

癌症病人營養評估

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營養評估

- **A**nthropometric data(測量值): Ht, Bt, ...
- **B**iochemical results (生化值)
- **C**linical symptoms (臨床症狀)
- **D**ietary data (飲食狀況)
- **M**edical history (醫療史)
- **P**sychosocial issues (社會心理)

癌症營養評估

- Assessment of **weight status**
 - Estimating **energy requirements**

- Evaluating **protein status**
 - Estimating **protein requirement**

體重狀況



Weight Status

Weight Status (體重狀況)

UBW: usual body weight

CBW: current body weight

$$\% \text{ Usual Weight} = \frac{\text{Current weight}}{\text{Usual weight}} \times 100$$

Where, 85 - 95 % is considered mild malnutrition

75 - 84 % is considered moderate malnutrition

0 - 74 % is considered severe malnutrition

Recent Weight change (近期體重變化)

Where, significant weight loss is considered:

- 1 - 2% over 1 week
- 5% over 1 month
- 7.5% over 3 months
- 10% over 6 or more months

身體質量指數 (Body Mass Index, BMI)

	身體質量指數(BMI) (kg/m ²)
體重過輕	BMI < 18.5
正常範圍	18.5 ≤ BMI < 24
異常範圍	過重： 24 ≤ BMI < 27 輕度肥胖： 27 ≤ BMI < 30 中度肥胖： 30 ≤ BMI < 35 重度肥胖： BMI ≥ 35



Body Mass Index (BMI)

$$\text{身體質量指數 (BMI)} = \text{體重 (kg)} / \text{身高}^2 (\text{m}^2)$$

BMI < 18.5 Lean (台灣)

BMI < 20 : may be associated with health problems for most

BMI 20-25: associated with the lowest risk of illness for most

BMI 25-27: associated with health problems for some; caution is suggested if BMI is in this zone

BMI > 27 : associated with increased risk of developing health problems

recommended by the Expert Group on Weight Standards (Health and Welfare, 1988)

Estimating actual body weight during edema (水腫) and ascites (腹水)

- ❑ the exact volume of excess fluid is not a measurable entity for the diagnosis of edema or ascites.
- ❑ Thus, there is not an empirical formula to determine an actual body weight during a fluid overload state.
- ❑ Suggested that consideration be given to the patients **pre-edema weight**, **weight history** and **desirable body weight** when deriving a weight value to be used in the nutritional assessment.

Estimating Energy Requirements

估計熱量需求

	SEDENTARY	MODERATE	ACTIVE
OVERWEIGHT	20-25 KCAL/KG	30 KCAL/KG	35 KCAL/KG
NORMAL WEIGHT	30 KCAL/KG	35 KCAL/KG	40 KCAL/KG
UNDERWEIGHT	35 KCAL/KG	40 KCAL/KG	45-50 KCAL/KG

Harris-Benedict Equation: REE x Activity Factor x Injury Factor

MALES (kJ/day)

$$\text{REE} = 278 + 58(W) + 21(H) - 28.5(A) \times \text{AF} \times \text{SF} \quad (\text{Kcal/d} = 66.47 + 13.75W + 5.00H - 6.78A \times \text{AF} \times \text{SF})$$

FEMALES (kJ/day)

$$\text{REE} = 2743 + 40(W) + 7.7(H) - 19.7(A) \times \text{AF} \times \text{SF} \quad (\text{Kcal/d} = 655.1 + 9.56W + 1.85H - 4.68A \times \text{AF} \times \text{SF})$$

Stress Factors (壓力因素)

- Surgery 1.2
- Infection 1.2~1.6
- Fractures 1.3
- Head injury +steroid 1.6
- Cancer 1.1~1.4
- Respiratory failure with sepsis 1.6

Harris-Benedict Equation:

REE x Activity Factor x Injury Factor

- 劉先生58歲因大腸癌住院,身高170公分,體重52公斤,目前正接受化療,請問他的熱量需求為何?
- $BEE = 66.47 + 13.75W + 5H - 6.78A$
- $BEE = 66.47 + 13.75(63.6) + 5(170) - 6.78(58) = 1398$
- Total calorie needs = $1398 \times 1.2 \times 1.3 = 2180$ (大卡)

Estimating Fluid Needs (水份需要)

Adults: 35 ml/kg (25-50 years)

30 ml/kg (50-75 years)

25 ml/kg (75 years and greater)

