FEED FOR HEALTH – THE NUTRITION EDUCATION POLICY FOR HEALTHCARE PRACTICE **(NEPHelP)** TRAINING PACKAGE

FACILITATING THE PROVISION OF NUTRITION EDUCATION, FOCUSSING ON THE HOSPITAL SETTING

International Forum on QUALITY & SAFETY in HEALTHCARE

NNEdPro Global Centre for Nutrition and Health

BMJ Nutrition, Prevention & Health

nutrition.bmj.com BMJ

27th March 2019

The International Forum on Quality and Safety in Healthcare, Glasgow, UK

TODAY'S MENU…

Timing/ presenter	Topic
9 - 9.20	Introduction to the team and aims of the session
9.20 - 9.40 **Sumantra Ray**	Scope of nutrition. History, science and the future
9.40 - 10.00 **Elaine Macaninch**	Where is nutrition relevant in healthcare?
10.00 -10.30 **Luke Buckner** **Elaine Macaninch**	Nutrition Screening and management
10.30 – 10.45 **Luke Buckner**	Gastrointestinal aspects of nutrition
Break 15 minutes ***Announcement of Cambridge Nutrition Summer School 2019 & e-Learning***	
11.00 - 11.10 **Sumantra Ray** **Emily Fallon**	Micronutrient Quiz
11.10 - 11.30 **Sumantra Ray**	Break out groups
11.30 - 11.40 **Sumantra Ray**	Clinical case study
11.40 – 11.50	Summary and online evaluations
11.50 – 12.00	End of session and final questions

WORKSHOP AIMS

- Describe the common problems of nutritional care in hospitals and in public health
- Have an orientation to the use of appropriate screening tools to detect clinical malnutrition
- Begin to discuss basic nutritional interventions, before appropriate onward referral to specialists
- Understand the broader pathways of referral for nutrition services between primary and secondary care

Workshop Team

Professor Sumantra Ray RNutr, Dr Luke Buckner, Elaine MacAninch RD

Emily Fallon, Matheus Abrantes

Acknowledgements: Dr Kathy Martin RN, Dr Minha Rajput-Ray & NNEdPro Team

About Us.....

Originating in 2008 from:

UNIVERSITY OF CAMBRIDGE

An award winning, international and interdisciplinary think-tank, training academy and knowledge network

A strategic partnership between doctors, dietitians, nutritionists, researchers, educators and other professionals

Anchored in Cambridge (UK)

Working without borders!!!

2015 CN AWARDS WINNER

thebmjawards 2016 Finalist

*** 2017 Medical Nutrition/ESPEN International Award ***

*** 2018 Global Challenges Award ***

*** > 40 Projects > 10 Hubs > 150 Peer Reviewed Outputs ***

Our Key Strategic Partners

Academic Institutions

CAMBRIDGE UNIVERSITY Health Partners

UNIVERSITY OF CAMBRIDGE

Ulster University

Imperial College London

UNIVERSITÀ DEGLI STUDI DI PARMA

Specialist Organisations

BDA The Association of UK Dietitians

BMJ

GODAN Global Open Data for Agriculture & Nutrition

NIM Nutrition in Medicine®

Society for Nutrition Education and Behavior

LGC

We gratefully acknowledge the support of:

The Aim Foundation is a family foundation that seeks to achieve positive social change by promoting wellbeing through funding organisations working to prevent problems arising. The AIM Foundation was set up in 1989 with an endowment that has allowed grant-giving of £400,000 in recent years.

We gratefully acknowledge the support of:

GODAN
Global Open Data
for Agriculture & Nutrition

GODAN supports the proactive sharing of open data to make information about agriculture and nutrition available, accessible and usable to deal with the urgent challenge of ensuring world food security. It is a rapidly growing group, currently with over **892** partners from national governments, non-governmental, international and private sector organisations that have committed to a joint Statement of Purpose.

Medical Nutrition Education Network UK

Global Centre for Nutrition and Health

A global network: 200+ members, 11 key strategic partners, 37 virtual core members

Culinary Medicine UK

College of Medicine

Growing medical student network

Medical Nutrition Education

Our purpose

- Increase doctors nutritional skill to improve patient care through nutritional
  - Diagnosis
  - Intervention
  - Referrals

Key People

- NNEdPro: Dr. Luke Buckner & Prof. Sumantra Ray
- Nutritank: Iain Broadley & Ally Jaffee
- ERImN: Elaine MacAninch & Dr. Kathy Martin

The Scope of Nutrition: History, Science and the Future…

www.nnedpro.org.uk

Celebrating 10 years of nutrition education and innovation

The Need for Nutrition Education/Innovation Programme (NNEdPro)

Global Centre for Nutrition and Health

CAMBRIDGE UNIVERSITY Health Partners

BMJ

Professor Sumantra (Shumone) Ray, RNutr

NNEdPro Founding Chair & Governing Body Fellow, Wolfson College Cambridge
Course Director in Applied Human Nutrition, University of Cambridge
Chair in Global Nutrition, Ulster University
Co-Founder & Chair, BMJ Nutrition, Prevention and Health
Honorary/Visiting Professor: Imperial; Waterloo; Wollongong

W: **www.nnedpro.org.uk** Email: **sr506@cam.ac.uk**

Today's ABC of Nutrition…

- **A: Nutrition as a scientific discipline (Historical Perspective)**
- **B: Nutrition as a scientific discipline (Back to Basics)**
- **C: Translating Nutrition - A global challenge…**

PART-A: Nutrition as a cognate scientific discipline I

- **Historical perspectives**
  – the rise, fall and place of nutrition over time

- **Back to basics**
  – defining nutrition, diet and malnutrition in the modern day

(Key Refs: Nutrition Society Series, 2013; Oxford Handbook of Nutrition and Dietetics 2012)

Nutrition: A New Discipline?

- Historical perspective
  - Hippocrates – *"Let food be thy medicine…"*
  - Bible – 1st Nutrition RCT?
  - Galen's Humours – blood, yellow bile, black bile, phlegm relating to diet (?!)
  - Famine, feuds, plague and the salt trade…
  - 19th/20th Century – golden age of nutrition

Laying Foundations for Modern Nutrition

- **Dr Elsie Widdowson, CH, CBE, FRS**
- A true pioneer of nutrition science.
- Working with Dr Robert McCance, they published the first issue of *The Composition of Foods.*
- This was the first time that the intakes of individuals had been assessed.
- Seminal work and basis for nutritional databases around the world.

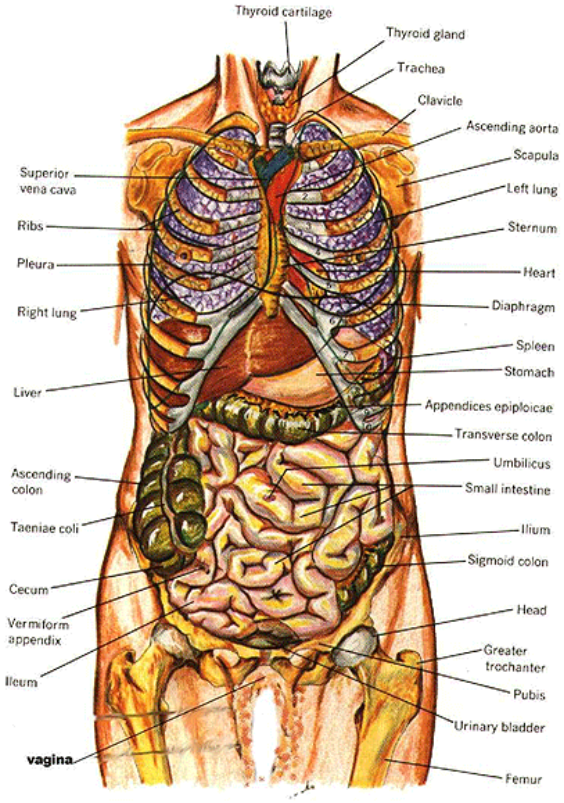
(Ref: Elsie Widdowson by Gail Goldberg, MRC Insight Jan 2013)

Nutrition and Human Physiology

- Entropy – 2nd Law of thermodynamics
- Matter has a tendency to become chaotic
- Human body made of very organised molecules
- Keeping them organised requires energy

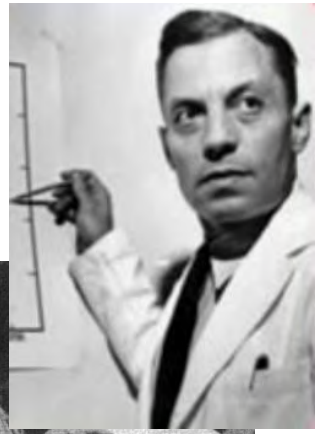
Our Collection of Molecules

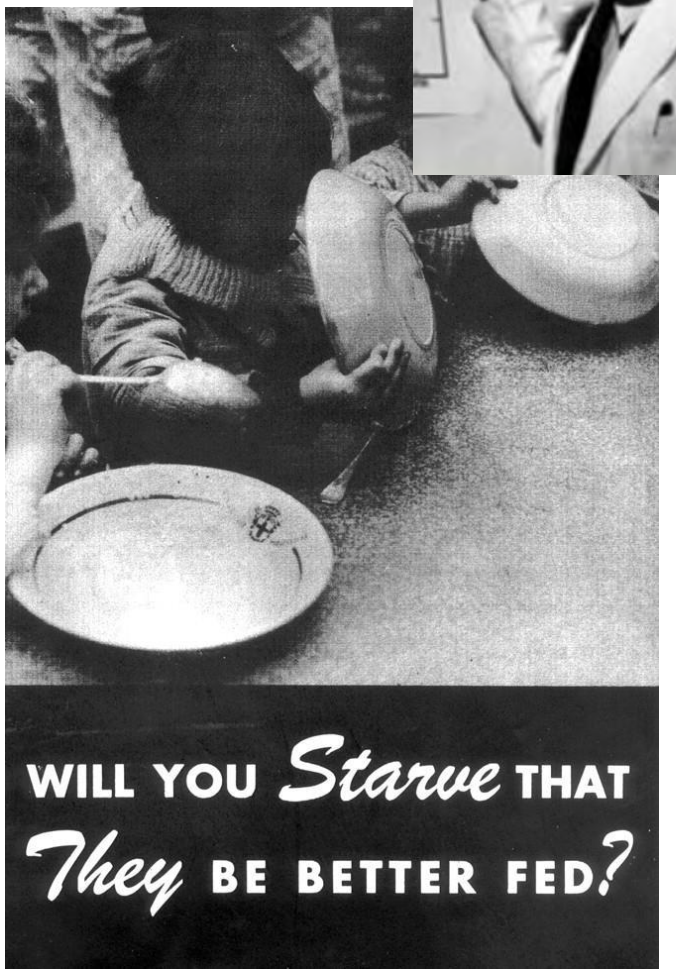
- Constantly being broken down and replaced
- Every seven years it is all replaced
- Replacement molecules are swallowed!
- All this requires energy
- We measure energy in calories
- Insufficient calories = starvation



The Minnesota Experiment

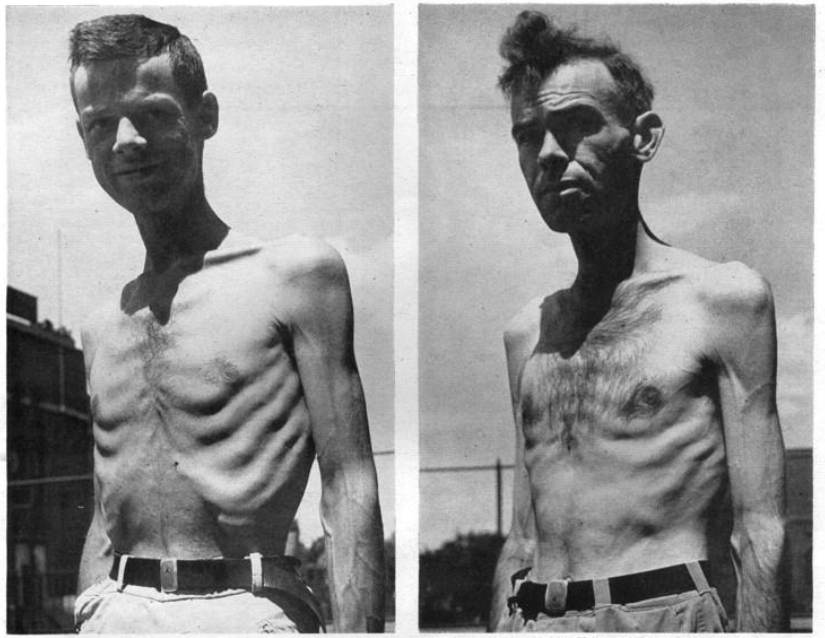
- Dr Ancel Keys – physiologist
- In 1944, 36 Conscientious Objectors joined this study at the University of Minnesota
- Fit young men were starved for 6 months
- Aim to reduce body weight by 25%





Effects were dramatic and immediate

- Extreme tiredness
- Sensitivity to cold
- Inability to concentrate
- Loss of motivation
- Loss of libido
- Obsession with food
- Irrational hatred of others



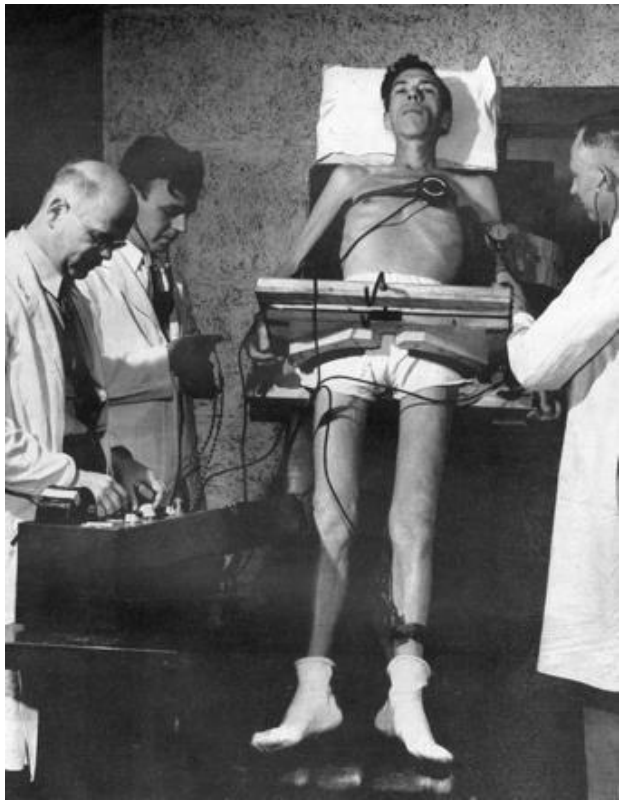
AFTER FIVE MONTHS OF STARVATION DIET CONSCIENTIOUS OBJECTORS SAMUEL LEGG (LEFT) AND EDWARD COWLES HAVE LOST 35 AND 30 POUNDS RESPECTIVELY

MEN STARVE IN MINNESOTA

CONSCIENTIOUS OBJECTORS VOLUNTEER FOR STRICT HUNGER TESTS TO STUDY EUROPE'S FOOD PROBLEM

The Biology of Human Starvation

- Published 1950, 2 volumes 1385 pages
- Refeeding just as problematic
  - Feelings of tiredness and weakness were slow to improve
  - Getting muscle back was hard
- Recovery took as long as two years
- These were healthy, young men!

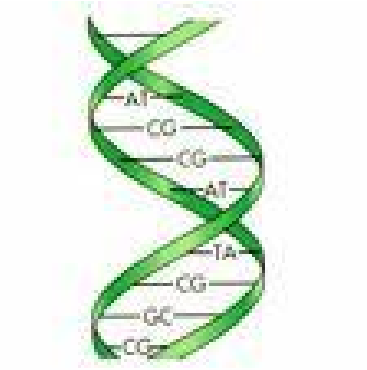


19th and 20th Centuries: A 'Golden Age' for Nutrition

- Advances in chemistry
- Understanding of physiology
- Nature and function of nutrients
- Focus on diseases of deprivation
- Introduction of school meals and milk
- Rationing for the 2nd World War

Are we entering a 'Platinum Age'?

- Human genome
  - Nutrigenetics
  - Nutraceuticals
  - Nutriomics
  - Nutrition informatics



Kazimierz Funk (February 23, 1884 – November 20, 1967), commonly anglicized as Casimir Funk, Polish biochemist, credited with the concept of Vitamins in 1912 , which he called vital amines or vitamines.

Did healthcare *"throw out the baby with the bathwater?"*

- Nicholas Culpepper's 15th Century "English Physician" still in print
- There is no "pill for every ill"
- Use of nutritional remedies
- Modern medicines 1940's
- Advent of the Dietetic profession
- Obesity will bankrupt the NHS (Wanless, 2007)
- Under-nutrition in hospitals and high risk groups is common
- Relative uncoupling of nutrition science and practice…

PART-B: Nutrition as a cognate scientific discipline II

- **Historical perspectives**
  – the rise, fall and place of nutrition over time

- **Back to basics**
  – defining nutrition, diet and malnutrition in the modern day

(Key Refs: Nutrition Society Series, 2013; Oxford Handbook of Nutrition and Dietetics 2012)

How is Nutrition Defined Today?

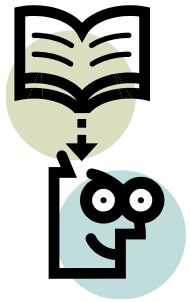
Nutrition is the sum total of the processes involved in the taking in and the utilization of food substances by which growth, repair and maintenance of the body are accomplished. It involves ingestion, digestion, absorption and assimilation. Nutrients are stored by the body in various forms and drawn upon when the food intake is not sufficient.

Nutrition Science is the study of nutrients in food, how the body uses nutrients, and the relationship between diet, health and disease

How are Nutrition, Biological and Social Sciences Related?

Levels of human function (factors)	Accompanying scientific disciplines of study
Constitutional	
• Cell nucleus — DNA ⇄ RNA (Genetic level)	• Molecular biology, foods
• Cells: metabolism	
• Internal environment	• Biochemistry, foods
• Circulation	• Biochemistry, physiology, foods
• All organ systems, *also*	• Physiology, pathology, foods, pharmacology, etc.
• Central nervous system	• Psychology, pathology, foods, pharmacology, etc.
Nutritional status Health/ill-health	
External environment	
• Food security/insecurity	• Foods, agriculture, food systems, sociology, anthropology, economics, politics, policy, etc.
• Household characteristics; care	
• Social circumstances	
• Economic circumstances	
• Housing, sanitation, politics	
• Agriculture, health services (resources; ideologies)	

How are Nutrition, Diet and Malnutrition Related?



NUTRITION

- Dietary Intake: What you eat
- Nutritional Status: What you are
- Functional Capacity: What you can do
- Goodness of fit: Capacity to do

DIET

- Composition (quantity and quality) of foodstuffs in meals and the way in which these meals are consumed (frequency and pattern)

(Academy of Medical Royal Colleges, 2010)

MALNUTRITION

Consequence if prolonged...

- Inadequate intake of one or more nutrients (undernutrition)
- Excessive intake of one or more nutrients (overnutrition)
- Imbalanced nutrient intake
- Obesity
- Undernutrition in medical care: 'Hospital Malnutrition'

What are Nutrients?

- Nutrients are chemical compounds that the body requires for growth and metabolism, that cannot be made in the body and must be supplied in the diet
- Macronutrients: protein, fat and carbohydrate are the sources of energy to the body but also perform other vital functions
- Micronutrients: vitamins and minerals; only needed in milligram or microgram quantities but essential for health

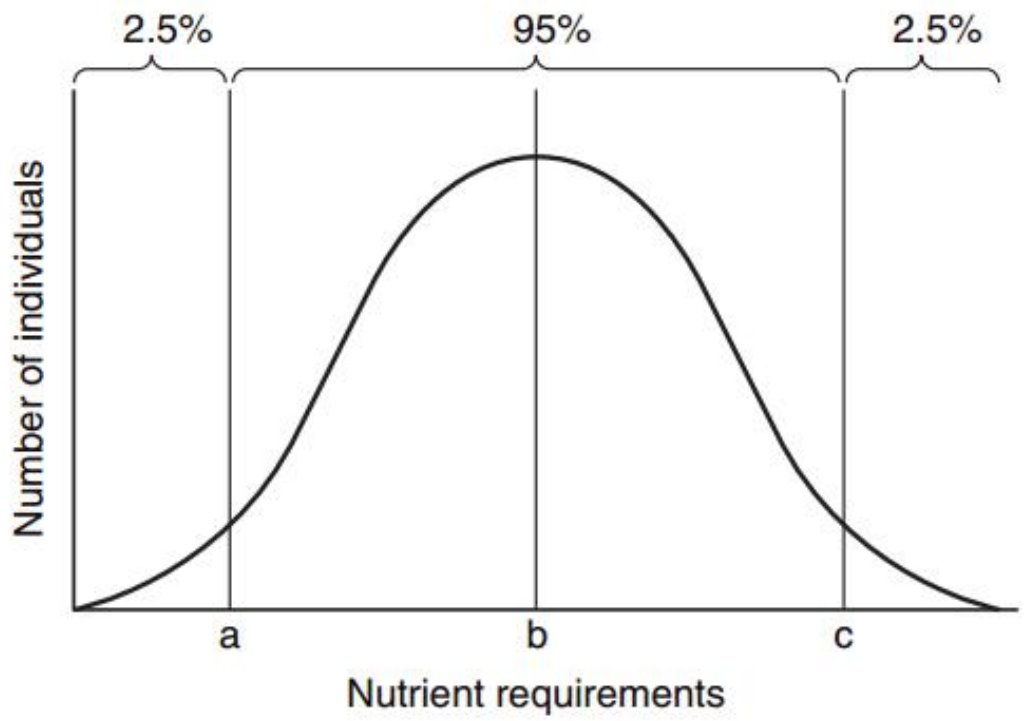
What are Nutrient Classes?

