Screening tools in daily practice

The focus on cancer

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Definition of malnutrition

Static parameter

Body Mass Index

$$\textbf{BMI} = \frac{\text{weight [kg]}}{\text{height [m}^2\text{]}}$$

- **normal nutritional status** 20.0 – 25.0 kg/m²
- **mild** MN 18.0 – 19.9 kg/m²
- **moderate** MN 16.0 – 17.9 kg/m²
- **severe** MN < 16 kg/m²

Sobotka L, et al. ESPEN Book 2004 / Schols AM et al. Am J Respir Crit Care Med 1995;152:1268
Cabre E et al. Gastroenterology 1990;85:1597 / Bastow MD et al. BMJ 1983;287:1589

Definition of malnutrition

Dynamic parameters

Pathological weight loss (unintentional)

> 5% bw 1 mt / **> 7.5%** bw 3 mts / **> 10%** bw 6 mts

Keele AM et al. Gut 1997;40:303 / Rana SK et al. Clin Nutr 1992;11:337
Keys A et al. Science 1950;112:371

Food intake in the preceding week

food intake below 25% of normal requirement

Kondrup J et al. J Hepatol 1997;27:239 / Olin AO et al. JPEN 1996;20:93
Unosson M et al. Clin Nutr 1992;11:134 / Windsor JA et al. Br J Surg 1988;75:880

Cancer: disease and nutrition are key determinants of patients' QoL

QoL function scores are determined by:

- cancer location 30 %
- nutritional intake 20 %
- weight loss 30 %
- chemotherapy 10 %
- surgery 6 %
- disease duration 3 %
- stage of disease 1 %

50 % !

Ravasco P et al. Supp Care Cancer 2004;12:246

Consequences of cancer-related MN

Mortality ↑

Length of stay ↑

- **Re-Hosp. ↑**
- **Convalescence ↑**

Morbidity ↑

- **Infections ↑**
- **Wound healing ↓**
- **Tolerance to anti-cancer-therapy ↓**
- **Organ dysfunction ↑**
- **Complications ↑**

Quality of life ↓

- **Physical and mental problems**

Stanga Z et al. Eur J Cli Nutr;62:687 / S. Iff, Stanga Z. Clin Nutr 2008;3:154

Prevalence of cancer-related MN

Cancer out- and inpatients

- **Cancer outpatients** (1'000 pts, NRS-2002) **33.8 %**

Bozzetti et al. Support Care Cancer 2009;17:279

- **Cancer inpatients** (71 pts, PG-SGA) **76 %**

Bauer et al. Eur J Clin Nutr 2002;56:779

- **Colorectal cancer** (inpatients, 234 pts, PG-SGA) **41 %**

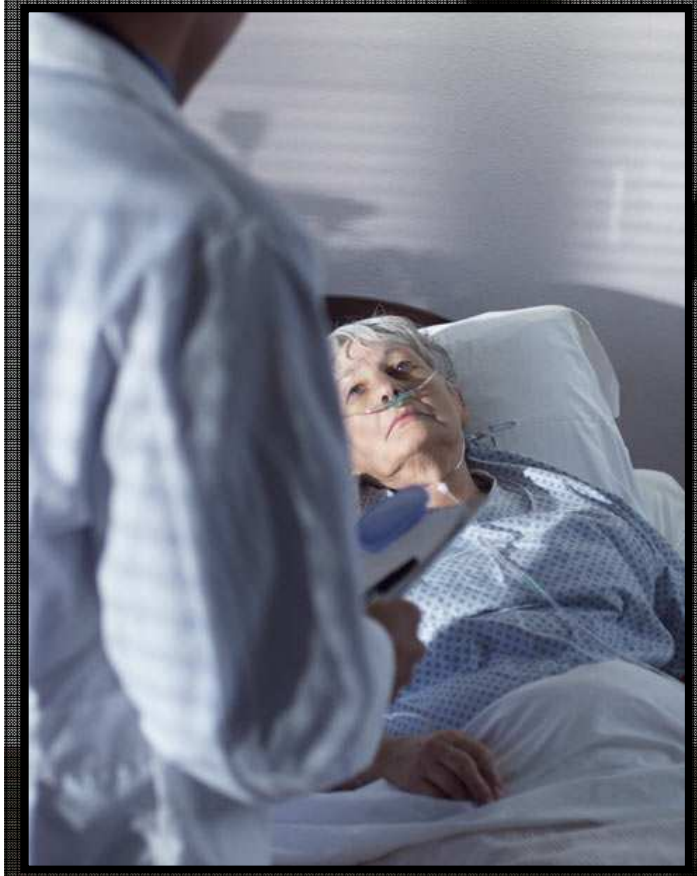
Gubta et al. Eur J Clin Nutr 2004;59:35

- **Ovarian cancer** (inpatients, 132 pts, SGA) **50 %**

Gubta et al. J Ovar Res 2008;1:5

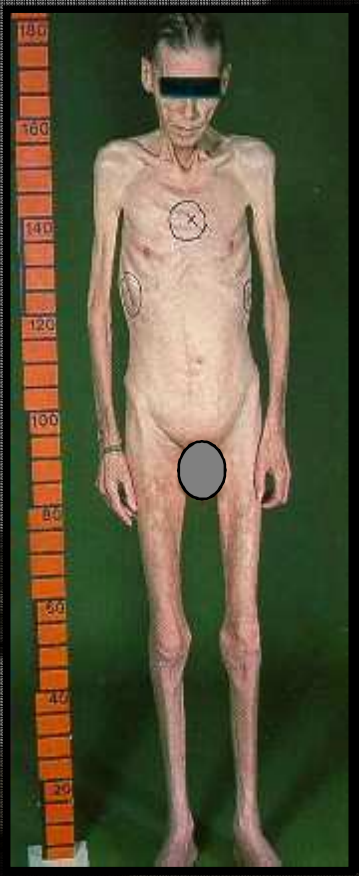
Nutritional management

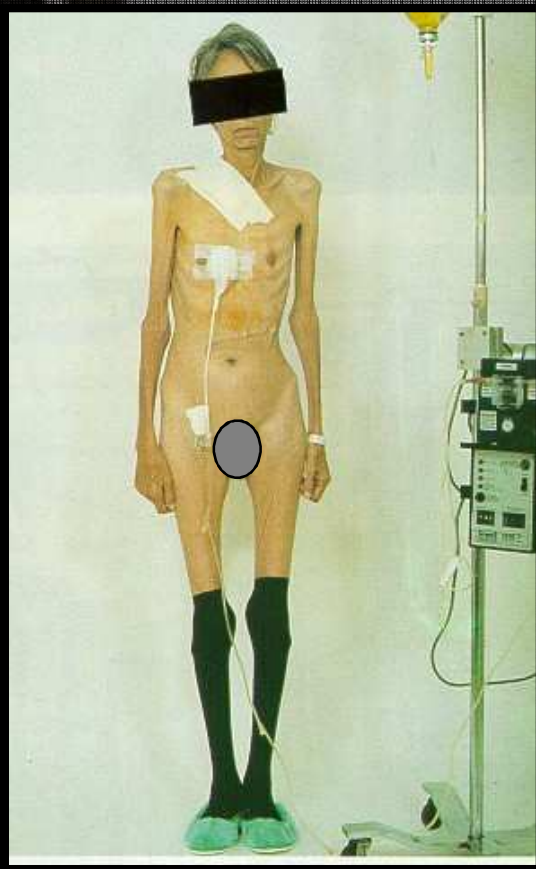
SCREENING at admission



Ideal

All patients at risk identified!





Kondrup J et al. Clin Nutr 2003;22:415

Quality of a screening tool

Requirements according ESPEN

- Easy
- Efficient
- Available
- Inexpensive

- Specificity
- Sensitivity
- Reliability
- Predictive validity


ESPEN
Community
MUST ©
Inter-rater reliability
κ = 0.66
substancial
Kondrup J et al. Clin Nutr 2003;22:415

MUST© Malnutrition Universal Screening Tool

Body Mass Index
(kg/m2)

BMI	Score
> 20.0	0
18.5-20.0	1
< 18.5	2

Malnutrition Advisory Group. BAPEN 2000

MUST© Malnutrition Universal Screening Tool

Body Mass Index
(kg/m2)

BMI	Score
> 20.0	0
18.5-20.0	1
< 18.5	2

Weight loss
(unintentional)

In the last 3-6 months

Percent	Score
≤ 5	0
5-10	1
≥ 10	2

Malnutrition Advisory Group. BAPEN 2000

MUST© Malnutrition Universal Screening Tool

Body Mass Index
(kg/m2)

BMI	Score
> 20.0	0
18.5-20.0	1
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Weight loss
(unintentional)

