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# Current nutrition promotion, beliefs and barriers among cancer nurses in Australia and New Zealand

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# Current nutrition promotion, beliefs and barriers among cancer nurses in Australia and New Zealand

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*Rationale:* As many cancer patients and survivors do not meet nutritional and physical activity guidelines, healthier eating and greater levels of physical activity could have considerable benefits for these individuals. While research has investigated the cancer patients' perspective on their challenges in meeting the nutritional and physical guidelines, little research has been conducted on the role their health professionals play in this process. Cancer nurses may be ideally placed to promote healthy behaviours to their patients, but little is known about such promotion, particularly in Australasia (Australia and New Zealand). The primary aim of this study was to examine current healthy eating promotion towards patients, beliefs and barriers among cancer nurses in Australasia.

*Patients and Methods:* We conducted an online survey to investigate cancer nurses' current healthy eating promotion practices, beliefs and barriers. Sub-group cancer nurse comparisons were performed on hospital location (metropolitan vs regional and rural) and years of experience (<25 or ≥25 years) using ANOVA and chi square analysis for continuous and categorical data, respectively to gain some insight into whether these demographic characteristics may influence healthy eating promotion. *Results:* A total of 123 Australasian cancer nurses responded to the survey. Cancer nurses believed they were often the major provider of nutritional advice to their cancer patients (32.5%), a value marginally less than that of dietitians (35.9%) but substantially higher than oncologists (3.3%). The majority promoted healthy eating prior (62.6%), during (74.8%) and post treatment (64.2%). Interestingly, most cancer nurses felt that healthy eating had positive effects on the cancer patients' quality of life (85.4%), weight management (82.9%), mental health (80.5%), activities of daily living (79.7%) and risk of other chronic diseases (79.7%), although only 75.5% agreed or strongly agreed that this is due to a strong evidence base. While almost one third (31.6%) of nurses stated they did not have any barriers to promoting healthy eating, a lack of time (25.8%), lack of adequate support structures (17.3%) and lack of expertise (12.2%) were cited as the most common barriers. Analysis across sub-groups indicated very few significant differences in their healthy eating promotion practices, beliefs and barriers, suggesting that these demographic characteristics have minor effects on healthy eating promotion. *Conclusion:* Australasian

cancer nurses have favourable attitudes towards promoting healthy eating to their cancer patients across multiple stages of the cancer treatment and believe that healthy eating has many benefits for their patients. Unfortunately, several barriers to healthy eating promotion were reported. If these barriers can be overcome, nurses may be able to work more effectively with dietitians and nutritionists to improve the outcomes for cancer patients.

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## 22 Introduction

23 Cancer rates are rising in many international countries, with Australian 2010  
 24 data indicating that within an overall population of 22 million people, there  
 25 were 116,580 new cases of cancer diagnosed that year (Australian Institute  
 26 of Health and Welfare 2014).{Australian Institute of Health and Welfare &  
 27 Australasian Association of Cancer Registries 2010, #1109;Oefelein, 2002  
 28 #144} This very high number of new cancer cases in Australia is consistent  
 29 with many other countries and may reflect many factors including ageing of  
 30 the population (Brown et al. 2001; Li) and improved detection (Newton &  
 31 Galvão 2008). In addition, a range of modifiable risk factors appear to  
 32 contribute to these higher cancer rates, including insufficient levels of  
 33 physical activity, poor dietary choices and other unhealthy lifestyle choices,  
 34 such as smoking (Chan et al. 2005; Coups & Ostroff 2005).

35 Earlier detection of many cancers and advancements in surgical techniques,  
 36 radiation therapy, chemotherapy and hormonal therapies are allowing many  
 37 more individuals with cancer to survive longer post-diagnosis (Etzioni et al.  
 38 2008). Survival rates of 88% and 85% for prostate and breast cancer  
 39 respectively, indicate that that 53,296 Australian men diagnosed with  
 40 prostate cancer and 53,051 Australian women diagnosed with breast cancer  
 41 are still alive 5 years post-diagnosis (Australian Institute of Health and  
 42 Welfare & Australasian Association of Cancer Registries 2010). While survival  
 43 rates are high, cancer treatments result in many short- and long-term side-  
 44 effects that seriously affect the quality of life (QoL) and overall health and  
 45 wellbeing of these individuals. Many of these treatments may contribute to

46 cancer fatigue, with many of the hormonal therapies also predisposing these  
 47 individuals to unhealthy changes in body composition such as cachexia or  
 48 sarcopenic obesity. Cancer cachexia, is described as a multifactorial syndrome  
 49 involving the continual loss of skeletal muscle mass (with or without loss of fat mass) that is not  
 50 reversible by conventional nutritional support (Fearon et al. 2011). Sarcopenic obesity  
 51 is a condition characterised by significant reductions in muscle and bone  
 52 mass and increases in fat mass (Berger et al. 2012; Bylow et al. 2007; Genton  
 53 et al. 2006). Hormonal therapies (such as androgen deprivation therapy) and  
 54 chemotherapy can lead to similar significant declines in body composition  
 55 that predispose cancer patients to cachexia or sarcopenic obesity (Galvao et  
 56 al. 2008; Young et al. 2014). Moreover, these alterations in body weight and  
 57 composition may be associated with reduced functional status, the  
 58 development of co-morbidities such as osteoporosis, fall-related fractures,  
 59 and cardio-metabolic syndrome (Bundred 2012; Kintzel et al. 2008; Oefelein  
 60 et al. 2002; Young et al. 2014), increased rates of chemotherapy toxicity  
 61 (Azim et al. 2011; Prado et al. 2008) and may be linked to decreased survival  
 62 rates (Sparano et al. 2012). Many cancer patients also live with numerous  
 63 additional symptoms including poor sleep, urinary and sexual dysfunction,  
 64 and negative body image that may further impact aspects of their QoL and  
 65 their ability to perform self-care, work, and leisure activities (Baker et al.  
 66 2005; Flynn et al. 2011; Keogh et al. 2013; Ottenbacher et al. 2013). Such  
 67 results suggest that improved treatments may allow cancer patients to live  
 68 longer, but not necessarily better lives. Improvements in usual care practices

69 are therefore needed to increase the overall health and QoL post-diagnosis  
70 for all cancer populations.