Class/category	Subclass/category	Nutrient examples
Carbohydrates (macronutrients)	Monosaccharides Disaccharides Polysaccharides	Glucose, fructose, galactose Sucrose, maltose, lactose Starch and dietary fiber
Proteins (macronutrients)	Plant and animal source proteins	Amino acids ($n = 20$): aliphatic, aromatic, sulfur-containing, acidic, basic
Fats and oils (lipids) (macronutrients)	Saturated fatty acids Monounsaturated fatty acids Polyunsaturated fatty acids (n-3, n-6, n-9)	Palmitic and stearic acid Oleic (*cis*) and elaidic (*trans*) fatty acids Linoleic, α-linolenic, arachidonic, eicosapentaenoic, docosahexaenoic acid
Minerals (micronutrients)	Minerals and electrolytes Trace elements	Calcium, sodium, phosphate, potassium, iron, zinc, selenium, copper, manganese, molybdenum, fluoride, chromium
Vitamins (micronutrients)	Fat soluble Water soluble	Retinol (A), calciferols (D), tocopherols (E), vitamin K Ascorbic acid (C), thiamine (B_1), riboflavin (B_2), niacin (B_3), pyridoxine (B_6), folate, cobalamin (B_{12})
Water	Water	Water

What is Nutrient-Energy Conversion?

Nutrient	Kcal/g	kJ/g	Comments
Protein	4	17	
Fat	9	37	Original Atwater factor was 8.9 kcal
Carbohydrate	3.75	16	Value is for available carbohydrate expressed as monosaccharides. If carbohydrate is expressed directly or by difference 4kcal/g.
Sugar alcohols	2.4	10	Mean value used in food labelling.
Ethyl alcohol	7	10	Mean value used in food labelling.
Glycerol	4.31	18	Assumes complete metabolism.

What are Dietary Reference Values?

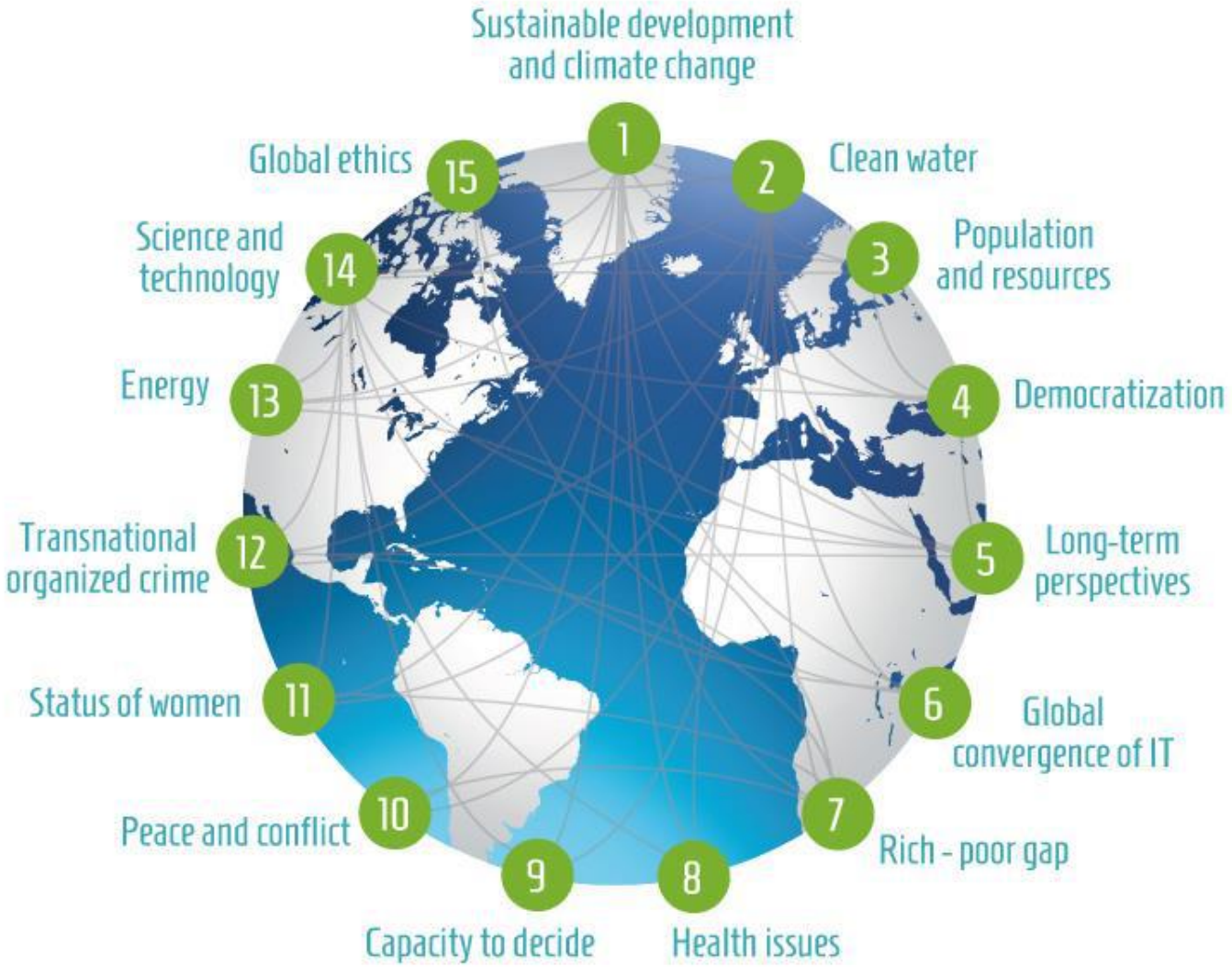


(a) The mean minus a notional 2 standard deviations (SDs); intakes below this will be inadequate for nearly all of the population. (b) The mean; the midpoint of the population's requirement. (c) The mean plus a notional 2 SDs; the intake that is adequate for nearly all of the population. Note that, in practice, because insufficient data exist to establish reliable means and SDs for many nutrient requirements, the reference intakes describing the points a and c on the curve are generally set, in the case of a, at the level that is judged to prevent the appearance of signs of deficiency (biochemical or clinical), and, in the case of c, at the level above which all individuals appear to be adequately supplied. Thus, it is unlikely that even 2.5% of the population would not achieve adequacy at intake level c.

What are Dietary Reference Cut-offs?

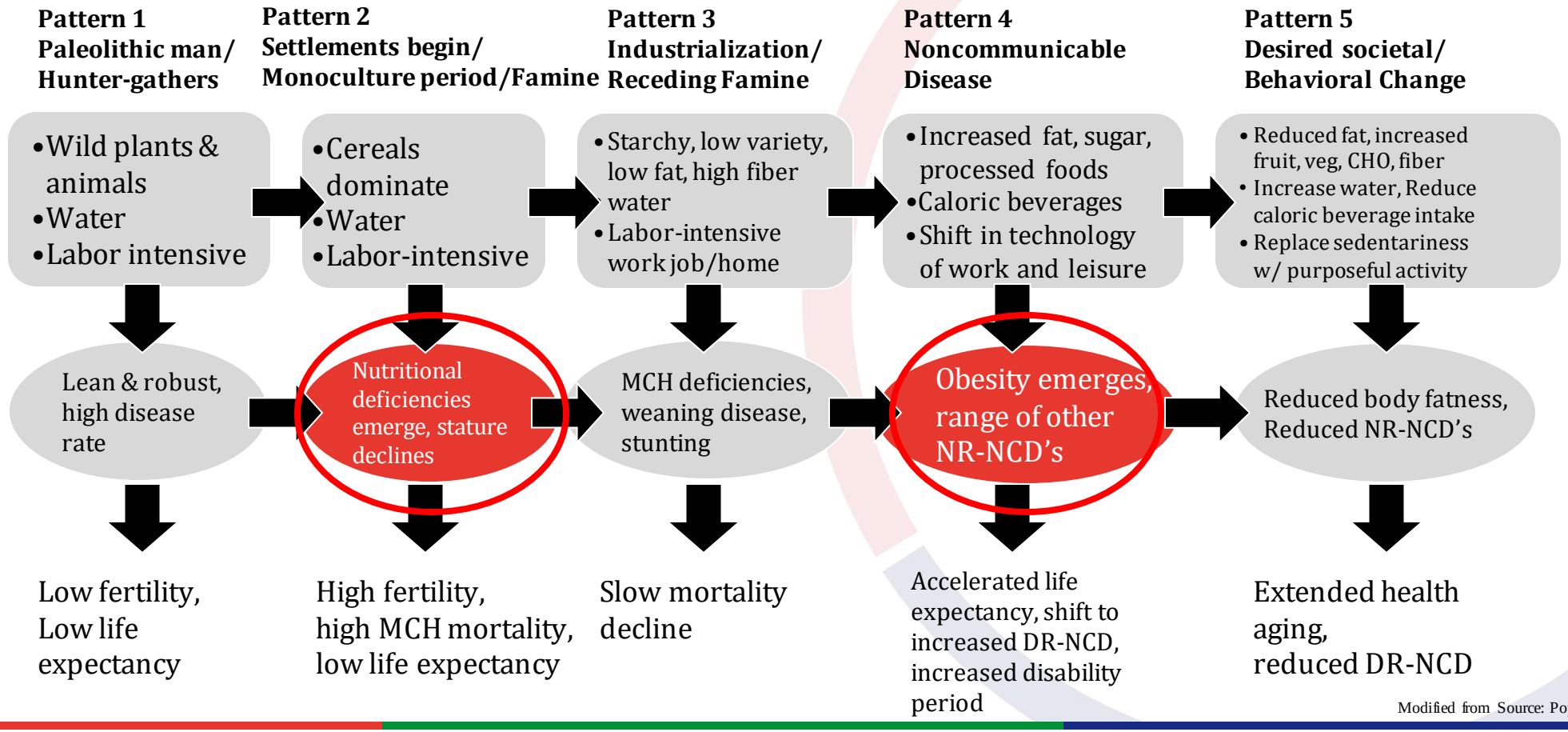
	a	b	c
European Communities Scientific Committee for Food **Population reference intakes** (1993)	Lowest threshold intake (**LTI**)	Average requirement (**AR**)	Population reference intake (**PRI**)
US Food and Nutrition Board, National Academy of Sciences, National Research Council **Recommended daily allowances** (1989)			Recommended daily allowance (**RDA**)
US Food and Nutrition Board, Institute of Medicine, National Academies of Health, Canada **Dietary reference intakes** (1997–2005)		Estimated average requirement (**EAR**)	Recommended daily allowance (**RDA**)
British Committee on Medical Aspects of Food Policy (COMA) **Dietary reference values** (1991)	Lower reference nutrient intake (**LRNI**)	Estimated average requirement (**EAR**)	Reference nutrient intake (**RNI**)
World Health Organization/Food and Agriculture Organization (WHO/FAO)			Recommended nutrient intake (**RNI**)
National Health and Medical Research Council (NHMRC), Australia and New Zealand **Nutrient reference values** (2006)		Estimated average requirement (**EAR**)	Recommended dietary intake (**RNI**)
United Nations University (UNU) **Nutrient intake values** (2007)		Average nutrient requirement (**ANR**)	Individual nutrient level (INL_x; in this case INL_{98})

PART-C: Translating Nutrition - A global challenge…



Concept: Global Nutrition Transition

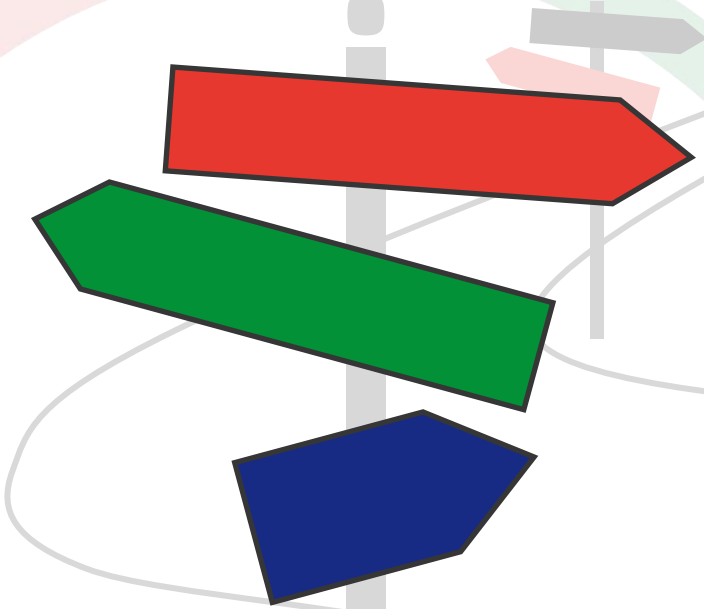
Urbanization, economic growth, technological changes for work, leisure, & food processing, mass media growth



Modified from Source: Popkin 2002 revised 2006.

Conundrum ***TRIPLE*** Nutritional Burden

- Co-existence of under and over-nutrition (and associated chronic diseases)
- Can occur in the same countries, communities and even individuals
- One of the greatest challenges to national policy, health policy and resources…




UNDERGROUND
MIND THE GAP

Dietary Guidelines and Shifting Sands of Evidence

2013 AHA/ACC Guideline on Lifestyle Management to Reduce Cardiovascular Risk

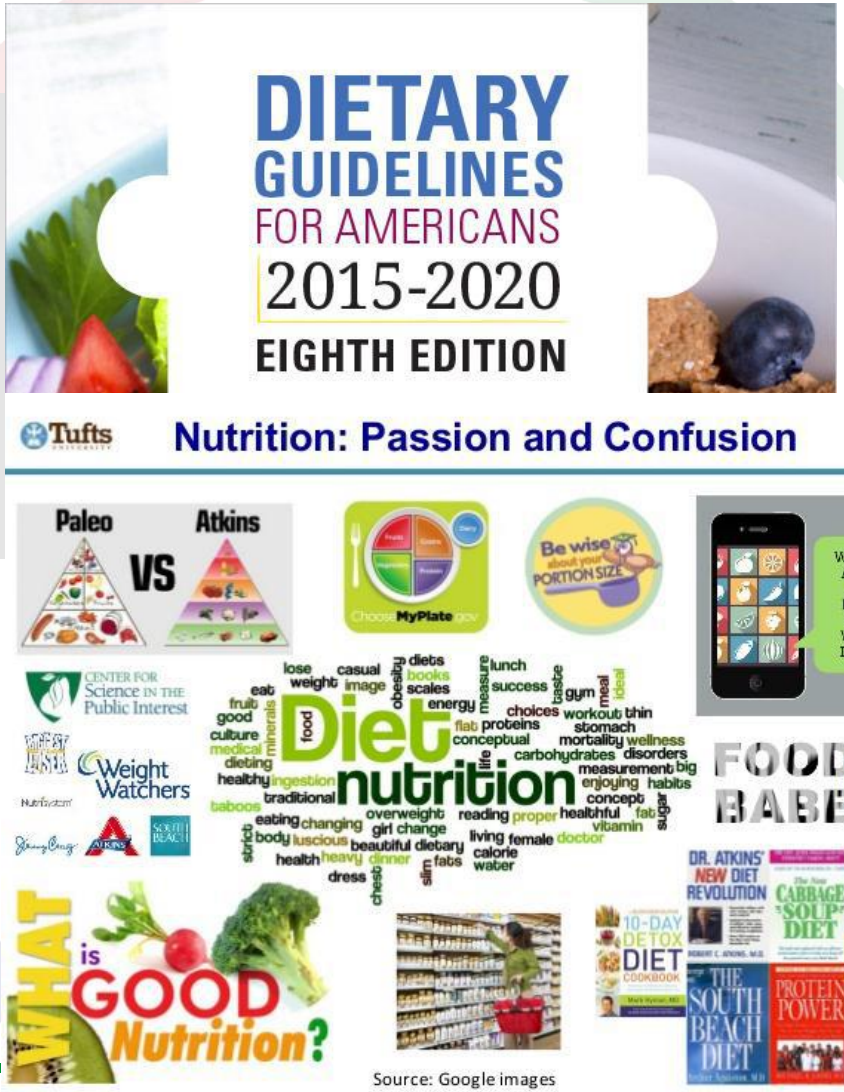
A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

Endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation, American Pharmacists Association, American Society for Nutrition, American Society for Preventive Cardiology, American Society of Hypertension, Association of Black Cardiologists, National Lipid Association, Preventive Cardiovascular Nurses Association, and WomenHeart: The National Coalition for Women with Heart Disease

Annals of Internal Medicine

Reviews | 18 March 2014

Association of Dietary, Circulating, and Supplement Fatty Acids With Coronary Risk:
A Systematic Review and Meta-analysis



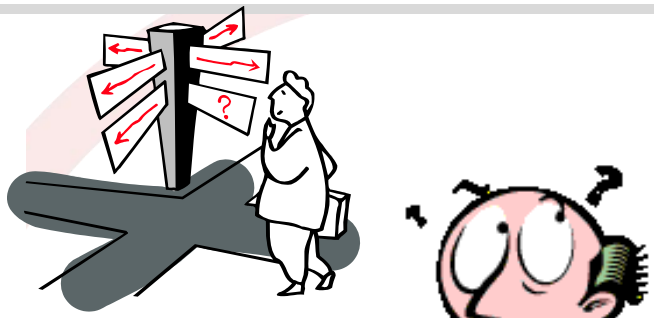
Source: Google images

The Media and Changing Public Health Messages?

The Telegraph

Eight portions of fruit and vegetables a day protects against heart disease

Eating a minimum of eight portions of fruit and vegetables a day can lower the risk of heart disease by almost a quarter, scientists have claimed.



Daily Mail

Why those 'super healthy' foods are simply a gimmick

EVIDENCE ALERT!!!

- **Consumption** of five or more portions of fruit and veg daily (consuming a range of fruit, including ample quantities of soft/dark-pigmented fruit such as berries) ?
- **Intake** of oily fish at least once weekly (or preferably 2-3 large portions weekly) ?
- **Reduction** in total dietary fat with elimination of trans fats and a higher consumption of monounsaturated than saturated fats ?
- **Reduction** of salt intake to a minimum (below 6 g/day)
- **Sensible** use of alcohol (up to 3-4 units/day max)
- **'Mediterranean'** type diets including omega-3 fats, fruit and vegetables, wholegrains, pulses, nuts, fresh produce vs. processed foods and low amounts of saturated fat ?

