Original Article

The complexity of treating wasting in ambulatory rehabilitation: is it starvation, sarcopenia, cachexia or a combination of these conditions?

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Nutritional status is often impaired in ambulatory rehabilitation patients. Wasting conditions can be classified as starvation, sarcopenia or cachexia but differences between these are not well defined, and misdiagnosis may lead to inappropriate intervention. A secondary analysis of data from 187 ambulatory rehabilitation patients aged ≥60 years aimed to identify patients with one or more wasting condition, and investigate the impact on common rehabilitation outcomes. Starvation was defined by fat-free mass index and the Council on Nutrition Appetite Questionnaire score; sarcopenia by fat-free mass index and quadriceps strength; and cachexia by fat-free mass index and serum C-reactive protein. Selected rehabilitation outcomes were compared for those who were, and those who were not, identified as having one or more wasting condition. Of those identified with starvation (n=30), all were also identified as sarcopenic and 20 as cachectic; of those identified as sarcopenic (n=75), 30 had starvation and 37 were cachectic; and of those identified as cachectic (n=37), 20 had starvation and all were sarcopenic. Twenty participants were identified as having all three conditions. Those with starvation had higher level of depression (p=0.003), lower self-rated health (p=0.032), and lower levels of physical function (motor p=0.006; process p=0.004) than those with no evidence of a wasting condition. Those who had sarcopenia had lower physical function (motor p=0.012; process p=0.003) as did those with cachexia (motor p=0.025; process p=0.042). Results suggest problems in operationalising definitions in an ambulatory clinical setting. The overlap identified in this analysis suggests that up to 40% (75/187) of patients could be misidentified and prescribed inappropriate nutritional support.

Key Words: wasting, starvation, sarcopenia, cachexia, aged

INTRODUCTION

Nutritional health is an important determinant of overall health, particularly among older adults with chronic disease. However, nutritional status is often impaired in older adults and this is associated with increased length of hospital stay and increased morbidity and mortality.[1,2] Nutrition is recognised to be important in ambulatory rehabilitation due to the increased physical and mental demands of programs, with recent reports that 30-50% of rehabilitation patients are malnourished.[3] Appropriate nutrition therapy is necessary to facilitate improved health outcomes for older adults in rehabilitation and optimise their ability to fully participate in programs.[4]

Although wasting can be categorised as starvation, sarcopenia or cachexia, the difference between these conditions is not well defined.[5] It is generally accepted that simple starvation results purely from protein-energy deficiency resulting in loss of both lean and fat mass; sarcopenia is a progressive loss of muscle mass with ageing, associated with increased frailty and reduced function, and resulting in loss of strength; and cachexia is a complex syndrome thought to be cytokine driven, resulting in severe loss of fat free mass or body cell mass.[5-7]

There is strong rationale to vary nutrition therapy for these conditions as sarcopenia and cachexia are largely thought to occur regardless of energy balance.[8] As such they may not be reversed by increased energy and protein intake alone, which is the accepted therapy for starvation.[5] Therefore, the provision of appropriate therapy depends on the ability to accurately categorise starvation, sarcopenia and cachexia, and therefore distinguish

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between wasting conditions. Furthermore, there is evidence of a relationship between wasting and poor cognition, depression, self-perceived health and physical function.[9,10] However, it is not clear if this relationship is the same for all categories.

Therefore, the aims of this secondary analysis of data from a sample of older adults participating in ambulatory rehabilitation were to: 1) identify those patients with starvation, sarcopenia or cachexia according to commonly reported descriptions; 2) identify the number of patients who were included in more than one of these three categories and therefore likely to be treated sub-optimally under usual clinical practice; and 3) investigate the impact of wasting conditions on common rehabilitation outcomes.

