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Frailty Prevention and Treatment: Why Registered Dietitian Nutritionists Need to Take Charge

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1 **Frailty Prevention and Treatment: Why Dietitians Need to Take Charge**

2

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18 **Introduction**

19 Americans aged 85 years or older are the fastest growing population segment in the U.S.
20 Many older adults have multiple chronic degenerative diseases and other illnesses. These
21 conditions can take a toll on their ability to perform basic activities of daily living, frequently
22 resulting in a poorer quality of life, frailty, and increased disability.¹

23 Today there are no common, well-accepted guidelines for the prevention or treatment of
24 frailty. Frailty, like obesity and diabetes, is a condition with a multiplicity of causes. Thus a
25 multi-factorial approach—including nutrition—is needed for its prevention and treatment.¹
26 Internationally, healthcare systems are establishing multidisciplinary protocols on frailty; in
27 Europe, dietitians are taking a very active role in the development and implementation of these
28 protocols. We believe that registered dietitian nutritionists (RDNs) in the U.S. have the
29 responsibility today to take a similar leading role; becoming integral to nutritional screening,
30 intervention, and advocating for pre-frail and frail older adults, thus making a meaningful
31 difference in their quality of life and health outcomes.

32

33 **Defining Frailty and Disability**

34 The international consensus is that physical frailty is: 1) a clinical syndrome, which
35 increases vulnerability to stressors, leading to functional impairment and adverse health
36 outcomes, 2) potentially reversible or attenuated by interventions, and 3) can be identified with
37 simple, validated screening tests and 4) should be screened for in all adults over age 70.² A more
38 precise definition of frailty has yet to be agreed upon, and consequently methods to identify this
39 syndrome are diverse. A recent study found 67 different instruments to measure or identify
40 frailty; nine were more commonly used and cited in the literature.³ Further work is required to

41 refine methods for frailty screening. However, existing data suggest that high levels are present
42 among the oldest in our populations.

43 Recently, Bandeen-Roche et al estimated that 15% of U.S. older adults are frail, with a frailty
44 prevalence of 9% for those aged 65–69 years and 38% for those aged 90 or older.⁴ Historically,
45 the terms frailty and disability have often been conflated and referred to together. Now it is
46 recognized that while these terms are similar, they are distinct and fall along a continuum, where
47 pre-frailty and frailty precede disability.⁵

48 Disability was defined in the U.S. Census Bureau’s American Community Survey as having
49 a major difficulty in one of the following: hearing, vision, cognitive function, ambulation, self-
50 care (e.g. bathing or dressing), or living independently.⁶ The proportion of adults with a
51 disability increased with older age. The greatest contrast was evident between adults with many
52 disabilities; for those aged 65 to 74 only 7% reported three or more disabilities, while for 75-84
53 year olds it was 16.5%, and then the percent more than doubled to 41.5% for those aged 85 and
54 older. Because there are currently 5.9 million Americans aged 85 years or older, and this number
55 is expected to quadruple by 2050, the human and demographic problem of disability is
56 potentially one of great severity.⁷

57

58 **The Impact of Frailty on the Health of Older Adults**

59 The consequences of disability on quality of life and health are clear. But now, as the
60 U.S. population has grown older, concerns about the effects of frailty on decreased quality of life
61 and health have also risen.⁸ Avoiding frailty is important for the health of older adults because
62 the disability that often follows affects their ability to live independently, socialization, nutrition,
63 activities of daily living, mobility and morbidity, as well as risks of institutionalization and

64 death. Indeed Bandeen-Roche concluded that their findings supported "... the importance of
65 frailty in late-life health etiology and the potential value of frailty as a marker of risk for adverse
66 health outcomes and as a means of identifying opportunities for intervention in clinical practice
67 and public health policy."⁴

68 Fried et al's landmark study among 4317 community-dwelling adults aged 65 and older
69 documented that the diagnosis of frailty independently predicted the three-year progression in
70 decreased mobility and activities of daily living, and thus disability. Frailty led to a heightened
71 risk of falls, hospitalization, institutionalization, mortality, and decreased quality of life.¹
72 Decreased quality of life and increased dependency are two outcomes of frailty that the very
73 oldest adults regard as very important. For example, in a Dutch health evaluation study, those
74 over 85 years of age valued functional and social independence the most, followed by avoidance
75 of dependence, while those over 65 years of age valued less sickness and pain the most.⁹

76 Quality of life is also associated with emotional and mental status. In studies of older
77 adults using instruments such as the Mini-Mental State Examination, an inverse association was
78 found between cognitive function and frailty and a positive association was shown between
79 depression and frailty.¹⁰ It is not surprising that depression is associated with frailty because
80 depression is typically related to isolation, limited physical activity, weight loss, and lack of
81 mobility – all of which prevent socializing.

