

**Nutrition care practices in hospital wards
Results from the Nutrition Care Day Survey 2010**

Agarwal, Ekta; Ferguson, Maree; Banks, Merrilyn; Batterham, Marijka; Bauer, Judith; Capra, Sandra; Isenring, Elisabeth

Published in:
Clinical Nutrition

DOI:
[10.1016/j.clnu.2012.05.014](https://doi.org/10.1016/j.clnu.2012.05.014)

Published: 01/12/2012

Document Version:
Peer reviewed version

[Link to publication in Bond University research repository.](#)

Recommended citation(APA):

Agarwal, E., Ferguson, M., Banks, M., Batterham, M., Bauer, J., Capra, S., & Isenring, E. (2012). Nutrition care practices in hospital wards: Results from the Nutrition Care Day Survey 2010. *Clinical Nutrition*, 31(6), 995-1001. <https://doi.org/10.1016/j.clnu.2012.05.014>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

For more information, or if you believe that this document breaches copyright, please contact the Bond University research repository coordinator.

Bond University

From the Selected Works of Ekta Agarwal

December, 2012

Nutrition care practices in hospital wards: Results from the Nutrition Care Day Survey 2010

Ekta Agarwal, *The University of Queensland*

Maree Ferguson, *University of Queensland*

Merrilyn Banks, *The University of Queensland, Australia*

Marijka J Batterham, *University of Wollongong*

Judith Bauer, *The University of Queensland, et al.*



SELECTEDWORKS™

Available at: <https://works.bepress.com/ekta-agarwal/S/>

1 **Title: Nutrition care practices in hospital wards: Results from the Nutrition Care Day**
2 **Survey 2010**

3 Ekta Agarwal¹, Maree Ferguson^{1, 2}, Merrilyn Banks^{1, 3}, Marijka Batterham⁴, Judith Bauer¹,
4 Sandra Capra¹, Elisabeth Isenring^{1, 2}

5 ¹The University of Queensland, Brisbane, QLD 4072, Australia

6 ²Princess Alexandra Hospital, Brisbane, QLD 4102, Australia

7 ³Royal Brisbane and Women's Hospital, Brisbane, QLD 4029, Australia

8 ⁴The University of Wollongong, Wollongong, NSW 2522, Australia

9

10 **Short title:** Nutrition care practices in hospital wards

11

12 **List of abbreviations:**

13 ADA EAL: American Dietetic Association Evidence Analysis Library ®

14 ANCDS – Australasian Nutrition Care Day Survey

15 Aus – Australia

16 AuSPEN – Australasian Society of Parenteral and Enteral Nutrition

17 HPE – High Protein Energy Diet

18 MST – Malnutrition Screening Tool

19 MUST – Malnutrition Universal Screening Tool

20 NCCAC: National Collaborating Centre for Acute Care

21 NHMRC: National Health and Medical Research Council

22 NRS-2002 – Nutrition Risk Screening-2002 tool

23 ONS – Oral Nutritional Supplement

24

25

26

27 **Address for Correspondence:**

28 Mrs Ekta Agarwal

29 PhD Candidate,

30 School of Human Movement Studies

31 The University of Queensland

32 St Lucia

33 Queensland 4072

34 Australia

35 Contact Number: + 61 422 851650

36 Email address: e.agarwal@uq.edu.au

37

38

39

40

41

42

43

44

45

46

47

48

49

50

51

52

53 **Abstract**

54 **Background and Aim:** This paper describes nutrition care practices in acute care
55 hospitals across Australia and New Zealand.

56 **Methods:** A survey on nutrition care practices in Australian and New Zealand hospitals
57 was completed by Directors of dietetics departments of 56 hospitals that participated in the
58 Australasian Nutrition Care Day Survey 2010.

59 **Results:** Overall 370 wards representing various specialities participated in the study.
60 Nutrition risk screening was conducted in 64% (n= 234) of the wards. Seventy nine
61 percent (n=185) of these wards reported using the Malnutrition Screening Tool, 16% using
62 the Malnutrition Universal Screening Tool (n= 37), and 5% using local tools (n= 12).
63 Nutrition risk rescreening was conducted in 14% (n= 53) of the wards. More than half the
64 wards referred patients at nutrition risk to dietitians and commenced a nutrition intervention
65 protocol. Feeding assistance was provided in 89% of the wards. "Protected" meal times
66 were implemented in 5% of the wards.

67 **Conclusion:** A large number of acute care hospital wards in Australia and New Zealand
68 do not comply with evidence-based practice guidelines for nutritional management of
69 malnourished patients. This study also provides recommendations for practice.

70 (184 words)

71

72 **Keywords:** Nutrition risk, malnutrition, screening, dietary interventions, evidence-based
73 guidelines, Australasian Nutrition Care Day Survey

74

75

76

77

78

79 **Introduction**

80 The Australasian Nutrition Care Day Survey (ANCDs) reported a 30% malnutrition
81 prevalence rate in acute care patients in hospitals across Australia and New Zealand [1].
82 While patients are often admitted to hospital with existing malnutrition [1, 2], the
83 deterioration of their nutritional status during hospitalisation is not uncommon. Malnutrition
84 is associated with adverse outcomes such as higher complications rates, impaired wound
85 healing, increased length of hospital stay, higher readmission rates, increased morbidity
86 and mortality, and increased health care costs [3]. Given its high prevalence and
87 associated repercussions, early identification of malnutrition (or nutritional risk) is
88 undisputable [4].