In the last 3-6 months

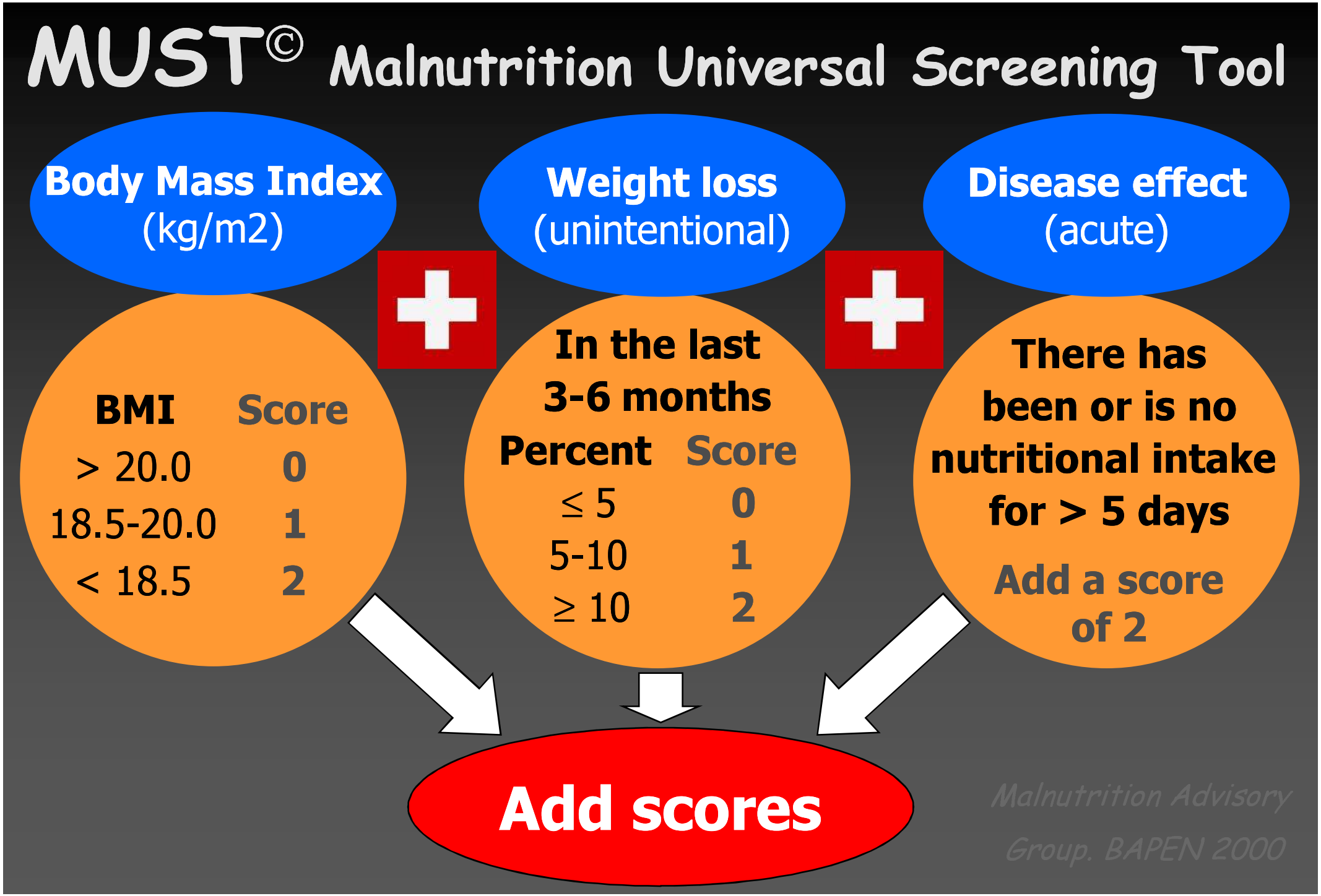
Percent	Score
≤ 5	0
5-10	1
≥ 10	2

Disease effect
(acute)

There has been or is no nutritional intake for > 5 days

Add a score of 2

Malnutrition Advisory Group. BAPEN 2000


MUST© Malnutrition Universal Screening Tool
Body Mass Index (kg/m2)
Weight loss (unintentional)
Disease effect (acute)
BMI Score
> 20.0 0
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In the last 3-6 months
Percent Score
≤ 5 0
5-10 1
≥ 10 2
There has been or is no nutritional intake for > 5 days
Add a score of 2
Add scores
Malnutrition Advisory Group. BAPEN 2000

MUST© Malnutrition Universal Screening Tool

Overall risk of malnutrition

Score	Risk MEASURE	Implement
0	low → ROUTINE CLINICAL CARE	**Hospitals:** screening every week **Care Homes:** screening every month **Community:** screening every year

Malnutrition Advisory Group (MAG UK). BAPEN 2000

MUST© Malnutrition Universal Screening Tool

Overall risk of malnutrition

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0	low → ROUTINE CLINICAL CARE	**Hospitals:** screening every week **Care Homes:** screening every month **Community:** screening every year
1	mild → OBSERVE	**Hospitals & Care Homes:** document dietary and fluid intake for 3 days **Community:** repeat screening (1-6 mts)

Malnutrition Advisory Group (MAG UK). BAPEN 2000

MUST© Malnutrition Universal Screening Tool

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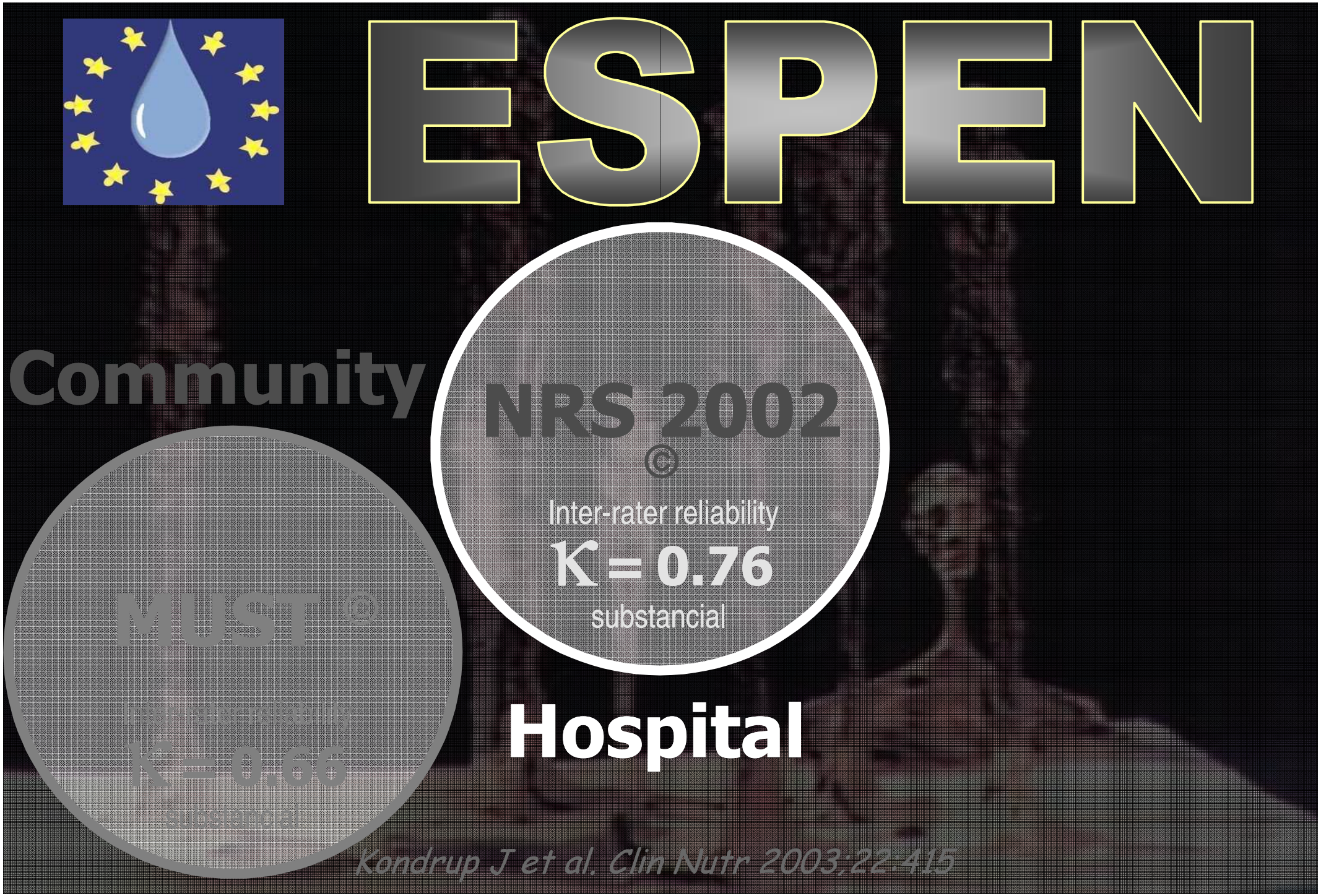
1	mild → OBSERVE	**Hospitals & Care Homes:** document dietary and fluid intake for 3 days **Community:** repeat screening (1-6 mts)
≥ 2	high → TREAT	**Hospitals, Care Homes & Community:** **Start nutritional therapy**

Malnutrition Advisory Group (MAG UK). BAPEN 2000


ESPEN
Community
NRS 2002
©
Inter-rater reliability
κ = 0.76
substancial
MUST ©
κ = 0.66
substancial
Hospital
Kondrup J et al. Clin Nutr 2003;22:415

Nutrition Risk Screening NRS 2002

Pre-Screening: four questions

Question	Yes	No
Is BMI <20.5 kg/ m² ?	💣	☺
Has the patient lost weight within the last 3 months ?	💣	☺
Has the patient had a reduced dietary intake in the last week ?	💣	☺
Is the patient severely ill ? (e.g. in intensive care)	💣	☺

If the answer is Yes to any question,
the screening (NRS 2002) has to be performed.

Kondrup J, Stanga Z, et al. Clin Nutr 2003;22:321

NRS 2002

Nutritional Risk Score

Nutritional risk

Kondrup J et al.

Clin Nutr 2003;22:321

Impaired nutritional status	Score
Normal nutritional status	0
Grade 1 (mild impairment) Weight loss > 5% in 3 months *OR* Food intake below 50-75% of normal requirement in prec. week	1
Grade 2 (moderate impairment) Weight loss > 5% in 2 months *OR* BMI 18.5 to 20.5 + impaired general condition *OR* Food intake below 25-50% of normal requirement in prec. week	2
Grade 3 (severe impairment) Weight loss > 5% in 1 month *OR* BMI < 18.5 + impaired general condition *OR* Food intake below 0-25% of normal requirement in prec. week	3
Intermediate Score A	?

NRS 2002

Nutritional Risk Score

Nutritional risk

Kondrup J et al.

Clin Nutr 2003;22:321

Severity of disease (≈ stress metabolism)	Score
No illness	0
Grade 1 (mild) • Hip fracture, chronic patients with acute complications: cirrhosis, COPD • Chronic hemodialysis, diabetes, oncology	1
Grade 2 (moderate) • Major abdominal surgery • Stroke • Severe pneumonia • Hematologic malignancy	2
Grade 3 (severe) • Head injury • Burns • Bone marrow transplantation • Intensive care patients (APACHE Score > 10)	3
Intermediate Score B	?