82 In addition to its potential impact on mental health, frailty can have direct adverse
83 nutritional effects when the lack of energy to shop or cook leads to decreased nutrient intake.¹⁰
84 Frailty is also associated with poorer health outcomes and increased mortality. Bandeen-Roche
85 documented that among the frail, 42% were hospitalized in the previous year, compared to 22%
86 of the pre-frail and 11% of robust older adults. Frailty was associated with older adults having

87 hip, back, or heart surgery in the last year and falls; more than 50% of frail older adults had
88 fallen in the previous year.⁴

89 Frailty is potentially linked to increased healthcare costs. In one study of older patients
90 undergoing colorectal surgery procedures, hospital costs and discharge costs increased with
91 advanced frailty and higher degrees of frailty were related to increased rates of discharge,
92 institutionalization and 30-day readmission.¹¹ Frailty may play an even greater role in healthcare
93 spending in the future, since per capita spending on Medicare increases with age. The
94 Congressional Budget Office has estimated that “population aging” is expected to account for a
95 larger share of healthcare spending growth through 2039 than either “excess spending growth” or
96 the “coverage expansion” subsidies provided under the Affordable Care Act.¹²

97

98 **Clinical Identification and Treatment of Frailty**

99 Because frailty often occurs in patients with one or more chronic diseases, the syndrome may
100 be overlooked as attention is given to other, more acute, conditions. Clinically, frailty is not
101 measured by a cursory medical record review or by simply looking at the patient in a chair or
102 bed. It requires active involvement with the patient. Table 1 describes sets of indicators used to
103 measure frailty in clinical practice. One of the most common uses the Fried criteria, which are a
104 combination of clinical indicators, physical assessment, and other measures, particularly
105 functional measures. RDNs in the U.S. can easily acquire the skills to screen and assess for
106 frailty.

107 As a syndrome, frailty is characterized by dysregulation in multiple systems, leading to a loss
108 of dynamic homeostasis, decreased physiologic reserve, and increased risk for morbidity and
109 mortality. Xue et al hypothesized that frailty was a cycle, where a stressor or insult could

110 influence any point in the cycle, leading to a progression of signs and symptoms.¹³ Recent
111 findings support the hypothesis that sarcopenia is also a continuous process; one could visualize
112 that insults added on top of this gradual and universal age-related decline in lean tissue could
113 manifest as frailty.¹³ Clinical research, particularly in recent years, has suggested several
114 important multisystem, pathophysiological processes in the development of frailty, possibly
115 including chronic inflammation and immune activation, as well as processes in the
116 musculoskeletal and endocrine systems. Etiologic factors contributing to frailty potentially
117 include genetic, epigenetic and metabolic factors, environmental and lifestyle stressors, as well
118 as acute and chronic diseases.¹⁴

119 Treatments and interventions for frailty are targeted to prevent, delay, reduce, or reverse, or
120 the severity of frailty and, when it is irreversible, to prevent or reduce adverse health outcomes.
121 Exercise interventions have most consistently shown benefit in treating frailty.¹⁵
122 Pharmacological interventions have less evidence, and while clinical research continues to target
123 potential drug therapies, there are unique research challenges in this population because older
124 adults frequently have multiple chronic diseases, low physiological reserves and polypharmacy.
125 Some promising treatments for frailty involve multifactorial, interdisciplinary interventions,
126 including nutritional therapies.¹⁶

127

128 **Nutritional Interventions for Frailty**

129 A specific dietary pattern characterizing frail individuals has yet to be described and there
130 may be several such profiles contributing to or resulting in frailty. Deficits of food energy,
131 protein, essential amino acids, calcium, and vitamin D may each be involved in frailty. Weight
132 loss is such a major contributor to frailty that energy intake cannot, and must not, be ignored.

133 Clearly, a lack of energy intake will result in under nutrition, tissue wasting and all the associated
134 detrimental consequences. A recent review of nutritional intervention studies targeting frail older
135 adults found that modification of nutritional quality (either with oral nutritional supplements or a
136 better diet) improved strength, walking speed, and nutritional status in the majority of frail or
137 pre-frail older adults, but the greatest effect was in those with malnutrition.¹⁶ In these studies,
138 “better diet” included utilization of Meals on Wheels, adding an extra meal each day,
139 individualized dietary counseling, and food fortification.¹⁶ In addition, energy balance
140 throughout life is crucial for optimal muscle retention in older age. It is known that those with
141 the largest body size will have more muscle mass, but it has also been shown that greater fat
142 mass is associated with faster muscle loss¹⁷. This has implications with the current rise in obesity
143 in middle age, potentially leading to greater problems related to muscle loss, including frailty, in
144 the future.

