Health Economics in clinical nutrition

Nutrition Economics

Essential for global health

Dr. Karen Freijer, PhD, BSc, RDN
Partnership Overweight Netherlands
Erasmus Medical Centre, internal medicine, Netherlands
Past-chair and Founder of ISPOR Special Interest Group (SIG) Nutrition Economics
Freijer4Food & health care consultancy

FREIJER4FOOD
& HEALTH CARE

Disclosure

Erasmus MC Universitair Medisch Centrum Rotterdam

PON partnerschap overgewicht nederland

General Manager Partnership Overweight Netherlands (PON) – internal medicine

ISPOR Improving healthcare decisions

Nutrition Economics Special Interest Group

Founder & Chair

DCN Diëtisten Coöperatie Nederland

Advisory board member

FREIJER4FOOD & HEALTH CARE

Consultancy

Economy

the study of the optimal allocation of limited resources for the production of benefit to society (Samuelson 2005)

Health Economics

Scarcity

allocate <u>limited</u> health care resources among *<u>unlimited</u> wants and needs* to achieve the *<u>maximum health benefit</u>*

Value

Choices

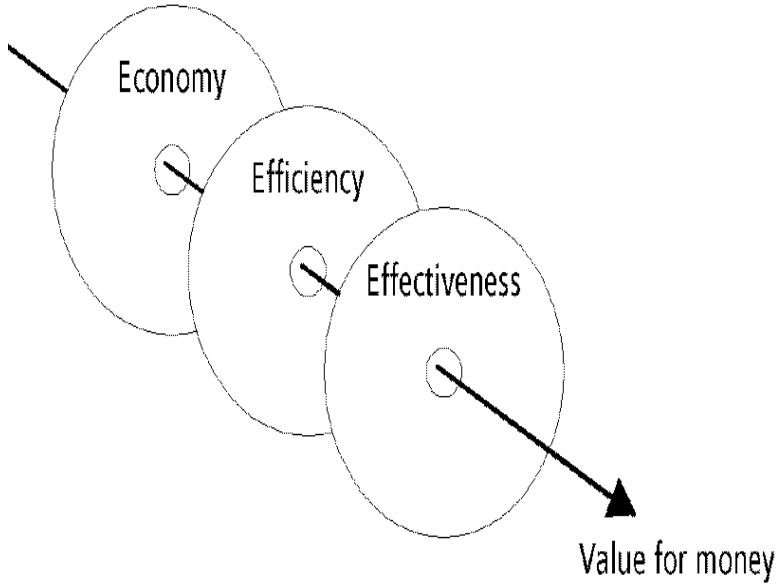
WHOSE PERSPECTIVE?

Health economics

Economy

the study of the optimal allocation of limited resources for the production of benefit to society (Samuelson 2005)

Health Economics



the maximum health gain per DKK/Euro… (value for money)

Perspectives and silos

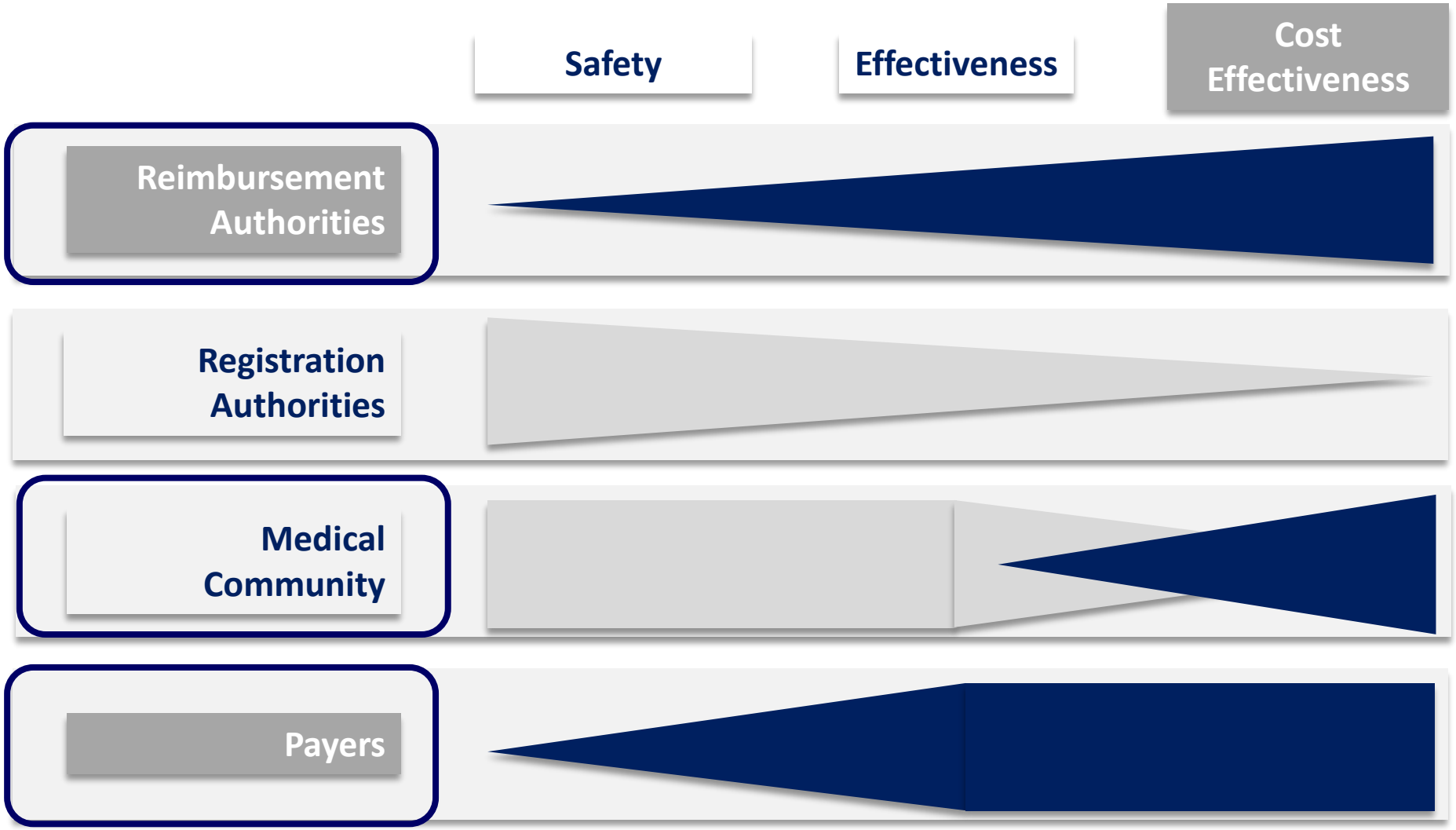
Government/Society

Health Insurers

WHOSE PERSPECTIVE?

Health care institutions:
Hospital
Nursing home/care home
Home care

Different stakeholders need different evidence



FREIJER4FOOD & HEALTH CARE

Type of costs - resource use

	Medical costs	Non Medical costs
	Healthcare sector	Outside healthcare sector
Direct costs	Medical costs (for prevention, diagnostics, therapy, rehabilitation and care)	Patient costs (time and travelling costs)
Indirect costs	Medical costs in life-years gained	Productivity costs, legal costs, special education

Rutten-van Molken M. *Van kosten tot effecten: een handleiding voor evaluatiestudies in de gezondheidszorg*. second edition, Elsevier gezondheidszorg: Maarssen; 2010 [Dutch]