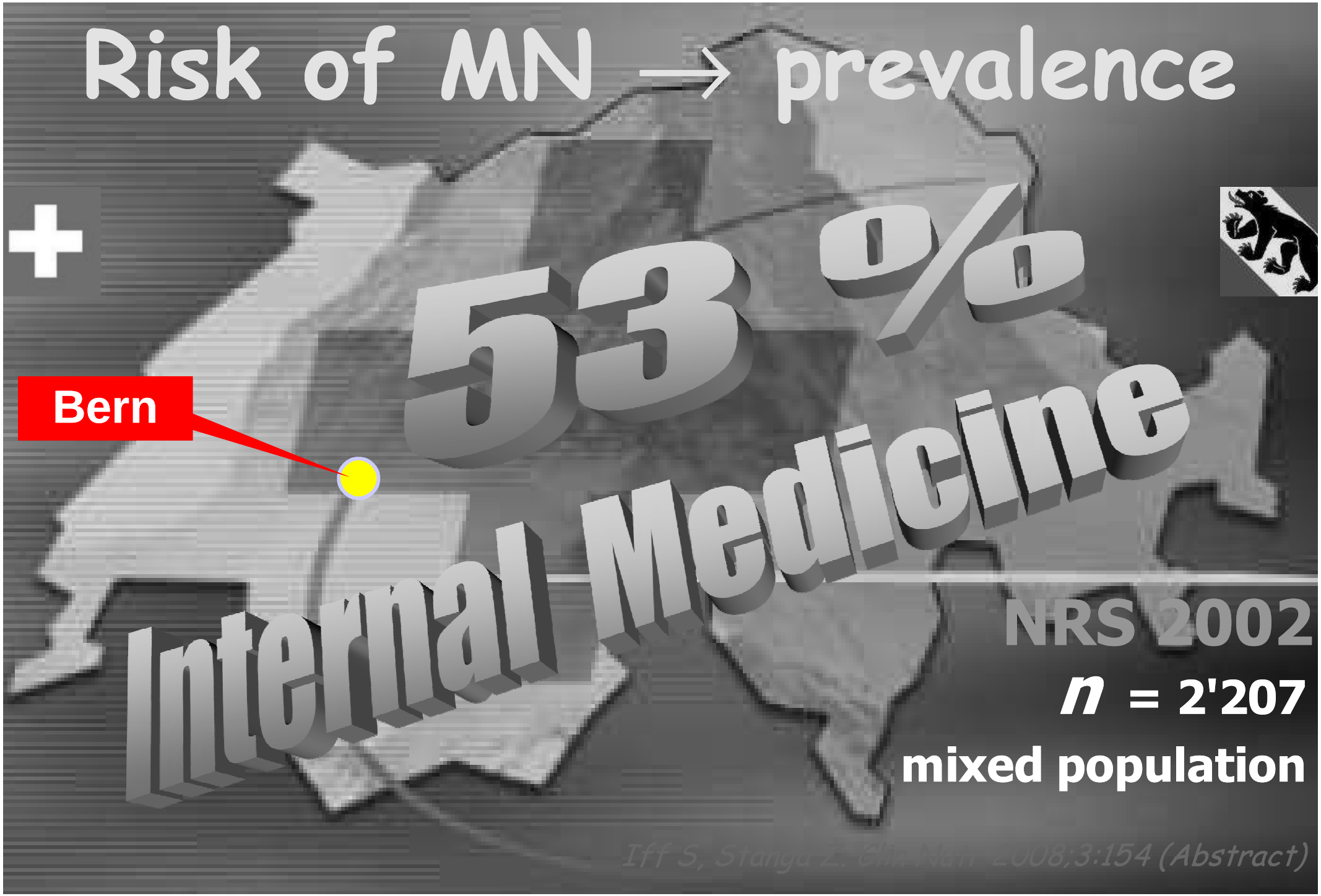
Nutritional Risk Score 2002

Calculation and interpretation of the score

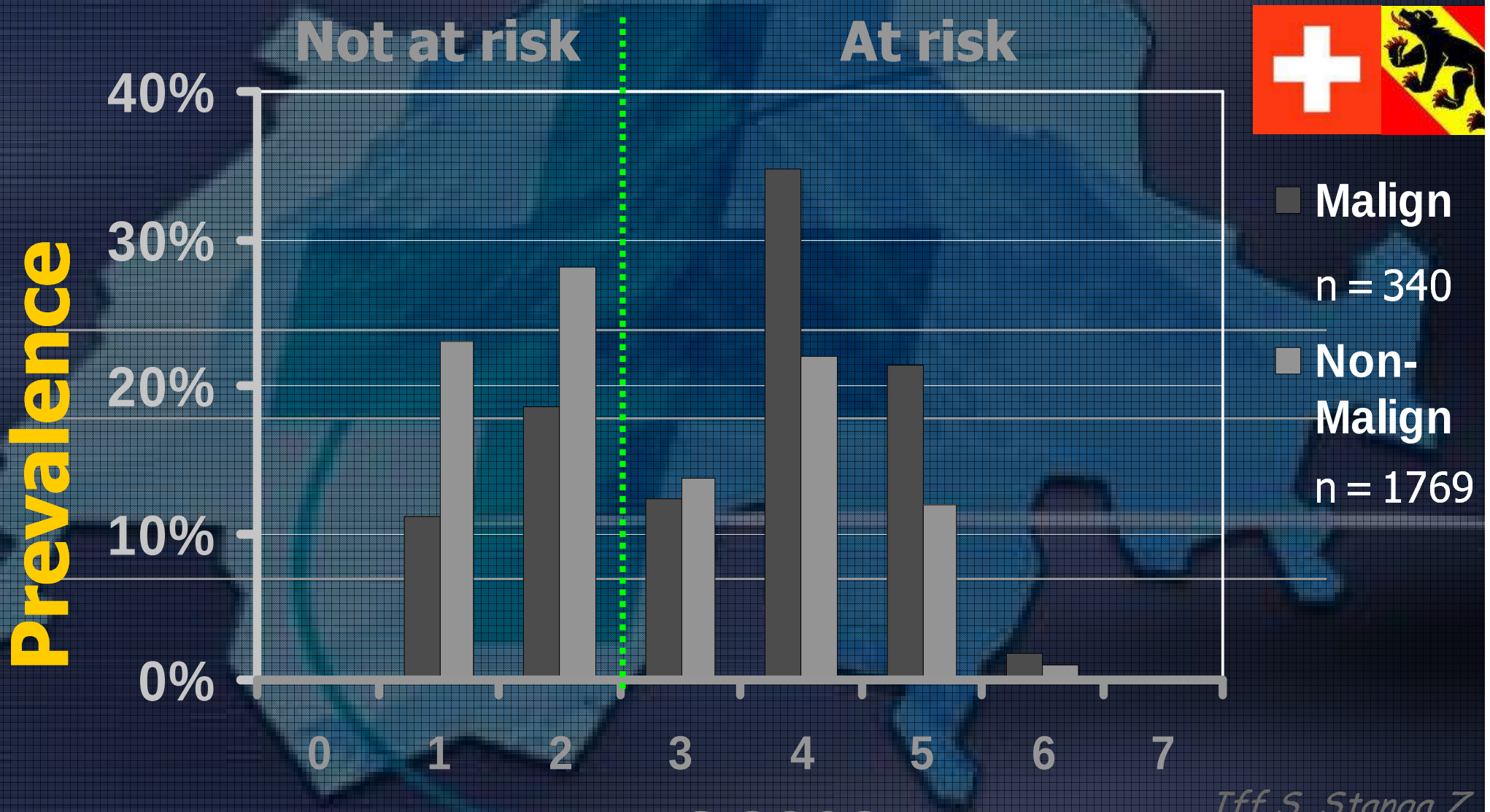
1. Define severity (1-3) of the impairment of the nutritional status (highest grade) and then the severity of disease (Stress ↑)
2. Calculate total score = **A** + **B** ⇒ **?**
3. If age ≥ 70 years: add **1** to the total score to correct for frailty
4. **Score ≥ 3:**

Start nutritional therapy

Kondrup J et al. Clin Nutr 2003;22:321


Risk of MN → prevalence
Bern
53 %
Internal Medicine
NRS 2002
n = 2'207
mixed population
Iff S, Stanga Z. Clin Nutr 2008;3:154 (Abstract)

Prevalence → risk of Malnutrition



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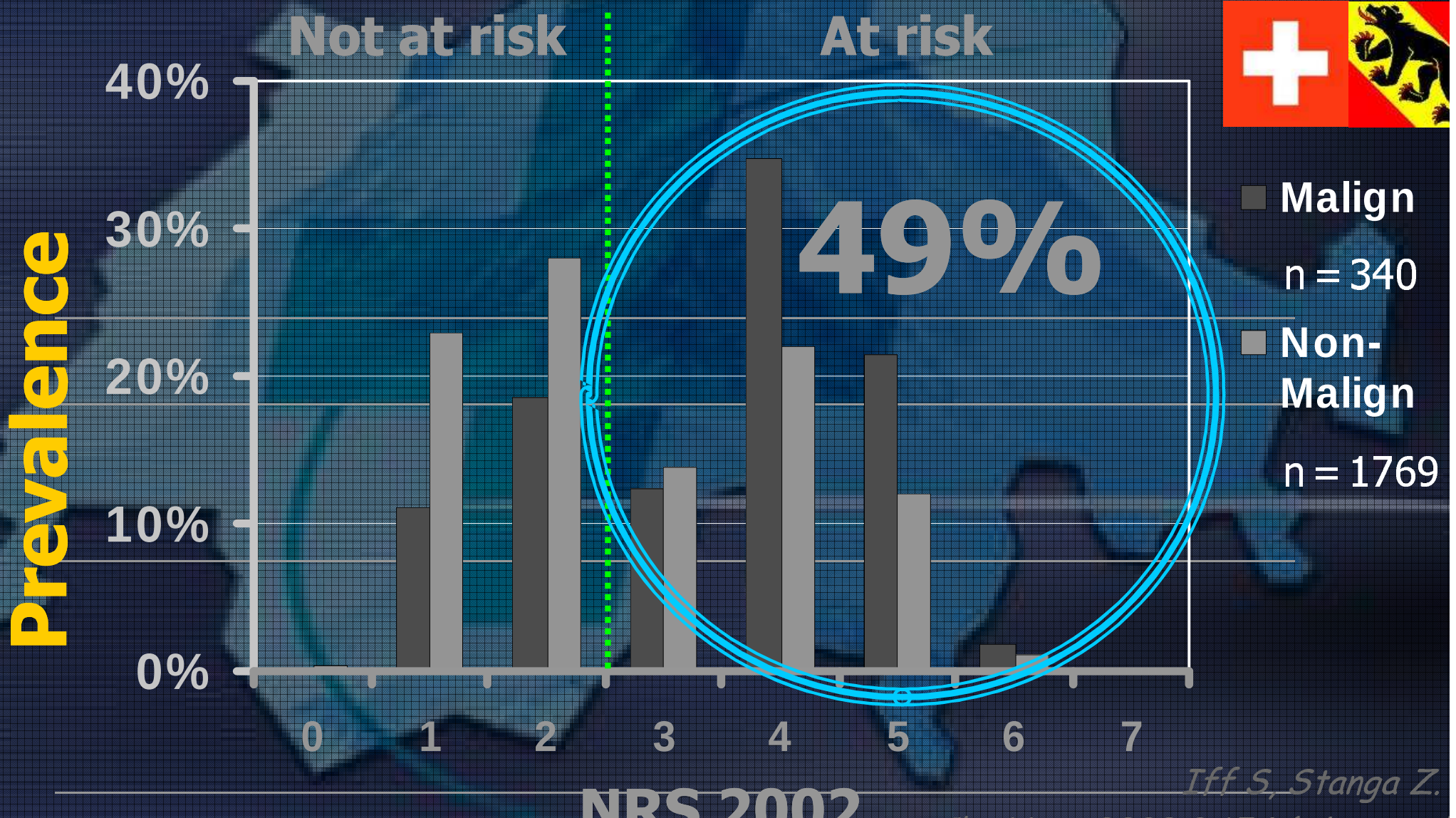

