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| Malnutrition in Victorian cancer services  Cancer Malnutrition Point Prevalence Study 2016 summary report |
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Department of Health

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Contents

[Authorship 1](#_Toc61518325)

[Project team 1](#_Toc61518326)

[Executive summary 2](#_Toc61518327)

[Key findings 2](#_Toc61518328)

[Summary 3](#_Toc61518329)

[Introduction 3](#_Toc61518330)

[Methodology 3](#_Toc61518331)

[Results 4](#_Toc61518332)

[Conclusion 6](#_Toc61518333)

[Background 7](#_Toc61518334)

[Research question 8](#_Toc61518335)

[Aims 8](#_Toc61518336)

[Methodology 9](#_Toc61518337)

[Population 9](#_Toc61518338)

[Study criteria 9](#_Toc61518339)

[Study tools 9](#_Toc61518340)

[Survey protocol and guidelines 10](#_Toc61518341)

[Ethical considerations 11](#_Toc61518342)

[Training of dietitians in data collection 11](#_Toc61518343)

[Data management 11](#_Toc61518344)

[Data analysis 11](#_Toc61518345)

[Results 12](#_Toc61518346)

[Statewide malnutrition risk screening 12](#_Toc61518347)

[Statewide malnutrition prevalence 12](#_Toc61518348)

[Malnutrition prevalence by diagnosis 14](#_Toc61518349)

[Malnutrition prevalence by cancer stage 16](#_Toc61518350)

[Malnutrition prevalence by demographic variables 16](#_Toc61518351)

[Malnutrition prevalence by treatment modality 18](#_Toc61518352)

[Malnutrition prevalence by participating health service 19](#_Toc61518353)

[Dietetic intervention 22](#_Toc61518354)

[Malnourished patients receiving dietetic intervention by tumour type 23](#_Toc61518355)

[Malnourished patients receiving dietetic intervention by treatment modality 24](#_Toc61518356)

[Malnourished patients receiving dietetic intervention by site 25](#_Toc61518357)

[Types of nutrition support 26](#_Toc61518358)

[Outcomes 27](#_Toc61518359)

[Discussion 29](#_Toc61518360)

[Conclusion 32](#_Toc61518361)

[Appendix 1: Participating sites by Integrated Cancer Service 33](#_Toc61518362)

[Appendix 2: Data collection tool 34](#_Toc61518363)

[Appendix 3: Instructions for completing the data collection sheet 41](#_Toc61518364)

[Malnutrition Prevalence Study data collection tool 41](#_Toc61518365)

[Appendix 4: Cancer Malnutrition Point Prevalence Study – guidelines for approaching patients 45](#_Toc61518366)

[Appendix 5: Patient information sheet 48](#_Toc61518367)

[Appendix 6: Tumour types and malignancy groups 49](#_Toc61518368)

[References 50](#_Toc61518369)

# Authorship

The Cancer Malnutrition Point Prevalence Study is an initiative of the Victorian Government. It forms part of the Malnutrition in Victorian Cancer Services program. The Nutrition Department at Peter MacCallum Cancer Centre (Peter Mac) was commissioned to provide statewide leadership and project management.

This report was written by Belinda Steer from the Peter MacCallum Cancer Centre Nutrition Department, with support from Jenelle Loeliger, Kathryn Marshall and Nicole Kiss.

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## Project team

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# Executive summary

Despite some significant improvements in awareness and a reduction in cancer malnutrition prevalence in Victoria over the past four years, the findings from previous point prevalence studies (PPSs) indicate that cancer malnutrition is multifactorial and continues to be a significant area of concern for oncology services and their patients. In 2016 a cancer malnutrition PPS was undertaken using a newly developed, sustainable methodology based on the methodology used in previous studies.

## Key findings

| - | 2012 | 2014 | 2016 |
| --- | --- | --- | --- |
| No. patients | 1,677 | 1,913 | 1,340 |
| No. inpatients | 337 | 350 | 321 |
| No. ambulatory patients | 1,340 | 1,563 | 1,019 |
| No. participating sites | 17 | 27 | 16 |
| Overall patients at risk of malnutrition (%) | 36 | 33 | 37 |
| Malnutrition prevalence – overall (%) | 31 | 26 | 23 |
| Malnutrition prevalence – inpatients (%) | 57 | 57 | 37 |
| Malnutrition prevalence – ambulatory patients (%) | 25 | 19 | 18 |

| - | 2012 | 2014 | 2016 |
| --- | --- | --- | --- |
| Highest malnutrition prevalence (tumour stream, %) | UGI 61% | UGI 48% | UGI 43% |
| H&N 40% | H&N 36% | Lung 29% |
| Lung 37% | Lung 33% | H&N 28% |
| Lowest malnutrition prevalence (tumour stream, %) | Breast 14% | Breast 13% | Breast 8%  Skin and melanoma 8% |

H&N = head & neck; UGI = upper gastrointestinal

|  |  |  |
| --- | --- | --- |
| What does this mean?  Overall, malnutrition prevalence is trending downwards within Victorian health services.  This is a reflection of:  increased awareness of cancer malnutrition  improved malnutrition screening rates and referral to a dietitian  a greater proportion of those with malnutrition under the care of a dietitian. |  | Targeted improvements from these results should be:  early identification of malnutrition risk in vulnerable groups  development of sustainable and effective nutrition models of care to manage:   * + - the high volume of malnourished patients     - the high-risk tumour streams that continue to have high rates of malnutrition despite high rates of dietetic intervention     - nutrition care regardless of location. |

# Summary

## Introduction

Malnutrition is a state of nutrition in which ‘a deficiency or excess (or imbalance) of energy, protein and other nutrients causes measurable adverse effects on tissue/body forms or function and clinical outcomes’.1 In the context of cancer, malnutrition refers to the deficiency state or under-nutrition also known as protein-energy malnutrition.

Oncology patients are 1.7 times more likely to be malnourished than other clinical groups.2 Malnutrition has serious implications for health and recovery from illness, surgery and cancer treatments and is an independent predictor of outcome.3,4 Timely and regular nutrition risk screening and nutritional assessment are required to ensure early nutrition inventions and best patient outcomes.4 Cancer-related malnutrition has been identified as a significant supportive care need in the cancer population, often poorly recognised and therefore untreated.

The Cancer Malnutrition Point Prevalence Study (PPS), first conducted in 2012 and repeated in 2014, has been conducted as part of the Malnutrition in Victorian Cancer Service (MVCS) program of work, supported and funded by Cancer Strategy and Development, Department of Health and Human Services. This study has been instrumental in determining the proportion of Victorian adults with cancer who have malnutrition and identifying areas for improvement regarding cancer malnutrition. The studies have found the overall malnutrition prevalence of cancer patients receiving active treatment in Victoria significantly reduced from 31 per cent in 2012 to 26 per cent in 2014.6 In 2014, malnutrition prevalence varied greatly between ambulatory patients and inpatients (19 per cent vs 57 per cent respectively) and across tumour streams, with the highest rates occurring in the upper gastrointestinal tumour stream (48 per cent) and the lowest in the breast tumour stream (14 per cent).6 In addition, the PPS has demonstrated that malnourished patients have poorer outcomes and more complications compared with well-nourished patients, leading to increased healthcare costs.6

The results from the previous PPSs have been used by the Victorian Government and individual health services. This robust, local evidence has been used to:

* increase the awareness of a malnutrition diagnosis and its implications
* demonstrate areas of most need for resourcing and process improvement projects
* support business cases and grant applications to better manage malnutrition
* raise the profile of cancer malnutrition as a quality and risk issue
  + increase awareness of the importance of nutrition care processes and dietetic practice.

Despite some significant improvements in awareness and a reduction in prevalence in Victoria over the past four years, the findings from the 2012 and 2014 PPSs indicate that cancer malnutrition is multifactorial and continues to be a significant area of concern for oncology services and their patients. Ongoing assessment and monitoring of the nutrition care provided to patients with cancer, through repeated PPSs, is essential to achieve further improvements in patient safety and quality of care.

In 2016 the cancer malnutrition PPS was undertaken using a newly developed, sustainable methodology based on the methodology used in the 2012 and 2014 studies. Refer to the *Phase III Malnutrition in Victorian cancer services: summary report* for further details.7

## Methodology

Patients invited to participate in the study included those who were admitted as acute care inpatients for cancer treatment or related care (≥ two-night stay), attending for ambulatory intravenous chemotherapy or radiotherapy. Patients were excluded if they were receiving terminal care, when participation was likely to be too burdensome, if they were admitted to subacute, rehabilitation or hospice care or were unwilling/unable to consent.

The Peter MacCallum Cancer Centre Ethics Committee granted low-negligible risk multisite ethics approval, with site-specific assessment authorisation obtained at each of the participating health services. All patients provided verbal consent to allow data collection.

Data were collected in a common four-week period (14 November – 9 December 2016) across all health services. Either dietitians employed in the health service, or dietetic students who had competently completed their clinical placement at that health service, conducted the nutrition screening, assessment and data collection. All patient information was de-identified and entered into a central database via Research Electronic Data Capture (REDCap). The Department of Health and Human Services is the custodian of this dataset.

## Results

A total of 1,340 participants from 12 health services (16 individual sites) were included in the study. Of these, 49 per cent were male. The average age of participants was 67.3 years, almost half (49 per cent; *n* = 660) were 65 years of age or older, and 9 per cent (*n* = 115) were over 80 years of age. Twenty-three per cent of participants identified as being from a culturally diverse background, and 1 per cent identified as Aboriginal.

The majority of participants were being treated in the ambulatory setting (*n* = 1,019; 76 per cent), with the largest patient groups being haematology (19 per cent), breast (18 per cent), colorectal (14 per cent) and lung (11 per cent).

The following table provides a summary of the study findings and implications.

Table 1: Summary of cancer malnutrition point prevalence study findings 2016

| Variable | Findings | Comments |
| --- | --- | --- |
| Malnutrition risk | Thirty-seven per cent of patients in Victorian cancer services were at risk of malnutrition in 2016. | The 2016 data continues to indicate that approximately one-third of all patients with cancer are at risk of malnutrition. Results from 2012 and 2014 are consistent with this result (36% vs 33% respectively). |
| Overall malnutrition prevalence | The prevalence of malnutrition was 23% in Victorian cancer services in 2016.  Significantly more inpatients were malnourished compared with ambulatory patients (37% vs 18% respectively; *p* < 0.001). | As the malnutrition diagnosis was determined using an alternative diagnosis, a direct comparison to previous study results cannot be made, only a general comparison. This result indicates that more than one-fifth of cancer patients are malnourished. |
| Cancer type | Malnutrition is more likely in cancer patients with the following tumour streams: upper gastrointestinal (43%), lung (29%), head & neck (28%) and colorectal (24%).  Breast and skin and melanoma cancer patients had the lowest rate of malnutrition (8% each). | Malnutrition prevalence ranges from 8% to 43% depending on the type of cancer.  The 2016 data continues to indicate that malnutrition can occur in all tumour streams. Timely and repeated nutrition risk screening is essential to identifying patients at risk of malnutrition, regardless of their diagnosis. |
| Treatment type | Malnutrition status varied between treatment types, with patients receiving combined chemoradiation therapy having the highest rate of malnutrition (27%) compared with single-modality treatments of chemotherapy (23%), radiation therapy (22%), surgery (20%) and stem cell transplant (11%). | The 2016 data continues to indicate that malnutrition is more common in patients receiving multimodal treatment compared with those receiving single-modality treatments. |
| Age | Malnutrition prevalence increased with age, with a significant difference between patients < 65 years compared with those > 65 years (17% vs 28%; *p* < 0.001).  The age group with the lowest prevalence was the 35–49-year age group at 11% compared with 39% in those aged > 80 years. | The 2016 data confirms that older cancer patients are more likely to be malnourished. |
| Social situation | Malnutrition prevalence was significantly higher in patients who live alone compared with those living with family or a carer (30% vs 21%; *p* = 0.003). | Eighteen per cent of the study population lived alone compared with 82% living with family or a carer.  The 2016 data continues to indicate that additional attention should be given to patients known to live alone. |
| Nutrition support | Almost one-third (32%) of the patients assessed as malnourished were not receiving nutrition care from a dietitian.  Inpatients with malnutrition were more likely to be receiving dietetic care than those in the ambulatory setting (74% vs 64%; *p* = 0.202).  Oral nutritional support (52%) and oral nutrition supplements (49%) were the most common forms of nutrition support. Seven per cent of patients required enteral nutrition support and all these patients had either a head & neck or upper gastrointestinal tumour. | The 2016 data continues to indicate that a clinically significant proportion of malnourished patients are not receiving care from a dietitian, with a higher proportion of malnourished ambulatory patients not receiving dietetic care. However, positively, the proportion of malnourished patients not receiving care from a dietitian has decreased from 46% in 2014 to 32% in 2016.  Given the small percentage of patients who require enteral or parenteral nutrition (8%), the quality and nutritional content of food in hospitals continues to be an important factor to ensure adequate nutrition and to reduce the risk of nutritional decline during hospital admissions. |
| Outcomes | The 30-day mortality rate was higher in malnourished patients compared with well-nourished patients (5% vs 2%).  Malnourished inpatients were nearly four times more likely to be readmitted to hospital within 30 days of data collection compared with well-nourished patients (14% vs 4%). A majority of these readmissions were unplanned (74% unplanned for malnourished patients; 63% for well-nourished patients).  Rates of admission for ambulatory patients within 30 days of data collection were similar for malnourished and well-nourished patients (20% vs 17%). | The 2016 data continues to indicate that malnourished patients have poorer outcomes, including higher mortality and readmission rates.  These findings have an impact on health service utilisation and healthcare costs, as well as patient costs. |

## Conclusion

Overall, there appears to be a continued downward trend in the prevalence of malnutrition in Victorian cancer services, from 31 per cent in 2012, to 26 per cent in 2014 and 23 per cent in 2016, although different malnutrition criteria were used for the 2016 study and there were some differences in the health services involved.