89 Nutrition screening, a rapid and simple procedure, can help detect patients who are at
90 nutritional risk or have existing nutritional problems [5]. A variety of screening tools [6-10]
91 have been validated and endorsed by nutrition care guidelines in different countries [11-
92 13]. However, the extent of the integration of nutritional screening within nutrition care in
93 hospitals across Australia and New Zealand is unclear. While there is no published
94 information about nutrition screening practices in New Zealand, a nutrition screening
95 survey was conducted in 1995 [14] and repeated in 2008 [15] within Australian hospitals.
96 In 1995, responses from dietitians representing 124 hospitals indicated that only 3% (n= 4)
97 of the hospitals conducted nutrition screening [14]. In 2008, responses from 68 hospitals
98 indicated that 78% (n= 53) of the hospitals had adopted screening as routine practice [15],
99 although the results may not have been reflective of the total population.

100

101 In 2009, the Dietitians Association of Australia published "Evidence Based Practice
102 Guidelines for the Nutritional Management in Adult Patients across the Continuum of Care"
103 [11]. In addition to recommending nutrition screening, these guidelines also endorsed
104 practices such as dietary counselling, fortification of food, oral nutritional supplements,

105 tube feeding, parenteral nutrition, and the provision of feeding assistance at meal times as
106 part of standardised nutrition care for acute patients [11]. It remains unknown if these
107 guidelines have been implemented in hospitals across Australia or New Zealand. Evidence
108 regarding the compliance with these practices within New Zealand hospitals is also
109 lacking.

110 The present study is a part of the larger ANCDS and aims to describe nutrition care
111 practices in acute care wards of participating hospitals. The paper also compares current
112 practices with various evidence-based nutrition care practice guidelines (Appendix 1).

113

114

115

116

117

118

119

120

121

122

123

124

125

126

127

128

129

130

131 **Methods**

132 The ANCDS was a multisite cross-sectional survey. Members of the Australasian Society
133 of Parenteral and Enteral Nutrition (AuSPEN), and Dietitians Association of Australia
134 (DAA) Interest Groups participated in the study. Site representatives from each
135 participating hospital were provided with details regarding the study methodology. Wards
136 where:

137 • malnutrition prevalence was likely to be low (e.g. Maternity and Obstetric);
138 • patient burden for participation was likely to be high or patients were critically ill
139 (e.g. Paediatric, Mental health (including eating disorders), Intensive Care Units,
140 High Dependency Units, Emergency Departments);

141 • nutrition screening and assessment are not routinely performed (Outpatient
142 Departments);

143 were excluded from the study. Non-acute care wards (such as Rehabilitation and sub-
144 acute wards) were also excluded.

145 Directors of Nutrition and Dietetics Departments of participating hospitals were requested
146 to complete a questionnaire for each participating ward from their hospital for this study.

147 Information collected in the questionnaire included:

148 • Ward speciality

149 • Number of beds

150 • Protocols regarding:

151 ○ Weighing patients,

152 ○ Nutrition screening and rescreening,

153 ○ Management of patients with nutritional risk,

154 ○ “Protected” meal times (periods when all non-urgent clinical ward-based

155 activities are ceased to allow for patients to eat meals without interruptions

156 and for staff to offer assistance to improve patients’ nutritional intake [16]),

- 157 ○ Feeding assistance (a variety of activities such as adjusting the bed-table to
158 allow easier access to the meal, helping patients sit comfortably, opening
159 food containers, helping patients with using cutlery, providing verbal
160 encouragement, cutting the meals, pouring drinks into cups, providing a
161 more social atmosphere, and physically feeding the patients [17]).

162 Ethical approval was provided by the Medical Research Ethics Committee of The
163 University of Queensland. Approval was also obtained from local Human Research Ethics
164 Committees of participating hospitals.

165

166 **Statistical Analyses**

167 All statistical analyses were performed with software package PASW Statistics Gradpack
168 18 (SPSS Inc., USA). Frequency and percentage was used to describe categorical
169 variables (ward speciality; protocols related to weighing patients, “protected” meal times,
170 feeding assistance, nutrition screening, nutrition rescreening, type of screening tool used,
171 dietary interventions for patients identified as at risk of malnutrition).

172 Bivariate analyses of categorical variables were undertaken using Chi-square tests. .
173 Exact tests (using Monte Carlo method) were used when the minimum cell frequency
174 assumption was violated. Comparisons of medians were performed using non-parametric
175 tests (Mann-Whitney U Test). P-values less than 0.05 (two tailed) were considered
176 statistically significant.

