



SIG-Micronutrients (MN) - INTERNAL

08SEP23 – 12:45-13:45

Agenda:

- Welcome
- Our new members
- Status of the PPTs for module 44 (ad LLL officers Prague)
 - Discuss content
 - Who in charge of changes
- Varia

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Miriam van der Werf



NESPEN

THE HAGUE
UNIVERSITY OF
APPLIED SCIENCES

Amsterdam UMC

UNIVERSITY
OF AMSTERDAM



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Micro complications with macro consequences

Treating patients with intestinal failure – the nutritional way

Subject	Content
Micronutrients	Vitamins Trace elements Magnesium
Circadian rhythm	Bone turnover Glucose variability Energy expenditure Sleep / wake rhythm Nitrogen balance Clock gene expression
Clinical outcomes	Osteoporosis
Implications in clinical practice	Dieticians in the lead

Granted with:
Dutch Research Council: doctoral grant for teachers (2021-II)
Amsterdam Gastroenterology Endocrinology Metabolism: AGEM innovation grant (2022)

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Christian Stoppe -How it begun...



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CS: What is going on...



The accurate CSX study



The support CSX study





VIT VICTORY

Vitamin C in Thermal Injury: A phase II multi-center randomized trial



Patients: 666 patients, 18-65 years of age, Degree 2nd and/or 3rd degree burns requiring skin grafting with TBSA > 20%.

Randomization: Control & treated to vit C → POD/Death

There is an urgent need to reinvigorate clinical trials, evidence generation & practice in the field ...

A new trial platform !!! 5

- Europe, US, Canada
- Japan, China
- South America
- Australia...

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The LLL documents to discuss

LLL 44.1 Clinical case_08SEP	08.09.2024 19:11
LLL 44.1 Course-08SEP	08.09.2024 19:08
LLL 44.2 Clinical case_KG-08SEP HL	08.09.2024 19:26
LLL 44.2 Course-08SEP	08.09.2024 19:22
LLL 44.3 Clinical case_08SEP_draft HL	07.09.2024 23:34
LLL 44.3 Course HL draft sept 08SEP	08.09.2024 13:40
LLL 44.4 Clinical case 30AUG	30.08.2024 11:27
LLL 44.4 Course AdM 08SEP	08.09.2024 13:46

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46th ESPEN Congress
on Clinical Nutrition & Metabolism
Milan, Italy • 7-10 September 2024
CLINICAL NUTRITION - THE TRANSVERSAL SCIENCE

SIG-Micronutrients (MN) - OPEN

08SEP23 14:50 **Agenda:**

- Welcome
- Creation of a MN - GL-APP
- Members of the SIG-MN
- Creation of the MN LLL 44 module (& publication)
- Publications 2023-24
- Ongoing research projects:
 - Analytical developments
 - Vitamin D
- MN Additives are needed to cover specific and high needs
- RE-APPEAL to industry for the development of MN analytics
- Q&A

Mrs. Anna Schweinlin
Prof. ass. Angélique de Man
Dr. Karin Amrein

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From the guideline to the app

46th ESPEN CONGRESS

Scientific Guideline

Practical Guideline

Guideline App

Anna Schweinlin

Contents lists available at ScienceDirect

Clinical Nutrition

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

ESPEN Guideline

ESPEN micronutrient guideline

Mette M. Berger^{1,2,3}, Alan Shenkin^{1,2,3}, Anna Schweinlin⁴, Karin Amrein⁵, Marc Augsburger¹, Hans-Konrad Biesalski¹, Stephan C. Bischoff¹, Michael P. Caser⁶, Karan Chandogan⁷, Hanna-Liis Lepp⁸, Angélique M.E. de Man⁹, Giovanna Muscarini¹⁰, Magdalena Pielka¹¹, Loris Pironi¹², Serge Rezz¹³, Cristina Cuesta¹⁴

General aspects

(1) Adequate amounts of all essential trace elements and vitamins should be supplied to all patients receiving medical nutrition from the beginning of the period of nutritional support. (S1, A, 100%)

(2) Micronutrient supplements should be provided orally or parenterally if this can be done safely and effectively. (S2, A, 100%)

(3) CSP should be determined at the same time of any micronutrient analysis. (S3, B, 87%)

*Toxicity Mn, Fe, Pt

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What are the steps of app development?