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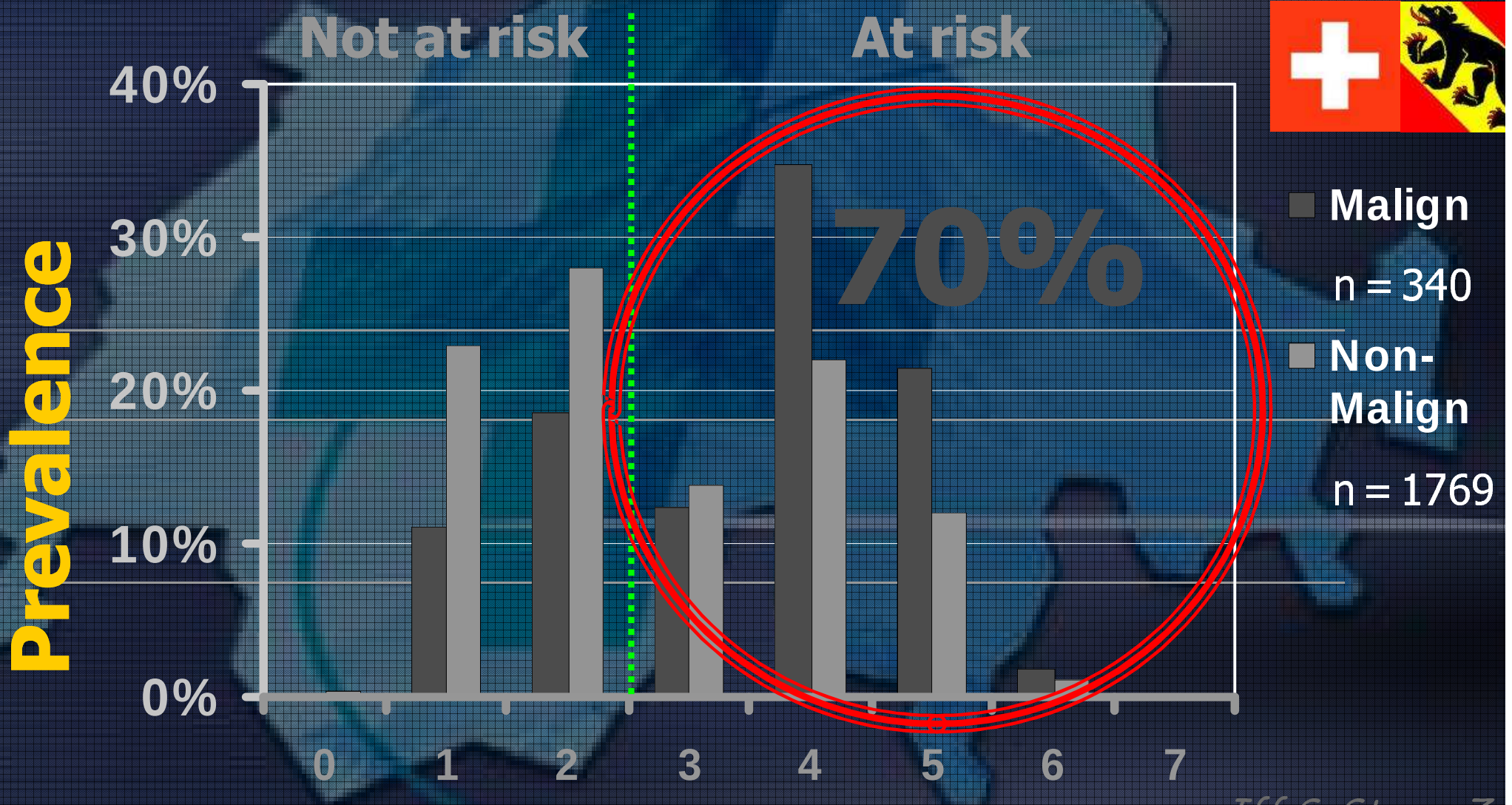


Iff S, Stanga Z. Clin Nutr 2008;3:154 (Abstract)

Comparison of screening tools at admission

SGA© (reference) vs MUST© vs NRS 2002© in association with LOS

= Subjective Global Assessment

Prosp. study, *n* = 995, hospital admission, mixed population

	MUST©	NRS 2002©	SGA©
Prevalence of MN	23 %	24 %	44 %
Sensitivity	61 %	62 %	
Specifity	78 %	93 %	
Pos. predictive value	64 %	85 %	
Neg. predictive value	79 %	65 %	

Kyle UG et al. Clin Nutr 2006

Comparison of screening tools at admission

	LOS 1-10 d	LOS >10 d	OR	*p*
SGA©				
• **Moderate MN**	**83 %**	**17 %**	**1.4**	*0.143*
• **Severe MN**	**71 %**	**29 %**	**2.4**	*<0.001*
MUST©				
• **Score 1**	**93 %**	**7 %**	**1.1**	*0.889*
• **Score ≥2 Punkte**	**74 %**	**26 %**	**3.1**	*<0.001*
NRS 2002©				
• **Score 3-4**	**74 %**	**26 %**	**2.2**	*<0.001*
• **Score >5**	**64 %**	**36 %**	**2.9**	*<0.001*

Kyle UG et al. Clin Nutr 2006

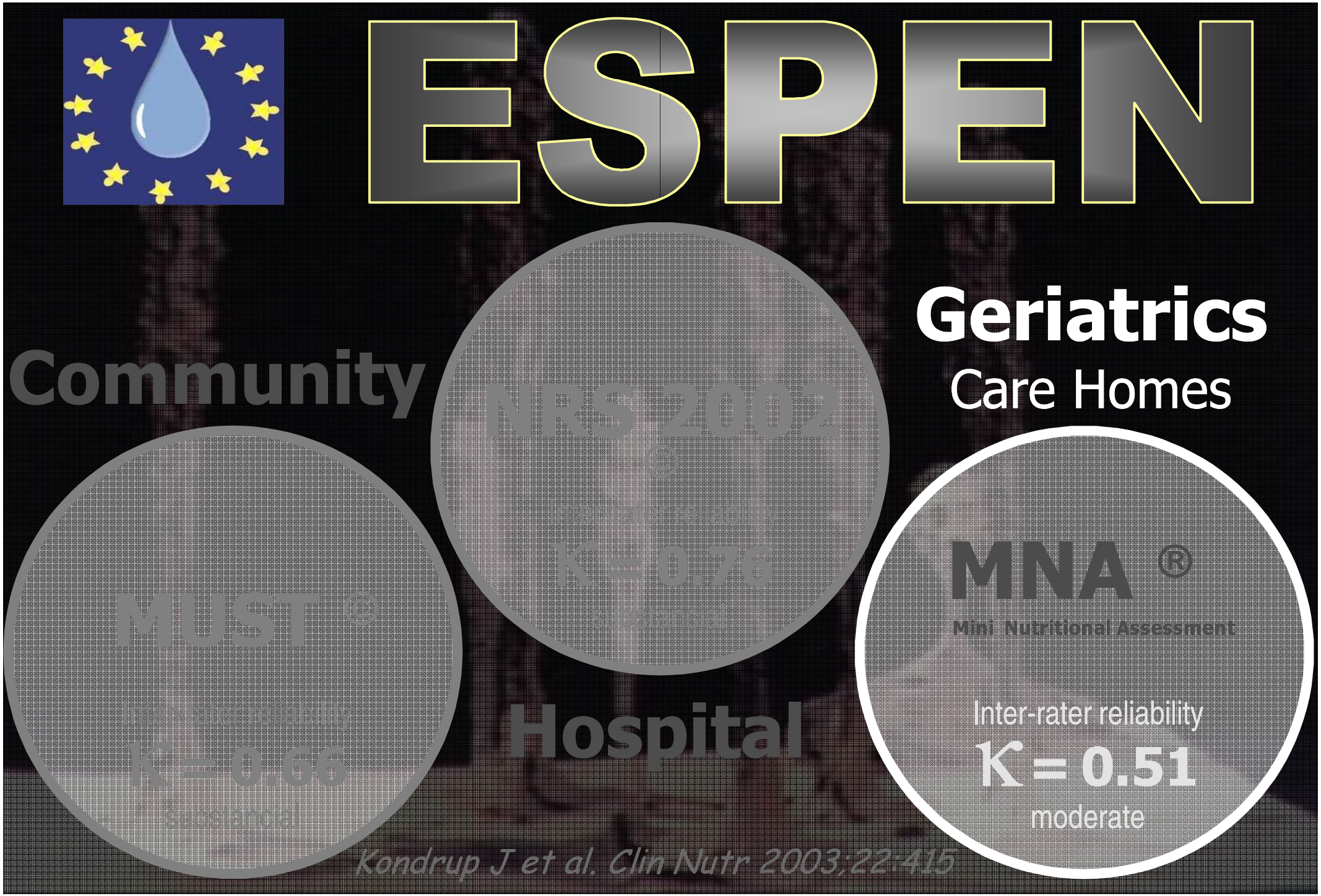
Comparison of screening tools at admission

