider questionnaire

At baseline, GPs were more likely to be ‘moderately confident’ or ‘very confident’ in assessing, providing education, referral and follow-up than PNs (Table 18).

Table 18: Proportion of GPs and PNs reporting they were ‘moderately confident’ to ‘very confident’ in undertaking assessment and management activities of obese patients aged 40-70 years with low health literacy

Assessment and management activities	GP	PN	Total
	n=38	n=23	n=61
Assess diet	55%	39%	49%
Assess PA	63%	39%	52%
Assess readiness to change (to lose weight)	58%	35%	46%
Provide education and advice on weight management	71%	35%	54%
Arrange referral for diet, PA or weight management	71%	52%	62%
Follow-up patients referred for weight management and prevent relapse	58%	52%	54%

Potential barriers to preventive care

GPs and PNs reported a lack of interest, a lack of time and patients’ low health literacy as major barriers to preventive care for obese patients with low health literacy. PNs were more likely to report uncertainty about what preventive care to provide, communication difficulties or cultural differences (see Table 19). There was no significant change in the perception of either intervention or control groups regarding barriers over the 12-month period.

Table 19: Factors reported as ‘very important’ potential barriers to preventive care for obese patients with low health literacy aged 40-70 years at the baseline

Barriers	GP	PN	Total
	n=38	n=23	n=61
Lack of time	47%	48%	44%
Uncertainty about what preventive care to provide	18%	22%	20%
Communication difficulties with patients	18%	35%	25%
Cultural differences between doctors and patients	8%	30%	15%
Lack of patient interest	68%	57%	61%
Patients’ low health literacy	45%	52%	44%

The proportion of the GPs and PNs who agreed or strongly agreed with specific statements about obesity management at baseline are presented in Table 20. The attitudes of most GPs and PNs were positive towards the treatment of obesity and they saw managing it as part of their role. However, only 15% reported being successful with 26% enjoying the challenge of helping obese patients manage their weight.

There was no significant change in attitudes of GPs and PNs in the intervention or control groups over the 12 months.

Table 20: GPs' and PNs' attitudes towards the management of obesity ^

Attitudes	GP	PN	Total
	n=38	n=23	n=61
I think it is important to treat obesity before it has a chance to cause medically related problems.	97%	100%	97%
Obesity is a treatable condition.	82%	87%	80%
Waist circumference is a reasonable measure of obesity.	76%	65%	80%
I feel that most treatment programs have so little success that it is not worthwhile referring patient.	16%	9%	13%
Patients who do not desire weight loss should be respected and not be encouraged to do so.	13%	3 13%	13%
The physician who addresses weight may be overly concerned with societal norms for thinness.	5%	9%	13%
Being obese is not a serious problem unless it causes or aggravates a patient's medical condition.	3%	9%	3%
A patient's weight is not my concern.	0	4%	2%
I have been successful in treating patients for obesity.	19%	9%	15%
I enjoy treating mildly obese patients.	32%	17%	26%
I do not feel qualified to treat obese patients myself.	3%	2 9%	7%
I believe my own counselling is just as good as most other options for weight loss for my patients.	11%	9%	11%

^ proportion reporting that they 'agree' or 'strongly agree' with statements at the baseline

Appendix 17: BMWGP – Findings from the baseline and follow-up audit data: Recording of risk factors

To appraise the completeness of the assessment of patients, de-identified data was extracted from the medical records of participating practices at baseline and 12 months. 22,070 records of patients aged 40-70 years, including 53% female and an average age of 53 years, were analysed. Significant gaps in the recording of data were found as shown in Table 23. Recording rates for risk factors were higher for those patients who had a BMI of 30 or more as per Table 23. There were no significant differences between patient groups.

Table 21: Recording of risk factors for all patients versus patients with BMI >30

Assessment recorded in patients' records	All patients 40-70 years	Patients with recorded BMI >30
Alcohol	5.5%	9.9 %
Smoking status	76.8%	88.3%
BMI	30.2%	-
Waist circumference	4.5%	17.8%
BP	67.9%	93.4%
Lipids	28.7%	38.4%
CDV	36.8%	52.2%

Where it was recorded, BMI levels were similar in patients attending the intervention and control practices at baseline and at follow-up (see Table 22: Recording of risk factors at baseline and 12 months*).

Table 22: Recording of risk factors at baseline and 12 months*

Risk factors	All patients				Patients with BMI >30 at baseline			
	Interv'n	Control	Interv'n	Control	Interv'n	Control	Interv'n	Control
n=	8930	13140	7563	6181	1061	1753	1354	972
	BL	BL	12m	12m	BL	BL	12m	12m
Alcohol	6.3	4.9*	10.8	6.1*	11.5	9.0	18.9	9.0*
Smoking status	82.9	72.6*	85.2	83.6*	91.7	86.3*	93.6	92.9
BMI	25.5	33.4*	41.0	39.5	-	-		
Waist circumference	4.4	4.6	18.7	12.9	18.7	17.3	47.9	35.0*
BP	66.4	68.9*	68.5	74.3*	92.2	94.1	94.8	92.9*
Lipids	25.7	30.7*	32.9	38.7*	31.7	42.4*	39.2	49.9*
CVD	39.5	35.0*	39.9	48.1*	50.0	53.5	53.1	64.9*

* all patients and patients with BMI >30 at baseline

Mean BMI for those patients whose BMI ≥ 30 at baseline, decreased in both the intervention (35.0 to 33.7 p<0.001) and control groups (34.7 to 33.7, p<0.001) (see Table 23).

Table 23: BMI at baseline and 12 months

BMI category	Intervention group	Control group	Intervention	Control
	Baseline	Baseline	12 months	12 months
	n=2273	n=4391	n=3098	n=2444
<18	0.7	0.8	0.7	0.5
18-24	18.5	21.5	19.8	21.7
25-29	34.1	37.8	35.8	38.0
30-34	26.2	24.3	25.4	25.6
35-39	13.3	10.4	12.1	9.4
40+	7.1	5.2	6.2	4.8

Average CVD risk was similar in the intervention and control groups (mean 6.73 SD 5.39). There were no significant differences in the CVD risk of patients in intervention or control practices at baseline or follow-up (see Table 24).

Table 24: CVD risk of patients

CVD risk category	Intervention group	Control group	Intervention group	Control group
	BL	BL	12 months	12 months
	n=531	n=938	n=719	n=631
<10%	76.6	81.2	78.9	84.8
10-14%	13.6	10.2	12.5	9.8
15+%	9.8	8.5	8.6	5.4

CVD risk tended to be higher for patients who were overweight or obese.

Figure 5: CVD risk by BMI