145 The current daily requirement for protein is estimated as 0.8 g/kg/day. However, there is
146 controversy about the adequacy of this amount,¹⁸ particularly for older adults. Also, there is
147 some evidence that 10-25% of older adults do not meet the daily requirement for protein.¹⁹ Some
148 researchers claim even greater numbers of those with chronic or acute illness are at risk of low
149 protein intake.¹⁸ Some experts suggest that older adults may require 1.0-1.2 g/kg/day of protein
150 to maintain nitrogen balance and promote muscle protein synthesis, and may need even more
151 during illness.¹⁸ Regardless of the outcome of these debates about the amount of protein, it is
152 established beyond doubt that if energy needs are not met either because energy intakes are
153 insufficient or because of increased requirements due to fever, infection or other causes, protein
154 catabolism will occur. Prolonged protein catabolism will lead to continued loss of muscle and
155 other reductions in lean body mass, which highlights the paramount importance of adequate

156 energy intake. There is also some indication, although less conclusive, that timing and
157 distribution of protein intake throughout the day is important to ensure maximal utilization of
158 available protein.¹⁹ Another consideration is the potential supplementation with essential amino
159 acids or protein metabolites such as beta-hydroxy-beta-methylbutyrate (HMB), which recent
160 systematic reviews conclude may improve muscle outcomes.²⁰⁻²¹ More research is needed on
161 these topics.

162 Regarding vitamin D and calcium; it is well accepted that these nutrients are crucial for
163 bone health and protect older adults from bone loss. Vitamin D also may have a role in
164 preventing falls in frail and deficient individuals,²² as well as in muscle function.²³ However,
165 there is currently no consensus on how much Vitamin D is needed to optimize bone strength in
166 frail individuals, although it is recognized that these individuals consist of a particular at-risk
167 group. It also seems that low vitamin D status influences responses to treatments targeted at
168 improving muscle function.¹⁹

169

170 **Opportunities for U.S. RDN Leadership and Skill Development in Frailty**

171 Even today, the U.S. healthcare workforce is not large enough to meet older adult's needs
172 and there is a scarcity of healthcare professionals specialized in geriatrics. By 2030, an estimated
173 3.5 million additional healthcare professionals and direct-care workers will be needed to provide
174 care for older adults.²⁴ The Academy of Nutrition and Dietetics identified the “approaching gray
175 tsunami” as one of 10 change drivers and trends impacting the profession.²⁵ Thus, geriatrics is
176 clearly an area that is likely to have major impacts on future dietetic practice.

177 Worldwide, there is a recognized role for nutrition in helping prevent and treat frailty.
178 Research is emerging and becoming more conclusive that conditions like frailty cannot be

179 treated with drugs alone, but require a combination of an adequate diet, strength building
180 exercise, physical activity and, in certain cases, drugs to impact the condition and decrease the
181 progression of sarcopenia.²⁶ This presents an opportunity for RDN leadership, as nutrition is
182 recognized as an important factor in prevention and treatment of frailty. Further, there is
183 evidence of substantial unmet needs because of treatment fragmentation, lack of attention to
184 nutrition, and an absence of a comprehensive approach for this population. Yet our gap analysis
185 of dietetic training and practice in the U.S. documents that there is limited preparation for this
186 role broadly by the profession (Table 2).

187 Attention to frailty in older adults is continuing to build. The European Union is one of
188 the leaders in defining frailty, developing resources such as www.frailty.net, and carrying out
189 studies that find frail older adults are high users of community resources, hospitalization, and
190 nursing homes.¹⁵ European action plans, best practices, briefings, and consensus papers on frailty
191 all maintain a strong focus on nutrition (Table 3). The European Federation of the Associations
192 of Dietitians briefing paper on management of nutrition-related disease in older adults identifies
193 a strong role for the RDN--across the continuum of care--in helping prevent and treat frailty.
194 Similarly, there is an opportunity for U.S. RDNs to take the lead on frailty recognition,
195 prevention, treatment, and research.

196 U.S. RDNs can easily expand their skills, and work to better understand and use the
197 clinical tools needed to identify and manage frailty and educate others on the important role of
198 nutrition. But if they do not seize the opportunity to fill the gap, the opening may be lost.
199 Specifically, if U.S. RDNs do not step up to this challenge and get involved, it is likely then that
200 the treatment focus in the U.S. will shift primarily to recommendations for exercise and
201 pharmacological interventions, and other healthcare professionals will take the lead while the

202 nutritional aspects of prevention and treatment will be neglected or forgotten. Table 4 outlines
203 several suggestions on how U.S. RDNs today can include a focus on frailty in their individual
204 practice settings.

205

206 **Recommendations and Conclusions**

207 It is time for U.S. RDNs to actively engage in frailty prevention and treatment in older
208 adults. Chief among the many challenges that remain is advocating for policy changes so third
209 parties will cover costs, training, staffing, and interventions to prevent sarcopenia from giving
210 rise to frailty and to deal with those who are already frail. A second urgent task is to develop and
211 validate pre-frail screening and assessment tools and to prevent pre-frailty whenever possible.
212 U.S. RDNs can help lead the research in this area and in developing a definition of frailty that
213 takes into account the multi-factorial nature of the condition.

