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# Neue Evidenz zur Behandlung der Mangelernährung: Hin zu einer personalisierten und Kosten-effizienten Therapie

**Nutridays 2024, Bern**

**Pascal Tribolet MSc nutr. med., Ernährungsberater SVDE**

Dozent Berner Fachhochschule Gesundheit und Wissenschaftlicher Mitarbeiter  
Universitätsklinik Kantonsspital Aarau

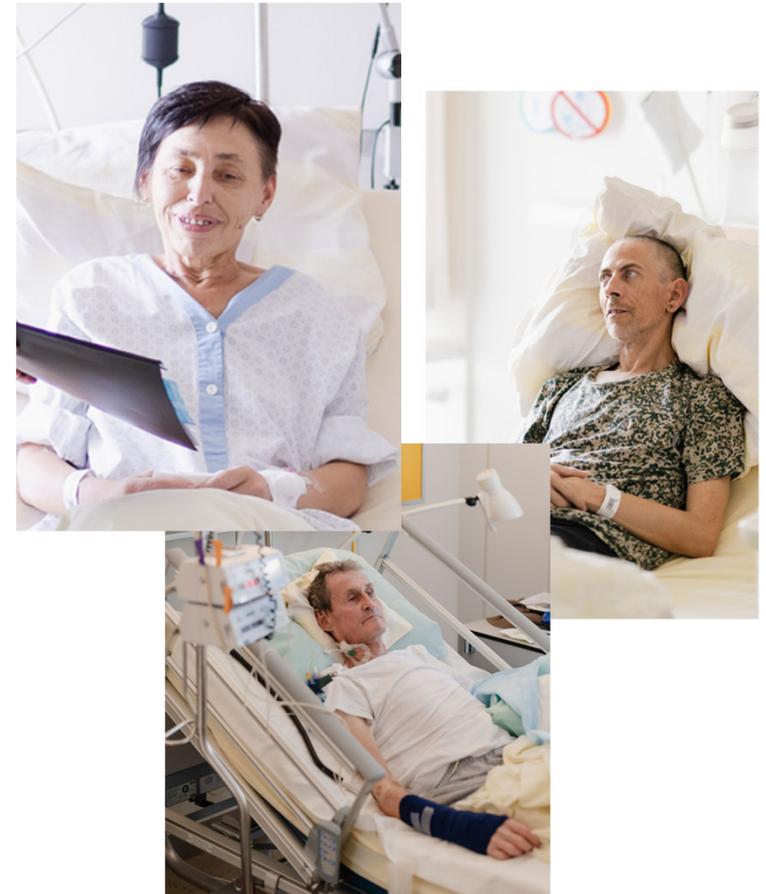
**Prof. Dr. med. Philipp Schuetz**

Chefarzt Universitätsklinik Kantonsspital Aarau

# Hospitalisierter Patient mit Mangelernährungsrisiko

## Offene Fragen zur Mangelernährung:

1. Wie wird «Mangelernährung definiert?
  - Pathophysiologie und Definition?
  - Was sind diagnostische Kriterien?



# Die Pathophysiologie der Mangelernährung ist komplex und beinhaltet verschiedene Pathways

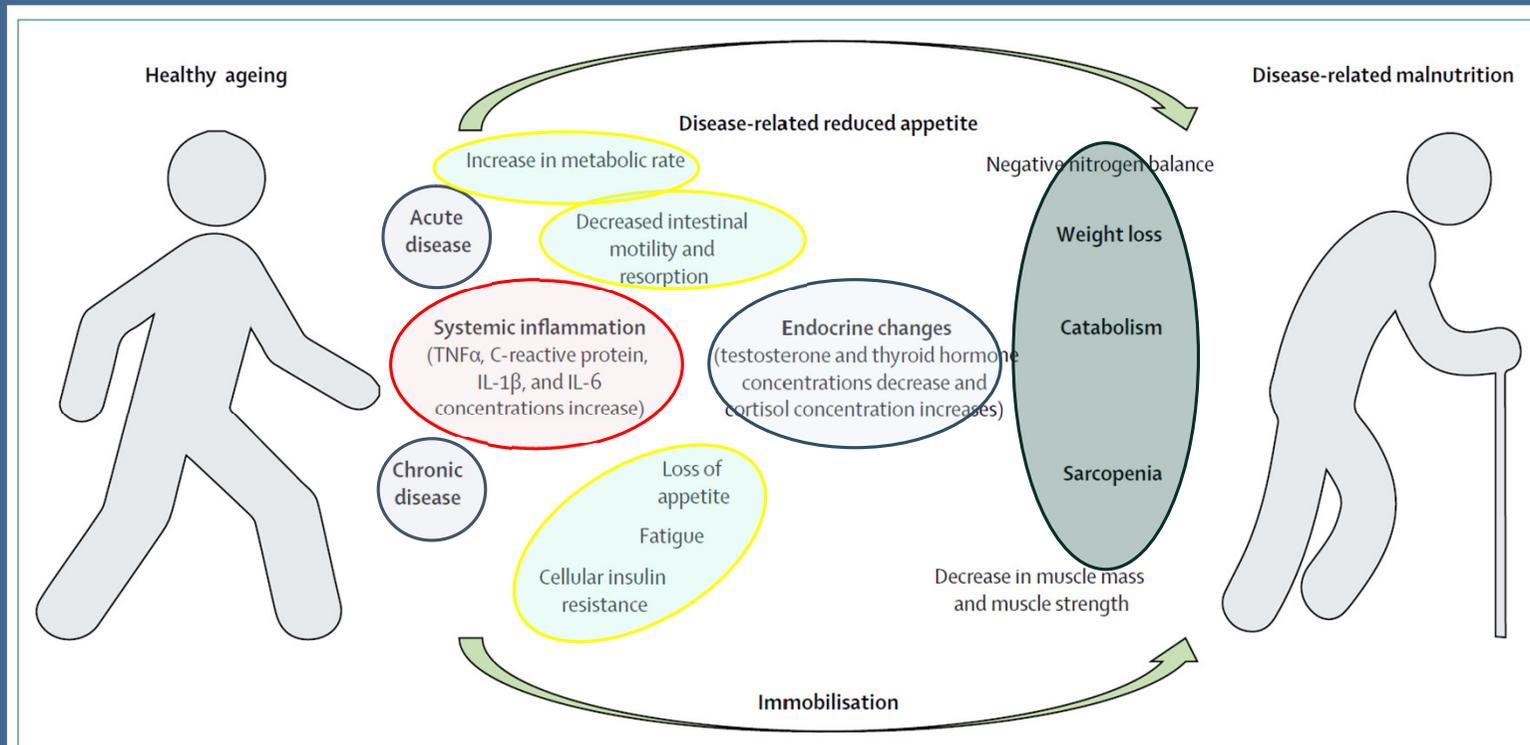


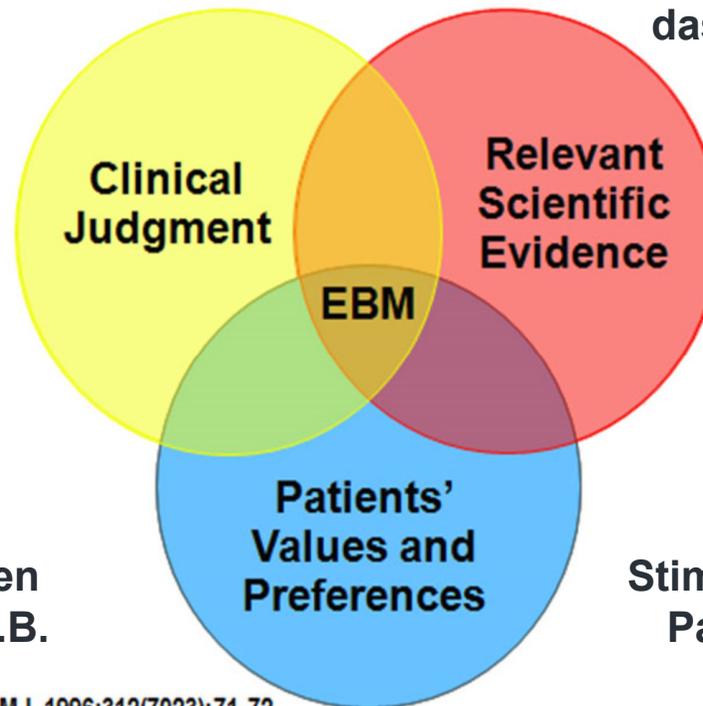
Figure 1: Pathophysiology of malnutrition  
IL=interleukin. TNF $\alpha$ =tumour necrosis factor  $\alpha$ .

# Von der Evidenz-basierten Medizin (EBM) zur Evidenz-basierten Ernährungsmedizin (EBN)

Ist es wirklich eine «Krankheitsbedingte Mangelernährung»?

Gibt es Evidenz, dass die Therapie das klinische Outcome verbessert?

Ausschluss von Sekundären Ursachen? Medikamenten-NW?



Ist es eine Situation, wo wir den Patienten behandeln wollen (z.B. Tumorpatient)?

Stimmen unsere Ziele mit jenen des Patienten / der Familie überein?

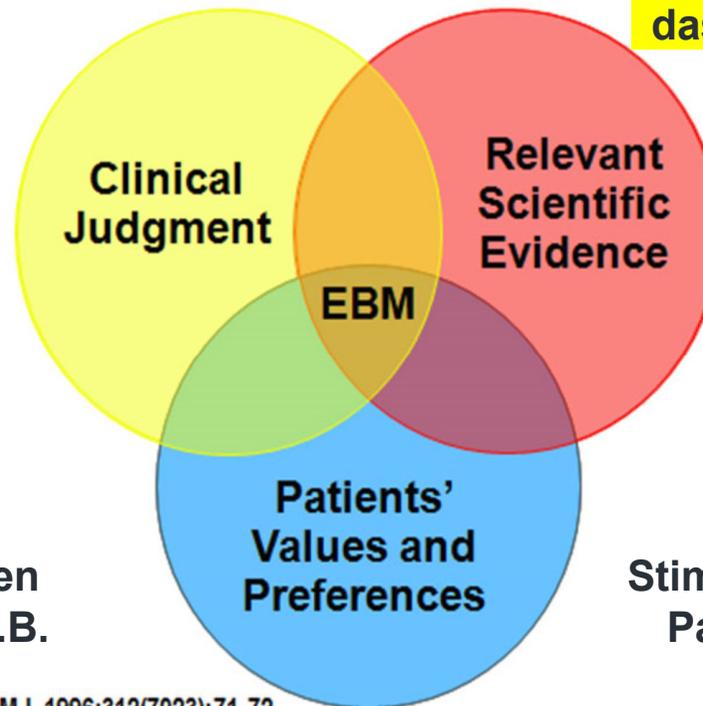
l. BMJ. 1996;312(7023):71-72.