177

178

179

180

181

182

183 **Results**

184 **1. Demographics:** A total of 370 wards from 56 hospitals participated in the study
185 (Australia: 287 wards from 42 hospitals; New Zealand: 83 wards from 14 hospitals)
186 (Table 1). Wards from eight main specialities (Medical, Surgical, Oncology, Neurology,
187 Orthopaedics, Renal/Urology, Gastroenterology, and Cardiology/Respiratory) participated in
188 the study with ward sizes ranging from 7 – 54 beds.

189

190 **2. Protocols**

191 **Weighing patients:** Patients' weights at the time of admission were recorded in 32%
192 (n= 117) of the wards. More than half the wards (n= 204, 55%) weighed patients only
193 when requested. Although the remaining wards did not record patient weights at the
194 time of hospital admission, they did so on a daily (n= 12, 3%), weekly (n= 18, 5%),
195 biweekly (n= 8, 2%), or pre-surgery (n= 10, 3%) basis. A significant difference in
196 protocols for weighing patients according to ward speciality was observed (χ^2 , $p < 0.01$,
197 $df = 88$). Oncology wards had the highest reports of weighing patients on admission (n=
198 12, 46%). The practice of weighing patients when requested was most commonly
199 reported for orthopaedic (n= 24, 77%), gastroenterology (n= 8, 62%), other (n= 14,
200 61%), surgical (n= 47, 58%) and medical wards (n= 58, 57%).

201

202 **Nutrition screening and rescreening practices:** Nutrition screening was routinely
203 performed in 64% (n= 234) of all wards. Intra-hospital variations in nutrition screening
204 practices were reported in 114 participating wards from 12 hospitals. Less than half of
205 these wards (n= 54, 47%) implemented nutrition screening. .

206 When wards were evaluated regarding protocols for both weighing and nutrition
207 screening, the results were as follows:

- 208 • One-third of the wards (n= 120, 33%) conducted nutrition screening and recorded
209 patient weights at some stage during their admission;
- 210 • 114 wards (31%) only conducted nutrition screening and recorded weights if a
211 request was made;
- 212 • 46 wards (12%) only weighed patients at some stage during admission and did not
213 conduct nutrition screening;
- 214 • 90 wards (24%) conducted neither routine weighing nor nutrition screening for their
215 patients.

216 Nutrition rescreening was routinely performed in 14% (n= 53) of the wards on a weekly
217 (n= 48), fortnightly (n= 3) or monthly (n= 2) basis. Nutrition rescreening was conducted
218 *ad hoc* (n= 42, 11%), when requested (n= 23, 6%) or never in 252 wards (68%).

219 Although no significant differences were found in screening and/or rescreening
220 practices amongst ward specialities, these practices were significantly different amongst
221 regions ($p < 0.001$) (Table 1). Significant differences were also noticed when
222 comparisons were made between regions regarding protocols for both- weighing and
223 nutritional screening ($p < 0.001$) (Table 1).

224

225 **Nutrition Screening Tools:** A majority of the wards that conducted nutrition screening,
226 used the Malnutrition Screening Tool (MST) (n= 185, 79%). The remaining wards used
227 either the Malnutrition Universal Screening Tool (MUST) (n= 37, 16%), Nutrition Risk
228 Screening Tool (NRS-2002) (n= 3, 1%), or other local screening tools (n= 9, 4%).

229 Wards from within four hospitals varied in their choice of tool (Table 2).

230

231 **Management of patients with nutrition risk:** Table 3 summarises the management of
232 patients with nutrition risk in wards where nutrition screening was performed (n= 234).

233 In wards where nutrition screening was not performed (n= 136) and patients were
234 referred for management of their nutritional status:

- 235 • More than three-quarters of the wards referred patients to dietitians and commenced
236 a nutrition intervention protocol such as high protein-energy diets, oral nutritional
237 supplements, and/ or food charts (n= 106, 78%);
- 238 • The remaining wards did nothing (n= 30, 22%).

239 There were no significant differences in the nutrition interventions between ward
240 specialties ($p > 0.01$).

241

242 **Feeding assistance:** The availability of feeding assistance for patients was reported
243 for 331 (90%) of the wards. Nursing staff (n= 320 wards, 97%), family members (n=
244 277 wards, 84%), and health care assistants (n= 57 wards, 17%) most commonly were
245 reported as providing this assistance.

246

247 **“Protected” mealtimes:** “Protected” mealtimes were implemented in 5% (n= 18) of the
248 wards.

249 **Discussion**

250 This paper reports an overall poor level of adherence to the recommended guidelines for
251 weighing, screening and rescreening patients during their hospital admission. Appendix 1
252 summarises the guidelines for optimum nutrition care for hospitalised patients [5, 11, 18].