71 We would argue that healthy behaviours like physical activity, adequate  
72 nutrition, weight management and smoking cessation have considerable  
73 health benefits for cancer patients and should be strongly considered to  
74 become more routinely integrated into usual care practices. Meta-analyses  
75 and systematic reviews indicate that a healthy diet is an important  
76 component of enhanced QoL among cancer patients and is positively linked  
77 to many benefits including reduced levels of diabetes and obesity,  
78 osteoporosis, and potentially cancer recurrence (Langius et al. 2013; Millar &  
79 Davison 2012; Mokdad et al. 2003).

80 Unfortunately, a recent review indicates that too few cancer patients engage  
81 in healthy eating and sufficient physical activity for health benefit (Rogers et  
82 al. 2015). Adherence to specific guidelines was practiced only by a minority  
83 of patients, with only 14.8% to 19.1% consuming the recommended daily  
84 amount of fruits and vegetables, and between 29.6 to 47.3% engaging in the  
85 advised physical activity (Blanchard et al. 2008). Unhealthy lifestyles are an  
86 issue in a variety of cancer settings, especially where patients are at risk of  
87 cachexia or sarcopenic obesity where the primary aim is to obtain sufficiently  
88 balanced nutrition (particularly protein and overall calories) to maintain  
89 levels of muscle mass and perhaps to limit the gain in fat mass (Balstad et al.  
90 2014; Chevalier & Farsijani 2014). As a result, cancers patients are more  
91 likely to increase their healthy behaviours if their oncologists and/or the other  
92 health professionals in the oncology care team actively promote lifestyle



93 modification as a tertiary preventative strategy. One challenge of such a  
 94 paradigms shift for the health professionals is that such health promotion is  
 95 not often their primary area of training or practice. Indeed, health  
 96 professionals have several concerns when charged with promoting a healthy  
 97 diet to their patients, ranging from the belief that diet wouldn't impact the  
 98 cancer outcome, or that such discussions may be interpreted by the survivor  
 99 to infer that the patients' cancer is the result of their poor lifestyle choices  
 100 (Williams et al. 2015).

101 A diagnosis of cancer may encourage patients to change their lifestyle habits,  
 102 becoming more physically active, eating a better diet or quitting smoking  
 103 (Anderson et al. 2013; Demark-Wahnefried et al. 2000). Health professionals  
 104 are in a position to actively promote and/or respond to questions about these  
 105 behaviours, thereby assisting their patients to make achievable lifestyle  
 106 changes (Velentzis et al. 2011). Such promotion has the potential to result in  
 107 many health benefits. For example, in prostate cancer patients receiving  
 108 androgen deprivation therapy who are often at risk of osteoporosis, the  
 109 promotion of sufficient calcium and vitamin D intake has been shown to be  
 110 effective in reducing bone loss (Davison et al. 2012).

111 Nurses have a key role in communication between cancer patients and the  
 112 wider oncology care team as they may have more contact with their patients  
 113 and relatively more time per consultation for counselling their patients than  
 114 oncologists. Evidence from nurses in general practice (van Dillen et al. 2014)  
 115 and paediatric (Blake & Patterson 2015) settings indicate that nurses saw  
 116 themselves as important health professionals in relation to promoting healthy

117 eating to their patients. Cancer nurses however, may face a number of  
 118 barriers affecting their ability to promote healthy behaviours to their patients  
 119 (Karvinen et al. 2012). Lack of guidelines and lack of time was often cited as  
 120 barriers (O'Hanlon & Kennedy 2014) as well as the desire to minimise  
 121 patients' distress (Miles et al. 2010) and the relative lack of access to  
 122 evidence-based resources to provide to their patients (Blake & Patterson  
 123 2015).

124 There is relatively little international data on the current healthy eating  
 125 promotion practices, beliefs and barriers of cancer nurses. It is also apparent  
 126 that almost all of the healthy behaviour (predominantly physical activity)  
 127 promotion research has been conducted in North America and Europe, with  
 128 virtually no research conducted in Australasia (Australia and New Zealand).  
 129 The current study sought to address these limitations within the literature by  
 130 gaining some insight into the current healthy eating promotion practices,  
 131 beliefs and barriers of cancer nurses in Australia and New Zealand. A  
 132 secondary goal was to gain preliminary insight into whether these practices  
 133 and determinants were influenced by the location of the nurses' hospitals  
 134 (rural vs metropolitan) or years of work experience. It was hypothesised that  
 135 cancer nurses would, in principle, support the promotion of healthy diets to  
 136 their patients and believe that healthy diet has many benefits, but that they  
 137 would cite many barriers to the frequent discussion of dietary issues with  
 138 their patients.

## 139 **Methods**

### 140 **Participants and procedures**

141 Registered cancer nurses (RNs) who provide medical support to cancer  
 142 patients in either Australia or New Zealand were invited to participate in our  
 143 online survey. Australian cancer nurses were invited to participate via links  
 144 posted on the Cancer Nurses Society of Australia (CNSA) website, while New  
 145 Zealand cancer nurses were invited via an email from the Cancer Nurses  
 146 Section of the New Zealand Nurses Organisation (NZNO). The web link or  
 147 email nurses received included a description of the research and an invitation  
 148 to participate in the study via an electronic link  
 149 (<https://www.surveymonkey.com/s/healthpromotionbynurses>). Additionally,  
 150 any registered nurses providing health care to cancer patients were eligible  
 151 to participate; these potential participants were recruited using social media  
 152 (Twitter and Facebook).

