

### Nutrition and the elderly: identifying those at risk

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The tools used to identify nutritional risk are becoming more sophisticated but they are still inadequate for diagnosing marginal, let alone subclinical, malnutrition. Only rarely are low dietary intakes and seemingly abnormal biochemical findings found to be associated with the disturbance of form and function that is necessary for the diagnosis of clinical malnutrition. This is not altogether surprising: 'the (clinical) diagnosis becomes more difficult . . . where non-nutritional disease produces signs and symptoms difficult to distinguish from those of deficiency' and 'normal (biochemical) ranges for the elderly are not yet well established, and other factors apart from nutritional status could influence the results' (Department of Health and Social Security (DHSS), 1979a).

As yet, recommended allowances for the elderly are no more than extrapolations from the studies on young adults. For instance, in the UK all women over the age of 55 years are classified as sedentary. Munro (1983) suggested the need for well-authenticated dietary allowances for elderly people, divided into decades of age, with levels which are relevant to maintaining tissue function and performance and not just biochemical values in the tissues. He further suggested that the pattern of increased chronic disease and the extensive use of therapeutic drugs by the elderly should be allowed for in nutritional recommendations.

Nutritionists do their best with the tools at their disposal; evidence is taken from dietary recalls or 2, 3 or 7 d weighed dietary records, and translated into energy and nutrient intakes. This is too literal a translation, with inherent shortcomings at every step.

Table 1 shows energy intakes of one group (women of 75 years or older) who recorded a 7 d weighed dietary intake during a survey on meals-on-wheels recipients (Davies *et al.* 1974).

Does Table 1 show evidence of nutritional risk? Maybe it does according to the recommended daily intakes (RDI) of 1969 (DHSS, 1969), but maybe it does not by the amended recommended daily amounts (RDA) of 1979 (DHSS, 1979b). However,

Table 1. *Energy intakes of women aged 75 years and over (n 50)*

	MJ	kcal
Mean	7.32	1750
Range	5.06-11.05	1210-2640
RDI	7.95	1900
RDA	7.03	1680

RDI, recommended daily intakes (Department of Health and Social Security, 1969); RDA, recommended daily amounts (Department of Health and Social Security, 1979b).

because there are such wide ranges of intakes for energy and all nutrients, quotations of satisfactory means are virtually meaningless if one is seeking to identify individuals at nutritional risk. Some quoted 'satisfactory means' are good examples of the nutritionist using statistics like a drunkard uses a lamp-post: more for support than for illumination.

Likewise, it only confuses an international audience to quote low percentages of the RDA as a sign of nutritional risk; RDA vary in different countries. For example, in order to achieve a satisfactory calcium intake, one would only have to fly a group of subjects consuming 600 mg Ca/d from the USA to the UK: 600 mg is a risky 75% of the American RDA of 800 mg but is an excellent 120% of the British recommendation of 500 mg.

All too frequently RDA meant to cover requirements for groups are mistakenly applied to individuals: 'this view of ample provision presupposes that there is no danger associated with these high intakes, even in individuals who have requirements at the lowest end of the normal range' (National Advisory Committee on Nutrition Education, 1983).

It may not be true that nutrient intakes much in excess of adequate are desirable. Maybe some elderly men and women thrive better on lower intakes. If this is so, advertisements or prescriptions for dietary supplements may in many instances not only be unnecessary, they may actually be counter-productive.

An individual's nutrient requirements can be increased or decreased by many factors, including age, sex, individual body metabolism, functional capacity, absorption, drug therapy, physical state and adaptation.

Individuals at nutritional risk cannot be identified merely by picking out those at the lower range of intake whether it be for thiamin, potassium, vitamin C or any other nutrient. Low intakes, without any diagnosable change in function or form, are not necessarily evidence of undernourishment; just as subjects with high intakes are not necessarily at risk through overnutrition.

#### *Energy intakes, meals-on-wheels recipients*

Table 2 shows the energy intakes of elderly recipients of meals-on-wheels (Davies *et al.* 1974). These people may not have been as active as Professor Durnin's elderly farmers and peasants who could be consuming 16.7–20.9 MJ (4000–5000 kcal) daily (Durnin, 1978) but several of the over 80s were still active, with healthy appetites.

Table 2. *Daily energy intake of twenty-six elderly (65–75+ years) men receiving two meals-on-wheels per week (Davies et al. 1974)*

Age-range (years)	65–69	70–74	75–79	80+
No. of subjects	6	4	5	11*
Energy intake				
Mean (MJ/d)	9.20	8.75	8.67	9.15
(kcal/d)	2199	2091	2072	2186
Range (MJ/d)	7.36–10.57	6.06–12.54	6.48–10.15	6.95–13.36
(kcal/d)	1760–2527	1449–2997	1550–2426	1661–3192

\*Two subjects were over 85 years.

