Nutritional considerations in Epidermolysis Bullosa

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eb Clinet

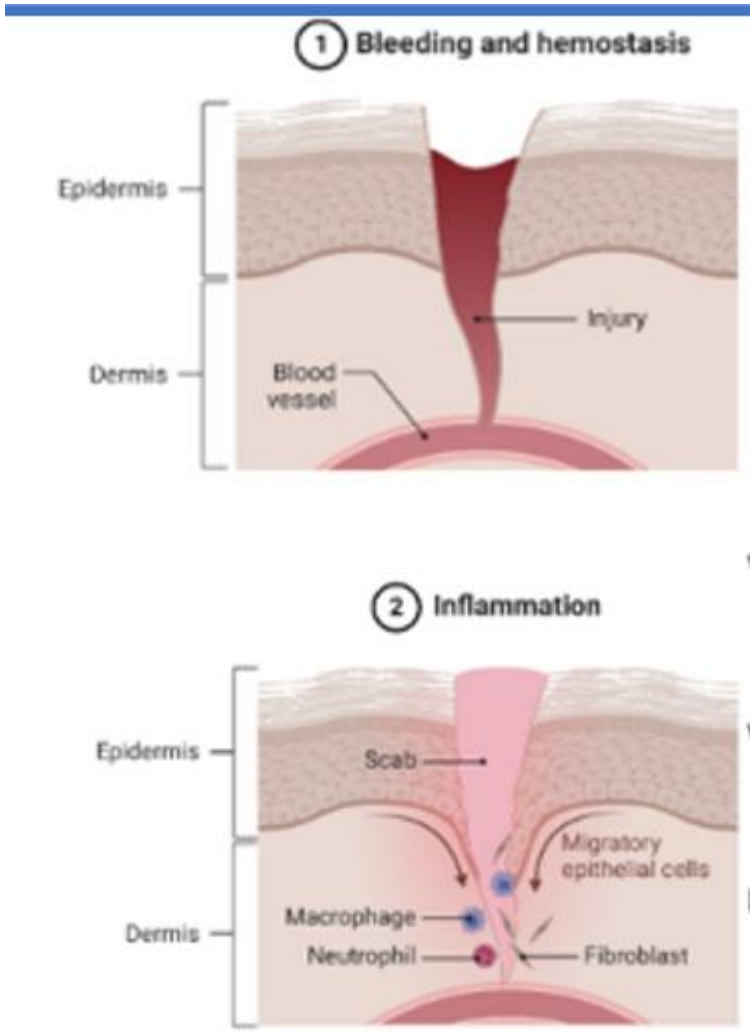
Importance of Nutrition in EB

Requirements vary depending on sub-type and severity of EB → Compensate for nutrient losses via wound exudate → Optimise wound healing

Optimise wound healing → Optimal growth → Optimal bone mineralisation → immune function

immune function → Promote healthy gut function → Overall quality of life

Key Nutrients involved in Wound Healing



Vitamin K, Calcium both needed for coagulation

Vitamin A, Vitamin C needed for immune response
Protein needed for immune cell and glutamine as energy source

Hajj, John & Sizemore, Brandon & Singh, Kanhaiya. (2024). Impact of Epigenetics, Diet, and Nutrition-Related Pathologies on Wound Healing. International Journal of Molecular Sciences. 25. 10474..