- Conversion of flowcharts into individual steps, each step means a click or swipe on the screen
- Creation of short titles for each recommendation
- Programming by Börm Bruckmeier Company
- First proofreading/testing of the beta version
- Corrections/changes performed by Börm Bruckmeier Company
- Second proofreading/testing of the beta version
- Release in the stores



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Special aspects of the Micronutrients Guideline

- Tables provide essential information
- Landscape format not compatible with a smartphone display
- Focus on EN and PN, omit the EC directive
- Display EN and PN in separate views
- The background to the calculation of amounts and supplementation is explained explicitly and clearly visible

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Special Interest Groups

Nutrition in Surgery
Acute Intestinal Failure
Cachexia-Anorexia in chronic diseases
Home Artificial Nutrition & Chronic Intestinal Failure
Nutrition in Geriatrics
Tracer Methodology
Nutrition in Obesity
Perioperative Nutrition, ERAS
Micronutrient
Nutrition Education Support Team, NEST

Aims of the SIG-MN:

- To coordinate/perform scientific and epidemiological studies in the field of MNs
- To become a reference group for international questions transmitted over the ESPEN central website
- To create a network in the field of MN
- To promote education in the domain of MNs
- To promote collaborative research in the field
- To help adapt national policies regarding MNs
- To stimulate the industry to produce adapted MN products

Education: The group contributes to the ESPEN LLL program

Focus: Nutritional and metabolic disorders related to inadequate MN status

Composition of the group:

- The ESPEN-MN Special Interest Group has a maximum of 12(?) members.
- The group is multidisciplinary: members are recruited from physicians, pharmacists, biologists, nurses, and dietitians.
- Membership of the group is normally limited to 4 years (?) but can be extended to assure continuity if the member vigorously participates in the SIG's activities.

Officers 2023: The initial officers are:

Chair & Secretary: Mette M Berger (CH)

Members: Alan Shenkin (UK), Angélique de Man (NL), Karin Amrein (AU), Michael Casaer (BE), Kursat Gundogan (TU), Hanna-Lis Lepp (ES), Serge Rezzi (CH), Oguzhan Dizdar (joined in Dec 2023-TU) (see next page)

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SIG-MN – who?

Officers 2024 (initiated FEB 2023):

Secretary: Mette M Berger (CH)

Members: Alan Shenkin (UK)

Angélique de Man (NL)

Karin Amrein (AU)

Michael Casaer (BE)

Oguzhan Dizdar (TU)

Kursat Gundogan (TU)

Hanna-Lis Lepp (ES)

Serge Rezzi (CH)

Arthur van Zanten (NL)

(+)

Miriam van der Werf (NL)

Christian Stoppe (GE)

Composition of the group:

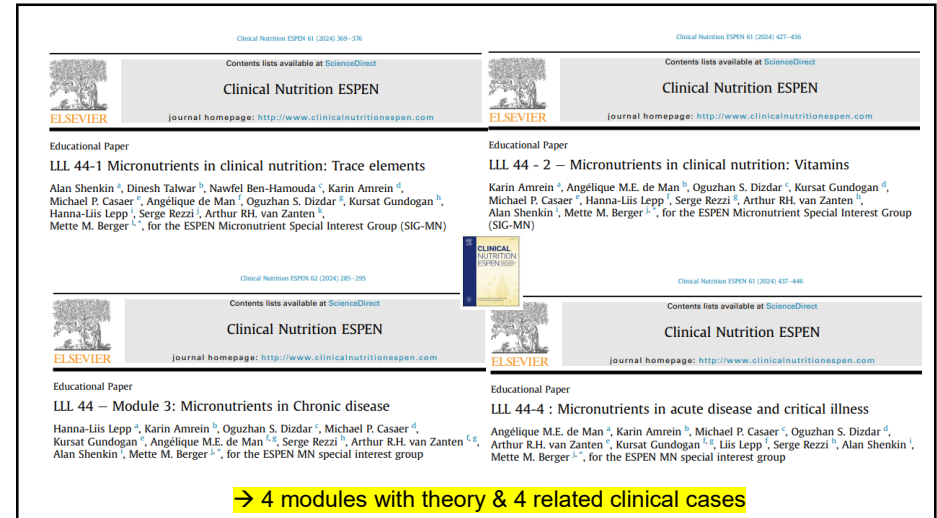
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2023-24 Achievements