Adolescents: 40-60 ml/kg

Infants: 100-150 ml/kg

If fluid losses are increased by diarrhea, vomiting, excessive sweating, fever

- A) Replace known losses
- B) Use the higher range of fluid requirements in the estimation of need
- C) In cases of fever, add 200 ml of water for each degree celcius that the temperature is elevated.
- D) Monitor lab values closely and adjust fluid needs as required

水份補充的計算

- **Total amount of Fluid**
 - Oral intake,
 - total intravenous fluids,
 - free water in enteral feeds,
 - total parenteral nutrition

- **Calculate** the total amount of fluid

- **Subtract** the amount calculated in from the patients estimated needs.

- **Ensure** that the remaining fluid needs are provided.

蛋白質狀況



Protein Status

Protein Status

- Biological data:
 - **Albumin (白蛋白)**
 - 3.0~3.5 g/dL mild malnutrition
 - 2.1~3.0 g/dL moderate malnutrition
 - <2.1 g/dL severe malnutrition

 - **Pre-albumin (前白蛋白)**
 - 17-42 mg/dL

 - **Nitrogen Balance (氮平衡)**
 - +2~6 g (protein intake/6.25-UUN+4)

Protein Needs (蛋白質需要量)

□ Rough estimate for patients

- Mildly stressed 1.0~1.2 g/kg
- Moderately stressed 1.3~1.5 g/kg
- Severely stressed 1.5~2.5 g/kg

Total Lymphocyte Count (TLC)

$$\text{Total lymphocyte count} = \frac{\% \text{ lymphocytes} \times \text{WBC}}{100}$$

2000 - 3500 n/mm	=	Normal nutrition
1800 - 2000	=	Mild malnutrition
< 1500	=	Moderate malnutrition
< 900	=	Severe malnutrition

***** LOW TLC may be a result of radiation therapy or chemotherapy effects on the bone marrow rather than poor nutrition.**

Cachexia 診斷標準

TABLE 2

Diagnostic criteria for cachexia

Criteria

Unintentional weight loss ($\geq 5\%$)

BMI

<20 in those aged <65 y

<22 in those aged ≥ 65 y

Albumin < 35 g/L (3.5 g/dL)

Low fat-free mass (lowest 10%)

Evidence of cytokine excess (eg, elevated C-reactive protein)

癌症病人營養評估工具



	MST (malnutrition screening tool)	MUST (malnutrition universal screening tool)
發佈單位	美國靜脈暨腸道營養學會 <i>American Society for Parenteral and Enteral Nutrition (ASPEN)</i> (2002)	英國靜脈暨腸道營養學會 <i>British Association for Parenteral and Enteral Nutrition (EAPEN)</i> (2003)
特色	為最簡單、快速、有效及可靠的篩檢工具，用來確定病人營養不良的風險。	主要是用來評估成人病患是否有蛋白質-熱量營養不良(PEM)的風險，具有相當高的信度。
使用	<p style="text-align: center;">兩步驟</p> <ol style="list-style-type: none"> 1. 食慾的好壞 2. 體重的減輕 	<p style="text-align: center;">五步驟</p> <ol style="list-style-type: none"> 1. BMI分數 2. 體重喪失分數 3. 急性疾病影響分數 4. 營養不良整體性風險 5. 處理指引

MUST & MST vs NRS-2002

Table 4 Agreement of MUST* and MST† versus NRS-2002‡

	Sensitivity (%)	Specificity (%)	PV+ (%)	PV- (%)	Agreement %	Kappa [§]
MUST						
All	97.3	77.4	63.2	98.6	83.1	0.64 (G)
Restricted [¶]	95.5	62.9	61.8	62.9	75.4	0.53 (M)
MST						
All	48.7	94.6	78.3	82.2	81.5	0.49 (M)
Restricted [¶]	68.2	94.3	88.2	82.5	84.2	0.65 (G)

PV⁺, positive predictive value; PV⁻, negative predictive value.

*Stratton *et al.*, 2004.

†Ferguson *et al.*, 1999.

‡Kondrup *et al.*, 2003b.

§Kappa (*k*) coefficients classification 0.2 < *k* ≤ 0.0 denotes poor (P) agreement between both tools, 0.4 < *k* ≤ 0.2 is fair (F), 0.6 < *k* ≤ 0.4 is moderate (M), 0.8 < *k* ≤ 0.6 shows good agreement (G) and ≥ 0.8 = almost perfect agreement.