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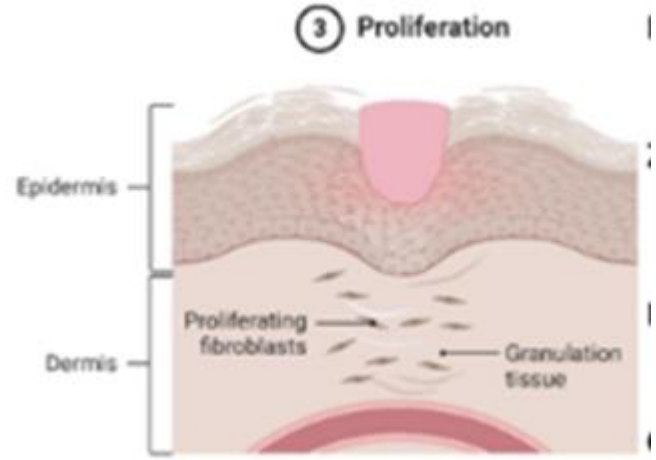
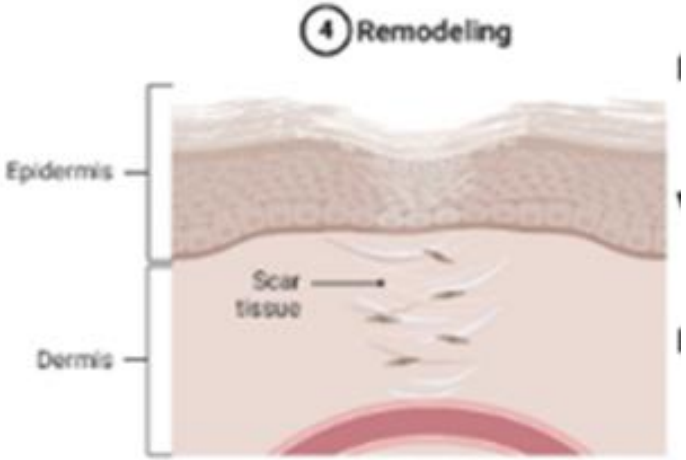


- Protein – arginine regulates collagen deposition, aids wounds contraction
- Zinc – needed for matrix metalloproteinase making room for new cells
- Iron – needed for tissue perfusion and collagen synthesis



- Protein for collagen formation, immune cells
- Vitamin C – collagen structure crosslinks
- Iron for collagen maturation and wound strength

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Calculating Estimated Nutritional Needs in EB:

- **Caloric requirements:**

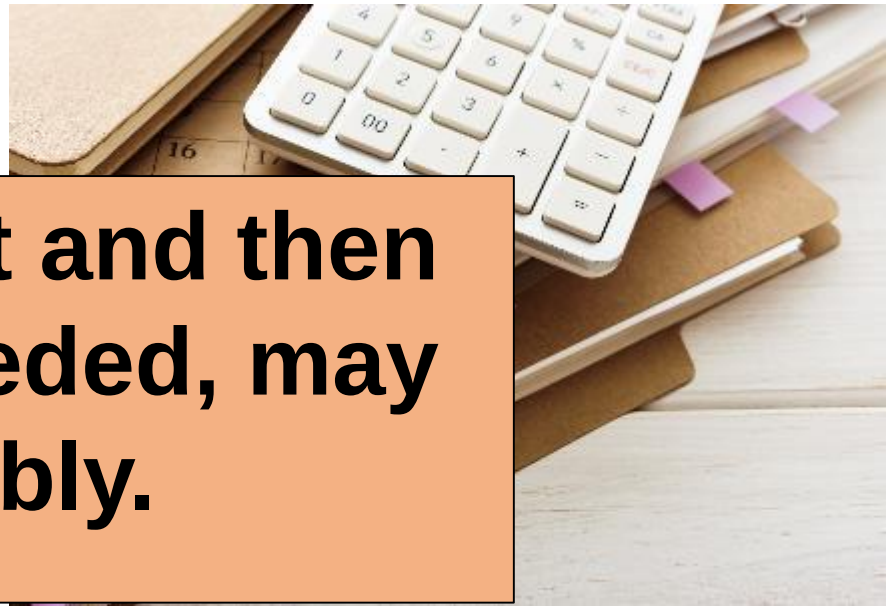
  Schofield Equation

  REE (WHO equation) X activity factor X stress factor

  app

- **Protein r**

  Typi



Calculate a starting target and then monitor and adjust as needed, may fluctuate considerably.