FREIJER4FOOD & HEALTH CARE

Type of costs - resource use

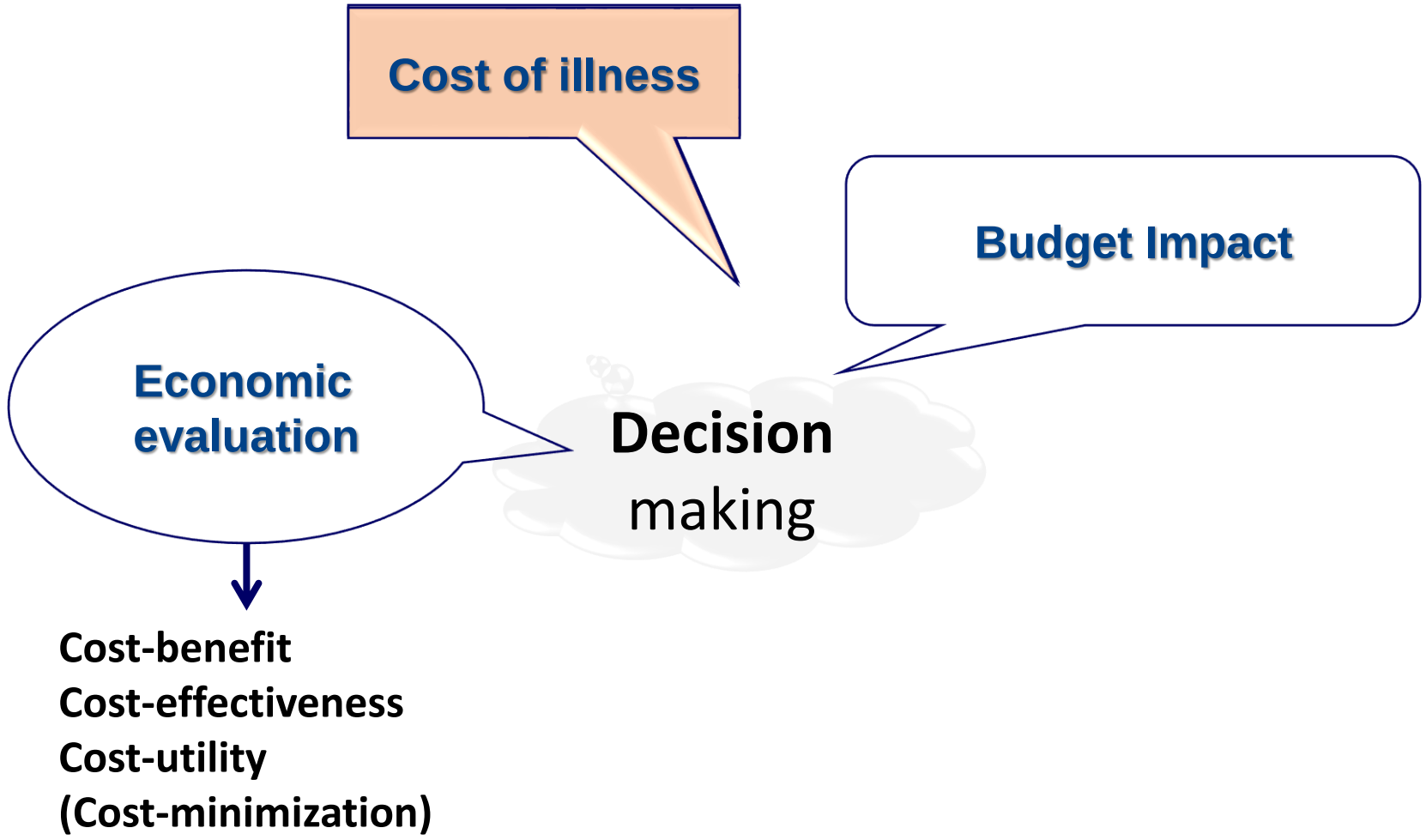
	Medical costs	Non Medical costs
	Healthcare sector	Outside healthcare sector
Direct costs	Medical costs (for prevention, diagnostics, therapy, rehabilitation and care)	Patient costs (time and travelling costs)
Indirect costs	Medical costs in life-years gained	Productivity costs, legal costs, special education

Society
Health care/ insurance
Health care provider

Rutten-van Molken M. *Van kosten tot effecten: een handleiding voor evaluatiestudies in de gezondheidszorg*. second edition, Elsevier gezondheidszorg: Maarssen; 2010 [Dutch]

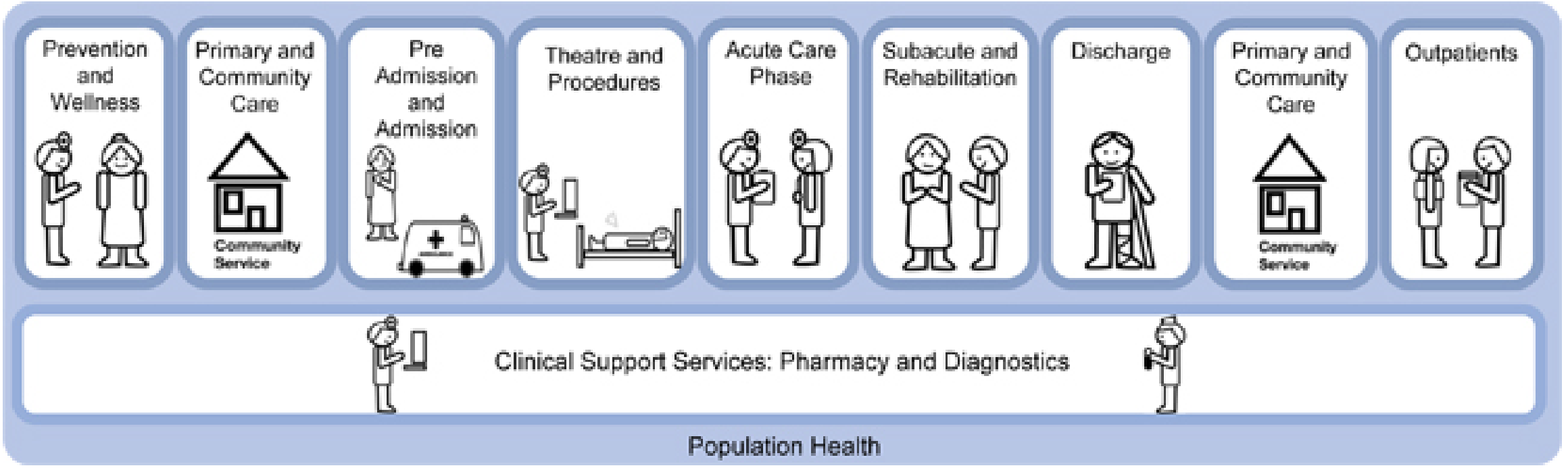
FREIJER4FOOD & HEALTH CARE

Basics


Cost of illness
Budget Impact
Economic evaluation
Decision making
Cost-benefit
Cost-effectiveness
Cost-utility
(Cost-minimization)

Cost of illness

***What happens to the patient and how often* = COSTS**



Cost of illness

(DISEASE RELATED) MALNUTRITION

Table: Total additional costs of disease related malnutrition according to gender, age and healthcare sector * 1,000,000 (Euro 2011)

	Men		Women		Total
Age	**>18 and <60**	**> 60**	**>18 and <60**	**> 60**	**All ages**
Hospital setting	**188**	**424**	**184**	**437**	**1,233**
Nursing- and residential home setting	**9**	**107**	**6**	**331**	**453**
Home care setting	**6**	**43**	**9**	**126**	**185**
Total	**203**	**574**	**200**	**894**	**1,871**

Cost of illness

(DISEASE RELATED)
MALNUTRITION

DKR 6 billion per year[1]

