

Review Article

Clinical Nutrition for an Ageing PopulationMark L Wahlqvist¹⁻³, Meei-Shyuan Lee⁴

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Abstract

The application of clinical nutrition to ageing populations requires the development of a high degree of multidisciplinary with its related scholarship and skills. Clinical Nutrition is the prevention, diagnosis and management of nutritionally-related health problems (NRHP) by qualified health care practitioners. It may be practised by those specialised in it or in the course of work from primary to tertiary health care, in various major (*e.g.*, internal medicine, surgery, obstetrics & gynecology, and psychiatry) disciplines and in sub-specialties and for various age groups, notably children (paediatrics) and the elderly (geriatrics). With population ageing, the field of geriatric nutrition has grown. Its underpinning science and scholarship require contributions from ageing biology, the medical sciences, epidemiology, sociology, and bioethics; it must also be coordinated with the food system to ensure food security; its practitioners need an intimate knowledge of communities and households. It may be considered in several domains *Geriatric Nutritional Epidemiology, Preventive geriatric nutrition, Diagnostic geriatric nutrition, Management geriatric nutrition- care, therapeutics, palliation and Nutrition and Ageing Economics and Community Geriatric Nutrition*. Effective geriatric nutrition is a team and community endeavour.

KEY WORDS: nutrition, aging, geriatrics, health promotion, community health

The Nature of Clinical Nutrition

Clinical Nutrition is the prevention, diagnosis and management of nutritionally-related health problems (NRHP) by qualified health care practitioners¹⁾. NRHP can be classified as “Disorders affecting food or nutrient intake”, “Body composition disorders”, “Nutritionally dependent disorders”, and “Nutritionally responsive disorders”.

Clinical Nutrition may be practised by those specialised in it or in the course of work from primary to tertiary health care, in various major (*e.g.*, internal medicine, surgery, O&G and psychiatry) disciplines and in sub-specialties and for various age groups, notably children (paediatrics) and the elderly (geriatrics).

Geriatric Nutritional Epidemiology

Proportionately and absolutely, elders are increasing worldwide, partly because of increased life expectancy and partly because of decreased fertility. The relatively new phenomenon for the human species is that life expectancies are increasing not just from birth, but within later life. In many countries, over the last 30-40 years, life expectancies have been increasing at an astonishing 1 year in every 3-4 years, or some 10-16 years in all during that period. Although the proportions of populations 65 years and over are greatest in developed economies like those of Japan, Scandinavia, the Netherlands, and Australia, numerically they are greatest in the developing world²⁾. This poses a considerable potential demand on public health and clinical nutrition resources which must be met as the younger work-force either shrinks or has compromised health and nutrition status³⁾.

But, if disability in later life can be minimised and productivity continued, perhaps in more socially relevant terms, the concerns about a dependent elderly population may be less well-founded⁴⁾. There is good evidence that Disability Adjusted Life Expectancies (DALES) are increasing in some societies which means that disability is being compressed towards the end of life, when most health costs are incurred⁵⁾. This provides

some optimism that physical and mental impairment among older people as a group may be lessened.

Nevertheless, dependency and institutional care tend to be greater with age and it is important to recognise the reasons for this. While cardiovascular disease and cancer still dominate the causes of death in developed economies, chronic lung disease, respiratory infection, diabetes, injury, accidents and suicide, neurodegenerative disease (notably dementia and Parkinsonism), musculo-skeletal disease, falls and fractures, multisystem disease and organ failure play a major role in morbidity and mortality. Almost all of these have nutritional factors in their pathogenesis⁶⁾. They are summarized in *Table 1*.

Table 1 Major Health Problems of Later Life & the Extent of Nutritional Relationship Indicated by Number of Asterisks (*)

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- Frailty***
 - sarcopenia, resilience, response times, musculo-skeletal
 - Mobility**
 - Independent living**
 - Falls**
 - Cardio respiratory function***
 - Incontinence*
 - Cognitive Impairment**
 - Climate adaptability- thirst, temperature**
 - Multisystem failure**
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For clarification, urinary incontinence may be exacerbated by problems of water and electrolyte balance and its management; faecal incontinence may accompany various disorders of gut motility and health. Patients may seek to reduce the inconvenience of incontinence by reduced fluid intake which presents added risk where thirst is impaired.

Frailty is linked to a range of underlying functional disorders, but especially of loss of muscle mass and strength (sarcopenia) which may occur in the face of overfatness or obesity. Weight loss in the aged is a poor prognostic sign and may be quite complex in body compositional terms and in regard to energy balance and regulation⁷⁾. But it may be assessed by simple questions (like chewing) and anthropometric measurements.

The emerging field of geriatric clinical nutrition is that of climate adaptability- evidenced in diminished thirst appreciation and the inadequate response to higher temperatures and dehydration. Natural disasters, which are increasing, like typhoons, cyclones and hurricanes, drought and floods, fires and earthquakes (related to atmospheric pressure change and its effects on tectonic plate movement) affect the elderly more than their younger counterparts. The infrastructural damage of natural disasters like the failure of water, power, communication and health services disproportionately affect the aged and their food security.