Over the past six years some of the key objectives of the MVCS program of work have been to raise the awareness of cancer malnutrition, as well as identify areas for improvements to reduce the cancer malnutrition burden on our health services. The results of the 2016 PPS have shown that this program of work has clearly been successful at achieving these objectives. Through awareness raising, identifying areas of need and providing resources to address these areas, improvements in screening and referral rates have resulted in a higher percentage of patients receiving dietetic care that has most likely translated into improved patient and health service outcomes.

These results do, however, indicate that cancer malnutrition remains a significant quality and risk issue for health services, and further work focused on cancer malnutrition is still warranted. Future PPSs can provide an important mechanism for monitoring changes in prevalence and identifying areas of need for both the state as a whole and for individual health services.

The PPS has identified many key findings that highlight particular areas requiring targeted improvements. The following areas of focus have been identified:

* early identification of malnutrition risk, leading to dietetic referral and intervention, especially in admitted patients, traditionally low-risk tumour streams, the elderly and patients who live alone
* development of sustainable models of care to effectively manage the high volume of malnourished patients identified, especially in the colorectal and haematology tumour streams
* improved discharge planning for malnourished patients, including initiation of appropriate community-based monitoring and interventions to maintain nutrition care outside the acute care setting, with the subsequent potential to reduce unplanned admissions
* investigation into more effective interventions or models of care to manage the traditionally high-risk tumour streams (including upper gastrointestinal) that continue to have high rates of malnutrition despite relatively high rates of dietetic intervention.

# Background

Malnutrition can be defined as a state of nutrition in which ‘a deficiency or excess (or imbalance) of energy, protein and other nutrients causes measurable adverse effects on tissue/body forms or function and clinical outcomes’.1 In the context of cancer malnutrition, and throughout the Malnutrition in Victorian Cancer Service (MVCS) program of work, malnutrition refers to the deficiency state or under-nutrition also known as protein-energy malnutrition.

Oncology patients are 1.7 times more likely to be malnourished than other clinical groups.2 Malnutrition has serious implications for health and recovery from illness, surgery and cancer treatments and is an independent predictor of outcome.3,4 Timely and regular nutrition risk screening and nutritional assessment are required to ensure early nutrition inventions and best patient outcomes.4 Cancer-related malnutrition has been identified as a significant supportive care need in the cancer population, often poorly recognised and therefore untreated. Strategies to address the need for better supportive care for people with cancer are outlined in *Providing optimal cancer care, supportive care policy for Victoria*.5

The Cancer Malnutrition Point Prevalence Study (PPS), first conducted in 2012 and repeated in 2014, has been conducted as part of the MVCS program of work, supported and funded by Cancer Strategy and Development, Department of Health and Human Services. This study has been instrumental in determining the proportion of Victorian adults with cancer who have malnutrition and identifying areas for improvement regarding cancer malnutrition. The studies have found the overall malnutrition prevalence of cancer patients receiving active treatment in Victoria significantly reduced from 31 per cent in 2012 to 26 per cent in 2014.6 In 2014 malnutrition prevalence varied greatly between ambulatory patients and inpatients (57 per cent vs 19 per cent respectively), and across tumour streams, with the highest rates occurring in the upper gastrointestinal (UGI) tumour stream (48 per cent) and the lowest in the breast tumour stream (14 per cent).6 In addition, the PPS has demonstrated that malnourished patients have poorer outcomes and more complications compared with well-nourished patients, leading to increased healthcare costs.6

Both the Victorian Government and individual health services have benefitted from previous PPS results. This robust, local evidence has been used to:

* increase the awareness of a malnutrition diagnosis and its implications
* demonstrate areas of most need for resourcing and process improvement projects
* support business cases and grant applications to better manage malnutrition
* raise the profile of cancer malnutrition as a quality and risk issue
* increase awareness of the importance of nutrition care processes and dietetic practice.

Despite some significant improvements in awareness and a reduction in prevalence in Victoria over the past four years, the findings from the 2012 and 2014 PPS indicate that cancer malnutrition is multifactorial and continues to be a significant area of concern for oncology services and their patients. Ongoing assessment and monitoring of the nutrition care provided to patients with cancer, through repeated PPS, is essential to achieve further improvements in patient safety and quality of care.

In 2016 the cancer malnutrition PPS was undertaken using a newly developed, sustainable methodology based on the methodology used in the 2012 and 2014 studies. Refer to the *Phase III Malnutrition in Victorian cancer services: summary report* for further details.7

This report provides the results and details of the 2016 cancer malnutrition PPS.

## Research question

To determine the prevalence of malnutrition within the cancer population in acute Victorian health services and to identify areas requiring improvement, with the long-term goal of reducing cancer malnutrition prevalence and burden in Victorian cancer services.

## Aims

1. Assess the prevalence of malnutrition risk and the subsequent presence of malnutrition within those screened as at risk for admitted (multi-day) cancer patients in Victoria.
2. Assess the prevalence of malnutrition risk and the presence of malnutrition within those screened at risk for ambulatory chemotherapy and radiotherapy patients in Victoria.
3. To report 30-day outcomes for the study cohort (including mortality and hospital admission) and investigate associations with malnutrition.
4. Identify areas requiring local improvement in the management and treatment of malnutrition in Victorian cancer services.

# Methodology

## Population

Twelve health services participated in the 2016 cancer malnutrition PPS. All 12 health services had participated in the two previous cancer malnutrition PPSs (2012 and 2014). Refer to Appendix 1 for a full list of participating health services and individual sites.

Anticipated numbers were based on estimates of each hospital’s cancer treatment volume using the following:

* inpatients – based on number of specific oncology beds per hospital or average number of oncology patients admitted (as advised by each site) plus 50 per cent of surgical beds (for non-oncology specific caseload) × 1 day
* chemotherapy – twice the number of chairs in each day therapy unit × 5 days
* radiotherapy – based on an average of 25 patients treated per machine daily (as advised by radiotherapy services at Peter Mac) × 2 days.

## Study criteria

Inclusions:

* All consenting adults admitted to an acute ward (inpatient, ≥ two-night stay) of the health service for cancer treatment or related management
* All consenting adults attending the health service for intravenous (IV) chemotherapy administration or who have received an IV chemotherapy agent within the preceding three weeks; this included any cancer-suppression treatments (cytotoxic agents, hormonal and biological therapies) but not supportive treatments (blood transfusions, biphosphonates)
  + All consenting adults attending the health service for radiotherapy

Exclusions:

* Paediatric cancer patients aged 17 years or younger
* Patients admitted for fewer than two nights
* Patients admitted to subacute, rehabilitation or hospice care
* Patients receiving terminal care or where death is imminent (~ one month)
* Patients who were unaware of their diagnosis of malignancy at admission
* Ambulatory patients attending for nursing or medical review only including blood, radiological or other diagnostic tests, dressings and related care
* Patients for whom participation is considered too burdensome
* Patients unable to consent due to being non-English speaking, cognitive impairment or sedation

## Study tools

The Malnutrition Prevalence Study Tool was developed specifically for the study in Research Electronic Data Capture (REDCap), a secure online database hosted by the University of Melbourne. A paper version was made available where required (refer to Appendix 2).

Malnutrition risk was determined using a validated and reliable malnutrition risk screening tool (Malnutrition Screening Tool, MST)9 built into the study tool. The MST was used to identify patients at risk of malnutrition. Any participant determined as being at risk of malnutrition (MST score ≥ 2) then required a physical assessment so their nutritional status could be established. A diagnosis of malnutrition was determined where the patient matched the following criteria using the ICD-10-AM definition of:

BMI < 18.5 kg/m2 or unintentional loss of weight ≥ 5 per cent

**with** evidence of suboptimal intake resulting in subcutaneous fat **and/or** muscle wasting.8

REDCap calculated malnutrition risk based on the MST. The conditional workflow developed within REDCap reveals questions based on previous responses.

Data was collected for each of the following areas:

* patient demographics, including Aboriginal or Torres Strait Islander status and culturally diverse background
* anthropometry, including weight loss
* food intake, including degree of reduction compared with usual intake
* malnutrition risk
* muscle status, subcutaneous fat stores and fluid accumulation assessment
* current nutrition interventions
* type of malignancy
* treatments received for current malignancy
  + outcomes at 30 days, including admission/readmission and patient status.

For a complete list of the data collected in the 2016 PPS, please refer to Appendix 2.

## Survey protocol and guidelines

### Days of study

All data were collected in a common four-week period (14 November – 9 December 2016):

* All inpatients – participating sites chose any **one** day within the four-week period. An additional day could be chosen if the target patient numbers were not achieved.
* All patients attending the chemotherapy day unit – participating sites chose any **five consecutive** days within the four-week period to achieve the target patient numbers.
  + All radiotherapy patients – participating sites chose any **two** days within the four-week period. An additional two days could be chosen if the target numbers were not achieved.

### The key points

* Data collection was conducted by dietitians employed in the health services and/or student dietitians who had passed their clinical placement at that health service.
* The MST questions were completed with the patient and for patients at risk of malnutrition (MST ≥ 2), and a physical examination was conducted, as per the PG-SGA.10
* The dietitian obtained personal, medical (cancer diagnosis and current treatments) and nutrition information from the patient and/or via the patient’s medical history.
* Any patient found at risk of malnutrition (MST ≥ 2) and who was unknown to the dietetics service was offered the option of nutritional advice and management at a subsequent time.
  + On day 30, dietitians reviewed hospital records to collect information on hospital admissions and mortality.

Refer to Appendix 3 for details of the instructions for completing data collection and Appendix 4 for guidelines for approaching patients.

## Ethical considerations

This survey was identified as a low-negligible risk (LNR) or quality improvement activity on the basis of the following:

* Malnutrition risk screening is non-invasive and considered part of routine care.
* Nutrition assessment is conducted and considered usual care by dietitians.
* Staff or students from each participating organisation were assessing their own patients and accessing medical records.
* No interventions were involved.
* Confidentiality and security of patient information was upheld at all times.
* Patients were provided with written information explaining the study in plain language (Appendix 5).
  + Patients had to provide verbal consent to participate.

A multi-site ethics application, using the Victorian common LNR application (*Ethics Forms On-line*) was completed and approval granted at Peter Mac, as the lead agency. Following this, all sites were required to submit an LNR site-specific assessment application. All sites were granted approval.

## Training of dietitians in data collection

Training on how to complete the data collection tool was available to each of the sites via an online learning module, as well as through a written instruction tool (Appendix 3).

## Data management

The data collection tool was designed to be completed electronically in REDCap in real time (at the time of data collection). If this was not possible at a health service, it was printed and filled in as a paper-based version for each participant, then the site or student dietitian was required to enter the data into the centralised REDCap database. Paper-based data collection forms will be securely stored in a locked file within the Nutrition Department of each health service for five years.

Once all data entry was completed, the data was exported into an electronic database (Microsoft Excel) for analysis. Participating health services were provided with a database containing information corresponding to information collected for their site. The Victorian Department of Health and Human Services retains the complete electronic database and acts as data custodian.

## Data analysis

All data was analysed using SPSS version 25. Descriptive statistics are presented as the mean. Analyses were undertaken using chi-square tests for equal proportions for categorical variables. A two-sided *p*-value of 0.05 was considered to be statistically significant.

# Results

A total of 1,571 oncology patients were admitted to or attended participating health services for oncology treatments during the study period.

Of these, 1,340 oncology patients (85 per cent) consented to participate and were screened for malnutrition risk. The number screened represents 82 per cent of the projected numbers:

* inpatients – 321 (of 366 projected; 88 per cent)
* chemotherapy day patients – 684 (of 840 projected; 81 per cent)
* radiotherapy patients – 335 (of 428 projected; 78 per cent).

## Statewide malnutrition risk screening

All 1,340 oncology patients were screened using the MST for risk of malnutrition. The proportion of cancer patients identified as being at risk of malnutrition (as determined by an MST score ≥ 2) was 37 per cent (*n* = 492) (see Figure 1).

Figure 1: Malnutrition risk screening

## Statewide malnutrition prevalence

A physical assessment was conducted on 449 of the 492 patients identified as being at risk of malnutrition. Forty-three patients identified as being at risk of malnutrition did not have a physical assessment completed, therefore a malnutrition diagnosis could not be determined for these patients.

Of the patients identified as at risk of malnutrition and with a completed physical assessment, 302 patients, or 23 per cent of the total participants, were malnourished (Figure 2).