1. Report: Underernæring - Det skjulte samfundsproblem 2014

FREIJER4FOOD & HEALTH CARE

Cost of illness

OVERWEIGHT/OBESITY

RESEARCH Open Access

Burden of disease study of overweight

1 February 2022

Costs overweight and obesity over €79 billion a year

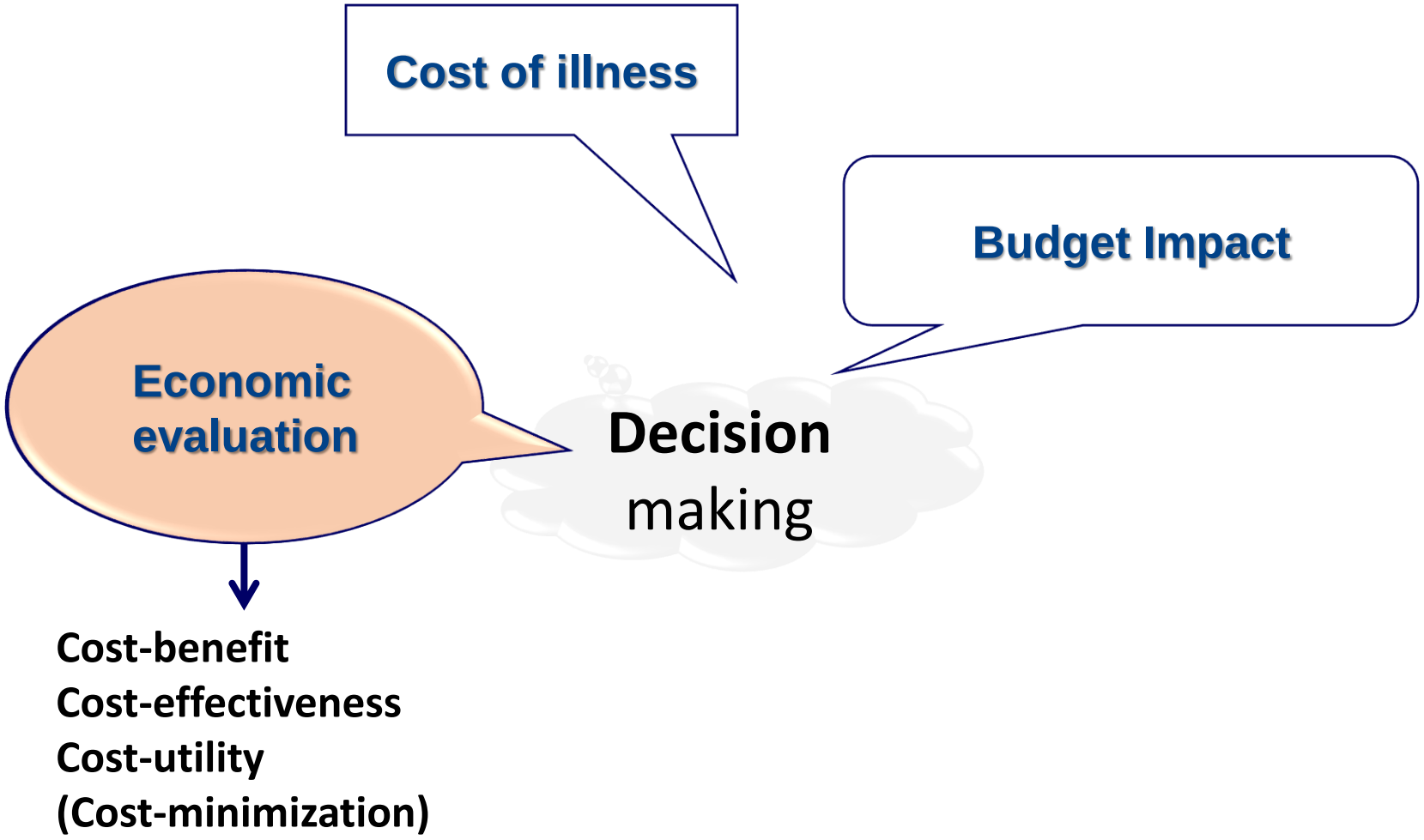
WORLD OBESITY

Economic impact of overweight and obesity to surpass $4 trillion by 2035

Hecker et al. BMC Public Health (2022) 22:46 https://doi.org/10.1186/s12889-021-12449-2

FREIJER4FOOD & HEALTH CARE

Basics


Cost of illness
Budget Impact
Economic evaluation
Decision making
Cost-benefit
Cost-effectiveness
Cost-utility
(Cost-minimization)

Valuation of consequences = type of economic evaluation

Table 1. *Cost, Effects, Utility, and Benefits of Treating Patients with Disease X with Two Alternate Strategies, Treatment A and Treatment B*

Strategy	Treatment Costs	Effectiveness (Life Expectancy)	Utility (Quality of Life)	Utility (Quality-Adjusted Life Expectancy)	Benefits
Treatment A	$20 000	4.5 years	0.80	3.6 QALYs*	$4000
Treatment B	$10 000	3.5 years	0.90	3.15 QALYs	$2000

Incremental cost-effectiveness ratio = $\frac{\$20\,000 - \$10\,000}{4.5 \text{ years} - 3.5 \text{ years}}$ = $10 000 per life-year gained

Incremental cost-utility ratio = $\frac{\$20\,000 - \$10\,000}{3.6 \text{ QALYs} - 3.15 \text{ QALYs}}$ = $22 222 per QALY gained

Incremental cost-benefit ratio = $\frac{\$20\,000 - \$10\,000}{\$4000 - \$2000}$ = 5 $

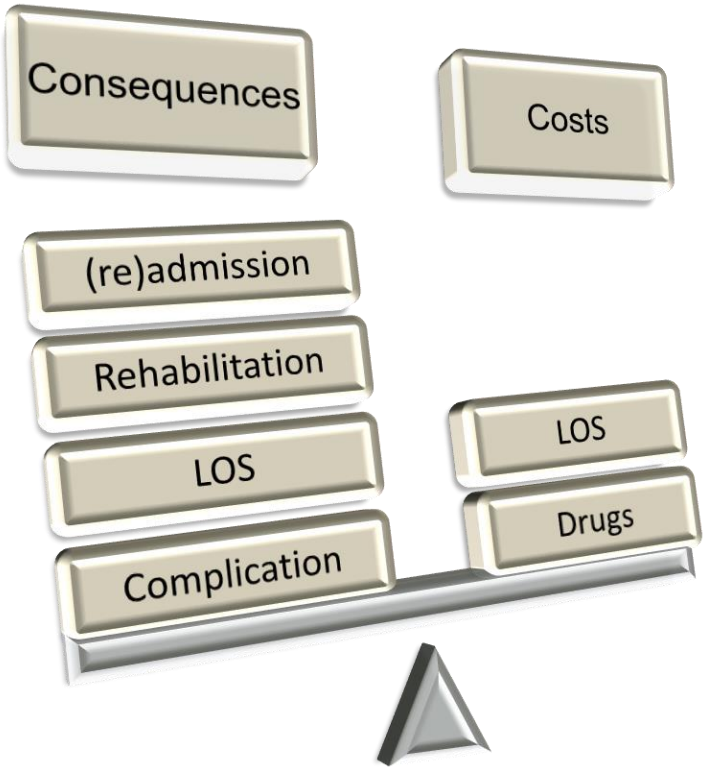
* QALYs = quality-adjusted life years. = quantity and quality of life measurement

Detsky AS. A clinicians's guide to cost-effectiveness analysis. Am College of Physicians 1990

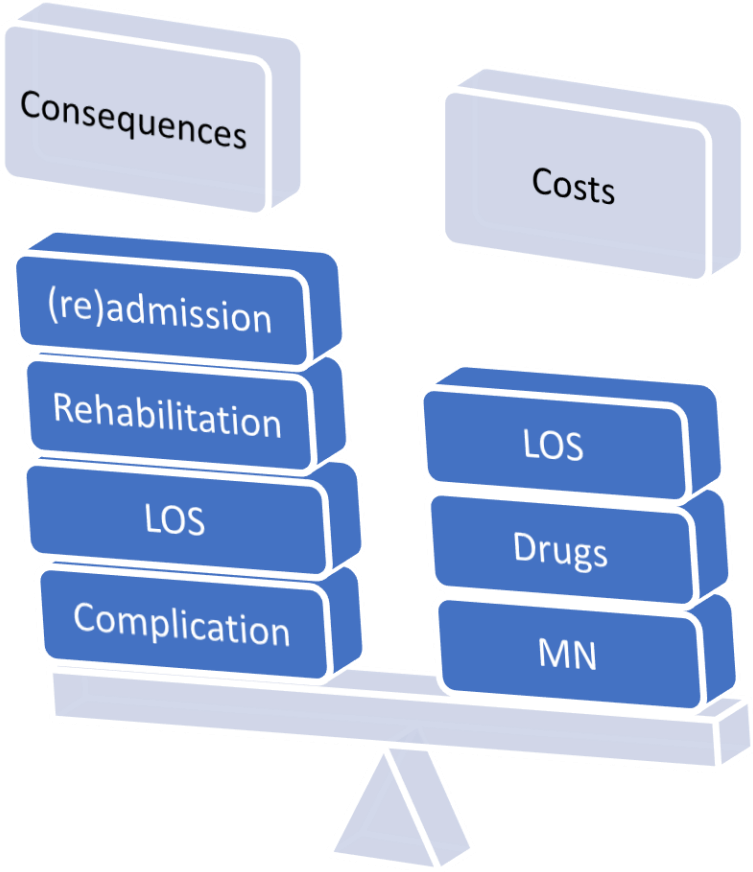
FREIJER4FOOD & HEALTH CARE

Economic evaluation

Incremental = Δ costs/Δ consequences (ICER)