*Risk factors*

To overcome the shortcomings of dietary, clinical and biochemical assessments, it is necessary to consider possible alternatives for the identification of nutritional risk in elderly individuals.

There are two types of risk. The first type is that which is long-standing: there can be a very long latent period between nutritional deficiency and its clinical appearance. For these people there need to be early warning signs so that early preventive action can be taken. The second type of risk can be a sudden medical or social stress (e.g. a bereavement or a surgical operation) which can tip marginal, or even perfectly adequate, nutrition swiftly over into poor nutrition. For these people, prompt action needs to be taken at that critical stage.

Both types were recognized in the DHSS (1972) report 'A Nutrition Survey of the Elderly'. Having drawn attention to only a small percentage of demonstrably-malnourished elderly men and women, the report continues: 'there were others for whom more could have been done, and others still whose margin of safety must have been narrow'.

We need to know whether these people are travelling slowly, or rapidly, into a state of risk and what type of preventive action can be taken. Perhaps the best safeguard for both types of elderly individuals, or indeed elderly groups, is the identification of possible risk factors.

For instance, Bransby & Osborne (1953) in Sheffield found that the elderly living alone ate less of the foods requiring preparation than did married couples.

Similarly, Lempert (1960) reported, in the Stockport survey of the aged, that widowers had the poorest diet: 'marriage keeps particularly the old men healthy'. Lempert (1960) reported also on the positive non-risk factors: the best fed, she said, were those cared for by the younger generation, those of high social class, independent means and, especially, those over 80 years of age who continued to work.

By the early 1970s Exton-Smith (1971) had recognized primary and secondary causes of malnutrition in the elderly. He drew a distinction between social or environmental causes and physical or mental disorders. The social and environmental causes, he found, include unmet social needs and call for improved public health measures. The physical and mental disorders may or may not respond to appropriate medical treatment (Exton-Smith, 1980).

Those potential primary and secondary causes of nutritional deficiencies in the elderly are itemized in Table 3.

Table 3. *Potential causes of malnutrition in the elderly (Exton-Smith, 1980)*

Primary cause	Secondary cause
Ignorance	Impaired appetite
Social isolation	Masticatory inefficiency
Physical disability	Malabsorption
Mental disturbance	Alcoholism
Iatrogenic disorder	Drugs
Poverty	Increased requirements

Similarly, the DHSS (1979a) report on elderly men and women in six areas of England and Scotland associated the incidence of undernutrition with the following medical and social 'at risk' factors: living alone, being housebound, no regular cooked meals, supplementary benefit, classification in social classes IV and V, low mental test score, depression, chronic bronchitis, emphysema, gastrectomy, poor dentition, difficulty in swallowing, smoking and alcoholism.

In many instances, as with Exton-Smith's (1980) list, the factors were inter-related. Subjects in whom four or more risk factors operated were said to be at considerable risk of malnutrition. An important finding was that in subjects diagnosed as malnourished, co-existing medical causes were almost invariably found to be present.

#### *Importance of follow-up information*

What is lacking is a serial follow-up of the individuals who participated in that first large government survey of the elderly in 1967–68 (DHSS, 1972). Of the 879 elderly men and women in this survey, 365 were seen again 5 years later (DHSS, 1979a). The following questions need to be answered from the information collected. What were the causes of death of those who had not survived? How was mortality related to that individual's clinical, biochemical and dietary assessments? Even more important, what was the extent of morbidity in the survivors: how many 'at risk' factors had already been apparent in that individual? Had any preventive measures been applied? If so, with what success? Or why had they failed?

It is of importance to study all findings from follow-up investigations even when the surviving sample is small. Of the 100 elderly men and women already at nutritional and social risk studied by the Gerontology Nutrition Unit at Queen Elizabeth College in 1970, seven individuals survived for a further 10 years. We found that their original energy and nutrient intakes were maintained into their eighth or even ninth decade in spite of 10 years of deteriorating health and disability (Davies *et al.* 1981).

It is more generally accepted that with deteriorating health there is usually an associated fall in nutrient intakes (Stanton & Exton-Smith, 1970). Maybe we should be recognizing that lowered intakes are not inevitable, and that extra efforts are needed from us at this critical stage to keep up the interest of the ailing elderly in food and in exercise.

In the DHSS (1972, 1979a) surveys, were there individual cases of maintenance of intakes even in adverse circumstances? What were the principal individual causes of marked changes in eating patterns? Until all these findings are published we cannot adequately interpret this type of longitudinal information, following the same person through the years.

#### *Nutritional and social support of the elderly*

The term 'elderly' in Great Britain generally refers to 'persons of pensionable age', i.e. men 65 years and over, women 60 years and over. These 'elderly' now

account for nearly 17% of our total population, and numbers are increasing. In the foreseeable future the greatest increase in numbers will be in the over-80 years age-group. At the age of 80 years, at present, the ratio, women:men is 2:1, at the age of 85 years, the ratio is nearly 3:1. These 'elderly elderly' are among those most in need of nutritional and social support. There are, of course, some who survive with vigour to become the elderly elite, but others have to make increasing calls on the Health and Social Services.