Figure 2: Malnutrition assessment

|  |  |  |
| --- | --- | --- |
| **The overall prevalence of malnutrition is 23 per cent in Victorian cancer services.** |  | **Malnutrition prevalence has been trending downwards over the past six years (31% → 26% → 23%).** |

Malnutrition prevalence was compared for inpatients and ambulatory/day-only patients (Table 1).

A significant difference (*p* < 0.001) in malnutrition prevalence was observed between inpatients (37 per cent) and ambulatory patients receiving either radiotherapy and/or chemotherapy (18 per cent).

**Table 1: Victorian cancer services statewide malnutrition prevalence**

| Patient population | Included | Number (%) of patients at risk of malnutrition | Number (%) of patients with malnutrition |
| --- | --- | --- | --- |
| **Inpatient** | 321 | 181 (56%) | 119 (37%) |
| **Ambulatory** | 1,019 | 312 (31%) | 183 (18%) |
| **Total** | **1,340** | **493 (37%)** | **302 (23%)** |

This 2016 data indicates that admitted patients with cancer continue to have a higher malnutrition prevalence than ambulatory patients receiving either radiotherapy and/or chemotherapy.

## Malnutrition prevalence by diagnosis

Patients were grouped according to tumour streams based on type and location of the malignancy.

These tumour stream groups were based on the Cancer Council Victoria groups (see Appendix 6).

Malnutrition prevalence by tumour stream ranged from 8 to 43 per cent, depending on tumour type (Figure 3 and Table 2).

|  |  |  |
| --- | --- | --- |
| **The top four tumour streams associated with the highest prevalence of malnutrition are:**   * **UGI, including endocrine and thyroid: 43 per cent** * **lung: 31 per cent** * **head & neck (H&N): 31 per cent** * **colorectal: 26 per cent.** |  | **UGI, H&N and lung remain the top three tumour streams with the highest prevalence of malnutrition, which is consistent with 2012 and 2014 results.** |

Figure 3: Malnutrition prevalence by tumour type

Statewide malnutrition prevalence = 23%

\* Other includes: bone and soft tissue, central nervous system, other thoracic and abdominal, secondary – unknown primary

Malnutrition prevalence continues to be higher in the tumour streams that involve the gastrointestinal tract, or where the treatment involves this area (UGI, H&N, lung, colorectal).

Table 2: Malnutrition prevalence by tumour type

| Tumour type | Total  included | Number (%) of patients at risk of malnutrition | Number (%) of patients with malnutrition | Malnutrition prevalence within total PPS population | Prevalence over patients with malnutrition |
| --- | --- | --- | --- | --- | --- |
| **Breast** | 242 | 50 (21%) | 19 (8%) | 1.4% | 6.3% |
| **Colorectal** | 187 | 72 (39%) | 48 (26%) | 3.6% | 15.9% |
| **Genitourinary** | 112 | 34 (30%) | 25 (22%) | 1.9% | 8.3% |
| **Gynaecological** | 59 | 20 (34%) | 9 (15%) | 0.7% | 3.0% |
| **Haematological** | 250 | 102 (41%) | 55 (22%) | 4.1% | 18.2% |
| **H&N** | 109 | 51 (47%) | 34 (31%) | 2.5% | 11.3% |
| **Lung** | 144 | 55 (38%) | 45 (31%) | 3.6% | 14.9% |
| **Skin and Melanoma** | 52 | 11 (21%) | 4 (8%) | 0.3% | 1.3% |
| **UGI** | 120 | 72 (60%) | 52 (43%) | 3.9% | 17.2% |
| **Other** | 56 | 25 (45%) | 11 (20%) | 0.8% | 3.6% |

|  |  |  |
| --- | --- | --- |
| **The top five diagnoses associated with the *highest volume* of malnourished patients within the study population as a whole were:**   * **haematological (*n* = 55, 4.1 per cent)** * **UGI (*n* = 52, 3.9 per cent)** * **colorectal (*n* = 48, 3.6 per cent)** * **lung (*n* = 45, 3.6 per cent)** * **H&N (*n* = 34, 2.5 per cent).** |  | **The top five diagnoses associated with the highest volume of malnourished patients has included haematological, UGI, colorectal and lung diagnoses for the past six years.** |

## Malnutrition prevalence by cancer stage

The presence of metastatic disease was recorded as a surrogate measure of more advanced disease (*n* = 1,157). In total, 460 or 34 per cent of the total participants had metastatic disease recorded as being present. Similar rates of metastatic disease were seen in both inpatients (37 per cent) and ambulatory patients (34 per cent).

Malnutrition prevalence rates between patients with or without metastatic disease were compared. Significantly higher malnutrition prevalence rates were observed for patients with metastatic disease (Table 3).

Table 3: Malnutrition prevalence by presence of metastatic disease (*n* = 1,157)

| Presence of metastatic disease | Total number | Number (%) of patients with malnutrition | *p*-value |
| --- | --- | --- | --- |
| **No** | 697 | 129 (19%) |  |
| **Yes** | 460 | 128 (28%) | < 0.001 |

## Malnutrition prevalence by demographic variables

Malnutrition prevalence was determined by gender, age and social situation (Table 4).

Table 4: Malnutrition prevalence by demographic variable

| Category | Variable | Total number | Number (%) of patients with malnutrition | *p*-value |
| --- | --- | --- | --- | --- |
| **Gender (*n =* 1,340)** | Male | 662 | 185 (28%) | < 0.001 |
| Female | 678 | 117 (17%) |  |
| **Age (*n* = 1,292)** | 18–34 years | 70 | 9 (13%) |  |
| 35–49 years | 151 | 17 (11%) |  |
| 50–64 years | 446 | 89 (20%) |  |
| 65–80 years | 511 | 130 (25%) | < 0.001\* |
| > 80 years | 114 | 44 (39%) | < 0.001^ |
| **Social situation (*n* = 1,335)** | Lives with family/carer | 1,081 | 226 (21%) |  |
| Lives alone | 241 | 72 (30%) | 0.003# |
| Lives in residential care | 13 | 4 (31%) |  |

\* < 65 years compared with ≥ 65 years

^ ≤ 80 years compared with > 80 years

# Lives alone compared with lives with family/carer

### Gender

Fifty-one per cent of the study population were female. A difference was seen in malnutrition prevalence between men and women, with men significantly more likely to be malnourished.

### Age

The average age of participants was 67.3 years. Forty-seven per cent (*n* = 625) of the study population were 65 years of age or older and 9 per cent (*n* = 114) were over 80 years of age.

Malnutrition was more prevalent in the older age groups, as can be seen in Figure 4. Malnutrition prevalence was significantly higher for those aged 65 years or older compared with those younger than this (28 per cent vs 17 per cent; *p* < 0.001), as well as those aged over 80 years compared with those younger than 80 years (39 per cent vs 21 per cent; *p* < 0.001).

Figure 4: Malnutrition prevalence by age

|  |  |  |
| --- | --- | --- |
| **As people age they are more likely to be malnourished, with the highest prevalence seen in patients over 80 years of age.** |  | **Consistent with the 2012 and 2014 PPSs, patients > 80 years of age continue to have the highest prevalence of malnutrition.** |

### Social situation

The majority of the study participants (81 per cent) lived with family or carers; however, 18 per cent lived alone. Those living alone were significantly more likely to be malnourished than those living with family or carers (*p* = 0.003).

|  |
| --- |
| **People with cancer who live alone are more likely to be malnourished than those living with family or carers.** |

## Malnutrition prevalence by treatment modality

Comparisons were made in the prevalence of malnutrition based on the type of treatment the patients were receiving. Malnutrition prevalence ranged from 11 per cent in patients receiving haematopoietic stem cell transplants through to 27 per cent in patients receiving the multi-modal treatment of chemoradiation (Figure 5).

Figure 5: Malnutrition prevalence by treatment modality

\* The ‘other’ category included, but was not limited to, patients receiving immunotherapy.

## Malnutrition prevalence by participating health service

Sites were de-identified and assigned numbers beginning with M (metropolitan) and R (regional). The same numbers that have been used in the 2012 and 2014 report were used in 2016 and will remain the same numbers throughout the remainder of this report.

The malnutrition prevalence at each health service was determined, ranging from 13 to 36 per cent (Figures 6–10 and Table 5).

Figure 6: Overall malnutrition prevalence by health service

|  |
| --- |
| **The percentage of sites with overall malnutrition prevalence rates higher than the statewide average has reduced in 2016 (53 per cent in 2012 and 2014 → 42 per cent in 2016).** |

Table 5: Malnutrition prevalence by health service

| Site | Included | Percentage of total study population | Number (%) of patients with malnutrition |
| --- | --- | --- | --- |
| **R3** | 76 | 6 | 23 (30%) |
| **R4** | 101 | 8 | 21 (21%) |
| **R5** | 49 | 4 | 8 (16%) |
| **M1** | 121 | 9 | 31 (26%) |
| **M3** | 223 | 17 | 49 (22%) |
| **M4** | 130 | 10 | 30 (23%) |
| **M5** | 234 | 17 | 42 (18%) |
| **M6** | 152 | 11 | 31 (20%) |
| **M7** | 101 | 8 | 31 (31%) |
| **M8** | 70 | 5 | 19 (27%) |
| **M9** | 55 | 4 | 7 (13%) |
| **M10** | 28 | 2 | 10 (36%) |

Figure 7 demonstrates the malnutrition prevalence of each site compared with the number of patients included in this study.

Figure 7: Malnutrition prevalence by patient numbers for individual sites

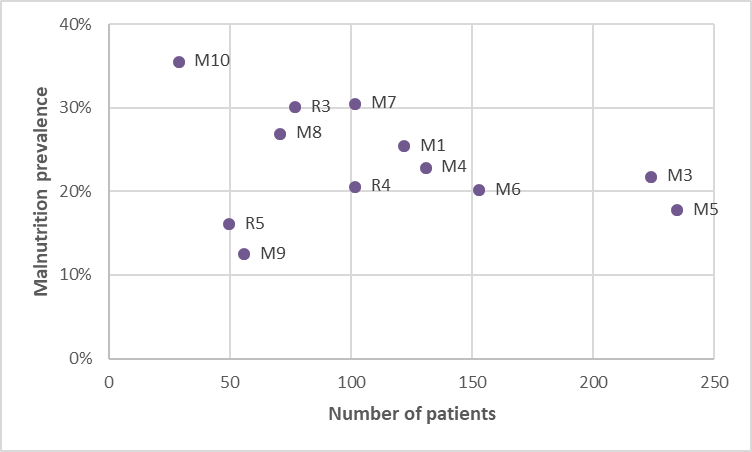


Figure 7 demonstrates that some sites with higher malnutrition prevalence rates had relatively small participant numbers, hence skewing their data. There was little difference seen in malnutrition prevalence rates between metropolitan and regional health services (22 per cent vs 23 per cent; *p* = 0.921). This differs from the 2014 PPS, where regional health services were found to have a statistically significant lower prevalence of malnutrition compared with metropolitan health services (19 per cent vs 28 per cent; *p* < 0.001).

Figures 8, 9 and 10 demonstrate malnutrition prevalence by site based on each treatment area: inpatients, chemotherapy day units and radiotherapy.

Figure 8: Inpatient malnutrition prevalence by health service

Figure 9: Chemotherapy day unit malnutrition prevalence by health service

Figure 10: Radiotherapy unit malnutrition prevalence by site\*

\* Dietetic services to Peter Mac radiotherapy services at Box Hill and Moorabbin are provided as a satellite service by the Nutrition Department at Peter Mac, Melbourne; therefore, prevalence results and practices relating to malnutrition reflect those from Peter Mac. Otherwise all radiotherapy services are provided by the local participating health service.

## Dietetic intervention

Table 6 shows that 451 patients (34 per cent of total population; *n* = 1,340) were receiving current dietetic interventions. Of this group, 205 patients (45 per cent) were assessed as malnourished on the study days.

A higher percentage of malnourished admitted patients (inpatients) were receiving dietetic intervention compared with ambulatory patients (74 per cent vs 64 per cent), but this did not reach statistical significance (*p* = 0.202). Forty-five per cent of inpatients were receiving dietetic intervention when not malnourished compared with 19 per cent of ambulatory patients.

Table 6: Dietetic intervention by admitted or ambulatory patients

| Category | Included | Number of patients with malnutrition | Number (%) of patients with malnutrition receiving dietetic intervention | *p*-value |
| --- | --- | --- | --- | --- |
| Inpatient | 321 | 119 | 88 (74%) |  |
| Ambulatory | 1,019 | 183 | 117 (64%) | 0.202 |
| **Total** | **1,340** | **302** | **205 (68%)** |  |

|  |
| --- |
| **About one-third (32 per cent) of patients with malnutrition were not receiving dietetic intervention.** |

## Malnourished patients receiving dietetic intervention by tumour type

There is a wide variation in the number of patients with malnutrition who were receiving dietetic intervention based on tumour stream. Patients with a skin and melanoma cancer diagnosis and malnutrition were most likely to be receiving dietetic intervention (100 per cent of malnourished patients; *n* = 4) compared with patients with a breast cancer diagnosis and malnutrition, who were the least likely (37 per cent of malnourished patients; *n* = 19). Caution is to be taken in interpreting the results, in particular for tumour streams with a small volume (Figure 11 and Table 7).