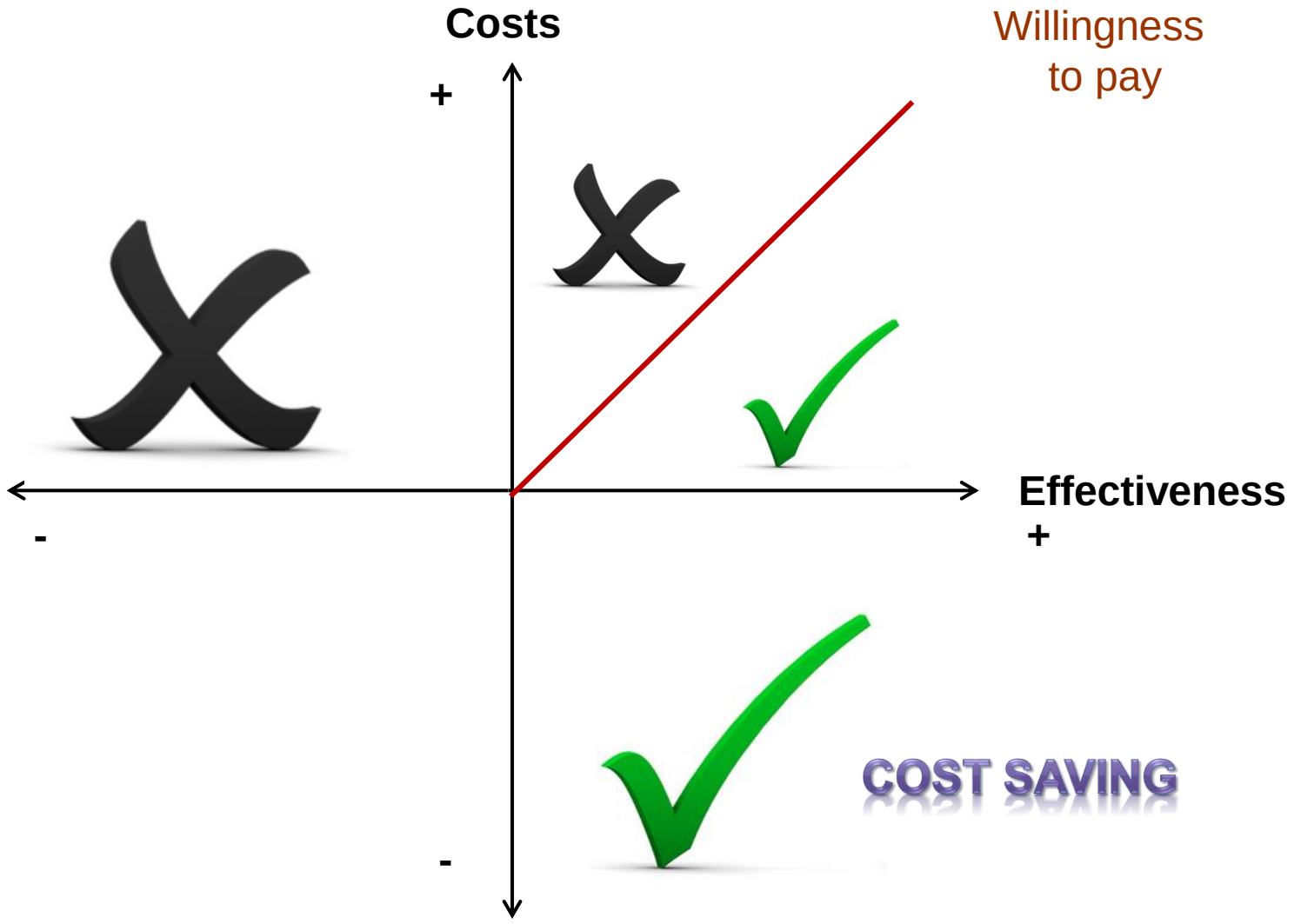


Intervention A



Intervention B

Cost effectiveness plane



Economic evaluations - guidelines

Country specific	General
• **Study design** • **Study population** • **Choice of comparator** • **Perspective** • **Data collection procedure** (*alongside clinical trial or modeling*) • **Discounting *(time-preference)***	• **Hard clinical outcomes which can be valued, e.g.** **LOS, Complications, (re-) admissions to health institutions, QoL** • **More real world evidence**

Quality & reporting HE evaluations

ORIGINAL RESEARCH ARTICLE

Check for updates

Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) Statement: Updated Reporting Guidance for Health Economic Evaluations

Don Husereau[1,2] · Michael Drummond[3] · Federico Augustovski[4,5,6] · Esther de Bekker-Grob[7] · Andrew H. Briggs[8] · Chris Carswell[9] · Lisa Caulley[10,11,12] · Nathorn Chaiyakunapruk[13] · Dan Greenberg[14] · Elizabeth Loder[15,16] · Josephine Mauskopf[17] · C. Daniel Mullins[18] · Stavros Petrou[19] · Raoh-Fang Pwu[20] · Sophie Staniszewska[21]

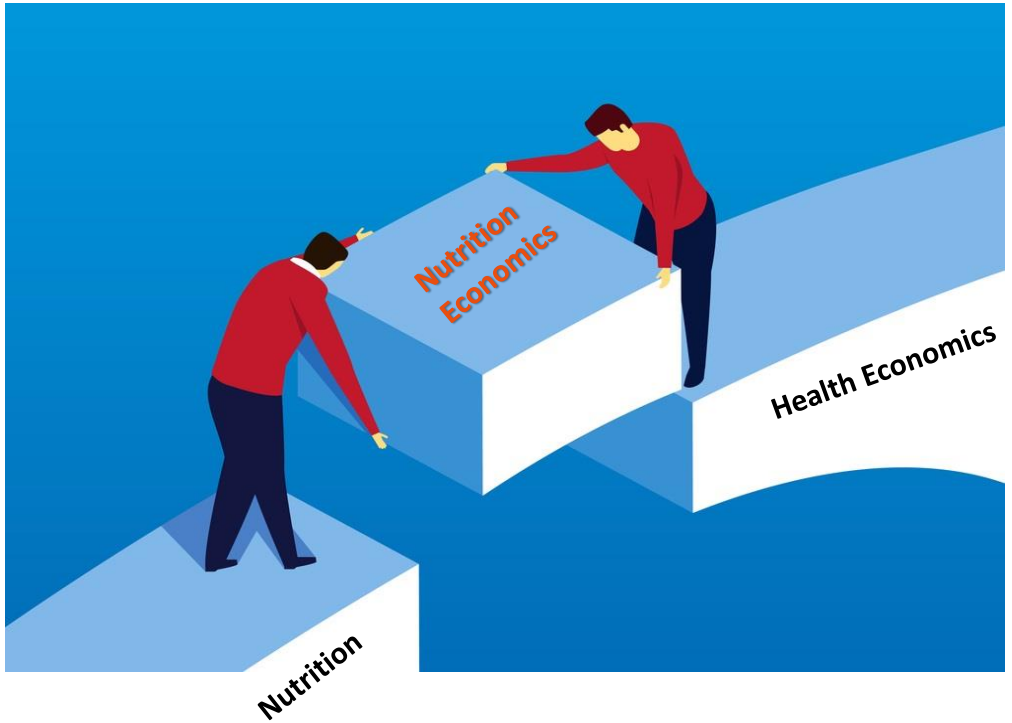
Accepted: 23 November 2021 / Published online: 11 January 2022

FREIJER4FOOD & HEALTH CARE

Nutrition Economics

- Merging of **nutrition** and **health economics** discipline
- Interdependency between nutritional habits, health and public expenses
- To illustrate health and economic aspects of specific changes in the daily nutrition and nutrition recommendations through the lens of cost-effectiveness

- Nutrition economics is defined as "**a discipline dedicated to researching and characterizing health and economic outcomes in nutrition for the benefit of society**"[1]



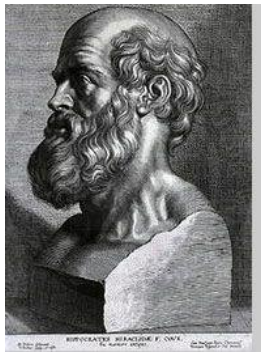
European Journal of Clinical Nutrition (2015) 69, 539–545

www.nature.com/ejcn

REVIEW

The view of European experts regarding health economics for medical nutrition in disease-related malnutrition