### 153 **Ethics Approval**

154 Institutional approval for this study was obtained from the Bond University  
 155 Human Review Ethics committee (RO1651) and the University of Otago  
 156 Human Ethics Committee (13/260) and organizational approval obtained from  
 157 both the CNSA and NZNO. Ethics approval included permission to offer an  
 158 incentive for participation, which consisted of twenty-four, \$20 gift vouchers  
 159 that were randomly allocated to participants who completed the survey. All

160 participants provided informed consent electronically on the main survey  
161 page prior to accessing the online survey.

## 162 **Survey design and implementation**

163 A cross-sectional, observational study was designed using an online, web-  
164 based questionnaire survey software (SurveyMonkey). The survey questions  
165 consisted of array, single choice, multiple choice, list dropdown, numerical  
166 input and short answer free text. Filters and skip logic (where appropriate)  
167 were utilized to expedite completion of the survey. The questionnaire was  
168 initially trialled with 12 nurses, with only minor changes made to the  
169 terminology or layout prior to being made available online. The Australian  
170 survey was activated on October 2013 and closed on July 2014 and the New  
171 Zealand survey was activated on December 2013 and also closed July 2014.

## 172 **Study instrument**

173 The online survey questionnaire was based upon two key theoretical  
174 frameworks within health behaviour research, namely the Theory of Planned  
175 Behaviour (TPB) and the Social Cognitive Theory (SCT). The components of  
176 the TPB comprises normative beliefs, perceived control and intentions (Ajzen  
177 1985), and whilst SCT places emphasis on thought process constructs  
178 governing behaviour (Bandura 1986). The survey questions were designed to  
179 reflect these constructs within the two theories as well as drawing on other  
180 key studies within the literature that identified determinants of healthy living  
181 in cancer patients (Blanchard et al. 2002; Jones et al. 2005b). The constructs  
182 and factors of these theories could be applied to how patients perceive the

opinion and advice of health professionals such as oncologists and cancer, in relation to the performance of healthy behaviours (Husebo et al. 2013; Jones et al. 2005b; Keogh et al. 2010; Short et al. 2013). The questionnaire used the guiding principles of TPB and SCT to assess cancer nurses' practice towards nutrition promotion, attitudes towards beneficial effects of healthy eating in cancer patients and their perceived barriers for healthy eating promotion. The wider survey was divided into four major sections, these being demographics of the cancer nurses and three healthy living components which included healthy eating, physical activity and smoking habits. The inclusion of healthy eating, physical activity and smoking questions was done so to minimise the potential for the nurses who did not promote a specific healthy behaviour e.g. healthy eating to decline the invitation to participate in the survey, only answer some of the questions in the survey or to feel pressured to give response(s) that was not consistent with their actual behaviour or beliefs. In this paper, only data relevant to the cancer nurses' healthy eating promotion habits towards their patients will be reported.

Demographics obtained from the cancer nurses included age, gender, professional qualifications, years practicing, practice type (public/private), hospital location (metropolitan, regional, rural) and specialisation (cancer or tumour group). Assessment of cancer nurses' lifestyle habits consisted of single-choice questions. Items included current smoking status, whether they reported following a healthy diet on a regular basis and frequency of physical activity.

207 The Cancer nurses' nutrition promotion practices were examined with single  
 208 choice and multiple-choice questions. Items sought to assess nurses'  
 209 opinions on responsibility of healthy eating promotion in their hospital and  
 210 whether they felt the dietician/nutritionist, oncologist, themselves or others  
 211 were the primary person in charge. Attitudes towards healthy eating  
 212 promotion during different stages of cancer treatment (pre-, during- and post-  
 213 treatment) were investigated with multiple-choice items.

214 Cancer nurses' beliefs on beneficial effects of healthy eating were assessed  
 215 on a Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree) on  
 216 seven different factors: 1.) improves health related QoL, 2.) improves weight  
 217 management, 3.) improves mental health, 4.) improves activities of daily  
 218 living, 5.) reduces risk of cancer recurrence, 6.) reduces risk of other diseases  
 219 and 7.) reduces tumour specific comorbidities. Furthermore, cancer nurses  
 220 were asked their opinion on whether they think their patients are generally  
 221 uninterested in healthy eating, that promoting healthy eating is entirely up to  
 222 them (i.e. responsibility of the nurse), if they believe they should promote  
 223 healthy eating and if there is a strong evidence base to promote healthy  
 224 eating.

225 Assessment items of the most commonly perceived barriers included lack of  
 226 time, lack of adequate support structures, lack of expertise, lack of  
 227 knowledge, risk to survivor, not my job and finally not having any barriers at  
 228 all for healthy eating promotion (Blake & Patterson 2015; Brandes et al. 2015;  
 229 Brotons et al. 2005). The respondents were asked to rank each barrier

230 according to their personal experience from primary barrier (3 points),  
231 secondary barrier (2 points) to tertiary barrier (1 point).

## 232 **Statistical analyses**

233 Data were evaluated using IBM SPSS version 22.0 and Microsoft Excel 2010  
234 software. Demographics, nutrition promotion practices and beliefs of cancer  
235 nurses were analysed using descriptive statistics. We chose to do sub-group  
236 comparisons across hospital location (metropolitan vs regional and rural) and  
237 years of practice ( $< 25$  years and  $\geq 25$  years) due to comparable sample  
238 sizes of these sub-groups. Sub-group comparisons based on cancer nurse  
239 gender (male or female), hospital type (private or public) and cancer group  
240 specialization were not performed as the sample sizes of these sub-groups  
241 were too unbalanced. Selected sub-group comparisons were examined using  
242 one way analyses of variance (ANOVA) for continuous variables or chi-square  
243 tests for categorical variables related to the nurses' healthy eating promotion  
244 practices, beliefs and barriers. Descriptive data are presented as mean and  
245 standard deviation or counts and frequencies depending on the type of data.  
246 All statistical tests were two-sided with a significance level of  $p < 0.05$  and  
247 performed with SPSS version 22.

## 248 **Results**

249 All registered members with a valid email address of the CNSA and NZNO  
 250 received an invitation to complete the online questionnaire between October  
 251 or December 2013 and July 2014. The exact response rate is unknown;  
 252 however, as a guide the number of members at that time ranged from 500 to  
 253 1500 in each organization. A total of 123 registered nurses from Australia  
 254 and New Zealand completed the online questionnaire.

