Ensuring Good Nutrition for Vulnerable Population Groups such as Elderly and Hospitalized Individuals in Affluent Societies

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Key messages

• Micronutrient deficiencies are well established in the developing world, but a growing body of evidence indicates that they exist in the developed world too.

• Life expectancy for populations around the world continues to grow, but the last decade of life is often compromised by the burden of partially preventable health issues.

• Healthy ageing is essential if the elderly are to remain independent and play an integral role in society.

• Micronutrient deficiencies and insufficiencies within vulnerable populations in the developed world have serious health and economic consequences.

• The same level of attention that is currently given to overnutrition should be given to undernutrition and appropriate changes made to public health policies and programs.

The Lady with the Lamp

“Every careful observer of the sick will agree in this that thousands of patients are annually starved in the midst of plenty, from want of attention to the ways which alone make it possible for them to take food. This want of attention is as remarkable in those who urge upon the sick to do what is quite impossible to them, as in the sick themselves who will not make the effort to do what is perfectly possible to them. For instance, to the large majority of very weak patients it is quite impossible to take any solid food before 11 A.M., nor then, if their strength is still further exhausted by fasting till that hour. For weak patients have generally feverish nights and, in the morning, dry mouths; and, if they could eat with those dry mouths, it would be the worse for them.”

So wrote Florence Nightingale, the founder of modern nursing, in 1898. The words of “The Lady with the Lamp”, who began to revolutionize nursing through her management of British field hospitals during the Crimean War of 1853–56, have a troublingly topical ring.
Even in the developed world, an increasing number of people consume nutrient-poor food on a regular basis. Recent surveys in Western countries consistently indicate inadequate intake of nutrients such as vitamins and minerals, compared to recommendations. Especially at risk are elderly people in institutions such as hospitals and nursing homes, whose access to good nutrition is frequently compromised by a multiplicity of factors. These include a phenomenon known as the “anorexia of ageing,” which can be aggravated by the negative effects of nutrient-drug interactions. As the average age of populations in affluent societies increases, this is becoming a growing problem, creating unnecessary human suffering while at the same time driving up the overall costs of medical and residential care. Solutions exist, in terms of nutrition science on the one hand and care management systems on the other, but a significant effort is required to translate this potential into effective public health policies and programs that will support long-term national and global health, economic productivity and stability, and societal resilience.

Figure 1 | Global vitamin D map

The return of vitamin D deficiency diseases

According to the International Osteoporosis Foundation’s (IOF) latest figures, approximately 88% of the world’s population does not have an optimal vitamin D status. This lack is leading to the return of a number of diseases that characterized the Victorian era, such as tuberculosis, scarlet fever and rickets. The lame and sickly child Tiny Tim, for instance, from Charles Dickens’s 1843 novella *A Christmas Carol*, has recently been diagnosed as suffering from both TB and rickets.

As cholecalciferol (vitamin D3), vitamin D is synthesized in the skin by the action of ultraviolet light on 7-dehydrocholesterol; it is also present in a small number of foods, most notably fatty cold saltwater fish such as sardines and mackerel. The return of the bone deficiency disease rickets among young people has been associated with lack of exposure to sunlight – a trend attributable partly to an excess of sedentary indoor activities among this age group and partly to the extensive use of UV sun screens to protect against sunburn.

Table 1 | Vitamin D deficiency/insufficiency

<table>
<thead>
<tr>
<th>Area of operation of vitamin D</th>
<th>Consequences of deficiency/insufficiency</th>
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<tbody>
<tr>
<td>Musculo-skeletal system</td>
<td>• Falls and fractures</td>
</tr>
<tr>
<td>Immune system</td>
<td>• Infections</td>
</tr>
<tr>
<td></td>
<td>• Allergies</td>
</tr>
<tr>
<td></td>
<td>• Tumors</td>
</tr>
<tr>
<td>Endocrine system</td>
<td>• Type I diabetes</td>
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<tr>
<td></td>
<td>• Type II diabetes</td>
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<tr>
<td>Circulatory system</td>
<td>• Hypertension</td>
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<tr>
<td></td>
<td>• Stroke</td>
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<tr>
<td></td>
<td>• Heart attack</td>
</tr>
<tr>
<td>Nervous system</td>
<td>• Multiple sclerosis</td>
</tr>
<tr>
<td></td>
<td>• Depression</td>
</tr>
<tr>
<td></td>
<td>• Alzheimer’s disease</td>
</tr>
</tbody>
</table>