Webster-Gandy et al, 2011

Solution: Knowledge Creation and Intervention

Research Institutions **Generating Nutrition Evidence** from Molecules to Mankind…

NNEdPro **Translating Nutrition Evidence** to Healthcare Practitioners…

Informing Health Policy and Clinical Practice

Population Health

Translation into societal and cultural context

Epidemiology / trials / surveillance

Aetiological studies
Behavioural science

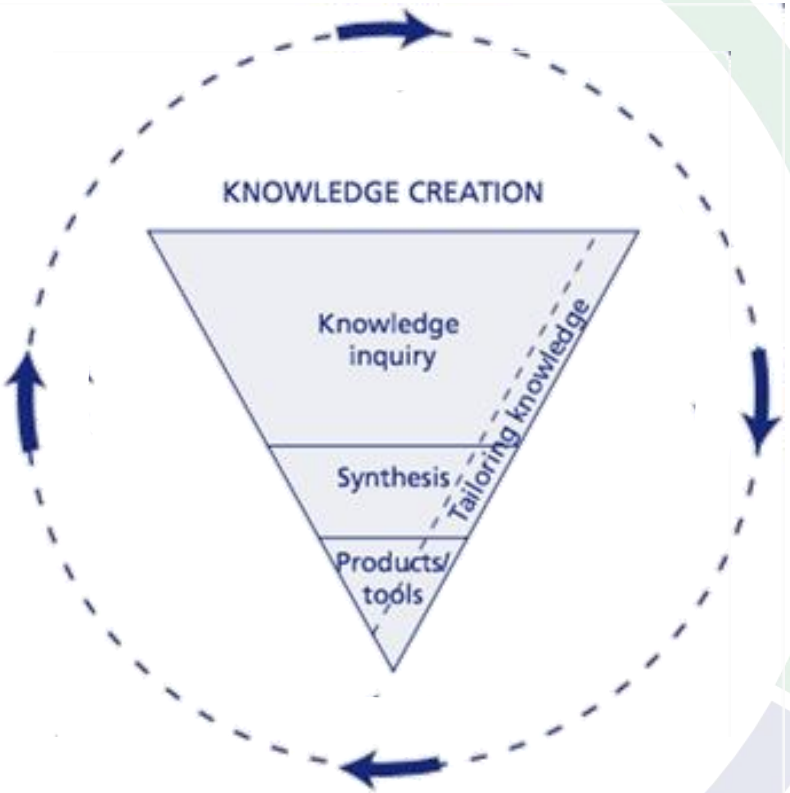
Human physiology
Intermediary metabolism

Innovative methodologies
Biomarkers, 'omics'

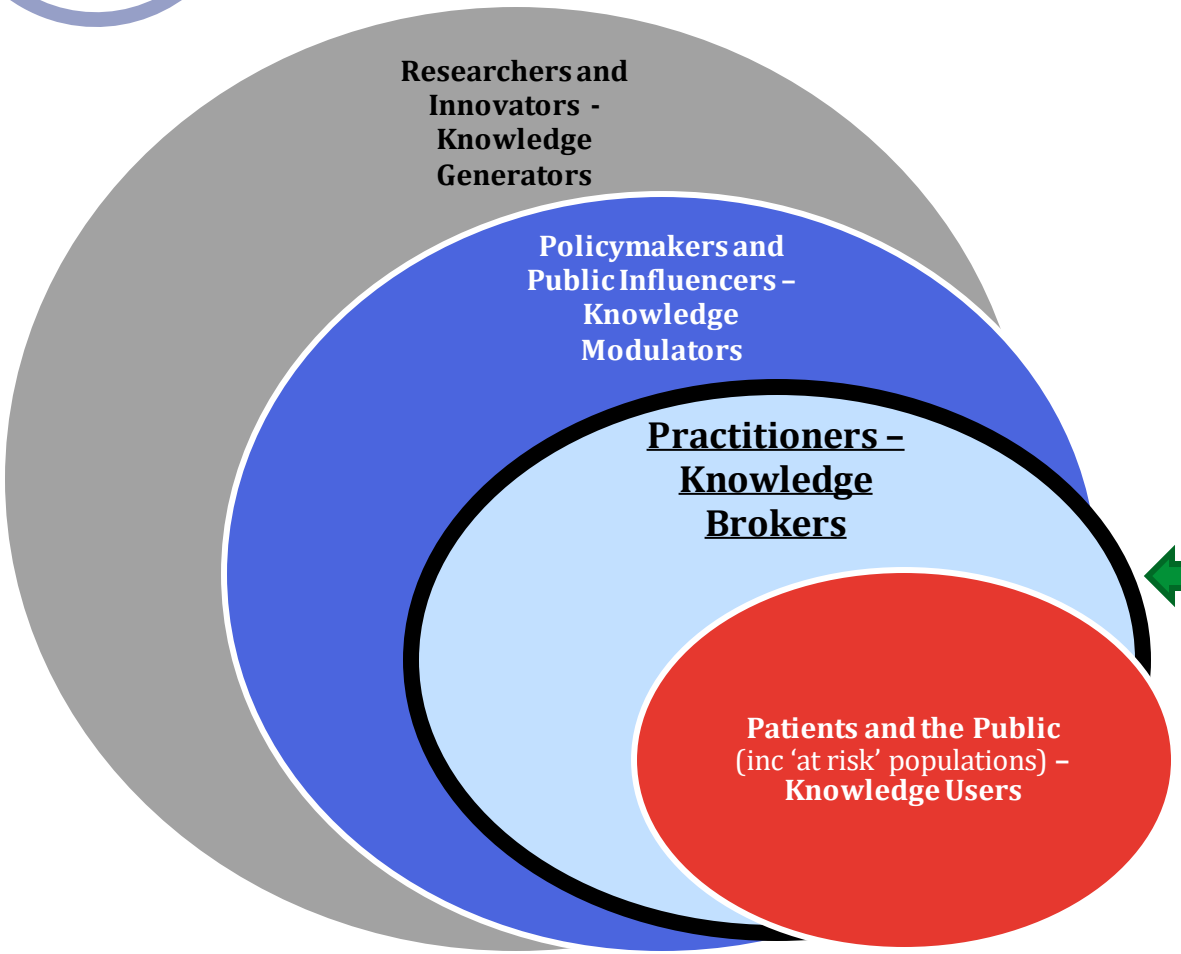
Underpinning mechanism

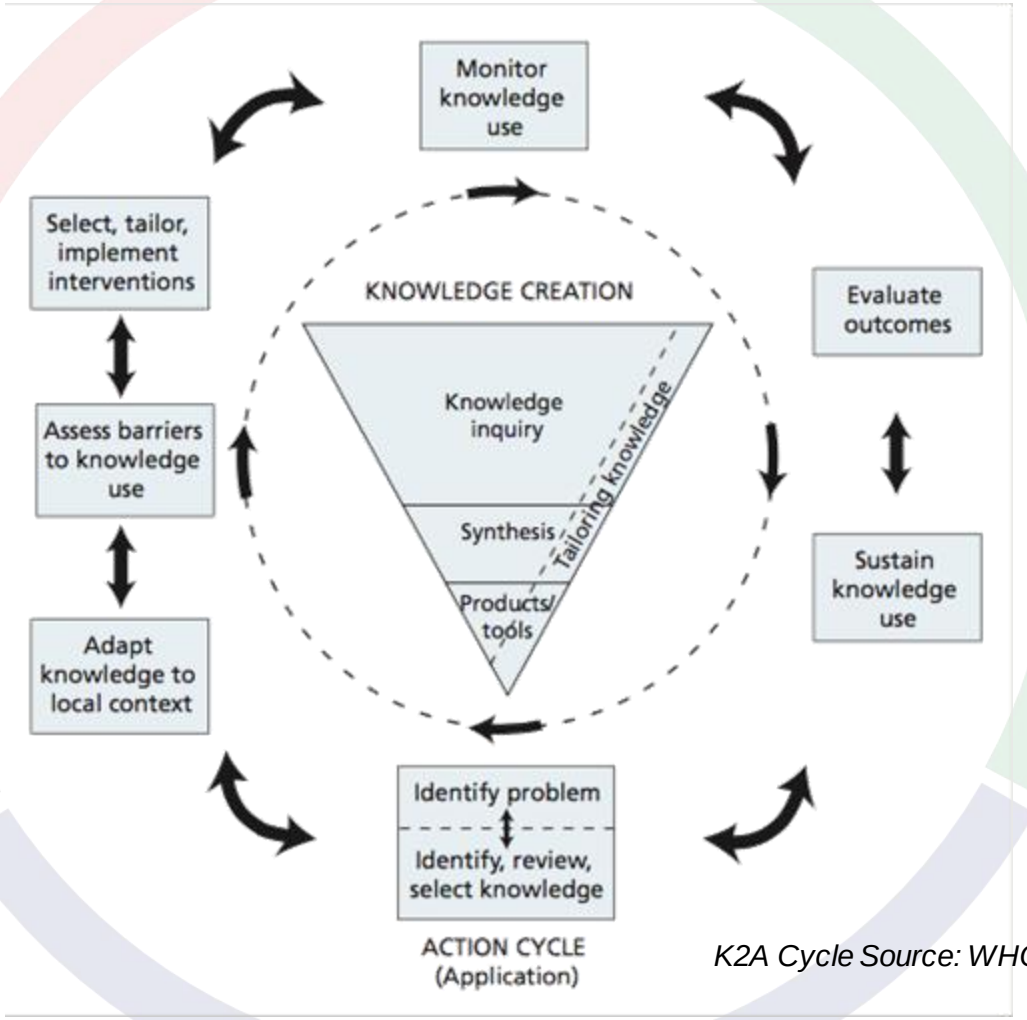
Discovery science Hypothesis generation

Basic Sciences



Rationale for Health Practitioners as Knowledge Brokers…



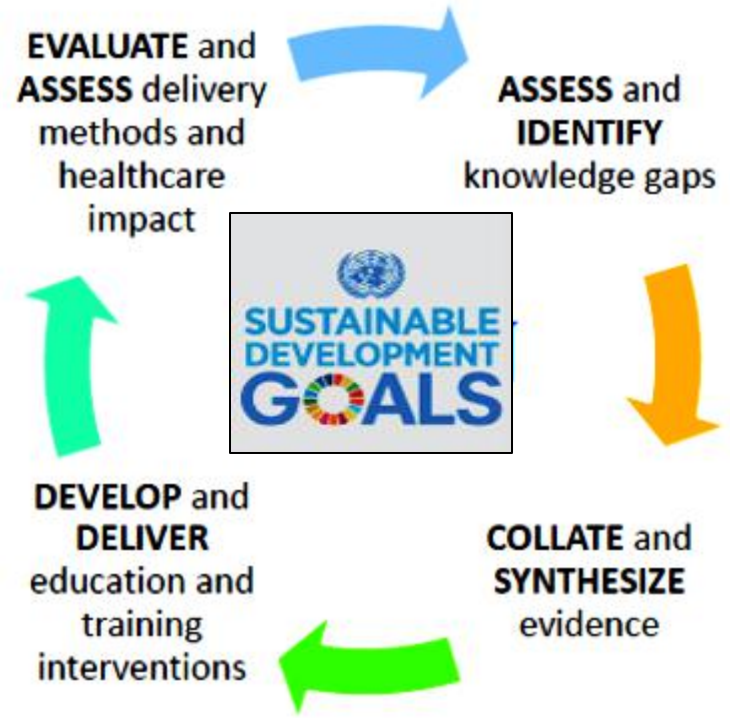


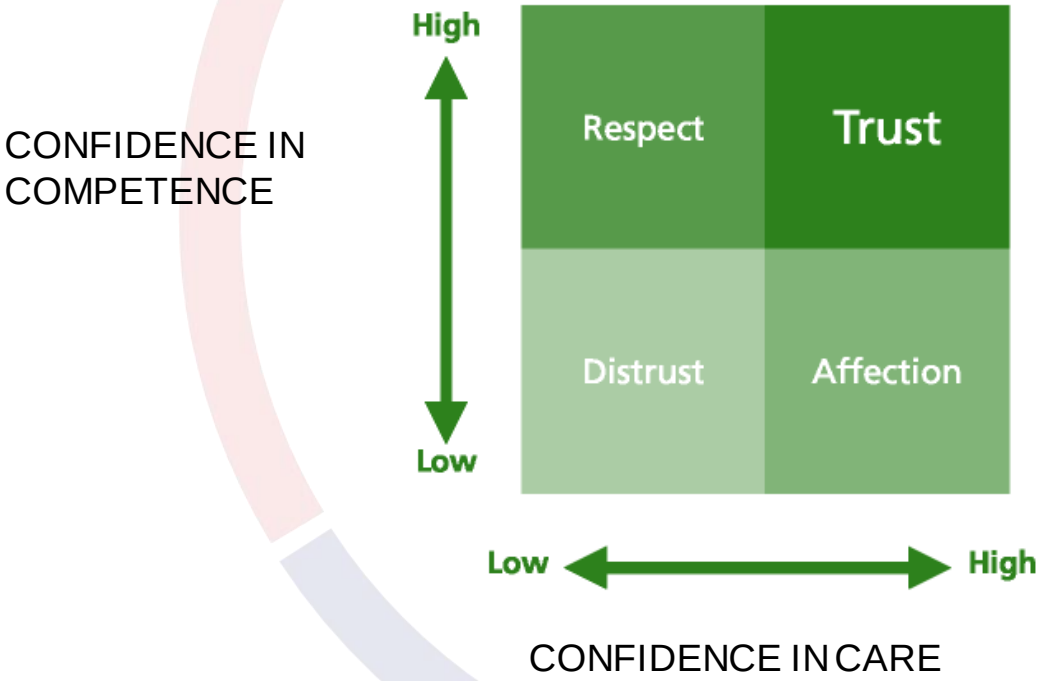
K2A Cycle Source: WHO

ADDRESSING NEEDS

UNITED NATIONS DECADE OF ACTION ON NUTRITION 2016-2025

To develop a critical mass of self-sustaining knowledge, skills and capacity in Nutrition and Health, within the global healthcare and public health workforce, resulting in significantly improved health practices and outcomes.

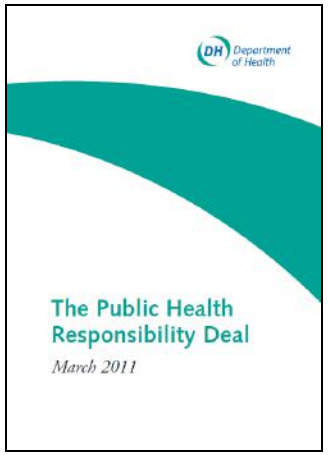


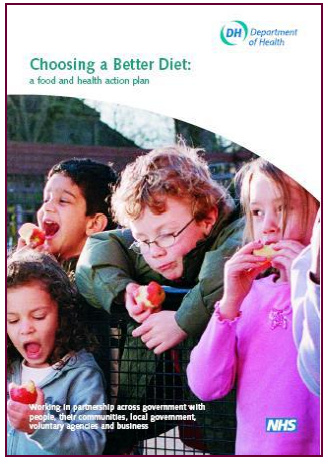


Population Nutrition Surveillance

NATIONAL DIET AND NUTRITION SURVEY

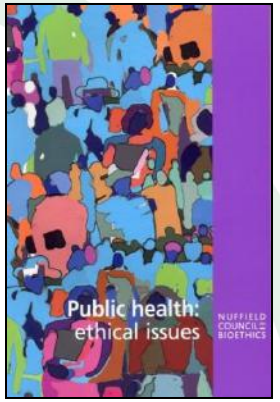
- **For monitoring progress against government targets eg salt, saturated fat**
- **For monitoring progress on diet and nutrition objectives of UK Health Departments, eg 'Choosing Health', 'The Public Health Responsibility Deal'**
- **To enable estimates to be made of compounds added to foods eg preservatives, colourings, flavourings**
- **To identify areas where further research is needed**





Public Health Intervention Ladder

- **Eliminate choice**
- **Restrict choice** - regulate to restrict the options available to people with the aim of protecting them
- **Guide choice through disincentives** – disincentives to influence people not to pursue certain activities
- **Guide choices through incentives** – regulations to guide choices by fiscal and other mechanisms
- **Guide choices through changing the default policy**
- **Enable choice** – supporting individuals to change their behaviors
- **Provide information** – inform and educate the public
- **Do nothing** or simply monitor the current situation



Public health: ethical issues, Nuffield Council on Bioethics, 2007

Global Policy

General Assembly of the United Nations
President of the 68th Session

Stage

19 Jun 2014 03:01:21

(Part 1) Prevention and control of non-communicable diseases - General Assembly: Informal interactive hearing with non-governmental organizations, civil society organizations, the private sector and academia (Original)

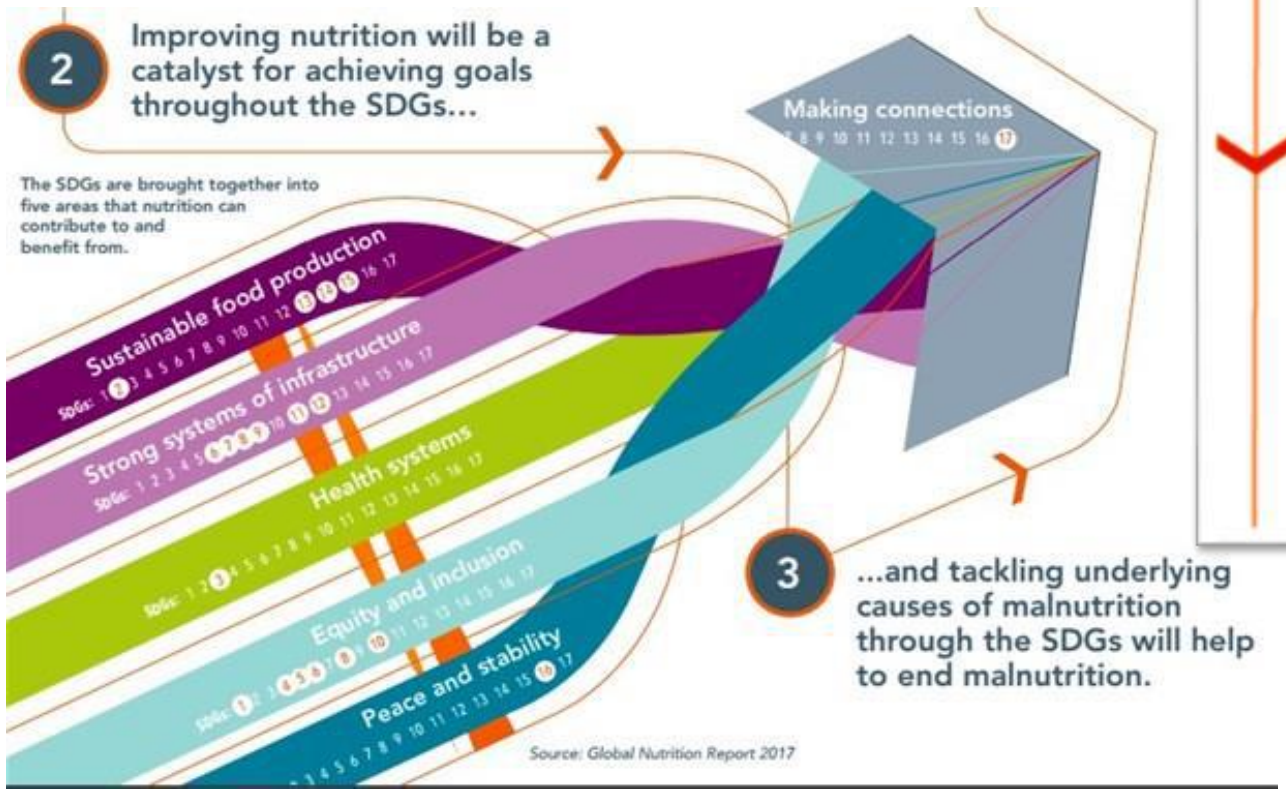
- Opening: Statements by the President of the General Assembly, the Secretary-General of the United Nations and the Assistant Director-General of the World Health Organization
- Round Table 1: "Enhancing international cooperation for NCDs:

19 Jun 2014 03:00:40

(Part 2) Prevention and control of non-communicable diseases - General Assembly: Informal interactive hearing with non-governmental organizations, civil society organizations, the private sector and academia (English)

- Round Table 2: "Mobilizing whole of society efforts for NCD prevention and control at national and regional levels: gaps, solutions, innovations and collaborative multi-sectoral partnerships, and fostering private sector and non-health sector