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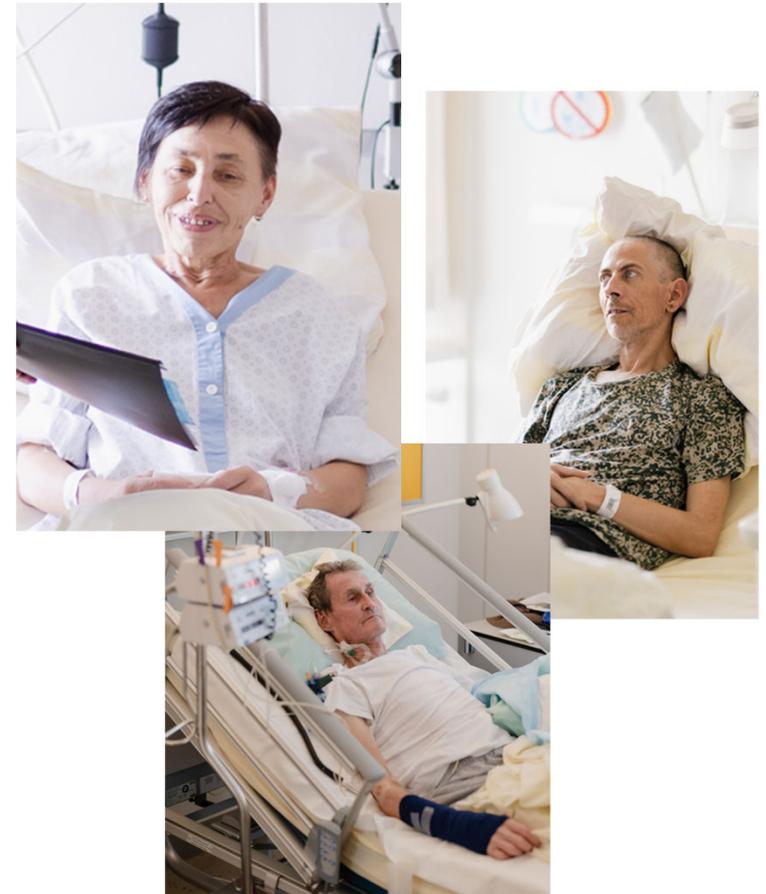
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  - Was sind diagnostische Kriterien?



# ESPEN Guidelines für Polymorbide Patienten 2023 Update

Clinical Nutrition 42 (2023) 1545–1568

Contents lists available at ScienceDirect

**Clinical Nutrition**

Journal homepage: <http://www.elsevier.com/locate/clnu>

ESPEN Guideline

**ESPEN guideline on nutritional support for polymorbid medical inpatients**

Carla Wunderle <sup>a,1</sup>, Filomena Gomes <sup>a,b,1</sup>, Philipp Schuetz <sup>a,\*,1</sup>, Franziska Stumpf <sup>a,c</sup>, Peter Austin <sup>d</sup>, María D. Ballesteros-Pomar <sup>e</sup>, Tommy Cederholm <sup>f</sup>, Jane Fletcher <sup>g</sup>, Alessandro Laviano <sup>h</sup>, Kristina Norman <sup>i</sup>, Kalliopi-Anna Pouliou <sup>j</sup>, Stéphane M. Schneider <sup>k</sup>, Zeno Stanga <sup>l</sup>, Stephan C. Bischoff <sup>m</sup>

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<sup>d</sup> Pharmacy Department, Oxford University Hospitals NHS Foundation Trust, Oxford, UK; University College London School of Pharmacy, London, United Kingdom  
<sup>e</sup> Complejo Asistencial Universitario de León, Spain  
<sup>f</sup> Uppsala University, Uppsala and Karolinska University Hospital, Stockholm, Sweden  
<sup>g</sup> Queen Elizabeth Hospital, Birmingham, United Kingdom  
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<sup>i</sup> Charité University Medicine Berlin and German Institute for Human Nutrition, Germany  
<sup>j</sup> Agricultural University of Athens, Greece  
<sup>k</sup> Centre Hospitalier Universitaire de Nice, Université Côte d'Azur, Nice, France  
<sup>l</sup> University Hospital and University of Bern, Switzerland  
<sup>m</sup> Institute of Nutritional Medicine, University of Hohenheim, Stuttgart, Germany

**ARTICLE INFO**

**Summary**

**Background:** Disease-related malnutrition in polymorbid medical inpatients is a highly prevalent syndrome associated with significantly increased morbidity, disability, short- and long-term mortality, impaired recovery from illness, and cost of care.

**Aim:** As there are uncertainties in applying disease-specific guidelines to patients with multiple conditions, our aim was to provide evidence-based recommendations on nutritional support for the polymorbid patient population hospitalized in medical wards.

**Methods:** This update adheres to the standard operating procedures for ESPEN guidelines. We did a systematic literature search for 15 clinical questions in three different databases (Medline, Embase and the Cochrane Library), as well as in secondary sources (e.g. published guidelines), until July 12th. Retrieved abstracts were screened to identify relevant studies that were used to develop recommendations (incl. SIGN grading), which was followed by submission to Delphi voting.

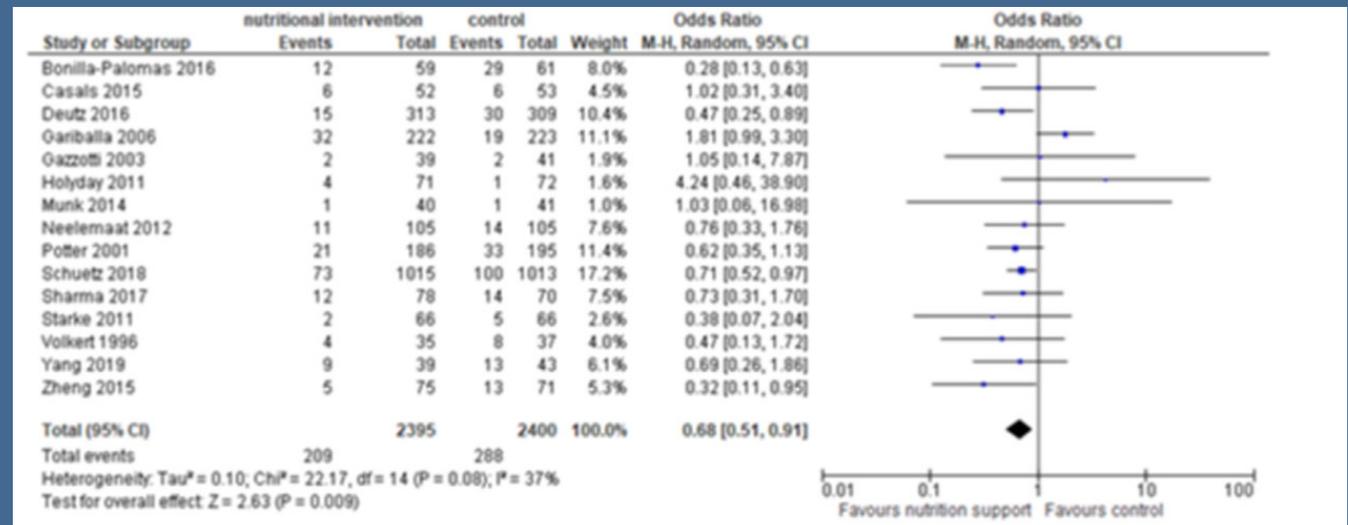
**Results:** From a total of 3527 retrieved abstracts, 60 new relevant studies were analyzed and used to generate a guideline draft that proposed 32 recommendations (7x A, 11x B, 10x O and 4x GPP), which encompass different aspects of nutritional support including indication, route of feeding, energy and protein requirements, micronutrient requirements, disease-specific nutrients, timing, monitoring and procedure of intervention. The results of the first online voting showed a strong consensus (agreement of >90% on 100% of the recommendations). Therefore, no final consensus conference was needed.

**Conclusions:** Recent high-quality trials have provided increasing evidence that nutritional support can reduce morbidity and other complications associated with malnutrition in polymorbid patients. The timely screening of patients for risk of malnutrition at hospital admission followed by individualized nutritional support interventions for at-risk patients should be part of routine clinical care and

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<sup>1</sup> C.W., F.G. and P.S. contributed equally to this study.

<https://doi.org/10.1016/j.clnu.2023.06.023>  
 0261-5614/© 2023 European Society for Clinical Nutrition and Metabolism. Published by Elsevier Ltd. All rights reserved. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).



# Metaanalysis über den Effekt der Ernährungsintervention auf die Mortalität von internistischen Patienten

JAMA Network | **Open** 

Original Investigation | Nutrition, Obesity, and Exercise

## Association of Nutritional Support With Clinical Outcomes Among Medical Inpatients Who Are Malnourished or at Nutritional Risk

### An Updated Systematic Review and Meta-analysis

Filomena Gomes, PhD; Annic Baumgartner, MD; Lisa Bounoure, PhD; Martina Bally, MD; Nicolaas E. Deutz, MD; Jeffrey L. Greenwald, MD; Zeno Stanga, MD; Beat Mueller, MD; Philipp Schuetz, MD, MPH

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#### Abstract

**IMPORTANCE** Malnutrition affects a considerable proportion of the medical inpatient population. There is uncertainty regarding whether use of nutritional support during hospitalization in these patients positively alters their clinical outcomes.

**OBJECTIVE** To assess the association of nutritional support with clinical outcomes in medical inpatients who are malnourished or at nutritional risk.

**DATA SOURCES** For this updated systematic review and meta-analysis, a search of the Cochrane Library, MEDLINE, and Embase was conducted from January 1, 2015, to April 30, 2019; the included studies were published between 1982 and 2019.

**STUDY SELECTION** A prespecified Cochrane protocol was followed to identify trials comparing oral and enteral nutritional support interventions with usual care and the association of these treatments with clinical outcomes in non-critically ill medical inpatients who were malnourished.