Source: Armin Zittermann, Vitamin D Case: Status and impact on healthcare costs. Presentation delivered at University Medical Center Groningen, Netherlands, as part of the symposium “A Century of Vitamins,” April 3-4, 2012.

Inadequate levels of vitamin D also have a significant effect on elderly patients. In 2012, it was estimated that the provision of vitamin D supplementation to people aged over 65 in Europe would lead to net healthcare cost savings of EUR 10.5 billion per year.

Though vitamin D deficiency is best known and researched in elderly and in particular hospitalized or institutionalized populations it should be mentioned that micronutrient deficiencies in this group are not limited to vitamin D.

“Healthy Ageing”

According to the World Health Organization (WHO), by 2050 the proportion of the global population over the age of 60 years will double from its 2000 figure, rising from c. 11% to 22%. Although this may be interpreted as a success story for public health policies and socioeconomic development, it also challenges societies to address the social, economic and health issues of ageing and age-related conditions.

Healthy ageing is key if older people are to remain independent and play an integral part in society. (“Healthy” refers to physical, mental, and social wellbeing as indicated in the WHO definition of health.) Lifelong health promotion, with a clear emphasis on the fundamental role of nutrition and micronutrients to reduce risks of chronic conditions and disability, may prevent or delay the onset of several non-communicable diseases. One example for such an initiative in the European Union is the European Innovation Partnership on Active and Healthy Ageing, which aims to increase the average healthy lifespan by two “healthy” years by 2020.

In the long-term, inadequate micronutrient intake can lead to chronic micronutrient undernutrition and consequent health problems, including lower resistance to development of chronic disease thus reducing health span and longevity. Micronutrient deficiencies (MNDs) are particularly harmful during pregnancy and early childhood due to their impact on the physical and cognitive development of children. Micronutrient requirements also have to be adjusted later in life – for example, to accommodate the specific micronutrient requirements of the elderly and those living in particular settings such as hospitals and institutions.
When you ask advocates why they become champions of a cause, it is usually because of some personal wake-up call. They, or someone close to them, has privately suffered from the condition they are now publicly fighting for. By this rule of thumb, we all should be nutrition champions. That is because every country has a serious public health problem and one in every three people is affected worldwide.

What is malnutrition? It’s all around you. It’s your friend’s baby who just won’t grow properly through lack of the right kind of feeding and care; it’s your exhausted mother who does not have enough vitamins and minerals coursing through her veins; it’s your father’s blood pressure that is too high because of too much salt; it’s your sibling who has diabetes because of too much sugar; it’s your friend who cannot walk up the stairs to your apartment because his joints scream out in pain from carrying too much bodyweight because of an imbalanced diet and too little exercise.

It is too many early graves and it is too much lost potential.

Source: Lawrence Haddad, Senior Research Fellow in the International Food Policy Research Institute’s Poverty Health and Nutrition Division, Huffington Post, September 16, 2015
Malnutrition in hospitalized patients