255 Details of the demographic profiles are presented in Table 1. In summary, the  
 256 majority of participants (95.9%) were female, the mean age was  $48.7 \pm 10.5$   
 257 years and the mean number of years in practice was  $23.0 \pm 11.7$  years. The  
 258 most common field nurses worked in was general oncology ( $n=48$ , 40%), with  
 259 a specialisation in gynaecological cancers being the second most common  
 260 group ( $n=21$ , 17.5%). The vast majority of cancer nurses were based in  
 261 public ( $n=102$ , 84%) rather than private ( $n=19$ , 16%) hospitals. The location  
 262 of the hospitals was distributed almost equally with 51.7% working in the  
 263 metropolitan area and 48.3% in regional or rural hospital locations.

264 Insert table 1 about here

265 Considering their own lifestyle behaviours, the majority of the respondents  
 266 (88%) reported that they eat healthy on a regular basis, and were not  
 267 currently smoking (98%). Almost half (47%) of the sample described



268 themselves as physically active in that they performed at least 5 sessions of  
269 moderate intensity exercise for 30 minutes or more per week.

270 The current nutrition promotion practices of cancer nurses are summarised in  
271 Table 2. Most of the cancer nurses considered the dietician/nutritionist  
272 (35.9%) as the primary person responsible for providing healthy eating  
273 advice to their patients; however, 32.5% of nurses considered they were the  
274 primary person responsible for addressing their patients' nutrition concerns.  
275 Almost 75% of the respondents stated that the most common time they  
276 promoted healthy eating was during cancer treatment. More than half of  
277 nurses (52.8%) promoted healthy eating to their patients during all cancer  
278 stages (pre-, during, and post-treatment).

279 Insert table 2 about here

280 Sub-group comparisons were analysed for years of practice (<25years versus  
281  $\geq 25$ years) as well as hospital location (metropolitan versus rural and regional  
282 located hospitals). No significant differences in nutrition practices were  
283 observed between nurses with more or less than 25 years of experience.  
284 Significantly more nurses working in metropolitan areas considered the  
285 nutritionist/dietician as the primary person responsible for healthy diet advice  
286 compared with nurses in rural hospitals (46.8% vs 24.1%,  $p=0.015$ ,  
287 respectively).

288 The current nutrition promotion beliefs are summarised in Table 3. A majority  
 289 of cancer nurses agreed or strongly agreed that healthy eating improves  
 290 health-related QoL (85.4%), weight management (82.9%), mental health  
 291 (80.5%), activities of daily living (79.7%) and risk of other chronic diseases  
 292 (79.7%) for cancer patients. Moreover, 70.7% agreed or strongly agreed that  
 293 healthy eating could reduce risk of cancer recurrence and 63.4% believed  
 294 that healthy eating can reduce tumour specific comorbidities. While 68.3% of  
 295 cancer nurses believed that healthy eating has some benefits for their  
 296 patients, 29.3% did not respond to this question.

297 A range of other beliefs may affect the cancer nurses' promotion of healthy  
 298 eating to their patients. For example, 75.5% of the cancer nurses believed  
 299 the evidence base for healthy eating promotion to their patients is strong,  
 300 with 69.9% of the nurses also feeling that their cancer patients are interested  
 301 in healthy eating advice. More than half (59.4%) felt that their cancer  
 302 nursing peers believe that all nurses should promote healthy eating to cancer  
 303 patients. Interestingly, only 49% of the nurses felt that they were in control  
 304 of what healthy eating advice they provided their patients.

305 Insert table 3 about here

306 Table 4 compares the current healthy eating beliefs of the cancer nurses  
 307 across years of practice and hospital location (metropolitan versus rural and

308 regional). In general, there were few significant effects for years of practice  
 309 or hospital location on the cancer nurses' healthy eating beliefs. The  
 310 exceptions to this were that less experienced cancer nurses (<25 years of  
 311 practice) were significantly more likely to believe that healthy eating could  
 312 reduce tumour specific comorbidities than their more experienced  
 313 counterparts ( $p=0.042$ ). The cancer nurses working in metropolitan hospitals  
 314 were also significantly more likely to believe healthy eating could have  
 315 positive impacts on health related QoL ( $p=0.046$ ).

316 Insert table 4 about here

317 Table 5 provides data on the most frequently cited barriers to healthy eating  
 318 promotion. The most commonly cited barriers for not promoting healthy  
 319 eating were lack of time (25.8%), lack of adequate support structures  
 320 (17.3%), lack of expertise (12.2%), risk to cancer patient (5.1%) and lack of  
 321 knowledge (4.4%); with 2.2% not considering it their job to give dietary  
 322 advice. However, almost a third (31.6%) reported no barriers in promoting a  
 323 healthy diet. Sub-group analysis between nurses working in metropolitan vs.  
 324 regional/rural hospitals or with more or less than 25 years of experience  
 325 reported some significant differences in the frequency of most commonly  
 326 cited barriers to healthy eating promotion. Compared to the less experienced  
 327 cancer nurses (<25 years of practice), those with  $\geq 25$  years experience were  
 328 more likely to state they had no barriers in promoting healthy eating

( $p=0.045$ ). The less experienced nurses also cited a lack of knowledge significantly more often as a perceived barrier to healthy eating promotion than their more experienced counterparts ( $p<0.001$ ). Regarding hospital location, cancer nurses working in regional and rural hospitals were more likely to cite a risk to the cancer patient as a barrier to healthy eating promotion than those working in metropolitan hospitals ( $p<0.001$ ).