253

254 **Weighing, nutrition screening and rescreening of patients, nutrition screening tools:**

255 Patients' body weight and recent weight history are the most easily obtainable indices of
256 nutritional assessment [19]. Body weight recorded at the time of hospital admission can
257 also be useful in determining patients' medication dosage, hydration level and recent
258 weight history. Since recent weight history is a more reliable indicator of nutritional status
259 [20] it is often included in nutrition screening tools [6, 8-10]. Nutrition risk screening, at the
260 time of hospital admission, is advocated by nutrition care guidelines in many countries [11-
261 13]. Prospective cohort studies provide a good level of evidence for implementing nutrition
262 risk screening programs in acute care wards (Appendix 1). In agreement with the ANCDS,
263 a large European study (conducted in over 1200 acute care wards in 325 hospitals) found
264 inter-region differences in nutrition screening practices [21] supporting our conclusion that
265 evidence-based recommendations do not always translate into practice. Approximately
266 one-quarter of all wards in the ANCDS did not conduct nutrition risk screening or record
267 patient weights during hospital admission. The absence of any form of surveillance of
268 nutrition risk in patients could potentially lead to patients at risk of malnutrition going
269 undiagnosed and perhaps untreated in these wards.

270 Previous studies have suggested that for the successful implementation of nutrition
271 screening it is important to communicate the value of nutrition screening and screening
272 tools, and provide training to staff members to enhance their competency with the use of
273 the tools [22-25]. The ANCDS found inter- and intra-hospital inconsistencies not only in
274 screening practices but also with the choice of nutrition screening tools. By implementing a

275 standardised nutrition screening program using one validated tool across wards within
276 each hospital the importance of nutrition screening will be highlighted along with facilitating
277 staff training and competency with the tool and consistency in practice. In contrast to the
278 European study that found the use of local screening tools to be prevalent [21], the
279 ANCDS found a more consistent approach with the MST being the most commonly used
280 tool in Australasia, perhaps because the tool was developed in Australia. Since local
281 screening tools generally have not undergone validity testing, it is recommended that local
282 tools be substituted with those that have demonstrated reliability, and validity in various
283 clinical settings, and are capable of being administered by a range of hospital personnel. A
284 range of guidelines endorse the use of a number of validated and reliable nutrition
285 screening tools [11-13, 18] (Appendix 1) which can be adopted by wards that either
286 currently use local tools or do not conduct nutrition screening for their patients.

287

288 **Management of patients with nutrition risk:** The ANCDS has previously reported that
289 half of the malnourished participants not receive additional nutritional support on the day of
290 the survey, and they also consumed $\leq 50\%$ of the food offered [1]. The study did not
291 investigate if participants had been previously diagnosed for malnutrition and/or were
292 under dietetic supervision. However, it is likely that nutritional interventions are largely
293 preceded by nutrition screening and assessment, the absence of which may leave patients
294 undiagnosed and therefore untreated. Nutrition risk screening increases the likelihood of
295 commencement of nutritional interventions and therefore should be implemented in acute
296 care wards.

297 A recent review that evaluated no intervention versus the effectiveness of interventions
298 (such as dietary advice with or without nutritional supplements) in the management of
299 malnutrition concluded that nutritional interventions were effective in improving weight,
300 body composition and grip strength in comparison to no intervention [26]. A satisfactory

301 level of evidence is available in current literature to support positive outcomes associated
302 with dietary counselling provided by a dietitian, and prescription of individualised nutritional
303 support in acute care patients (Appendix 1) [11]. There is also an excellent body of
304 evidence to support the use of oral nutritional supplements in improving several outcomes
305 in acute care patients (Appendix 1) [11, 26]. A majority of wards in the present study
306 referred patients at nutrition risk to dietitians, who could then conduct a comprehensive
307 nutritional assessment and make suitable recommendations. The strength of the
308 recommendations in nutrition care guidelines (Appendix 1) should substantiate the
309 rationale for implementing a nutrition intervention pathway for wards that do not screen
310 patients for nutrition risk and/or do not implement a nutrition intervention for patients at risk
311 of malnutrition

312

313 **Feeding assistance:** The present study found that nursing staff were the main providers
314 of feeding assistance. Although the extent of feeding assistance provided by nursing staff
315 was not evaluated in this study, there is a satisfactory level of evidence to indicate that
316 provision of feeding support may improve several outcomes (Appendix 1) [11]. Nursing
317 staff have traditionally provided this assistance to patients in hospitals. However, a
318 qualitative metasynthesis by Jefferies et al (2011) found that over the years, nursing focus
319 has inadvertently shifted from providing nutrition support towards managing specialised or
320 high priority tasks during mealtimes [27]. Other studies have found that interruption at
321 mealtimes, routine duties, clashes with their own meal breaks, and time constraints do not
322 allow nursing staff to provide the required feeding assistance to patients [17, 28, 29].
323 Perhaps additional support, such as volunteers, carers and family members, can be
324 trained to assist with feeding patients, especially when there are no complicating factors
325 that can compromise patient safety [27].

326

327 **“Protected mealtimes”**: Although the Dietitians Association of Australia [11] and the
328 Council of Europe [30] endorse the implementation of “protected” mealtimes as a method
329 of nutrition intervention in malnourished patients, evidence to support its use is lacking in
330 current literature and may explain why it is not often used.