K Freijer[1], I Lenoir-Wijnkoop[2], CA Russell[3], MA Koopmanschap[4], HM Kruizenga[5], SK Lhachimi[6,7], K Norman[8], MJC Nuijten[9] and JMGA Schols[10]

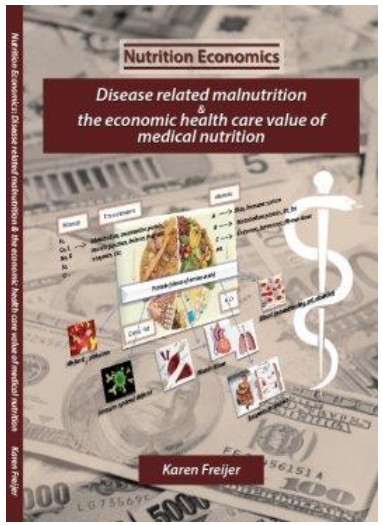


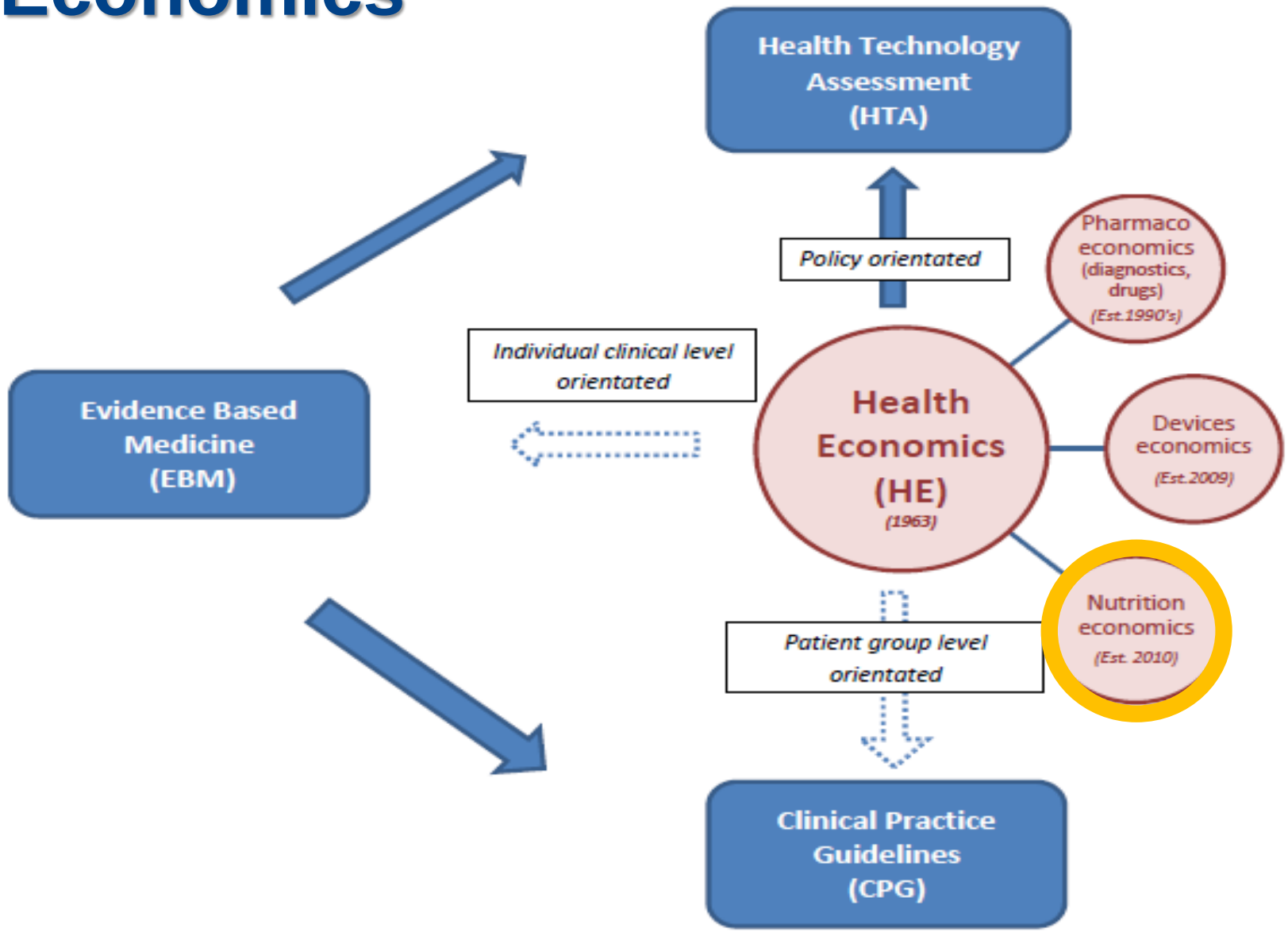
"Let food be thy medicine and medicine be thy food" – Hippocrates

PALEOSPIRIT.COM

FREIJER4FOOD & HEALTH CARE

Nutrition Economics



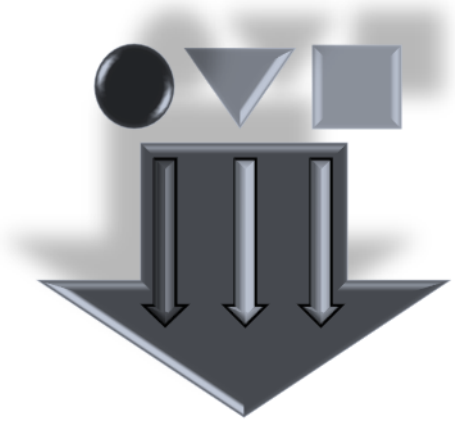


Freijer K. Nutrition Economics: DRM & Economic value of medical nutrition-PhDThesis 2014, Maastricht Univeristiy NL

FREIJER4FOOD & HEALTH CARE

(Medical) Nutrition

*Novel synergistic **combinations** of nutrients*



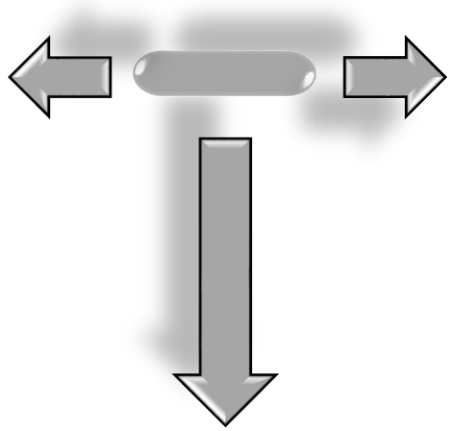
Nutrients focus on ***multiple*** fysiological systems, safety has been proven

Mostly as *part of total treatment* → *on top of daily individual diet*

Pharma

(New) Chemical Entity

(one compound)

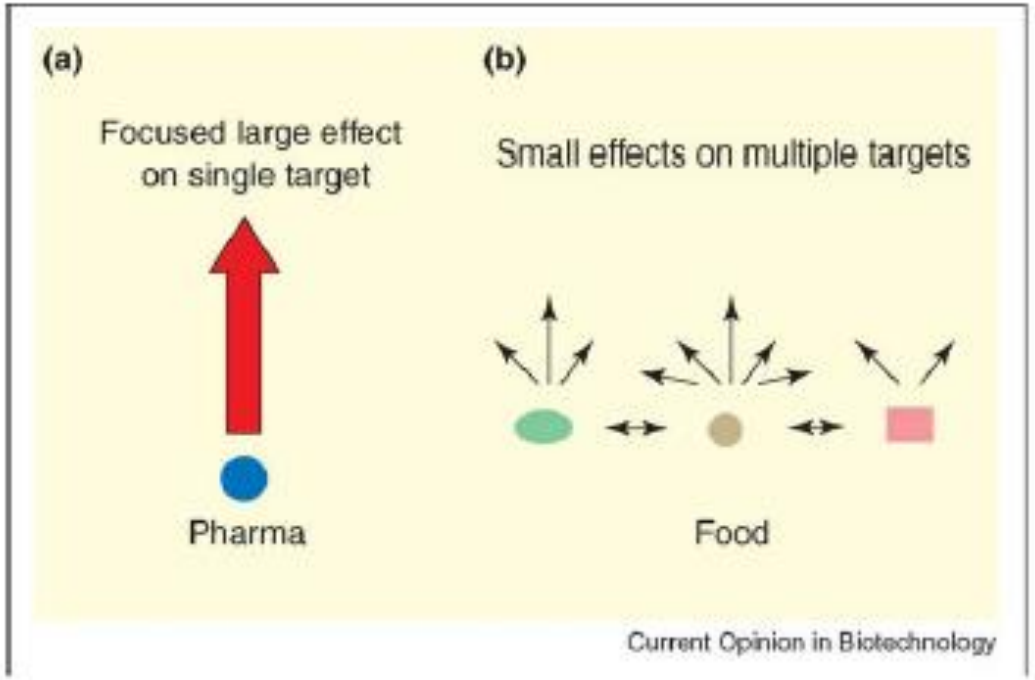


Focus on ***single*** intervention, adverse events

Specificities related to nutrition

The **complexity of nutrition** that interacts with multiple interdependent physiological and metabolic processes

Nutrition components that impact on **different targets**, requires an approach that is different from the pharmaceutical field



Comparison of the actions of the bioactive components in **(a)** pharma and **(b)** food products.