Figure 11: Malnourished patients receiving dietetic intervention by tumour type

Table 7: Malnourished patients receiving dietetic intervention by tumour type

| Tumour type | Total population | Number (%) of patients receiving dietetic intervention | Number of patients with malnutrition | Number (%) of patients with malnutrition receiving dietetic intervention |
| --- | --- | --- | --- | --- |
| **Breast** | 242 | 23 (10%) | 19 | 7 (37%) |
| **Colorectal** | 187 | 59 (32%) | 48 | 27 (56%) |
| **Genitourinary** | 112 | 28 (25%) | 25 | 13 (52%) |
| **Gynaecological** | 59 | 14 (24%) | 9 | 5 (56%) |
| **Haematological** | 250 | 84 (34%) | 55 | 38 (69%) |
| **H&N** | 109 | 86 (79%) | 34 | 32 (94%) |
| **Lung** | 144 | 58 (40%) | 45 | 35 (78%) |
| **Skin and melanoma** | 52 | 11 (21%) | 4 | 4 (100%) |
| **UGI** | 120 | 69 (58%) | 52 | 37 (71%) |
| **Other** | 56 | 19 (34%) | 11 | 7 (64%) |

|  |  |  |
| --- | --- | --- |
| **The top five tumour streams associated with the biggest gaps in dietetic services to malnourished patients by volume are:**   * **colorectal (*n =* 21; 7 per cent)** * **haematology (*n =* 17; 5.6 per cent)** * **UGI (*n =* 15; 5 per cent)** * **breast (*n =* 12; 4 per cent)** * **genitourinary (*n =* 12; 4 per cent).** |  | **Breast and colorectal have been in the top five tumour streams associated with the biggest gaps in dietetic services to malnourished patients in 2012, 2014 and 2016.** |

## Malnourished patients receiving dietetic intervention by treatment modality

Rates of dietetic intervention for malnourished patients by treatment modality range from 60 to 81 per cent. Those best recognised and referred to dietetic service are those patients receiving surgery or concurrent chemoradiation treatment. The lowest referral rates are in those patients receiving chemotherapy (*n =* 207) and stem cell transplant (*n =* 3) (Table 8).

Table 8: Dietetic intervention to malnourished patients by treatment modality

| Treatment | Number (%) of patients receiving dietetic intervention | Number of patients with malnutrition | Number (%) of patients with malnutrition receiving dietetic intervention |
| --- | --- | --- | --- |
| **Surgery** | 115 (39%) | 58 | 47 (81%) |
| **Chemotherapy** | 280 (31%) | 207 | 138 (67%) |
| **Radiation therapy** | 174 (37%) | 100 | 75 (75%) |
| **Stem cell transplant** | 18 (64%) | 3 | 2 (67%) |
| **Chemoradiation** | 91 (41%) | 59 | 47 (80%) |

## Malnourished patients receiving dietetic intervention by site

A wide variation in the proportion of patients receiving dietetic interventions was seen between participating sites. This ranged from 13 to 70 per cent, with 20–100 per cent of patients identified with malnutrition known to a dietitian (Figure 12 and Table 9).

Figure 12: Malnourished patients receiving dietetic intervention by site

Table 9: Malnourished patients receiving dietetic intervention by site

| Site | Total population | Number (%) all patients receiving dietetic intervention | Number of patients with malnutrition | Number (%) of patients with malnutrition receiving dietetic Intervention |
| --- | --- | --- | --- | --- |
| **M1** | 121 | 49 (40%) | 31 | 20 (65%) |
| **M3** | 223 | 70 (31%) | 49 | 37 (76%) |
| **M4** | 130 | 35 (27%) | 30 | 15 (50%) |
| **M5** | 234 | 69 (29%) | 42 | 23 (55%) |
| **M6** | 152 | 54 (36%) | 31 | 21 (68%) |
| **M7** | 101 | 34 (34%) | 31 | 23 (74%) |
| **M8** | 70 | 28 (40%) | 19 | 14 (74%) |
| **M9** | 55 | 19 (35%) | 7 | 7 (100%) |
| **M10** | 28 | 18 (64%) | 10 | 9 (90%) |
| **R3** | 76 | 17 (22%) | 23 | 11 (48%) |
| **R4** | 101 | 46 (46%) | 21 | 19 (90%) |
| **R5** | 49 | 12 (24%) | 8 | 6 (75%) |

## Types of nutrition support

Nutrition support provision was determined as:

* no intervention – the patient is receiving a standard or full ward diet without fortification/supplements or having their usual home diet
* oral nutrition support – the patient is implementing/using dietary advice/food fortification only (the patient has modified their current diet to include high-energy/high-protein foods or fortifying foods to increase energy and protein content)
* commercial oral nutrition supplements – the patient is including supplements made with commercial powders (for example, Sustagen, Advital, Ensure, Proform) or pre-packaged, ready-made, nutritionally complete supplements (for example, Fortisip, Resource, Ensure varieties)
* enteral nutrition – the patient is receiving enteral nutrition via a feeding tube, for example, NGT, PEG, JEJ (this could be total/complete enteral nutrition or supplementary)
  + parenteral nutrition – the patient is receiving total parenteral nutrition (TPN) – this could be total/complete TPN or supplementary.

Differences were seen in the type of nutrition support provided to patients based on where they receive treatment and tumour type (Figures 13 and 14).

Figure 13: Nutrition support by inpatients and ambulatory patients

Only 41 patients (3 per cent) were receiving enteral nutrition support and nine patients (less than 1 per cent) required parenteral nutrition support. Patients receiving enteral nutrition support as an inpatient were predominantly having it as their complete nutrition (77 per cent) compared with ambulatory patients, who were predominantly having it as supplementary (58 per cent). Parenteral nutrition was only used in inpatients, with a majority of this as complete nutrition support (89 per cent).

Figure 14: Nutrition support by tumour type

## Outcomes

Outcomes for all patients were collected from the medical history and hospital admissions records at 30 days following the initial study day (Table 10).

Table 10: Thirty-day outcomes for all patients

| Category | Variable | Total number | Number (%) with malnutrition |
| --- | --- | --- | --- |
| **30-day mortality** | Alive | 1,116 | 248 (22%) |
| Deceased | 33 | 14 (42%) |
| Unknown / not available | 191 | 40 (21%) |
| **Admission/ readmission** | No | 803 | 139 (17%) |
| All readmissions | 319 | 101 (32%) |
| Planned | 181 | 40 (22%) |
| Unplanned | 138 | 59 (43%) |
| Remains an inpatient | 12 | 4 (33%) |

### Thirty-day mortality

Mortality outcomes were available for 1,149 patients (86 per cent). Thirty-three patients (2.5 per cent of the total population) were deceased at 30 days. Of the patients who had died, 14 (42 per cent) were malnourished. The 30-day mortality rate was 2.5 times higher in malnourished patients (4.6 per cent vs 1.8 per cent).

### Admission or readmission

Admission (for ambulatory patients) or readmission to hospital was recorded if patients required admission to an inpatient bed (≥ two-night admission) within 30 days after data collection. This excludes day-only attendances for chemotherapy or other day-only procedures. Given that many oncology patients have routine hospital admissions, all admissions were classed as planned or unplanned.

Data for 1,122 patients (84 per cent) was available, with patients who remained as an inpatient, deceased and those with missing/unknown data not included (*n =* 218).

# Discussion

Overall, there is a continued step-wise, downward trend in the prevalence of malnutrition in Victorian cancer services – from 31 per cent in 2012, to 26 per cent in 2014 and 23 per cent in 2016.

Despite the use of different criteria for diagnosing malnutrition, and a slightly different cohort of health services involved in the 2016 study compared with previous studies, these results suggest that improvements have been made, but that cancer malnutrition continues to be a significant issue for health services.

Malnutrition prevalence rates presented in the literature vary considerably, depending on the patient groups included, from 26 per cent in chemotherapy day patients11 to 76 per cent in admitted oncology patients.12 These studies2,3,11–13 are now all more than eight years old, and there have been significant improvements made to oncologic treatments over this time, resulting in a reduction in the severity of nutrition impact symptoms and therefore potentially the prevalence of malnutrition, making comparison difficult.

A sustainable methodology was developed in 2016 to enable the cancer malnutrition PPS to be repeated biennially across Victorian cancer services. The development of this methodology included future-proofing the study so the data collected could be used to diagnose malnutrition using multiple definitions of malnutrition should any one definition become standard national or international practice. The ICD-10-AM criteria was used as the diagnostic criteria for malnutrition in the 2016 study, given this is the criteria used for coding malnutrition among inpatients in Victorian cancer services; however, data is also available within the study to diagnose malnutrition using the European Society for Clinical Nutrition and Metabolism and The Academy of Nutrition and Dietetics definitions. Due to this change in methodology from using the Patient Generated-Subjective Global Assessment (PG-SGA) to diagnose malnutrition in the 2012 and 2014 studies, direct comparisons cannot be made between the results of these studies, only identification of trends.

Despite the positive downward trend in the prevalence of malnutrition in admitted patients with cancer over the past six years, admitted patients continue to have a cancer malnutrition prevalence approximately twice that of ambulatory patients.

These findings could be because malnourished patients are more likely to be admitted to hospital, as has previously been reported, but could also be due to malnutrition being acquired during their admission. The PPS methodology does not allow for a longitudinal study that would identify the timepoint at which patients became malnourished, therefore results are unable to point to whether those with malnutrition are more likely to be admitted or if malnutrition was a complication of care. Further work is required in the inpatient setting particularly, to better identify malnutrition risk, but additionally to prevent any nutritional decline and subsequent hospital-acquired malnutrition through appropriate nutrition care provision. It is important to ensure staff roles and responsibilities for nutrition care and appropriate food service systems are in place to best support nutrition care to patients.

Despite acknowledging the high nutritional risk of UGI cancer patients, both within nutrition and across the multidisciplinary team, UGI patients continue to have the highest malnutrition prevalence rates of all tumour streams.

This result is consistent with both the previous 2012 and 2014 PPS results. In addition, UGI had the second highest volume of malnourished patients in the study, and only 71 per cent of the malnourished UGI patients were receiving dietetic intervention at the time of data collection. The location of these tumours, combined with the effects of treatment, predisposes these patients to a higher risk of malnutrition; however, these results suggest that current identification processes and/or interventions have not been effective at combatting this risk, and further work is needed in this area, including investigations into effective interventions, to manage this high-risk group.

Of the 12 health services involved in this PPS, only three health services, including one regional site, had 90 per cent or more of their malnourished patients receiving dietetic intervention.

Identifying patients who are at risk of malnutrition leading to dietetic referral and intervention continues to be a clinical service gap for all tumour streams and for a majority of health services. Despite these ongoing concerns, the 2016 results did suggest a positive trend of a higher percentage of patients receiving dietetic intervention overall compared with the 2014 results.

Colorectal and haematology tumour streams have the largest gaps in dietetic services to malnourished patients by volume in this study (*n* = 21 and *n* = 17 respectively), which is most likely due to the high volume of patients treated with these diagnoses.

Previous local projects conducted as part of the Phase II MVCS program of work focused on these areas; however, these results suggest that additional work is required to ensure that a sustainable model of care can be developed to appropriately manage these high-risk and high-volume groups of patients.

Traditionally known ‘high-risk’ tumours streams, including H&N, lung and UGI, had high percentages of malnourished patients receiving dietetic interventions; however, traditionally known ‘low-risk’ tumour streams, including breast, genitourinary and gynaecological, continue to have lower percentages. Malnourished breast cancer patients continue to have the lowest rate of dietetic intervention, with only 37 per cent of malnourished patients receiving dietetic intervention. These low rates could be due to several reasons, including inadequate screening and referral pathways/processes, inadequate dietetic resources, lower clinical prioritisation and/or ineffective interventions or monitoring.

One of the key objectives of the MVCS program of work has been to raise the awareness of cancer malnutrition, which has clearly been successful. Further work is still required to continue in this area, particularly in the traditionally lower risk tumour streams where malnutrition continues to be a concern.

This study continues to indicate that patients who live alone have a higher prevalence of malnutrition compared with those who live with family or carers. In addition to this, malnutrition prevalence rates increase with increasing age. Given our population is ageing, and that health care is increasingly delivered in the ambulatory setting, these findings are significant.

Additionally, these results are consistent with the previous PPS results, indicating that malnutrition continues to be a significant risk factor for hospital admission for cancer patients. Admission rates to hospital continue to be higher in patients with cancer malnutrition. To date, much of the work of the MVCS program has focused on acute health care services; however, not all of a cancer patient’s treatment and care is delivered in these settings.

**Future work needs to include a focus on:**

* **adequate discharge planning for malnourished cancer patients**
* **appropriate transition of nutrition care between acute and primary/community care**
* **appropriate ambulatory/community monitoring and interventions, especially in the older population.**

This PPS methodology has several limitations. Because data was collected on a single day, or only on a limited number of days, the results may not be truly representative of the oncology population, and therefore only reflect the patients included in this study. With relatively large numbers included in this PPS, like the 2012 and 2014 studies, this improves the validity of the data. Additionally, the methodology does not allow for tracking of patients over time. For example, the change in nutritional status cannot be determined, including the onset of malnutrition, which limits the ability of a study such as this to pinpoint when a patient may become malnourished and/or times during treatment of greatest risk. Through the development of this sustainable methodology, several data points needed to be either removed or simplified to ensure that robust and essential data could be collected within existing resources biennially. These data points were removed or simplified after consultation with dietitians, as they had limited value, were difficult to collect or were too subjective. This has resulted in a further limitation in that some findings from the study have been simplified compared with the 2012 and 2014 studies. For example, the following data points were not collected in the 2016 PPS that were included previously: severity of malnutrition, treatment intent, complications during an admission, and commencement of nutrition support within 30 days after the study day.