MATERIALS AND METHODS

Subjects and setting

A cross-sectional analysis was performed on baseline data collected as part of a randomised controlled trial (RCT) conducted in southern Adelaide, Australia between June 2005 and June 2006; methods used in the trial were previously described in detail.[11] All study participants had been referred for ambulatory rehabilitation at Repatriation General Hospital, Adelaide, Australia, following an acute hospital admission. Ethics approval for the study was obtained from Clinical Research Ethics Committees at Repatriation General Hospital, Flinders Medical Centre and Noarlunga Health Services, and all subjects gave written informed consent prior to participation in the research. The study was registered on the Australian New Zealand Clinical Trials Registry (ACTRN 12605000638639).

Measurements

In the original study, height was estimated from knee height for all participants, regardless of functional ability,[12] and bodyweight was recorded in the fasted state, wearing light clothing and no shoes. For this analysis, estimated body mass index (eBMI) was calculated and admitting diagnosis recorded to describe patient characteristics, and nutritional status was assessed by use of the Mini Nutritional Assessment (MNA), an 18-item screening and assessment tool which has been well validated in older adults.[13] Data were assessed and subjects grouped as starving, sarcopenic or cachectic, according to commonly reported descriptions of categories of wasting condition[5,14] (criteria defined in Table 1).

Given that this was a secondary data analysis, investigation was only possible using existing variables. With that in mind, the description of each category of wasting condition required an assessment of estimated fat-free mass index (eFFMI) since loss of fat-free mass (FFM) is common to all three categories. FFMI is a height normalised index of FFM, derived by dividing FFM (kg) by height (m) squared.[15] FFM was obtained from bioelectrical impedance analysis, considered a valid method of assessment of body composition for research purposes.[16]

The Council on Nutrition Appetite Questionnaire (CNAQ), an 8-item questionnaire validated in older adults, was used to assess reduced appetite as a proxy for inadequate protein-energy intake. A score of ≤28 indicates significant risk of at least 5% weight loss in the next six months.[17] Reduced strength was assessed by measuring quadriceps strength, which is closely related to functional outcomes, using a hand-held dynamometer.[18,19] Strength was normalised for bodyweight and considered to be abnormally low if less than 27.8%, on one or both legs, for men and less than 20.8% for women; equivalent to more than 2 standard deviations below the mean value and therefore considered to be below normal.[20] Inflammation was assessed from levels of C-reactive protein (CRP), a positive acute-phase protein, which is a sensitive marker of the level of systemic inflammation and a serum concentration measured at >5 mg/L is considered abnormal.[21]

Numbers of participants in each category of wasting condition were summed. Comparisons between those who were, and those who were not, identified as having a wasting condition were conducted to evaluate differences in cognitive function as defined by Mini Mental State Examination (MMSE) score (higher score indicates better cognition), depression from the Geriatric Depression

Table 1. Criteria used to assess category of wasting condition of participants in this study of older Australians participating in ambulatory rehabilitation

Wasting condition	Criteria	
Starvation	Low FFM	Poor appetite
defined by	FFMI (kg/m^2)	CNAQ
	M, ≤17.4	≤ 28
	F, ≤15.0	
Sarcopenia	Low FFM	Reduced strength
defined by	FFMI (kg/m^2)	Quad strength, % †
	M, ≤17.4 kg/m^2	M, <27.8
	F, ≤15.0 kg/m^2	F, <20.8
Cachexia	Low FFM	Increased acute phase response
defined by	FFMI (kg/m^2)	CRP (mg/L)
	M, ≤17.4	> 5
	F, ≤15.0	

FFM, fat free mass; FFMI, fat free mass index; CNAQ, Council on Nutrition Appetite Questionnaire[17]; CRP, C-reactive protein.
†normalised for body weight – force kg/kg body weight x 100.