The International Union of Nutritional Sciences (IUNS) Food Habits in Later Life (FHILL) project showed that “diet, particularly the Mediterranean diet, operates irrespective and together with other factors as an appreciable contributor to survival, with strength comparable to or greater than all other measured variables. The independence and strength of the predictiveness of food pattern for survival, and for this to be cross-cultural from Europe to Asia is an important [basis of] food and health policy”⁸⁾. While there are dietary patterns in common for enhancing elderly survivorship, these are consistent with a range of food cultures associated with

longevity. It is of food cultural advantage if cross-cultural approaches can be accommodated in public health and clinical nutrition approaches.

Preventive geriatric nutrition

This must anticipate NRHP and minimise their eventuality, largely through life-course and, even inter-generational approaches to various forms of fitness, physical, metabolic, cognitive and mental and social while developing personal networks and healthy localities for this course.

Diagnostic geriatric nutrition

The diagnostic process must give prominence to cultural, family and personal history, including that to do with food, activity and substance abuse, accommodation and personal or household resources (monetary and other); understand the purported and actual problem, have a high index of suspicion for blunted physiological and stress responses (e.g., thirst, taste, fever, immune, cardio-respiratory), take into account the trend towards frailty (including sarcopenia, strength), incontinence, recurrent infection, multiple organ dysfunction, especially cognitive impairment, multiple pharmacotherapy, and mood change; document food acquisition capability, its storage, ability and capacity to prepare food.

The Mini Nutritional Assessment, MNA, which is a commonly used Clinical Geriatric Nutrition assessment tool to identify nutritional problems among the aged and has 2 question clusters, A-F for screening and, if the first cluster indicates possible malnutrition, a second set, G-R (including arm and calf circumference), which provides more definition of nutritional status (*Table 2*)⁹⁾.

Increasingly, a high index of suspicion is now required for some increasingly frequent NRHP among the aged, additional to those already identified:

- Food pattern errors: e.g., limited diversity with missing fruit, vegetables, legumes and whole grain intakes and of small quantities of animal-derived foods like eggs, fish, dairy^{10,11)}. There is a 7% – 8% reduction in mortality hazard ratio for every 20 g increase in daily legume intake with adjustment for location/ ethnicity¹⁰⁾.
- Physical Inactivity: e.g., need for regular walking or tai-chi or other exercise for balance, strength and aerobic fitness. (It is difficult to achieve an adequate intake of nutritious food components without sufficient physical activity)
- Sarcopenic obesity with poorly recognised muscle and bone loss; ask about weight loss and chart trend.
- Vitamin D deficiency with effects not only on bone density, but also on muscle strength, immunodeficiency, metabolic disorders like pre-diabetes, increased risk of certain cancers (e.g., breast) (*Fig. 1*). Vitamin D sufficiency depends on sunlight and/or animal-derived foods or sun-dried fungi (to convert ergosterol into ergocalciferol). Caution is required about the method to achieve sufficiency in those prone to or living in localities with high rates of actinic damage and skin cancer¹²⁾. Vitamin D status deteriorates and falls and

Table 2 Screening by Mini Nutritional Assessment (MNA)

Screening	Assessment
A. Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties? 0 = severe decrease in food intake 1 = moderate decrease in food intake 2 = no decrease in food intake	G. Lives independently (not in nursing home or hospital) 0 = no 1 = yes
B. Weight loss during the last 3 months 0 = weight loss greater than 3kg (6.6 lbs) 1 = does not know 2 = weight loss between 1 and 3kg (2.2 and 6.6 lbs) 3 = no weight loss	H. Takes more than 3 prescription drugs perday 0 = no 1 = yes
C. Mobility 0 = bed or chair bound 1 = able to get out of bed / chair but does not go out 2 = goes out	I. Pressure sores or skin ulcers 0 = no 1 = yes
D. Has suffered psychological stress or acute disease in the past 3 months? 0 = yes 2 = no	J. How many full meals does the patient eat daily 0 = 1 meal 1 = 2 meals 2 = 3 meals
E. Neuropsychological problems 0 = severe dementia or depression 1 = mild dementia 2 = no psychological problems	K. Selected consumption markers for protein intake status • At least one serving of dairy products (milk, cheese, yogurt)per day yes no • Two or more servings of legume or eggs per week yes no • Meat, fish or poultry every day yes no 00 = if 0 or 1 yes 0.5 = if 2 yes 1.0 = if 3 yes
F. Body Mass Index (BMI) (weight in kg) / height in m2) 0 = BMI less than 19 1 = BMI 19 to less than 21 2 = BMI 21 to less than 23 3 = BMI 23 or greater	L. Consumes two or more servings of fruits or vegetable per day? 0 = no 1 = yes
Screening score (subtotal max. 14 points)	M. How much fluid (water, juice, coffee, tea, milk...) is consumed per day? 00 = less than 3 cups 0.5 = 3 to 5 cups 1.0 = more than 5 cups
12 points or greater: normal – not at risk – no need to complete assessment 11 points or below: possible malnutrition – continue assessment	N. Mode of feeding 0 = unable to eat without assistance 1 = self-fed with some difficulty 2 = self-fed without any problem
	O. Self view of nutritional status 0 = views self as being malnourished 1 = us uncertain of nutritional state 2 = views self as having no nutritional problem
	P. In comparison with other people of the same age, how does the patient consider his/her health status? 0.0 = not as good 0.5 = does not know 1.0 = as good 2.0 = better
	Q. Mid-arm circumference (MAC) in cm 0.0 = MAC less than 21 0.5 = MAC 21 to 22 1.0 = MAC 22 or greater
	R. Calf circumference (CC) in cm 0 = CC less than 31 1 = CC 31 or greater
	Assessment (max. 16 points) Screening score Total assessment (max. 30 points)
	Malnutrition Indicator Score 17 to 23.5 points at risk of malnutrition Less than 17 points malnourished