- Publication of the MN symposium 7-8 Nov22
- Publication of the practical MN-guideline with flow-charts
- Creation of the LLL course 44: 4 modules dedicated to:
 - ❖ Trace elements
 - ❖ Vitamins
 - ❖ Chronic diseases / home MNT
 - ❖ Acute diseases / ICU
- Publication of the 4 LLL modules in CNE
- **First LLL module live: Prague 2025**

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→ 4 modules with theory & 4 related clinical cases

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ESPEN Endorsed Recommendation
 The science of micronutrients in clinical practice – Report on the ESPEN symposium^a
 Mette M. Berger^{a,*,1}, Karin Amrein^b, Rocco Barazzoni^c, Laure Bindels^d, Irene Bretón^e, Philip C. Calder^f, Stefano Cappa^g, Cristina Cuerda^h, Patrizia D'Amelioⁱ, Angélique de Man^j, Nathalie M. Delzenne^k, Alastair Forbes^l, Laurence Genton^m, Adrian F. Gombartⁿ, Francisca Joly^o, Alessandro Laviano^p, Christophe Matthys^q, Pui Pui Phyoo^r, Paula Ravasco^s, Mireille J. Serlie^t, Alan Shenkin^u, Nicole U. Stoffel^{v,w}, Dinesh Talwar^x, Arthur R.H. van Zanten^y

ESPEN practical short micronutrient guideline
 Mette M. Berger^{a,*,1}, Alan Shenkin^{b,1}, Oguzhan Sitki Dizdar^c, Karin Amrein^d, Marc Augsburger^e, Hans-Konrad Biesalski^f, Stephan C. Bischoff^g, Michael P. Casaer^h, Kursat Gundoganⁱ, Hanna-Liis Lepp^j, Angélique M.E. de Man^k, Giovanna Muscogiuri^{l,m}, Magdalena Pietkaⁿ, Loris Pironi^{o,p}, Serge Rezzi^q, Anna Schweinlin^g, Cristina Cuerda^r

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ONGOING RESEARCH

- Analytical tools
 - Vitamin D
- Prof. ass. Angélique de Man
 Dr. Karin Amrein

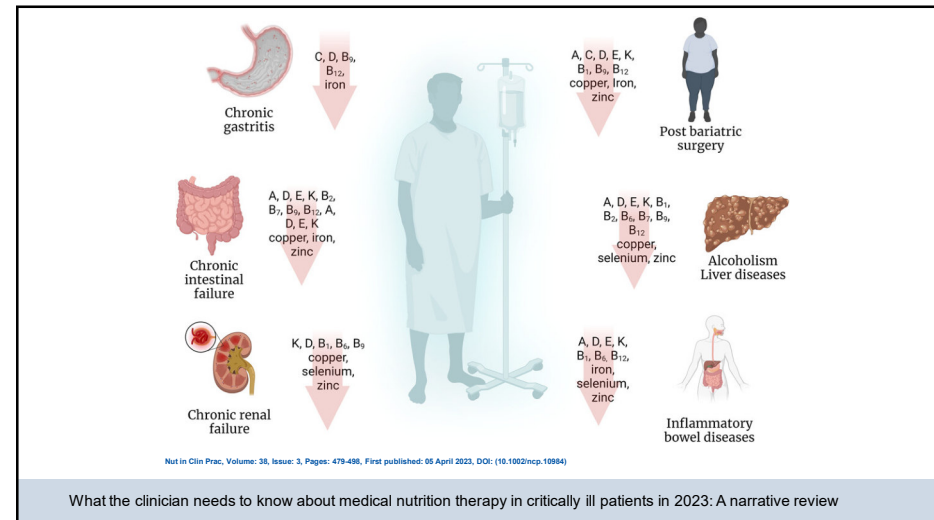
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New analytical tools to determine micronutrient functional body status in ICU patients