Table 2. Characteristics of 187 ambulatory rehabilitation patients included in cross-sectional analysis

	Male (n=93)	Female (n=94)	Total (n=187)
Age, (y), mean (SD)	76 (8)	78 (8)	77 (8)
Height (cm), mean (SD)	170 (6)*	158 (6)*	164 (7)
Weight (kg), mean (SD)	76 (13)*	67 (15)*	72 (15)
eBMI (kg/m^2), mean (SD)	26 (4)	27 (6)	27 (5)
FFM (kg), mean (SD)	53 (8)*	38 (8)*	45 (11)
eFFMI (kg/m^2), mean (SD)	18 (3)*	15 (3)*	17 (3)
MNA score, mean (SD)			
Screening score	9 (2)	9 (2)	9 (2)
Total score	23 (3)	22 (3)	23 (3)
Admitting diagnosis; n (%)			
Stroke	43 (46)	31 (33)	74 (40)
Elective orthopaedic	14 (15)	21 (22)	35 (19)
Hip fracture	5 (5)	9 (10)	14 (8)
Other ortho	5 (5)	8 (9)	13 (7)
Falls	4 (4)	4 (4)	8 (4)
Deconditioned	5 (5)	8 (9)	13 (7)
Other	17 (9)	13 (14)	30 (16)

SD, standard deviation; eBMI – estimated body mass index; FFM, fat-free mass; eFFMI, estimated fat-free mass index; MNA, Mini Nutritional Assessment.
*Significant difference between males and females by independent samples t-test (p<0.001).

Scale (GDS) (higher score indicates increased depression), self-rated health from questions 1 and 2 of the SF-36 Health Survey (lower score indicates better perception of health) (Q1: In general, would you say your health is? Excellent [1], Very Good [2], Good [3], Fair [4], Poor [5]; Q2: Compared to one year ago, how would you rate your general health now? Would you say it is: Much better than one year ago [1], Somewhat better now than one year ago [2], About the same as one year ago [3], Somewhat worse than one year ago [4], Much worse now than one year ago [5]), nutritional status from the MNA, and physical function from the Assessment of Motor and Process Skills (AMPS) (higher score indicates better function).[22-25]

Statistical analysis

Data were analysed using SPSS version 17.0.1.[26] All tests were two-tailed and the level of statistical significance was set at a p value of 0.05. For continuous data, mean (SD), or median (Q1, Q3) were reported, as appropriate. Frequencies and percentages were reported for categorical data. Independent samples t-tests, or Mann-Whitney U tests for non-normally distributed data, were used to assess differences in continuous data between those who were, and those who were not, identified as having a wasting condition. For categorical data, chi-squared tests were performed to examine differences between those who were, and those who were not, identified as having a wasting condition.

RESULTS

Of 230 participants randomised in the primary trial, 187 (93 men; 94 women) adults aged ≥60 years had data available that enabled assessment of wasting conditions according to the descriptions used in this analysis. Forty three original participants were excluded as they were younger than 60 years (16 men; 27 women: mean age 48.3 (11.8) years). Mean (SD) length of stay in acute care for participants randomised to receive day rehabilitation was 15.3 (16.5) days, and 13.9 (10.6) days for those who received home rehabilitation. Participant characteristics are presented in Table 2. Males were significantly larger than females in height, weight, FFM and eFFMI (p<0.001). There were no significant differences across gender for age, eBMI or admitting diagnosis. There were no significant differences across gender or admitting diagnosis between those who were and those who were not included in the analysis.

Table 3. Study participants in each category of wasting condition by gender; n (%)[†]

	Male (n=93)	Female (n=94)
Starvation	8 (9)[*]	22 (23)[*]
Sarcopenia	32 (34)	43 (46)
Cachexia	19 (20)	18 (19)
None[‡]	53 (57)	44 (47)
Missing[§]	8 (8)	7 (7)

[†]n (%) do not total 100% due to overlap between categories; [‡]study participants not included in any wasting condition; [§]study participants with missing data resulting in inability to categorise wasting condition; [*]Significant difference between numbers of males and females according to Chi-squared test (p=0.004)

Numbers of study participants identified in each category of wasting condition are shown in Table 3 and Figure 1. Thirty (16%) participants were identified as suffering from starvation, 75 (40%) as sarcopenic and 37 (20%) as cachectic, however there was overlap between groups. Of the people identified with starvation, all were also identified as sarcopenic (100%) and 20 (67%) as cachectic. Of those identified as sarcopenic, 30 (40%) were identified as having starvation and 37 (49%) as being cachectic. Of those identified as cachectic, 20 (54%) were also identified as having starvation and all (100%) were identified as sarcopenic. Twenty (11%) participants were identified as having all three conditions.