**DATA EXTRACTION AND SYNTHESIS** Two reviewers independently extracted data and assessed risk of bias; data were pooled using a random-effects model.

**MAIN OUTCOMES AND MEASURES** The primary outcome was mortality. The secondary outcomes included nonselective hospital readmissions, length of hospital stay, infections, functional outcome

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#### Key Points

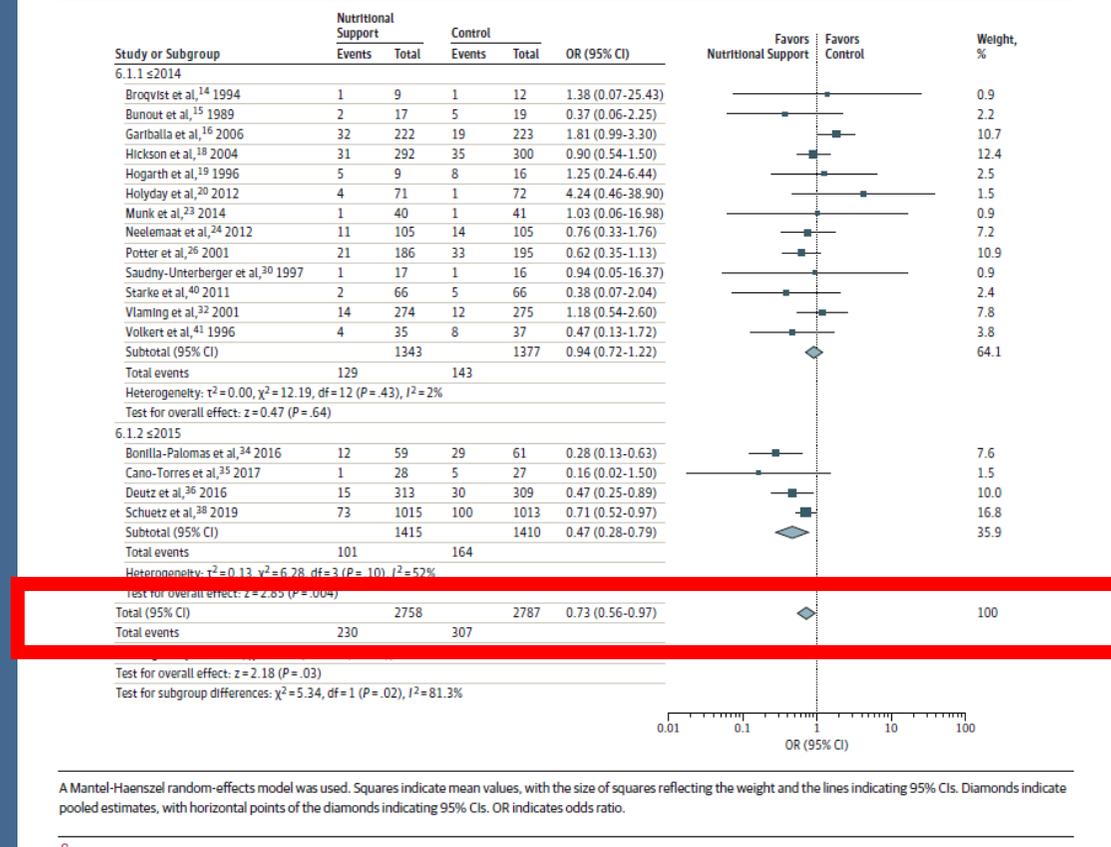
**Question** What is the association of nutritional support with clinical outcomes in medical inpatients who are malnourished or at nutritional risk?

**Findings** In this updated systematic review and meta-analysis of 27 trials including 6803 patients, nutritional support provided during hospitalization was associated with significantly lower rates of mortality and nonselective hospital readmissions, as well as higher energy and protein intake and weight increase.

**Meaning** This study's findings suggest that nutritional support in hospitalized patients who are malnourished or at nutritional risk is associated with improved nutritional and clinical outcomes and should be considered

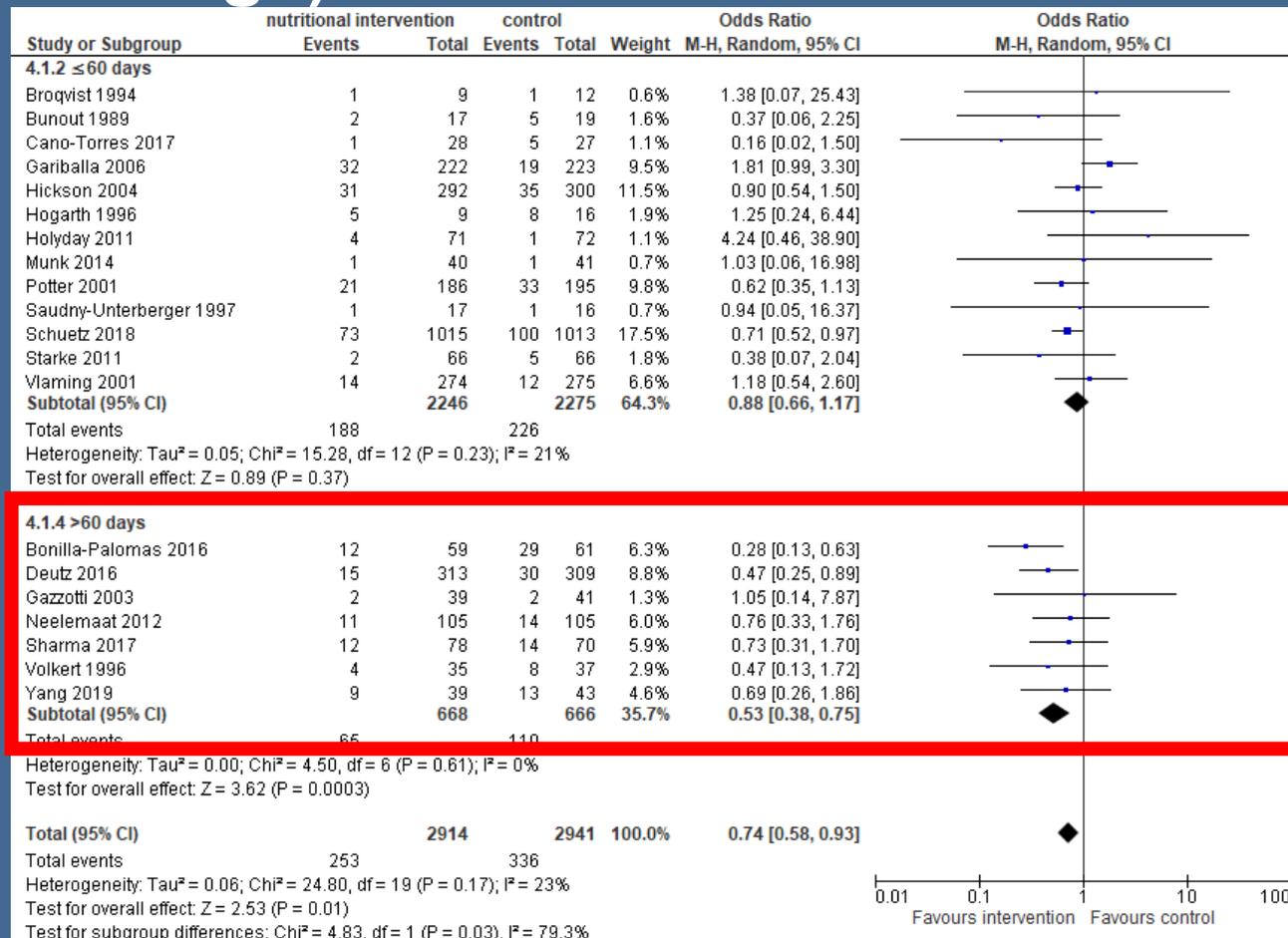
# 25% Mortalität Reduktion bei Patienten welche eine Ernährungstherapie erhalten haben

Figure 1. Forest Plot Comparing Nutritional Intervention vs Control for Mortality, Stratified by Publication Year