331

332 The present paper aimed to provide a snapshot of existing nutrition care in acute care
333 wards in Australian and New Zealand hospitals. Previous reports have highlighted barriers
334 to implementing optimum nutrition care practices in acute care hospital wards due to
335 factors such as increasing patient age [22], presence of delirium, dementia, depression or
336 severe illness [22], nurses’ lack of training and/or competency with nutrition screening
337 tools [24, 25]. Previous studies have also reported prioritisation of patients’ medical needs
338 by hospital staff [31], nursing staff’s poor understanding and knowledge about the nutrition
339 care process [31], shortage of nursing staff [31], poor interdisciplinary communication [31],
340 competing priorities preventing nursing staff from providing feeding assistance [17, 31],
341 frequent mealtime interruptions by medical, nursing, and others, [17] as organisational
342 factors that have been an impediment to implementing nutrition interventions in hospital
343 patients. Perhaps nursing and dietetics departments need to collaborate towards
344 resolving these barriers and implementing the guidelines into practice by:

- 345 • Establishing a multidisciplinary nutrition care committee that advocates the
346 implementation of nutrition care guidelines;
- 347 • Ensuring nursing staff receive ongoing education and support regarding the
348 importance of nutrition screening and rescreening from dietetics staff members;
- 349 • Standardising the use of one validated nutrition screening tool across all wards
350 within a hospital to improve nursing staff’s experience, competency and confidence
351 with its use;
- 352 • Implementing the use of a standardised nutrition care pathway in every ward;

- 353 • Conducting regular audits to assess compliance with the guidelines.

354

355 **Limitations**

356 Due to the voluntary nature of participation (and therefore possibly greater interest in
357 understanding and/or modifying existing nutrition care practices) these results represent a
358 best case scenario of nutrition care practice. The information gathered was not directly
359 observed but it is likely that the Directors of Dietetic departments consulted with ward
360 dietitians on the specific details to gain deeper understanding. Approximately 20% of acute
361 care hospitals from Australia [32]; and 38% of acute care hospitals from New Zealand [33]
362 (with >60 beds) participated in this study. Although this may not represent a majority of
363 acute care hospitals, the ANCDS is the largest study to evaluate nutrition care practices at
364 a ward-level from a variety of acute care specialities within this region.

365

366

367

368 **Strengths and Significance**

369 This study is significant for enrolling a wide variety of ward specialities to provide an insight
370 into various aspects of nutrition care for acute care patients across Australia and New
371 Zealand. Since the results have been compared with current evidence-based practice
372 guidelines for the management of patients at nutritional risk, these data provide dietetics
373 department managers across Australia and New Zealand hospitals with the opportunity to
374 evaluate their practice and build on it to design and implement nutrition care protocols to
375 maximise beneficial patient outcomes.

376

377

378

379 **Conclusion**

380 This is the first multicentre study to evaluate nutrition risk screening and nutrition care
381 practices in hospitals across Australia and New Zealand. Results from this study confirm
382 that hospital wards are either largely non-compliant with or vary greatly with evidence-
383 based recommendations related to nutrition screening, intervention, and choice of nutrition
384 screening tools. Results from this study provide a starting point for further research
385 regarding barriers and enablers to various nutrition care practices in acute care hospitals
386 across Australia and New Zealand. There is a substantial body of evidence that
387 demonstrates the positive effects of nutritional interventions on patient outcomes
388 (Appendix 1) [11, 26]. Therefore, it is important that nutrition interventions commenced in
389 hospitals are continued post-discharge and followed up by community-based nutrition
390 services. Perhaps future studies could also evaluate the effect and availability of, and
391 patient-compliance with, such community-based nutrition interventions in Australia and
392 New Zealand.

393

394

395

396 **Conflict of Interest:** None of the authors have a conflict of interest to declare.

397

398

399

400 **Statement of Authorship:** The project was done as part of the PhD study by EA and was
401 supervised by EI, MF, and MBanks. The project was planned and designed by EA, EI, MF,
402 and MBanks. The project was coordinated; data was acquired, analysed and interpreted
403 by EA. Statistical advice was provided by MBatterham. The original manuscript was written

404 by EA, and then all authors participated in editing and final revisions. All authors have read
405 and approved the final manuscript.

406

407

408

409 **Acknowledgements:** The authors would like to thank (1) Participating sites for their time
410 and effort in collecting the data for this study; (2) AuSPEN for its support in organising the
411 webinars for training dietitians involved with data collection; and the small research grant
412 awarded to Ekta Agarwal in 2010; (3) Members of the AuSPEN Steering Committee for
413 their valuable feedback on the project plan in the initial stages of the project; (4)
414 Queensland Health for funding Queensland hospitals to recruit additional dietitians for
415 aiding with data collection.