Prosp. study, *n* = 995, hospital admission, mixed population

Conclusion

The **NRS-2002©** appears to be a clinical screening tool that better predicts hospital-related outcome, (e.g. LOS) than **MUST©** or **SGA©**

Kyle UG et al. Clin Nutr 2006


ESPEN
Community
NRS 2002
Inter-rater reliability
κ= 0.78
substantial
Geriatrics
Care Homes
MUST ®
Inter-rater reliability
κ= 0.68
substantial
MNA ®
Mini Nutritional Assessment
Inter-rater reliability
κ= 0.51
moderate
Hospital
Kondrup J et al. Clin Nutr 2003;22:415

PG-SGA

Patient-Generated Subjective Global Assessment

1996 Ottery adapted the SGA to meet more specifically the needs of the oncological population:

- patient-generated history section
- increased gastrointestinal symptom section
- scoring and triage components have been added

Detsky AS et al. JPEN 1987;11:9 ... Ottery FD. Nutrition 1994;10:6

Patient-Generated Subjective Global Assessment

To be completed by the patient

1. Weight

In summary of my current and recent weight:

I currently weigh about _____ pounds

I am about _____ feet _____ tall

A year ago I weighed about _____ pounds

Six months ago I weighed about _____ pounds

During the past two weeks my weight has:

☐ decreased ☐ not changed ☐ increased

2. Food intake

As compared to my normal, I would rate my food intake during the past month as either:

☐ unchanged
☐ more than usual
☐ less than usual

I am now taking:

☐ little solid food
☐ only liquids
☐ only nutritional supplements
☐ very little of anything

Ottery FD. Nutrition 1996;12:S15

Patient-Generated Subjective Global Assessment

To be completed by the patient

3. Symptoms

I have had the following problems that kept me from eating enough (check all that apply):

- ☐ no problems eating
- ☐ no appetite, just did not feel like eating
- ☐ nausea
- ☐ vomiting
- ☐ constipation
- ☐ diarrhea
- ☐ mouth sores
- ☐ dry mouth
- ☐ pain; where? _____
- ☐ things taste funny or have no taste
- ☐ smells bother me
- ☐ other _____

4. Functional capacity

Over the past month, I would rate my activity as generally:

- ☐ normal with no limitations
- ☐ not my normal self, but able to be up and about with fairly normal activities
- ☐ not feeling up to most things, but in bed less than half the day
- ☐ able to do little activity and spend most of the day in bed or chair
- ☐ pretty much bedridden, rarely out of bed

Ottery FD. Nutrition 1996;12:S15

Patient-Generated Subjective Global Assessment

Worksheet 1

Scoring weight loss

To determine score, use 1 month weight data if available. Use 6 month data only if there is no 1 month weight data. Use points below to score weight change and add one extra point if patient has lost weight during the past 2 weeks. Enter total point score in Box 1 of the PG-SGA.

Wt loss in 1 month	Points	Wt loss in 6 months
10% or greater	4	20% or greater
5-9.9%	3	10 -19.9%
3-4.9%	2	6 - 9.9%
2-2.9%	1	2 - 5.9%
0-1.9%	0	0 - 1.9%

Worksheet 2

Scoring criteria for condition

Score is derived by adding 1 point for each of the conditions listed below that pertain to the patient.!

Category	Points
Cancer	1
AIDS	1
Pulmonary or cardiac cachexia	1
Presence of decubitus, open wound, or fistula	1
Presence of trauma	1
Age greater than 65 years	1

Ottery FD. Nutrition 1996;12:S15

Patient-Generated Subjective Global Assessment

Worksheet 3 – Scoring Physical Examination

Physical exam includes a subjective evaluation of 3 aspects of body composition: fat, muscle, & fluid status. Since this is subjective, each aspect of the exam is rated for degree of deficit. Muscle deficit impacts point score more than fat deficit. Definition of categories: 0 = no deficit, 1+ = mild deficit, 2+ = moderate deficit, 3+ = severe deficit. Rating of deficit in these categories are *not* additive but are used to clinically assess the degree of deficit (or presence of excess fluid).

Fat Stores:				
orbital fat pads	0	1+	2+	3+
triceps skin fold	0	1+	2+	3+
fat overlying lower ribs	0	1+	2+	3+
Global fat deficit rating	**0**	**1+**	**2+**	**3+**

Muscle Status:				
temples (temporalis muscle)	0	1+	2+	3+
clavicles (pectoralis & deltoids)	0	1+	2+	3+
shoulders (deltoids)	0	1+	2+	3+
interosseous muscles	0	1+	2+	3+
scapula (latissimus dorsi, trapezius, deltoids)	0	1+	2+	3+
thigh (quadriceps)	0	1+	2+	3+
calf (gastrocnemius)	0	1+	2+	3+
Global muscle status rating	**0**	**1+**	**2+**	**3+**

Fluid Status:				
ankle edema	0	1+	2+	3+
sacral edema	0	1+	2+	3+
ascites	0	1+	2+	3+
Global fluid status rating	**0**	**1+**	**2+**	**3+**

Point score for the physical exam is determined by the overall subjective rating of total body deficit.

No deficit	score = 0 points
Mild deficit	score = 1 point
Moderate deficit	score = 2 points
Severe deficit	score = 3 points

Ottery FD. Nutrition 1996;12:S15

Patient-Generated Subjective Global Assessment

Worksheet 4 – Scoring metabolic stress

Score for metabolic stress is determined by a number of variables known to increase protein & caloric needs. The score is additive so that a patient who has a fever of > 102 degrees (3 points) and is on 10 mg of prednisone chronically (2 points) would have an additive score for this section of 5 points.

Stress	none (0)	low (1)	moderate (2)	high (3)
Fever	no fever	>99 and <101	≥101 and <102	≥102
Fever duration	no fever	<72 hrs	72 hrs	> 72 hrs
Steroids	no steroids	low dose (<10mg prednisone equivalents/day)	moderate dose (≥10 and <30mg prednisone equivalents/day)	high dose steroids (≥30mg prednisone equivalents/day)

Worksheet 4 – SGA rating

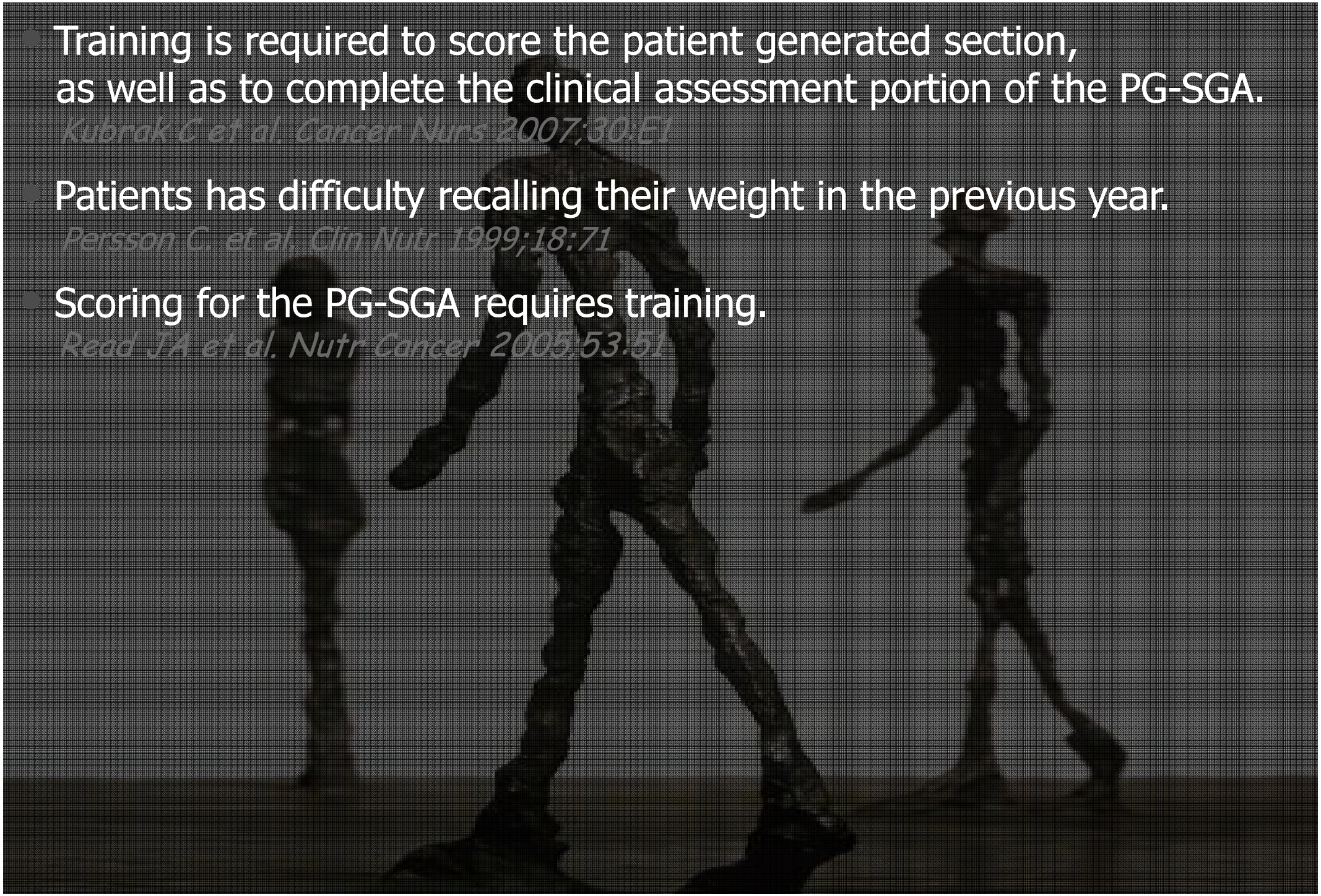
☐ A = well nourished ☐ B = moderately (or suspected of being) malnourished ☐ C = severely malnourished