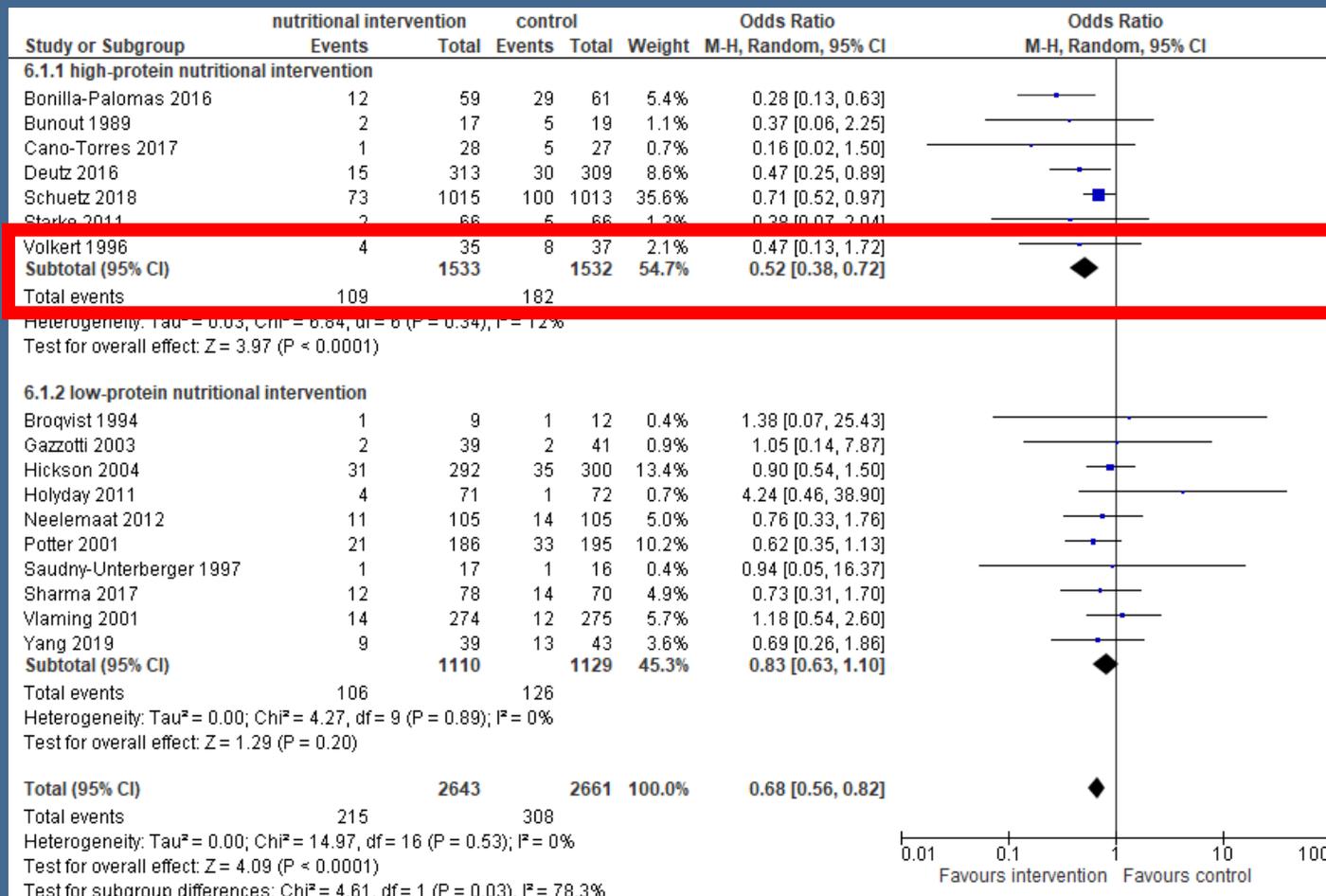


# Subanalyse 1:

## Lange (>60 Tage) Interventionen sind am effektivsten



# Subanalyse 2: Hoch Protein Interventionen sind am effektivsten



# Evidenz zur Ernährungstherapie im Spital

THE LANCET **EFFORT Trial**

Articles

## Individualised nutritional support in medical inpatients at nutritional risk: a randomised clinical trial



*Philipp Schuetz, Rebecca Fehr, Valerie Baechli, Martina Geiser, Manuela Deiss, Filomena Gomes, Alexander Kutz, Pascal Tribolet, Thomas Bregenzer, Nina Braun, Claus Hoess, Vojtech Pavlicek, Sarah Schmid, Stefan Bilz, Sarah Sigrist, Michael Brändle, Carmen Benz, Christoph Henzen, Silvia Mattmann, Robert Thomann, Claudia Brand, Jonas Rutishauser, Drahomir Aujesky, Nicolas Rodondi, Jacques Donzé, Zeno Stanga\*, Beat Mueller\**

### Summary

**Background** Guidelines recommend the use of nutritional support during hospital stays for medical patients (patients not critically ill and not undergoing surgical procedures) at risk of malnutrition. However, the supporting evidence for this recommendation is insufficient, and there is growing concern about the possible negative effects of nutritional therapy during acute illness on recovery and clinical outcomes. Our aim was thus to test the hypothesis that protocol-

Published Online  
April 25, 2019  
[http://dx.doi.org/10.1016/S0140-6736\(18\)32776-4](http://dx.doi.org/10.1016/S0140-6736(18)32776-4)  
See Online/Comment

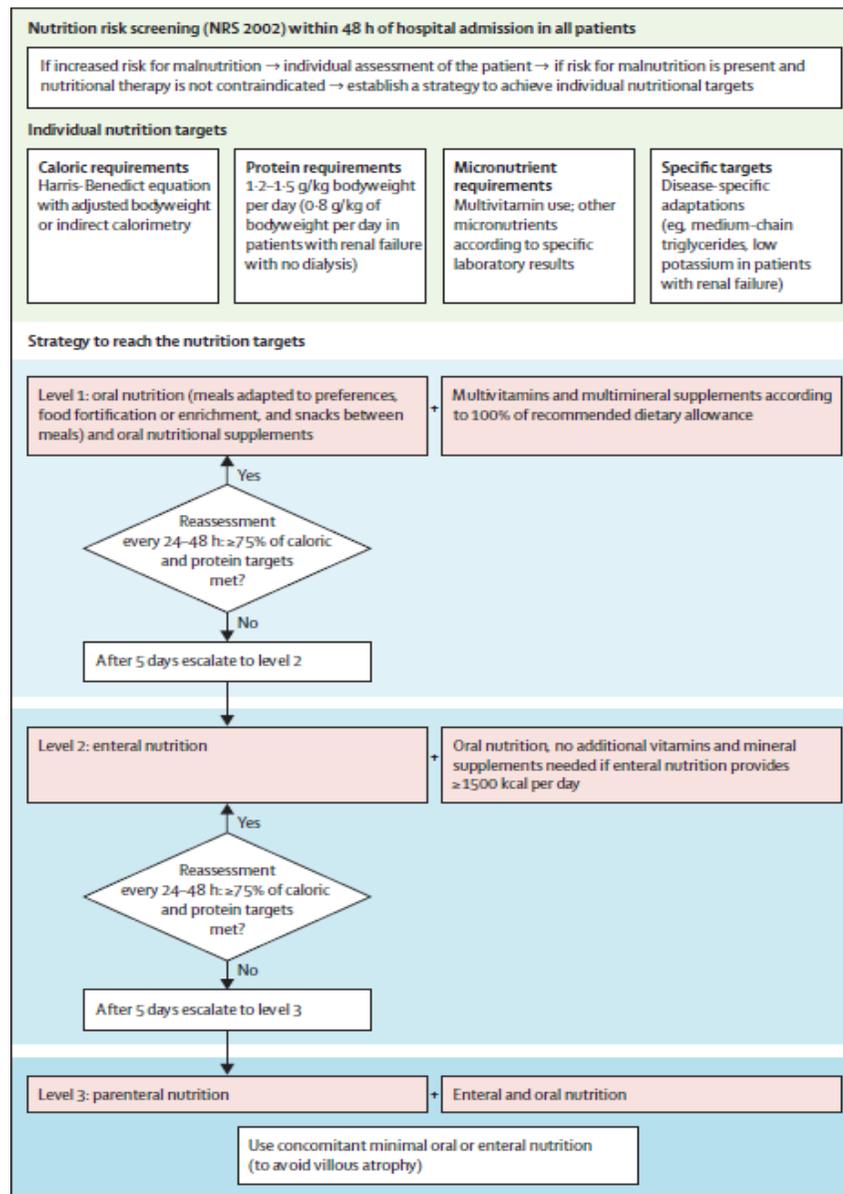


Figure 1: Nutritional algorithm used during the trial  
Reproduced from Bounoure et al.<sup>19</sup> by permission of Elsevier.

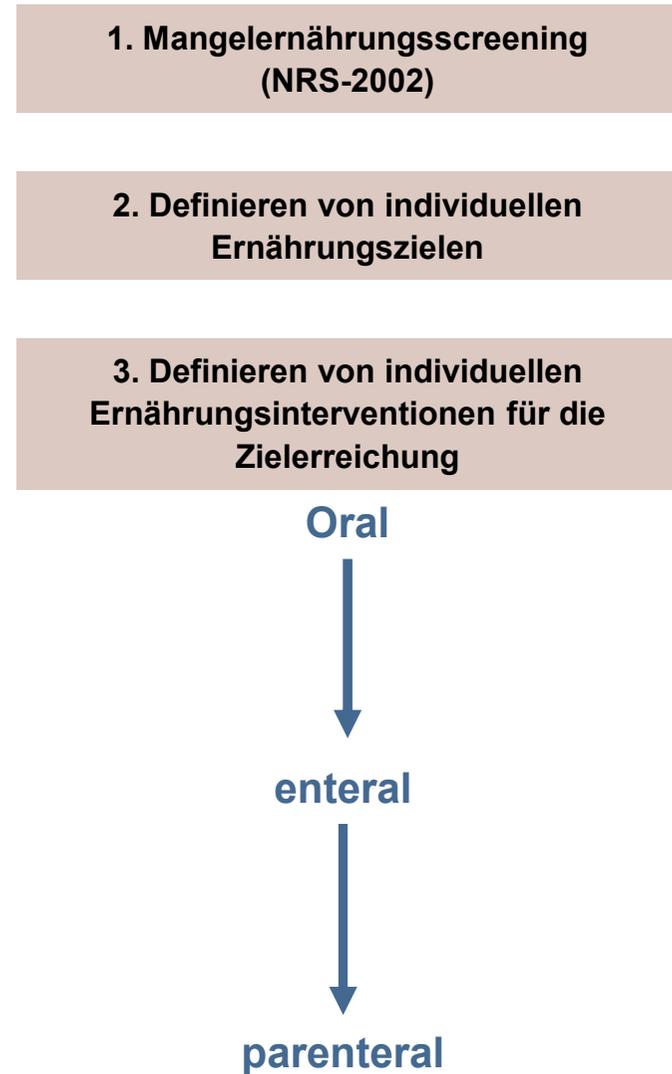
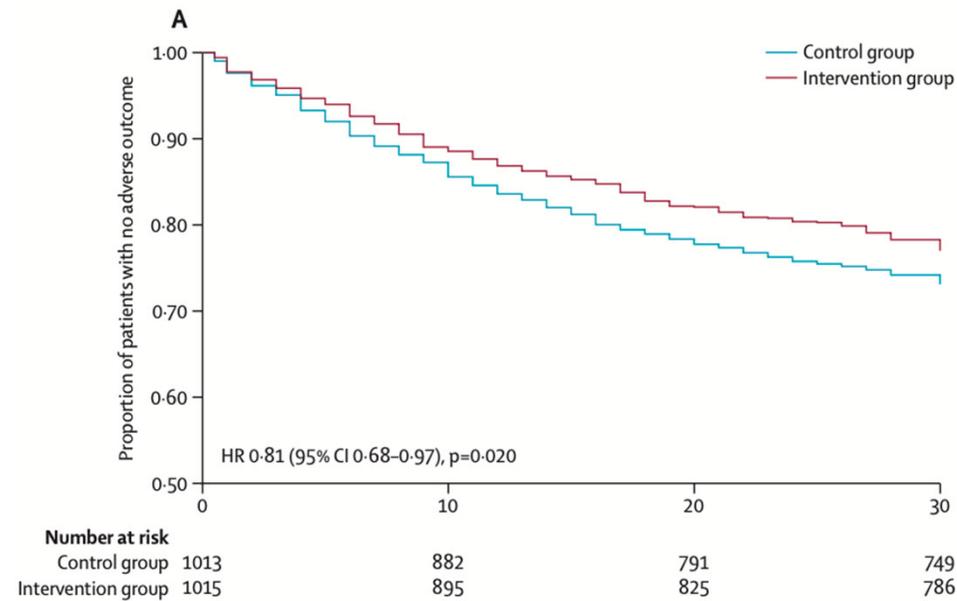


Fig 1- Schuetz P, et al. Lancet. 2019;393(10188):2312-2321.