- Adults : 20kcal/kg – 60kcal/kg (EAR 20-35kcal/kg)

  0.75g- 5g protein/ kg (RNI 0.75g/kg)

Factors influencing requirments: Severity, sub type, body compostion, losses, infection, activity factor, etc

Unable to meet high requirements:

- Gastrointestinal:
  - Oral blisters
  - Pain
  - Oral mucosa fusion
  - immobile tongue
    - Reduced or slow intake of food/fluids
    - Pain, boredom and reduced eating pleasure
  - Gastroesophageal reflux
  - Nausea
  - Constipation
  - Oesophageal Strictures –
    - acute and chronic oral reduction

- Dental caries
  - Painful to brush teeth
  - Missing teeth
  - Only able to have soft / pureed foods
    - Reduced fibre, kcals, protein

Unable to meet high requirements:

- Wounds and blistered skin
    - Nutrient loss
    - Pain
    - Daily dressing change
- Large quantity of medication
    - Movicol volumes sometimes large
    - Numerous and regular medications/ supplements
- Hunger
    - chronic hunger but unable to eat to need.
    - Fear of food getting stuck – oesophageal stricture
        - Negative impact on mood, concentration and quality of life.

GI Complications:

- Freeman, et al, 2008:
  - 130/223 (58%) of all EB patients had GI complications
- EB Simplex: constipation and reflux were frequently observed.
- Junctional EB: failure to thrive and protein-losing enteropathy (PLE) were common.
- Dystrophic EB: Constipation was common
  - GOR affected three-quarters of those with recessive DEB
- Diarrhoea affected a small but significant proportion of children with recessive DEB

Constipation:

Higher fluid reqs → Iron sup → Medications

Poor oral fibre intake → Painful passing of stool → Blistering

Withhold → Reduces intake food/fluid

Easing Constipation

- Optimise fibre gradually :
  - 2-16yrs: 15-25g day /adults: 30g per day
- Fibre-rich supplementary drinks and enteral feeds
- High fibre supplements
- Laxatives: osmotic vs stimulant: macrogol gel
  - not PRN
  - not taken at same time as meds
  - made up to correct volume
- Medications (opioids, tricyclic antidepressants, Iron supps)
  - non-compound iron supplements
- Probiotics / prebiotic fibre

- Toilet adaptations
- Psychological support

Nutrition Support:

Establish regular pattern of small meals and snacks ‘little and often’, soft texture if easier to manage (not essential)

Food fortification;

add high kcal/proteins, low sugar, foods such as;

oil, nut butters, cocoa, avocado, cheese, skimmed milk powder, cocoa powder, etc.

Fat/protein/carbohydrate modules:

Liquid sachets, powders

High kcal/ high protein milk or juice sip feeds:

Compact varieties /fibre-enriched varieties

→ Dental health must be considered:

Chose unflavoured /neutral where possible
Offer in one go not sips through the day
Never to be given at night or before sleep
Use a straw
Brush or rinse with non-alcohol mouth wash afterwards

Enteral feeding:

- In some severe cases with poor feed tolerance in infants who don’t respond to all interventions described….tube feeding may be necessary.
- Last resort as increases chances of oesophageal strictures.
- Fixation advised by EB specialist nursing team
- Not always needed but if struggling to maintain tube securely –
  - Lasso technique can be successful with close supervision and monitoring of position and skin integrity on nostril etc.

Gastrostomy placement:

- Long term faltering growth along with other contributing factors (swallowing difficulties, aspiration);
  - Early discussion in infancy of likely need.
    - Careful decision made by the family and MDT
    - Preparation and education beforehand
    - Often very difficult decision; takes years to decide in some cases
- Individual feeding plans set up around patient routine
- Encourage oral intake of foods wherever possible.

Micronutrients:

- Fine et al, 1989 highlighted iron, zinc, Vit C, Vit A and B12 deficiencies in 79 EB pts
- Ingen-Housz-Oro, S., *et al*, 2004, showed 36%-70% patients with Recessive Dystrophic EB had Vit D, C, Iron, Zinc, and Selenium deficiency.
- Yerlett *et al*, 2021, Vitamin K deficiency in RDEB patients (37.5%)
- Yerlett *et al,* 2022, Vitamin D deficiency in RDEB patients (88%)
- Greenblatt et al, 2022, Vitamin C deficiency (32%)

Biochemistry: Monitoring & Interpretation

- Nutrition bloods at least 6-12 monthly depending on need:
    - Minerals: Zinc, Selenium, Copper, Iron profile,
    - Vitamins: A, D, E, K, B12, PIVKA II, folate,
        - If indicated Vitamin C.
    - Carnitine – amino acid derivative involved in metabolism of fatty acids

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Blood monitoring:

The acute phase response can have direct impact on serum biomarkers…..