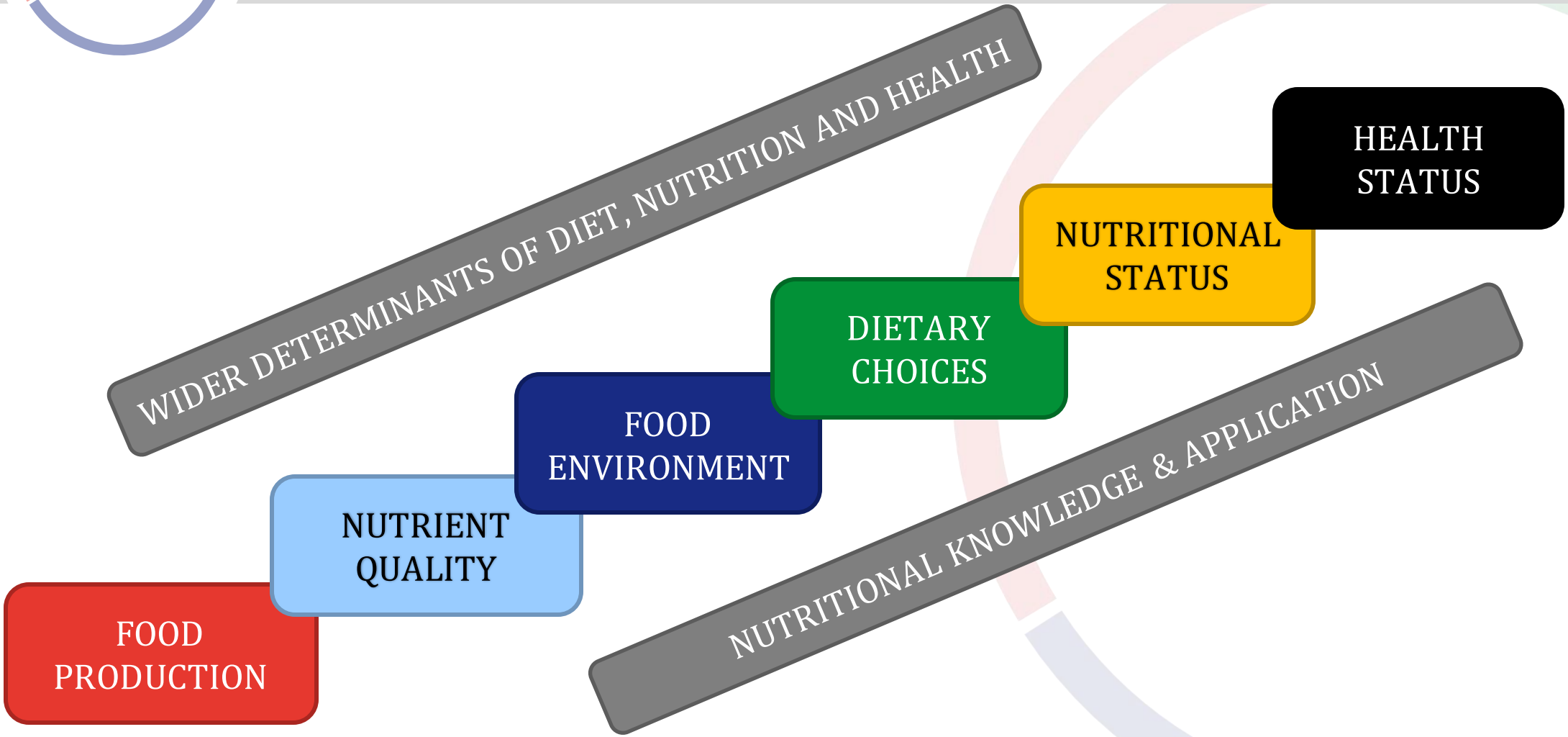
DEFINING THE NEED



GLOBAL NUTRITION REPORT

Nourishing the SDGs

CONCEPTUAL FRAMEWORK → STEP-LADDER FROM FOOD TO HEALTH…



Thank you

sr506@cam.ac.uk

Emily Fallon: Intro & Invitation to D-KAP

A quick survey

HTTP://SURVEYS.FAHS.SURREY.AC.UK/VITAMIN_D

Where is Nutrition Relevant in Healthcare

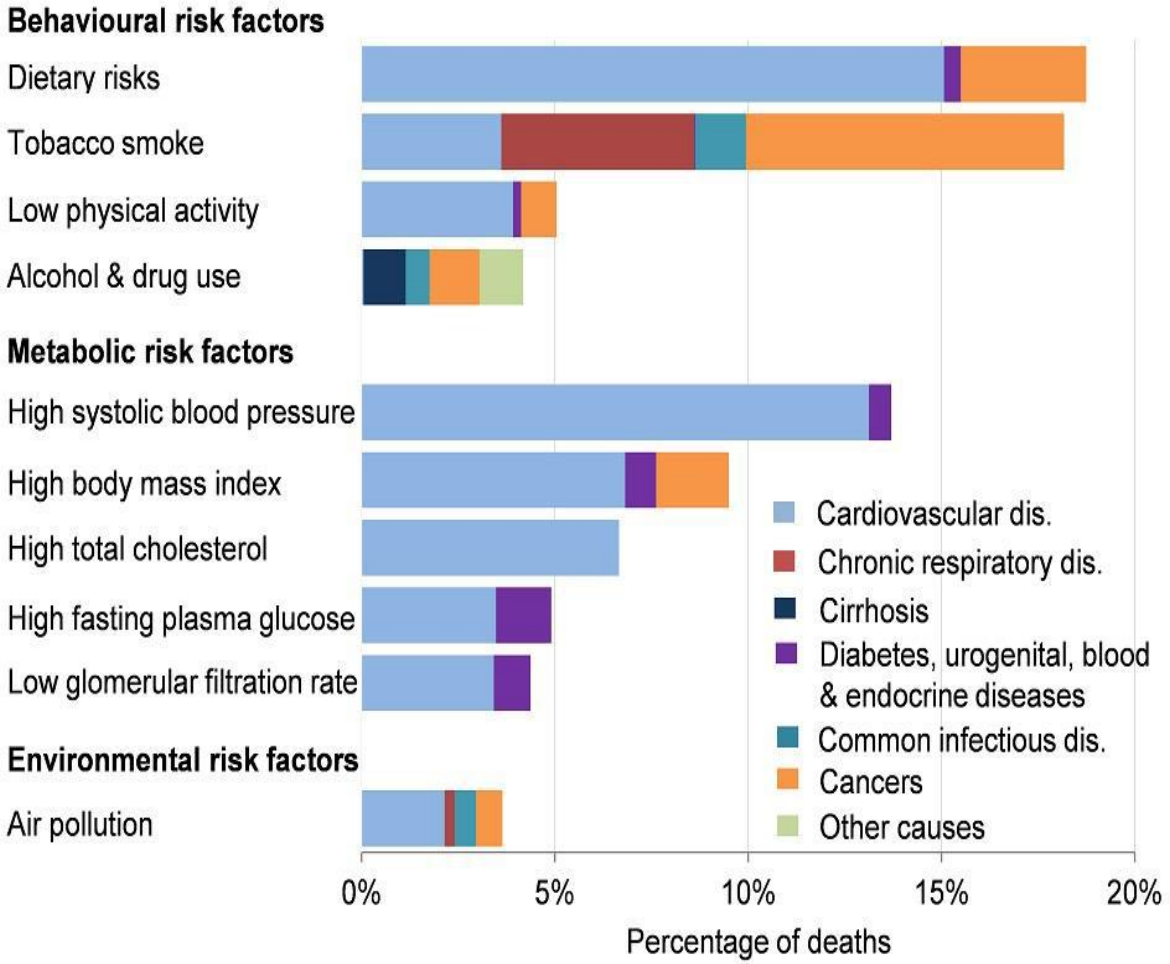
Elaine MacAninch RD

January 2019

“the NHS will take to strengthen its contribution to prevention and health inequalities”.

"Nutrition training, and an understanding of what is involved in achieving and maintaining a healthy weight, varies between medical schools. Together with the professional bodies and universities we will ensure nutrition has a greater place in professional education training."

RISK FACTORS AND CAUSES OF DEATH IN ENGLAND, 2013



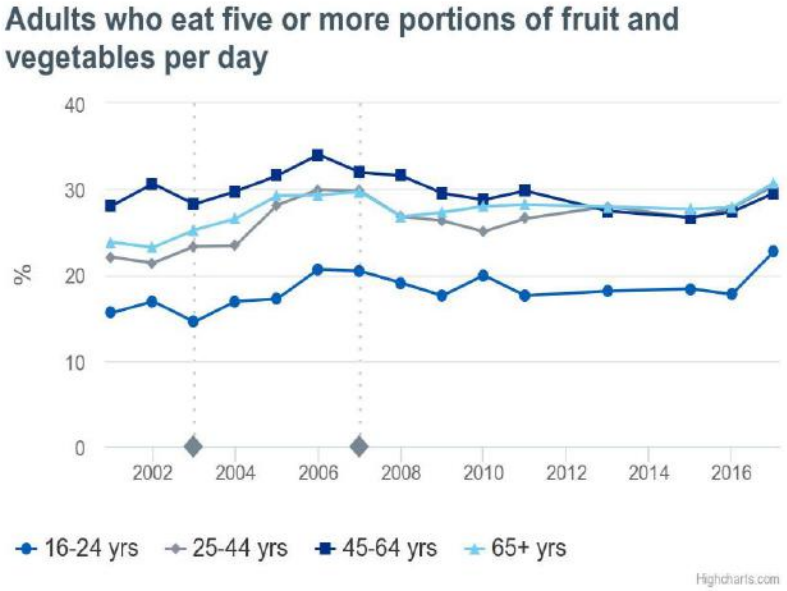
Dietary risk factors and tobacco smoke accounted 20% of deaths

For dietary risks, the majority of deaths were due to cardiovascular diseases

CVD prevalence reported in 22% of the lowest income quintile and 16% in the highest income quintile.

Global Burden of Disease 2013

WHAT ARE DIETARY RISKS?



Only 29% of adults ate five or more portions of fruit and vegetables a day.

18% of children aged between 5 and 15 ate five or more portions of fruit and vegetables a day.

Health Survey for England 2017

Public Health England

Food Standards Agency
food.gov.uk

National Diet and Nutrition Survey

Years 1 to 9 of the Rolling Programme (2008/2009 – 2016/2017): Time trend and income analyses

A survey carried out on behalf of Public Health England and the Food Standards Agency

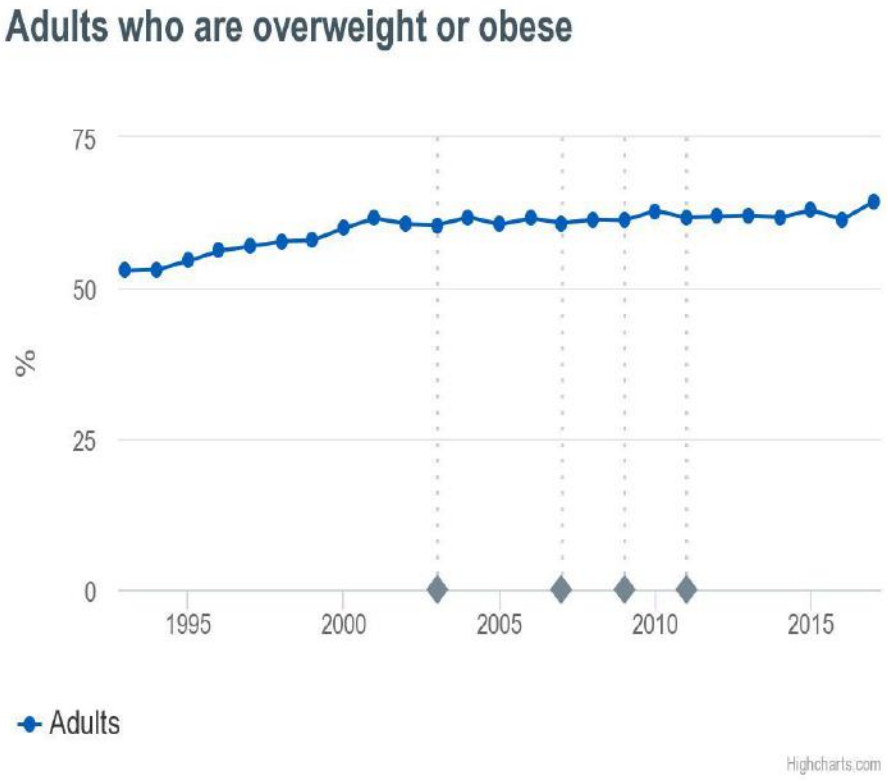
Nutritional intake significantly improved with higher income

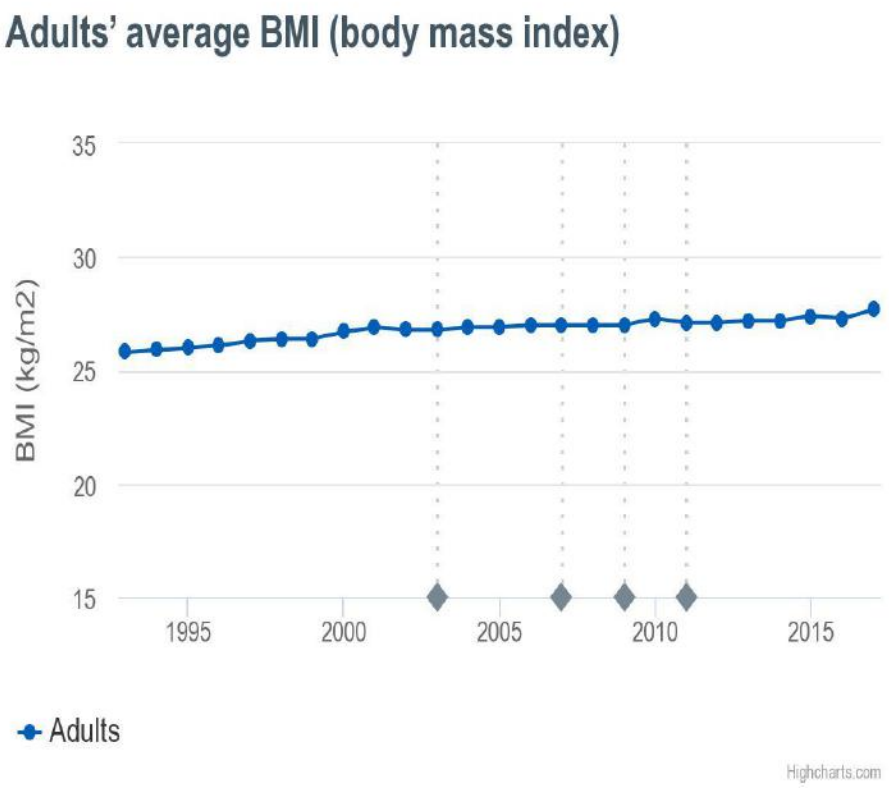
Sugar sweetened beverages and processed meat consumption is decreasing

Fibre is decreasing. Only 4% 11-18 year olds and 9% of adults meeting recommendations

57% of women had a low serum folate

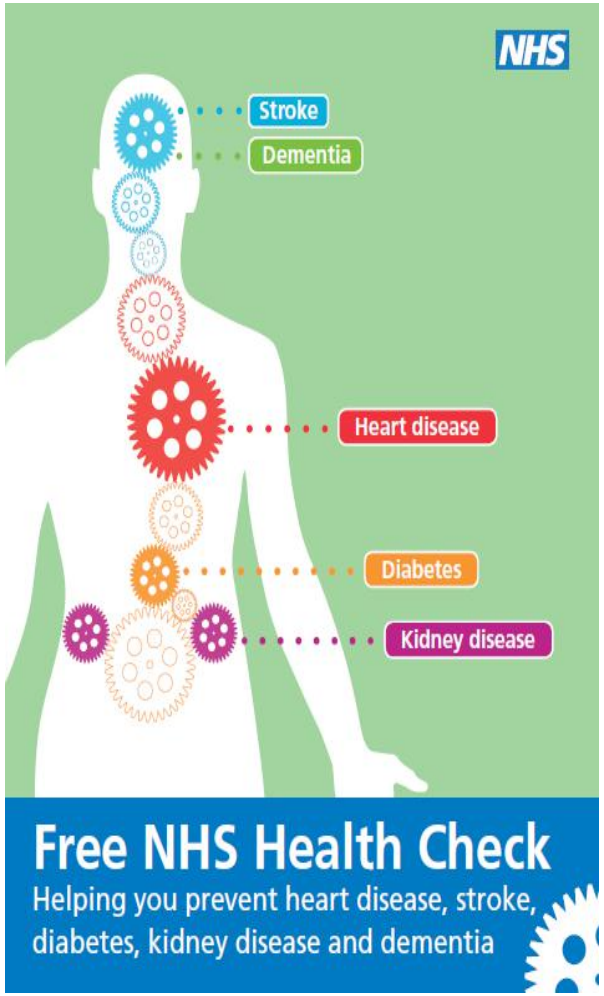
Dietary Vitamin D was low in all ages





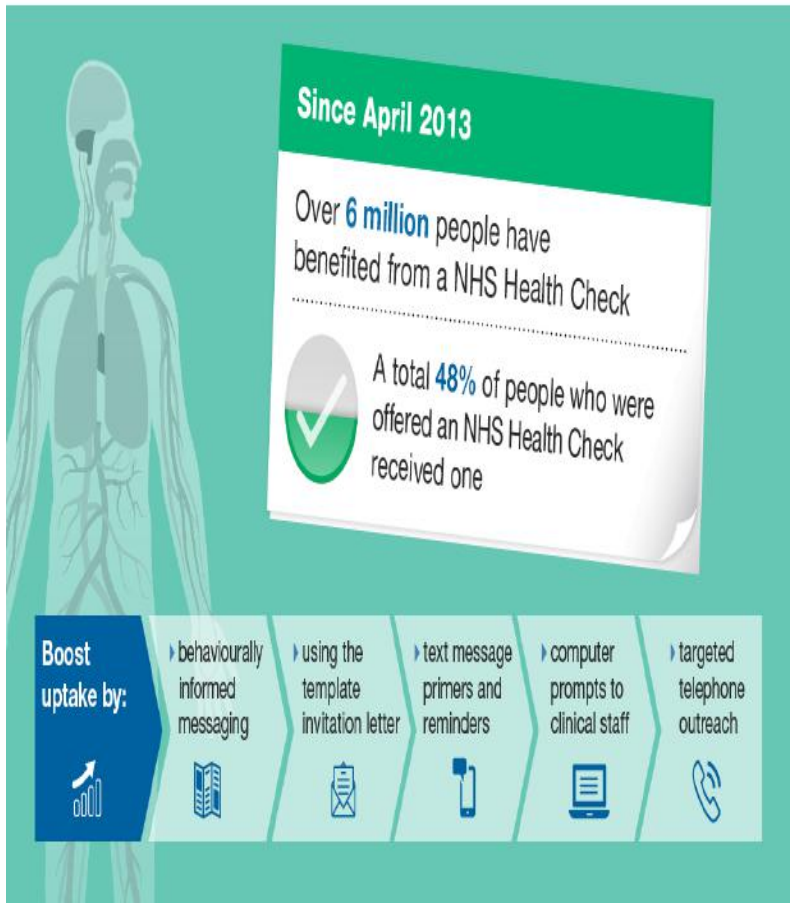
- In 2017, 64% of adults in England were overweight or obese.
- Being overweight or obese is associated with an increased risk for a number of common causes of disease and death including diabetes, cardiovascular disease and some cancers.

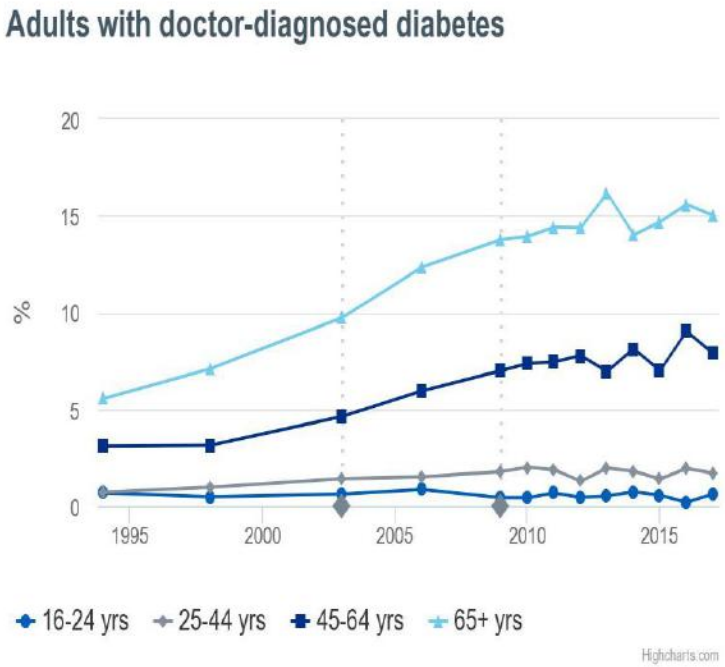
Health Survey for England 2017



Public Health England

Healthmatters





Doctor-diagnosed diabetes among adults has risen from 2.4% in 1994 to 6.5% in 2017.

Health Survey for England 2017

What about people that are not getting enough to eat?

Let's think about the impact of malnutrition in healthcare

1. Why may people be malnourished on admission to hospital?

2. How much of a clinical concern is this?

3. What can we do about this?

In groups spend a few minutes jotting down your answers

A SHORT QUIZ ☺

How many UK adults are affected by malnutrition?

a) 1 in 100
b) 1 in 20
c) 1 in 10

- B 1 in 20 (3 million adults in the UK) How close was your Answer?

1. How many people are malnourished on admission to hospital?

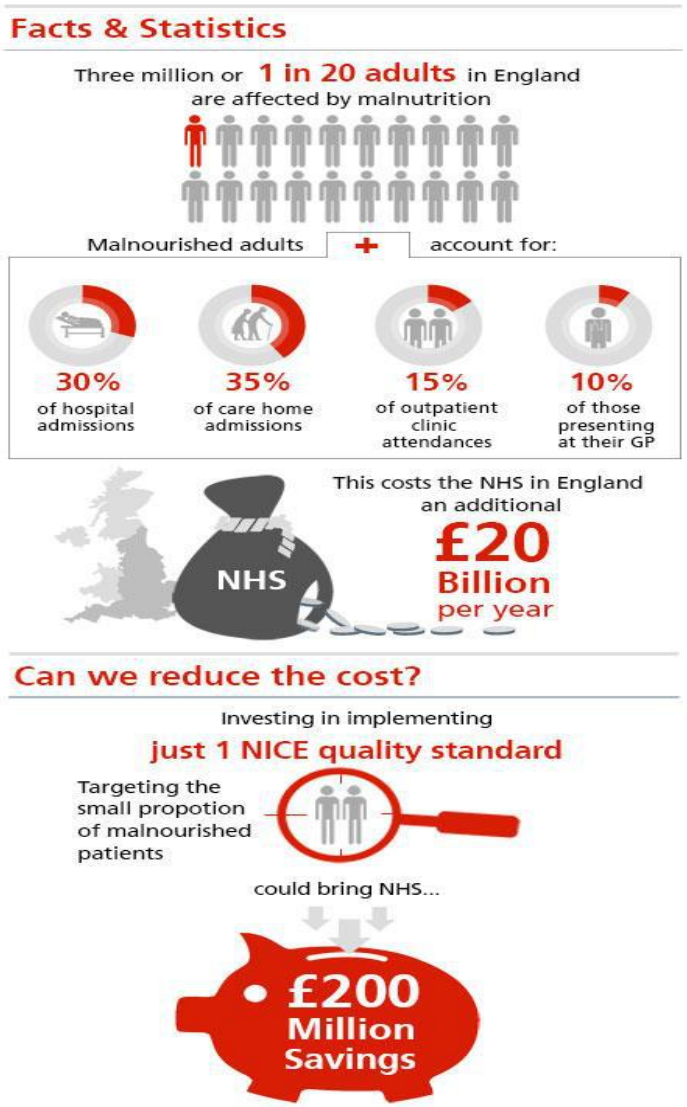
a. 1 in 2
b. 1 in 3
c. 1 in 5
d. 1 in 10

- B. 1 in 3 Does this reflect what you are seeing in your daily practice

3. Your patient with pressure sore damage has a BMI of 40 (120kg, 19 stone) with unintentional weight loss of 15kg in the last 3 months. What is his nutritional risk?

a. Over nutrition risk
b. Low risk of malnutrition
c. Medium risk of malnutrition
d. High risk of malnutrition

- d. High risk of malnutrition we will learn more about this later..