Clinical surveys in hospitalized patients continue to show an unacceptable high frequency of undernutrition from all over Europe. In the words of the Committee of Experts on Nutrition, Food Safety and Consumer Protection, Council of Europe: “There are many adverse consequences of disease-related undernutrition. The patient becomes apathetic and depressed, and this may lead to loss of morale and loss of will to recover. Inability to concentrate means that the patient cannot benefit from instructions about techniques needed for self-care. A general sense of weakness impairs appetite and ability to eat. The respiratory muscles are weakened, making it difficult to cough and expectorate effectively, with increased risk of lung infection. Impaired ventilatory drive may also make it difficult to wean a critically ill patient from a ventilator. Cardiac function is impaired, with reduced cardiac output and risk of heart failure. Gastrointestinal function and structure is injured. Mobility is reduced, delaying recovery and predisposing to thromboembolism and bedsores. The undernourished patient develops impaired resistance to infection, which in turn can worsen nutritional status. Undernutrition, in combination with disease, is thus an insidious factor which prolongs recovery, increases the need for high-dependency nursing care and sometimes intensive care, increases the risk of serious complications of illness and, at its worst, leads to death either from a preventable complication or from malnutrition. To all this is added the reduced quality of life of the patients.”

The consequences of malnutrition in hospital patients are therefore highly ramified, although not always immediately evident. An inadequate diet in patients whose health may already be compromised by a variety of factors not only increases individual suffering but also greatly increases the costs of attempting to return that individual to a state of relative health and wellbeing. Longer stays in hospital, higher prescription rates and increased demands on medical and nursing staff are just some of the more obvious consequences of inadequate nutrition.

Malnutrition in elderly patients

The elderly are at increased risk of developing both protein-calorie malnutrition and vitamin and mineral deficiencies. The frequency of undernutrition increases with advancing age due to problems such as poor dentition, loss of taste, difficulty swallowing and malabsorption. Drug-nutrient interaction is also a major factor, as many elderly people are on medication, and the actions of numerous active pharmaceutical ingredients can interfere with the body’s ability to digest and utilize such nutrients as are ingested.
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Table 2 | Drug-nutrient interaction

<table>
<thead>
<tr>
<th>Drug</th>
<th>Reduced nutrient availability</th>
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<tbody>
<tr>
<td>Alcohol (regular consumption &gt; 2 units)</td>
<td>Zinc, vitamins A, B, B, folate, vitamin B&lt;sub&gt;12&lt;/sub&gt;</td>
</tr>
<tr>
<td>Antacids</td>
<td>Vitamin B&lt;sub&gt;12&lt;/sub&gt;, folate, iron, total kcal</td>
</tr>
<tr>
<td>Antibiotics, broad-spectrum</td>
<td>Vitamin K</td>
</tr>
<tr>
<td>Digoxin</td>
<td>Zinc, total kcal (via anorexia)</td>
</tr>
<tr>
<td>Diuretics</td>
<td>Zinc, magnesium, vitamin B&lt;sub&gt;6&lt;/sub&gt;, potassium, copper</td>
</tr>
<tr>
<td>Laxatives</td>
<td>Calcium, vitamins A, B, B, D, E, K</td>
</tr>
<tr>
<td>Lipid-binding resins</td>
<td>Vitamins A, D, E, K</td>
</tr>
<tr>
<td>Metformin</td>
<td>Vitamin B&lt;sub&gt;12&lt;/sub&gt;, folate / Vitamin C, folate</td>
</tr>
<tr>
<td>Phenytoin / Salicylates</td>
<td>Vitamin D, folate / Vitamin C, folate</td>
</tr>
<tr>
<td>SSRIs (Selective serotonin reuptake inhibitors)</td>
<td>Total kcal (via anorexia)</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>Folate</td>
</tr>
</tbody>
</table>

Source: James T. Birch, Jr., Assistant Clinical Professor – Dept. of Family Medicine, Division of Geriatric Medicine, Landon Center on Ageing Kansas University Medical Center, 2007.