¶Restricted analysis to head and neck, peritoneal and gastrointestinal tumour location groups.

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NRS-2002: Nutrition Risk Screening 2002

Predict length of hospital stay (LOS)

MST & MUST

- 當分析僅限於腫瘤的位置時，在那些發生營養風險頻率較高的分類中(頭頸癌、腹腔及腸胃癌)，**MST**顯示較高的診斷意義，和NRS-2002擁有較高的一致性。
- 在確認長期住院的癌症病人所存在的風險時，**MUST**和**NRS-2002**擁有較高的一致性。(相較於MST和NRS-2002)

2008 J Hum Nutr Diet, 21, pp. 575–583

Malnutrition Screening Tool (MST)

- The aim of this study was to develop a simple, reliable and valid malnutrition screening tool that could be used at hospital admission to identify adult acute patients at risk of malnutrition.

Nutrition 1999;15:458 – 464.

- 此研究的目的是發展一個簡單、可靠和有效的營養不良篩選工具，可用於確定成年的緊急入院病人的營養不良風險。

Malnutrition

Is your patient at risk?

Malnutrition Screening Tool¹

1. Have you / the patient lost weight recently without trying?	
No	0
Unsure	2
Yes, how much (kg)?	
1 - 5	1
6 - 10	2
11 - 15	3
> 15	4
Unsure	2
2. Have you / the patient been eating poorly because of a decreased appetite?	
No	0
Yes	1
Total Score	

Applies to the last 6 months

Of weight loss and appetite questions

If unsure, ask if they suspect they have lost weight e.g. clothes are looser

For example, less than 3/4 of usual intake

May also be eating poorly due to chewing and swallowing problems

If your patients have lost weight and / or are eating poorly they may be at risk of malnutrition i.e. score 2 or more



Malnutrition occurs in approximately 30-35% of acute and 40-45% of residential patients in Queensland Health Institutions²

Action

- 1. Refer** to Malnutrition Action Flowchart and / or refer to Dietitian for full assessment and intervention
- 2. Document**
- 3. Weigh** patients on admission and:
 - weekly (acute)
 - monthly (long-term care)
- 4. Rescreen** patients:
 - weekly (acute)
 - monthly (long-term care)

Small weight losses weekly add up to significant weight loss and malnutrition

Note: Overweight / obese patients who have unexplained weight loss and illness can become protein depleted / malnourished too

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最近
6個月

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For example,
less than $\frac{3}{4}$
of usual

少於平常
量的 $\frac{3}{4}$

May be
eating poorly
due to chewing
and swallowing
problems

If your patients have lost weight and / or are eating poorly they may be at risk of malnutrition i.e. score 2 or more

這病人最近(6個月)是否體重減輕?

- 否 0
- 不確定 2
- 是 (幾公斤?)
 - 1~5 1
 - 6~10 2
 - 11~15 3
 - >15 4
 - 不確定 2

2.這病人最近是否因胃口差而吃不好?

- 否 0
- 是 1

□ 總分 > 2 要有行動處理

營養不良篩檢 MST

1. 病患體重最近有不自主的下降嗎?

否 0分

不確定 2分

如果是，請問減輕多少公斤?

1-5 1分

6-10 2分

11-15 3分

>15 4分

不確定 2分

2. 病患常因食慾不振而吃的很少嗎?