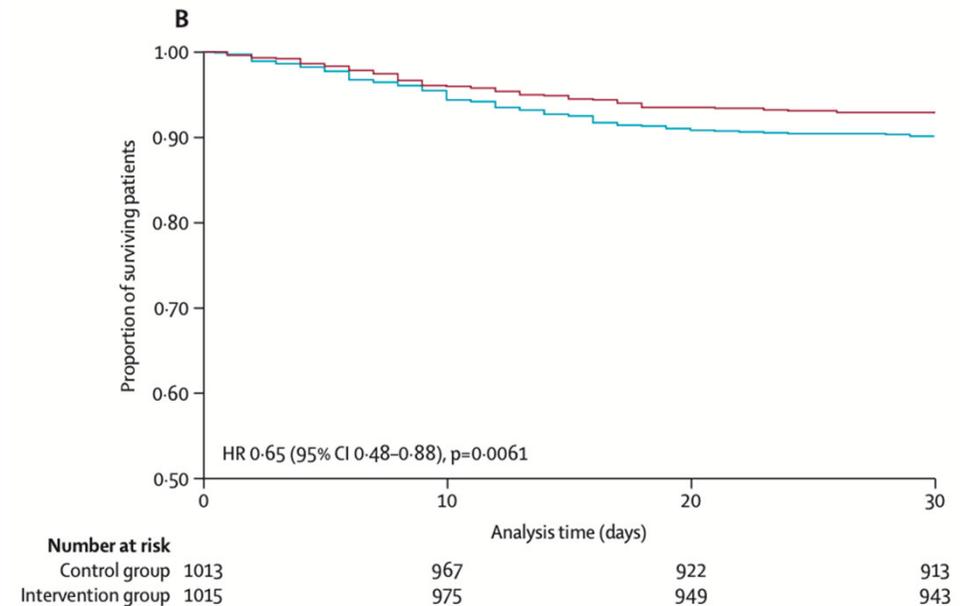
# Resultate (1/2)

## Complications



**26.9% (control) vs 22.9% (intervention)**  
**Number needed to treat: 25**

## 30-day mortality



**9.9% (control) vs 7.2% (intervention)**  
**Number needed to treat: 37**

## Resultate (2/2)



	Intervention group (n=1015)	Control group (n=1013)	Odds ratio or coefficient (95% CI)	p value
<b>Outcomes</b>				
<b>Primary outcome</b>				
Adverse outcome within 30 days	232 (23%)	272 (27%)	0.79 (0.64 to 0.97)	0.023
<b>Single components of primary outcome</b>				
All-cause mortality	73 (7%)	100 (10%)	0.65 (0.47 to 0.91)	0.011
Admission to the intensive care unit	23 (2%)	26 (3%)	0.85 (0.48 to 1.51)	0.58
Non-elective hospital readmission	89 (9%)	91 (9%)	0.99 (0.73 to 1.35)	0.96
<b>Major complications</b>				
Any major complication	74 (7%)	76 (8%)	0.95 (0.68 to 1.34)	0.79
Nosocomial infection	40 (4%)	39 (4%)	1.01 (0.63 to 1.59)	0.98
Respiratory failure	14 (1%)	13 (1%)	1.06 (0.49 to 2.28)	0.89
Major cardiovascular event	8 (1%)	7 (1%)	1.11 (0.40 to 3.11)	0.84
Acute kidney failure	32 (3%)	31 (3%)	1.01 (0.61 to 1.69)	0.96
Gastrointestinal events	9 (1%)	15 (1%)	0.57 (0.25 to 1.31)	0.19
Decline in functional status of $\geq 10\%$ *	35 (4%) of 942	55 (6%) of 913	0.62 (0.40 to 0.96)	0.034
<b>Additional secondary outcomes</b>				
Mean length of stay (days)	9.5 (7.0)	9.6 (6.1)	-0.21 (-0.76 to 0.35)	0.46
Mean Barthel score (points)*	88 (26)	85 (30)	3.26 (0.93 to 5.60)	0.006
Mean EQ-5DVAS (points)†	59 (26)	56 (29)	3.06 (0.53 to 5.59)	<0.0001
Mean EQ-5D index (points)	0.75 (0.32)	0.73 (0.34)	0.13 (0.09 to 0.17)	0.018
<b>Side-effects from nutritional support</b>				
All side-effects	162 (16%)	145 (14%)	1.16 (0.90 to 1.51)	0.26
Gastrointestinal side-effects	43 (4%)	40 (4%)	1.12 (0.68 to 1.83)	0.66
Complications due to enteral feeding or parenteral nutrition	5 (<1%)	3 (<1%)	1.63 (0.38 to 6.95)	0.51
Liver or gall bladder dysfunction	4 (<1%)	7 (1%)	0.54 (0.15 to 1.91)	0.34
Severe hyperglycaemia	48 (5%)	46 (5%)	1.06 (0.69 to 1.61)	0.80
Refeeding syndrome	86 (8%)	73 (7%)	1.21 (0.86 to 1.70)	0.27

Data are number of events (%), unless otherwise stated. All odds ratios were calculated with a logistic regression for



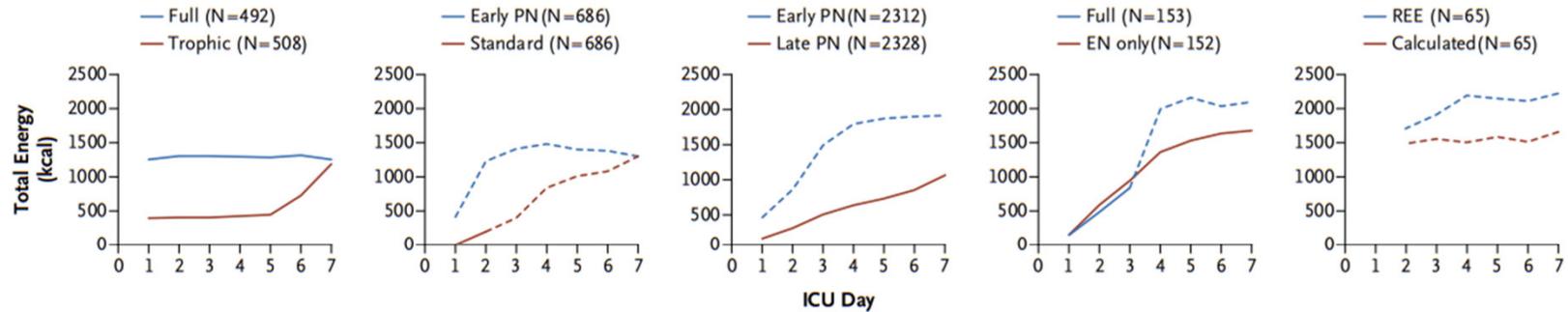
# *Personalized* Nutrition

Customized methods, ingredients, formulas and self-monitoring kits tailored to specific consumer health goals

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**Sollte die Ernährungstherapie «individualisiert» werden?**

# Haben wir Fortschritte in der Behandlung der Mangelernährung gemacht? Warum sehen wir nicht die gleichen Ergebnisse in Studien zur Intensivpflege?

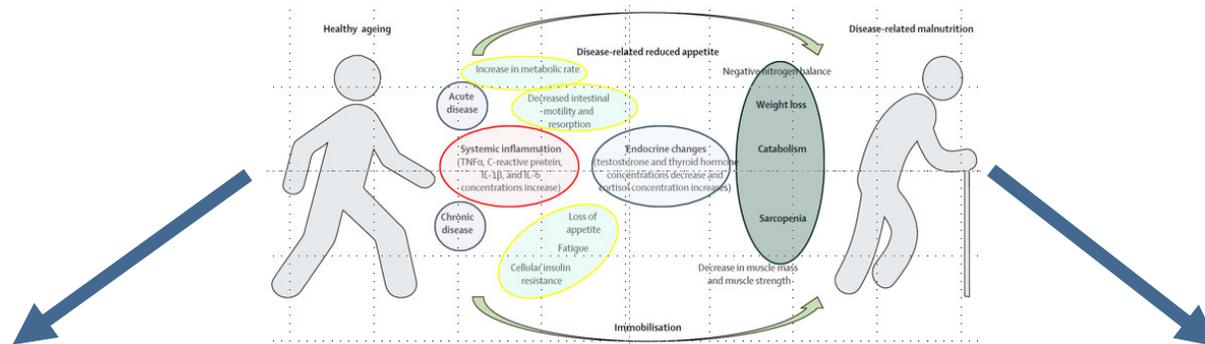


	<b>EDEN Trial (N=1000)</b>	<b>Early PN Trial (N=1372)</b>	<b>EPaNIC Trial (N=4640)</b>	<b>SPN Trial (N=305)</b>	<b>TICACOS (N=130)</b>
<b>Type of Patients</b>	Medical (acute lung injury) Eligible for EN	Mixed medical and surgical EN relatively contraindicated (short term)	Mixed medical and surgical (unselected) With nutritional risk (NRS, ≥3)	Mixed medical and surgical (on day 4) Eligible for EN but <60% target	Mixed medical and surgical
<b>New Infections in ICU</b>	Unaffected	Unaffected	More with early PN	Between day 9 and day 28: less with SPN From randomization to day 28: unaffected	More with REE
<b>Duration of Mechanical Ventilation</b>	Unaffected	Shorter with early PN	Longer with early PN	Unaffected	Longer with REE
<b>Length of Stay in ICU</b>	Unaffected	Unaffected	Longer with early PN	Unaffected	Longer with REE
<b>Mortality in ICU</b>	Unaffected	Unaffected (60-day mortality: unaffected)	Unaffected	Unaffected	Unaffected (trend toward reduced hospital mortality)

**Figure 1.** Comparison of Macronutrient Intake and Outcomes of Five Randomized, Controlled Trials Evaluating Nutrition during Critical Illness.