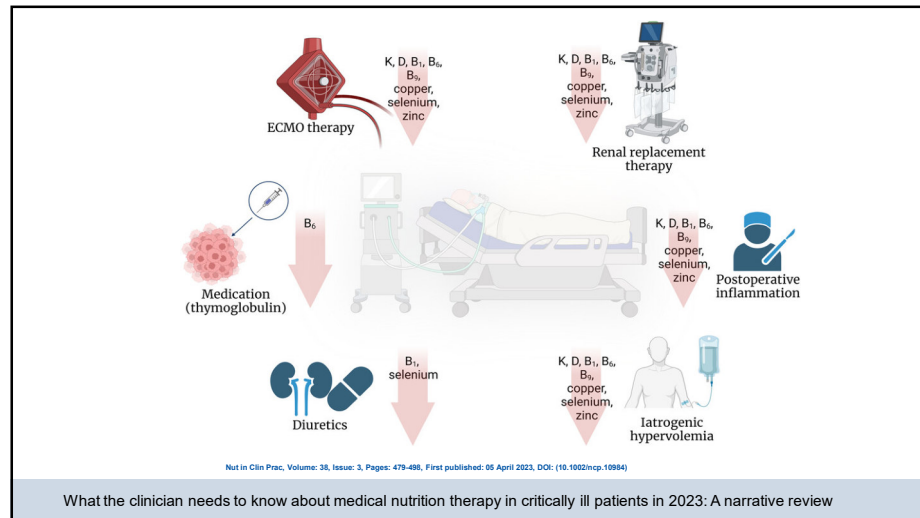
Angelique de Man, intensivist
ESPEN SIG-meeting 8 September 2024



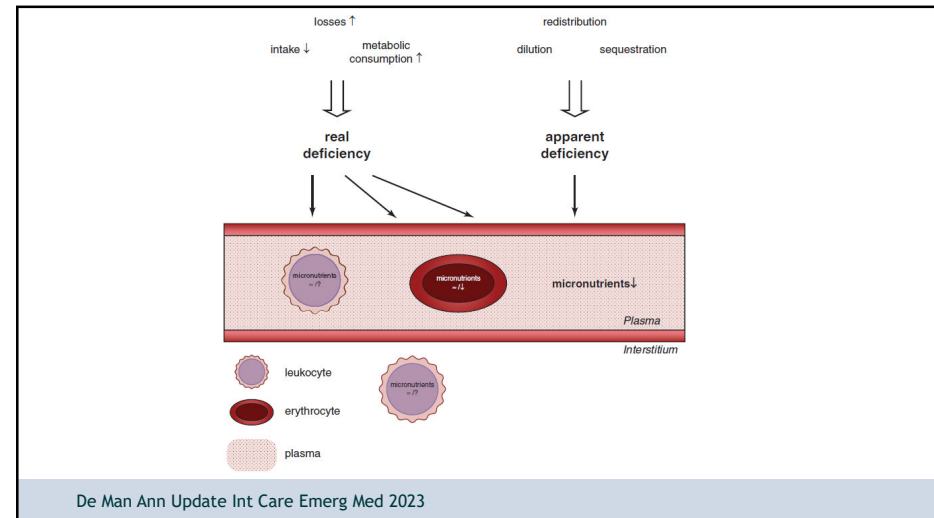
17



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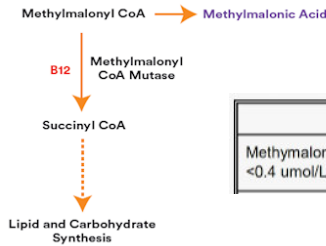


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Functional markers



	B ₁₂ Deficiency	Folate Deficiency
Methylmalonic acid <0.4 umol/L	Elevated	Normal

www.clinicallabs.com.au

www.grepmc.com

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UPDATE 2024



N=420/766 (55%)
Partner study in Canada

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REVIEW



Vitamin D in the critically ill – update 2024

Christina Geiger^a, James Dayre McNally^b, Kenneth B. Christopher^c and Karin Amrein^d

Purpose of review

This review aims to summarize the latest publications on vitamin D focused on critically ill patients.

