4 years of the GLIM criteria: Where are we? Results of the GLIM survey

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Global Leadership Initiative on Malnutrition - The GLIM Pathway to Consensus 2016-2019

ESPIN Endorsed Recommendation

GLIM criteria for the diagnosis of malnutrition — A consensus report from the global clinical nutrition community

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Clinical Nutrition 2019
- also published in JPEN and JCSM
The GLIM procedure for the diagnosis of malnutrition

**Risk screening**
- At risk for malnutrition
  - Use validated screening tools

**Diagnostic Assessment**
- **Diagnostic Criteria**
  - **Phenotype**
    - Weight loss
    - Low BMI/underweight
    - Reduced muscle mass
  - **Etiology**
    - Decreased food intake or absorption
    - Disease burden/inflammatory condition
- **Meets criteria for malnutrition diagnosis**
  - Requires at least 1 Phenotype Criterion and 1 Etiology Criterion

**Diagnosis**
- **Determine severity of malnutrition**
  - Severity determined based on phenotypic criteria

**Severity grading**

### Diagnostic Criteria

**Phenotype**
- Weight loss
- Low BMI/underweight
- Reduced muscle mass

**Etiology**
- Decreased food intake or absorption
- Disease burden/inflammatory condition

### Phenotypic Criteria

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight loss (%)</td>
<td>&gt;5% within past 6 months or &gt;10% beyond 6 months</td>
</tr>
<tr>
<td>Low BMI (kg/m²)</td>
<td>&lt;20 if &lt;70 years, or &lt;22 if ≥70 years</td>
</tr>
<tr>
<td>Reduced muscle mass</td>
<td>&lt;50% of ER &gt;1 week, or any reduction for &gt;2 weeks, or any chronic gastrointestinal malabsorption</td>
</tr>
</tbody>
</table>

### Etiologic Criteria

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased food intake or malabsorption</td>
<td>≤50% of ER &gt;1 week, or any reduction for &gt;2 weeks, or any chronic gastrointestinal malabsorption</td>
</tr>
<tr>
<td>Inflammation</td>
<td>Acute disease/injury or chronic disease-related inflammation</td>
</tr>
</tbody>
</table>
GLIM bibliometry Jan 2019 - Jan 2023

GLIM original paper bibliometry (Scopus)
Clinical Nutrition Publ. Feb 2019: 900 citations
J Parent Enteral Nutr Publ. Feb 2019: 266 citations

~330 papers in PubMed – ”Global Leadership Initiative on Malnutrition OR GLIM” as search term

~220 validation/application studies
• Criterion validity
• Predictive validity

Papers by country

Current GLIM missions

• Validation studies
  • Criterion validity – compared to standard
  • Predictive validity – ability to predict negative outcomes
• Implementation
• Criterion specification
  • Muscle mass methodology and cut-offs
  • How to define disease burden/inflammation?
• ICD coding for ICD-11 (WHO)
Current GLIM missions

- Validation studies
  - Criterion validity – compared to standard
  - Predictive validity – ability to predict negative outcomes

- Implementation

- Criterion specification
  - Muscle mass methodology and cut-offs
  - How to define disease burden/inflammation?

- ICD coding for ICD-11

GLIM criterion validity – a meta-analysis

- 20 studies, >10,000 patients
- Cancer (7), hospitalized (8), CKD (2), ICU (2), CVD (1)
- 13 countries
- 15 used either SGA or PG-SGA as semi-gold comparator

Results

- Amalgamated sensitivity 0.72 (true positives)
- Amalgamated specificity 0.82 (true negatives)

Conclusion:
The GLIM criteria “have the potential to be used as the gold standard for diagnosing malnutrition”
GLIM predictive validity in cancer - a meta-analysis

- 12 studies, 7,000 patients
- 7 countries
- Overall survival – main outcome
- Malnutrition prevalence 12%-88%

Results
HR 1.90 (95%CI 1.56-2.29) for OS if normal nutrition acc. to GLIM

Conclusion: The GLIM criteria “have the potential to improve survival stratification in patients with cancer”

Jan 23 2022, Xu et al. Clin Nutr 2022

Long-term impact of malnutrition according to GLIM

Hong Kong, living at home
Data of osteoporosis survey
N=3702, age 72 years
Malnourished 10.7%

Higher risk from malnutrition:
- Sarcopenia
- Frailty
- Mortality

Young SST et al. JAMDA 2021
Review on validation and feasibility of GLIM - PubMed Aug 2021 to Aug 2022

134 GLIM papers came out from a PubMed search
• 97 clinical trials; 40 in older populations (>60 years), 40 in cancer populations, 17 in populations <60 years