Source:
The cost of malnutrition in England and potential cost savings from nutritional interventions

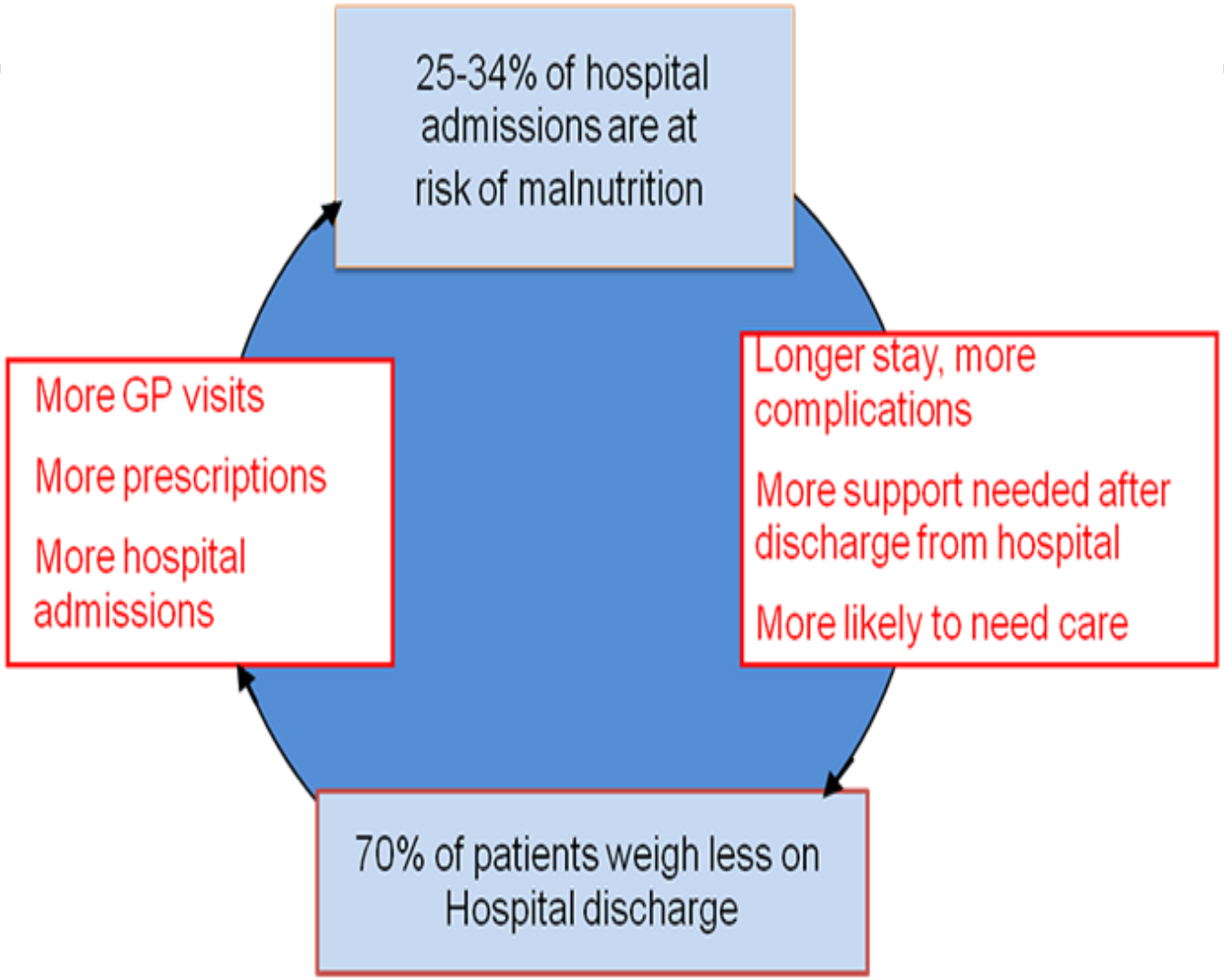
Marinos Elia
on behalf of the Malnutrition Action Group of BAPEN and the National Institute for Health Research Southampton Biomedical Research Centre

Where do we see nutritional problems in healthcare?

- Critical & Acute Care
- Dementia
- Diabetes
- Eating Disorders
- Cancer / oncology
- Stroke
- Elderly medicine
- Orthopaedics (falls & fractures)
- Paediatrics
- Irritable Bowel Syndrome
- Learning Disabilities
- Malnutrition
- Mental Health
- Neurosciences
- Obesity
- Public Health
- Renal

WHY MAY PATIENTS BECOME MALNOURISHED IN HOSPITAL?

The Malnutrition Carousel



Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: http://www.elsevier.com/locate/clnu

Original article

Malnutrition in healthcare institutions: A review of the prevalence of under-nutrition in hospitals and care homes since 1994 in England

Sumantra Ray [a,*], Celia Laur [b], Rajna Golubic [c]

[a] Cambridge University Hospitals, Cambridge, United Kingdom
[b] Need for Nutrition Education Programme, Cambridge, United Kingdom
[c] St. John's College, Cambridge University, United Kingdom

ARTICLE INFO

Article history:
Received 5 February 2013
Accepted 27 October 2013

Keywords:
Hospitals
Care homes
Malnutrition
Under-nutrition
Prevalence
Incidence

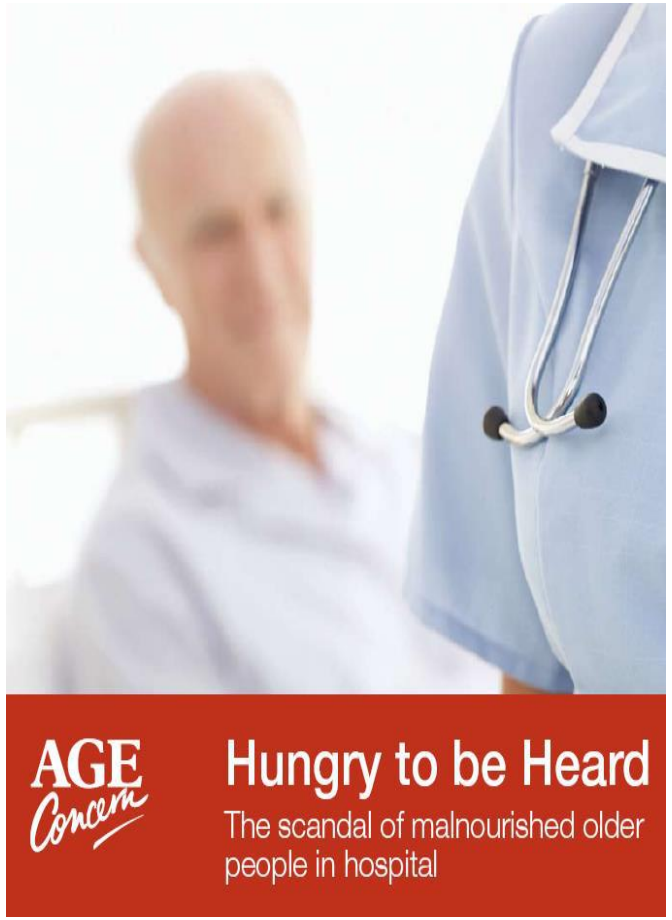
SUMMARY

Background & aims: One in four hospital patients in the UK are estimated to be affected by 'hospital malnutrition' (under-nutrition). There is a need for robust epidemiological data relating to the frequency, distribution and determinants of this clinical problem of public health importance. This review aims to undertake a narrative synthesis of data on the descriptive epidemiology of under-nutrition, and to address some of the methodological limitations.

Methods: A methodical review of literature was undertaken, tracking the reported prevalence and incidence of under-nutrition in hospital, in the UK, since 1994.

Results: The 16 articles retrieved and reviewed demonstrate that nutrition in hospital is a long standing problem in UK hospitals and care homes. The existing literature is comprised mainly of cross-sectional surveys describing the prevalence of under-nutrition in hospital which ranges from 11 to 45%. There is considerable heterogeneity in the published literature on hospital malnutrition (under-nutrition) and very few studies either measure or have estimated incidence.

Conclusions: Under-nutrition in hospital continues to be under-addressed, yet a major public health problem in the UK. Defining the descriptive epidemiology of this problem is one of the first steps towards understanding its aetiology or planning and evaluating appropriate prevention or treatment strategies.



"…. Six out of 10 older people are at risk of becoming malnourished, or their situation getting worse, in hospital. Malnourished patients stay in hospital for longer, are three times as likely to develop complications, during surgery, and have a higher mortality rate than well-fed patients…"

Starving to death on NHS wards?
By Michelle Roberts
Health editor, BBC News online
9 January 2017

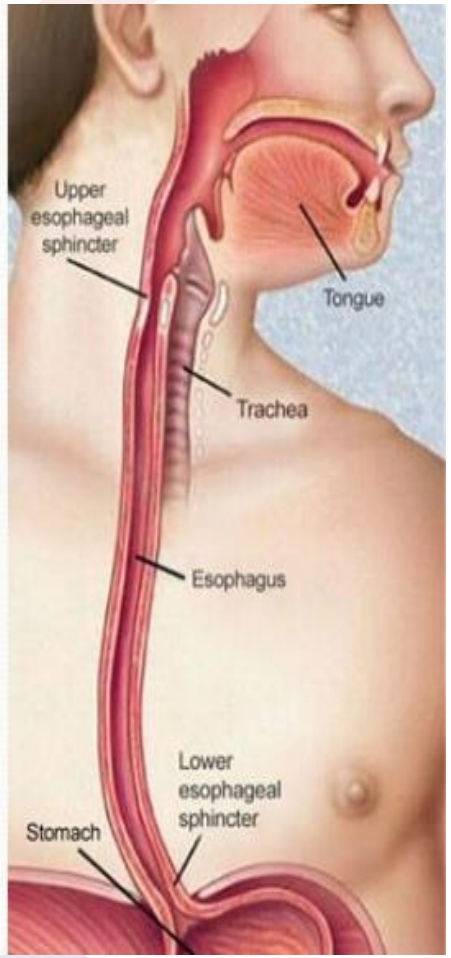
The data for England and Wales shows that in 2015, hunger and/or dehydration were a factor in 828 patient deaths in hospitals and care homes.

COMMON CAUSES OF UNDERNUTRITION

- Reduced intake
- Reduced absorption
- Increased requirements

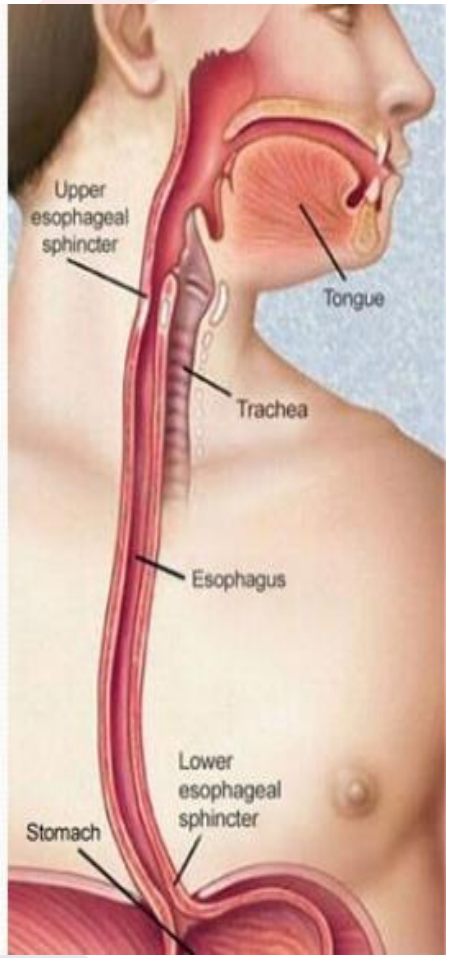
COMMON CAUSES OF UNDERNUTRITION

- Reduced intake
  - Nil by mouth
  - Anorexia
    - Chemotherapy/ Medications
    - Cancer, infection or inflammation
  - Poor dentition
  - Change in taste or smell
  - Dysphagia



COMMON CAUSES OF UNDERNUTRITION

- Reduced absorption
  - Reduced secretions
    - Bile
    - Pancreatic
  - Damage to absorptive GI surfaces
    - IBD
  - Surgical GI resections
  - Fistulae



COMMON CAUSES OF UNDERNUTRITION

- Increased requirements
  - Infection
  - Surgery
  - High outputs
    - Urine, bowels or drains
  - Burns

Malnutrition is both cause and a consequence of disease

PHYSICAL

Disease related malnutrition

Mobility

Feeding

Swallowing

Low activity

Decreased organ reserve

Specific disease

Multiple drugs taste)

Alcohol

PSYCHOLOGICAL

Depression/bereavement

Dementia

SOCIAL

Isolation

Poverty

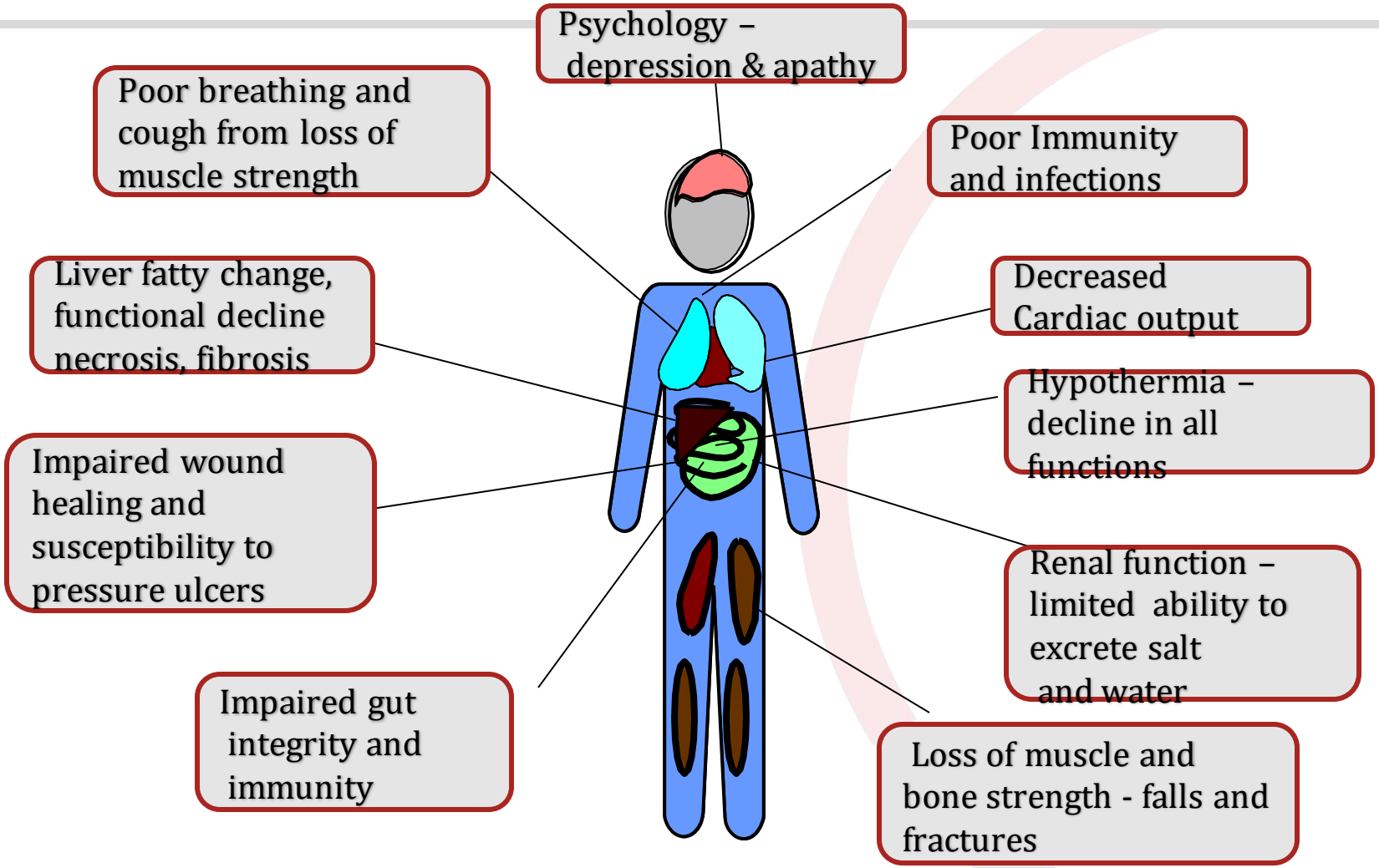
MALNUTRITION TASK FORCE

Source Malnutrition Task Force

EXAMPLES OF DISEASES/CONDITIONS

- Cancer
- Chronic Obstructive Pulmonary Disease
- Heart failure
- Gastrointestinal disorders such as Crohns disease, liver disease, coeliac disease
- Neurological conditions such as stroke, Motor Neurone Disease, Parkinsons Disease, multiple sclerosis, dementia
- Burns, surgery or trauma
- Mental health conditions (such as depression and psychosis)

How much of a clinical concern do you think this is?


Psychology – depression & apathy
Poor breathing and cough from loss of muscle strength
Poor Immunity and infections
Liver fatty change, functional decline necrosis, fibrosis
Decreased Cardiac output
Hypothermia – decline in all functions
Impaired wound healing and susceptibility to pressure ulcers
Renal function – limited ability to excrete salt and water
Impaired gut integrity and immunity
Loss of muscle and bone strength - falls and fractures

CONSEQUENCES OF MALNUTRITION

Malnourished people:

- saw their GP twice as often,
- had 3 times the number of hospital admissions and
- stayed in hospital more than 3 days longer than those who were well nourished

guardian.co.uk

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News › Society › Older people

Elderly leave hospital malnourished

Figures show more hospital patients malnourished on departure from hospital than on arrival

Comments (5)

Buzz up!

Owen Bowcott
guardian.co.uk, Friday 22 January 2010 07.00 GMT
Article history

Age Concern and Help the Aged claims that six out
to hospital are at risk of becoming malnourished or
Vieira/PA

The number of patients leaving hospital with
record levels over the past year, according t
NHS.

Those affected are primarily the elderly, many of whom are already in a frail condition when admitted for treatment. Failure to ensure that they eat properly while in hospital and to improve the nutritional quality of

Telegraph.co.uk

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HOME > HEALTH > HEALTH NEWS

Thousands of patients leave hospital malnourished

Almost 200,000 NHS patients left hospital malnourished last year, it has emerged, raising questions about food standards on wards.

tor
2010

nservatives have found that the number of
rished has risen by record levels in the last

se in the numbers discharged from wards in a
ear.

gures showed that more people left hospital
urished than went in with the problem, which
nservatives branded a "scandal".

of help with eating has been a major source of
laint in the NHS and has been consistently
by regulators despite the introduction of
es such as red trays to highlight which
ble patients need assistance with food.

fficials said the issue was complex and
ishment could arise as a complication of the
ng illness rather than lack of care, for
l e cancer patient may lose their appetite while
t in treatments.

s id that patient care does not stop because
re discharged from hospital and many receive

nts find the food in hospitals lacking in
ent

Almost 10,000 patients who went into hospital healthy last year were malnourished by the time they left.

DEBATE: IS OUR TREATMENT OF ELDERLY PATIENTS A NATIONAL DISGRACE

This was on top of the 175,000 who went
tal underfed and who were discharged in the same state.

ng figures – described as "scandalous" by charities for the elderly – expose the
nt's failure to tackle the problem more than two years after promising to take action.

ures obtained by the Conservatives reveal that last year saw the largest number of
eave hospital malnourished and the largest number of healthy patients becoming
hed during their stay.

Doctors have repeatedly warned that without good nutrition, patients are at higher risk of catching infections and developing complications following operations.

But an alarming number do not receive proper nourishment, either because they are unable to eat the food and need nurses to help or because they find the food unpalatable.