# Conclusion

Overall, there is a continued downward trend in the prevalence of malnutrition in Victorian cancer services, from 31 per cent in 2012, to 26 per cent in 2014 and 23 per cent in 2016.

Over the past six years some of the key objectives of the MVCS program of work have been to raise the awareness of cancer malnutrition, as well identify areas for improvements to reduce the cancer malnutrition burden on our health services. The results of the 2016 PPS have shown that this program of work has clearly been successful at achieving these objectives. Through awareness raising, identifying areas of need, and providing resources to address these areas, improvements in screening and referral rates have resulted in a higher percentage of patients receiving dietetic care that has most likely translated into improved patient and health service outcomes.

These results do, however, indicate that cancer malnutrition remains a significant quality and risk issue for health services and further work focused on cancer malnutrition is still warranted. Future PPSs can provide an important mechanism for monitoring changes in prevalence and identification of areas of need for both the state and for individual health services.

The PPS has identified many key findings that highlight particular areas requiring targeted improvements. The following areas of focus have been identified:

* early identification of malnutrition risk, leading to dietetic referral and intervention, especially in admitted patients, traditionally low-risk tumour streams, the elderly and patients who live alone
* development of sustainable models of care to effectively manage the high volume of malnourished patients identified, especially in the colorectal and haematology tumour streams
* improved discharge planning for malnourished patients, including initiation of appropriate community-based monitoring and interventions to maintain nutrition care outside the acute care setting, with the subsequent potential to reduce unplanned admissions
* investigation into more effective interventions or models of care to manage the traditionally high-risk tumour streams, including UGI, that continue to have high rates of malnutrition despite relatively high rates of dietetic intervention.

# Appendix 1: Participating sites by Integrated Cancer Service

**Hume Regional Integrated Cancer Service (Hume RICS)**

* + Goulburn Valley Health – Shepparton

**Gippsland Regional Integrated Cancer Service (GRICS)**

* + Latrobe Regional Hospital – Traralgon including radiotherapy services

**Grampians Integrated Cancer Service (GICS)**

* + Ballarat Health Services – Ballarat Hospital and Ballarat Austin Radiation Oncology Service

**North Eastern Metropolitan Integrated Cancer Service (NEMICS)**

* Austin Health – Austin Hospital including radiotherapy services
  + Eastern Health – Box Hill including Peter Mac radiotherapy services,\* Maroondah

**Southern Melbourne Integrated Cancer Service (SMICS)**

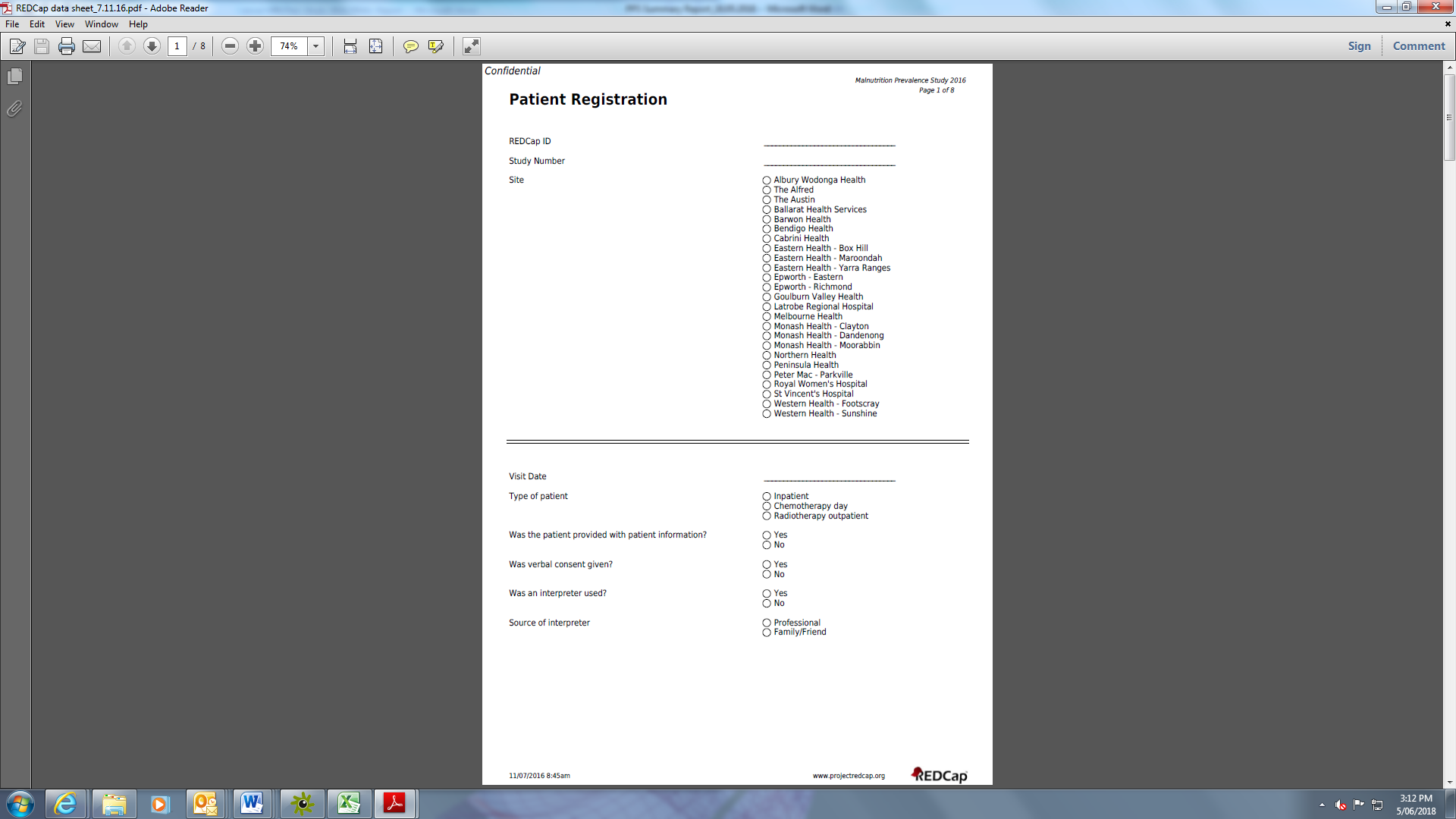
* Alfred Health – The Alfred including radiotherapy services
* Peninsula Health – Frankston
  + Monash Health – Moorabbin including Peter Mac radiotherapy services,\* Clayton and Dandenong

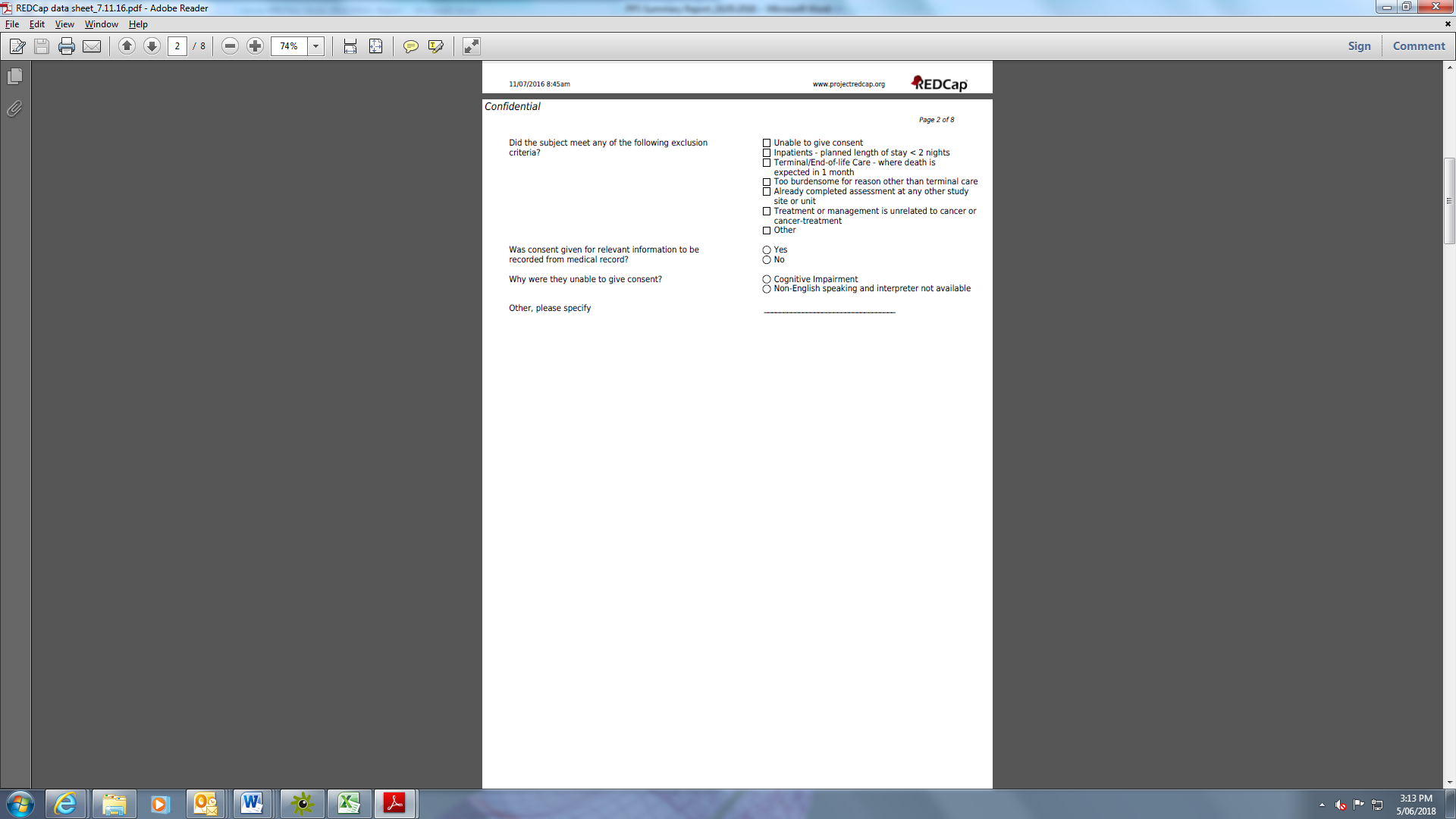
**Western and Central Melbourne Integrated Cancer Service (WCMICS)**

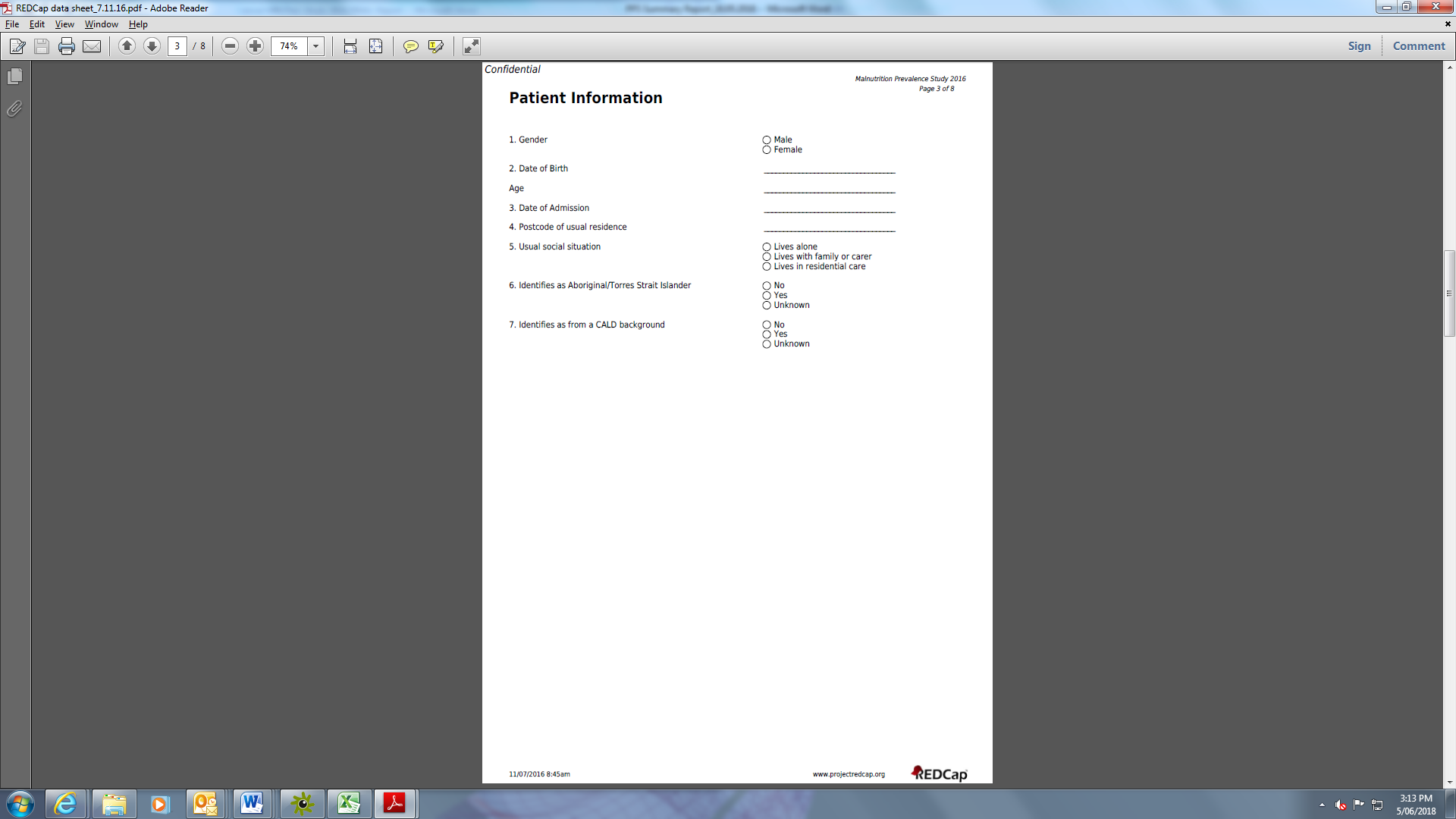
* Melbourne Health – City Campus, Parkville
* Peter MacCallum Cancer Centre – Melbourne
* St Vincent’s Health – Fitzroy
  + Western Health – Footscray and Sunshine including Peter Mac radiotherapy services