否 0分

是 1分

食慾分數 _____

* MST分數 _____



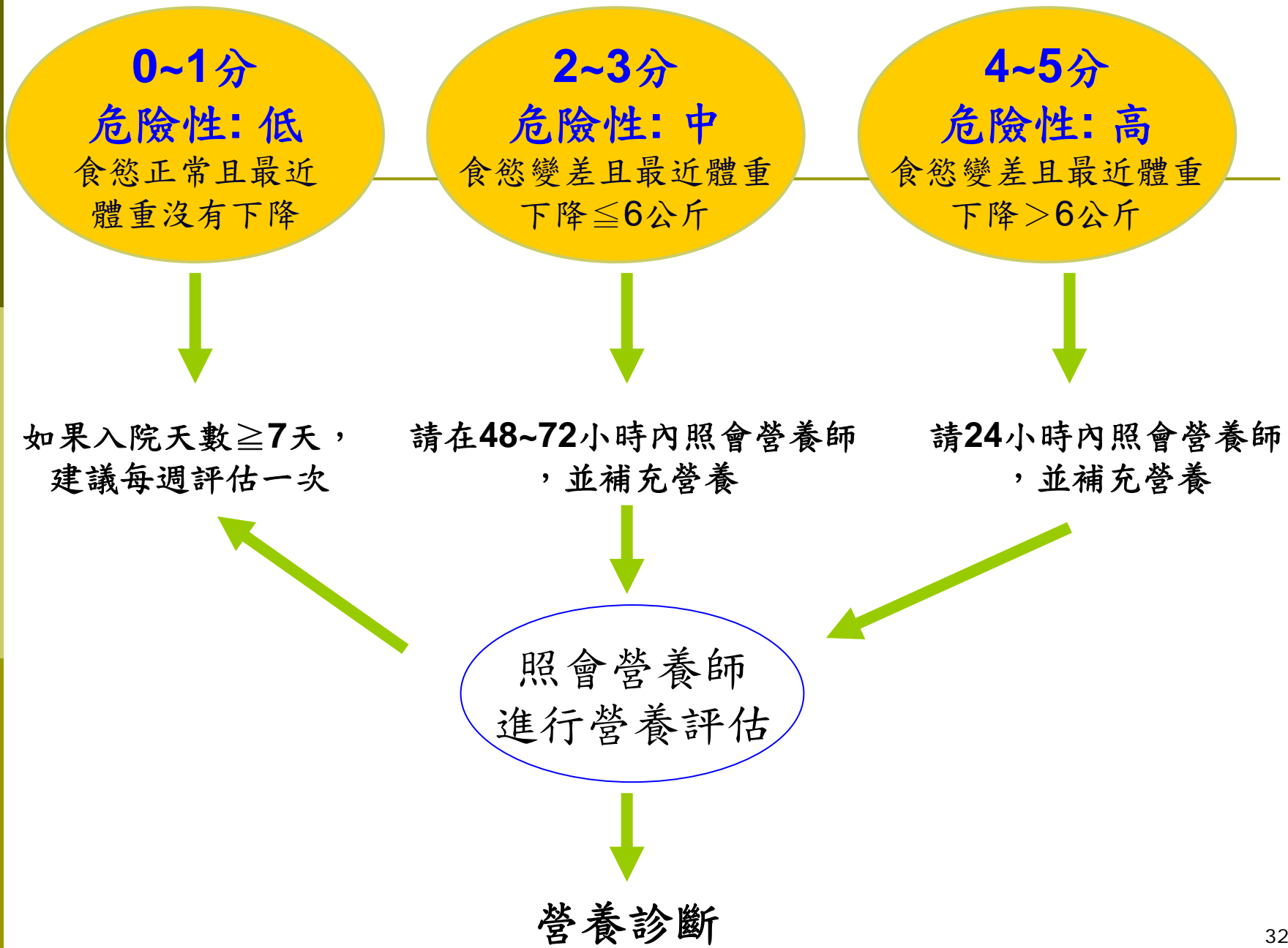
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Malnutrition Universal Screening Tool (MUST)

- MUST由Malnutrition Advisory Group (MAG)所發展。
- MAG為英國靜脈暨腸道營養醫學會(British Association for Parenteral and Enteral Nutrition, BAPEN)的常務委員會。
- MAG的組成包括學者、醫生、護士、營養師、藥劑師和病人。

British Journal of Nutrition (2004), 92, 799–808

MUST

- MUST用於**成人的營養篩檢**，原是由**社區發展出來**的篩檢方法，因此使用於社區篩檢相對的干擾因素會比較小，具有相當高的信度， $\kappa=0.88-1.00$ ；且於英國不同的社區執行以確認其可行性，接著又被擴大使用於各建康機構包括醫院，在住院天數、老人病房死亡率都得到很好的信度、效度及預測力
- 主要是用來評估**成年病患體重不足、肥胖者的營養不良**的風險，其無法用來檢測缺陷或過量攝取維生素和礦物質。
- MUST適用於所有成年病患，更進一步發展為蛋白質-熱量營養不良和營養不良風險的判斷標準。

British Journal of Nutrition (2004), 92, 799–808

Step 1 + **Step 2** + **Step 3**
 BMI score + Weight loss score + Acute disease effect score