Current Opinion in Biotechnology 2006, **17**:217–225

RCT have their limits and are not sufficient to generate the appropriate evidence

There is a need to develop well-suited designs in order to

- correctly measure the impact of nutrition-related health effects
- express them in socio-economic values
- support Public Health decision making

Features that prevent a straightforward use of pharmaco-economic models to nutrition

European Journal of Clinical Nutrition (2015) 69, 539–545
© 2015 Macmillan Publishers Limited All rights reserved 0954-3007/15
www.nature.com/ejcn

REVIEW

The view of European experts regarding health economics for medical nutrition in disease-related malnutrition

K Freijer[1], I Lenoir-Wijnkoop[2], CA Russell[3], MA Koopmanschap[4], HM Kruizenga[5], SK Lhachimi[6,7], K Norman[8], MJC Nuijten[9] and JMGA Schols[10]

…ology

…product's consumption and future health status

- Time-frame …sessing effectiveness
- Long timespa… **…nty** of nutrition economic mo…
- Food products come with their **nutritional profile** and ***as part of the* daily dietary intake**
- Foods are –in general– not s…

Health Policy Plan. 2021 May 17;36(4):533-541. doi: 10.1093/heapol/czaa149.

Economic evaluation of interventions to address undernutrition: a systematic review

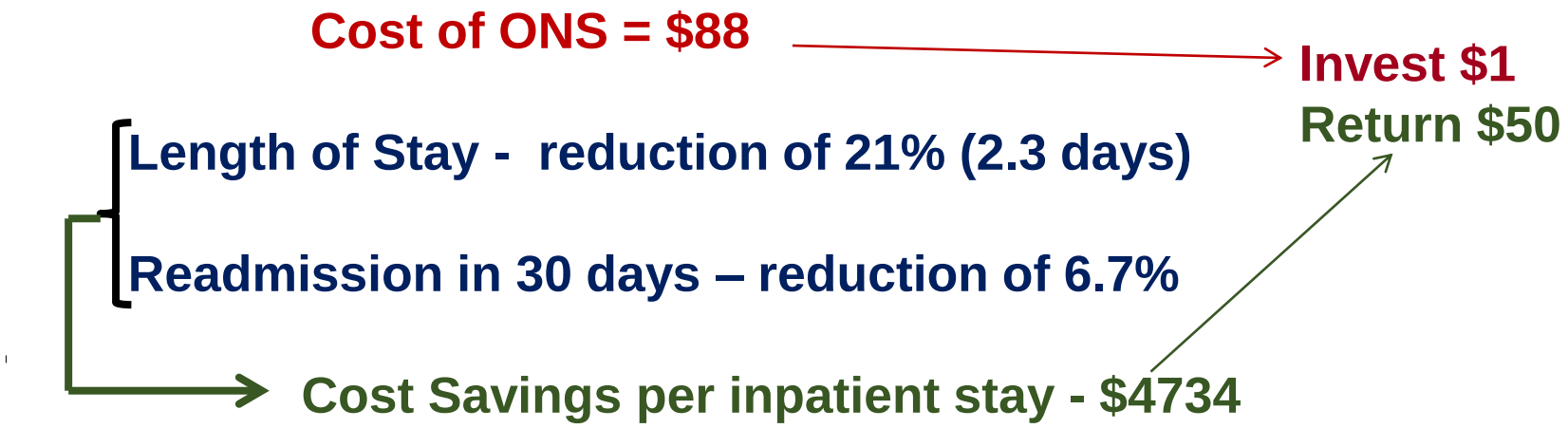
European Journal of Clinical Nutrition **volume 77**, pages413–426 (2023)
Review Article | Open access | Published: 04 October 2022

Modelling health and economic impact of nutrition interventions: a systematic review

Cost benefit of oral medical nutrition in hospital

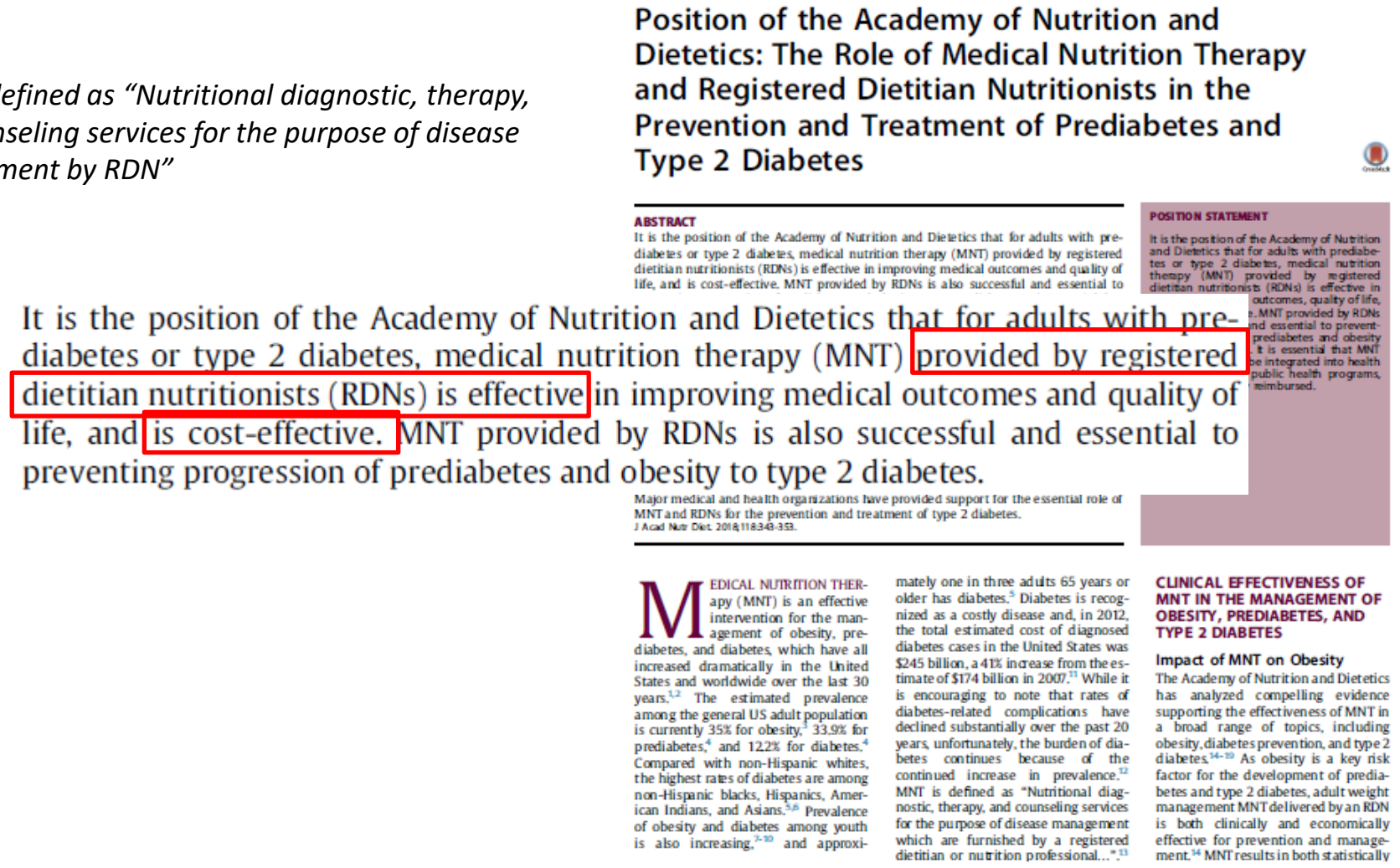
Database analysis of around 20% of all **US hospital admissions** between *2000 and 2010*
.....*700,000 hospital episodes* of adult patients using ONS
.....matched with *44 million non-ONS* inpatient episodes .