Ottery FD. Nutrition 1996;12:S15

PG-SGA represents a good option for assessing nutritional status in various clinical situations

Several studies have assessed the validity of the PG-SGA in cancer patients:

- PG-SGA correlates with s-albumin and s-pre-albumin
  Person C et al. Clin Nutr 1999;18:71
- PG-SGA correlates with weight loss in the previous 6 mths
  Bauer J et al. Eur J Clin Nutr 2002;56:779
  Isenring E et al. Eur J Clin Nutr 2003;57:305
- PG-SGA correlates with LOS
  Bauer J et al. Eur J Clin Nutr 2002;56:779
- PG-SGA correlates with QoL
  Isenring E et al. Eur J Clin Nutr 2003;57:305
- PG-SGA correlates with energy intake (kcal)
  Ravasco P et al. Clin Oncol 2003;15:443



- Training is required to score the patient generated section, as well as to complete the clinical assessment portion of the PG-SGA.
  Kubrak C et al. Cancer Nurs 2007;30:E1
- Patients has difficulty recalling their weight in the previous year.
  Persson C. et al. Clin Nutr 1999;18:71
- Scoring for the PG-SGA requires training.
  Read JA et al. Nutr Cancer 2005;53:51

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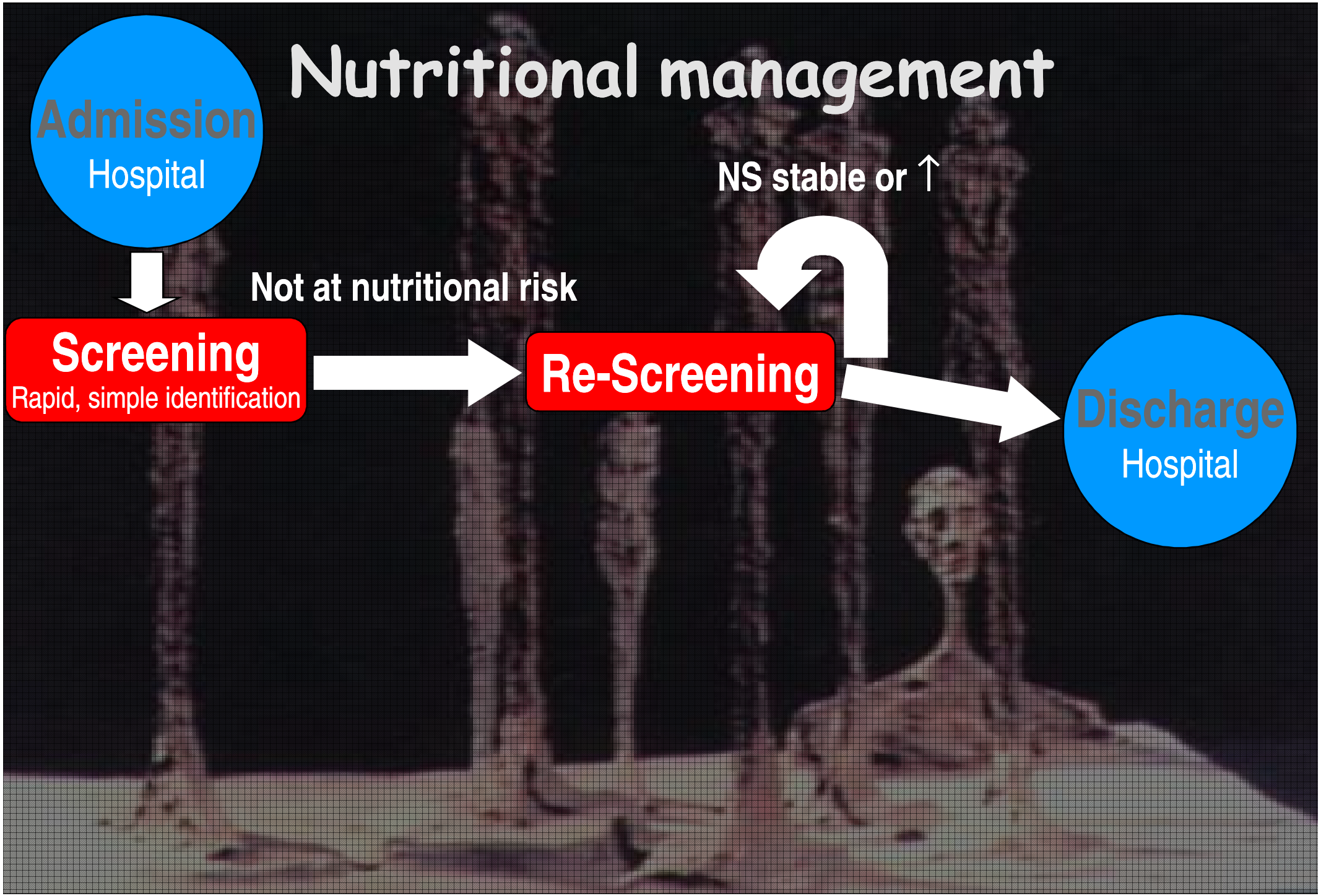
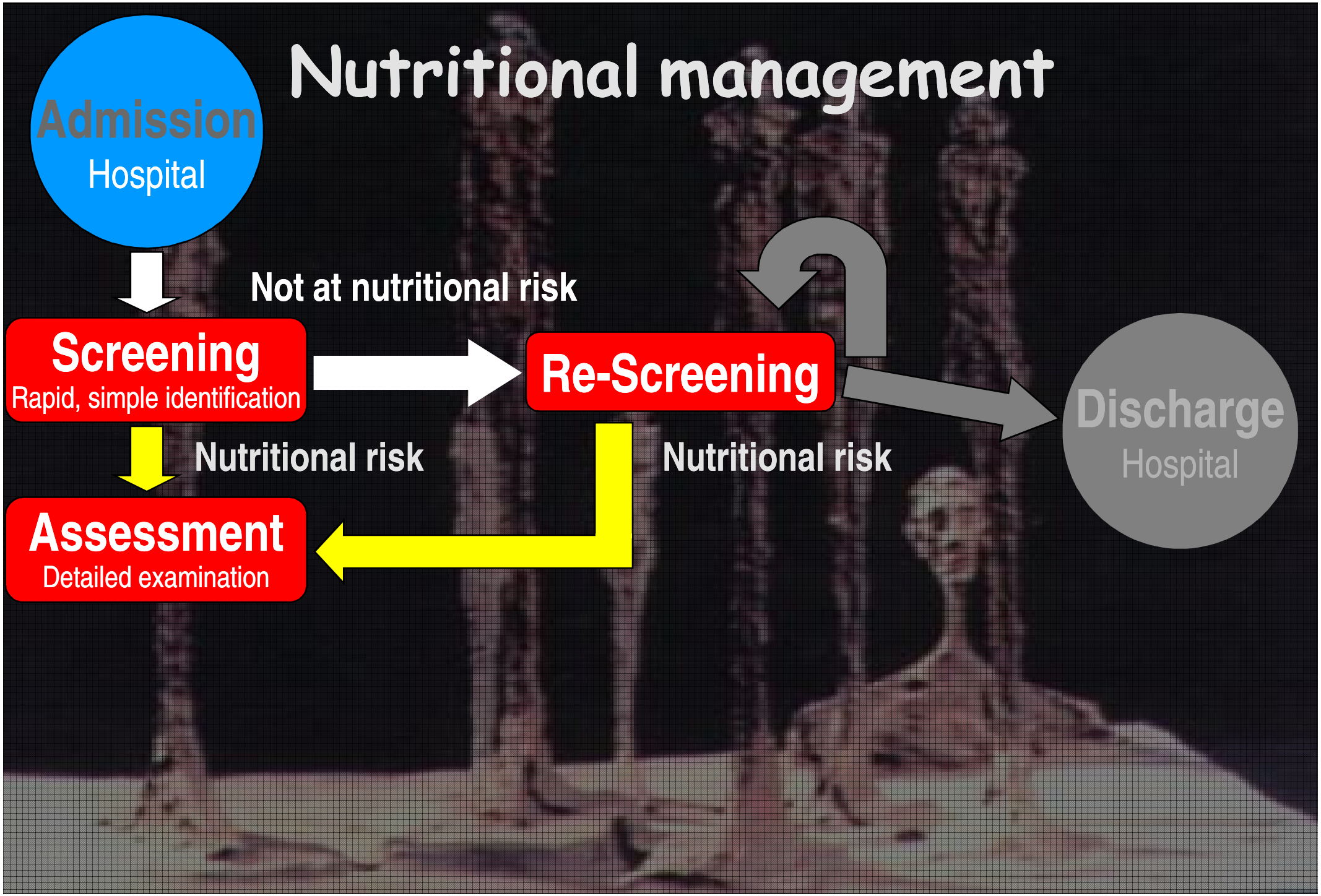
- Scoring for the PG-SGA requires training.
  Read JA et al. Nutr Cancer 2005;53:51
- SGA does not allow for the categorization of mild malnutrition and focuses on chronic or established rather than acute nutritional changes.
  Sungurtekin H et al. Nutrition 2004;20:428
  Christensson L et al. Eur J Clin Nutr 2002;56:810
- The SGA might equally likely represent an index of sickness rather than nutrition.
  Jeejeebhoy KN, Philadelphia: Saunders, W.B. ;1990
- The SGA better identifies established malnutrition than nutritional risk its sensitivity is suboptimal.
  Detsky AS et al. JAMA 1994;271:54 / Kyle UG et al. Clin Nutr 2006;25:409


Nutritional management
Admission
Hospital
Not at nutritional risk
Screening
Rapid, simple identification
Re-Screening
NS stable or ↑
Discharge
Hospital