BMI kg/m ²	Score
>20(>30 Obese)	= 0
18.5-20	= 1
<18.5	= 2

Unplanned weight loss in past 3-6 months	
%	Score
<5	= 0
5-10	= 1
>10	= 2

If patient is acutely ill and there has been or is likely to be no nutritional intake for >5 days
Score 2

If unable to obtain height and weight, see reverse for alternative measurements and use of subjective criteria

Step 4

Overall risk of malnutrition

Add Scores together to calculate overall risk of malnutrition
 Score 0 Low Risk Score 1 Medium Risk Score 2 or more High Risk

Step 5

Management guidelines

0 Low Risk
Routine clinical care

- Repeat screening
 Hospital – weekly
 Care Homes – monthly
 Community – annually for special groups e.g. those >75 yrs

1 Medium Risk
Observe

- Document dietary intake for 3 days if subject in hospital or care home
- If improved or adequate intake – little clinical concern; if no improvement – clinical concern - follow local policy
- Repeat screening
 Hospital – weekly
 Care Home – at least monthly
 Community – at least every 2-3 months

2 or more High Risk
Treat*

- Refer to dietician, Nutritional Support Team or implement local policy
- Improve and increase overall nutritional intake
- Monitor and review care plan
 Hospital – weekly
 Care Home – monthly
 Community – monthly

* Unless detrimental or no benefit is expected from nutritional support e.g. imminent death.

All risk categories:

- Treat underlying condition and provide help and advice on food choices, eating and drinking when necessary.
- Record malnutrition risk category.
- Record need for special diets and follow local policy.

Obesity:

- Record presence of obesity. For those with underlying conditions, these are generally controlled before the treatment of obesity.