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Health News
Elder Health
Rebecca Smith
News
UK News

Pons
Retirement
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"Doctors have repeatedly warned that without good nutrition, patients are

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Hard to stomach: A record 10,000 hospital patients hit by malnutrition

By DANIEL MARTIN
Last updated at 10:23 AM on 22nd January 2010

Comments (34) | Add to My Stories

At least 10,000 patients left hospital last year after becoming malnourished while under NHS care - the highest number on record.

Official NHS figures show that in 2008/09 175,003 patients were victims of malnutrition or another nutritional difficulty when they were admitted to hospital.

But 185,446 were suffering the same conditions when they were discharged.

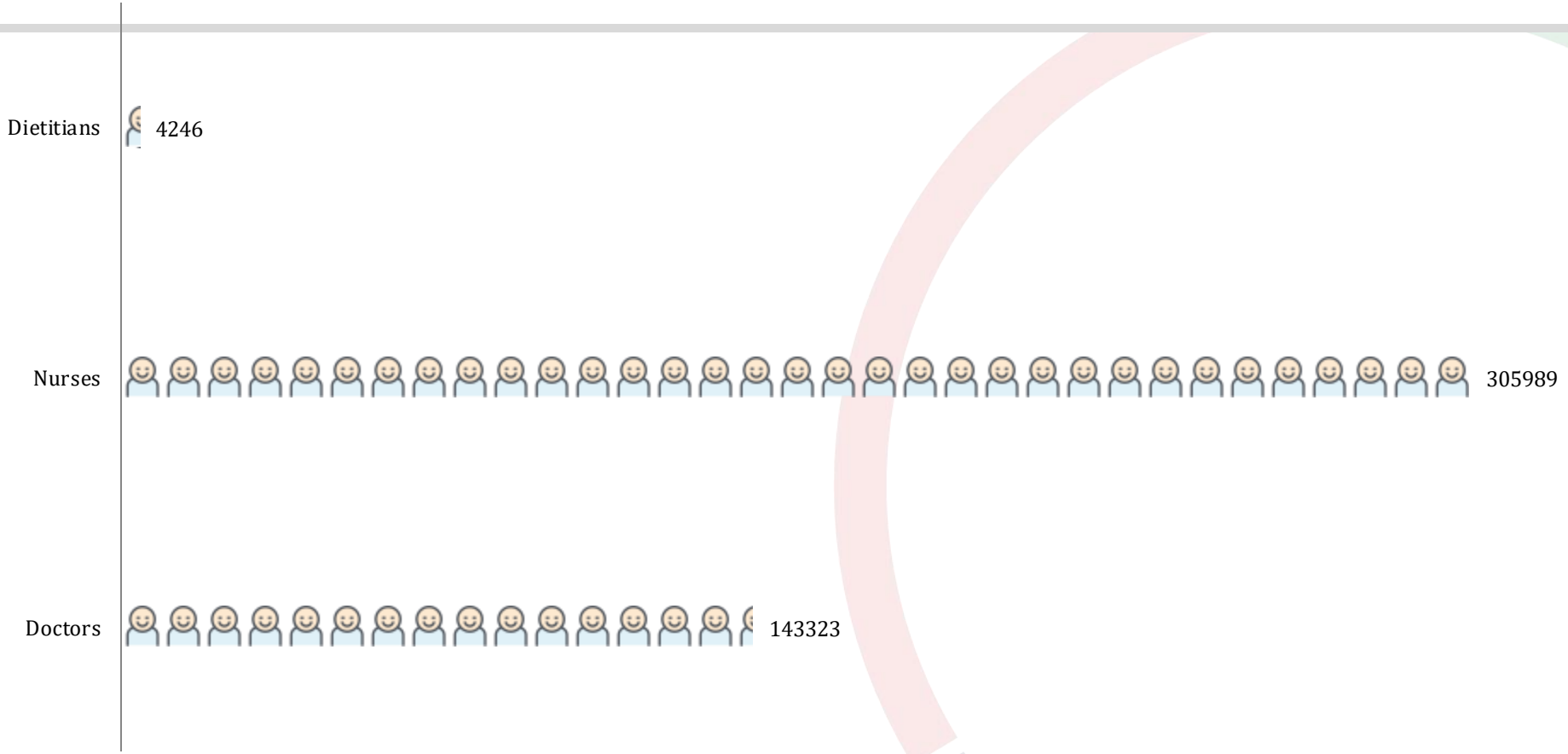
Slide kindly supplied by Rhonda Smith

“The surgery went well but her recovery was poor as she was not eating or drinking. Her family were concerned that she was dehydrated as she was not being given regular fluids and there was no fluid chart even though she was on IV. Her nutrition was also
poor and caused her weight to plummet”.
The patient died.

Source
: Independent case notes review Mid Staffordshire Foundation Trust Inquiry:
January 2005 – March 2009

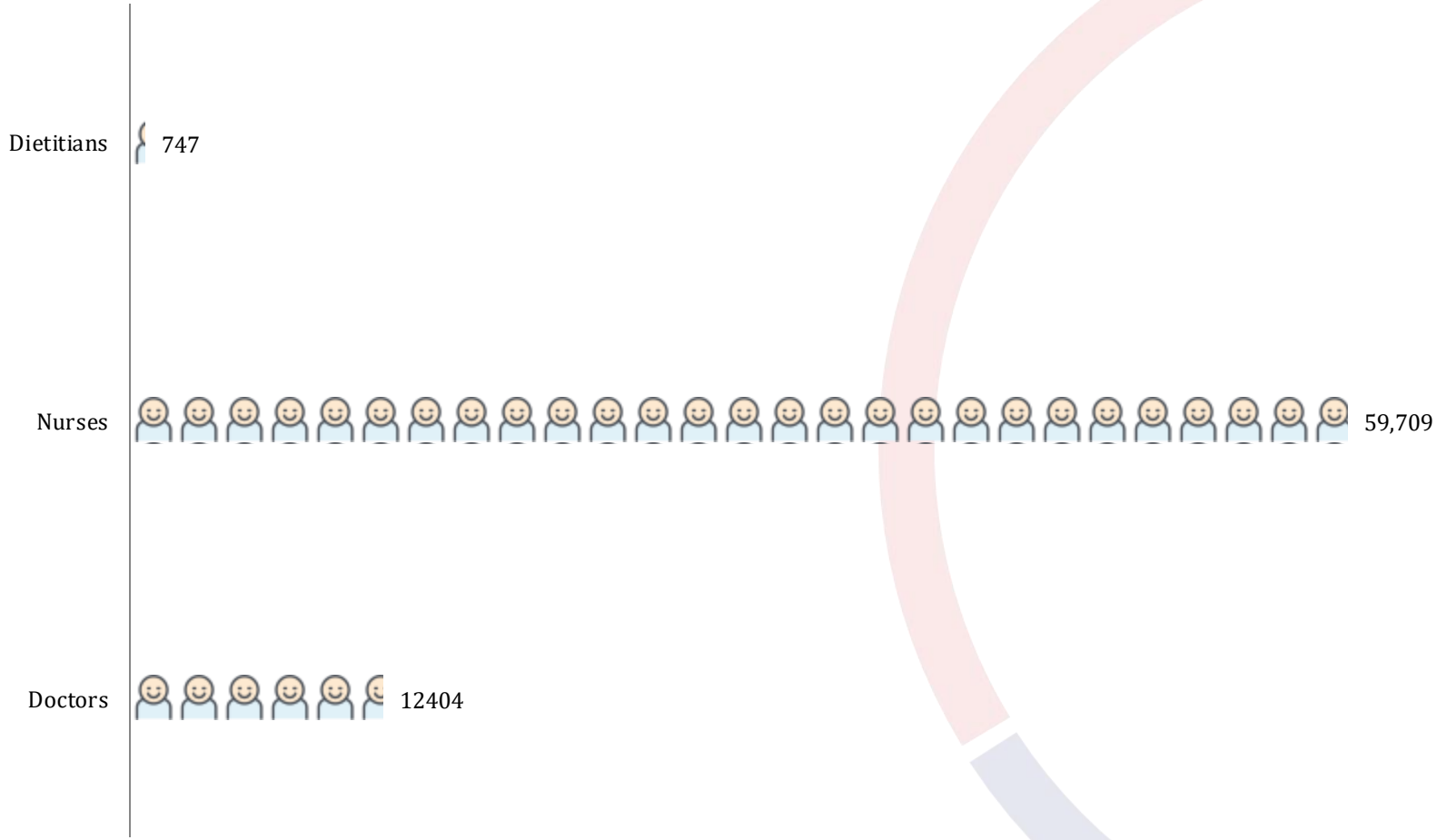
WHAT IS A DOCTOR/ NURSES/ DIETITIANS ROLE?

Number of Doctors, Nurses and Dietitians in England and Wales



Source NHS Digital NHS and Primary care workforce statistics

Number of Doctors, Nurses and Dietitians in Scotland



Source National Records of Scotland **NHS Central Register (NHSCR)**

Doctors & Nurses

- GMC

14. Nutritional assessment

Making an assessment of the patient's state of nutrition. This includes an evaluation of their diet; their general physical condition; and measurement of height, weight and body mass index.

- NMC

Use evidence-based, best practice approaches for meeting needs for care and support with nutrition and hydration, insert, manage and remove-oral/nasal/gastric tubes

manage artificial nutrition and hydration using oral, enteral and parenteral routes

manage the administration of IV fluids - manage fluid and nutritional infusion pumps and device

Nutrition Screening and Assessment

Dr Luke Buckner

Screening ≠ Assessment

Nutritional screening

- A rapid, simple and general initial evaluation
- Detect significant risk of malnutrition and to implement a clear plan of action

Nutritional assessment

- A more detailed, specific, and more in-depth evaluation of nutritional status by an expert
- Allows specific dietary plans to be implemented, often for more complicated nutritional problems

NUTRITIONAL SCREENING TOOLS

Important Characteristics of a Screening Tool for Malnutrition

Practical

- Quick & easy to complete / range of alternate measures

Universal

- All adults (including elderly) / settings (acute, primary care, nursing home)

Reliable

- Reproducibility between users

Valid & Evidence-based

- Content, internal, concurrent & predictive validity

Linked to a care plan for treatment

- Facilitates staff to initiate appropriate monitoring & referral to dietitian

Acceptable to patients and health care team

Nutritional Screening Tools

Most widely used:

- Malnutrition Universal Screening Tool (MUST)
- Mini Nutritional Assessment (MNA)
- Subjective Global Assessment (SGA)

NUTRITIONAL SCREENING TOOLS - 'MUST'

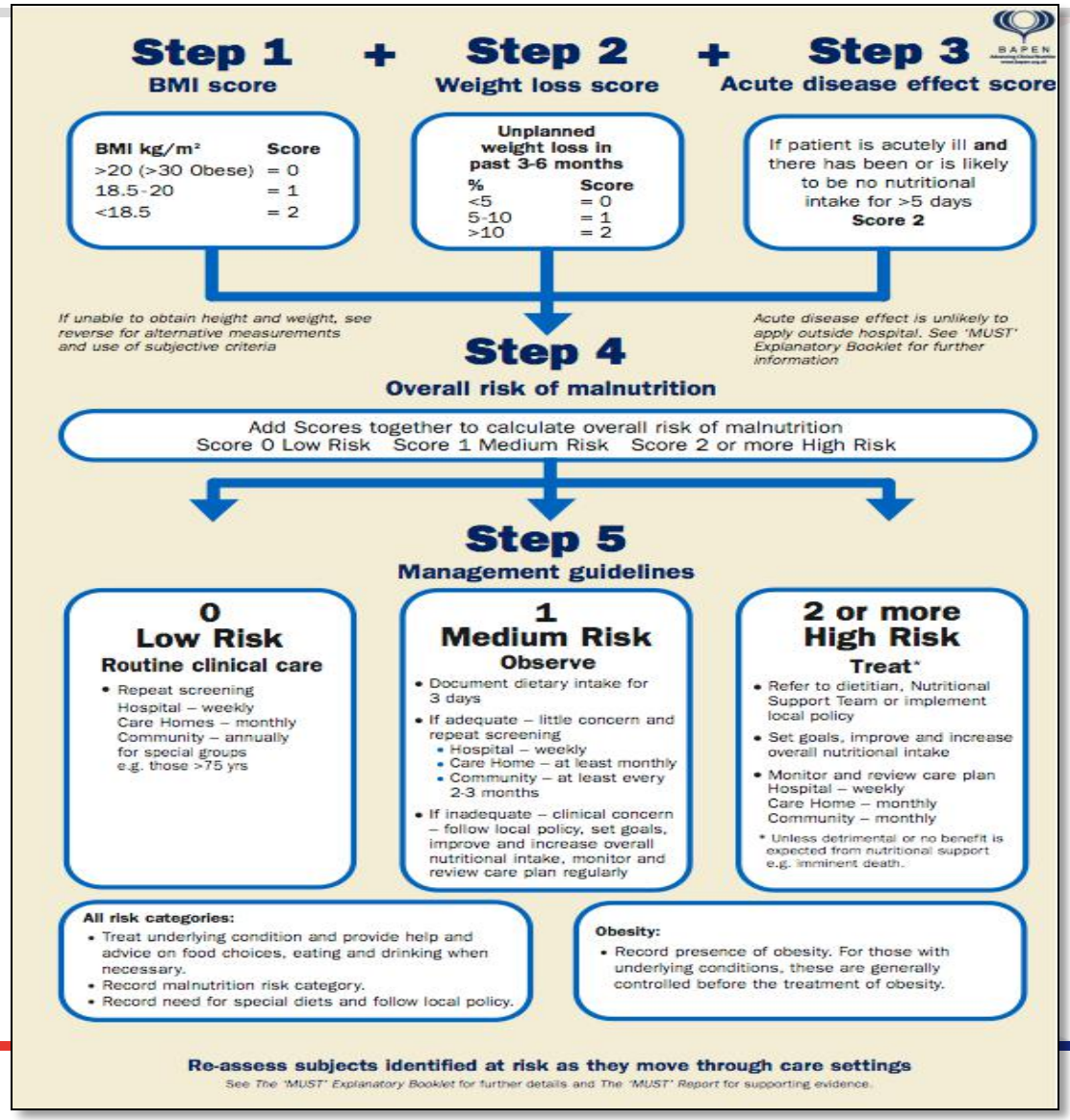
http://www.bapen.org.uk/must

- Developed by BAPEN*[1]
- Supported by the BDA and RCP
- Identifies risk of malnutrition / obesity, not specific vitamin or mineral deficiencies
- Provides management guidelines for a care plan

*BAPEN; British Association Of Parenteral and Enteral Nutrition

1. Elia et al., 2003


BAPEN
Advancing Clinical Nutrition
'Malnutrition Universal Screening Tool'
MAG
Malnutrition Advisory Group
A Standing Committee of BAPEN


Step 1
BMI score
+
Step 2
Weight loss score
+
Step 3
Acute disease effect score
BMI kg/m²
Score
>20 (>30 Obese) = 0
18.5-20 = 1
<18.5 = 2
Unplanned weight loss in past 3-6 months
%
Score
<5 = 0
5-10 = 1
>10 = 2
If patient is acutely ill and there has been or is likely to be no nutritional intake for >5 days
Score 2
If unable to obtain height and weight, see reverse for alternative measurements and use of subjective criteria
Acute disease effect is unlikely to apply outside hospital. See 'MUST' Explanatory Booklet for further information
Step 4
Overall risk of malnutrition
Add Scores together to calculate overall risk of malnutrition
Score 0 Low Risk Score 1 Medium Risk Score 2 or more High Risk
Step 5
Management guidelines
0
Low Risk
Routine clinical care
• Repeat screening
Hospital – weekly
Care Homes – monthly
Community – annually
for special groups
e.g. those >75 yrs
1
Medium Risk
Observe
• Document dietary intake for 3 days
• If adequate – little concern and repeat screening
• Hospital – weekly
• Care Home – at least monthly
• Community – at least every 2-3 months
• If inadequate – clinical concern – follow local policy, set goals, improve and increase overall nutritional intake, monitor and review care plan regularly
2 or more
High Risk
Treat*
• Refer to dietitian, Nutritional Support Team or implement local policy
• Set goals, improve and increase overall nutritional intake
• Monitor and review care plan
Hospital – weekly
Care Home – monthly
Community – monthly
* Unless detrimental or no benefit is expected from nutritional support e.g. imminent death.
All risk categories:
• Treat underlying condition and provide help and advice on food choices, eating and drinking when necessary.
• Record malnutrition risk category.
• Record need for special diets and follow local policy.
Obesity:
• Record presence of obesity. For those with underlying conditions, these are generally controlled before the treatment of obesity.
Re-assess subjects identified at risk as they move through care settings
See The 'MUST' Explanatory Booklet for further details and The 'MUST' Report for supporting evidence.

NUTRITIONAL SCREENING
(DOCTOR / NURSE / OTHER HCP)

Who is responsible?

Refer at risk patients to dietitian

±

Refer at risk patients to SLT (dysphagia)

Nutritional Assessment
(dietitian / doctor / trained HCP)

NUTRITIONAL ASSESSMENT

A full assessment of nutritional status considers:

- **A Anthropometry**
- **B Biochemistry and Haematology**
- **C Clinical assessment**
- **D Dietary assessment**
- **E Extra factors, including social/psychosocial factors**

NUTRITIONAL ASSESSMENT

ANTHROPOMETRY

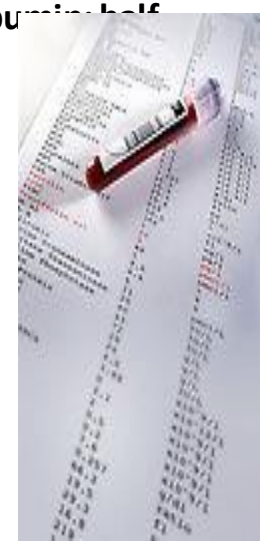
- **The measurement of the human body; includes weight, height, body composition**
- **Reflection of nutritional status: lean body mass (LBM), fat stores and body water**

Protein Status (LBM)	Fat Stores	Body Water
Mid-arm muscle circumference	BMI	Bioelectrical impedance
Grip Strength	Triceps skinfold thickness	Biochemistry
Nitrogen balance	Waist circumference	Fluid balance charts / Oedema
	Bioelectrical impedance	Rapid weight change

NUTRITIONAL ASSESSMENT

BIOCHEMISTRY

Blood	**Hematological parameters**
	Serum proteins (Albumin; half-life 21d, Pre-albumin; half-life 2d)
	Urea & Creatinine
	Potassium, Phosphate, Magnesium
	Calcium, Albumin, Vitamin D, PTH
	CRP & ESR
	WCC
Urine	**Urinary Sodium loss (salt depletion)**
	Urinary Urea Nitrogen (Nitrogen balance)



NUTRITIONAL ASSESSMENT

CLINICAL

- **Acute or chronic illness can have an impact on nutritional status, *directly* (due to disease effects) and *indirectly* (effects on food intake)**

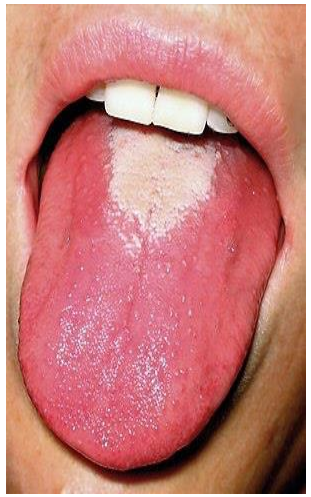
Increased nutrient requirement	Increased nutrient losses	Impaired nutrient ingestion, digestion or absorption
•Metabolic response to trauma/ injury •Metabolic cost of injury repair •Sepsis/ infection •Involuntary activity e.g. tremors/spasms	Due to: •Vomiting •Diarrhoea •Renal excretion •Surgical drains •Bleeding •Wound/fistula exudates	Due to: •Dysphagia •Anorexia •Impaired digestive enzymes •Loss of absorptive surface (e.g. bowel resection, IF) •Unconsciousness/post surgical complications

NUTRITIONAL ASSESSMENT

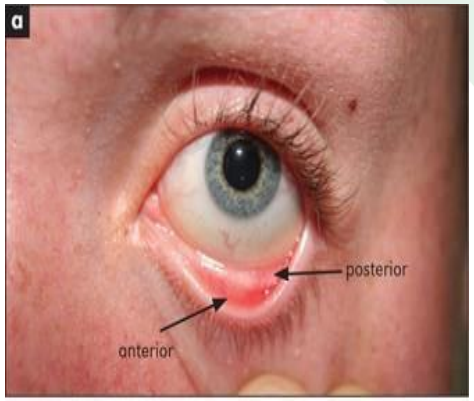
DIETARY

- Assesses the quality and quantity of the usual and current dietary intake – diet history, diaries, 24h recall, FFQ
- Evaluates reasons for any changes in dietary habit – social, financial, education, cultural
- Provides information about *energy* and *protein* intake, and specific nutrients such as *iron, calcium, potassium* and *phosphate* depending on clinical condition

Nutritional Assessment
Physical Assessment



- Clinical assessment looking for signs of malnutrition
  - Anaemia [Iron and B vitamin deficiencies]
    - Pallor
    - Angular cheilitis
    - Glossitis



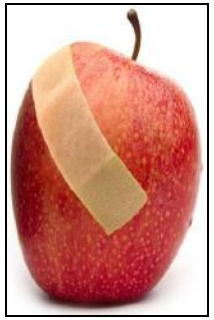
Nutritional Screening & Assessment: Role of the Doctor/HCP

Doctors have a responsibility for

- **Ensuring the nutritional screening is carried out, understanding the score and incorporating nutrition into management.**
- **Documenting the results of screening in the medical notes**
- **Referral to dietitian as appropriate for nutritional assessment**
- **Carrying out nutritional assessment when appropriate**
  - **anthropometry, biochemistry, clinical, physical**
- **Work as part of MDT**

WHAT CAN YOU DO?

