“Cofactors first. In hospital recovery, calories and protein can’t work if a single missing cofactor stalls the pathway. All 45 Essentials is a natural, once-daily micronutrient + essential amino acid base that aligns with ESPEN/ASPEN guidance to keep metabolism, immunity, and tissue repair switched on while the rest of care does its job.”

All 45 Essentials — Hospital Therapeutic Use Dossier

One-liner for clinicians

A natural, non-synthetic, once-daily “cofactor complete” adjunct that delivers all essential amino acids, vitamins, and minerals to close micronutrient gaps that sabotage recovery in hospitalized adults — while fitting cleanly into existing ESPEN/ASPEN nutrition pathways. ESPNASPEN

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1) Why hospitals should care (evidence snapshot)

- **Malnutrition on arrival is common** and frequently worsens in-house; prevalence ranges ~20–50% depending on criteria and cohort, and is linked to infections, pressure injuries, longer LOS, costs, and mortality. Early detection + routine micronutrient provision is recommended. ESPNPubMedClinical Nutrition ESPEN

- **Guidelines**: ESPEN advises supplying *adequate amounts of all vitamins and trace elements* whenever medical nutrition is provided; ASPEN warns that feeding below DRIs risks vitamin/mineral shortfalls in the ICU. ESPNASPEN

- **Refeeding risk**: Starting or escalating calories in depleted patients can precipitate hypophosphatemia, hypokalemia, and hypomagnesemia; thiamine + multi-micronutrient coverage and close electrolytes are standard precautions. SPGHNP

- **Specific recovery domains with supportive data** (representative findings; details in Appendix C):

- **Wound/pressure injury support**: Arginine + vitamin C + zinc formulas have improved healing in malnourished patients in several RCTs/meta-analyses (effect sizes vary; baseline deficiency matters). PubMed+1PMC+1

- **Muscle metabolism & sarcopenia**: Leucine-enriched essential amino acids acutely stimulate MPS in older adults; longer-term functional benefits are mixed but supportive when combined with adequate protein/rehab. Physiology JournalsBioMed CentralScienceDirect

Bottom line: A complete essential micro/aminonutrient backdrop is a standards-aligned, low-risk "safety net" that reduces rate-limiting biochemical bottlenecks during recovery; macronutrients and protein targets still do the heavy lifting. ESPN+1

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2) Product scope (clinical framing)

- **What it is:** A daily functional-food adjunct (not a drug) supplying **all nine essential amino acids**, **13 essential vitamins**, and **16 essential minerals** in natural sources (no synthetics).

- **What it is not:** A calorie/protein replacement, disease-specific formula, or high-dose therapeutic for confirmed deficiencies (iron-deficiency anemia, B12 deficiency, etc.). Use targeted therapy when a deficiency is diagnosed.

Positioning in pathways: "Micronutrient foundation" to accompany standard enteral/oral nutrition, ERAS peri-op feeding, wound care bundles, and geriatric/frailty protocols. ESPN+1

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3) Indications & patient selection

Appropriate as a default adjunct in adults who can take oral/enteral products, including:

- At **risk of malnutrition** by NRS-2002/MUST/GLIM or with poor intake (>3–5 days). PMC

- **Peri-operative** (major surgery, oncology) as part of ERAS nutrition. ESPN

- **Chronic wounds/pressure injuries** (as part of complete energy/protein plan; see Section 7). PMC

- **Older adults with sarcopenia/frailty**, rehab, or deconditioning. Physiology Journals

- **Medical inpatients** with expected stays >48–72 h where micronutrient adequacy is uncertain. ASPEN

Use with caution or individualize (see Section 6): advanced CKD (electrolytes), active warfarin therapy (vitamin K), hemochromatosis (iron), Wilson disease (copper), thyroid disease (iodine/levothyroxine separation), severe hepatic failure.

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4) Dosing & administration (hospital protocol)

> **Because your exact per-dose amounts aren't specified here, plug the final label values into the placeholders.** Formulary reviewers will expect a table showing %RDA/AI and mg for each component.

Default adult inpatient order (oral/enteral):

- **Dose:** 1 daily dose providing ~100% of adult **DRIs** for all vitamins/trace elements **+** ≥ a clinically meaningful serving of **EAAs** (≥8–10 g total EAAs with leucine emphasis is typical in the literature). Physiology Journals
- **Route:** PO; OK to deliver via feeding tube (flush well; see Drug-nutrient separations below).
- **Timing:** With food *except* when separations are required (levothyroxine, tetracyclines, fluoroquinolones; details below).
- **Duration:** Throughout admission or while inadequate intake risk persists; may continue at discharge.