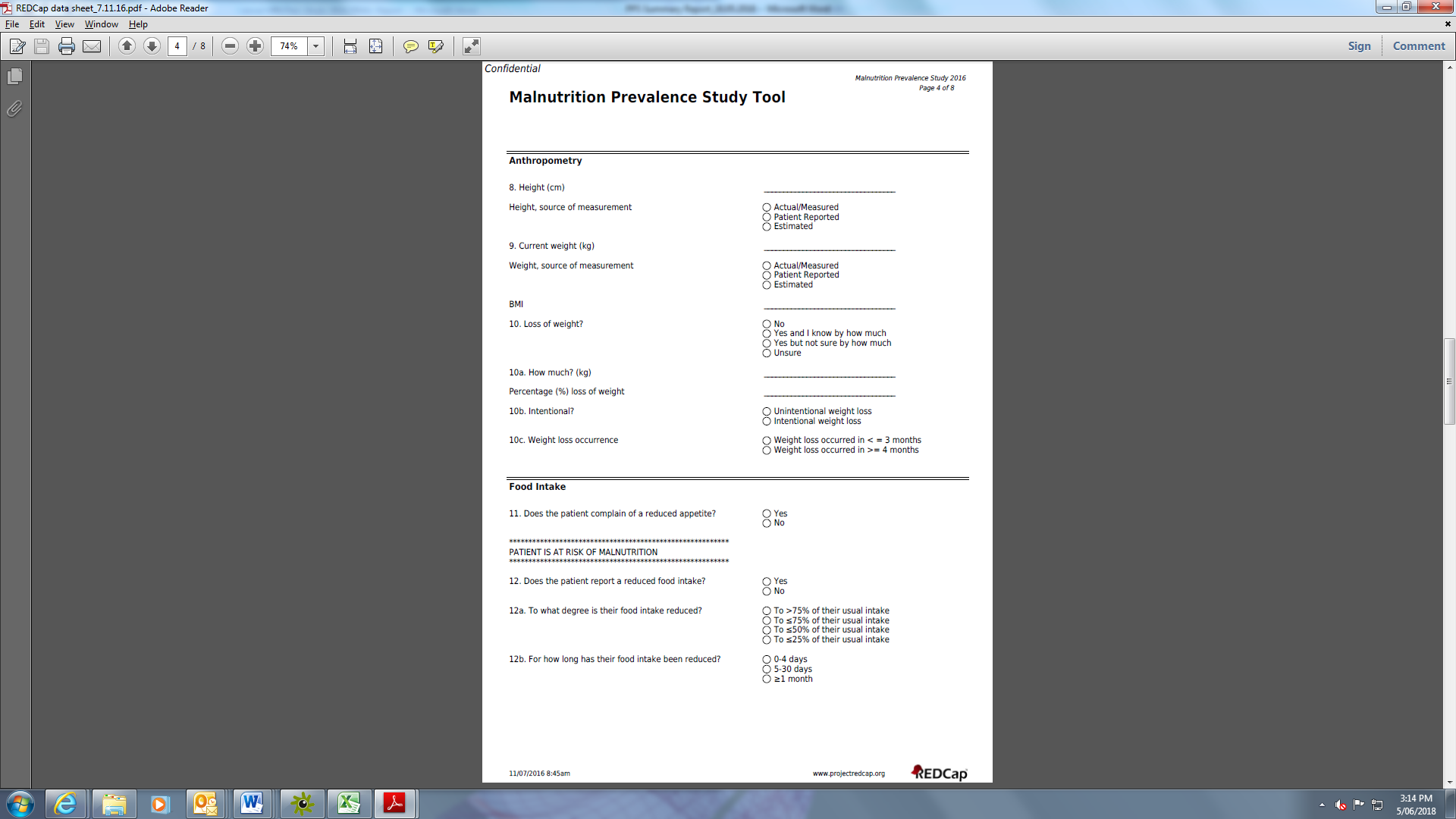
\* Dietetic services to Peter Mac radiotherapy services at Box Hill and Moorabbin are provided as a satellite service by the Nutrition Department at Peter Mac, Melbourne; therefore, prevalence results and practices relating to malnutrition reflect those from Peter Mac. Otherwise all radiotherapy services are provided by the local participating health service.