- **Be a nutrition champion!**
- Check nutrition screening scores (MUST)
- Malnutrition can begin within the community but be found in hospital



NNEdPro

Cambridge Summer School in Applied Human Nutrition

CPD accredited comprehensive Foundation Certificate Course in Applied Human Nutrition for professionals interested in nutrition and its health applications

5th - 9th July 2019

Course Programme Highlights:

Basic Concepts in Human Nutrition
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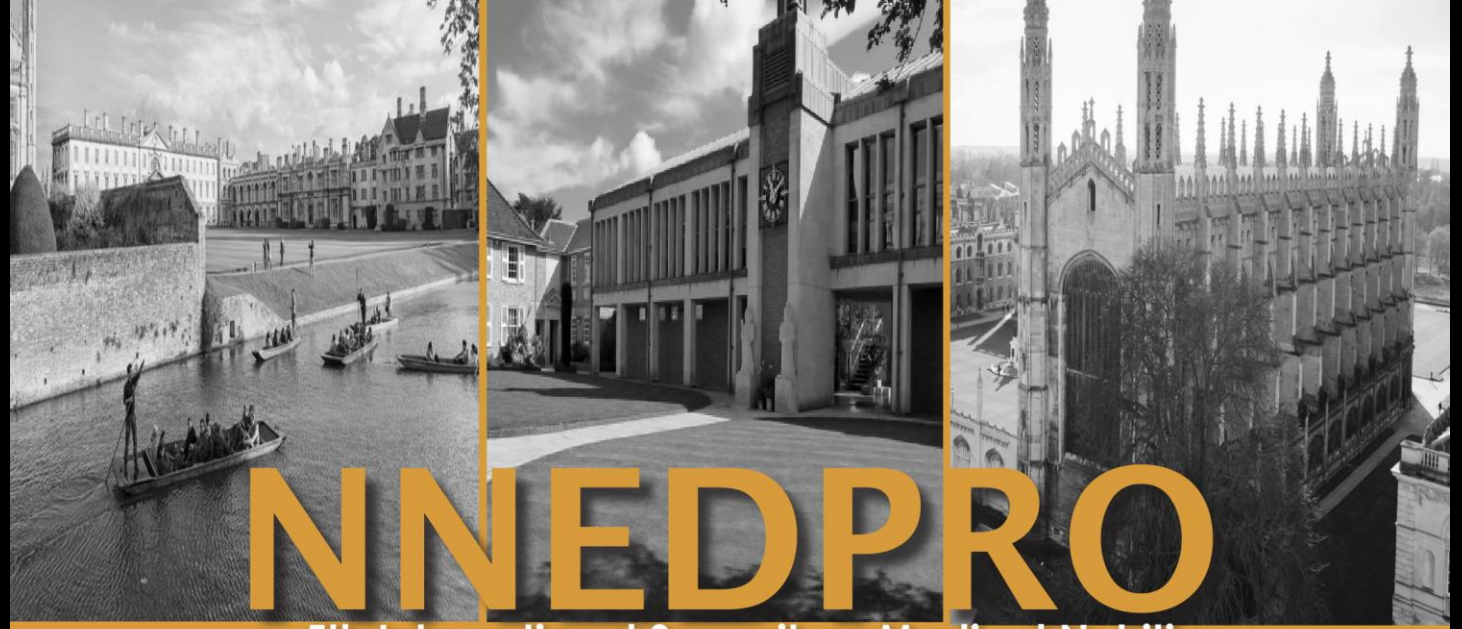

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Deadline: 30th June 2019

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13th Annual Congress of the International Society of Nutrigenetics/Nutrigenomics

Using genomic information for predicting response to nutrition

Sessions will focus on genomic differences affecting energy balance, genotype-specific nutrition interventions and the human genetics controling the gut microbiome

Scientific Poster Session

Abstract submissions of original research are accepted by email to info@nnedpro.org.uk
Max. 250 words
Email Subject Heading: INSS 2019 Poster Abstract
Deadline: 30th June 2019

The best abstract submission on 'Genetics of energy metabolism & regulation' and 'Human genetics controlling gut microbiome' will be selected for an award and oral presentation.

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Clinical Case Studies: Elaine MacAnaninch, RD

Case study 1 Alice-

BAPEN MUST Online nutrition screening tool

Alice has been admitted into hospital. She has early dementia, pressure sore damage and a suspected urine infection.

What is her nutritional risk?

Use online

Ht: 1.62m

Wt: 100kg

Wt 3 months ago: 115kg

1.Calculate the MUST score using the online calculator

2. What would your management plan be?

https://www.bapen.org.uk/screening-and-must/must-calculator

Overall Score 2 – High Risk
What is you management plan?

- **1. Document her score.**
- **2. Ask her about her food intake** at home/ Symptoms such as nausea/ bowels
- **3. Refer to the Dietitian.**
- **4. In hospital** encourage oral intake higher in Kcals/ protein/
- ✓ Respect protected meal times/ ensure meals are not missed due to investigations using out of hours catering if necessary.
- ✓ Does she need meds review- For example anti-emetics/antidepressants/ ? Is she constipated/ dehydrated..etc
- ✓ Repeat MUST weekly.
- **5. Discharge planning** Alert to maybe needing more social support at home. Consider other services e.g. physio/ OT

PROTECTED **MEAL TIMES**

- ‘Eating’ is as important as any other treatment or medication.
- Time and nursing attention/focus needed at mealtimes
- Any non essential work should be discontinued

Create culture of food first

Case Study 2 John

John has been admitted to hospital with a suspected CVA. He was observed coughing post eating and drinking. Speech and language reviewed him and deemed his swallow unsafe and recommended nil by mouth.

Ht: 1.62m

Wt: 44kg

Wt 3 months ago: 47kg

1. What would your management plan be?

High Risk of malnutrition
What is your management plan?

- Choice of feeding route?
- ✓ Nasogastric
- ✓ Obtain consent. Consider ethics. Consider how long feeding tube will in place and when/why it is removed

- Safety?
- ✓ Check placement before feeding
- ✓ Review medications
- ✓ Assess refeeding risk

NUTRITION WITHIN CLINICAL HISTORY TAKING
'HOW ARE YOU EATING?'

- **Interest**
- **Ability**
- **Access**
- **Quality/ adequacy**
- **Weight changes**
- **Acute disease effect**

Interest
Do you enjoy your food?
Have you noticed any change in your appetite?
Have you noticed any change in the way food tastes?

Disease effect
Consider enquiring about the effect of specific symptoms:
How has the (nausea/ constipation/ tiredness) affected your eating?

Weight changes
Have you lost any weight recently?
Have you noticed your clothes/ jewellery is feeling looser recently?

Ability
Have you noticed any problems with eating?
Are you able to chew ok?
Have you noticed any coughing/ SOB when eating?

Quality/ adequacy
How often do you have a cooked meal?
Do you ever miss a meal?
How many drinks do you have in a day?

Access/ food security
Does anyone help you with shopping/ cooking?
Who cooks your food/ does the food shopping?

Practice: Nutrition in clinical history taking

Alice has been admitted into hospital. She has early dementia, pressure sore damage and a suspected urine infection.

What is her nutritional risk?

High risk of malnutrition

Find out more about her nutritional problems.....

Food is Medicine too
This is everybody's responsibility

CAMPAIGN FOR BETTER HOSPITAL FOOD

✓Offer food and drinks are rich in calories and protein
✓Offer help and encouragement.

Undernutrition: from basic intervention to gastrointestinal support

Dr Luke Buckner

INITIAL MANAGEMENT OF UNDERNUTRITION

- Environmental factors
  - Tray in reach of patient, assistance if required
  - Alter textures
  - Improve dentition
  - Ward based meals/snacks
    - Nil by mouth –> Early breakfast

INITIAL MANAGEMENT OF UNDERNUTRITION

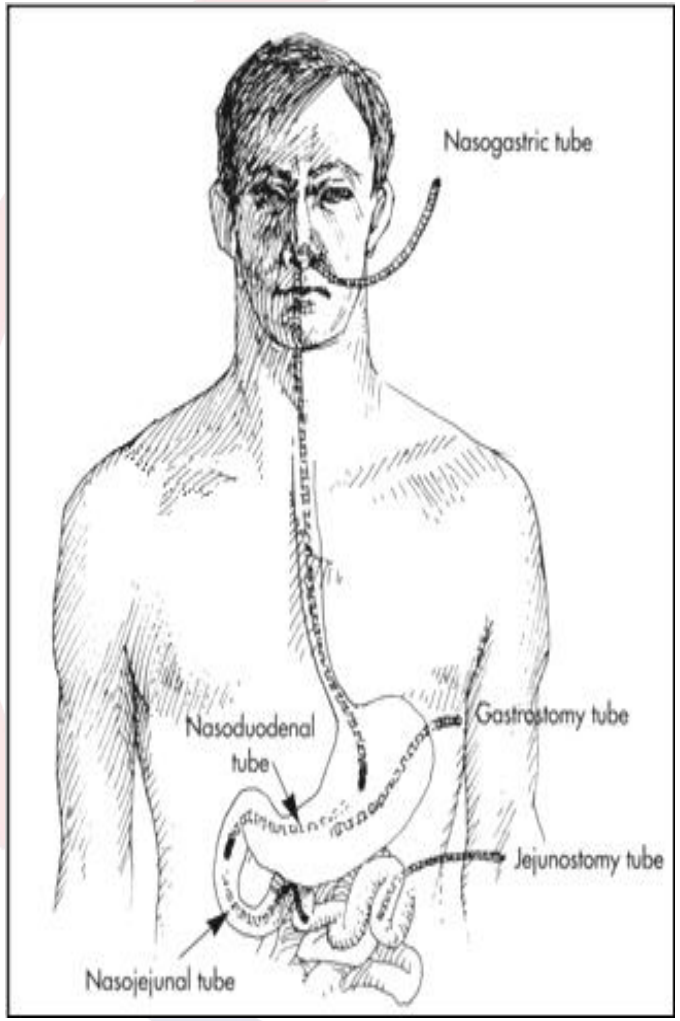
- Increase content of food
  - Add in snacks alongside 3 or 4 meals per day
  - Avoid low-calorie drinks or food options
    - Salad, soups
  - Choose higher energy, fat or protein sources
    - Full fat milk
    - Add butter, margarine, olive oil or cheese to mashed potato
    - Milky drinks, smoothies

Next steps

- If not seeing measurable change on re-assessment
  - Consider Oral nutrition supplements
    - Numerous types and brands
    - Different tastes and profiles
    - Adjust to patients needs and check they actually use them
    - Powders vs ready to drink
- If still inadequate to consider additional enteral feeding

ENTERAL FEEDING ROUTES

- Depends on …
  - Predicted time required for enteral feeding
  - Patients co-morbid status
  - Tolerance of procedure



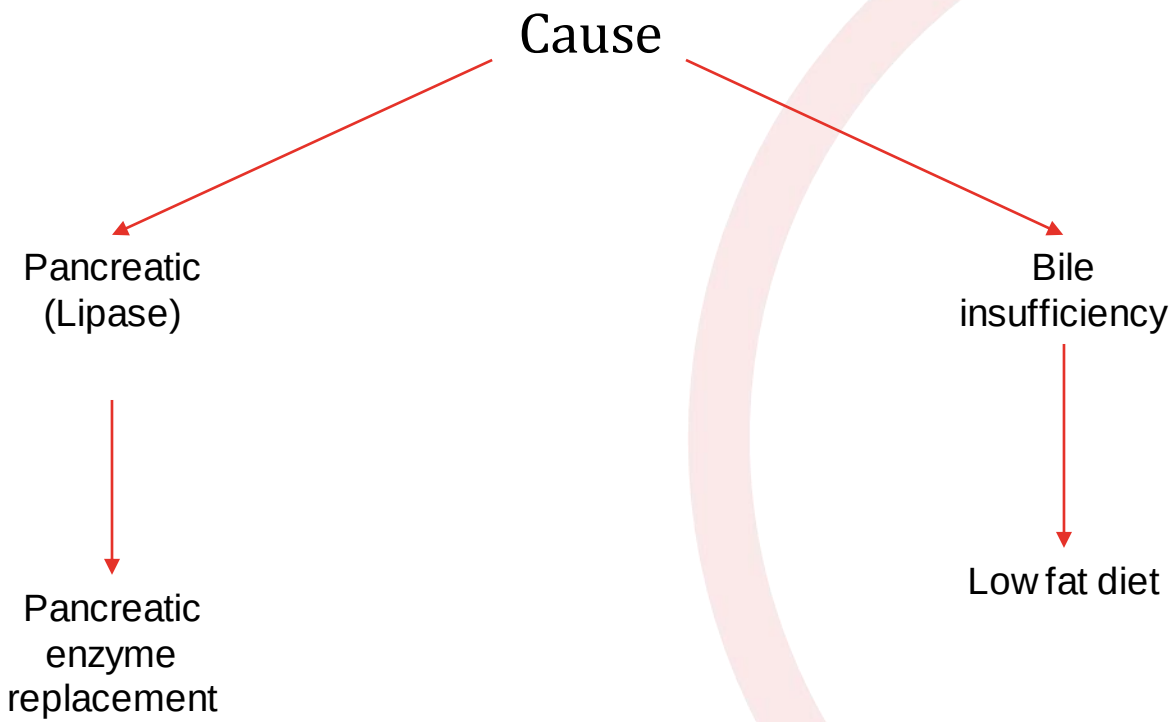
MALABSORPTION

- **General principles of management**
  - Treatment of cause
  - Inadequate absorption of one nutrient can lead to malabsorption of others
    - Fat malabsorption -> Fat soluble vitamin deficiencies
  - A period of restoration back to baseline required, before stabilising diet

STEATORRHOEA

- Fat malabsorption
  - Complex formation with Calcium and other mineral hindering absorption
  - Associated with fat soluble vitamin deficiency
    - Vitamins A, D, E and K
- Common causes
  - Bile insufficiency
  - Pancreatic insufficiency
    - Lipase

MANAGEMENT


Cause
Pancreatic (Lipase)
Pancreatic enzyme replacement
Bile insufficiency
Low fat diet

MANAGEMENT

- **Low fat diet**
  - Temporarily - very-low fat diet
    - 20g/day of fat
    - Days only, until symptoms resolve
  - Slow addition of fats as tolerated
    - Most can tolerate around 40g/day
  - Longer term focus on …
    - **Energy content –** Not coming from Fat, consideration of Medium chain triglycerides
    - **Fat soluble vitamin and calcium deficiencies –** At risk
    - **Essential fatty acids –** Need to focus on obtaining these within diet

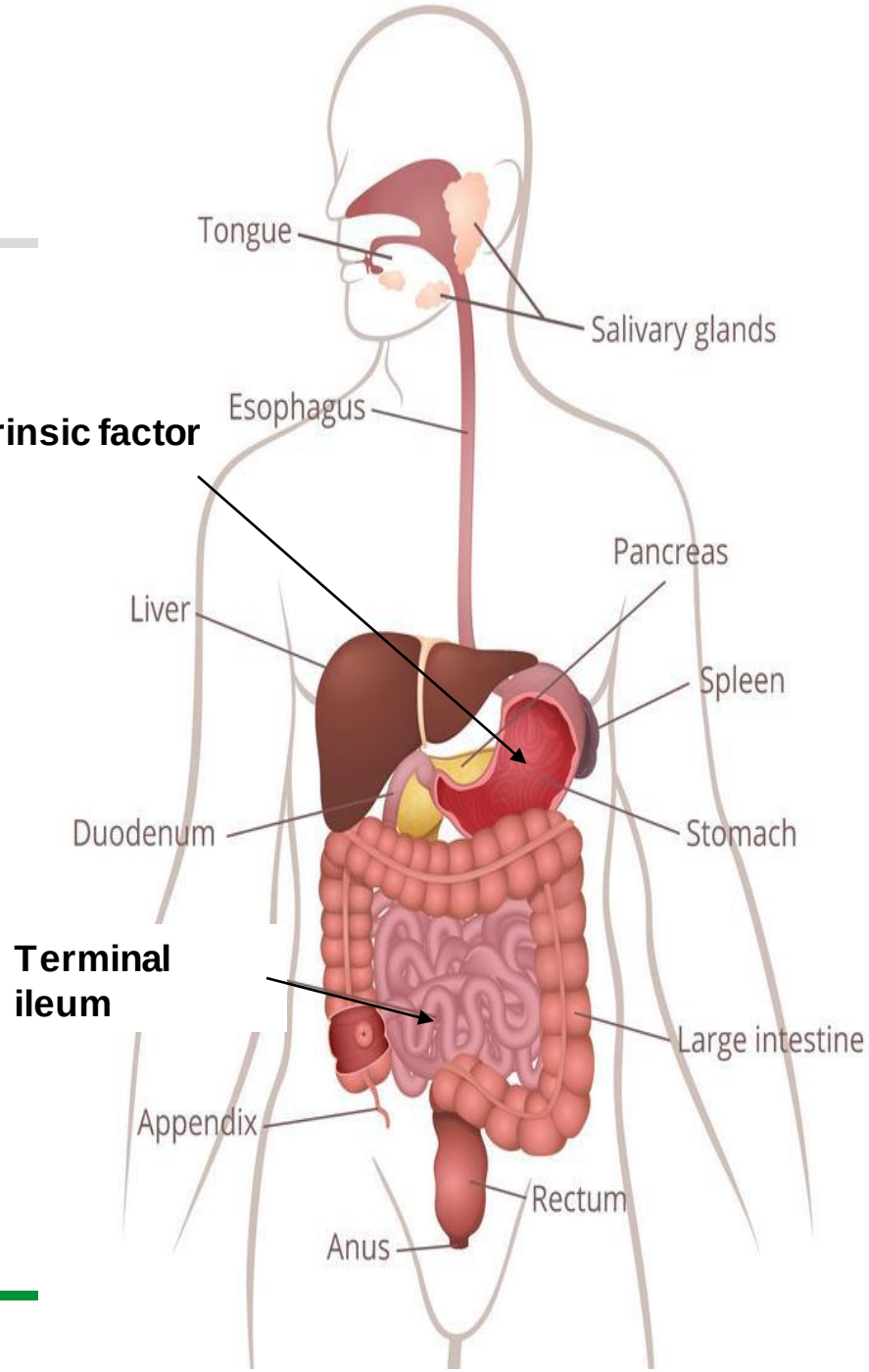
INFLAMMATORY BOWEL DISEASE

- High risk of undernutrition and micronutrient deficiencies

- At risk groups
  - Children and adolescents
  - Partial/ complete obstruction
  - Post-operative
    - Acute
    - Single/multiple resections

Crohn's Disease

- **Particular considerations**
  - Often undernourished – 85% of patients
  - Vitamin B_{12} - Absorption in terminal ileum
  - Partial obstructions
    - Avoid fibrous foods e.g nuts and meat gristle



Crohn's Disease

- **No particular diet supported by evidence for Crohn's**
  - **Reduce undernutrition**
    - Normal diet – focus on energy and protein dense foods
    - Consider calcium and Vitamin D in those on long-term steroids
  - **Treat flare ups**
    - Corticosteroids still best way to treat flare ups
    - Elemental or polymeric enteral feeding equally effective as each other in treating acute flares
- **Insufficient evidence currently for use of …**
  - Omega 3 fatty acids
  - Probiotics

ULCERATIVE COLITIS

- Undernutrition less common than Crohn's
- No evidence that elemental or other dietary intervention beneficial
- **<u>High rate of iron deficiency anaemia</u>**

PARENTERAL NUTRITION

'PN may be described as the aseptic delivery of nutritional substrates directly into the circulatory system. It should be used to prevent or treat malnutrition **when the GI tract is unavailable or its function is inadequate**'

(*Collagiovanni, 1997)*

When to use PN:

- **Intestinal rest**
  - Ileus (confirmed by CT or X-ray)
  - Perforation / peritonitis
  - Intestinal Obstruction
  - Immobility
    - High gastric aspirate (despite prokinetics)
    - High fistula output > 500mls/day
  - Severe mesenteric ischaemia
- **Intestinal Failure**
- **Failure of enteral feeding**

PARENTERAL NUTRITION:

Advantages

- <u>Life-saving</u>
  - Necessary, only a minority of cases suitable for intestinal transplant
- Most patients can achieve full nutritional intake quickly
  - Beware refeeding risk

Disadvantages

- Risks of invasive procedure
  - Line sepsis
  - Pneumothorax
  - Bleeding
- Impaired metabolism
  - Glucose control
    - Rebound hypoglycaemia
  - Electrolyte & fluid imbalances
    - Re-feeding Syndrome
- Liver dysfunction
- Expensive (£70-100 per day)

What is Intestinal Failure (IF)?