It is recognized that people most likely to take action on social and environmental risk factors are those responsible for the day-to-day care of elderly men and women: health visitors, home helps and others in the Health and Social Services, and also relations, friends and neighbours. We therefore sought for risk factors which could easily be identified, and acted on, by non-medical personnel. In this respect, our risk factors were complementary to (but somewhat different from) those previously outlined in the present paper.

We were concentrating on elderly people at home who might be in need of meals-on-wheels or other services. However, this simple risk factor concept could be equally valid and adapted for other disciplines, other age-groups or other disabilities. The research findings leading to the choice of ten pertinent risk factors have been described elsewhere (Davies, 1981). However, practical action is not always taken on research findings, even if these include recommendations. It is essential to present techniques to implement these recommendations. An assessment kit for use by the Social Services was therefore designed by the Gerontology Nutrition Unit. This could enable those looking after the elderly to make constructive use of our research (Gerontology Nutrition Unit, 1981).

By questioning to uncover the ten potential risks and identifying what is causing them, the kit points to possible individual solutions to nutritional and related problems: socio-economic, environmental and psychological factors, as well as dietary intakes and meal patterns (Table 4).

Within the kit, advice is given on how to assess each potential risk in association with the others. Once the potential risks and their causes are recognized, and the possible solutions have been discussed for acceptability with the client, immediate

Table 4. *Ten potential nutritional risk factors (Davies, 1981)*

1. Fewer than eight main meals, hot or cold, eaten in 1 week. That is, sometimes less than one main meal daily.
2. Very little milk drunk, less than 0.28 litres (0.5 pints) daily.
3. Virtual absence of fruit and vegetables, resulting in low intake of vitamin C.
4. Wastage of food, even that supplied hot and ready to eat; for instance, the delivered meals-on-wheels.
5. Long periods in the day without food or beverages.
6. Depression or loneliness.
7. Unexpected weight change, either a significant gain or loss.
8. Shopping difficulties.
9. Low income, possibly in need of supplementary benefit.
10. Indication of disabilities (including alcoholism) in the case study.

steps can be taken by the Social Services. Sometimes a nutritional risk is simply solved by non-nutritional means. For instance, the provision of a walking frame or the help of a Good Neighbour Service may be all that is necessary to encourage a so-called housebound client to venture out to the shops to choose food for an erstwhile empty store-cupboard.

The many statutory and voluntary local facilities, often under used, are listed in the kit. Research findings and recommendations can be implemented through them. For instance, the research of Judge & Cowan (1971) has shown a generally low intake of potassium in the elderly; this is often associated with depression, apathy and poor grip strength.

Table 5 similarly demonstrates low K intakes: of 100 elderly subjects sixty-nine had daily intakes below 60 mmol, thirty-two of them below 50 mmol (2 g). Following such information, home helps could be taught the value of increasing K intake by providing such people with milky drinks (e.g. coffee made with milk, instead of water); breakfast cereals sweetened with sultanas instead of sugar; a glass of orange juice or, even simpler, a raw banana.

The dietary advice needs to be matched to the person's capability, and somebody already weak or apathetic needs very simple advice.

It should not be overlooked that the diagnostic question 'how are you managing for food?' needs to be asked of a patient with chronic bronchitis or a wrist in plaster.

Drug-nutrient interaction is an increasingly complex problem which merits a seminar on its own, but even an elderly patient just taking drugs which lead to sleepy confusion or depression may well neglect to eat. Medical and non-medical personnel, if alerted to these risks, can take the appropriate action.

Are the elderly set in their ways? We demonstrated (Holdsworth *et al.* 1981) that elderly people will change food choice, particularly if maintenance of health is their motivation. They need to have access to accurate information; although to get a message over to the elderly themselves it may be necessary to use a non-academic approach in nutrition education (Holdsworth & Davies, 1982). Even cookery books can explain research findings to the elderly (Davies, 1972, 1979) whereas light-hearted slides can draw attention to serious risks such as the prevalence of bone disorders and fractures in old people and therefore the importance of specific foods for the provision of vitamin D and Ca; slides can also illustrate the need for sunlight to improve vitamin D status.

Once the risks are identified, practical research may be needed before one can advise on action. For example, many elderly people tend to cover up even in summer. The Gerontology Nutrition Unit is therefore monitoring the transmission

Table 5. *Dietary potassium intake of 100 elderly (65-75+ years) men (n 26) and women (n 74) receiving two meals-on-wheels per week (Davies et al. 1974)*

K intake (mmol/d)	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109
No. of subjects	1	10	21	37	22	4	3	—	2

of u.v. light using a polysulphone film (Davis, 1980) through different thicknesses of tights and fabrics.