KEY POINTS

- Vitamin D deficiency is highly prevalent in critically ill children and adults and is a rapidly modifiable risk factor for excess mortality and morbidity.
- Native vitamin D an inexpensive substance with a wide safety margin, and acute treatment in form of a loading dose in addition to ongoing maintenance therapy is an interesting option.
- To date, <5000 patients cumulative have been enrolled in randomized controlled trials and The potential benefit of acute native [biologically inactive] vitamin D treatment has not fully been answered.
- Even a small survival benefit may be relevant to critical care.
- Many questions remain with regard to used metabolite/s, dosing, target level and ideal target population.

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N=1578/2400 (66%)

Funding: ESICM, Fresenius, national sources

2024 > 320, record 2019: 292

Started 2017...

EFFECT OF HIGH-DOSE VITAMIN D3 ON 28-DAY MORTALITY IN ADULT CRITICALLY ILL PATIENTS WITH SEVERE VITAMIN D DEFICIENCY

Setting

- randomized, double blind, placebo controlled
- mixed ICUs (medical, surgical, neurologic)
- 2400 ICU patients; 25(OH)D ≤ 12 ng/ml

Intervention

- 540,000 IU Vitamin D3 vs. Placebo 1x po/tube
- 4,000 IU daily for 90 days

Primary Endpoint

28-DAY MORTALITY (POWERED FOR A 5% ABSOLUTE DIFFERENCE)

Secondary Endpoints

morbidity, LOS, lab, duration of mech.vent./circulatory support, readmissions etc.

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CENTERS / COUNTRIES



BELGIUM (140), started 2019, stopped 2024
No national funding
Jean-Charles Preiser



AUSTRIA (ca. 800), started 2017
Karin Amrein, Philipp Eller



GERMANY (> 100), started 2023
National funding (BMBF)
Würzburg (Patrick Meybohm)

UK (> 500), started 2021, 30 centers
National funding (NIHR)
Birmingham (Dhruv Parekh)



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Monitoring Analytical options Complements for higher needs

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Monitoring nutrition in the ICU

Clinical Nutrition 38 (2019) 584–593

Mette M. Berger^{a,*}, Annika Reintam-Blaser^{b,c}, Philip C. Calder^{d,e}, Michael Casar^f,
Michael J. Hiesmayr^g, Konstantin Mayer^h, Juan Carlos Montejó^{i,j}, Claude Pichard^k,
Jean-Charles Preiser^l, Arthur R.H. van Zanten^m, Stephan C. Bischoffⁿ, Pierre Singer^o



ESPEN micronutrient guideline

Clinical Nutrition 41 (2022) 1357–1424

Mette M. Berger^{a,l,*}, Alan Shenkin^{b,1}, Anna Schweinlin^c, Karin Amrein^d,
Marc Augsburger^e, Hans-Konrad Biesalski^f, Stephan C. Bischoff^g, Michael P. Casaer^g,
Kursat Gundogan^h, Hanna-Liis Leppⁱ, Angélique M.E. de Man^j, Giovanna Muscogiuri^{k,l},
Magdalena Pietka^m, Loris Pironi^{n,o}, Serge Rezzi^p, Cristina Cuerda^q



Analytical methods- Nothing new

Monitoring-GL aim at pushing institutions to include MN analysis

But monitoring-GL are difficult to apply in numerous settings worldwide

- Analysis is not available
- Analytical results not timely available (coming back weeks later)
- Analysis considered too costly in local health system

Development is needed

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Table 15. MN in parenteral nutrition

	PN Home & long-term A	PN high requirements ^a B
Trace elements		
Chromium	10–15 µg	15 µg
Copper	0.3–0.5 mg	0.5–1.0 mg
Fluoride	0–1 mg	Same as A
Iodine	130 µg	Same as A
Iron	1 mg	Same as A
Manganese	55 µg	Same as A
Molybdenum	19–25 µg	Same as A
Selenium	60–100 µg	150–200 µg
Zinc	3–5 mg	6–12 mg
Lipo-soluble vitamins		
A Retinol ^e	800–1100 µg	1100 µg
D3 Cholecalciferol	200 IU/5 µg	800–1000 IU/ 20–25 µg
E α-tocopherol	≥9 mg	20 mg
K1 phyloquinone	150 µg ^g	1–10 mg ^g
Water-soluble vitamins		
B1 Thiamine	Provide at least ^h	100–200 mg
B2 Riboflavin	2.5 mg	3.6 mg
B3 Niacin	3.6 mg	10 mg
B5 Pantothenic acid	40 mg	Same as A
B6 Pyridoxine	15 mg	Same as A
B7 Biotin	4 mg	6 mg
B9 Folic acid	60 µg	Same as A
B12 Cyanocobalamin	400 µg	600–1000 µg
C Ascorbic acid	5 µg	Same as A
	100–200 mg	200–500 mg