# Warum gibt es so unterschiedliche Reaktionen?

Art der Ernährung? Patientenauswahl? Aktivität und Inflammation?



## Patient 1

Polymorbider Patient aus dem Pflegeheim. Geringe Energie- und Proteinaufnahme während den letzten 6 Monaten, was zu Gewichts- und Muskelverlust geführt hat.

## Patient 2

Kataboler Patient mit starker Inflammation und metastasierendem Pankreas-CA. «Adäquate» orale Aufnahme, aber verliert rasch an Muskelmasse und weist Ödeme auf.

# Warum gibt es so unterschiedliche Reaktionen?

Art der Ernährung? Patientenauswahl? Aktivität und Inflammation?

**Spielt eine chronische Erkrankung eine Rolle?  
Z.B eine chronische Herzinsuffizienz?**



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**Individualized Nutritional Support for Hospitalized Patients With Chronic Heart Failure**

Original Investigation

Lara Hersberger, Anna Dietz, Helene Bürgler, Annika Bargetzi, Laura Bargetzi, Nina Kägi-Braun, Pascal Tribolet, Filomena Gomes, Claus Hoess, Vojtech Pavlicek, Stefan Bilz, Sarah Sigrist, Michael Brändle, Christoph Henzen, ... [SEE ALL AUTHORS](#)

J Am Coll Cardiol. 2021 May, 77 (18) 2307-2319

Topic(s): Heart Failure & Cardiomyopathies

Letters: [The Importance of Objective Nutritional Indexes in Heart Failure Patients](#)  
Editorial Comment: [Food and Pharma: Linking 2 Silos of Heart Failure Research and Therapy\\*](#)

## Related Podcast(s)



Individualized Nutritional Support for Hospitalized Patients with Chronic Heart Failure  
Valentin Fuster  
May 3, 2021

▶ 0:00 / 12:42 — 🔊 ⋮

**CENTRAL ILLUSTRATION: Kaplan-Meier Estimate of 30-Day Mortality for Patients With Moderate and High Nutritional Risk**

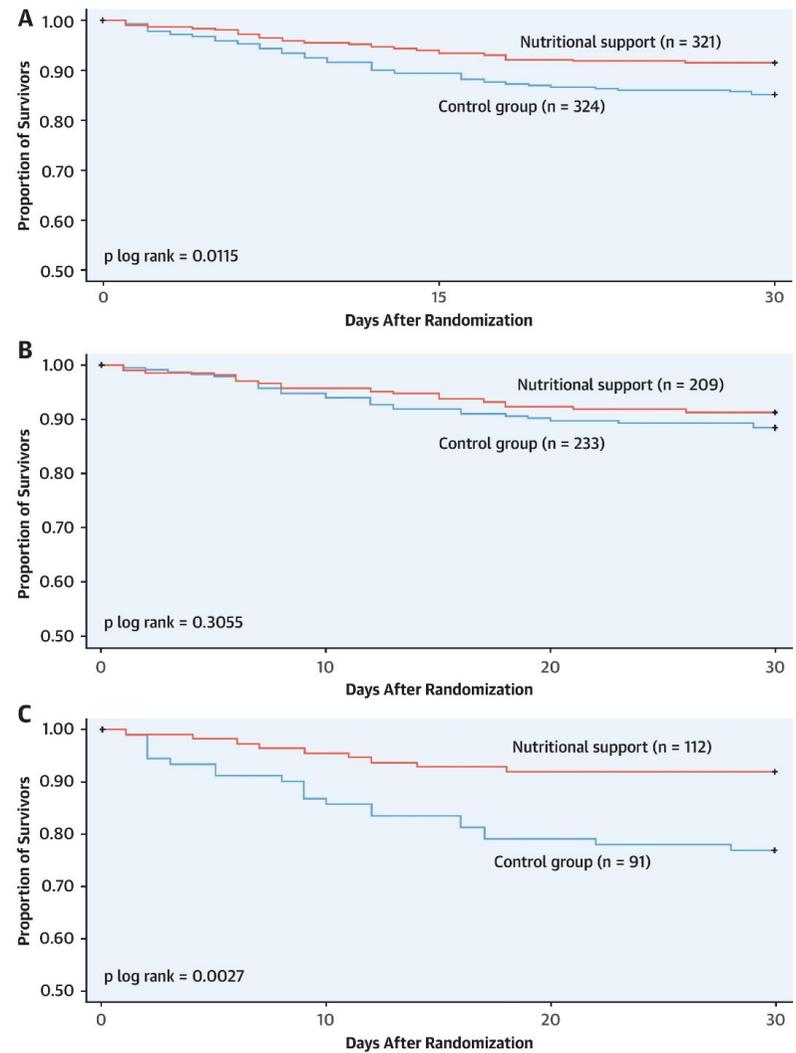
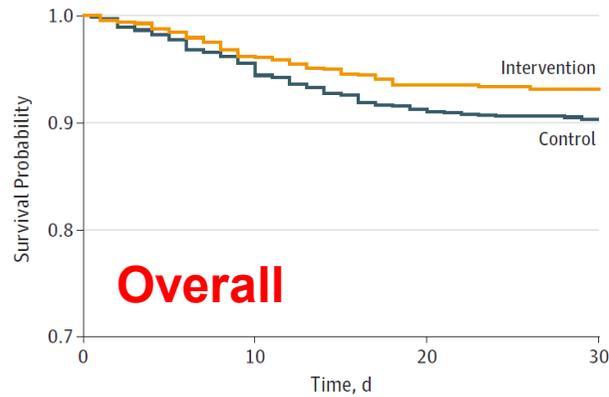


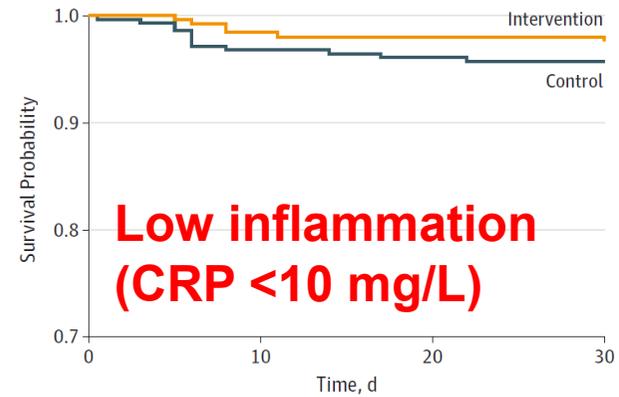
Figure 2. Kaplan-Meier Estimate for Time to Death Within 30-Days According to Inflammatory Status

**A** 30-Day mortality in overall population



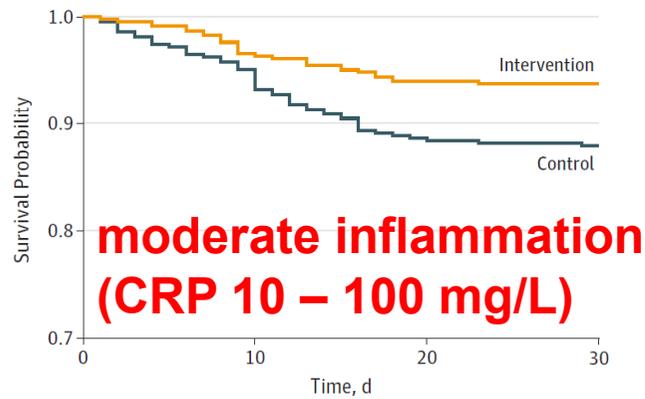
No. at risk	0	10	20	30
Control	972	929	887	878
Intervention	978	941	915	911

**B** 30-Day mortality among patients with low inflammation



No. at risk	0	10	20	30
Control	281	272	270	269
Intervention	252	248	247	247

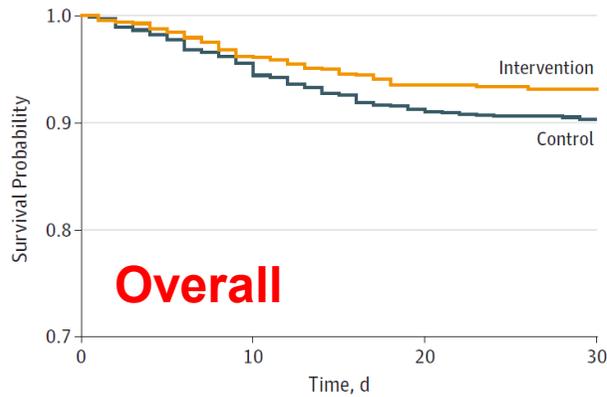
**C** 30-Day mortality among patients with moderate inflammation



No. at risk	0	10	20	30
Control	429	408	380	377
Intervention	465	449	437	436

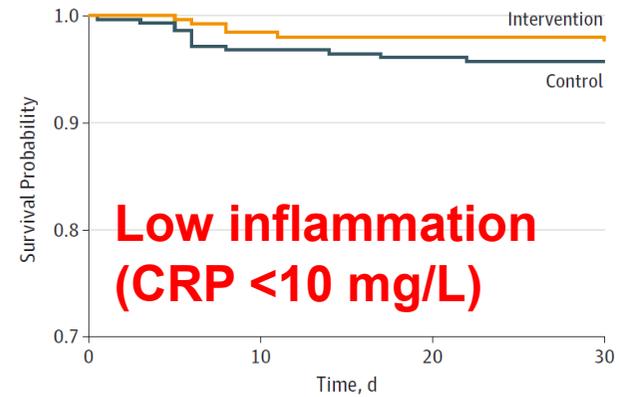
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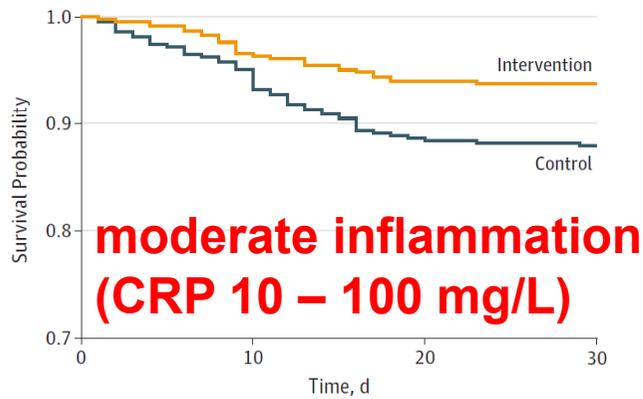
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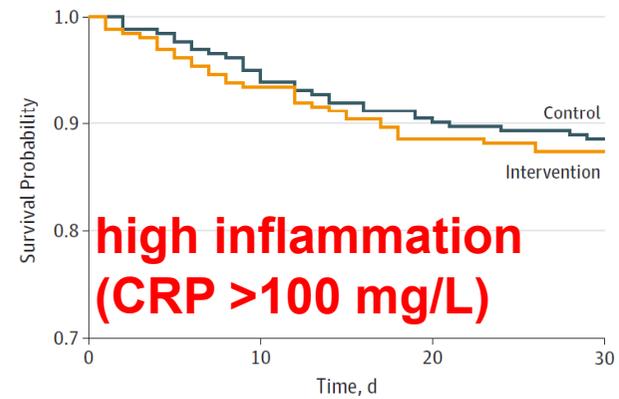
No. at risk	0	10	20	30
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Intervention	252	248	247	247