Feeding-tube compatibility tips

- Administer separately from meds prone to chelation (fluoroquinolones/tetracyclines) and **levothyroxine**; flush 30–60 mL water before/after. PMCMayo Clinic

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5) Safety, separations & interactions (what nursing and pharmacy need)

Electrolytes/renal considerations

- **CKD**: Potassium and magnesium handling can be impaired. Large guideline sets emphasize monitoring K+ and Mg2+ in CKD and with RAS inhibitors;

hypermagnesemia risk rises as GFR falls. Use clinician judgment; monitor BMP if adding any K/Mg-containing supplement. KDIGOScienceDirectPMC

High-salience drug-nutrient separations

- **Levothyroxine**: Separate from **calcium/iron/magnesium** by **≥4 hours**; all forms of calcium can reduce T4 absorption. PMC+1
- **Fluoroquinolones & tetracyclines**: Separate **iron/zinc/calcium/magnesium** by 2–6 h (local policy); chelation markedly reduces antibiotic levels. PMCRight Decisions
- **Warfarin**: **Vitamin K** intake changes alter INR; keep **daily K consistent** and inform anticoagulation service if starting/stopping. Office of Dietary SupplementsPMC

Condition-specific cautions

- **Iron**: Avoid extra iron in hemochromatosis or active iron overload; high doses can worsen GI symptoms and reduce zinc absorption. Office of Dietary Supplements+1
- **Zinc**: Chronic high zinc can induce **copper deficiency** neuropathy; ensure balanced Cu with any prolonged high-Zn exposure. Office of Dietary Supplements+1
- **Iodine**: Autoimmune thyroid disease may be iodine-sensitive; avoid excessive iodine without indication. Office of Dietary SupplementsPMC
- **Vitamin A**: Avoid megadoses in pregnancy (teratogenicity threshold ~3,000 µg RAE/day for preformed retinol). Your formula should stay within DRI. PMCOffice of Dietary Supplements

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6) Refeeding-syndrome precautions (when starting nutrition in depleted patients)

For **high-risk** patients (significant weight loss, minimal intake >5–10 days, electrolyte abnormalities, alcoholism, oncology, eating disorders):

1. **Before feeding**:
    - Give **thiamine** (e.g., 100–200 mg) and **multivitamin coverage**; correct low phosphate, potassium, magnesium.
    - Document baseline electrolytes. SPGHNP

2. **Initiate calories gradually**, advance over 3–5 days; **monitor K/Mg/Phos daily** for at least 72 h and replace aggressively per hospital protocol. Continue daily “All 45 Essentials” as the micronutrient base. SPGHNP

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7) How it supports major inpatient outcomes (mechanistic + clinical link)

- **Energy metabolism/mitochondria**: B-complex and magnesium are obligate **cofactors** for glycolysis, TCA, FAO; magnesium stabilizes ATP. Your product prevents a single cofactor from bottlenecking ATP production. ASPEN

- **Wound healing/skin integrity**: **Vitamin C** (collagen hydroxylation), **zinc** (DNA/RNA polymerases, keratinocytes), **copper** (lysyl oxidase crosslinking) plus **adequate protein/EAA** support granulation and tensile strength. Clinical data show benefit of arginine + C + zinc combinations; effects are modest and baseline-status dependent. PMCPubMed

- **Sarcopenia/immobility**: **Leucine-rich EAAs** acutely augment MPS in older adults and post-stroke rehab; pair with 1.0–1.5 g/kg/day hospital protein targets for functional benefit. Physiology JournalsESPN

- **Immune function**: Vitamins A, D, E, C; zinc, selenium; iron/copper for myelopoiesis and redox enzymes — coverage aligns with ESPEN micronutrient guidance. ESPN

- **Heme and oxygen delivery**: Iron (heme), copper (ceruloplasmin), B6/folate/B12 (erythropoiesis). Use targeted dosing if deficiency confirmed. PMC

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8) Practical implementation (how to deploy on the wards)

A. Screening & triggers

- Screen all admissions with **NRS-2002** (or MUST/GLIM). Auto-order “All 45 Essentials” if NRS-2002 ≥3 or expected intake <75% ≥3 days. PMC

B. Order set (EHR smart text)

- *All 45 Essentials*, 1 dose PO/FT **daily**; give with meals.