Insert table 5 about here

## Discussion

As emerging research indicates the benefits of maintaining a healthy diet in cancer patients and patients (Langius et al. 2013; Millar & Davison 2012; Mokdad et al. 2003), this study sought to gain some insight into the current nutrition promotion practices, beliefs and perceived barriers of cancer nurses in Australia and New Zealand. Such insight is important as: 1.) virtually no peer reviewed research on this topic has been published in Australasia; and 2.) cancer nurses often have more interaction with cancer patients and therefore more opportunities to discuss healthy behaviours such as nutrition than other health professionals like oncologists (Blake & Patterson 2015; Karvinen et al. 2012; O'Hanlon & Kennedy 2014).

Our results demonstrate that while the cancer nurses surveyed believed that providing healthy eating advice to cancer patients was primarily the

responsibility of dieticians, they also felt that nurses as a profession played a very important role as well. Such views appear consistent with other studies on nurse behaviour, whereby they provide important information to cancer patients on topics as broad as sexual health (Kotronoulas et al. 2009) and the benefits of physical activity (Karvinen et al. 2012). This would suggest that the promotion of healthy eating by cancer nurses to their patients is not beyond their current scope of practice.

The nurses in the current study felt that oncologists were the least likely health professional group (3.3%) to be the primary provider of nutritional advice to patients. Such results appear consistent with the relatively low proportion of oncologists providing lifestyle advice, with only 28% actually recommending physical activity to any survivor at the time of consultation (Jones et al. 2005a). The relatively minor role that oncologists appear to play in promoting healthy behaviours such as healthy eating and physical activity to their patients may reflect a number of factors. Most notably, the primary role of oncologists and other physicians is to give their patients accurate information about treatment options and to discuss medical issues. Due to their relative lack of training in nutrition and physical activity and time constraints during consultations, they may briefly mention the importance of healthy behaviours to patients, but leave more in-depth discussions to other health professionals, such as nurses. The cancer nurses may, therefore, be able to reinforce health promotion messages initially delivered by the oncologist, assisting the patients change their behaviour (van der Molen 1999).

Our results indicated that the majority of cancer nurses are promoting healthy eating to their patients prior to (62.6%), during (74.8%) and post-treatment (64.2%), with 52.8% promoting healthy eating at every stage of the treatment process. The promotion of healthy diet across all the treatment phases is important as healthy eating has numerous benefits for cancer patients, with some of these differences perhaps more important at the various treatment stages. Specifically, patients may experience alterations in appetite and require somewhat different nutritional intakes over each treatment phase in order to maintain sufficient nutritional intakes, body composition and QoL (Aapro et al. 2014; Hung et al. 2013; Rock et al. 2012).

The relatively high rate of healthy eating promotion by cancer nurses in this study appears consistent with their beliefs around the importance of healthy eating for their patients. The vast majority of the nurses in the current study agreed or strongly agreed that healthy eating promotion leads to numerous benefits for their patients, with improvement in QoL (85.4%), weight management (82.9%), mental health (80.5%), activities of daily living (79.7%) and reducing risk of other chronic diseases (79.7%) being the most common. It was however, interesting that only 75.5% of the cancer nurses agreed or strongly agreed that there is a strong evidence base for the promotion of healthy eating to cancer patients. Collectively these results indicate that while cancer nurses believe that there is considerable evidence that healthy eating has many benefits for their cancer patients, they are not completely sure about the strength or extent of this evidence. This may reflect the relatively limited number of studies examining specific nutritional

397 interventions within each cancer type, different treatments options or at  
398 different treatment phases. Nevertheless, healthy eating and other healthy  
399 behaviours may help to reduce risk of the long-term and late effects of  
400 cancer treatment including diabetes and obesity (Mokdad et al. 2003),  
401 osteoporosis (Millar & Davison 2012) and overall QoL (Langius et al. 2013).

402 Interestingly, cancer nurses thought that a high proportion (69.9%) of their  
403 patients were interested in healthy eating. This perception is inconsistent  
404 with recent data from the U.K., where one of the most consistent barriers  
405 cited by nurses, surgeons, and physicians to providing lifestyle advice, was  
406 lack of cancer patient interest. Other data suggest that cancer patients would  
407 welcome advice on health promotion and lifestyle (Anderson et al. 2013;  
408 Demark-Wahnefried et al. 2000; Keogh et al. 2014). These discrepancies  
409 throughout the literature suggest that improved communication is necessary  
410 to meet patients' needs. Nurses interested in improving their healthy eating  
411 (or other healthy behaviours) communication and promotion should consider  
412 the integration of evidence-based practice, with behaviour change theories  
413 such as the SCT shown to be an effective approach in delivering such  
414 information to cancer patients (Stacey et al. 2015).

415 The current study was also interested in identifying what barriers the nurses  
416 may have in promoting healthy eating to their cancer patients. Almost one  
417 third (31.6%) of the nurses stated that they did not have any barriers to  
418 promoting healthy eating, while for those who identified barriers, the lack of  
419 time (25.8%), adequate support structures (17.3%) and expertise (12.2%)  
420 were most common. Such results appear consistent with research involving

other health professionals in promoting healthy behaviours to patients (Blake & Patterson 2015; Brandes et al. 2015; Brotons et al. 2005). These barriers also appeared similar to the views of 236 cancer patients regarding consultations with their health professionals, with a lack of consultation time and an inability of the health professionals to provide accurate information cited as some of the major issues (Brandes et al. 2015). To overcome these issues and improve patient outcomes, more effort should be placed upon increasing consultation times between the patient and the oncology care team, providing continuing education for cancer nurses around the benefits of healthy eating, and the provision of greater support structures, such as referral pathways or specific nutritional resources to provide to their patients. Hospital and national healthcare policies may therefore, need to be considered to reduce some of these barriers to healthy eating promotion by the cancer nurses.

It was noteworthy that the years of practice (experience of the nurses) or location of the hospital in which the cancer nurses worked resulted in few significant differences in their nutritional promotion practices, beliefs, or barriers. This finding was somewhat unexpected as it was thought that more experienced nurses may be more likely to promote healthy behaviours like healthy eating than less experienced nurses. We also expected that nurses in metropolitan hospitals would likely have greater access to specialised service providers such as dieticians than nurses working in regional and rural hospitals. On this basis, it was expected that the metropolitan nurses may be more reluctant to work outside their primary area of expertise and be less



involved in promoting healthy behaviours such as healthy diet to their cancer patients. The relative lack of effect of years of practice and hospital location on the cancer nurses' healthy diet promotion practices, beliefs and barriers is a positive finding that increases the generalisability of these results and highlights the strong interest cancer nurses have in providing the best care to their cancer patients.