**C** 30-Day mortality among patients with moderate inflammation



No. at risk	0	10	20	30
Control	429	408	380	377
Intervention	465	449	437	436

**D** 30-Day mortality among patients with high inflammation



No. at risk	0	10	20	30
Control	262	249	237	232
Intervention	261	244	231	228



## **Wie sieht es mit den Kosten und der Kosteneffizienz der Ernährungstherapie aus?**

# Einige einfache Berechnungen zu den Kosten...

## Kosten der Ernährungsversorgung in EFFORT

- Durchschnittliche LOS 10 Tage
- Zeit der Ernährungsberatung (45 min Erstassessment, 10 min/Tag ~3h) 150 CHF
- Produkte ~ 1-2 ONS/Tag (Kosten 5 E/Tag) 100 CHF
- **Total Kosten pro Patient** 250 CHF
  
- **Kosten zur Vermeidung einer Komplikation (NNT 25) ~ 6000 CHF**

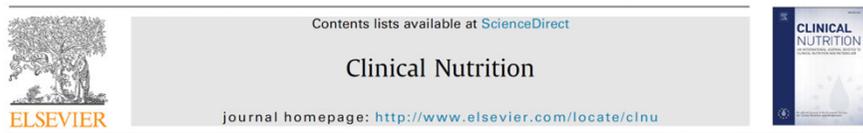
Was sind die Kosten einer schweren Komplikation?

- **Kosten zur Verhinderung eines Todesfalls (NNT 37) ~ 12000 CHF**

Was ist ein gerettetes Leben wert?

# Kosten-Nutzen-Analyse basierend auf einem statistischen Modell

Clinical Nutrition 39 (2020) 3361–3368



Original article

Economic evaluation of individualized nutritional support in medical inpatients: Secondary analysis of the EFFORT trial

Philipp Schuetz <sup>a,b,\*</sup>, Suela Sulo <sup>c</sup>, Stefan Walzer <sup>d,e,f</sup>, Lutz Vollmer <sup>d,g</sup>, Zeno Stanga <sup>a</sup>, Filomena Gomes <sup>b</sup>, Ricardo Rueda <sup>h</sup>, Beat Mueller <sup>a,b</sup>, Jamie Partridge <sup>c</sup>, for the EFFORT trial collaborators

<sup>a</sup> Medical University Department, Kantonsspital Aarau, Aarau, Switzerland  
<sup>b</sup> Medical Ecology, University of Basel, Basel, Switzerland

Open access Original research

## BMJ Open Cost savings associated with nutritional support in medical inpatients: an economic model based on data from a systematic review of randomised trials

Philipp Schuetz <sup>a,b,\*,1,2</sup>, Suela Sulo <sup>c,3</sup>, Stefan Walzer <sup>d,5,6</sup>, Lutz Vollmer <sup>4</sup>, Cory Brunton <sup>3</sup>, Nina Kaegi-Braun <sup>1</sup>, Zeno Stanga <sup>7</sup>, Beat Mueller <sup>1</sup>, Filomena Gomes <sup>1,8,9</sup>

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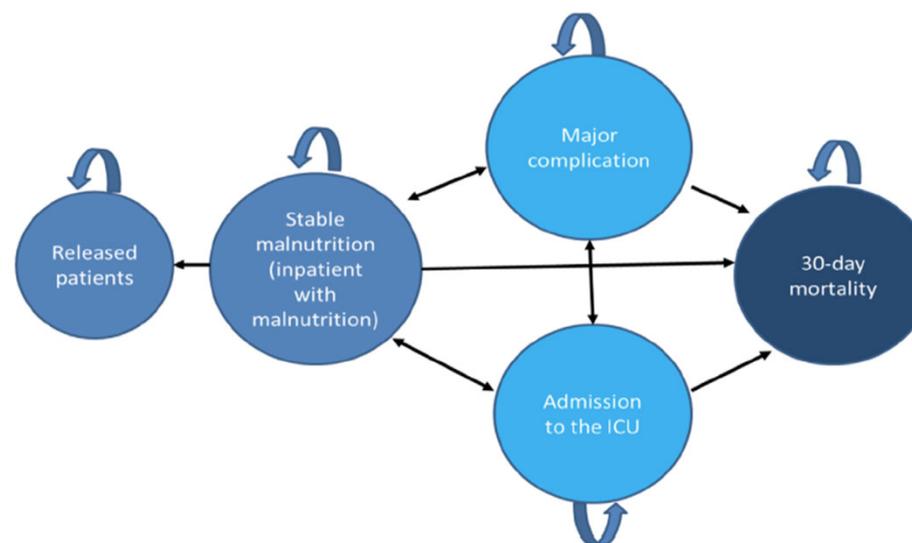
### ABSTRACT

**Background and aims** Nutritional support improves clinical outcomes during hospitalisation as well as after discharge. Recently, a systematic review of 27 randomised, controlled trials showed that nutritional

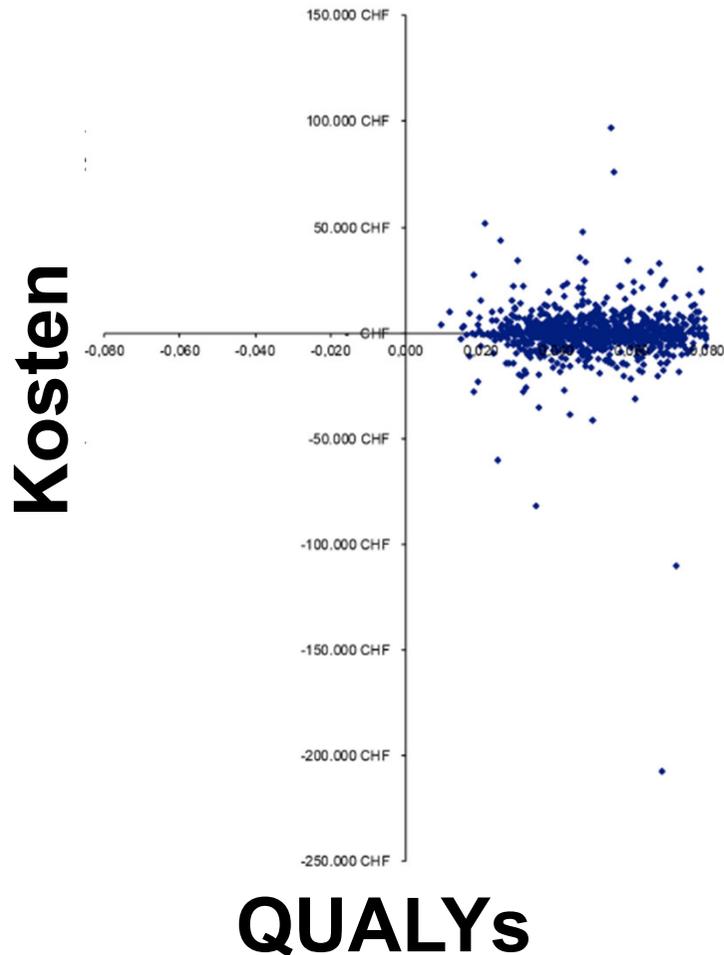
### Strength and limitations of this study

► Large data set of randomised nutritional trials based on a recent systematic review and meta-analysis.

## Markov model

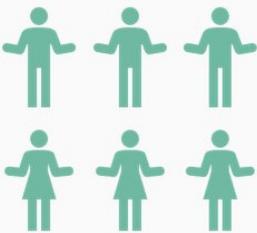


# Auswirkungen der Ernährungstherapie auf QUALYs



- Ernährungstherapie erhöht die Pflegequalität
- Ernährungstherapie ist nicht umsonst und eine Investition
- In einem ganzheitlichen Modell sind Kostenvorteile ähnlich wie die Investitionen
- **Ernährungstherapie im Spital ist kosteneffizient**

## Traditional nutrition



Traditional  
nutritional  
therapy

same therapy  
for every patient



Adverse event



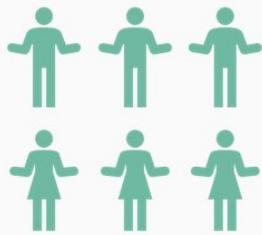
No benefit



Benefit

# The way to precision nutrition

## Traditional nutrition



Traditional nutritional therapy

same therapy for every patient

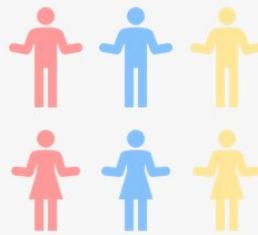


Adverse event

No benefit

Benefit

## Stratified nutrition



Stratified nutritional therapy

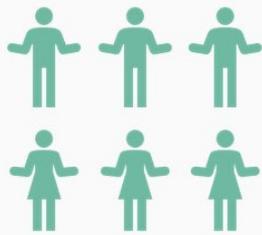
nutritional targets stratified by e.g.,  
- weight or BMI  
- diagnosis of illness



Patient subgroups benefit from stratified nutrition

# The way to precision nutrition

## Traditional nutrition



Traditional nutritional therapy

same therapy for every patient

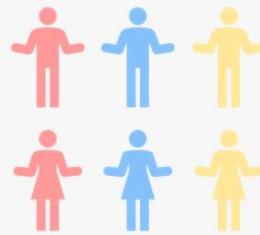


Adverse event

No benefit

Benefit

## Stratified nutrition



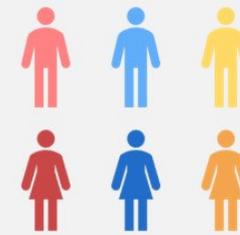
Stratified nutritional therapy

nutritional targets stratified by e.g.,  
- weight or BMI  
- diagnosis of illness