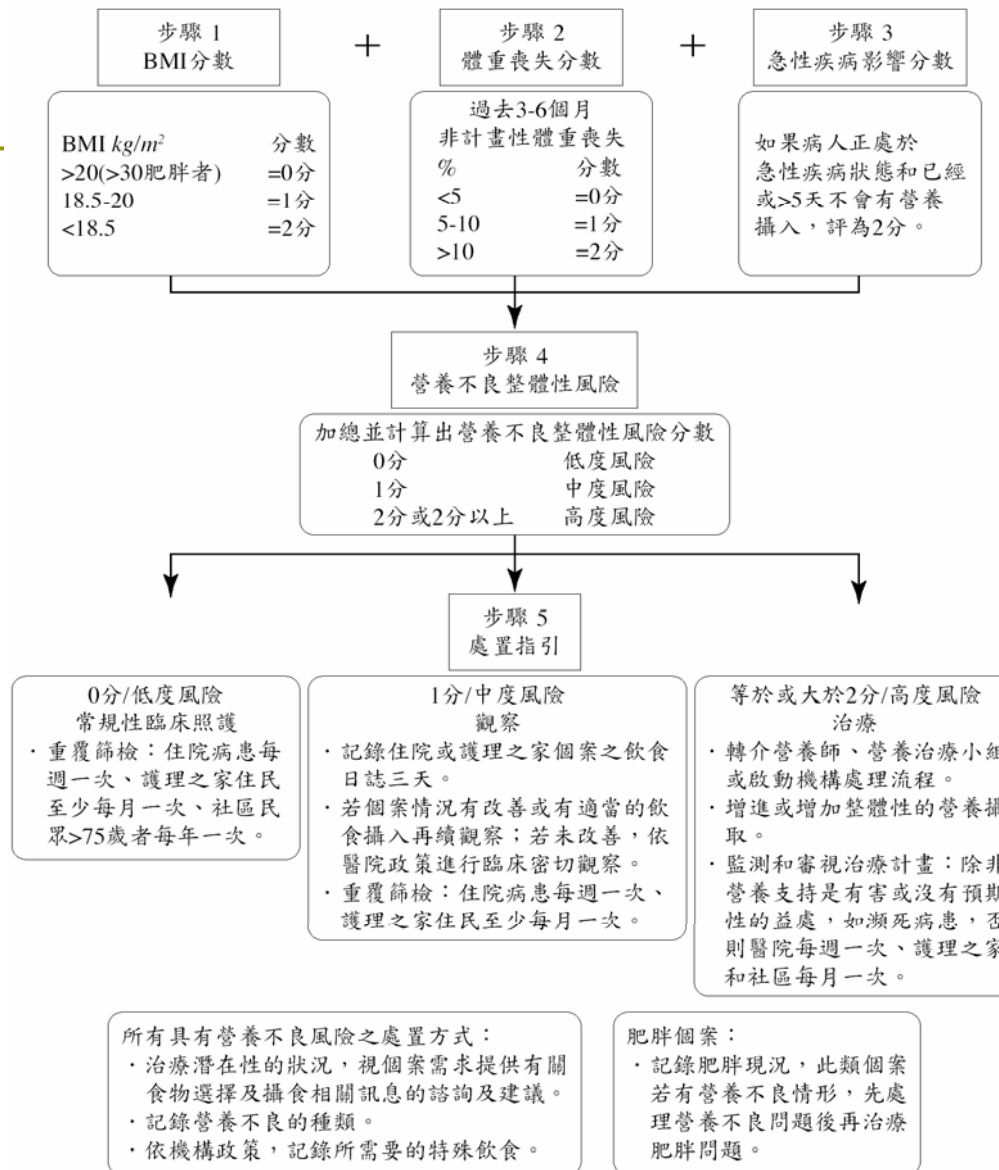
MUST:
 Five steps

Re-assess subjects identified at risk as they move through care settings

See The 'MUST' Explanatory Booklet for further details and The 'MUST' Report for supporting evidence.

營養不良通用篩檢工具 (Malnutrition Universal Screening Tool, MUST)