416

417

418

419

420

421

422

423

424

425

426

427

428
429**Table 1: Weighing, nutrition screening and rescreening practices in 287 acute care wards in 42 Australian and 83 acute care wards in 14 New Zealand hospitals**

Region	Number of wards (Number of hospitals)	Nutrition Screening		Nutrition Rescreening		Nutrition Screening and Weighing			
		Not performed at admission	Performed at admission	Not performed ^a	Performed regularly ^b	Neither performed	Only Screening	Only Weight measured	Both performed
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Queensland	93 (14)	5 (5%) ^c	88 (95%) ^c	54 (58%) ^c	39 (42%) ^c	5 (5%) ^c	43 (46%) ^c	0 ^c	45 (48%) ^c
New South Wales	64 (8)	8 (12%) ^c	56 (88%) ^c	64 (100%) ^c	0 ^c	7 (11%) ^c	31 (48%) ^c	1 (2%) ^c	25 (39%) ^c
Victoria	59 (12)	13 (22%) ^c	46 (78%) ^c	52 (88%) ^c	7 (12%) ^c	10 (17%) ^c	10 (17%) ^c	3 (5%) ^c	36 (61%) ^c
South Australia	34 (2)	31 (91%) ^c	3 (9%) ^c	33 (97%) ^c	1 (3%) ^c	16 (47%) ^c	2 (6%) ^c	15 (44%) ^c	1 (3%) ^c
Western Australia	26 (3)	18 (69%) ^c	8 (31%) ^c	26 (100%) ^c	0 ^c	8 (31%) ^c	7 (27%) ^c	10 (39%) ^c	1 (3%) ^c
Tasmania	8 (2)	8 (100%) ^c	0 ^c	8 (100%) ^c	0 ^c	8 (100%) ^c	0 ^c	0 ^c	0 ^c
Australian Capital Territory	3 (1)	0 ^c	3 (100%) ^c	1 (33%) ^c	2 (67%) ^c	0 ^c	0 ^c	1 (33%) ^c	2 (67%) ^c
New Zealand	83 (14)	53 (64%) ^c	30 (36%) ^c	79 (95%) ^c	4 (5%) ^c	36 (43%) ^c	17 (21%) ^c	20 (24%) ^c	10 (12%) ^c
OVERALL	370 (56)	136 (36%)^c	234 (64%)^c	317 (86%)^c	53 (14%)^c	90 (24%)^c	110 (30%)^c	50 (14%)^c	120 (32%)^c

a: "Not performed" includes rescreening conducted on request, ad hoc, or not performed

b: "Regularly" includes screening done on a weekly, fortnightly, or monthly basis

c: Chi-square test (Exact tests) (p < 0.001)

430
431
432
433
434
435
436
437

438 **Table 2: Inter-ward variations in choice of nutrition screening tools in five**
 439 **participating hospitals**

Hospital	Number of participating wards	Number of wards as per choice of nutrition screening tool			Number of wards not performing nutrition screening
		MST	NRS-2002	Other	
A	4	1	0	3	0
B	13	5	0	2	6
C	8	3	1	4	0
D	8	7	1	0	0

440 **Hospital A, B, C, D: De-identified hospitals**

441
442
443
444
445
446
447
448

Table 3: Description of protocols for the management of patients at nutritional risk or malnourished in wards where nutrition screening was performed (n= 234)

Frequency of implementing protocol	Protocol Description	Wards n (%)
Implemented Routinely	Dietitian referral only	78 (33%)
	Dietitian referral + HPE diet	24 (11%)
	Dietitian referral + Food chart	10 (4%)
	Dietitian referral + HPE Diet + Food Chart	9 (4%)
	Dietitian referral + ONS	8 (3%)
	Dietitian referral + ONS + Food Chart	7 (3%)
	Dietitian referral + ONS + HPE Diet	6 (3%)
	Nothing is done	8 (3%)
Implemented Ad Hoc	Dietitian referral only	60 (26%)
	Dietitian referral + HPE diet	12 (5%)
	Dietitian referral + HPE Diet + Food Chart	9 (4%)
	Dietitian referral + HPE Diet + ONS	3 (1%)

449 HPE: High Protein-Energy; ONS: Oral Nutritional supplements

450

451 **Appendix 1: Evidence-based guidelines and the level of evidence for nutritional management of patients in the acute care**
 452 **setting (American Dietetic Association Evidence Analysis Library (ADA EAL) ; National Collaborating Centre for Acute Care**
 453 **2006 (NCCAC); Watterson, Fraser et al. 2009):**

Criteria	Evidence Based Statement	Grade (NHMRC[11])	Grade (NCCAC)	Grade (ADA EAL)
Nutrition screening	i. Screening for malnutrition and the risk for malnutrition should be carried out by healthcare professionals with appropriate skills and training.	-	D(GPP)	-
	ii. All hospital inpatients on admission should be screening. Screening should be repeated weekly for inpatients.	-	D (GPP)	
	iii. Screening should assess BMI, percentage unintentional weight loss and should also consider the time over which nutrient intake has been unintentionally reduced and/or the likelihood of future impaired nutrient intake.	-	D (GPP)	
	iv. Implementation of a nutrition risk screening program: a. Improves the identification of individuals at risk of malnutrition; b. Facilitates timely and appropriate referral for nutrition	B B	- -	
Nutrition screening tools	Valid nutrition risk screening tools include:			
	i. MST	B		II
	ii. MUST	B	-	II
	iii. NRS- 2002	B		I
Nutrition Interventions	i. Dietary counselling by a dietitian may improve outcomes such as: a. Weight status and physical function b. Weight status and body composition	C C	-	-
	ii. Oral Nutritional Supplements may improve outcomes such as: a. Weight status, body composition, complications, pressure ulcers, life expectancy (evidence of an effect) b. Energy and protein intake, global nutritional status, mood	A A	-	-
	iii. Individually prescribed nutritional support (including high energy diets ± ONS) may improve outcomes including:			

	a. Energy intake and wound healing	C	-	-
	b. Weight status and nutritional biochemistry	C		
	iv. Feeding assistance may improve outcomes including energy intake, body composition, life expectancy and use of antibiotics	C	-	-
	v. "Protected" Mealtimes	No evidence located	-	-