214 Nutrition is key to helping prevent frailty. Access to a healthy diet, usual foods fortified
215 with the addition of extra food energy and/or protein (or micronutrients) and oral nutritional
216 supplements when needed, can maintain nutrition and help maximize an older adult's chances of
217 staying healthy and independent. Yet, if prevention does not succeed, nutrition still plays an
218 important role along with strength training and other strategies to minimize or ameliorate its
219 effects. Additionally, well-designed studies are required to better define the ideal amount, timing,
220 and sources of protein for older adults, the potential, if any, for essential amino acids and HMB
221 and to address the controversies on optimal calcium and Vitamin D intakes.¹⁹ With the
222 development of new medications to help build or maintain muscle mass, and the recognition of
223 sarcopenia as a code in the International Classification of Diseases, U.S. RDNs must advocate

224 that these therapies are paired with adequate nutrition and then lead the research on these
225 questions or the nutritional dimensions may be forgotten.

226 Frailty and sarcopenia must have even further recognition within ICD-10 codes to allow
227 medical teams to better define and quantify the key problems and interventions necessary for
228 each patient. Health outcomes research needs to focus on the effectiveness of nutrition
229 interventions as well as the secondary consequences of frailty, including falls, hospitalization
230 risk, and hospital re-admission rates. In addition, research is needed on frailty-related biomarkers
231 and quality of life measures. More attention and advocacy are also important to increase
232 insurance reimbursement for older adults in intensified frailty prevention and treatment
233 programs, and U.S. RDNs need to document that the costs of such programs are less than the
234 healthcare costs associated with hospital stays.

235 Nutrition is an integral part of maintaining muscle mass, bone strength, and functionality,
236 making it key to helping prevent and treat frailty in the older adult population. To ensure that
237 nutritional interventions count and really make a clinical difference there must also be measures
238 of progress or change to show improvement in nutritional status. U.S. RDNs have the
239 opportunity to become leaders in this arena and to keep nutrition as a mainstay in frailty
240 prevention and treatment and in supporting healthy aging.

241

242 **References**

- 243 1. Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: evidence for a phenotype. *J*
244 *Gerontol A Biol Sci Med Sci.* 2001;56(3):M146-M156.
- 245 2. Morley JE, Vellas B, van Kan GA, et al. Frailty consensus: a call to action. *J Am Med Dir*
246 *Assoc.* 2013;14(6):392-397.

- 247 3. Buta BJ, Walston JD, Godino JG et al. Frailty assessment instruments: systematic
248 characterization of the uses and contexts of highly-cited instruments. *Ageing Res Rev.*
249 2016; 26:53-61.
- 250 4. Bandeen-Roche K, Seplaki CL, Huang J, et al. Frailty in older adults: a nationally
251 representative profile in the United States. *J Gerontol A Biol Sci Med Sci.*
252 2015;70(11):1427-1434.
- 253 5. Fried LP, Ferrucci L, Darer J, Williamson JD, Anderson G. Untangling the concepts of
254 disability, frailty, and comorbidity: implications for improved targeting and care. *J*
255 *Gerontol A Biol Sci Med Sci.* 2004;59(3):255-263.
- 256 6. Wan H, Larsen LJ. *Older Americans with a Disability: 2008-2012.*
257 <https://www.census.gov/content/dam/Census/library/publications/2014/acs/acs-29.pdf>.
258 Accessed March 15, 2016.
- 259 7. Administration on Aging, Administration for Community Living, U.S. Department of
260 Health and Human Services. *A Profile of Older Americans: 2013.*
261 http://www.aoa.gov/Aging_Statistics/Profile/2013/docs/2013_Profile.pdf . Accessed
262 March 15, 2016.
- 263 8. Talegawkar SA, Bandinelli S, Bandeen-Roche K, et al. A higher adherence to a
264 Mediterranean-style diet is inversely associated with the development of frailty in
265 community-dwelling elderly men and women. *J Nutr.* 2012;142(12):2161-2166.
- 266 9. Hofman CS, Makai P, Boter H, et al. The influence of age on health valuations: the older
267 olds prefer functional independence while the younger olds prefer less morbidity. *Clin*
268 *Interv Aging.* 2015;10:1131-1139.