Using Propensity Scoring they produced otherwise comparable groups - only differing on their ONS use. Comparing the two they found **ONS patients did better**….



Value of dietitian

MNT is defined as "Nutritional diagnostic, therapy, and counseling services for the purpose of disease management by RDN"



Position of the Academy of Nutrition and Dietetics: The Role of Medical Nutrition Therapy and Registered Dietitian Nutritionists in the Prevention and Treatment of Prediabetes and Type 2 Diabetes

ABSTRACT

It is the position of the Academy of Nutrition and Dietetics that for adults with prediabetes or type 2 diabetes, medical nutrition therapy (MNT) provided by registered dietitian nutritionists (RDNs) is effective in improving medical outcomes and quality of life, and is cost-effective. MNT provided by RDNs is also successful and essential to

POSITION STATEMENT

It is the position of the Academy of Nutrition and Dietetics that for adults with prediabetes or type 2 diabetes, medical nutrition therapy (MNT) provided by registered dietitian nutritionists (RDNs) is effective in outcomes, quality of life, . MNT provided by RDNs nd essential to prevent- prediabetes and obesity . It is essential that MNT e integrated into health public health programs, eimbursed.

It is the position of the Academy of Nutrition and Dietetics that for adults with prediabetes or type 2 diabetes, medical nutrition therapy (MNT) provided by registered dietitian nutritionists (RDNs) is effective in improving medical outcomes and quality of life, and is cost-effective. MNT provided by RDNs is also successful and essential to preventing progression of prediabetes and obesity to type 2 diabetes.

Major medical and health organizations have provided support for the essential role of MNT and RDNs for the prevention and treatment of type 2 diabetes.

J Acad Nutr Diet. 2018;118:343-353.

MEDICAL NUTRITION THERAPY (MNT) is an effective intervention for the management of obesity, prediabetes, and diabetes, which have all increased dramatically in the United States and worldwide over the last 30 years.[1,2] The estimated prevalence among the general US adult population is currently 35% for obesity,[3] 33.9% for prediabetes,[4] and 12.2% for diabetes.[4] Compared with non-Hispanic whites, the highest rates of diabetes are among non-Hispanic blacks, Hispanics, American Indians, and Asians.[5,6] Prevalence of obesity and diabetes among youth is also increasing,[7-10] and approximately one in three adults 65 years or older has diabetes.[5] Diabetes is recognized as a costly disease and, in 2012, the total estimated cost of diagnosed diabetes cases in the United States was $245 billion, a 41% increase from the estimate of $174 billion in 2007.[11] While it is encouraging to note that rates of diabetes-related complications have declined substantially over the past 20 years, unfortunately, the burden of diabetes continues because of the continued increase in prevalence.[12] MNT is defined as "Nutritional diagnostic, therapy, and counseling services for the purpose of disease management which are furnished by a registered dietitian or nutrition professional...".[13]

CLINICAL EFFECTIVENESS OF MNT IN THE MANAGEMENT OF OBESITY, PREDIABETES, AND TYPE 2 DIABETES

Impact of MNT on Obesity

The Academy of Nutrition and Dietetics has analyzed compelling evidence supporting the effectiveness of MNT in a broad range of topics, including obesity, diabetes prevention, and type 2 diabetes.[14-19] As obesity is a key risk factor for the development of prediabetes and type 2 diabetes, adult weight management MNT delivered by an RDN is both clinically and economically effective for prevention and management.[14] MNT results in both statistically

J Acad Nutr Diet. 2018;118:343-353

FREIJER4FOOD & HEALTH CARE

ORIGINAL SCIENTIFIC PAPER

SYSTEMATIC REVIEW

Howatson *et al.* J. Prim Health care 2015;7(4):324–332

The contribution of dietitians to the primary health care workforce

Alexandra Howatson MDiet;[1] Clare R Wall PhD;[2] Petrina Turner-Benny RCompN, BA[1]

[1] Dietitians New Zealand

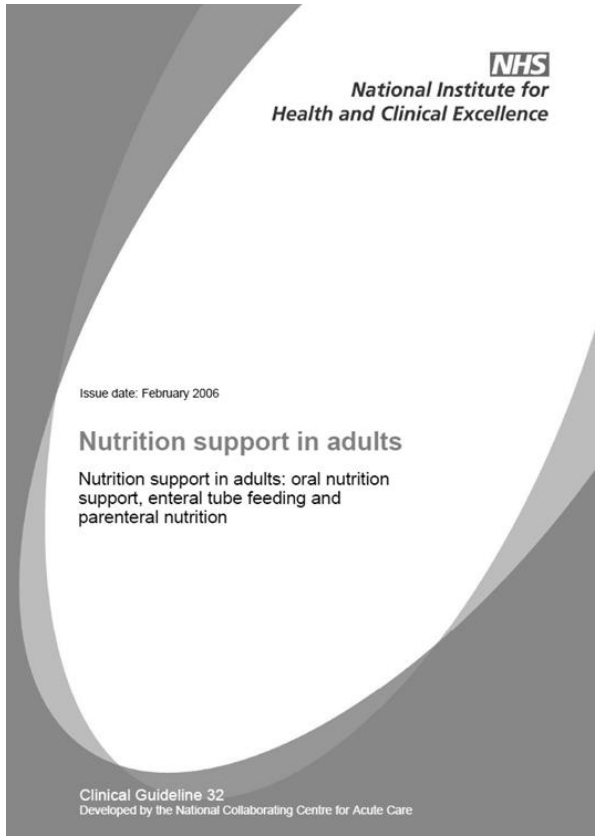
RESULTS: Dietetic intervention demonstrates statistically and clinically significant impacts on health outcomes in the areas of obesity, cardiovascular disease, diabetes, and malnutrition in older adults when compared to usual care. Dietitians working in primary health care can also have significant economic benefits, potentially saving the health care system NZ$5.50–$99 for every NZ$1 spent on dietetic intervention.

Published in final edited form as:
J Acad Nutr Diet. 2017 March ; 117(3): 404–421.e36. doi:10.1016/j.jand.2016.11.016.

The effectiveness and cost of lifestyle intervention including nutrition education for diabetes prevention: A systematic review and meta-analysis

The cost of intervention per participant delivered by dietitians was lower than interventions delivered by non-dietitians, though few studies reported costs.

Management of DRM elderly – economic evaluation



NICE 2006/2014

Population	100000
Percentage who are ≥65years UK (18.2%) (26)	18200
Percentage living in the community (93%) (27)	16926
Percentage at risk of malnutrition (7.3%) (4)	1236
Cost saving based on local implementation savings for those at risk of malnutrition (MR+HR; -£278.91[1] to -£395.64[2])	£344,733 to £489,011
Percentage at high risk of malnutrition (3.8%) (4)	643
Cost saving based on local implementation savings for those at high risk of malnutrition (HR; -£595.95[1] and -£997.02[2])	£383,196 to £641,084

MR-medium risk, HR- high risk; [1] Overall cost saving over 6 months, costs to implement – savings in health care use; using length of hospital stay; [2] Overall cost saving over 6 months, costs to implement – savings in health care use; using average hospital admission cost