454 NHMRC: National Health and Medical Research Council; NCCAC: National Collaborating Centre for Acute Care; ADA EAL: American
455 Dietetic Association Evidence Analysis Library®, BMI: Body Mass Index; Aus: Australia; MST: Malnutrition Screening Tool; MUST:
456 Malnutrition Universal Screening Tool; NRS-2002: Nutrition Risk Screening- 2002; ONS: Oral Nutritional Supplements
457 *NHMRC: Grade A: Excellent level of evidence; Grade B: Good level of evidence; C: Satisfactory level of evidence*
458 *NCCAC: Grade D (GPP): A good practice point (GPP) is a recommendation for best practice based on the experience of the Guideline*
459 *Development Group*
460 *ADA EAL: Grade I: Good strength of the evidence; Grade II: Fair strength of the evidence*

461 **REFERENCES**

- 462 1. Agarwal, E., M. Ferguson, M. Banks, J. Bauer, S. Capra and E. Isenring, *Nutritional status and dietary*
463 *intake of acute care patients: Results from the Nutrition Care Day Survey 2010*. Clinical Nutrition,
464 2011. **31**(1): p. 41-47.
- 465 2. Pichard, C., U.G. Kyle, A. Morabia, A. Perrier, B. Vermeulen and P. Unger, *Nutritional assessment:*
466 *lean body mass depletion at hospital admission is associated with an increased length of stay*. Am J
467 Clin Nutr, 2004. **79**(4): p. 613-618.
- 468 3. Norman, K., C. Pichard, H. Lochs and M. Pirlich, *Prognostic impact of disease-related malnutrition*.
469 Clinical Nutrition, 2008. **27**: p. 5-15.
- 470 4. Elia, M., L. Zellipour and R. Stratton, *To screen or not to screen for adult malnutrition*. Clinical
471 Nutrition, 2005. **24**: p. 867-884.
- 472 5. National Collaborating Centre for Acute Care, *Nutrition support in adults: Oral nutrition support,*
473 *enteral tube feeding and parenteral nutrition*. National Collaborating Centre for Acute Care,
474 London. Available from www.rcseng.ac.uk. Accessed on 3rd August 2009. 2006.
- 475 6. Ferguson, M., S. Capra, J. Bauer and M. Banks, *Development of a Valid and Reliable Malnutrition*
476 *Screening Tool for Adult Acute Hospital Patients*. Nutrition, 1999. **15**(6): p. 458-464.
- 477 7. Kruizenga, H., J. Seidell, de Vet HCW, N. Wierdsma and M. van Bokhorst-de van der Schueren,
478 *Development and validation of a hospital screening tool for malnutrition: the short nutritional*
479 *assessment questionnaire (SNAQ)*. Clinical Nutrition, 2005. **24**: p. 75-82.
- 480 8. Kondrup, J., H. Rasmussen, O. Hamberg, Z. Stanga and An Ad Hoc Espen Working Group, *Nutritional*
481 *Risk Screening (NRS 2002): a new method based on analysis of controlled clinical trials*. Clinical
482 Nutrition, 2003. **22**(3): p. 321-336.
- 483 9. Rubenstein, L., J. Harker, A. Salva, Y. Guigoz and B. Vellas, *Screening for undernutrition in geriatric*
484 *practice: Developing the Short-Form Mini Nutritional Assessment (MNA-SF)*. Journal of Gerontology,
485 2001. **56A**: p. M366-M372.
- 486 10. Elia, M., *Screening for malnutrition: a multidisciplinary responsibility. Development and use of the*
487 *malnutrition universal screening tool ('MUST') for Adults*. . 2003: Redditch: BAPEN 2003.
- 488 11. Watterson, C., A. Fraser, M. Banks, E. Isenring, M. Miller, K. Silvester, et al., *Evidence based*
489 *guidelines for nutritional management of malnutrition in adult patients across the continuum of*
490 *care* Nutrition and Dietetics, 2009. **66**(s3): p. s1-s34.
- 491 12. Mueller, C., C. Compher, D.M. Ellen and the American Society for Parenteral Enteral Nutrition Board
492 of Directors, *A.S.P.E.N. Clinical Guidelines*. Journal of Parenteral and Enteral Nutrition, 2011. **35**(1):
493 p. 16-24.
- 494 13. Kondrup, J., S. Allison, M. Elia, B. Vellas and M. Plauth, *ESPEN Guidelines for Nutrition Screening*
495 *2002*. Clinical Nutrition, 2003. **22**(4): p. 415-421.
- 496 14. Ferguson, M. and S. Capra, *Nutrition screening practices in Australian hospitals*. Australian Journal
497 of Nutrition and Dietetics, 1998. **55**(4): p. 157-161.
- 498 15. Ferguson, M., M. Banks, J. Bauer, E. Isenring, A. Vivanti and S. Capra, *Nutrition screening practices*
499 *in Australian healthcare facilities: a decade later*. Nutrition and Dietetics, 2010. **67**: p. 213-218.
- 500 16. Hospital Caterers Association (2004), *Protected mealtimes policy*. (online). Available at
501 <http://www.hospitalcaterers.org/documents/pmd.pdf> (accessed 12th August 2011).
- 502 17. Xia, C. and H. McCutcheon, *Mealtimes in hospital- who does what?* Issues in Clinical Nursing, 2006.
503 **15**: p. 1221-1227.
- 504 18. American Dietetic Association Evidence Analysis Library. *Nutrition Screening Evidence Analysis*
505 *Project*. Available from: <http://www.adaevidencelibrary.com/topic.cfm?cat=3584>, ADA, Accessed
506 on 21st November 2011.
- 507 19. Schenker, S., *Undernutrition in the UK*. Nutrition Bulletin, 2003. **28**(1): p. 87-120.
- 508 20. Jensen, G., J. Friedmann, D. Henry, A. Skipper, E. Beiler, C. Porter, et al., *Noncompliance with body*
509 *weight measurement in tertiary care teaching hospitals*. Journal of Parenteral and Enteral Nutrition,
510 2003. **27**(1): p. 89-90.