There was a statistically significant difference between numbers of males and females in the starvation category (8 vs 22; p=0.004) but not for sarcopenia or cachexia categories. Study participants with a wasting condition were significantly older (starvation 81.5 y (6.7) vs 76.1 y (7.9); p<0.001: sarcopenia 80.2 y (6.1) vs 74.7 (8.3); p<0.001: cachexia 80.8 y (6.0) vs 75.9 y (8.2); p=0.001), according to the descriptions used in this analysis. They also had lower levels of nutritional status according to the MNA than those with no wasting condition (starvation - screening 7.9 (1.9) vs 9.9 (1.8); assessment 20.3 (3.0) vs 23.5 (2.4); sarcopenia - screening 8.7 (2.2) vs 9.9 (1.8); assessment 21.4 (3.3) vs 23.5 (2.4); cachexia - (screening 8.7 (2.2) vs 9.9 (1.8); assessment 21.4 (3.3) vs 23.5 (2.4)).

Those with starvation had higher GDS score (4.3 (2.3) vs 2.9 (2.3); p=0.003), lower self-rated health (Q1) (3.4 (0.9) vs 3.0 (0.9); p=0.032) and lower AMPS scores (motor score 0.21 (-0.23, 0.65) vs 0.61 (0.19, 0.95); p=0.006: process score 0.32 (-0.19, 0.69) vs 0.67 (0.33-0.89); p=0.012) compared with those who did not. Those with sarcopenia had lower AMPS scores (motor 0.29 (-0.19, 0. 76) vs 0.61 (0.19, 0.95); p=0.004: process 0.36 (-0.07, 0.75) vs 0.67 (0.33, 0.89); p=0.067) as did those with cachexia (motor 0.27 (-0.14, 0.72) vs 0.61 (0.19, 0.95); p=0.025: process 0.39 (0.04, 0.84) vs 0.67 (0.33, 0.89); p=0.042). There were no significant differences in other rehabilitation outcomes (Table 4).

Following the finding that all those identified as having a wasting condition were sarcopenic further subdivision was conducted and those rehabilitation outcomes of interest were examined in more depth. Groups were sarcopenia only (those with sarcopenia and no other wasting condition), sarcopenia only plus starvation (ie, plus those with starvation but not cachexia) and sarcopenia only plus cachexia (i.e. plus those with cachexia but not starvation). It was found that those with any wasting condition had statistically significantly lower AMP process scores than those who had no evidence of any wasting condition (sarcopenia only 0.33 (-0.15, 0.74) vs 0.67 (0.33, 0.89); p=0.034: sarcopenia only plus starvation 0.27 (-0.16, 0.73) vs 0.67 (0.33, 0.89): p=0.006: sarcopenia only plus cachexia 0.40 (-0.07, 0.78) vs 0.67 (0.33, 0.89); p=0.042) (Table 5).

DISCUSSION

Using commonly reported descriptions to depict wasting conditions in this population of older ambulatory rehabilitation patients, this analysis demonstrated that 30 individuals were identified as suffering from starvation, 75 were sarcopenic and 37 were cachectic. Furthermore, there was considerable overlap between categories, with all those classified as starving and as cachectic included in the sarcopenia category, and 20 individuals fitting the criteria for all three groups. Those identified as having a wasting condition were significantly older than those who were considered not to have a wasting condition and nutritional status was assessed as significantly worse. Moreover, study participants who had starvation were more likely to be depressed, reported lower self-rated health and were assessed as having lower levels of physical function, than those who did not. Both those with sarcopenia and those with cachexia had low levels of physical function. There were no other significant differences in terms of rehabilitation outcomes.