Figure 3 | Healthy Ageing

Source: Adaptation of World report on ageing and health: http://apps.who.int/iris/bitstream/10665/186463/1/9789240694811_eng.pdf?ua=1
Figure 4 | Disease-related malnutrition: Clinical and economic consequences

In Europe: 33 million people*  

Source: Health Economics and (Disease-Related) Malnutrition: The Economic value of medical nutrition, Karen Freyer, University of Maastricht, 2013

In Europe: €170 billion per year*

Source: Health Economics and (Disease-Related) Malnutrition: The Economic value of medical nutrition, Karen Freyer, University of Maastricht, 2013

These (patho)physiological considerations are compounded by a range of practical factors. Elderly people may be less mobile than their younger counterparts, and may experience difficulty walking, driving or carrying shopping. They may be dependent on others for the purchasing and preparation of food, and their purchasing power itself may be limited, forcing them into a narrow range of buying choices. The challenges of shopping for food and preparing it in the home may encourage them to purchase non-perishable, processed foods, which are frequently high in sodium and nitrates and concomitantly low in vitamins.

Even if nutritious food is readily available, the ability of the elderly to consume it may be compromised by a variety of physical limitations. Oral health problems such as poor teeth, ulcers or dry mouth may make it difficult to masticate properly, and may lead to the conscious avoidance of certain nutritious foods. Changes in the senses of taste and smell that may result from illness and age, as well as from the effect of certain drugs and also radiation therapy, may make certain foods unattractive, or may diminish the individual’s appetite. Appetite loss may also be caused by a reduction in physical activity resulting directly from the increased immobility caused by age-related conditions such as arthritis, osteoporosis, sciatica and heart disease. Depression, social isolation and other mental health conditions may also play their part, as may dementia and alcohol or substance abuse. Last but not least, a limited understanding of the importance of good nutrition, and of how to obtain it from the diet, may play a role. For many reasons, a vicious spiral may be initiated, whereby poor diet hampers physical and mental capacity, thus further limiting the individual’s capability to access the nutrients that would help that individual to reverse the direction of the spiral.

The anorexia of ageing

Ageing is associated with a wide range of physical changes, including reduction in bone mass, lean mass, and water content, accompanied by an increase in body fat. This may be accompanied by a decline in the function of one or more organs. This loss of physical robustness may lead to a phenomenon known as the “anorexia of ageing,” whereby the feedback loops in the elderly person’s brain may falsely signal satiety or turn off the stimulation for hunger. The anorexic signals come to predominate over the central feeding drive.
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How to prevent malnutrition in hospitals

John E Thomas and David R Morley have observed that: “Nutritional intervention holds the promise of mitigating the growing burden of chronic disease and disability and improving the quality of life of the rapidly growing older population”. The Committee of Experts on Nutrition, Food Safety and Consumer Protection list five major factors, common for Europe, that seem to be the major barriers for proper nutritional care in hospitals, and propose remedies for each of them.

Lack of clearly defined responsibilities in planning and managing nutritional care

The responsibilities of staff categories and the hospital management with respect to procuring nutritional care should be clearly assigned. This means that standards of practice for assessing and monitoring nutritional risk/status of the patient should be developed at a national level, and the responsibility of each task clearly assigned. The responsibility of the hospital with regard to the nutritional care and support of the patient should not be limited to the hospital stay.

Lack of sufficient educational level with regard to nutrition among all staff groups

A general improvement in the educational level of all staff groups is needed. Specifically, a continuing education program on general nutrition and techniques of nutritional support for all staff involved in the nutritional care of patients should be available with focus on the nutritional training of the non-clinical staff members, and the definitions of their area of responsibility.

Lack of influence and knowledge of the patients

The provision of meals should be individualized and flexible, and all patients should have the possibility to order food and extra food – and be informed about this possibility. Also, patients should be involved in planning their meals and have some control over food selection. This should include the possibility of immediate feedback from the patients’ likes and dislikes of the served food – and the use of this feedback to develop appropriate, target group specific menus. Patients should be informed of the importance of good nutrition for successful treatment prior to admission and at discharge.