評估步驟及計分方式

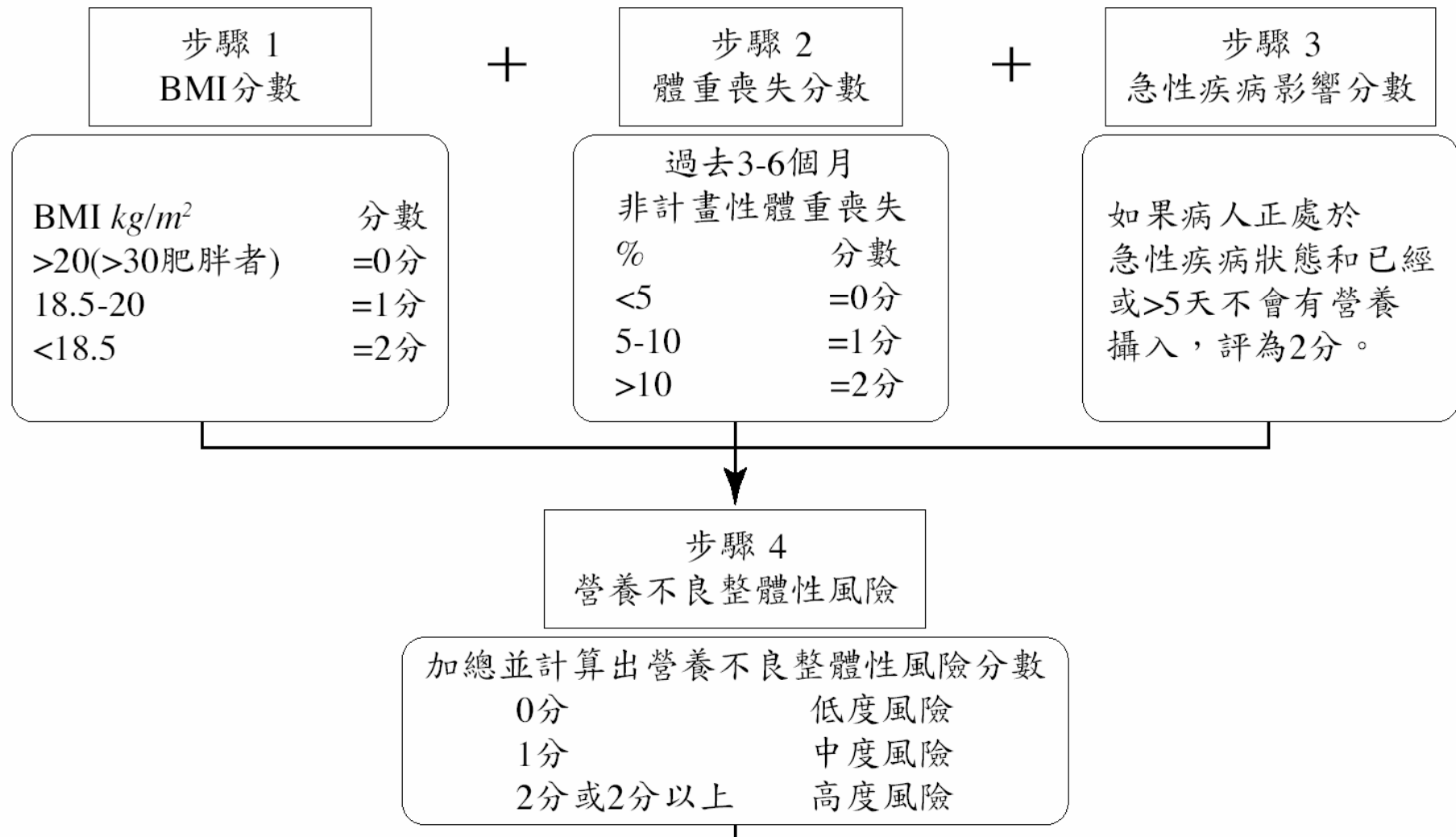


個案在照顧機構的轉介過程中，需重新評估並確認營養風險狀況。

資料參考：Reproduced with permission from BAPEN. Malnutrition advisory group(2003).
Malnutrition Universal Screening Tool

營養不良通用篩檢工具 (Malnutrition Universall Screening Tool, MUST)

評估步驟及計分方式



步驟 5
處置指引

0分/低度風險
常規性臨床照護

- 重覆篩檢：住院病患每週一次、護理之家住民至少每月一次、社區民眾>75歲者每年一次。

1分/中度風險
觀察

- 記錄住院或護理之家個案之飲食日誌三天。
- 若個案情況有改善或有適當的飲食攝入再續觀察；若未改善，依醫院政策進行臨床密切觀察。
- 重覆篩檢：住院病患每週一次、護理之家住民至少每月一次。

等於或大於2分/高度風險
治療

- 轉介營養師、營養治療小組或啟動機構處理流程。
- 增進或增加整體性的營養攝取。
- 監測和審視治療計畫：除非營養支持是有害或沒有預期性的益處，如瀕死病患，否則醫院每週一次、護理之家和社區每月一次。

所有具有營養不良風險之處置方式：

- 治療潛在性的狀況，視個案需求提供有關食物選擇及攝食相關訊息的諮詢及建議。
- 記錄營養不良的種類。
- 依機構政策，記錄所需要的特殊飲食。

肥胖個案：

- 記錄肥胖現況，此類個案若有營養不良情形，先處理營養不良問題後再治療肥胖問題。

個案在照顧機構的轉介過程中，需重新評估並確認營養風險狀況。

10 KEY POINTS

1. Malnutrition, used here to mean under-nutrition, affects at least 2 million people in the UK, detrimentally affecting their health, wellbeing, and ability to work.
2. Malnutrition is under-recognised and under-treated. It leads to disease, delays recovery, increases visits to GP and increases the frequency and length of hospital stay.
3. Nutritional care would improve with adoption of a screening tool which could detect malnutrition and guide action in all care settings.
4. 'MUST' can detect over-nutrition (overweight and obesity) as well as under-nutrition and is linked to a flexible care plan, which varies according to healthcare setting, patient group, and local resources.
5. Such a tool has been developed by the Malnutrition Advisory Group (MAG) of BAPEN. It is called the 'Malnutrition Universal Screening Tool' ('MUST') to indicate that it can be applied to all types of adult patients in all care settings.
6. 'MUST' is valid, reliable, and easy to use, and, with cautious interpretation, can be applied to all adult patients, even those who cannot have their weight or height measured, who have fluid disturbances, amputations, plaster casts, or who are pregnant and lactating.
7. 'MUST' has been made user friendly through extensive field testing by a wide range of professionals in different health care settings.
8. 'MUST' promotes multidisciplinary care and responsibility, with consequent improvements in clinical outcome.
9. 'MUST' could be appropriately used to implement the nutritional screening that is recommended or required by key initiatives in the UK, such as the National Framework for Older people, Essence of Care, Care Homes for Older People (Care Standards Act), and Food, Fluid and Nutritional Care in Hospitals (Scotland).
10. 'MUST' would be most effective if deployed in a healthcare system that prioritised nutrition strategies, training, and implementation.

總結

- 經由正確的營養評估,瞭解腫瘤病人**營養需求**,並給予適當營養,可進而改善病情
- 使用良好的**腫瘤營養篩檢工具**可以提早發現營養高危險群病人,提早給與營養介入,改善病人營養狀況

謝謝大家的聆聽