Albumin drops during acute phase response:

Carrier protein for many minerals: e.g: Ca and Zn.

Approx 70% of plasma zinc is bound to albumin, zinc measurements largely adjusted by albumin concentrations.

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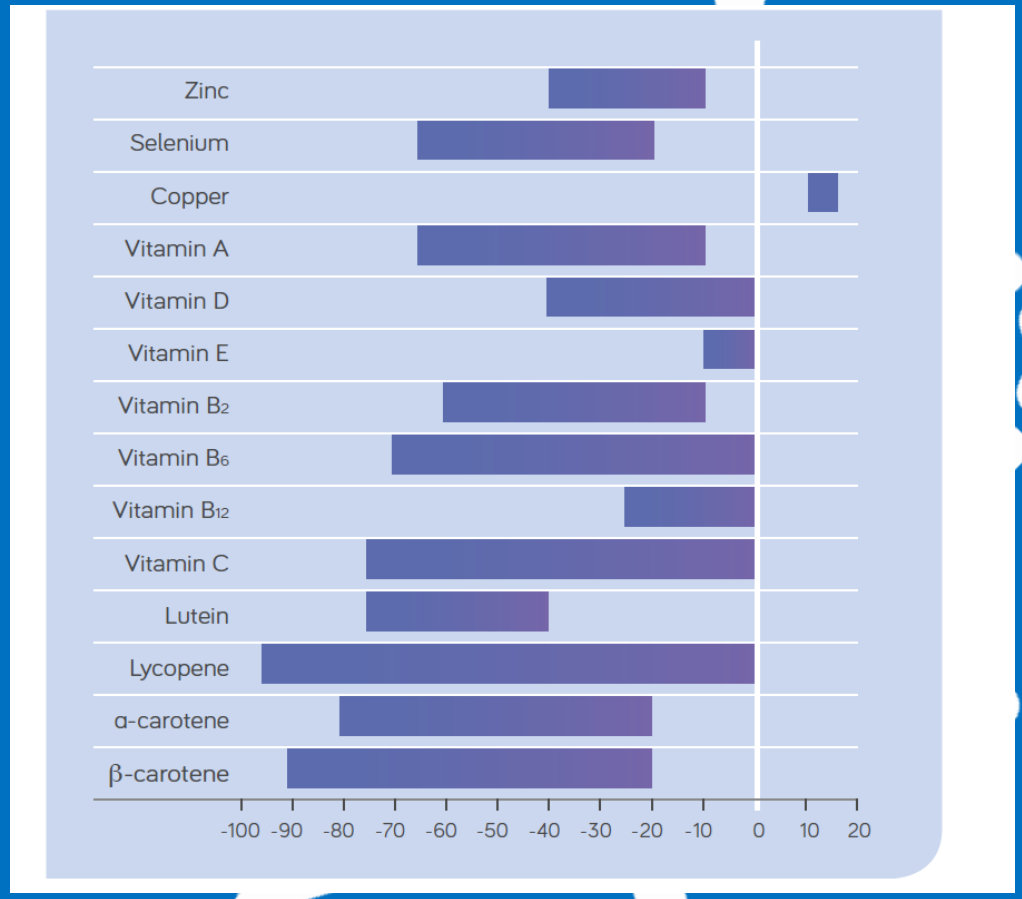
Copper + ferritin increase (acute phase reactants)



Gerasimidis K, et al (2020). Assessment and Interpretation of Vitamin and Trace Element Status in Sick Children: A Position Paper From ESPGHAN. J Pediatr Gastroenterol Nutr;70(6):873-81.

Micronutrient supplementation:

- Powder, drop, gummies, spray or liquid.