Similarly, practical research was conducted by the Gerontology Nutrition Unit before we could enable others to identify and rectify the potential nutritional risks of elderly people in residential care. Following such research we produced a residential homes catering and nutrition assessment kit (Gerontology Nutrition Unit, 1982) designed to be used by local dietitians to show the nutritional strengths as well as the weaknesses in each home; to identify the problems and then to solve them. As many as twenty-six potential nutritional risk factors were isolated, not merely low intakes of specific nutrients but also, for example, monotony of menu, very little home-style cooking, preponderance of 'convenience' foods.

### Summary

At present our interpretation of dietary, biochemical and clinical findings is still inadequate to diagnose marginal or subclinical malnutrition in the elderly. There are two main types of nutritional risk; the first is long-standing, against which early-warning signs and early preventive action are needed. The second type of nutritional risk may be sudden, following medical or social stress. This calls for prompt action at that critical stage.

Given the means to implement research findings, practical action can be taken by the Health and Social Services, relations, friends and the elderly themselves.

It is necessary to take practical action against nutritional risks at an early stage. For this reason, our current longitudinal study is concentrated on men and women at the age of retirement from work.

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### REFERENCES

- Bransby, E. R. & Osborne, B. (1953). *British Journal of Nutrition* 7, 160.
- Davies, L. (1972). *Easy Cooking for One or Two*, pp. 1-9. Harmondsworth: Penguin.
- Davies, L. (1979). *More Easy Cooking for One or Two*. Harmondsworth: Penguin.
- Davies, L. (1981). *Three Score Years . . . and Then? A Study of the Nutrition and Wellbeing of Elderly People at Home*. London: William Heinemann Medical Books.
- Davies, L., Hastrop, K. & Bender, A. E. (1974). *Modern Geriatrics* 4 (5), 220-224.
- Davies, L. & Holdsworth, M. D. (1980). *Journal of the American Dietetic Association* 76(3), 264-267.
- Davies, L., Purves, R. & Holdsworth, M. D. (1981). *Journal of Human Nutrition* 35, 442-447.
- Davis, A. (1980). *Polymer News* 6, 257-261.
- Department of Health and Social Security (1969). *Recommended Daily Intakes of Nutrients for the United Kingdom. Report on Public Health and Medical Subjects no. 120*. London: H.M. Stationery Office.

- Department of Health and Social Security (1972). *A Nutrition Survey of the Elderly. Report on Health and Social Subjects no. 3*. London: H.M. Stationery Office.
- Department of Health and Social Security (1979a). *Nutrition and Health in Old Age. Report on Health and Social Subjects no 16*. London: H.M. Stationery Office.
- Department of Health and Social Security (1979b). *Recommended Daily Amounts of Food Energy and Nutrients for Groups of People in the UK. Report on Health and Social Subjects no. 15*. London: H.M. Stationery Office.
- Durnin, J. V. G. A. (1978). In *Textbook of Geriatric Medicine and Gerontology* [J. C. Brocklehurst, editor]. Edinburgh: Churchill-Livingstone.
- Exton-Smith, A. N. (1971). *British Journal of Hospital Medicine* 5, 639-645.
- Exton-Smith, A. N. (1980). In *Metabolic and Nutritional Disorders in the Elderly*, pp. 66-76 [A. N. Exton-Smith and F. I. Caird, editors]. Bristol: John Wright & Sons.
- Gerontology Nutrition Unit (1981). *Meals-on-Wheels Assessment Kit*. London: Queen Elizabeth College.
- Gerontology Nutrition Unit (1982). *Catering and Nutrition in Residential Homes Assessment Kit*. London: Queen Elizabeth College.
- Holdsworth, M. D., Bilderbeck, N., Davies, L. & Purves, R. (1981). *Proceedings XII International Congress of Nutrition, San Diego*, p. 113. New York: Allan R. Liss.
- Holdsworth, M. D. & Davies, L. (1982). *Human Nutrition: Applied Nutrition* 36A, 22-27.
- Judge, T. G. & Cowan, N. R. (1971). *Gerontologica Clinica* 13, 221.
- Lempert, S. M. (1960). *Public Health* 74(10), 382-391.
- Munro, H. N. (1983). In *Nutritional Problems of the Elderly*, p. 12 [J. C. Somogyi and F. Fidanza, editors]. Basel: S. Karger.
- National Advisory Committee on Nutrition Education (1983). *Proposals for Nutritional Guidelines for Health Education in Britain*, p. 15. London: Health Education Council.
- Stanton, B. R. & Exton-Smith, A. N. (1970). *A Longitudinal Study of the Diet of Elderly Women*. London: King Edward's Hospital Fund.