- "Inability to maintain protein-energy, fluid, electrolyte or micronutrient balance, resulting from obstruction, dysmotility, surgical resection, congenital defect or disease-associated loss of absorption"

(O'Keefe at al, 2006)

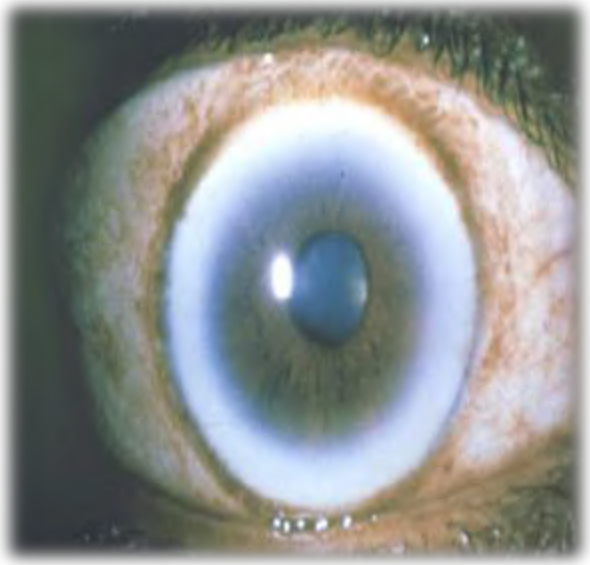
CLASSIFICATION OF IF

- **Type I**
  - Self-limiting
  - Usually postoperative e.g. ileus (15% of post-operative abdominal surgeries[1])
- **Type II**
  - Complex, metabolically unstable
  - Fluid balance problems
  - Septic
  - Require long hospital stay and multidisciplinary management
- **Type III**
  - Chronic
  - Metabolically stable - on home PN

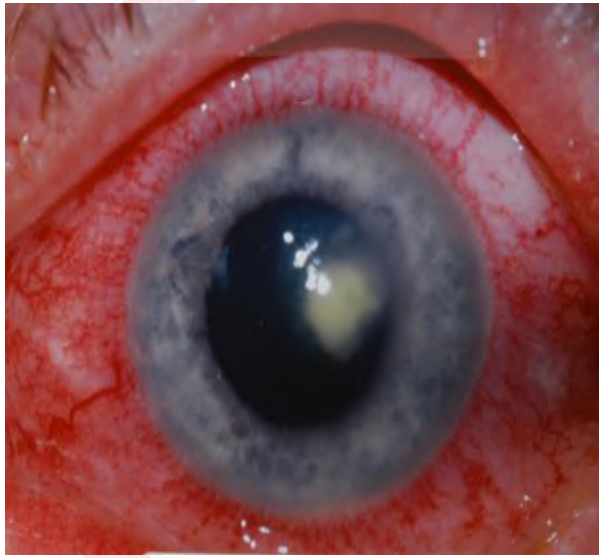
[1] ESPEN endorsed recommendations. Definition and classification of intestinal failure in adults. Clinical Nutrition. 2015 http://www.espen.org/files/PIIS0261561414002349.pdf

Physical Nutritional Assessment: Micronutrient Quiz

SUMANTRA RAY



Corneal Arcus



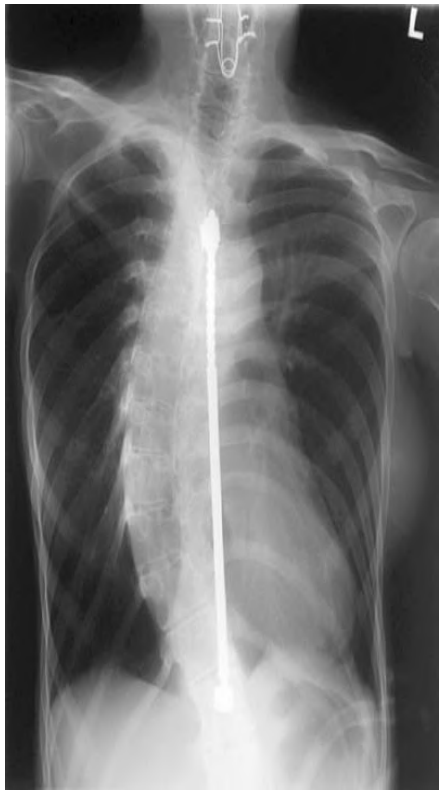
Fusarium Corneal Ulcer

Scurvy

Peridontal disease

Dermatitis Herpetiformis

Atopic eczema



Scoliosis

Osteoporosis

Rickets

Muscle wasting

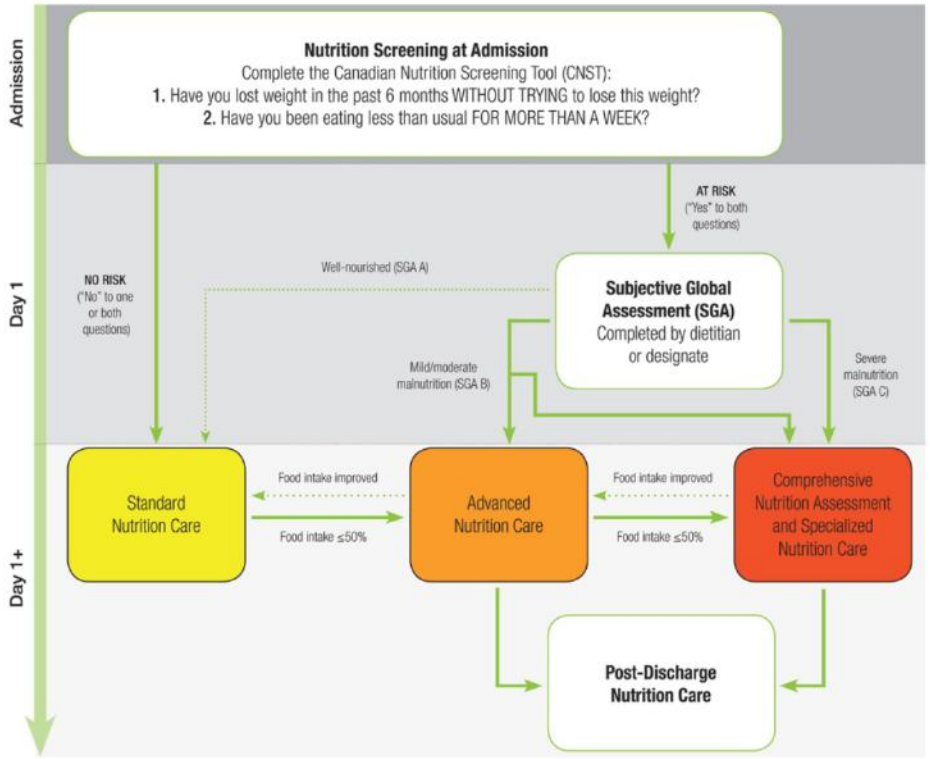
Group Activity

- Design a healthcare systems based nutrition intervention in groups
- How would you improve nutrition in your own clinical area?
- Feedback as a group

THE MORE TO EAT PROJECT

Optimizing Nutrition Care in Canadian Hospitals

One in three people who are admitted to hospital are already malnourished, and two thirds of these individuals leave hospital in the same nutritional state[1–3]. Knowledge synthesis indicates that hospital malnutrition independently **increases mortality, length of stay, and risk of readmission, and is costing the Canadian healthcare system approximately 2 billion dollars per year**[1,4,5]. To ensure that quality nutrition care is available to respond to this crisis, the Integrated Nutrition Pathway for Acute Care (INPAC), an evidence and consensus based knowledge tool and algorithm, was created [6,7].



How can hospitals implement and sustain INPAC?

Phase 1 of the More-2-Eat implementation project (M2E) used participatory action research to support INPAC implementation in 5 hospital units across Canada for 1-year. The objective was to demonstrate that nutrition care could be optimized by following INPAC [8]. Phase 2 aims **to create a sustainable model for INPAC implementation**, encouraging spread throughout Phase 1 hospitals and expanding to 6 new hospitals.

Key Results from More-2-Eat Phase 1:

- All hospital units improved nutrition care.
- Nutrition screening is now conducted on admission in all Phase 1 hospitals[9].
- "At risk" patients are being referred to a dietitian who now uses a standardized tool to triage, increasing their efficiency[9,10].
- Barriers to food intake were decreased, such as through volunteer programs or increasing food availability[11].
- Interviews indicate that 1-year later, many of these practices had continued and spread[12]. Further impact is being explored in Phase 2.

AN INTEGRATED CLINICAL CASE STUDY:

WHAT COULD POSSIBLY GO WRONG???

Prof Sumantra Ray RNutr

&

Dr Minha Rajput-Ray

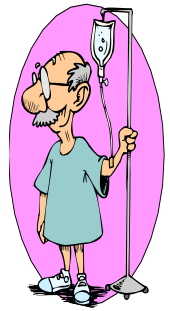
Assessment of Fluid Requirements

Important for clinical assessment and monitoring a patient's fluid status.

Questions to ask - is there a deficit, need for replacement or does the patient need maintenance fluids only?

Important to Consider:

- The ***nature*** of the fluid ***deficit*** must be ***identified***
- The ***type*** of fluid to best treat the deficit or maintain euvolaemia
- The appropriate ***rate*** of fluid - ***clinical assessment***
- Continued ***monitoring*** of fluid and electrolyte status



Common IV Fluids in Use on the Ward

Solution (mmol/L)	Na^+	Cl^-	K^+	Ca^{+2}	$HCO3^-$	Glu
Plasma	141	103	4-5	5	26	0
Normal Sal	154	154	0	0	0	0
Dextrose	0	0	0	0	0	50 G

THE FLUID PRESCRIPTION CHART

Clinical Case

- Mary Jones (70 year old retired secretary). Depressed and lonely as daughter had moved to Australia one month ago.
- Had not been eating well, had lost 2 kg over past month.
- Woke up - had a 'funny turn' and fell to the floor. Tried to pick herself up and found that her right side felt weak. Also had slurred speech - had no way of calling out for help. The phone was in the other room.
- She lay on the floor - hoping someone would find her. Morning turned to night ..... and daylight again (still no help) ! By now she was cold, dehydrated, hungry and was lying in a pool of urine and faeces.
- Finally, the next day - her neighbour sensed that something was not right and called the emergency services who broke through the front door and found her in a bad state !
- She was immediately rushed to hospital.

History

- **Collateral history:**
  From neighbour, medication details in patient's handbag.

- **PMHx:**
  Hypertension
  Angina
  COPD
  Osteoarthritis
  Varicose Veins
  Hysterectomy

- **Current medication:**
  Simvastatin 20mg (nocte)
  Aspirin 75mg (od)
  Paracetamol 1g, max QDS (PRN)
  Vitamin D tablets from health food shop

EXAMINATION

- **Alert, but confused GCS=$^{12}/_{15}$ ($E_4V_3M_5$)**
- **Dry mucous membranes, caked secretions-oral cavity**
- **Vital Signs:**

  Temp 36.2° C

  Blood Pressure=$^{160}/_{100}$ mm Hg

  Pulse 94 beats/min irregular

  O_2 sats = 92% (on 15L O_2)

  Resp. rate 14 breaths/min

- **Cardio-Resp examination:**

  Bi-basal crepitations, Heart sounds- I & II irregularly irregular

- **Neurological examination:**

  Right sided facial droop, slurred speech

  $^2/_5$ right arm weakness, $^4/_5$ right leg weakness

  Brisk deep tendon reflexes, upgoing plantar reflex on the right

INVESTIGATIONS

- **ECG:**

  Atrial fibrillation

- **Bloods:** significant results

  Haematology: WCC (12000 x 10^9)

  Biochemistry: dehydrated picture (U & E's raised) --Liver function: normal

- **CT Scan:**

  Ischaemic left MCA area

- **Urinalysis:**

  +3 leucocytes

Acute Medical Management

- IV hydration and antibiotics for UTI
- Outwith time window for thrombolysis
- New onset AF – loaded with IV digoxin
- It was the Friday evening (bank holiday weekend) when Mrs Jones was admitted
- No SALT team available
- Unable to swallow, thus NG tube passed and medications administered through this

Progress I

- Developed temperature overnight, breathless, on call house officer (FY1), diagnosed pneumonia, further IV antibiotics prescribed
- Patient agitated, repeated pulling out of NG tube every few hours
- No SALT team available to assess patient status over the weekend
- None of the nurses were safe swallow assessment trained. Thus, the patient was not given her medication for another 36 hours
- Meanwhile, the medical on call house officer (FY1) continued to hydrate with alternate IV 0.9% saline and 5% dextrose
- By now – limited venous access for IV hydration and antibiotics

PROGRESS II

- Shortage of beds, moved to another ward (case notes lost)
- Inadequate handover on Tuesday morning (after long weekend).
- Pharmacist and dietician not aware that patient was ‘starving’ for past 5 days
- Medical team decided to insert central line to gain venous access.
- Request made to the dietician to review patient for Total Parenteral Nutrition.
- Bloods taken for Magnesium and Phosphate
- Unfortunately, blood results not checked before starting TPN

PROGRESS III

- Within 24 hours Mrs Jones became confused, dyspnoeic, hypoxic and oedematous with evidence of multi-organ failure.
- Rushed to ITU but unfortunately died the same day

WHAT HAD HAPPENED…

SERIAL BLOOD RESULTS

	Admission	NG But not fed	TPN started	Refeeding	ITU (died)
	Day 1	Day 3	Day 5	Day 6	Day 7
Sodium (135-147)	149	142	137	135	134
Potassium (3.5-5.0)	3.8	3.6	3.3	2.4	2.2
Urea (4.0-12.0)	24.1	17.6	15.3	23.2	38.1
Creatinine (62-106)	152	124	118	166	189
Corr.Calc. (2.10-2.55)	2.11	2.22	2.36	2.22	2.20
CRP (<5)	37	90	178	206	282
Magnesium (0.70–1.15)	Not done	Not done	0.45	0.35	0.32
Phosphate (0.80-1.50)	Not done	Not done	0.56	0.33	0.31
Glucose	3.4	Not done	Not done	14.6	10.4

Refeeding Syndrome

- ‘Potentially fatal shifts in fluids and electrolytes that may occur in malnourished patients receiving artificial refeeding (whether enterally or parenterally)’
- These shifts result from hormonal and metabolic changes and may cause serious clinical complications. The hallmark biochemical feature of refeeding syndrome is Hypophosphataemia
- However, the syndrome is complex and may also feature abnormal sodium and fluid balance; changes in glucose, protein, and fat metabolism; thiamine deficiency; hypokalaemia; and hypomagnesaemia

Mehanna HM, Moledina J, Travis J. Refeeding syndrome: what it is, and how to prevent and treat it. BMJ. 2008 Jun 28;336(7659):1495-8.

Risk Factors for Refeeding

High risk of developing refeeding problems if:

one or more of the following:

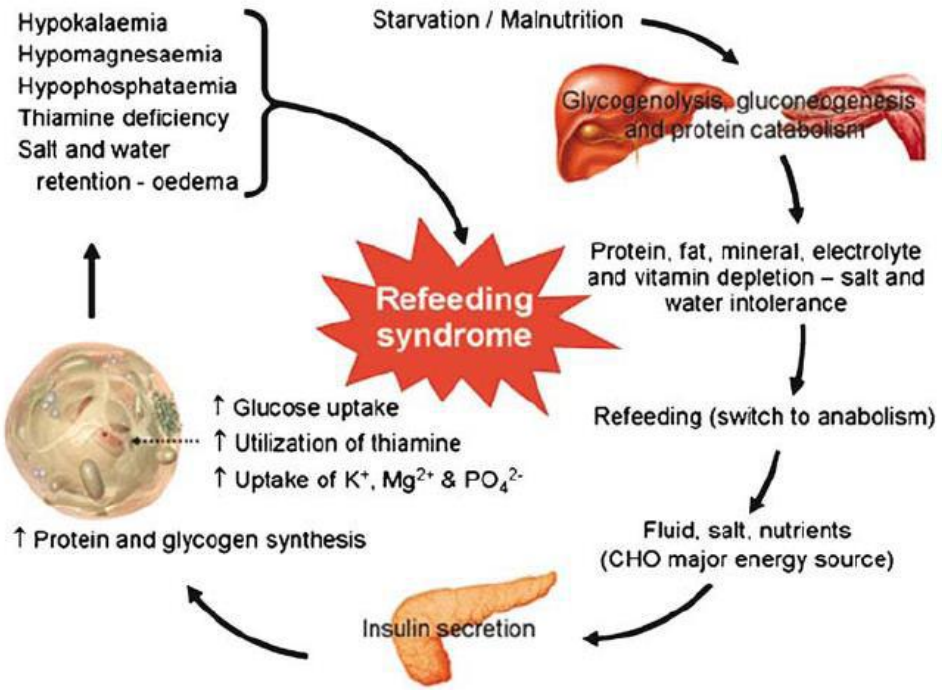
- BMI less than 16 kg/m^2
- unintentional weight loss greater than 15% within the last 3–6 months
- little or no nutritional intake for more than 10 days
- low levels of potassium, phosphate or magnesium prior to feeding.

two or more of the following:

- BMI less than 18.5 kg/m^2
- unintentional weight loss greater than 10% within the last 3–6 months
- little or no nutritional intake for more than 5 days
- a history of alcohol abuse or drugs including insulin, chemotherapy, antacids or diuretics.

(From NICE 32 Guideline 'Nutrition Support in Adults' February 2006)

REFEEDING MECHANISM



Z Stanga, A Brunner, M Leuenberger, RF Grimble, A Shenkin, SP Allison, DN Lobo. Review, Nutrition in Clinical Practice – the Refeeding Syndrome: Illustrative Cases and Guidelines for Prevention and Treatment European Journal of Clinical Nutrition, Published ahead of Print August 2007

Thiamine (Vit B1) & Refeeding

- Thiamine functions as a cofactor in intermediary carbohydrate metabolism
- Deficiency may contribute to re-feeding syndrome
- Wernicke's encephalopathy can be precipitated by carbohydrate feeding in thiamine-deficient patients
- Clinical features include mental confusion, ataxia, muscle weakness, oedema, muscle wasting, tachycardia and cardiomegaly

Refeeding Syndrome Management I

- Confirmation that this is re-feeding syndrome
- Being aware of other differential diagnoses for electrolyte imbalance i.e.
  - Alcohol use
  - Diabetic Ketoacidosis
  - Respiratory Alkalosis
  - Metabolic Acidosis
  - Vitamin D Deficiency
  - Hyperparathyroidism
  - Fanconi Syndrome
  - Renal Tubular Defects
- Evidence based Manangement: Bristol PPF study

Terlevich A, Hearing SD, Woltersdorf WW, Smyth C, Reid D, McCullagh E, Day A, Probert CS. Refeeding syndrome: effective and safe treatment with Phosphates Polyfusor. Therapeutics, Volume 17 Issue 10 Page 1325-1329, May 2003

Refeeding Syndrome Management II

- As per Bristol 2003 recommendations
- IV "Phosphates Polyfusor" (PPF) Infusion* (In patients with normal renal function)
  *** 500ml PPF = 50 mmol PO_4^{3-} + 81 mmol Na^+ + 9.5mmol K^+**
- 1 PPF infusion via a dedicated peripheral IV line in 24hrs
- Measure serum PO_4^{3-}, Mg^{2+}, Na^+, K^+, Ca^{2+} & Creatinine at (baseline) & daily over 3 days
- If the patient is eating then no interruption of oral feeding
- 2nd PPF infusion over another 24 hrs if PO_4^{3-} =/< 0.50mmol/L

Prevention of Refeeding

- Starting nutrition support at a maximum of 10 kcal/kg/day increasing levels slowly to meet or exceed full needs by 4-7 days
- Using only 5 kcal/kg/day in extreme cases of malnutrition
- Aim to monitor fluid balance and overall clinical status closely
- Unless pre-feeding plasma levels are high, prescribe oral, enteral or IV
  - Potassium (2-4 mmol/kg/day
  - Phosphate (0.3-0.6 mmol/kg/day
  - Magnesium (0.2 mmol/kg/day IV, 0.4 mmol/kg/day)
- Oral thiamine 200-300mg daily, vitamin B co-strong 1 or 2 tablets (tds) or full dose IV vitamin B preparation (pabrinex) and a balanced multivitamin supplemment
- Please refer to Trust Guidelines on Connect for information on how to prescribe IV Pabrinex

(From NICE 32 Guideline 'Nutrition Support in Adults' February 2006)

Questions & Feedback

THANKS!!!