Nutritional management
Admission
Hospital
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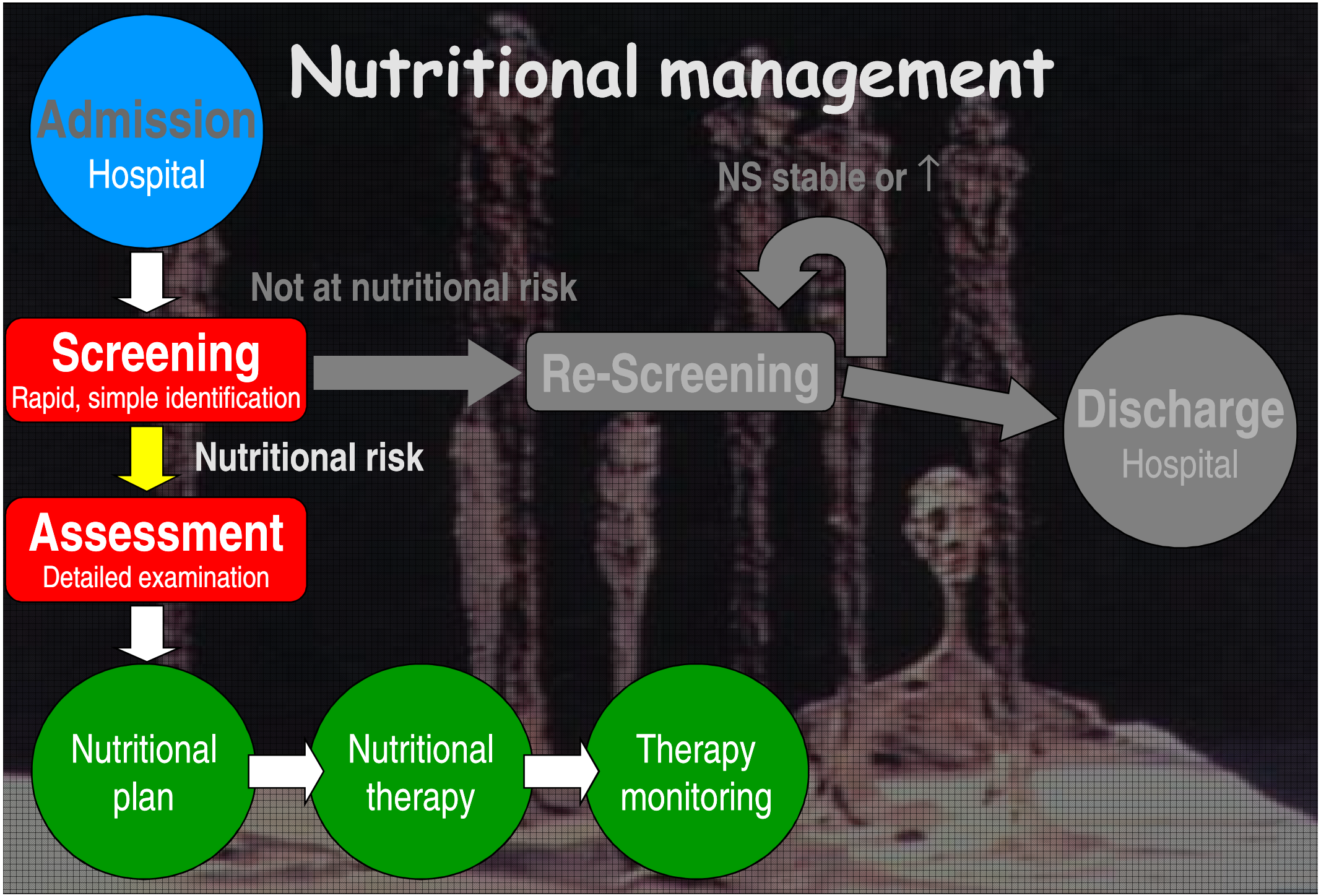
Screening
Rapid, simple identification
Re-Screening
Discharge
Hospital
Nutritional risk
Nutritional risk
Assessment
Detailed examination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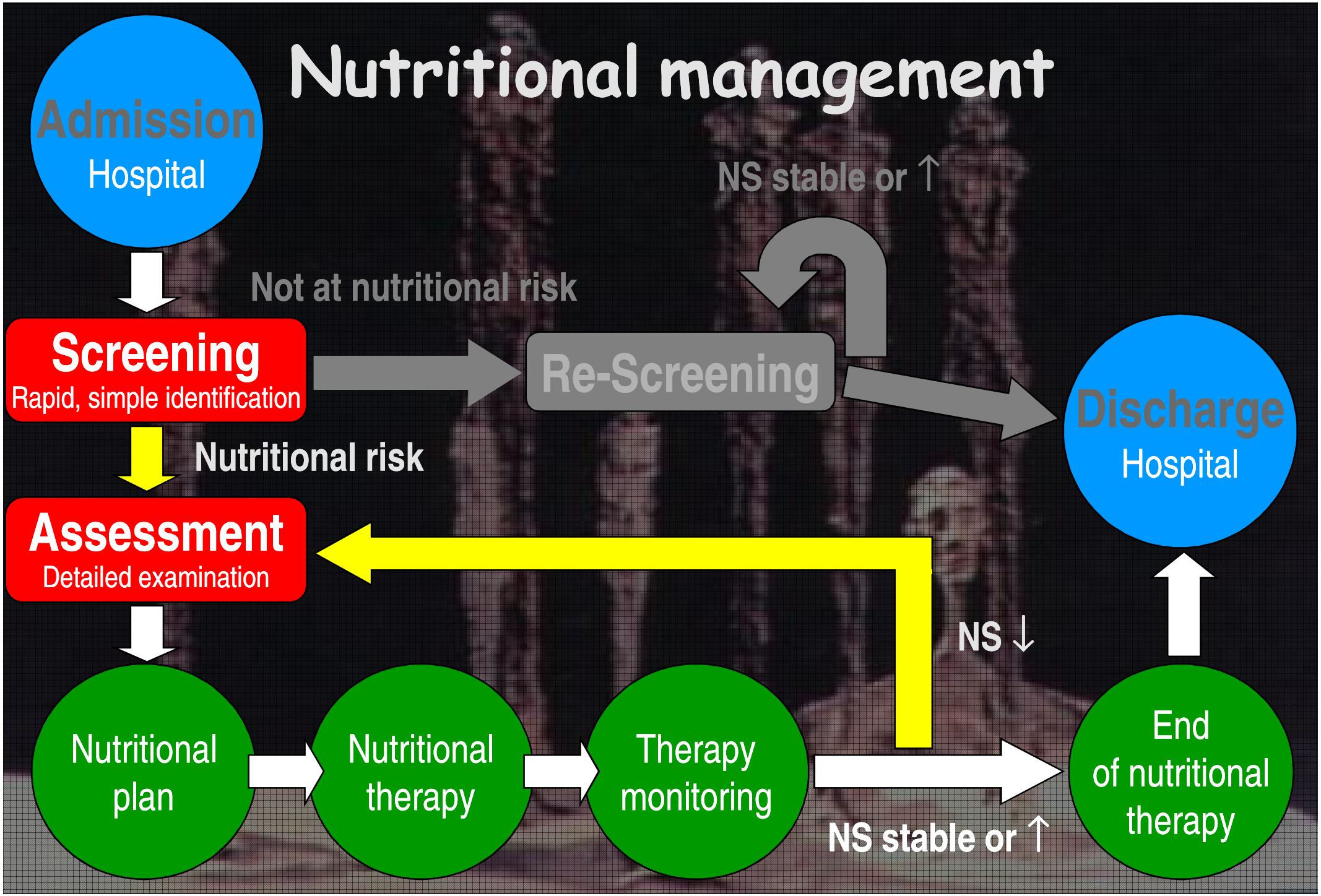
Assessment
Detailed examination
Nutritional plan
Nutritional therapy
Therapy monitoring