- Mindful of poly-medication
- Nausea
- If on single supplements, must be aware of nutrient interactions. i.e:

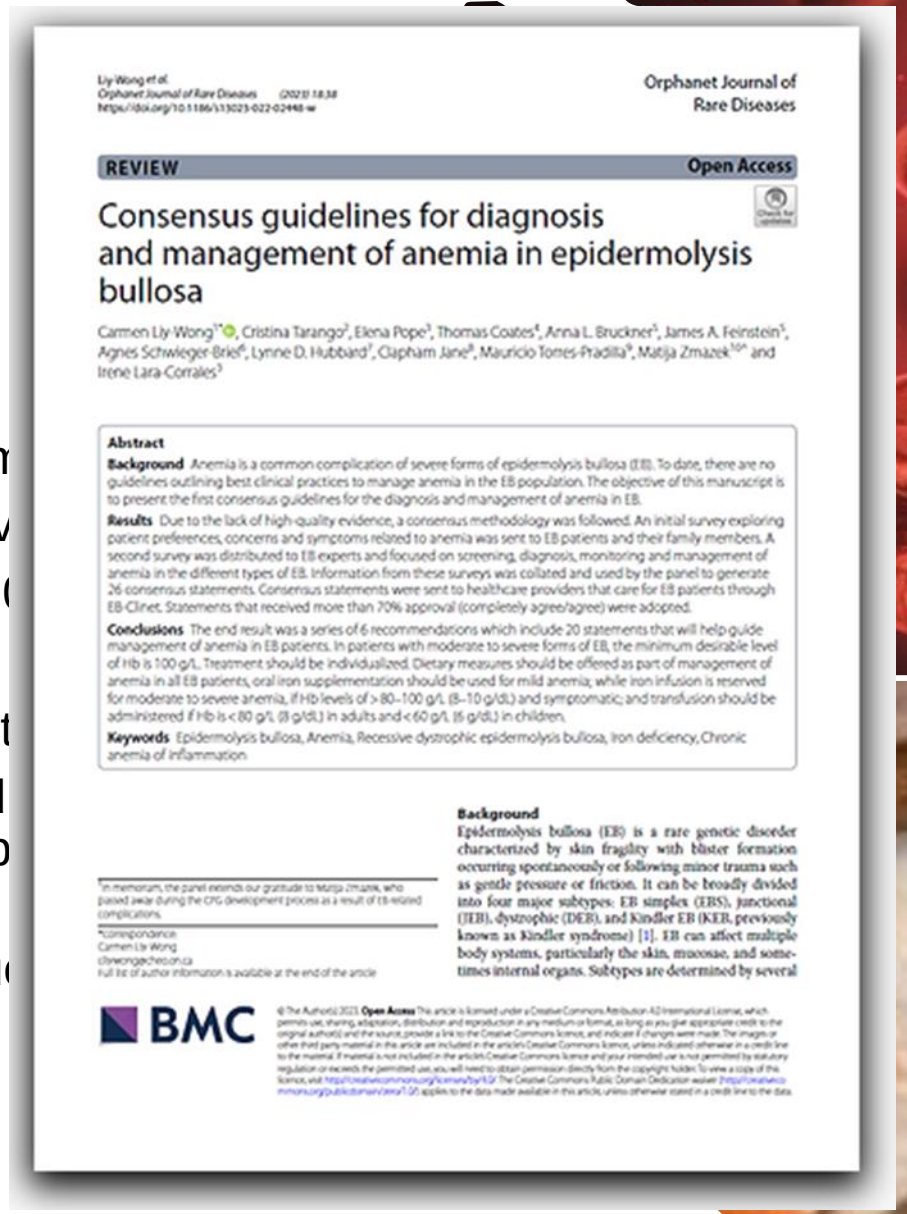
  - Iron and Zinc should be taken separately
  - Copper and vitamin C separately
  - Iron should not be taken with calcium sups, dairy foods or caffeine
  - Iron can be taken with vit C to improve absorption
  - Zinc taken with food

Anaemia and Iron supplementation::

- Enteral Iron Supplementation
  - capsules, tablets, liquids, gumm
- Regular IV Iron (caution during activ
- Blood tranfusion when Hb levels <7(

- Compound iron can cause GI sympt
  - Can use elemental iron instead such as spray or iron water sup available
  - Alternative days dosing to redu

→DEBRA CPG aneamia guidelines



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REVIEW Open Access

Consensus guidelines for diagnosis and management of anemia in epidermolysis bullosa

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Abstract

Background Anemia is a common complication of severe forms of epidermolysis bullosa (EB). To date, there are no guidelines outlining best clinical practices to manage anemia in the EB population. The objective of this manuscript is to present the first consensus guidelines for the diagnosis and management of anemia in EB.