40 GLIM trials in older populations
• 14,000 patients
Criterion validity (8) - SGA, PG-SGA, AND-ASPEN
• Moderate - good
Predictive validity (18)
• Good - excellent
Feasibility (18)
• 11% (comm-dw) - 74% (hip fr) malnourished

40 GLIM trials in cancer populations
• 34,000 patients
Criterion validity (5) - SGA, PG-SGA,
• Moderate - good
Predictive validity (19)
• Good - excellent
Feasibility (15)
• 12% (gastric) – 88% (mixed) malnourished

Cederholm & Barazzoni. COCNM 2022

Text books promoting GLIM
Current GLIM missions

- Validation studies
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GLIM Body Composition Initiative 2019-2022

GLIM DIAGNOSTIC PROCEDURE for MALNUTRITION

Muscle mass assessment

TECHNICAL APPROACHES
- BIA
- DXA
- CT
- US

Any available with appropriate expertise and reference values?

NO

CLINICAL APPROACHES
- ANTHROPOMETRY
  - Calf circumference
  - Mid-upper arm circumference

PHYSICAL EXAMINATION

Muscle mass

Yes

Barazzoni R et al. Clin Nutr 2022
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How do investigators solve the inflammation issue?

Survey of 134 GLIM papers from August 2021 to August 2022
- 38 papers on older populations were considered
  - 40 papers on cancer, and 16 on younger populations were omitted
- 27/38 papers gave information on the fulfilment the inflammation criterion
Survey: How do investigators solve the inflammation issue?

14 used presence of disease
- Acute disease – ER x2
- Internal medicine
- CKD x2
- Heart failure x2
- Liver cirrhosis
- "clinical judgement” x2

7 used CRP (and 1 se-albumin) alone
- CRP>3.2 – CRP>10mg/L

5 combined presence of inflammatory disease and CRP

Clinical judgement supported by CRP in cases of uncertainty of inflammatory disease and CRP

GLIM Inflammation Working Group
- Tommy Cederholm, Gordon Jensen, co-chairs
- Cristina Cuerda (ESPEN), David Evans (ASPEN), Isabel Correia (FELANPE), Veeradej Pisprasert (PENSA)
- Additional members - Rocco Barazzoni, Juan Ochoa, Renee Blauw, Charlene Compher.
Current GLIM missions

- Validation studies
  - Criterion validity – compared to standard
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ICD-11 classification of malnutrition
5B54 Underweight in adults

BMI <18.5 kg/m²
Proposal for ICD-11 amendment (launched 2020)

Standardizing the diagnosis of malnutrition:

Swedish initiative supported by >40 societies

5B72 Malnutrition in adults

When malnutrition is confirmed by the presence of a combination of phenotypic criteria; e.g. weight loss, low body mass index or reduced muscle mass, and etiologic criteria; e.g. reduced food assimilation (intake/digestion/absorption) or disease burden/inflammation.

5B72.0 Malnutrition in adults related to acute or chronic disease, injury or infection with moderate to severe inflammation

5B72.1 Malnutrition in adults related to disease with non-discernible or low level of inflammation

5B72.2 Malnutrition in adults related to pure starvation

WHO/ICD decision in ??

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5B72 Malnutrition in adults

Zoom-discussion with ICD/WHO Geneva in May, 2022 (TC, RB, GJ):

- Seriously interested – discussion continues.
- Time perspective: Perhaps a decision in 2-4 years.

5B72.1 Malnutrition in adults related to disease with non-discernible or low level of inflammation

5B72.2 Malnutrition in adults related to pure starvation

WHO/ICD decision in ??
GLIM Survey – current “global” status

25 responses from 60 ESPEN council-members:
18 Europe, 4 Asia, 3 Americas

1. Is GLIM used in your country?
   - Nationwide 7
   - Locally 12
   - No 4

2. Could GLIM be used in your country (1-10)?
   - Median 9
   - Average 8.6
   - Range 6-10
   - Comments: It takes time...

3. Suggested improvements
   - Guidance on the inflammation criterion
   - Cut-off values for muscle mass - staging
   - BMI cut-offs for Asian ethnicities?

4. Needed/suggested actions
   - Stronger validation
   - Education: Infographics, videos, webinars, workshops
   - Reimbursement, local NHS, national GL
   - ESPEN Congress Symposia, ESPEN GLIM sessions
   - ESPEN grants for validation studies
   - Examples of how GLIM can be combined with more comprehensive tools

5. Other “tools” used in your country
   - SGA/PG-SGA 8
   - NRS-2002 8
   - MNA 6
   - MUST 4
   - Others; e.g. SNAQ, ASPEN/AND...