Lack of co-operation between different staff groups

The hospital managers, physicians, nurses, dieticians and food service staff should work together toward the common goal: optimal nutritional patient care – and the hospital management should give priority to co-operation, e.g., by initiating organizational research to optimize co-operation. Also, organized contact between the hospital and the primary healthcare sector should be established.

Lack of involvement from the hospital management

The provision of meals should be regarded as an essential part of the treatment of patients, and not as a hotel service. The hospital management should acknowledge responsibility for food service and the nutritional care of the patients, and give priority to food policy and management of food services. The hospital managers should take account of the costs of complications and prolonged hospital stay due to undernutrition when assessing the cost of food service.


The relationship between NCDs and declining cognition and wellbeing in later life

Physical functioning of older adults has improved from the 1980s onwards, and common diseases such as arthritis have become less disabling. In contrast, prevalence rates of chronic health conditions (e.g., cardiovascular diseases, cancer) and multimorbidity, both associated with compromised wellbeing, are higher among later-born cohorts. In light of these conflicting findings, indicators of health should be taken into account when examining secular trends in cognition and wellbeing.

Methods of nutritional support

The different methods of nutritional support are:

• Oral nutritional support: this comprises nutritional guidance, assistance during eating, provision of fortified food, and oral nutritional supplements some of which are reimbursed.

• Enteral nutritional support

• Parenteral nutritional support, only when the gastrointestinal tract is not functional or the patient is not capable of ingesting food.

The nutritional assessment should include a simple dietary interview of the elderly person or of his/her relatives, to establish whether the person has a varied diet, rich in fruit and vegetables, and if he/she eats protein-containing foods (meats, fish, eggs) regularly. It is also recommended to evaluate the daily fluid intake. In malnourished elderly subjects or when there is a risk of malnutrition, not only should nutritional management be provided, but identified risk factors should be corrected, by proposing for example:

• Technical or human assistance during meals

• Oral and dental care

• A reassessment of the appropriateness of medication and diets

• Management of any underlying diseases.

Nutritional support is all the more effective when it is implemented early.

Source: Nutritional support strategy for protein-energy malnutrition in the elderly, Clinical Practice Guidelines, Haute Autorité de Santé (French National Authority for Health), France, April 2007, slightly adapted.
Figure 5 | A public-health framework for Healthy Ageing: opportunities for public-health action across the life course

Source: Adapted from WHO World Report on Health Ageing: http://apps.who.int/iris/bitstream/10665/186463/1/9789240694811_eng.pdf?ua=1
My personal view

Peter Weber

Nutrition is very complex, as it comprises a mixture of nutrients acting in concert and dependent on one another. Recent scientific insights have significantly increased scientific and medical understanding of the role and relevance of the various constituents of the diet, and an increasing level of significant scientific agreement exists about the importance of an appropriate level of macronutrient and micronutrient intake throughout the course of life to support growth, foster health, and prevent the onset of disease. In addition, it is important to realize that micronutrient inadequacies are also a fact in “Western-type” societies and are a growing problem as life expectancy in these societies increases.

Recent changes in lifestyle and eating patterns, along with increasing dependency on pre-cooked and processed foods, require that more attention should be given to nutrition as a key factor in determining human health. Nutritional deficiencies are often ignored and underappreciated, despite being a global issue of rising importance with devastating consequences for individuals, communities and national economies.

It is critical to continue developing nutritional solutions and economic models that address the value of nutrition interventions in improving public health as well as the impact of such interventions on healthcare budgets. The evidence is very encouraging, but key stakeholders need to engage to make it happen, and the elderly and their particular circumstances (which include a higher likelihood of taking medications on a regular basis as well as a greater chance of spending time in hospital) should receive much more attention in the future.

The extensive scientific knowledge currently available needs to be translated into cost-effective, practical public health solutions. These may include fortification and/or supplementation, and specific delivery mechanisms should be assessed on a case-by-case basis. The evidence is established, but it needs to be translated into efficient actions, policies and medical practice. Let’s make it happen!

Further reading


References