Abbreviation: PN = parenteral nutrition

^a Increased requirements may occur in patients with on-going increased losses such as gastrointestinal losses, continuous renal replacement therapy, those who are hypermetabolic or who are depleted before commencing PN, and in pregnancy.

^c Increased requirements during critical illness and in patients with acute admission with malnutrition (NRS 5): intended for max 15 days as repletion, to avoid requiring IV supply.

^e Retinol includes retinol and retinyl ester.

^g During PN, vitamin K requirements are usually provided by the lipid emulsions.

^h For water-soluble vitamins, amounts recommended are minimum amounts, and more can usually be safely delivered.

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Table 15. MN in enteral nutrition – comparison with DRI

	EN in 1500 kcal ^b C	EN high requirements in 1500 kcal ^c	DRI per day Age 31->70 yrs
Trace elements			
Chromium	35–150 µg	200 µg	20–35 µg
Copper	1–3 mg	Same as C	0.9 mg
Fluoride	0–3 mg	3–4 mg	3–5 mg (AI)
Iodine	150–300 µg	Same as C	150 µg
Iron	18–30 mg	30 mg	8 mg (18 mg F 19–50yrs) 1.8–2.3 mg
Manganese	2–3 mg	Same as C	45 µg
Molybdenum	50–250 µg	250 µg	55 µg
Selenium	50–150 µg	200 µg	8–11 mg
Zinc	10–20 mg	20 mg	
Lipo-soluble vitamins			
A Retinol ^d	900–1500 µg	1500 µg	700–900 µg
D3 Cholecalciferol	25 µg	30 µg	15–20 µg
E α-tocopherol	15 mg	40 mg	15 mg
K1 phyloquinone	120 µg	Same as C	90–120 µg
Water-soluble vitamins			
	Provide at least ^b :		
B1 Thiamine	1.5 mg	100 mg	1.1–1.2 mg
B2 Riboflavin	1.2 mg	10 mg	1.1–1.3 mg
B3 Niacin	18 mg	40 mg	11–16 mg
B5 Pantothenic acid	5 mg	7.5 mg	5 mg
B6 Pyridoxine	1.5 mg	7.5 mg	1.5–1.7 mg
B7 Biotin	30 µg	75 µg	30 µg (AI)
B9 Folic acid	330–400 µg DFE	500 µg	400 µg DFE
B12 Cyanocobalamin	>2.5 µg	7.5 µg	2.4 µg
C Ascorbic acid	100 mg	200 mg	75–90 mg

Abbreviations: EN = enteral nutrition, AI = Adequate Intake, DFE = dietary folate equivalent.

^a Increased requirements may occur in patients with ongoing increased losses such as gastrointestinal losses, continuous renal replacement therapy, those who are hypermetabolic or who are depleted before commencing PN, and in pregnancy.

^b The 1500 kcal value has been chosen based on numerous studies confirming that this value seems to be a very common objective. In case of higher nutrient delivery (e.g. 2000 kcal per day or more), exceeding this recommendation is not exposing the patient to any risk considering upper tolerable levels.

^c Increased requirements during critical illness and in patients with acute admission with malnutrition (NRS 5): intended for max 15 days as repletion, to avoid requiring IV supply.

The higher values are to be covered with additives, usually IC

^d Retinol includes retinol and retinyl ester.

^e High dose administered in case of coagulopathy (not nutrition-related).

^f For water-soluble vitamins, amounts recommended are minimum amounts, and more can usually be safely delivered.

Future developments – SIG-MN

To promote good clinical practice

We need

- Education and high-quality research
- Make hospital administrations aware about the importance of MN for clinical practice

Promotion & funding are required

- Sponsoring needed for:
 - Creation one/more research prizes
 - Development of the practical App
 - Development of analytical methods

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2024 SIG-MN – Q & discussion



[Link to the application](#)



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