This study is not without its limitations. The sample size of 123 nurses who completed the survey only represents a small proportion of the registered Australasian cancer nurses. Therefore, the sample recruited in the study may not be truly representative of Australasian cancer nurses, especially those working in private hospitals, as only 19 of the 123 respondents currently work in this sector. Nevertheless, the sample size of the current study is greater than (O'Hanlon & Kennedy 2014; Spellman et al. 2014) or similar to (Daley et al. 2008; Karvinen et al. 2010) other quantitative survey-based studies examining healthy behaviour promotion by health professionals to cancer patients.

The results of this study add to the existing literature regarding the promotion of healthy eating by health professionals to their cancer patients, particularly cancer nurses working in Australasia. Specifically, there is very limited research about healthy behaviour promotion (in general) of health professionals to cancer patients in Australasia (Spellman et al. 2014), or international research on the role of cancer nurses in healthy behaviour promotion (Karvinen et al. 2012; Williams et al. 2013). It is hoped the results of this study will encourage additional research into the current healthy

469 behaviour promotion practices of cancer nurses, while also highlighting some  
 470 of the barriers they face in providing this important information to their  
 471 patients. Based on current evidence (Langius et al. 2013; Millar & Davison  
 472 2012; Mokdad et al. 2003), it would appear likely that an increased promotion  
 473 of healthy behaviours, including a healthy diet and physical activity by health  
 474 professionals to cancer patients would result in improved survivor outcomes.  
 475 Cancer nurses are ideally placed to deliver these initial messages and to refer  
 476 interested patients to dieticians or nutritionists for further healthy eating  
 477 assistance.

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**Table 1** (on next page)

Sample Demographics

| Sample (n=123)                                                    | n (%)      |
|-------------------------------------------------------------------|------------|
| <b>Age (years, n=121)</b>                                         |            |
| <25                                                               | 4 (3.3)    |
| 26-35                                                             | 10 (8.2)   |
| 36-45                                                             | 31 (25.6)  |
| 46-55                                                             | 40 (33.1)  |
| 56-65                                                             | 33 (27.3)  |
| >65                                                               | 3 (2.5)    |
| <b>Gender (n=122)</b>                                             |            |
| Male                                                              | 5 (4.1)    |
| Female                                                            | 117 (95.9) |
| <b>Highest Educational Qualification (n=123)</b>                  |            |
| Registered nurse / Bachelor's Degree                              | 34 (27.6)  |
| Diploma/ Graduate Certificate                                     | 55 (44.7)  |
| Master's Degree                                                   | 33 (26.8)  |
| <b>Cancer group specialisation (n=120)</b>                        |            |
| General oncology                                                  | 48 (40)    |
| Gynaecological (breast, ovary)                                    | 21 (17.5)  |
| Haematology                                                       | 9 (7.5)    |
| Urogenital (prostate, bladder)                                    | 7 (5.8)    |
| Palliative care settings                                          | 7 (5.8)    |
| Lung                                                              | 6 (5)      |
| Gastrointestinal/colorectal                                       | 6 (5)      |
| Other (head and neck cancer, sarcoma, skin lymphoma, paediatrics) | 11 (9.2)   |
| <b>Years practicing (years, n=121)</b>                            |            |
| <5                                                                | 8 (6.6)    |
| 5-14.9                                                            | 27 (22.3)  |
| 15-24.9                                                           | 27 (22.3)  |
| ≥25                                                               | 59 (48.8)  |
| <b>Hospital (n=121)</b>                                           |            |
| Public                                                            | 102 (84.3) |
| Private                                                           | 19 (15.7)  |
| <b>Location (n=120)</b>                                           |            |
| Metropolitan                                                      | 62 (51.7)  |
| Regional                                                          | 39 (32.5)  |
| Rural                                                             | 19 (15.8)  |
| <b>Regular reader of professional journals (n=123)</b>            |            |
| Yes                                                               | 60 (48.8)  |
| No                                                                | 63 (51.2)  |

## Table 2 (on next page)

Nutrition promotion practices and sub-group comparison for years of practice and hospital location

<sup>i</sup>Numbers may not equal 123 due to missing data or missing response. <sup>i i</sup>Multiple-choice answers were possible. Metro = Metropolitan. \* $p < 0.05$ ; group differences based on Pearson Chi-squared analysis

1 **Table 2 Nutrition promotion practices and sub-group comparison for years of practice and hospital location.**