Results Due to the lack of high-quality evidence, a consensus methodology was followed. An initial survey exploring patient preferences, concerns and symptoms related to anemia was sent to EB patients and their family members. A second survey was distributed to EB experts and focused on screening, diagnosis, monitoring and management of anemia in the different types of EB. Information from these surveys was collated and used by the panel to generate 26 consensus statements. Consensus statements were sent to healthcare providers that care for EB patients through EB-Clinet. Statements that received more than 70% approval (completely agree/agree) were adopted.

Conclusions The end result was a series of 6 recommendations which include 20 statements that will help guide management of anemia in EB patients. In patients with moderate to severe forms of EB, the minimum desirable level of Hb is 100 g/L. Treatment should be individualized. Dietary measures should be offered as part of management of anemia in all EB patients, oral iron supplementation should be used for mild anemia; while iron infusion is reserved for moderate to severe anemia, if Hb levels of > 80–100 g/L (8–10 g/dL) and symptomatic; and transfusion should be administered if Hb is < 80 g/L (8 g/dL) in adults and < 60 g/L (6 g/dL) in children.

Keywords Epidermolysis bullosa, Anemia, Recessive dystrophic epidermolysis bullosa, Iron deficiency, Chronic anemia of inflammation

Background

Epidermolysis bullosa (EB) is a rare genetic disorder characterized by skin fragility with blister formation occurring spontaneously or following minor trauma such as gentle pressure or friction. It can be broadly divided into four major subtypes: EB simplex (EBS), junctional (JEB), dystrophic (DEB), and Kindler EB (KEB, previously known as Kindler syndrome) [1]. EB can affect multiple body systems, particularly the skin, mucosae, and sometimes internal organs. Subtypes are determined by several

*In memoriam, the panel extends our gratitude to Matija Zmazek, who passed away during the CPG development process as a result of EB-related complications.