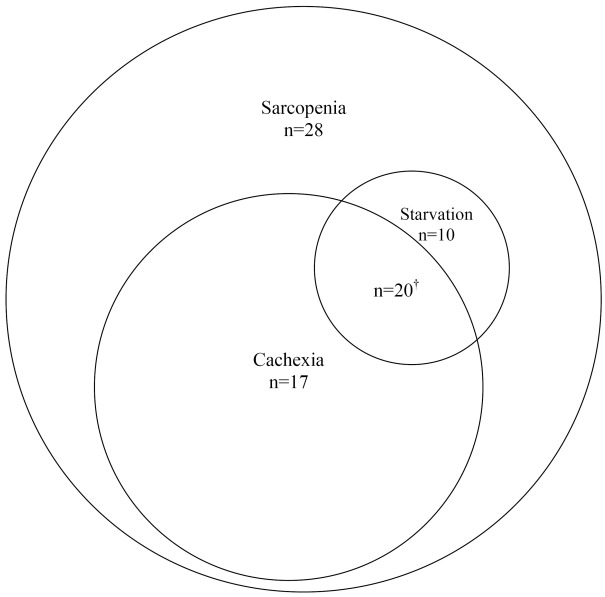

Figure 1. Illustration of the overlap between wasting, sarcopenia and cachexia as assessed in this group of older Australian adults participating in ambulatory rehabilitation. †Overlap between all three categories of wasting condition.

There is strong evidence that wasting conditions amongst older adults include starvation, sarcopenia and cachexia.[5,7,27,28] However, the literature is largely dominated by the term "malnutrition" which can lead to confusion in diagnosis and treatment. The practical implications of this are that nutrition screening tools used across settings to detect the risk of wasting are commonly understood to be detecting starvation rather than detecting categories of starvation, sarcopenia and cachexia. The findings of this study demonstrate that this understanding may in fact not be conducive to the provision of appropriate therapy. In this study all groups identified as having a wasting condition according to the selected criteria were identified as at risk of malnutrition by the MNA, demonstrating that this screening and assessment tool is not able to distinguish between wasting conditions. The literature indicates that provision of increased caloric and protein intake to older adults is not always effective in increasing body weight or improving outcomes,[3,8,29,30] yet guidelines consistently recommend refeeding patients who experience unintentional weight loss.[31] The likely result of non-specific screening tools would be treatment plans which invariably involve increased caloric intake, used in isolation from other therapies known to address sarcopenia and cachexia, thereby addressing starvation alone.

This is the first study to our knowledge that reports specifically on the prevalence of starvation in older adults. In comparison to the "malnutrition" literature in the rehabilitation population, our results demonstrate lower prevalence than reported in a recent review (16% vs 30-50%).[3] This finding is not unexpected as the "malnutrition" literature is likely to incorporate sarcopenia and cachexia in addition to starvation.

The consensus in the literature is that sarcopenia is age-related loss of muscle and muscle strength.[5,32-35] The prevalence of sarcopenia in our study was found to be

Table 4. Comparisons of selected rehabilitation outcomes between wasting conditions

	GDS		Self-rated health Q1		AMPS			
	Mean	SD	Mean	SD	Median†	Q1, Q3 †	Median‡	Q1, Q3‡
Starvation								
Yes, n=30	4.3	2.3*	3.4	0.9*	0.21	-0.23, 0.65**	0.32	-0.19, 0.69**
No, n=97	2.9	2.3*	3.0	0.9*	0.61	0.19, 0.95**	0.67	0.33, 0.89**
Sarcopenia								
Yes, n=75	3.5	2.3	3.3	0.9	0.29	-0.19, 0.76**	0.36	-0.07, 0.75**
No, n=97	2.9	2.3	3.0	0.9	0.61	0.19, 0.95**	0.67	0.33, 0.89**
Cachexia								
Yes, n=37	3.6	2.3	3.3	1.0	0.27	-0.14, 0.72**	0.39	0.04, 0.84**
No, n=97	2.9	2.3	3.0	0.9	0.61	0.19, 0.95**	0.67	0.33, 0.89**