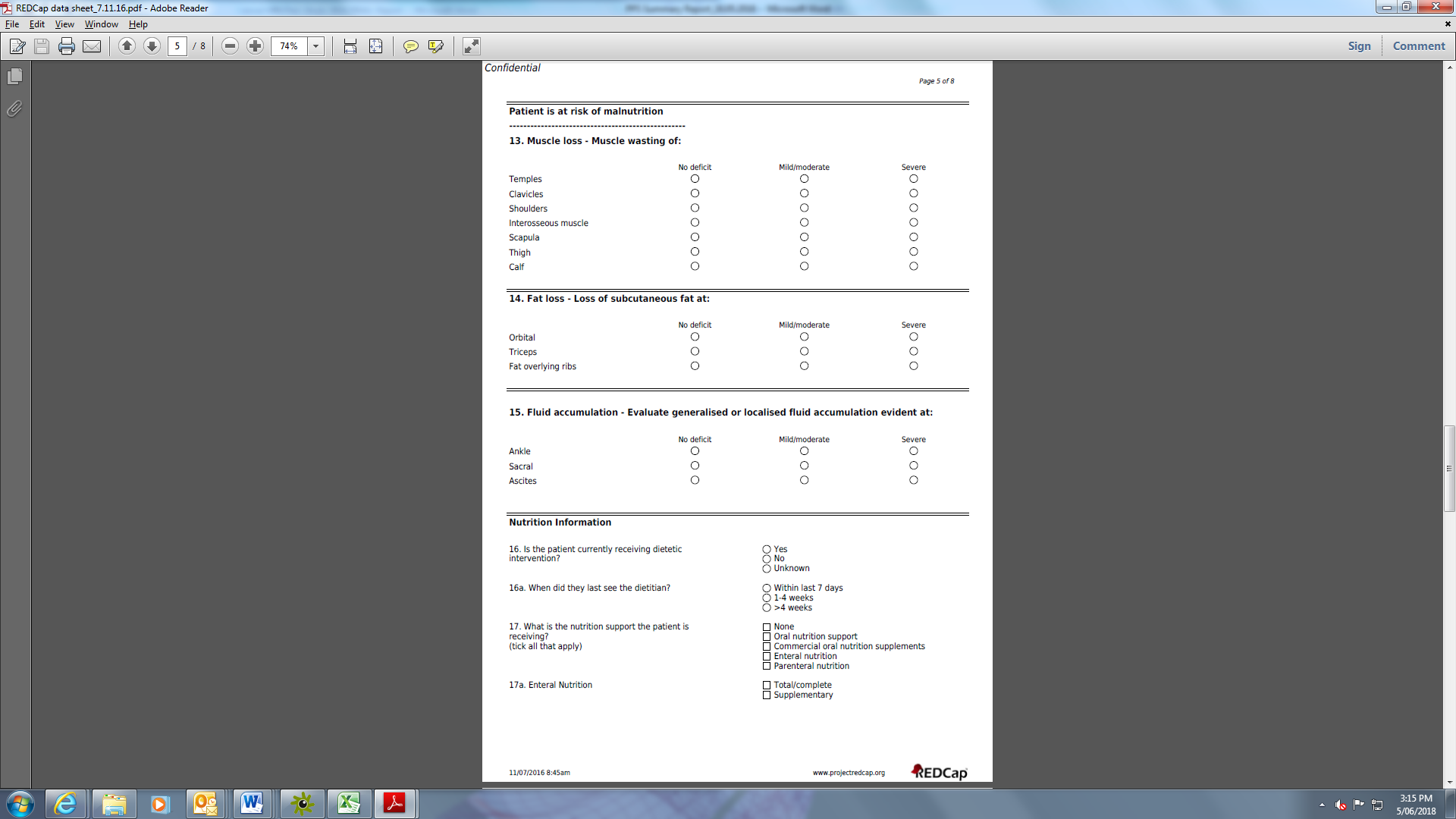
# Appendix 2: Data collection tool

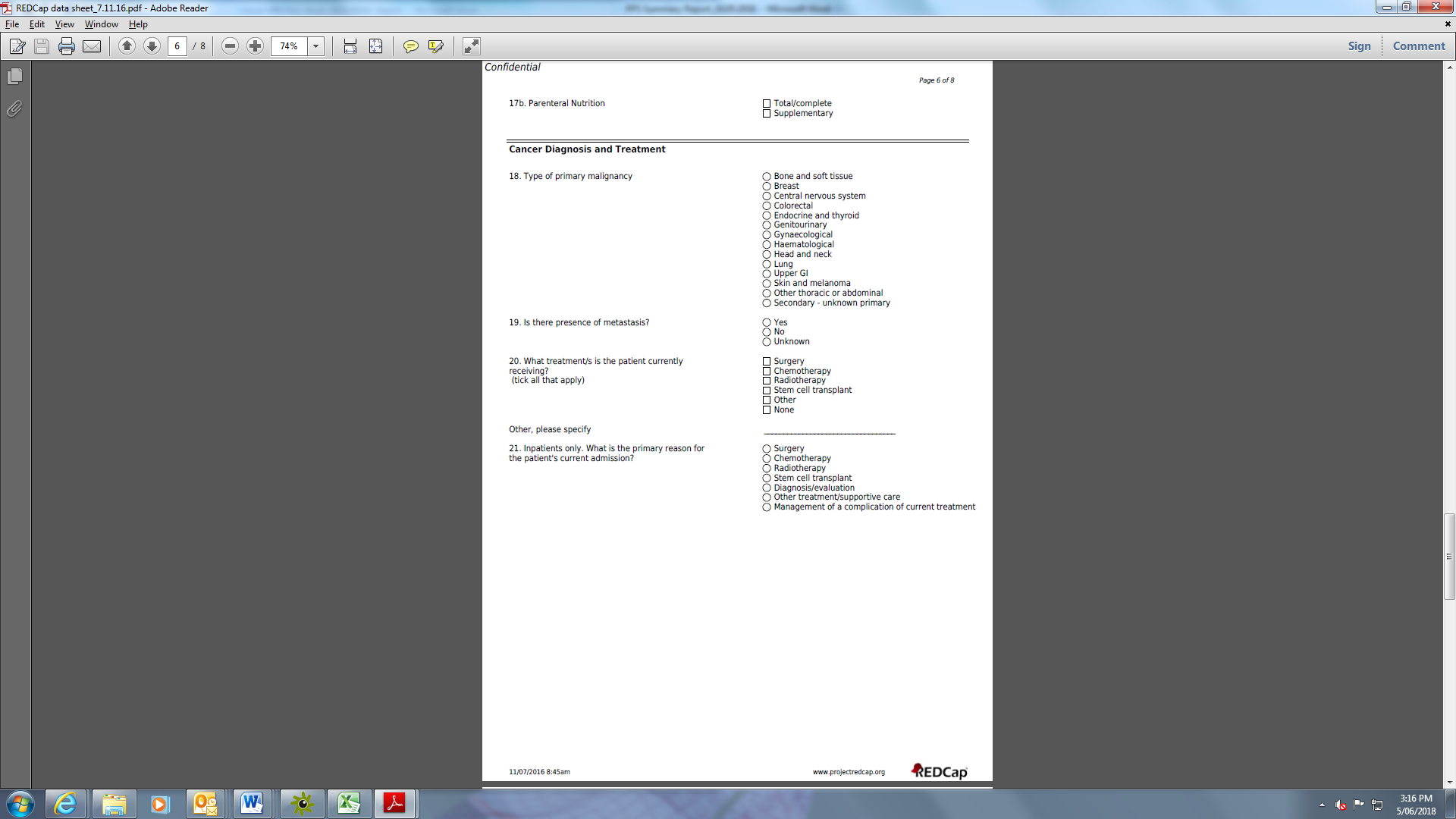


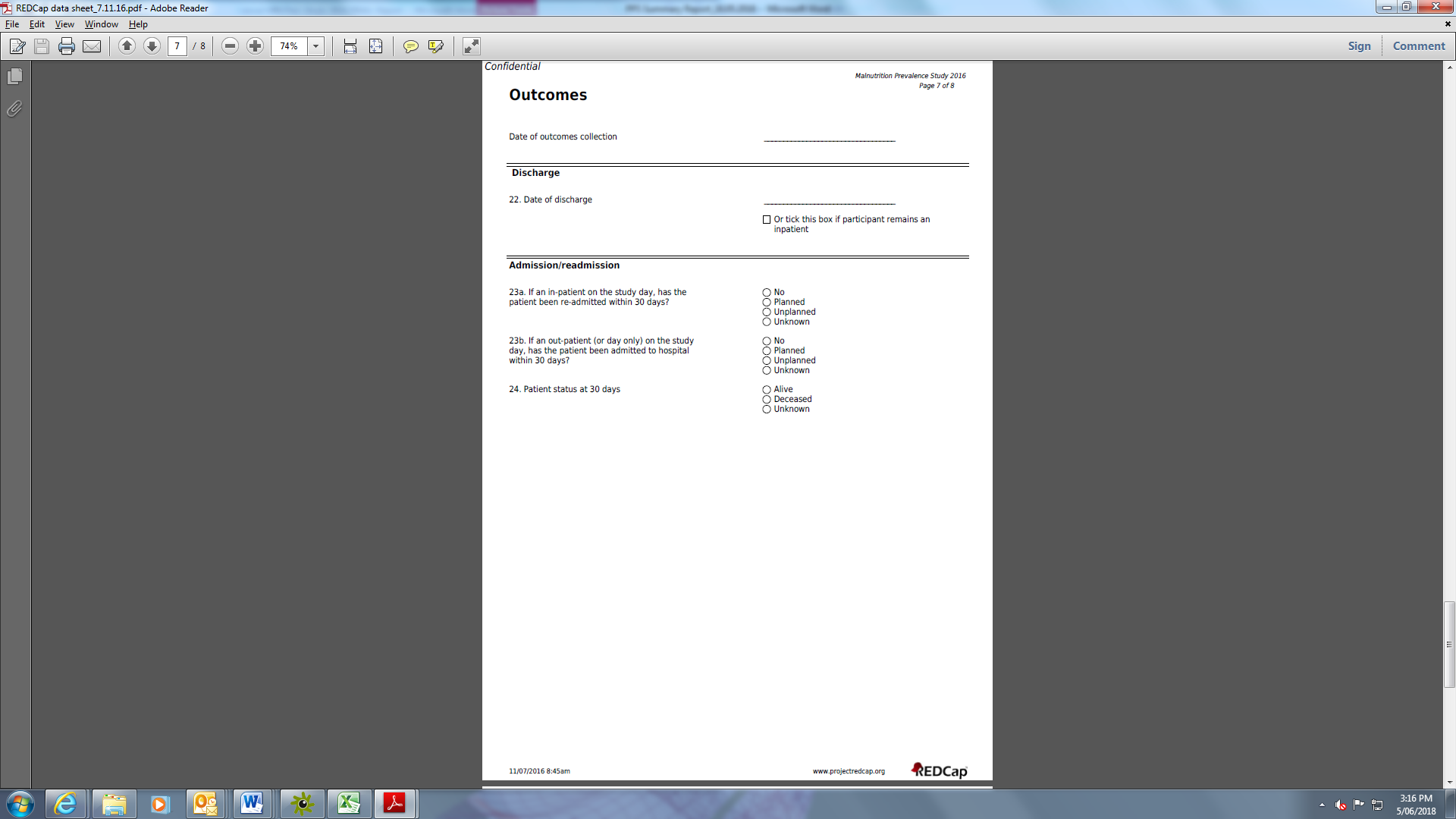












# Appendix 3: Instructions for completing the data collection sheet

Patient selection criteria

| Included | Excluded |
| --- | --- |
| All patients managed by oncology-specific units in acute hospitals  Patients with a known diagnosis of malignancy **at** **admission** under other medical/surgical units in **acute wards** receiving treatment or management related to cancer or cancer treatment.  Examples include patients with known bowel cancer admitted for a hemi-colectomy, patients with known lung cancer admitted for lobectomy and patients admitted with DVT-related PICC  All patients admitted for administration of an intravenous chemotherapy agent  All patients admitted to a chemotherapy day unit for treatment (blood transfusion) who have received an intravenous chemotherapy agent within the preceding three weeks  All adult patients attending for radiotherapy | Patients < 18 years  Cognitive impairment – without family present to assist with completion of verbal consent/data collection  Non-English speaking – without interpreter or family present to assist with completion of verbal consent/data collection  Terminal/end-of-life care – where death is expected within one month  Planned length of stay < two nights on day of data collection (inpatients only)  Where participation is deemed too burdensome*\** (these patients may consent to information previously collected as a part of routine nutrition care to be included from the medical history)  Patients with a diagnosis of malignancy **at admission** under other medical/surgical units in acute wards but where treatment or management is unrelated to cancer or cancer treatment  Patients who are unaware of their diagnosis of malignancy at admission such as patients with a bowel tumour (unconfirmed histology at admission) who are admitted for hemi-colectomy  Patients attending for medical reviews **only**  Patients receiving oral chemotherapy **only**  Patients receiving maintenance/hormone treatment only  Past history of malignancy – treated or in remission |

## Malnutrition Prevalence Study data collection tool

### About the patient:

1. Gender – male/female
2. Date of birth – complete as dd/mm/yyyy
3. Date of admission (inpatients) – complete as dd/mm/yyyy
4. Postcode of usual residence
5. Usual social situation – refers to the patient’s current living situation or that prior to their current admission to hospital:
   * lives alone – choose this if the patient lives alone
   * lives with family or carer – choose if the patient has someone with whom they share a home
   * lives in residential care – choose this if the patient resides in a hostel or nursing home.
6. Aboriginal/Torres Strait Islander – does the patient identify themselves as Aboriginal/Torres Strait Islander? Check for this in the patient registration details. If unable to determine, choose unknown.
7. Culturally diverse background – does the patient identify themselves as from a culturally diverse background? Do they have a preferred language other than English? Culturally diverse refers to ‘the range of different cultures and language groups represented in the population who identify as having particular cultural or linguistic affiliations by virtue of their place of birth, ancestry or ethnic origin, religion, preferred language or language spoken at home’14
8. Anthropometry:
9. Height (cm) – indicate if actual/measured, patient reported or estimated.
10. Current weight (kg) – indicate if actual/measured, patient reported or estimated.

10a. If yes to 10, how much weight has been lost (kg)?

10b. If yes to 10, was the loss of weight intentional or unintentional?

10b. If yes to 10, over what timeframe did the loss of weight occur?

1. Loss of weight? If patient unsure, choose unknown.

### Food intake:

1. Does the patient complain of a reduced appetite? Choose yes or no.

12a. If yes to 12, quantify the reduction in terms of percentage their usual intake.

1. Does the patient complain of a reduced food intake? Choose yes or no.

13b. If yes to 13, quantify how long their food intake has been reduced in days.

### Physical examination:

**Only** to be completed if a loss of weight has occurred or if the patient is unsure (question 10), **and** the patient has a reduced appetite and/or food intake (questions 11 and 12).

1. Muscle loss – examine listed site for muscle wasting.
2. Fat loss – examine listed site for loss of subcutaneous fat.
3. Fluid accumulation – examine listed site/area for generalised or localised fluid accumulation.

Score each muscle loss, fat loss and fluid accumulation site/area as:

* no deficit – indicating that on examination there is no evidence of muscle/fat loss or fluid accumulation
* mild/moderate – indicating on examination there is some evidence of muscle/fat loss or fluid accumulation; however, it is not severe
* severe – indicating on examination there is significant evidence of muscle/fat loss or fluid accumulation.

Aim to examine each individual site/area if possible. If not possible, due to patient positioning for example, aim to examine:

* ≥ four muscle sites
* ≥ two fate sites/areas
* ≥ two fluid accumulation sites/areas.

**The following information may be obtained from the patient directly, or by referring to the patient history, recorded nutrition statistics and current diet code lists.**

### Nutrition information:

1. Is the patient currently receiving dietetic intervention? Choose yes, no or unknown. This question refers to current active dietetic intervention relating to the current admission or episode of chemo/radiotherapy treatment.

16a. If yes to 16, indicate the time period when the patient was last seen by a dietitian as either within seven days, within four weeks or more than 4 weeks ago.

1. What is the nutrition support the patient is receiving? Indicate the patient’s current nutrition support (as on the day of the study).

It is possible to include more than one answer.

* None – the patient is consuming a standard or full ward diet without fortification/supplements/usual home diet.
* Oral nutrition support – dietary advice/food fortification only. The patient has modified their current diet to include high-energy/high-protein foods or fortifying foods to increase energy and protein content.
* Commercial oral nutrition supplements – where a patient is including supplements made with commercial powders (such as Sustagen, Advital, Ensure, Proform) or pre-packaged, ready-made, nutritionally complete supplements (such as Fortisip, Resource, Ensure).
* Enteral nutrition – the patient is receiving enteral nutrition via a feeding tube such as NGT, PEG, JEJ. Indicate if this is total/complete enteral nutrition or supplementary.
* Parenteral nutrition – the patient is receiving TPN. Indicate if this is total/complete TPN or supplementary.

### Cancer diagnosis and treatment:

The following information will be collected from the patient’s inpatient or outpatient notes.

1. Type of malignancy – refers to the current **primary** malignancy that is being treated. If the patient is receiving treatment to metastatic disease, choose the primary site if known:

* bone and soft tissue – osteosarcoma, Ewing’s sarcoma and soft tissue sarcomas
* breast
* central nervous system – cancers of the brain and spinal cord
* colorectal – cancers of the colon, rectum and anus
* endocrine and thyroid – cancers of the pancreas, pituitary, thyroid and adrenal glands
* genitourinary – cancers of the prostate, kidney, bladder, testes
* gynaecological – ovarian, cervical and vaginal cancers
* haematological – leukaemia, lymphoma, multiple myeloma
* head & neck – cancers of the mouth, throat and nose
* lung – non-small cell lung cancer, small cell lung cancer, mesothelioma
* secondary – unknown primary: where treatment is for metastatic disease, where primary is unknown
* skin and melanoma – squamous cell carcinoma, basal cell carcinoma and melanoma
* upper gastrointestinal – cancers of the oesophagus, stomach, small bowel, biliary duct, liver
* other thoracic or abdominal – cancer of the thymus.

1. Presence of distant metastasis – choose yes, no or unknown.
2. What treatment is the patient currently receiving? Current treatment refers to any treatment the patient is receiving in relation to the current active malignancy. You may choose more than one answer.

For example: a patient may be receiving chemoradiotherapy after surgery. In this case all three treatments will be selected. Alternatively, a patient may be admitted for surgery following chemoradiotherapy; again, all three treatments would be selected.

1. **This question is to be answered for inpatients only.** What is the reason for the patient’s current admission? You may choose more than one answer.

* Surgery – where the admission was for surgical resection of malignancy.
* Chemotherapy – where the admission was for administration of chemotherapy.
* Radiotherapy – where the admission was for radiotherapy.
* Stem cell transplant – where the admission was for a stem cell transplant.
* Diagnosis/evaluation – where the admission was for work up and investigation leading to a diagnosis and/or development of a treatment plan.
* Other treatment/supportive care – where the admission was for other direct management of malignancy or side effect. This may include pain management, neutropenic observation and so on.
* Management of a complication of current treatment – where the admission related to a complication of current treatment such as anaemia, PICC line related thrombosis, dehydration secondary to poor oral intake, infection due to neutropenia.

### Outcomes: to be collected *30 days* after the survey day for each participant

Date of outcomes collection – complete as dd/mm/yyyy.

This information should be obtained from the patient administration system.

1. Date of discharge – complete as dd/mm/yyyy. This will allow the calculation of total length of stay. For patients still admitted as an inpatient please choose ‘remains an inpatient’.
2. Admission/readmission
   * For inpatients on the study day – please indicate if the patient has been readmitted and if this was planned, unplanned or unknown.
   * For ambulatory patients on the study day – please indicate if the patient has been admitted and if this was planned, unplanned or unknown.
3. Please indicate the patient’s status at 30 days – alive, deceased or unknown. Only use unknown if the patient is lost to follow-up at your health service.

# Appendix 4: Cancer Malnutrition Point Prevalence Study – guidelines for approaching patients

Data collection will be conducted by dietitians employed in the health services or by student dietitians who have passed their clinical placement at that health service.

During the data collection, (student) dietitians will ensure patients’ privacy and dignity at all times. If the (student) dietitian has any concerns about the welfare of patients or their current treatment, they must discuss this with the nursing staff or coordinating dietitian as appropriate to the concern.