- 269 10. Mello AC, Engstrom EM, Alves LC. Health-related and socio-demographic factors
270 associated with frailty in the elderly : a systematic literature review . *Cad Saude Publica*.
271 2014;30(6):1143-1168.
- 272 11. Robinson TN, Wu DS, Stiegmann GV, Moss M. Frailty predicts increased hospital and
273 six-month healthcare cost following colorectal surgery in older adults. *Am J Surg*.
274 2011;202(5):511-514.
- 275 12. Congress of the United States Congressional Budget Office. *The 2014 Long-Term Budget*
276 *Outlook*. [https://www.cbo.gov/sites/default/files/113th-congress-2013-](https://www.cbo.gov/sites/default/files/113th-congress-2013-2014/reports/45471-Long-TermBudgetOutlook_7-29.pdf)
277 [2014/reports/45471-Long-TermBudgetOutlook_7-29.pdf](https://www.cbo.gov/sites/default/files/113th-congress-2013-2014/reports/45471-Long-TermBudgetOutlook_7-29.pdf). Accessed March 15, 2016.
- 278 13. Xue Q-L, Bandeen-Roche K, Varadhan R, Zhou J, Fried L. Initial manifestations of frailty
279 criteria and the development of frailty phenotype in the Women’s Health and Aging Study
280 II. *J Gerontol A Biol Sci Med Sci*. 2008;63(9):984-990.
- 281 14. Chen X, Mao G, Leng SX. Frailty syndrome: An overview. *Clin Interv Aging*.
282 2014;9:433-441.
- 283 15. Cameron ID, Fairhall N, Gill L, et al. Developing interventions for frailty. *Adv Geriatr*.
284 2015;2015:1-7. <http://dx.doi.org/10.1155/2015/845356>
- 285 16. Manal B, Suzana S. Nutrition and frailty : a review of clinical intervention studies. *J*
286 *Frailty Aging*. 2015;4(2):100-106.
- 287 17. Koster A, Ding J, Stenholm S, et al. Does the amount of fat mass predict age-related loss
288 of lean mass, muscle strength, and muscle quality in older adults? *J Gerontol A Biol Sci*
289 *Med Sci*. 2011;66(8):888-895. doi:10.1093/gerona/qlr070.

- 290 18. Bauer J, Biolo G, Cederholm T, et al. Evidence-based recommendations for optimal
291 dietary protein intake in older people: a position paper from the PROT-AGE study group.
292 *J Am Med Dir Assoc.* 2013;14(8):542-559.
- 293 19. Hickson M: Nutritional interventions in sarcopenia: a critical review. *Proc Nutr Soc.*
294 2015;74(4):378-386.
- 295 20. Cruz-Jentoft A, Landi F, Schneider S et al. Prevalence of an interventions for sarcopenia
296 in ageing adults:; a systematic review. Report of the International Initiative (EWGSOP
297 and IWGS). *Age Ageing.* 2014;43(6):748-59.
- 298 21. Yanai H. Nutrition for sarcopenia. *Review J Clin Med Res.* 2015;7(12):926-931.
- 299 22. Taylor C, Thomas PR, Aloia JF, Millard PS, Rosen CJ. Questions about Vitamin D for
300 primary practice: input from an NIH Conference. *Am J Med.* 2015;128(1):1167-1170.
- 301 23. Agergaard J, Trostrap J, Uth J, et al. Does Vitamin D intake during resistance training
302 improve skeletal muscle hypertrophic and strength response in young and elderly men? A
303 randomized controlled trial. *Nutr Metab.* 2015;12:32-46. doi:10.1186/s12986-015-0029-y
- 304 24. Robert Wood Johnson Foundation, Johns Hopkins Bloomberg School of Public Health.
305 *Chronic Conditions: Making the Case for Ongoing Care.*
306 <http://www.rwjf.org/content/dam/farm/reports/reports/2010/rwjf54583>. Accessed March
307 15, 2016.
- 308 25. Kicklighter J, Dorner B, Hunter AM, et al. *Change Drivers and Trends Driving the*
309 *Profession: A Prelude to the Visioning Report 2017.*
310 <http://www.eatrightpro.org/~media/eatrightpro%20files/leadership/volunteering/committe>
311 [e%20leader%20resources/changedriversandtrendsdrivingtheprofession.ashx](http://www.eatrightpro.org/~media/eatrightpro%20files/leadership/volunteering/committe). Accessed
312 March 15, 2016.

- 313 26. Meriglioli MN, Roubenoff R. Prospect for pharmacologic therapies to treat skeletal
314 muscle dysfunction. *Calcif Tissue Int.* 2015;96:234-242.
- 315 27. Gobbens RJ, van Assen MA. Frailty and its prediction of disability and health care
316 utilization: the added value of interviews and physical measures following a self-report
317 questionnaire. *Arch Gerontol Geriatr* 2012;55(2):369-379.
- 318 28. Peters LL, Boter H, Buskens E, Slaets JPJ. Measurement properties of the Groningen
319 Frailty Indicator in home-dwelling and institutionalized elderly people. *J Am Med Dir*
320 *Assoc.* 2012;13(6):546-551.
- 321 29. Rockwood K, Song X, MacKnight C, et al. A global clinical measure of fitness and frailty
322 in elderly people. *CMAJ.* 2005;173(5):489-495.
- 323 30. Bernstein M, Munoz N. Position of the Academy of Nutrition and Dietetics: food and
324 nutrition for older adults: promoting health and wellness. *J Acad Nutr Diet.*
325 2012;112(8):1255-1277.
- 326 31. Eliot KA, Kolasa KM. The need for interprofessional collaborative-ready dietetics
327 professionals. *J Acad Nutr Diet.* 2015;115(9 suppl):A14.
- 328 32. Rhea M, Bettles C. Future changes driving dietetics workforce supply and demand: future
329 scan 2012-2022. *J Acad Nutr Diet.* 2012;112(3 suppl):S10-S24.
- 330 33. Tappenden KA., Quatrara B, Parkhurst ML, Malone AM, Fanjiang G, Ziegler TR. Critical
331 role of nutrition in improving quality of care: an interdisciplinary call to action to address
332 adult hospital malnutrition. *JPEN J Parenter Enter Nutr.* 2013;37(4):482-497.
- 333 34. European Innovation Partnership on Active and Healthy Ageing. *Action Plan on*
334 *Prevention and Early Diagnosis of Frailty and Functional Decline, Both Physical and*