Brown F. *et al.* (2020) J Nutr Health Aging.;24,305-311

FREIJER4FOOD & HEALTH CARE

Economic evaluation – syst reviews

Milte RK *et al.* European Journal of Clinical Nutrition (2013) 67, 1243–1250

REVIEW

Econon … protein and energy supplementation in adult… strengthen the evidence

… 35, 125–137

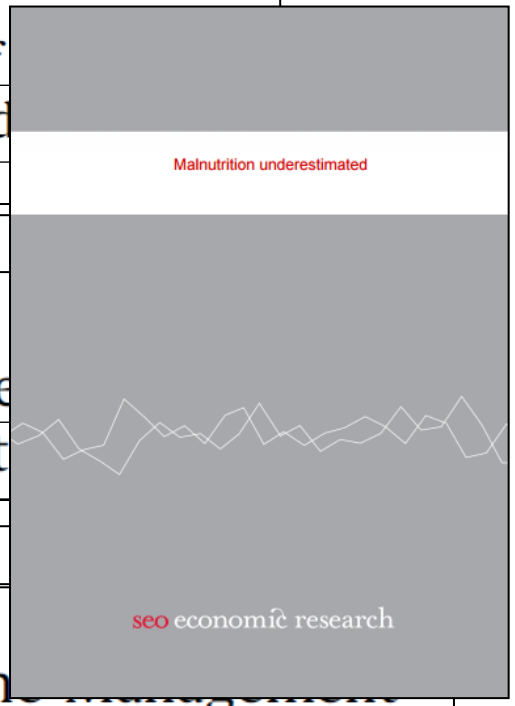
Meta-analyses

A systema… and cost effectiveness of standard o… ments in community and settings

…016) 35, 370–380

Meta-analyse…

A systematic review of the cost and cost effectiveness of standard oral nutritional supplements in the hospit…



Freijer K *et al.* JAMDA (2014) 15, 17-29

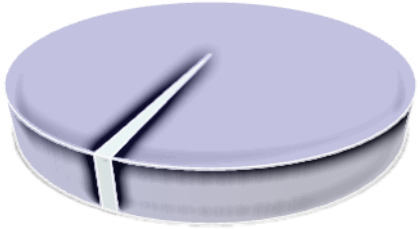
Review

The Economic Value of Enteral Medical Nutrition in th… of Disease-Related Malnutrition: A Systematic Review

FREIJER4FOOD & HEALTH CARE

Biggest Cost is the Consequence of Untreated Condition, Not Its Management

- Costs of (clinical) Nutrition are a small proportion of healthcare budgets: 1-3% in Europe



- **Biggest cost is due to the consequences of untreated condition**
  - Hospital (re-)admissions and LOS
  - Complications (e.g. infections)
  - Healthcare professionals
  - Medical treatments

Nutrition Economics: ISPOR SIG

VALUE IN HEALTH 22 (2019) 1–12

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/jval

VALUE HEALTH. 2022; 25(5):677–684

ISPOR Report

Medical Nutrition Terminology and Regulations in the United States and Europe—A Scoping Review: Report of the ISPOR Nutrition Economics Special Interest Group

Karen Freijer, PhD, RDN [1,*,†], Sheri Volger, MS, RDN [2,†], János G. Pitter, PhD, MD [3,†], Elizabeth Molsen-David, RN [4,†], Clarissa Cooblall, MPH [4,†], Silvia Evers, PhD, MSc [1], Mickaël Hiligsmann, PhD [5], Aurelie Danel, PharmD [6], Irene Lenoir-Wijnkoop, PhD, RDN [7,†], on behalf of the ISPOR Nutrition Economics Medical Nutrition Terms & Definitions Working Group's Leadership Team[‡]

[1]School for Public Health and Primary Care (CAPHRI), Maastricht University, Maastricht, The Netherlands; [2]Clinical Development

OBJECTIVES

- To examine MN terminology and definitions to provide a foundation for the development of emerging good practices for the economic evaluation of MN products.
- To identify MN regulations in Europe and the USA.
- To assess the proportion and types of current MN cost-effectiveness analyses.

ISPOR Report

Are We Ready for a New Approach to Comparing Coverage and Reimbursement Policies for Medical Nutrition in Key Markets: An ISPOR Special Interest Group Report

Moreno Perugini, MBA, MHE, Tricia J. Johnson, PhD, Tania Maria Beume, MSc, Olivia M. Dong, PhD, John Guerino, MHS, Hao Hu, PhD, Kirk Kerr, PhD, Shannon Kindilien, MA, Mark Nuijten, PhD, MD, Theresa U. Ofili, PharmD, Matthew Taylor, PhD, Alvin Wong, MS, Karen Freijer, PhD

ABSTRACT

Objectives: Healthcare policy makers should ensure optimal patient access to medical nutrition (MN) as part of the management of nutrition-related disorders and conditions. Questions remain whether current healthcare policies reflect the clinical and economic benefits of MN. The objective of this article is to characterize coverage and reimbursement of MN, defined as food for special medical purposes/medical food for a diverse set of countries, including Australia, Belgium, Brazil, Canada, China, France, Germany, Hong Kong, Italy, Japan, The Netherlands, Singapore, Spain, United Kingdom, and United States.

Take home messages

- **Nutrition Economics** → specific area within health economics → still in progress → very needed! (join ISPOR - Nutrition Economics)

→ *Standardization methodology (nutrition & nutrition economics)*

- *Applying future Nutrition Economics guidelines*
  → until then perform **high quality economic evaluations**

use health economic evaluation guidelines
& reporting standards (CHEERS) *Consolidated Health Economic Evaluation Reporting Standards*

- **Optimal nutritional management** especially by dietitian, can **save costs**

- Investing in **optimal nutrition** should be **standard** before spending money on symptomatic treatment

Cooperation

GOOD Nutrition PAYS

(DISEASE RELATED) MALNUTRITION

OVERWEIGHT/OBESITY

eClinicalMedici
Part of THE LANCET

ESPEN
The European Society for Clinical Nutrition and Metabolism

EASO

Trends
countri
Disease

sity in 204
al Burden of

is one
on on
isease
rition,
istinct
share
processes at different ends of
ly, health and development

ISPOR
Improving healthcare decisions

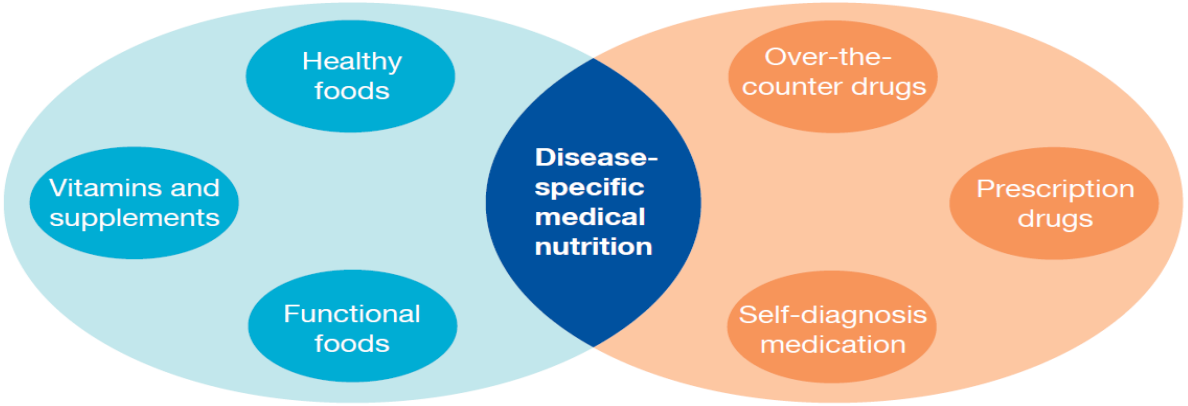
Nutrition Economics
Special Interest Group

Hecker et al. BMC Public Health (2022) 22:46 https://doi.org/10.1186/s12889-021-12449-2

FREIJER4FOOD & HEALTH CARE


Let's make the world
a better place.


GOOD
Nutrition
PAYS


Healthy foods
Vitamins and supplements
Functional foods
Disease-specific medical nutrition
Over-the-counter drugs
Prescription drugs
Self-diagnosis medication


Q&A
dreamstime.com

WORLD FOOD DA

Malr
WHO
says

Dr Francesco Branca

Director of the Department of Nutrition for Health and Development at the World Health Organization (WHO)

Malnutrition is a complex problem to solve but, as levels of undernutrition and obesity rise, something must be done, says leading food health expert Dr Francesco Branca.

> *Nutrition is the main cause of death and disease in the world.*

Malnutrition is a global problem

Millions of people are suffering from different forms of malnutrition. In fact, 1.9 billion adults are overweight or obese while 462 million are underweight. Among children, 52 million under-fives are suffering from wasting, where they have a low weight for height.