If a patient becomes distressed by the data collection, then the (student) dietitian will cease data collection and will liaise with ward/unit nursing staff as appropriate. If site (student) dietitians become distressed by the data collection, usual hospital support systems will be available.

**Approaching the patient to provide patient information sheet:**

Patient information sheets should be distributed to:

* inpatients one day before the study begins
* ambulatory radiotherapy patients two days before the study
  + ambulatory chemotherapy day patients on arrival to the chemotherapy day unit.

1. The dietitian, student dietitian, or other suitable staff member will approach the patient, introduce themselves and provide the patient information sheet.

|  |
| --- |
| ***Suggested script:***  *‘The Nutrition Department is conducting a study to investigate unplanned weight loss and decreased food intake in people with cancer.*  *All adult patients who are admitted to hospital tomorrow will be invited to participate in the study. The study will take no more than 10 minutes, during which time a dietitian [or student dietitian where appropriate] will be asking you a few questions about your weight and eating. Depending on your answers, we may be required to also do a quick physical examination, which would involve looking at your face, arms, shoulders, back and legs.*  *Here is some information about the study. Please read this information carefully in preparation of being included in the study. A dietitian [or student dietitian where appropriate] will ask your permission to take part in the study tomorrow and can answer any questions.*  *Your decision to participate in the study is voluntary and will not affect your ongoing treatment.’* |

**On the day of the study:**

1. The (student) dietitian will introduce themselves to the nurse in charge of the ward/unit. They will check with the nurse that all patients identified on the previous day remain suitable to participate.

Approaching the patient to participate:

1. The (student) dietitian will approach the patient and introduce themselves.
2. The (student) dietitian will check that that patient has received and read the patient information sheet about the malnutrition study.
3. The (student) dietitian will explain or remind the patient of the purpose of the study, answer any questions and proceed to obtain verbal consent for participation.

|  |
| --- |
| ***Suggested script:***  *‘You will have received some information about a nutrition study we are conducting today. Have you received and read the information provided? Do you have any questions or concerns? Are you happy to take part in this? Thank you.’* |

1. Once verbal consent is obtained the (student) dietitian will obtain personal and nutrition information from the patient.

If the patient has indicated that they have unintentionally lost weight or were unsure (question 10), **and** they reported having a reduced appetite and/or food intake (questions 11 and 12), the (student) dietitian will:

1. obtain consent to conduct a physical examination of the patient’s face, upper body, arms and legs

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| --- |
| ***Suggested script:***  *‘The answers you have just given me indicate that you may be at risk of malnutrition. I would like to perform a physical examination to help determine this. The examination will involve checking the fat and muscle stores in your face, upper body, arms and legs. You do not need to remove all your clothes but I will close the curtain to ensure your privacy. Would it be alright with you to proceed with this examination?’* |

1. once consent is obtained, conduct the physical examination, ensuring the patient’s privacy and dignity.
2. The (student) dietitian may clarify or obtain information about the person’s cancer diagnosis and current treatments from the patient directly.
3. The (student) dietitian will obtain consent to access the patient’s medical history to gather information about their cancer diagnosis and current treatments.

|  |
| --- |
| ***Suggested script:***  *‘Thank you for your time. To complete the information we are collecting I will need to get some further information about your cancer and treatment from your medical history today. Is it alright if I do this?*  *In addition to collecting information today, we would also like to check your hospital records again in one month to see how you are progressing and how much time you have spent in hospital. Would it be alright for us to do this?’* |

1. Thank the patient for their assistance and participation.

The (student) dietitian will record all information directly into the REDCap electronic database if possible, or onto a paper version of the data collection tool where portable electronic devices are not available.

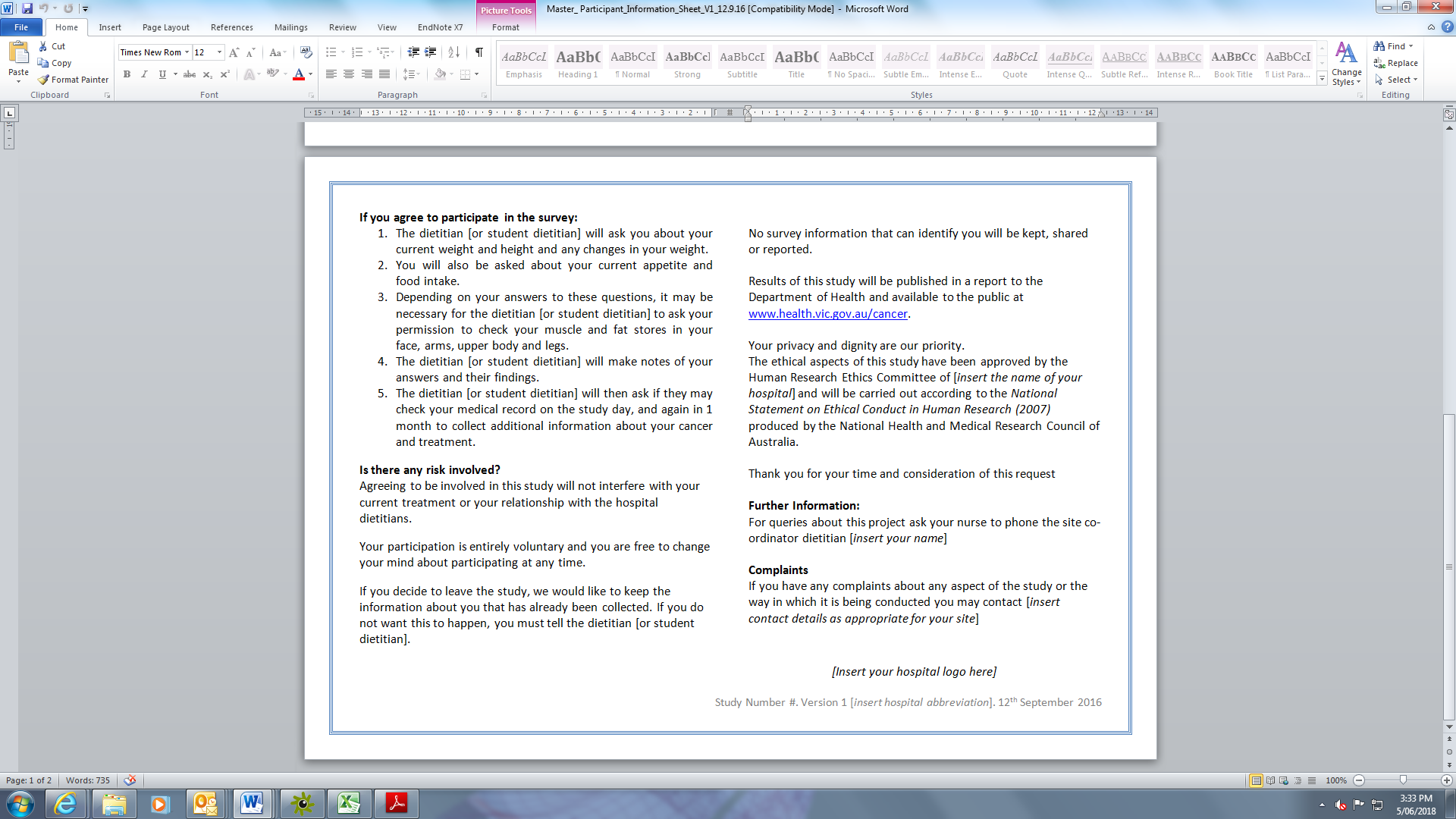
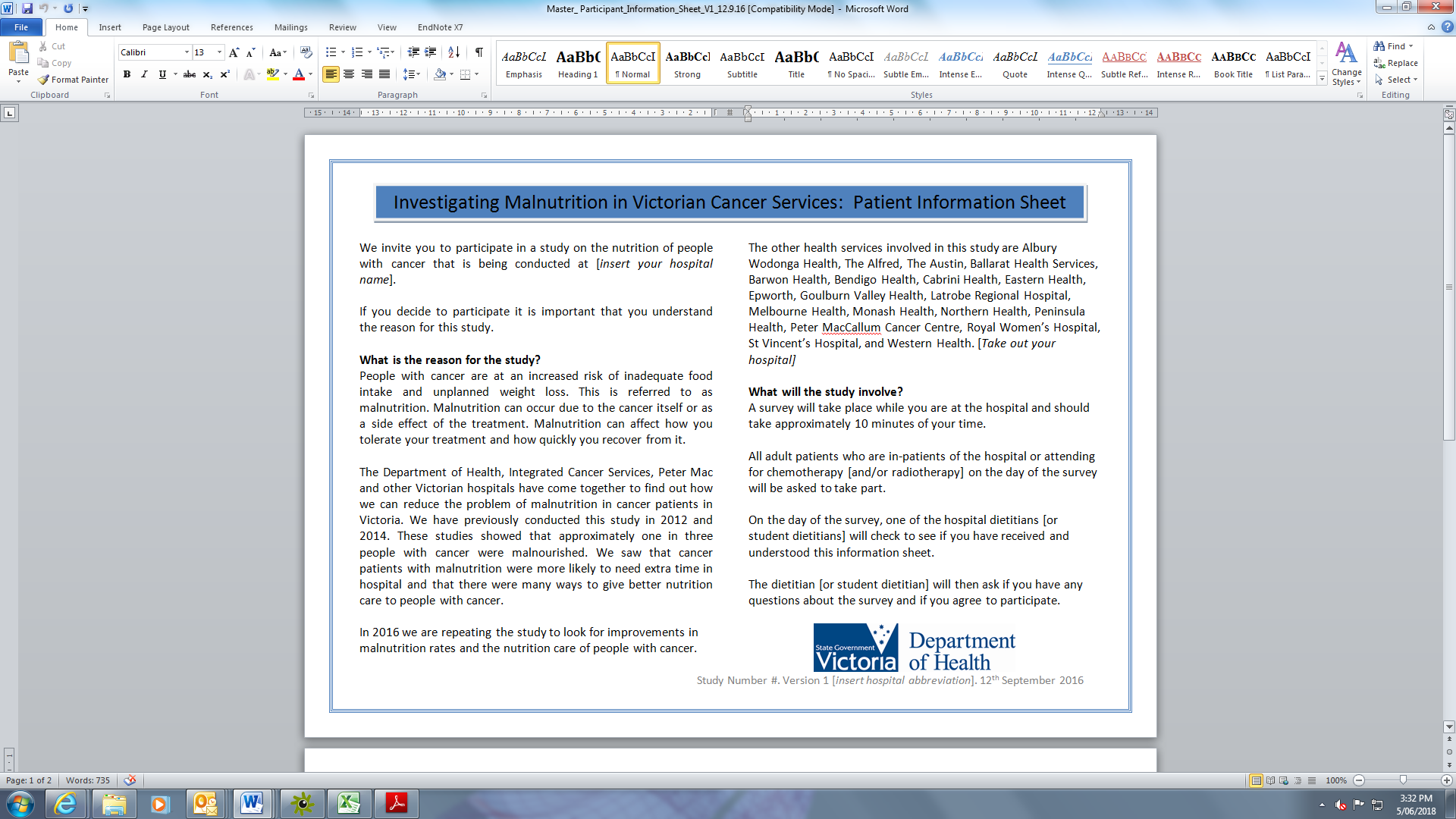
**Additional points:**

Any patient who has been found to be at risk of malnutrition, and who is not already known to the dietetics service, will be offered nutritional advice and management. Any inpatient can be referred to the unit dietitian for assessment and nutritional care. Outpatients will receive written information at the time of the study and be offered an outpatient review at the next suitable time.

If a patient is too unwell to participate in data collection but is already under the care of a dietitian it is recommended that you gain the patient’s consent to use information already available to include in the study data.

|  |
| --- |
| ***Suggested script:***  *‘I understand you are not feeling up to participating in the study today. However, because the dietitians are already seeing you we have sufficient information about you, your cancer and treatment. Would you provide your consent for us to get this information from your medical history and include it in the study?’* |

# Appendix 5: Patient information sheet



# Appendix 6: Tumour types and malignancy groups

| Malignancy group | Tumour types |
| --- | --- |
| Bone and soft tissue\* | Osteosarcoma, Ewing’s sarcoma and soft tissue sarcoma |
| Breast | Cancer of the breast |
| Central nervous system\* | Brain and spinal cord tumours |
| Colorectal | Cancers of the colon, rectum and anus |
| Endocrine and thyroid^ | Cancers of the pancreas, pituitary, thyroid and adrenal glands |
| Genitourinary | Cancers of the prostate, kidney, bladder, testicular |
| Gynaecological | Includes ovarian, cervical and vaginal cancers |
| Haematological | Includes leukaemia, lymphoma and multiple myeloma |
| Head & neck | Tumours of the mouth, throat and nose |
| Lung | Non-small cell lung cancer, small cell lung cancer, mesothelioma |
| Other thoracic or abdominal\* | Includes thymus |
| Secondary – unknown primary\* | Unknown primary: where treatment is for metastatic disease, where primary is unknown |
| Skin and melanoma | Squamous cell carcinoma, basal cell carcinoma and melanoma |
| Upper gastrointestinal | Includes oesophagus, stomach, biliary duct, liver |

\* Grouped as ‘other’

^ Included in upper gastrointestinal

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