|                                                                                                    | n=123 <sup>i</sup><br>(%) | Years of practice<br>n=121 (%) |                             |         | Hospital location<br>n=120 (%) |                                       |         |
|----------------------------------------------------------------------------------------------------|---------------------------|--------------------------------|-----------------------------|---------|--------------------------------|---------------------------------------|---------|
|                                                                                                    |                           | <25years<br>n=60<br>(49.6)     | ≥25years<br>n= 61<br>(50.4) | p-value | Metro<br>n= 62<br>(51.7)       | Rural &<br>Regional<br>n=58<br>(48.3) | p-value |
| <b>In your opinion, who is the primary person responsible for healthy eating in your hospital?</b> |                           |                                |                             |         |                                |                                       |         |
| Me                                                                                                 | 40 (32.5)                 | 17 (28.3)                      | 23 (37.7)                   | 0.273   | 17 (27.4)                      | 23 (39.7)                             | 0.171   |
| Nutritionist/Dietician                                                                             | 43 (35.0)                 | 25 (41.7)                      | 17 (27.9)                   | 0.111   | 29 (46.8)                      | 14 (24.1)                             | 0.015*  |
| Oncologist                                                                                         | 4 (3.3)                   | 3 (5.0)                        | 1 (1.6)                     | 0.301   | 0 (0)                          | 4 (6.9)                               | 0.099   |
| Other                                                                                              | 20 (16.3)                 | 12 (20.0)                      | 8 (13.1)                    | 0.308   | 10 (16.1)                      | 9 (15.5)                              | 0.717   |
| I don't know                                                                                       | 6 (4.9)                   | 2 (3.3)                        | 4 (6.6)                     | 0.414   | 4 (6.5)                        | 2 (3.4)                               | 0.691   |
| <b>Please indicate in which stage of cancer treatment healthy eating is promoted<sup>i i</sup></b> |                           |                                |                             |         |                                |                                       |         |
| Pre Treatment                                                                                      | 77 (62.6)                 | 40 (66.7)                      | 37 (60.7)                   | 0.492   | 37 (59.7)                      | 40 (69.0)                             | 0.289   |
| During Treatment                                                                                   | 92 (74.8)                 | 49 (79.0)                      | 43 (70.5)                   | 0.150   | 46 (74.2)                      | 45 (77.6)                             | 0.664   |
| Post Treatment                                                                                     | 79 (64.2)                 | 43 (69.4)                      | 36 (59.0)                   | 0.144   | 40 (64.5)                      | 39 (67.2)                             | 0.753   |
| Every stage                                                                                        | 65 (52.8)                 | 34 (54.8)                      | 31 (50.8)                   | 0.519   | 32 (51.6)                      | 33 (56.9)                             | 0.562   |
| I don't know                                                                                       | 10 (8.1)                  | 4 (6.5)                        | 6 (9.8)                     | 0.527   | 7 (11.3)                       | 3 (5.2)                               | 0.226   |

2 <sup>i</sup>Numbers may not equal 123 due to missing data or missing response. <sup>i i</sup>Multiple-choice answers were possible. Metro = Metropolitan.

3 \*p<0.05; group differences based on Pearson Chi-squared analysis

4

### **Table 3**(on next page)

Current beliefs of cancer nursers regarding healthy eating for cancer patients

\*all questions rated on a 4-point Likert scale with 1 = strongly disagree, 2 = disagree, 3 = agree and 4 = strongly agree. Metro = Metropolitan. <sup>i</sup>Numbers may not equal 123 due to missing data

1

| <b>What benefits may healthy eating have for your cancer patients?*</b><br><b>n=123<sup>i</sup></b> | <b>Strongly Agree</b><br><b>n (%)</b> | <b>Agree</b><br><b>n (%)</b> | <b>Disagree</b><br><b>n (%)</b> | <b>Strongly disagree</b><br><b>n (%)</b> | <b>No response</b><br><b>n (%)</b> |
|-----------------------------------------------------------------------------------------------------|---------------------------------------|------------------------------|---------------------------------|------------------------------------------|------------------------------------|
| Improve health related quality of life                                                              | 62 (50.4)                             | 43 (35.0)                    | 2 (1.6)                         | 0                                        | 16 (13.0)                          |
| Improve weight management                                                                           | 64 (52.0)                             | 38 (30.9)                    | 3 (2.4)                         | 0                                        | 18 (14.6)                          |
| Improve mental health                                                                               | 51 (41.5)                             | 48 (39.0)                    | 6 (4.9)                         | 0                                        | 18 (14.6)                          |
| Improve activities of daily living                                                                  | 48 (39.0)                             | 50 (40.7)                    | 6 (4.9)                         | 0                                        | 19 (15.4)                          |
| Reduce risk of cancer recurrence                                                                    | 31 (25.2)                             | 56 (45.5)                    | 15 (12.2)                       | 1 (0.8)                                  | 20 (16.4)                          |
| Reduce risk of other chronic diseases                                                               | 44 (35.8)                             | 54 (43.9)                    | 4 (3.3)                         | 0                                        | 21 (17.1)                          |
| Reduce tumour specific comorbidities                                                                | 25 (20.3)                             | 53 (43.1)                    | 20 (16.3)                       | 2 (1.6)                                  | 23 (18.7)                          |
| No benefits                                                                                         | 0                                     | 3 (2.4)                      | 9 (7.3)                         | 75 (61.0)                                | 36 (29.3)                          |
| My cancer patients are generally uninterested in healthy eating                                     | 4 (3.3)                               | 13 (10.6)                    | 73 (59.3)                       | 13 (10.6)                                | 20 (16.3)                          |
| Whether or not I promote healthy eating to my cancer patients is entirely up to me                  | 18 (14.6)                             | 42 (34.1)                    | 25 (20.3)                       | 13 (10.6)                                | 25 (20.3)                          |
| My fellow nurses believe I should be promoting healthy eating to my cancer patients                 | 14 (11.4)                             | 59 (48.0)                    | 18 (14.6)                       | 4 (3.3)                                  | 28 (22.8)                          |
| There is a strong evidence base suggesting I should promote healthy eating to my cancer patients    | 41 (33.3)                             | 52 (42.3)                    | 3 (2.4)                         | 1 (0.8)                                  | 26 (21.1)                          |

2



**Table 4**(on next page)

Comparison of cancer nurses' believes towards healthy eating across sample demographics

Data presented as mean  $\pm$ SD. All items rated on 4-point Likert scale, with 1 = strongly disagree, 2 = disagree, 3 = agree and 4 = strongly agree. Metro = Metropolitan. \*  $p < 0.05$ , group differences based on one way analysis of variance (ANOVA)