- **Hold parameters/alerts**:
    - If **INR managed with warfarin**, notify anticoagulation service on start/stop. Office of Dietary Supplements
    - If **eGFR <30**, check K/Mg within 72 h of start or if clinical changes occur. ScienceDirect
- **Separations** (add nursing FYI): Levothyroxine ±4 h; ciprofloxacin/doxycycline ±2–6 h; antacid/aluminum/magnesium ±4 h. Mayo ClinicPMC

C. Wound-care pathway add-on

- Ensure **energy 30–35 kcal/kg/day** and **protein 1.25–1.5 g/kg/day** in at-risk pressure injury patients; layer "All 45 Essentials" as cofactor base; consider disease-specific ONS (arginine + C + zinc) if intake remains suboptimal. e-acnm.orgPubMed

D. Peri-op & oncology

- Start pre-op day −5 to +14 where feasible to ensure cofactor sufficiency as ERAS encourages early feeding. ESPN

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9) What the product does not replace (set expectations)

- **Calories and high-quality protein** targets per ESPEN/ASPEN. ESPN
- **Therapeutic doses** for **documented deficiency** (e.g., IV iron for IDA, parenteral B12 for pernicious anemia, high-dose vitamin D repletion).
- **Electrolyte repletion** during refeeding (phosphate, potassium, magnesium). SPGHNP

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10) Quality & regulatory notes (for P&T review)

- Provide CoAs for heavy metals (Pb, Cd, Hg, As), allergens, micro count, and pesticide screens.

- Document **natural source** inputs and absence of synthetic isolates.
- Clarify **vegan/halal** status and **gluten/dairy/soy** allergens, and **sugar** content (important for diabetes services).

Appendix A — Full "45" ingredient list & principal clinical roles (quick-reference)

Essential amino acids (9) — histidine; isoleucine; leucine; valine; lysine; methionine; phenylalanine; threonine; tryptophan.
Roles: protein synthesis; collagen/elastin (lysine/threonine); catecholamines (phenylalanine→tyrosine); methylation & glutathione (methionine); serotonin/melatonin (tryptophan); immune/gastric acid (histamine from histidine); BCAA-driven muscle metabolism (isoleucine/leucine/valine). Physiology Journals

Vitamins (13) — A; B1; B2; B3; B5; B6; B7 (biotin); B9 (folate); B12; C; D; E; K.
Roles: coenzymes for energy metabolism; collagen hydroxylation (C); vision/epithelia (A); calcium-phosphate balance & gene regulation (D); membrane antioxidant (E); clotting γ-carboxylation & bone (K). ASPEN

Minerals (16) — macrominerals: calcium, phosphorus, magnesium, sodium, potassium, chloride, sulfur; trace: iron, zinc, copper, selenium, iodine, manganese, fluoride, chromium, molybdenum.
Roles: electrolyte/osmotic balance; ATP and signaling (Mg, P); oxygen transport (Fe); transcription & immunity (Zn); crosslinking (Cu); redox enzymes (Se); thyroid hormones (I); cartilage/bone matrix (Mn, F); insulin receptor cofactor (Cr); sulfur for glutathione/sulfation. ESPN

> **Optional adjunct (sold separately by you): Amorphous silica (SiO_2/orthosilicic acid)** — emerging evidence suggests supportive roles in collagen formation and bone turnover when paired with Ca/Vit D; data are mixed and not first-line. Consider only as an adjunct where appropriate. PMC+1

Appendix B — Contraindications & cautions (non-exhaustive)

- **Warfarin therapy**: maintain stable vitamin K intake; coordinate with anticoagulation clinic. Office of Dietary Supplements

- **Advanced CKD**: monitor **K** and **Mg**; avoid extra K in hyperkalemia; watch Mg in eGFR <30 mL/min unless specifically indicated. ScienceDirectPMC
- **Iron overload states** (e.g., hemochromatosis): avoid iron-containing products. Office of Dietary Supplements
- **Wilson disease**: avoid copper-containing products unless directed by specialist.
- **Thyroid disease**: iodine sensitivity; separate **levothyroxine** from mineral-containing doses by ≥4 h. PMC
- **Pregnancy**: keep **vitamin A** within DRI; avoid retinol megadoses. PMC

Appendix C — Selected evidence details (quick cites for committees)