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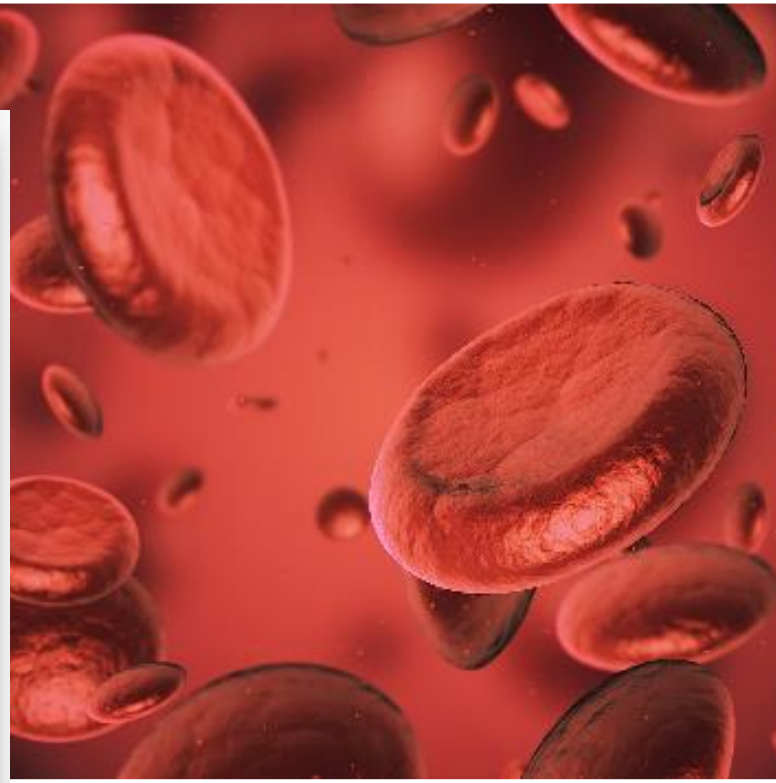
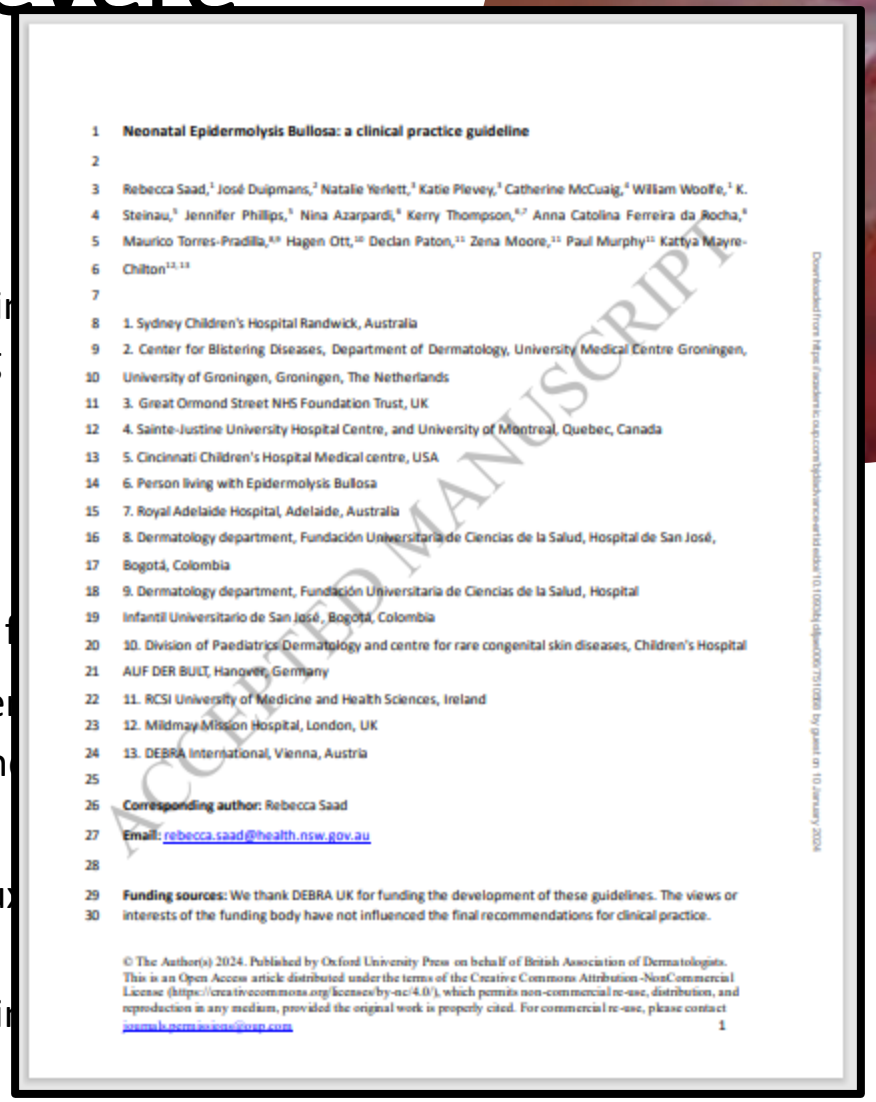


Nutrition in severe infants:

- Babies with severe skin loss at birth or i
weight gain or varying degrees of faltering
increased energy/protein:
  - Fortified expressed breast milk
  - Top up breast feeds with one or two f
- Areas of cutis aplasia (absent skin)/blister
  - Nutrient loss via blister and woun
- Stool/vomiting/gastro-oesophageal reflux
  - Antibiotics
  - Micronutrient supplements - timi