- 335 *Cognitive, in Older People.* [https://ec.europa.eu/research/innovation-union/pdf/active-](https://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/a3_action_plan.pdf)
336 [healthy-ageing/a3_action_plan.pdf](https://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/a3_action_plan.pdf). Accessed March 15, 2016.
- 337 35. European Innovation Partnership on Active and Healthy Ageing: *A Compilation of Good*
338 *Practices.* [http://ec.europa.eu/research/innovation-union/pdf/active-healthy-](http://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/gp_a3.pdf#view=fit&pagemode=none)
339 [ageing/gp_a3.pdf#view=fit&pagemode=none](http://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/gp_a3.pdf#view=fit&pagemode=none). Accessed March 15, 2016.
- 340 36. European Federation of the Associations of Dietitians. *Briefing Paper on the Role of the*
341 *Dietitian in the Prevention and Management of Nutrition-related Disease in Older Adults.*
342 [file:///C:/Users/arensme/Downloads/EFAD%20Briefing%20paper%20Older%20Adults%](file:///C:/Users/arensme/Downloads/EFAD%20Briefing%20paper%20Older%20Adults%20(4).pdf)
343 [20\(4\).pdf](file:///C:/Users/arensme/Downloads/EFAD%20Briefing%20paper%20Older%20Adults%20(4).pdf). Accessed March 15, 2016.
- 344 37. British Geriatrics Society. *Fit for Frailty, Consensus Best Practice Guidance for the Care*
345 *of Older People Living with Frailty in Community and Outpatient Settings.* British
346 Geriatrics Society Web site. http://www.bgs.org.uk/campaigns/fff/fff_full.pdf. Accessed
347 March 15, 2016.
- 348 38. World Health Organization. *The International Classification of Diseases, Tenth Edition,*
349 *Clinical Modification (ICD-10-CM).* <http://www.cdc.gov/nchs/icd/icd10cm.htm>.
350 Accessed March 15, 2016.
- 351 39. DeCaporale-Ryan LN, Cornell A, McCann RM, McCormick K, Speice J. Hospital to
352 home: a geriatric educational program on effective discharge planning. *Gerontol Geriatr*
353 *Educ.* 2014;35(4):369-379.

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Table 1: Description of Common Frailty Measures

Frailty Measure	Diagnosis	Components	How to Measure	Comments
Fried Criteria (U.S.) ¹	Must meet 3 of 5 criteria to be considered frail	<ul style="list-style-type: none"> • Unintentional weight loss • Weakness • Exhaustion • Slowness • Low physical activity level 	<ul style="list-style-type: none"> • Loss of ≥ 10 lbs in 1 year • Grip strength in lowest 20% at baseline using dynamometer • Self-reported exhaustion, identified by 2 questions on CES-D scale • Slowest 20% of population at baseline based on 15 feet timed walk • Weighted score of calories expended per week calculated from patient report of physical activity 	Addresses physical frailty only
Tilburg Frailty Indicator (Poland) ²⁷	1 point given for each "yes/sometimes" answer and 0 points for each "no" Considered frail when total score ≥ 5	<ul style="list-style-type: none"> • Sociodemographic characteristics • Physical domain • Psychological domain • Social domain 	Questionnaire with 25 questions: <ul style="list-style-type: none"> • Sociodemographics: 10 questions • Physical: 8 questions • Psychological: 4 questions • Social: 3 questions 	Addresses physical, psychological, and social frailty

Groningen Frailty Indicator (Netherlands) ²⁸	Moderate to severe frailty with score ≥ 4	<ul style="list-style-type: none"> • Physical components • Cognitive component • Social component • Psychological component 	Questionnaire with 15 questions: <ul style="list-style-type: none"> • Physical: 9 questions • Cognitive: 1 question • Social: 3 questions • Psychological: 2 questions 	Addresses physical, psychological, cognitive, and social frailty
7-Point Clinical Frailty Scale (Canada) ²⁹	7 point scale, where: 1=Very fit 7=Severely frail	<ul style="list-style-type: none"> • Presence and severity of current diseases • Ability in activities of daily living • Physical and neurological signs from clinical examinations 	Count of 70 clinical deficits	Addresses physical, psychological, and cognitive frailty