GDS, geriatric depression scale; AMPS, assessment of motor and process skills
†Activities of Daily Living motor score; ‡Activities of Daily Living process score; *Independent samples t-test (p<0.05); **Mann Whitney U test (p<0.05)

Table 5. Comparisons of selected rehabilitation outcomes between sub-categories of wasting conditions

	GDS		Self-rated health Q1		AMPS			
	Mean	SD	Mean	SD	Median†	Q1, Q3 †	Median‡	Q1, Q3‡
Sarcopenia only								
Yes, n=28	3.1	2.3	3.3	0.9	0.32	-0.43,0.86	0.33	-0.15, 0.74*
No, n=97	2.9	2.3	3.0	0.9	0.61	0.19, 0.95	0.67	0.33, 0.89*
Sarcopenia only plus starvation								
Yes, n=38	3.4	2.3	3.3	0.9	0.32	-0.38, 0.84	0.27	-0.16, 0.73*
No, n=97	2.9	2.3	3.0	0.9	0.61	0.19, 0.95	0.67	0.33, 0.89*
Sarcopenia only plus cachexia								
Yes, n=45	2.9	2.2	3.2	0.9	0.35	-0.18, -0.85	0.40	-0.07, 0.78*
No, n=97	2.9	2.3	3.0	0.9	0.61	0.19, 0.95	0.67	0.33, 0.89*
Sarcopenia in total								
Yes, n=75	3.5	2.3	3.3	0.9	0.29	-0.19, 0.76*	0.36	-0.07, 0.75*
No, n=97	2.9	2.3	3.0	0.9	0.61	0.19, 0.95*	0.67	0.33, 0.89*

GDS, geriatric depression scale; AMPS, assessment of motor and process skills
†Activities of Daily Living motor score; ‡Activities of Daily Living process score; *Mann Whitney U test (p<0.05)

40% which is consistent with a prevalence range of 20% (for those aged 60-69 years) to ~50% (for those aged over 75 years) reported in a recent review.[36] With a mean age of 77 (8) years, our sample fits within this age-appropriate range. It is noteworthy that all of those identified as starving or cachectic were included in our sarcopenic group, possibly due to the loss of muscle mass and strength known to occur with age.[37]

To our knowledge, this is the first study to report on the prevalence of cachexia amongst an older adult population. This analysis found that 1 in 5 study participants were cachectic. While there is currently no validated definition for cachexia, a recent consensus definition includes an indication that underlying illness is required for a diagnosis of cachexia.[21] Therefore, given that all subjects had recently undergone an acute hospital admission it is not unexpected that we would detect a considerable number of cachectic individuals in our sample.

It was interesting to note that physical function was worse for those who were classified as having any of the three wasting conditions. This is also consistent with the "malnutrition" literature which reports that rehabilitation patients at risk of malnutrition/malnourished, as defined by the MNA, have poorer physical function.[38,39] The association with reduced physical function was maintained when the wasting conditions were further subdivided to minimise overlap, with no other significant results found. In contrast, starvation was the only wasting condition to demonstrate a relationship with depression and self-rated health. The cross-sectional nature of this study prevents establishment of the direction of this association. It is not necessarily starvation causing depression/poor self-rated health but may be depression/poor self-rated health which are causing reduced dietary energy and protein intake and subsequently causing starvation. This speculation is supported with evidence that poor self-rated health can cause depression, and depression is in turn a risk factor for poor nutritional status.[40,41]