Neonatal Epidermolysis Bullosa: a clinical practice guideline

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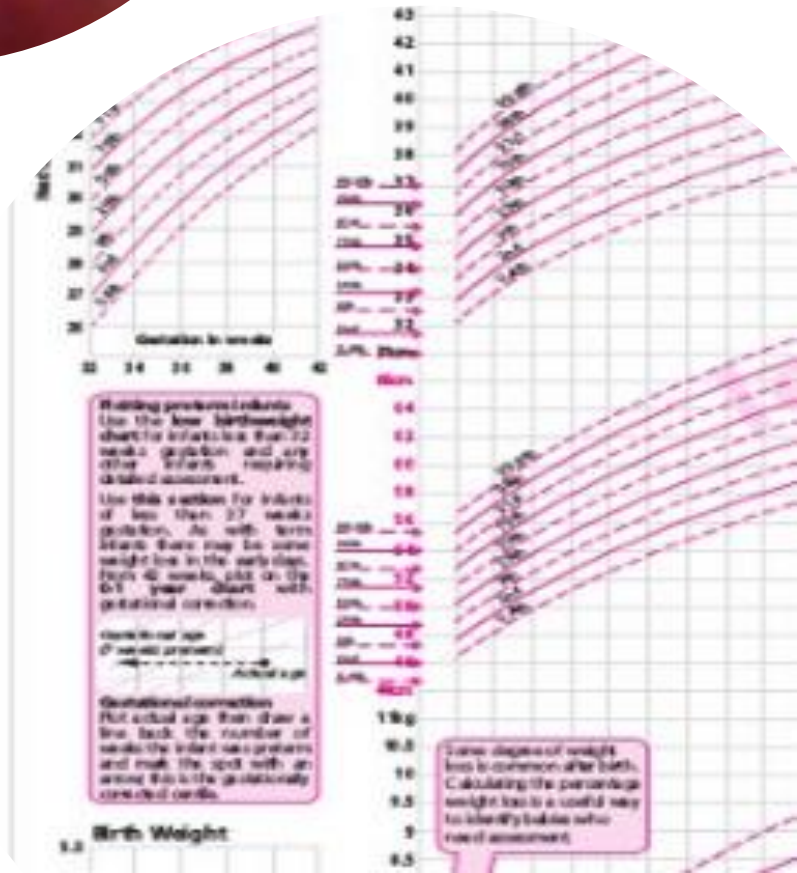

[Neonatal Care in EB – Clinical Practice Guideline (debra-international.org)]

Feeding practicalities:

Breast Feeding	Suckling can be painful Petroleum jelly/ barrier cream applied to skin around mouth/cheeks and to the breast to reduce friction
Bottle Feeding	•Poor suck can lead to exhaustion and low volumes •May need teething gel applied to the teat or the mouth before each feed to reduce pain on feeding •Haberman Special Feeder can be used very successfully – especially shaped teat to allow parental squeezing of milk flow depending on tolerance.

Problems faced in infancy

If poor feed tolerance; i.e: vomiting, severe reflux, diarrhoea, non-IgE mediated cow's milk protein allergy

- Consider trial of ext hydrolysed feed with MCT
- PPI therapy if needed (be aware of long term side effects)

Poor weight gain – losses greater than intake – check protein and sodium status and supplement if needed

Malabsorption?

Feeds can be concentrated under dietetic supervision to increase nutrient intake if taking specialist formula.

Gentle burping technique, air vented bottles and feed thickeners can help alleviate reflux symptoms.

Weight Management / Obesity in EB Simplex

- Reduced mobility
- Reduced self esteem
- Folds of skin increases sweating and blistering
  - Increased infection risk
- Pressure sores
- Along with all other associated co-morbidities with obesity – CHD, Diabetes, Stroke

In Summary:

- **Patients with EB present with a full spectrum of symptoms and complexity.**

- **Careful long-term dietetic monitoring of patients is essential to optimise nutritional status – growth / bones / immunity / QoL**

- **Mindful of the holistic picture and complete burden of the disease for these patients and nutritional therapy advised in a manageable and appropriate way.**

- **Relationship and rapport with families and patients is essential!**

Thank you!

- Key references:

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