Patient subgroups benefit from stratified nutrition

## Individualized nutrition



Individualized nutritional therapy

nutritional targets personalized by e.g.,  
- genomics and omics  
- handgrip strength  
- inflammation (CRP)  
- kidney (eGFR)



Patients benefit from stratification into subgroup



**Wie können wir die  
Evidenz in den Alltag  
übertragen?**

# Evidenz-basierte Ernährungsmedizin



# Toolbox für ein individualisiertes und Evidenz-basiertes Ernährungsmanagement



[clinicalnutrition.science](https://clinicalnutrition.science)

<b>NutriScreen</b>	Ernährungsscreenings und Diagnose Instrumente
<b>NutriCalc</b>	Rechner für individuelle Energie- und Proteinziele
<b>NutriGo</b>	Ernährungsrichtlinien für spezielle klinische Situationen
<b>NutriPro</b>	Umfassende Produktdatenbank (Beta-Version, Seite in Aufbau)
<b>NutriRisk</b>	Ursachen & Folgen der Mangelernährung inkl. Risikoberechnung
<b>NutriBib</b>	Bibliothek für die klinische Ernährung



## Wie geht es mit dem EFFORT-Projekt weiter?

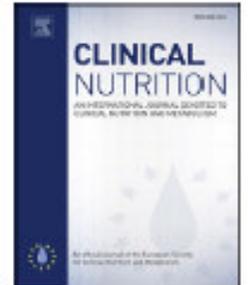
# Langzeiteffekt der Ernährungstherapie



Contents lists available at [ScienceDirect](#)

## Clinical Nutrition

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

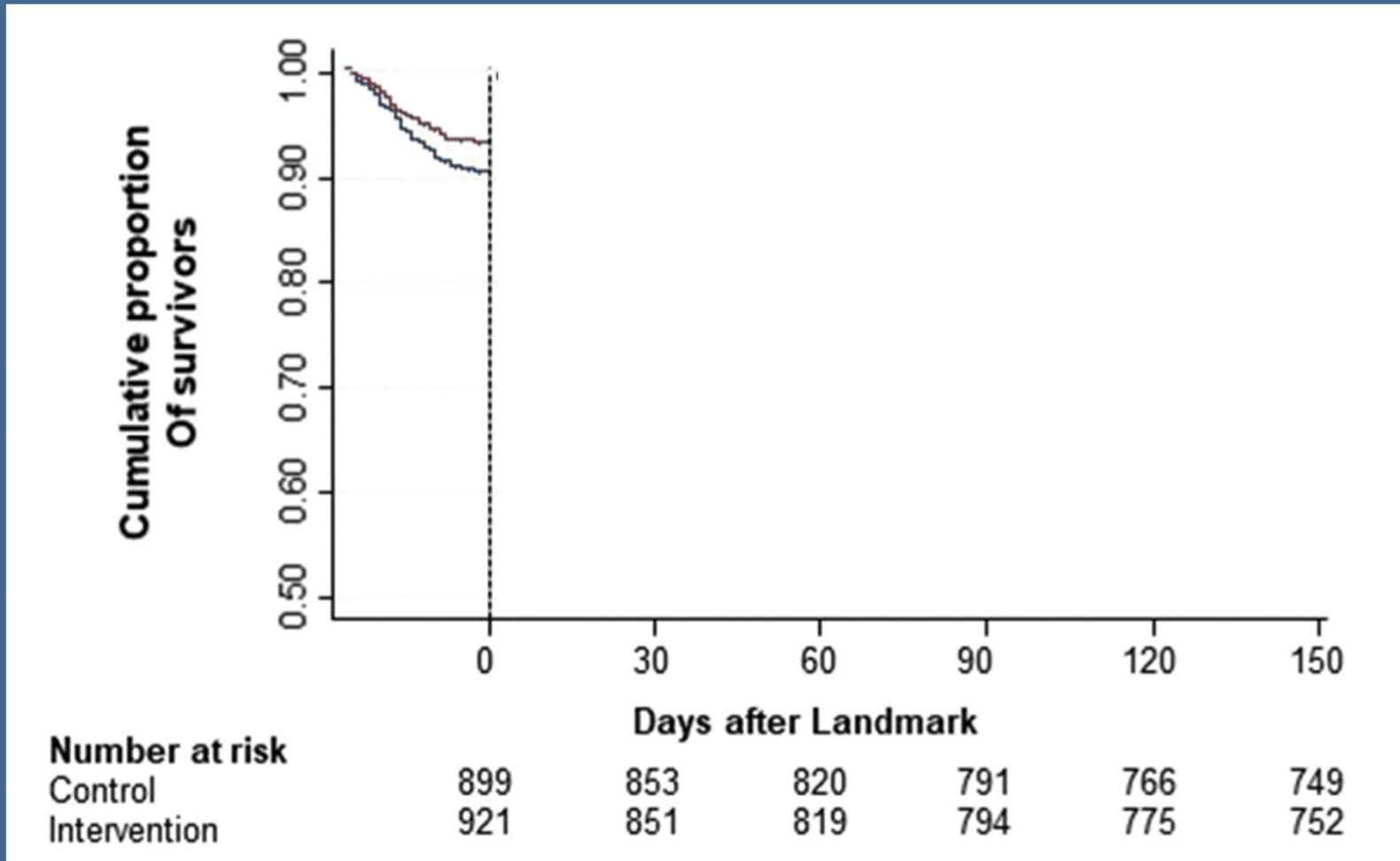


### Randomized Control Trials

Six-month outcomes after individualized nutritional support during the hospital stay in medical patients at nutritional risk: Secondary analysis of a prospective randomized trial

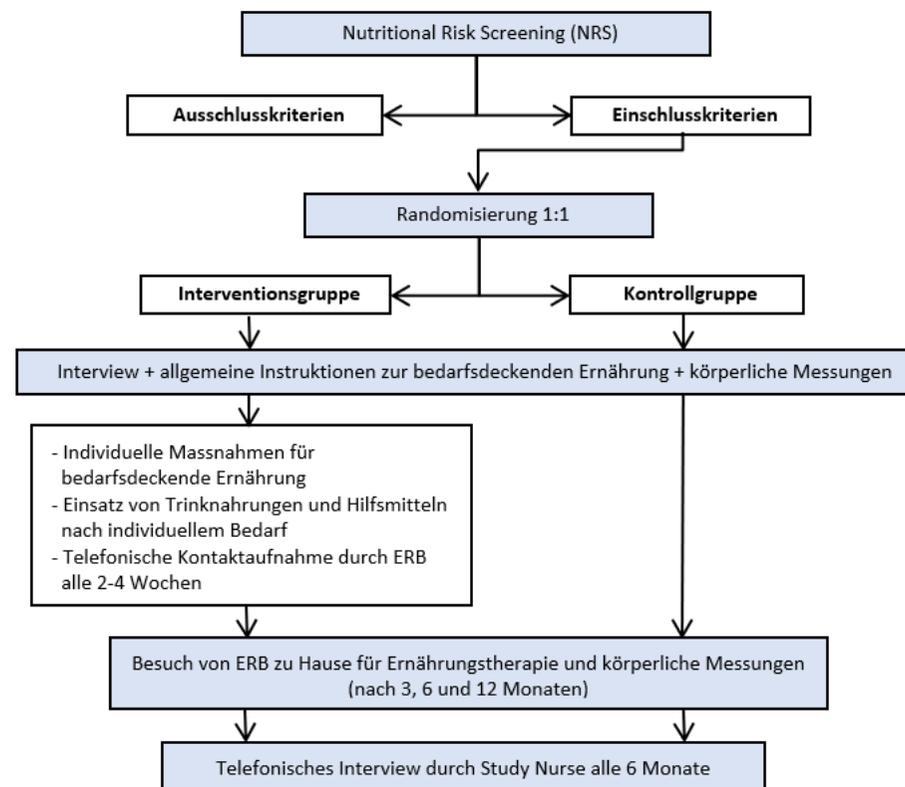
Nina Kaegi-Braun <sup>a</sup>, Pascal Tribolet <sup>a, b</sup>, Filomena Gomes <sup>a, c</sup>, Rebecca Fehr <sup>a</sup>,  
Valerie Baechli <sup>a</sup>, Martina Geiser <sup>a</sup>, Manuela Deiss <sup>a</sup>, Alexander Kutz <sup>a</sup>,  
Thomas Bregenzer <sup>d</sup>, Claus Hoess <sup>e</sup>, Vojtech Pavlicek <sup>e</sup>, Sarah Schmid <sup>e</sup>, Stefan Bilz <sup>f</sup>,  
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# Langzeiteffekt der Ernährungstherapie



# EFFORT II

(Effect of Continued Nutritional Support at Hospital Discharge on Mortality, Frailty, Functional Outcomes and Recovery)





**GESKES SSNC**

Gesellschaft für Ernährungsmedizin und Metabolismus Schweiz  
Société Suisse de Nutrition Clinique et Métabolisme  
Società Svizzera di Medicina Nutrizionale e Metabolismo  
Swiss Society for Clinical Nutrition and Metabolism



Berner Fachhochschule  
Haute école spécialisée bernoise  
Bern University of Applied Sciences

**KSA** Kantonsspital  
Aarau



**Besten Dank für Ihre Aufmerksamkeit!!**

**Nutridays 2024, Bern**

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**Prof. Dr. med. Philipp Schuetz**

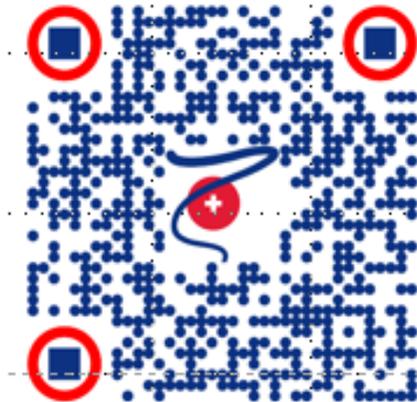
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# Let`s keep in touch....



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