- 511 21. Schindler, K., E. Pernicka, A. Laviano, P. Howard, T. Schu“tz, P. Bauer, et al., *How nutritional risk is*
512 *assessed and managed in European hospitals: A survey of 21,007 patients findings from the 2007-*
513 *2008 cross-sectional nutritionDay survey*. *Clinical Nutrition*, 2010. **29**: p. 552-559.
- 514 22. Frew, E., R. Cant and J. Sequeira, *Capturing the Data: Nutrition Risk Screening of Adults in Hospital*.
515 *Nutrients*, 2010. **2**: p. 438-448.
- 516 23. Frew, E., J. Sequeira and R. Cant, *Nutrition screening process for patients in an acute care public*
517 *hospital servicing elderly, culturally diverse population*. *Nutrition and Dietetics*, 2010. **67**: p. 71-76.
- 518 24. Porter, J., R. Raja, R. Cant and R. Aroni, *Exploring issues influencing the use of the Malnutrition*
519 *Universal Screening Tool by nurses in two Australian hospitals*. *Journal of Human Nutrition &*
520 *Dietetics*, 2009. **22**: p. 203-209.
- 521 25. Raja, R., S. Gibson, A. Turner, J. Winderlich, J. Porter, R. Cant, et al., *Nurses' Views and Practices*
522 *Regarding Use of Validated Nutrition Screening Tools*. *The Australian Journal of Advanced Nursing*,
523 2008. **26**(1): p. 26-33.
- 524 26. Baldwin, C. and C.E. Weekes, *Dietary advice with or without oral nutritional supplements for*
525 *disease-related malnutrition in adults*. *Cochrane Database of Systematic Reviews*, 2011. **Issue 9**.
526 **Art. No. CD002008**.
- 527 27. Jefferies, D., M. Johnson and J. Ravens, *Nurturing and nourishing: the nurses' role in nutritional*
528 *care*. *Journal of Clinical Nursing*, 2011. **20**(3-4): p. 317-330.
- 529 28. Kowanko, I., S. Simon and J. Wood, *Nutritional care of the patient: nurses' knowledge and attitudes*
530 *in an acute care setting*. *Journal of Clinical Nursing*, 1999. **8**: p. 217-224.
- 531 29. Tsang, M.F., *Is there adequate feeding assistance for the hospitalised elderly who are unable to feed*
532 *themselves?* *Nutrition & Dietetics*, 2008. **65**(3): p. 222-228.
- 533 30. Council of Europe Alliance (2003), *Council of Europe resolution food and nutritional care in hospital:*
534 *10 key characteristics of nutritional care in hospitals [online]*. Available at
535 http://www.bapen.org.uk/pdfs/coe_leaflet.pdf Accessed on 25th August 2011.
- 536 31. Ross, L., A. Mudge, A. Young and M. Banks, *Everyone's problem but nobody's job: Staff perceptions*
537 *and explanations for poor nutritional intake in older medical patients*. *Nutrition and Dietetics*, 2011.
538 **68**: p. 41-46.
- 539 32. *Australian Institute of Health and Welfare 2011. Australian hospital statistics 2009–10. Health*
540 *services series no. 40. Cat. no. HSE 107. Canberra: AIHW. Available from: <http://www.aihw.gov.au>*
541 *(Accessed on 17th April 2012)*.
- 542 33. *Certified providers of hospital and aged residential care services. New Zealand Ministry of Health –*
543 *Manatū Hauora. Available from:*
544 <http://cert.moh.govt.nz/certification/review.nsf/default?OpenForm>. Accessed on 17th April 2012.

545

546

547

548

549

550

551

552

553