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359 Table 2: Gap Analysis of Dietetic Training and Practice Related to Frailty: Opportunities for
 360 Enhanced Leadership and Skill Development

Training and Practice Area	Potential Gap	Opportunities for Enhanced Leadership and Skill Development
Clinical Education and Training	<ul style="list-style-type: none"> • Dietetic education and training does not routinely include experience in physical and functional assessment techniques, particularly those targeted to older adults • RDNs may enter practice without knowing how to measure frailty or interpret specific findings of frailty instruments 	<ul style="list-style-type: none"> • Include hands-on skill building in physical assessment for older adults and in using the Fried and other frailty instruments in dietetic training and continuing education programs • Consider the need for training in geriatric nutrition as identified in the Academy of Nutrition and Dietetics’ (AND) recent <i>Change Drivers and Trends Driving the Profession^a</i>
Position Statements and Practice Guidelines	<ul style="list-style-type: none"> • The most current <i>Position of the Academy of Nutrition and Dietetics: Food and Nutrition for Older Adults: Promoting Health and Wellness³⁰</i> includes some mention of frailty, but does not address it as a distinct condition or provide specific practice recommendations 	<ul style="list-style-type: none"> • Build off the international consensus established on frailty and partner with international dietetic associations to develop a unique AND position paper on frailty • Include a separate section on frailty in a future updated AND position paper on older adult nutrition
Proactive Care Team Leadership	<ul style="list-style-type: none"> • Multifactorial, interdisciplinary interventions show promise for frailty treatment, yet RDNs need to know how to measure frailty to be able to prove the necessity and value of nutritional interventions • RDNs, like other healthcare professionals, are not routinely educated in a “manner that would develop the soft skills needed to become an effective team member”³¹ • The need for interdisciplinary leadership was also identified in the profession’s 2012 future scan analysis “The professional will have to be assertive and 	<ul style="list-style-type: none"> • Use the Alliance for Patient Nutrition consensus approach as a model: “We underscore the importance of an interdisciplinary approach to addressing malnutrition both in the hospital and in the acute post-hospital phase”³³ <p>Consider the transdisciplinary professionalism trend identified in AND’s <i>Change Drivers and Trends Driving the Profession^b</i></p>

	<p>opportunistic to secure positions in a world where competencies and credentials are less important than teaming and problem solving”³²</p>	
<p>Advocacy with Payers and Providers</p>	<ul style="list-style-type: none"> • The Centers for Medicare and Medicaid Services (CMS) has had a frailty adjustment model for over 10 years, underscoring the potential importance of frailty on health outcomes for older adults • RDNs and AND have advocated on the importance of nutrition in general for older adults, but not on the role of nutrition in helping prevent/treat frailty 	<ul style="list-style-type: none"> • Build off the international consensus established on frailty and partner with international dietetic associations to develop advocacy platforms on the role of nutrition and RDNs in helping prevent/treat frailty • Consider the advocacy implication identified in AND’s <i>Change Drivers and Trends Driving the Profession</i>^c
<p>Clinical and Health Outcomes Research</p>	<ul style="list-style-type: none"> • The past decade has seen a significant increase in the number of scientific publications on frailty • However scientific publications on nutrition-specific interventions for frailty have been more limited and many have not measured impact on inflammatory status and other frailty biomarkers 	<ul style="list-style-type: none"> • Engage in/publish clinical and health outcomes research on nutritional interventions for frailty; include biomarker measures • Include nutritional interventions as a part of multifactorial, interdisciplinary clinical trials for frailty • Consider the demonstration of value and evidence-based care for malnutrition implication identified in AND’s <i>Change Drivers and Trends Driving the Profession</i>^d

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362 ^a“Training in geriatric nutrition and a variety of geriatric care specialties to support optimal
363 health and improve health outcomes for a diverse aging population in a variety of settings is
364 needed”²⁵

365 ^b“Transdisciplinary professionalism is becoming an essential ideology for a 21st century health
366 care system”²⁵

367 ^cSustained engagement in advocacy and public policy is essential for adequate funding and
368 reimbursement of food and nutrition-related programs and services to ensure healthful aging.”²⁵

369 ^d“Demonstration of the value/cost effectiveness of evidence-based nutritional care in the
370 prevention, treatment and management of malnutrition and chronic disease in older populations
371 is essential”²⁵

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373 Table 3: Action on Nutrition and Frailty in Europe