There are a number of limitations which should be considered in the interpretation of the results from this study. As the analyses were conducted on data from participants from an RCT the results may be biased and unrepresentative of the wider population because of the eligibility criteria of the RCT and refusal of some eligible patients to participate. Our previous study however does report a high eligibility and consent rate of 89% and 86% respectively.[11] Furthermore, the prevalence of wasting conditions in the general population could potentially be higher than that found in this investigation as those individuals who were more unwell may have been less likely to be eligible or to consent for the rehabilitation RCT. There is controversy around definitions of wasting conditions and

we acknowledge that there may be concerns around the measures we chose to include in this analysis, however this study reports on data collected as part of a previous RCT, hence possible analyses were restricted to the variables available. The proxy measures utilised in this study are in themselves validated measures however are not necessarily those that were reported in the recent publications proposing consensus definitions for starvation, sarcopenia and cachexia.[21,32,42,43] It is important to understand however that the consensus definitions developed for identification of, and differentiation between, wasting conditions, are yet in themselves to be comprehensively validated and operationalised. Despite the limitations, this is the first study, to our knowledge, to attempt to quantify diagnostic groups for wasting in a single group of older adults and therefore address an important gap in the literature.

In conclusion, this analysis provides evidence of difficulties in the diagnosis of wasting and the potential level of misdiagnosis of individual wasting conditions. It seems plausible that any inconsistency of effect from provision of nutritional support alone may be due, at least in part, to misdiagnosis of the category of wasting. Failure to respond to increased caloric intake should prompt clinicians to reconsider their course of treatment. The authors do not propose that nutritional support is futile in all wasting conditions but that sarcopenia and cachexia may require additional therapy, supplementary to existing strategies, to combat unintentional weight loss. It is recommended that work be conducted to validate the consensus definitions for starvation, sarcopenia and cachexia so that clearly defined diagnostic criteria can be established and validated, and further research undertaken into effective interventions.

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AUTHOR DISCLOSURES

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Original Article

The complexity of treating wasting in ambulatory rehabilitation: is it starvation, sarcopenia, cachexia or a combination of these conditions?

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治理非卧床復康中消瘦病人的複雜性：是飢餓，老年肌肉衰減症，惡病質或以上綜合情況

非卧床復康中病人的營養狀況多有受損。消瘦情況可分類為飢餓性、老年肌肉衰減症或惡病質。然而此等分類之區別不甚明確，錯誤診斷下可導致不恰當的調理。本文就 187 名年齡為 60 歲或以上的非卧床復康中病人的之數據作進一步分析，旨在識別其中患有一種或多種消瘦情況的病人，並探討其對於一般復康指標之影響。用於界定飢餓的標準為無脂肪體重指數及食慾評估量表(Council on Nutrition Appetite Questionnaire)的得分；老年肌肉衰減症以無脂肪體重指數及四頭肌力量來評定；惡病質則根據無脂肪體重指數及血清 C-反應蛋白。本研究根據幾項擬定的復康指標，就患有一種或多種消瘦狀況與沒有消瘦狀況的病人作出比較。被判斷為飢餓的消瘦病人(n=30)，全數均患有老年肌肉衰減症，而其中有 20 名病人亦同時有惡病質的情況。被判斷為患老年肌肉衰減症的消瘦病人(n=75)當中，30 名有飢餓的情況，37 名有惡病質的情況。被判斷為惡病質的消瘦病人中(n=37)，有 20 名有飢餓的情況，並全數患有老年肌肉衰減症。同時存在三種狀況的病人則有 20 名。與沒有消瘦徵狀的病人相比，飢餓病人的抑鬱程度較高(p=0.003)，病者自我健康評估較差(p=0.032)，身體機能亦較差(動作 p=0.006；程序 p=0.004)。患有老年肌肉衰減症的病人中，其身體機能亦較差(動作 p=0.012；程序 p=0.003)。患有惡病質的病人亦如是(動作 p=0.025；程序 p=0.042)。研究結果示意，要於門診臨床環境下作出消瘦狀況的界定，會有困難。本次分析顯示，分類時會有所重疊，故百分之四十的消瘦病人(75/187)有可能被錯誤診斷，從而被處方不恰當的營養輔助。

關鍵字：消瘦、飢餓、老年肌肉衰減症、惡病質、年老者