- **Hospital malnutrition burden** (20–50%) & harms; need for early screening/intervention. ESPNPubMed
- **ESPEN micronutrient guidance**: supply adequate vitamins/trace elements with medical nutrition; practical 2024 summary. ESPN+1
- **ASPEN 2021 ICU guideline**: DRIs should be met; underfeeding risks micronutrient inadequacy. ASPEN
- **Refeeding syndrome consensus (2020)**: diagnostic features, risk factors, electrolyte/thyamine protocol. SPGHNP
- **Wound/pressure injury nutrition**: arginine + vitamin C + zinc formulas improved healing in malnourished cohorts (CIs wide; consider baseline status). PubMed+1
- **Leucine/EAA and MPS in older adults**: increased MPS with leucine-rich EAAs; variable functional endpoints. Physiology JournalsBioMed Central

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What to hand pharmacy & nursing (ready-to-paste)

- **Med admin note**: “Separate from **levothyroxine (±4 h)** and **fluoroquinolones/tetracyclines (±2–6 h)** due to mineral chelation. Flush tube before/after.” PMCRight Decisions

- **Monitoring**: BMP (Na/K/Cl/CO_2/BUN/Cr) within 72 h if CKD/ACEi/ARB or electrolyte concerns; INR if on warfarin when started/stopped. KDIGOOffice of Dietary Supplements

- **Wound bundle**: Ensure **30–35 kcal/kg** and **1.25–1.5 g/kg protein** + pressure relief + micronutrient coverage. e-acnm.org

Closing Message

"In clinical care, nutrition is the one therapy every patient receives, yet hidden micronutrient gaps continue to undermine recovery.
All 45 Essentials is not an optional add-on — it is the foundational insurance against metabolic stalls, immune failure, and delayed healing.
By securing every cofactor, every day, it ensures that the calories, protein, and therapies we give actually work to their full potential.
For patients, it means strength preserved. For hospitals, it means better outcomes, shorter stays, and lower costs.
For medicine itself, it restores the most basic truth: healing begins with giving the body everything it needs to function."

All 45 ingredients List

1. Amino Acids

- **The 9 listed are the essential amino acids (EAAs) that the body cannot synthesize.**
- **Functions:**
    - **Histidine → precursor for histamine (immune, gastric acid, neurotransmission).**
    - **Isoleucine, Leucine, Valine → branched-chain amino acids (BCAAs), critical for muscle metabolism, insulin signaling, energy.**
    - **Lysine → collagen crosslinking, carnitine synthesis (fat metabolism).**
    - **Methionine → methyl donor (SAMe cycle), precursor for cysteine and glutathione.**
    - **Phenylalanine → precursor to tyrosine → dopamine, norepinephrine, epinephrine.**
    - **Threonine → structural proteins (elastin, collagen), immune function.**
    - **Tryptophan → serotonin, melatonin, niacin.**

👉 Together: these form the minimum protein quality requirement. Without all 9, protein synthesis is incomplete.

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2. Vitamins

- **Water-soluble (B-complex, C):**
    - **Function mostly as enzyme cofactors in energy metabolism (glycolysis, Krebs cycle, fatty acid oxidation, neurotransmitter synthesis).**
    - **Vitamin C is also a cofactor for prolyl/lysyl hydroxylase → crucial for collagen stability.**
- **Fat-soluble (A, D, E, K):**
    - **Vitamin A → vision, epithelial maintenance.**

- Vitamin D → calcium-phosphate homeostasis, gene regulation.
- Vitamin E → membrane antioxidant.
- Vitamin K → γ-carboxylation of clotting proteins, bone metabolism.

👉 Inclusion ensures all coenzyme systems are supported.

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3. Minerals

- Macrominerals:
  - Calcium & Phosphorus → bones/teeth, signaling, ATP.
  - Magnesium → ATP stabilization, >300 enzyme reactions.
  - Sodium, Potassium, Chloride → electrolytes, nerve conduction, osmotic balance.
  - Sulfur → comes mainly from methionine/cysteine → glutathione, connective tissue sulfation.
  - Iron → heme, cytochromes, oxygen transport.
- Trace minerals:
  - Zinc → >300 enzymes, DNA transcription, immunity, wound healing.
  - Copper → cytochrome c oxidase, collagen crosslinking.
  - Selenium → glutathione peroxidase (antioxidant).
  - Iodine → thyroid hormones.
  - Manganese → superoxide dismutase, cartilage synthesis.
  - Fluoride → hydroxyapatite stabilization in bone/teeth.
  - Chromium → potentiates insulin receptor.
  - Molybdenum → xanthine oxidase, sulfite oxidase.

👉 Trace minerals are small but rate-limiting cofactors in many biochemical pathways.