Organization	Publication	Comments
European Innovation Partnership on Active and Healthy Ageing	<i>Action Plan on Prevention and Early Diagnosis of Frailty and Functional Decline, Both Physical and Cognitive in Older People</i> ³⁴	Includes a focus on nutrition, because “malnutrition is one of the key determinants of frailty, and is both a cause and an effect of frailty” and “there is a pressing need to understand challenges underpinning malnutrition in older people.” Subsequently, one of the general objectives of the action plan is to “manage functional decline and frailty through targeted intervention in physical fitness,[and the] nutrition status....of older people.”
European Innovation Partnership on Active and Healthy Ageing	<i>A Compilation of Good Practices</i> ³⁵	Focus on the prevention and early diagnosis of frailty. Nutrition was one of the report’s four areas targeted for good practices. The report commented “There seems to be a close association between frailty and the nutrition status in older people.”
European Federation of the Associations of Dietitians	<i>Briefing Paper on the Role of the Dietitian in the Prevention and Management of Nutrition-related Disease in Older Adults</i> ³⁶	Identified that one of the dietitians’ leadership roles is “Educating healthcare professionals on the topic of malnutrition and its relationship with frailty.”
British Geriatrics Society	<i>Fit for Frailty, Consensus Best Practice Guidance of the Care of Older People Living with Frailty in Community and Outpatient Settings</i> ³⁷	Identified weight loss and poor nutrition as one of the “common problems in frailty which need to be addressed to reduce the severity and improve outcomes.”

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376 Table 4: Possible Roles of the U.S. RDN in Preventing and Treating Frailty

Practice Setting	Opportunities and Examples	Potential Research Studies
Acute Care	<ul style="list-style-type: none"> • Include frailty screening as part of basic nutritional screening on admission • Educate pre-frail/frail patients on basic nutrition, maintaining healthy body weight, importance of adequate calories, protein, vitamin D, and use of fortified foods or oral nutritional supplements if needed • Refer to physical or occupational therapists to help address need for assistance with basic daily activities and/or strengthening muscles • Support development of code for frailty to document diagnosis/treatment, allow for billing, provide basis for RDNs to demonstrate value of nutrition intervention <ul style="list-style-type: none"> ○ <i>The International Classification of Diseases, Tenth Edition, Clinical Modification, (ICD-10-CM)</i>,³⁸ includes frailty under code R54 (as part of age-related physical debility) ○ Applies to frailty, old age, senescence, senile asthenia, and senile debility ○ Does <u>not</u> include cognitive decline associated with aging, senile psychosis, or senility not otherwise specified, which is instead categorized under R41.81 • Advocate for including nutrition in geriatric care standards and best practices <ul style="list-style-type: none"> ○ Example: American Geriatrics Society’s <i>Hospital to Home</i>³⁹ program teaches medical professionals to assess patient’s functionality, social support, transportation, and environmental factors when considering discharge but does not include nutrition 	<ul style="list-style-type: none"> • Document frailty prevalence on hospital admission among older adult patient population • Include evaluation of processes to better prevent and treat frailty in nutrition quality improvement initiatives • Evaluate effectiveness of specific nutrition interventions such as vitamin D supplementation, use of fortified foods, or oral nutritional supplements on specific health measures such as blood vitamin D levels or malnutrition criteria

Alternate Site Care	<ul style="list-style-type: none"> • Include frailty screening as part of basic nutritional screening on admission and include frailty prevention and treatment in nutrition care plans • Advocate for frailty prevention and treatment in interdisciplinary care rounds • Refer to physical or occupational therapists to help address need for assistance with basic daily activities and/or strengthening muscles • Before patient discharge, educate pre-frail/frail patients and family caregivers on basic nutrition, maintaining healthy body weight, importance of adequate calories, protein, vitamin D, and use of fortified foods or oral nutritional supplements if needed 	<ul style="list-style-type: none"> • Evaluate effectiveness of specific nutrition interventions on health outcomes of pre-frail and frail patients, such as potential impact on weight gain, muscle strength, activities of daily living, hospital readmissions
Outpatient	<ul style="list-style-type: none"> • Model services based on multidisciplinary protocols <ul style="list-style-type: none"> ◦ Example: British Geriatrics Society’s <i>Fit for Frailty</i>³⁷ consensus best practices guides management of frailty in community and outpatient settings with a holistic medical review – including nutrition • Educate older adults and caregivers on warning signs of pre-frailty/frailty, and potential interventions to maintain strength and appetite 	<ul style="list-style-type: none"> • Evaluate effectiveness of specific nutrition interventions on health outcomes of pre-frail and frail patients, such as potential impact on weight gain, muscle strength, activities of daily living, hospital readmissions
Community	<ul style="list-style-type: none"> • Refer pre-frail/frail older adults to congregate or home delivered meal programs if ability to shop/prepare and/or adequate income to buy nutritious food are issues • Refer pre-frail/frail older adults living below the poverty level to the Supplemental Nutrition Assistance Program (SNAP) and specific senior food programs • Refer pre-frail/frail older adults to dietitians working with grocery stores • Explore opportunities for telehealth 	<ul style="list-style-type: none"> • Implement a validation study of a specific frailty screening tool for older adults living in the community

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	<ul style="list-style-type: none">○ Individual and group medical nutrition is among the list of telehealth services that the CMS covers, and RDNs can be authorized as distant site practitioners	
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