Nutritional management
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Hospital
NS stable or ↑
Not at nutritional risk
Screening
Rapid, simple identification
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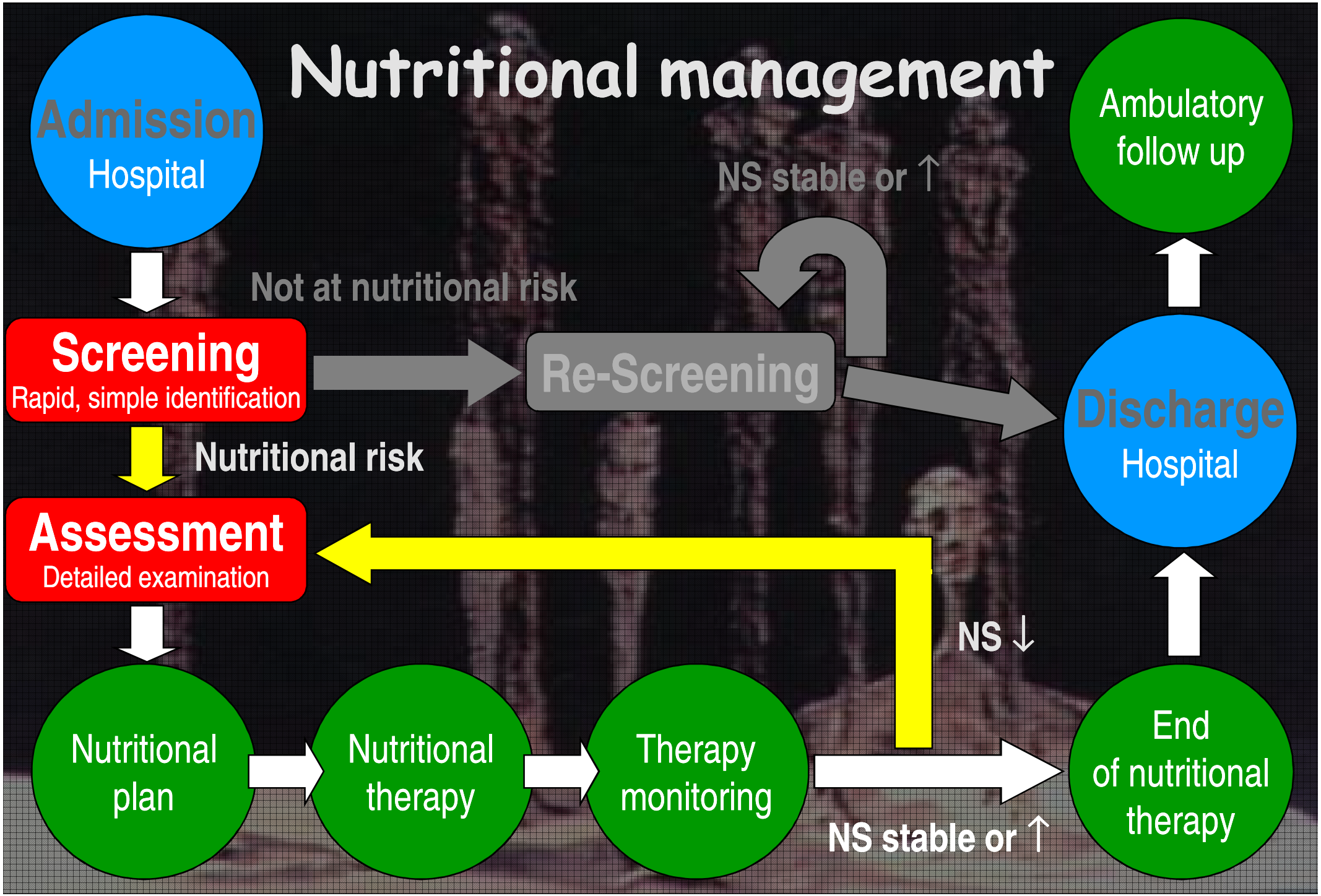
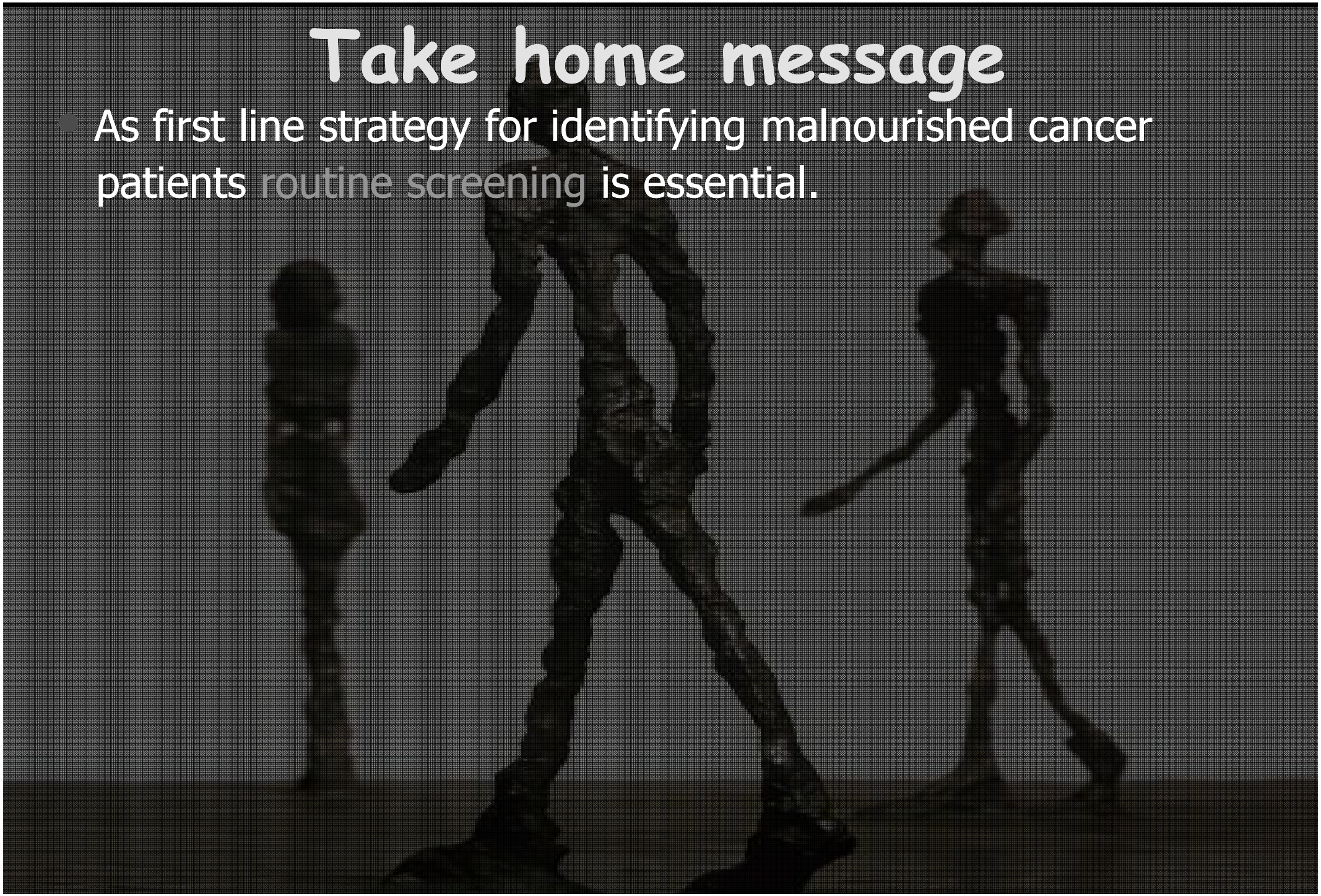
Discharge
Hospital
Nutritional risk
Assessment
Detailed examination
NS ↓
Nutritional plan
Nutritional therapy
Therapy monitoring
End of nutritional therapy
NS stable or ↑


Nutritional management
Admission
Hospital
Ambulatory follow up
NS stable or ↑
Not at nutritional risk
Screening
Rapid, simple identification
Re-Screening
Discharge
Hospital
Nutritional risk
Assessment
Detailed examination
NS ↓
Nutritional plan
Nutritional therapy
Therapy monitoring
End of nutritional therapy
NS stable or ↑

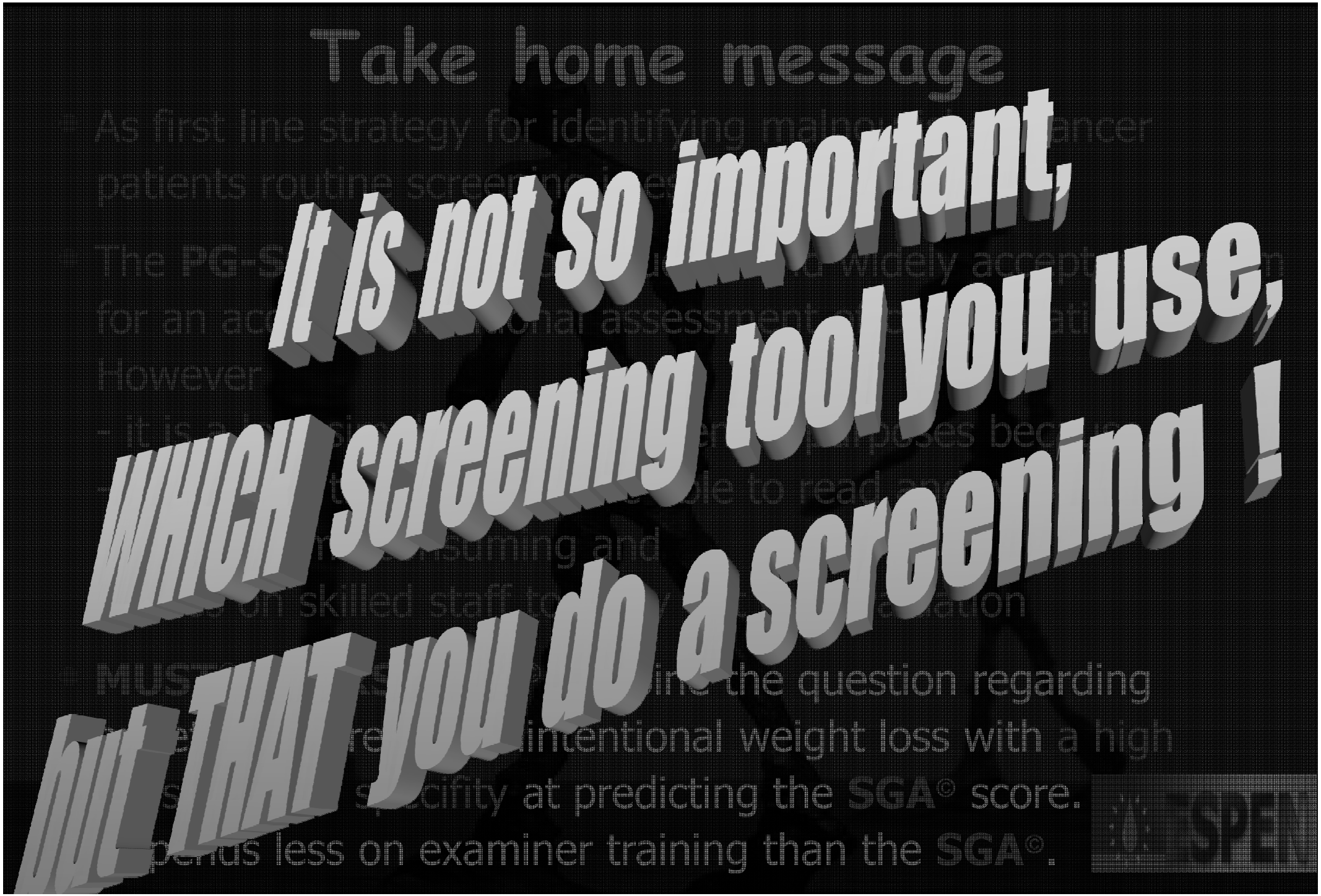
Take home message

- As first line strategy for identifying malnourished cancer patients routine screening is essential.



Take home message

- As first line strategy for identifying malnourished cancer patients routine screening is essential.
- The **PG-SGA©** is the most studied and widely accepted system for an accurate nutritional assessment of cancer patients. However
  - it is a less simple tool for screening purposes because
  - it requires that patients are able to read and write
  - is more time consuming and
  - relies on skilled staff to carry out the evaluation


Take home message
It is not so important,
WHICH screening tool you use,
but THAT you do a screening !


Thanks
for your
attention !