1

| What benefits may healthy eating have for your cancer patients? <sup>i</sup>                                     | Years of practice |   |           |   |        | Location  |                  |        |
|------------------------------------------------------------------------------------------------------------------|-------------------|---|-----------|---|--------|-----------|------------------|--------|
|                                                                                                                  | <25 years         |   | >25 years |   | p      | Metro     | Rural & Regional | p      |
| Improve health related quality of life                                                                           | 3.2               | ± | 2.9       | ± | 0.254  | 3.3 ± 1.1 | 2.9 ± 1.3        | 0.046* |
|                                                                                                                  | 1.1               |   | 1.4       |   |        |           |                  |        |
| Improve weight management                                                                                        | 3.2               | ± | 2.9       | ± | 0.200  | 3.2 ± 1.1 | 2.9 ± 1.4        | 0.158  |
|                                                                                                                  | 1.1               |   | 1.4       |   |        |           |                  |        |
| Improve mental health                                                                                            | 3.1               | ± | 2.7       | ± | 0.149  | 3.1 ± 1.1 | 2.8 ± 1.4        | 0.231  |
|                                                                                                                  | 1.1               |   | 1.4       |   |        |           |                  |        |
| Improve activities of daily living                                                                               | 2.9               | ± | 2.8       | ± | 0.547  | 3.1 ± 1.0 | 2.7 ± 1.5        | 0.140  |
|                                                                                                                  | 1.2               |   | 1.4       |   |        |           |                  |        |
| Reduce risk of cancer recurrence                                                                                 | 2.8               | ± | 2.5       | ± | 0.270  | 2.8 ± 1.1 | 2.5 ± 1.3        | 0.173  |
|                                                                                                                  | 1.1               |   | 1.4       |   |        |           |                  |        |
| Reduce risk of other chronic diseases                                                                            | 3.0               | ± | 2.6       | ± | 0.159  | 3.0 ± 1.2 | 2.6 ± 1.4        | 0.111  |
|                                                                                                                  | 1.2               |   | 1.4       |   |        |           |                  |        |
| Reduce tumour specific comorbidities                                                                             | 2.7               | ± | 2.2       | ± | 0.042* | 2.6 ± 1.3 | 2.3 ± 1.3        | 0.169  |
|                                                                                                                  | 1.1               |   | 1.4       |   |        |           |                  |        |
| No benefits                                                                                                      | 0.9               | ± | 0.7       | ± | 0.135  | 0.9 ± 0.6 | 0.7 ± 0.6        | 0.184  |
|                                                                                                                  | 0.6               |   | 0.6       |   |        |           |                  |        |
| My cancer patients are generally uninterested in healthy eating <sup>i i</sup>                                   | 1.8               | ± | 1.6       | ± | 0.257  | 1.8 ± 0.9 | 1.6 ± 0.9        | 0.248  |
|                                                                                                                  | 0.8               |   | 1.0       |   |        |           |                  |        |
| Whether or not I promote healthy eating to my cancer patients is entirely up to me <sup>i i</sup>                | 2.1               | ± | 2.1       | ± | 0.849  | 2.2 ± 1.3 | 2.0 ± 1.3        | 0.401  |
|                                                                                                                  | 1.3               |   | 1.4       |   |        |           |                  |        |
| My fellow nurses believe I should be promoting healthy eating to my cancer patients <sup>i i</sup>               | 2.2               | ± | 2.2       | ± | 0.882  | 2.2 ± 1.2 | 2.2 ± 1.4        | 0.946  |
|                                                                                                                  | 1.2               |   | 1.4       |   |        |           |                  |        |
| There is a strong evidence based suggesting I should promote healthy eating to my cancer patients <sup>i i</sup> | 2.6               | ± | 2.7       | ± | 0.744  | 2.7 ± 1.4 | 2.6 ± 1.4        | 0.842  |
|                                                                                                                  | 1.4               |   | 1.4       |   |        |           |                  |        |

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## Table 5 (on next page)

The most frequently cited nutrition promotion barriers<sup>i</sup>

<sup>i</sup>Points given on 3-point rating scale: highest rated barrier 3 points, lowest rated barrier 1 point. <sup>ii</sup>Numbers may not equal 123 due to missing data among groups. \* $p < 0.05$ , \*\* $p < 0.01$ , group differences based on Chi-squared analysis.

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| <b>N=123</b>                    | <b>I do not have barriers in promoting healthy eating</b> | <b>Lack of time</b> | <b>Lack of adequate support structures</b> | <b>Lack of expertise</b> | <b>Risk to patient</b> | <b>Lack of knowledge</b> | <b>Not my job</b> |
|---------------------------------|-----------------------------------------------------------|---------------------|--------------------------------------------|--------------------------|------------------------|--------------------------|-------------------|
| <b>Total n<sup>ii</sup> (%)</b> | 142<br>(31.6)                                             | 116<br>(25.8)       | 78<br>(17.3)                               | 55<br>(12.2)             | 23<br>(5.1)            | 20<br>(4.4)              | 10<br>(2.2)       |
| <b>Location</b>                 |                                                           |                     |                                            |                          |                        |                          |                   |
| Metropolitan                    | 73<br>(30.8)                                              | 63<br>(26.6)        | 49<br>(20.7)                               | 30<br>(12.7)             | 4<br>(1.7)             | 11<br>(4.6)              | 5<br>(2.1)        |
| Rural & Regional                | 69<br>(33.2)                                              | 53<br>(25.5)        | 29<br>(13.9)                               | 22<br>(10.6)             | 20<br>(9.6)            | 7<br>(3.4)               | 4<br>(1.9)        |
| P value                         | 0.658                                                     | 0.820               | 0.088                                      | 0.520                    | 0.0004<br>**           | 0.501                    | 0.890             |
| <b>Years of practice</b>        |                                                           |                     |                                            |                          |                        |                          |                   |
| <25 years                       | 63<br>(26.7)                                              | 59<br>(25.0)        | 39<br>(16.5)                               | 36<br>(15.3)             | 9<br>(3.8)             | 19<br>(8.1)              | 6<br>(2.5)        |
| >25 years                       | 79<br>(37.4)                                              | 54<br>(25.5)        | 39<br>(18.5)                               | 19<br>(9.0)              | 14<br>(6.6)            | 1<br>(0.5)               | 4<br>(1.9)        |
| P value                         | 0.045*                                                    | 0.901               | 0.621                                      | 0.058                    | 0.192                  | 0.0001**                 | 0.646             |

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