Based on “Vellas B, Villars H, Abellan G, Soto ME, Rolland Y, Guigoz Y, et al. Overview of the MNA--Its history and challenges. J Nutr Health Aging. 2006;10:456-63.”

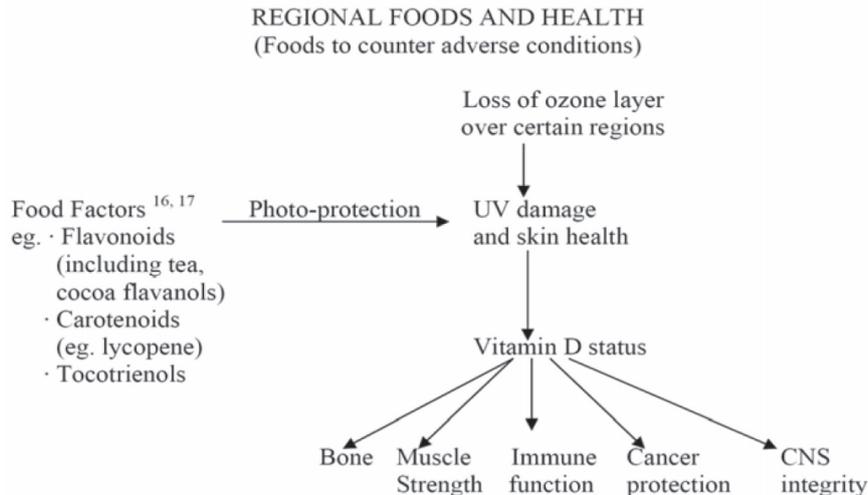


Fig. 1. Vitamin D, the environment and health ¹²⁾

fractures increase in winter with its shorter days, but this can be offset by vitamin D supplements.

Management geriatric nutrition- care, therapeutics, palliation

To achieve as good outcomes as possible, practitioners must work in concert with others in the caring role, especially in regard to food or food supplement providers (*e.g.*, meals-on-wheels, neighbours, relatives, institution); be aware of nutritious, palatable and affordable food products; seek opportunities to minimise costly and risky pharmacotherapy by use of food strategies; and introduce palliative methods as appropriate so that dignity and comfort are possible (*e.g.*, attend to hydration mouth and airway care in the dying patient).

Nutrition Economics

Economic factors are an inevitable adjunct to geriatric care plans and have a particular reference to nutrition. This may be because older people often have marginal financial means with needs which compete with expenditure on food, have ongoing responsibilities, including those of food, to others, are sometimes carers for their grandchildren, have special food needs themselves and have to cope with limited, possibly more costly, shopping arrangements and alternatives, along with difficulties in storage and with food preparative facilities. It may also be necessary to contend with social safety nets of varying adequacy ¹³⁻¹⁵⁾.

Community Geriatric Nutrition

There is a strong case to be made for familiar surroundings and established social networks to be part of independent living insofar as possible with advancing age ¹⁴⁻¹⁶⁾. These surroundings inevitably involve the local food system, home gardens, shopping, food storage, cooking and commensality or food sharing ¹⁷⁾.

As with most community-based approaches to nutrition and health, most familiar for mothers and children, women play a crucial role ¹⁸⁾ especially through home gardens ¹⁹⁾, depending in turn on education ²⁰⁾, and with prospects of more favourable health ²¹⁾. Older women and grandmothers often contribute to this food and health advantage ¹⁸⁾. There is some evidence that grandmothers play a particular role in the future health of their grandchildren, beyond their reproductive years (the grandmother hypothesis). These findings draw attention to the value of the NRH of women to the whole community.

Integrated Food and Health systems for ageing populations

Healthy Ageing as a preferred life outcome depends on integrated approaches between the food, health, education, communication, financial, legal and other infrastructural systems to achieve the

- **Longest life expectancy** with the
- **Least disability** and
- **Best quality of life (QOL)**

Intersectoral cooperation should also enable healthy ageing to be more affordable and sustainable. In so doing it should be possible to pursue dignity and functionality until as near to death as possible.

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