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Short Communication

The Norwegian Directorate of Health recommends malnutrition screening tool (MST) for all adults



Ingvild Paur ^{a, b, c, *}, Guro Berge Smedshaug ^a, Brita Haugum ^a, Asta Bye ^{d, e, f}, Erlend Eliassen ^{g, h}, Trine Linn Flottorp ^{i, j}, Hanne J. Juul ^{b, c}, Morten Mowe ^{k, l, m, n}, Tove Nakken ^o, Stephan Ore ^{p, q}, Gry Kirsti Sirevåg ^r, Kari Sygnestveit ^b, Lene Thoresen ^{b, s, t}, Ellinor Bakke Aasen ^{i, u, v, w}, Torunn Holm Totland ^{a, x}, Henriette Walaas Krogh ^a

^a Department of Non-Communicable Diseases, Division of Prevention and Public Health, Norwegian Directorate of Health, Oslo, Norway

^b Norwegian Advisory Unit on Disease-related Undernutrition, Oslo University Hospital, Oslo, Norway

^c Dept. of Clinical Services, Division of Cancer Medicine, Oslo University Hospital, Oslo, Norway

^d Department of Nursing and Health Promotion, Faculty of Health Sciences, OsloMet - Oslo Metropolitan University, Oslo, Norway

^e European Palliative Care Research Centre (PRC), Dept. of Oncology, Oslo University Hospital, And Institute of Clinical Medicine, University of Oslo, Oslo, Norway

^f Norwegian Association of Nutrition Science, Oslo, Norway

^g Nygaard Nursing Home, Sandefjord Municipality, Norway

^h Norwegian Union of Municipal and General Employees, Oslo, Norway

ⁱ Norwegian Patient Safety Programme [I Trygge Hender 24/7], Oslo, Norway

^j Primary Health Service, Dept. of Home Care Services, Sandefjord Municipality, Norway

^k Division of Medicine, Oslo University Hospital, Oslo, Norway

^l Institute of Clinical Medicine, University of Oslo, Oslo, Norway

^m Norwegian Medical Association, Oslo, Norway

ⁿ Norwegian Society of Clinical Nutrition and Metabolism, Oslo, Norway

^o User Representative, Oslo University Hospital, Oslo, Norway

^p Lovisenberg Omsorg, Oslo, Norway

^q Norwegian Association of Old Age and Nursing Home Medicine, Oslo, Norway

^r Department of Home Care Services and Rehabilitation, Time Municipality, Norway

^s Oncology Clinic, St. Olav's University Hospital, Trondheim, Norway

^t Norwegian Association of Clinical Dietitians Affiliated with the Norwegian Association of Researchers, Oslo, Norway

^u Centre for Development of Institutional and Home Care Services, Vestfold and Telemark County, Norway

^v Primary Health Service, Dept. of Nursing Homes, Sandefjord Municipality, Norway

^w Norwegian Nurses Organization, Oslo, Norway

^x Department of Physical Health and Ageing, Division of Mental and Physical Health, Norwegian Institute of Public Health, Oslo, Norway

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SUMMARY

Background & aims: Malnutrition is underdiagnosed and undertreated in Norway. In a revision of a national guideline on malnutrition, the Norwegian Directorate of Health aimed for a harmonization and standardization of the malnutrition screening practice, including a recommendation of one malnutrition screening tool to be used among all adults in Norwegian health and care services.

Methods: A working group was appointed by the Norwegian Directorate of Health. Evidence-based practice, a pragmatic decision-making process based on a literature review, the Grading of Recommendations Assessment, Development and Evaluation (GRADE), and the DECIDE decision-making model was used as a guidance in order to convert evidence into recommendations.

Results: The criteria and properties of the four most frequently validated malnutrition screening tools were identified and ranked by the working group. The tools were prioritized in the following order: 1: Malnutrition Screening Tool (MST), 2: Malnutrition Universal Screening Tool (MUST), 3: Nutritional Risk Screening 2002 (NRS-2002), and 4: Mini-Nutritional Assessment short form (MNA).

Abbreviations: MST, Malnutrition Screening Tool; MUST, Malnutrition Universal Screening Tool; NRS-2002, Nutritional Risk Screening 2002; MNA, Mini-Nutritional Assessment (short form); GRADE, Grading of Recommendations Assessment, Development and Evaluation; PPV, Positive predictive value; NPV, Negative predictive value.

* Corresponding author. Norwegian Advisory Unit on Disease-related Undernutrition, Oslo University Hospital, Domus Medica, Sognsvannsveien 9, 0372 Oslo, Norway.

E-mail address: inpaur@ous-hf.no (I. Paur).

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Conclusions: The Norwegian Directorate of Health recommends use of MST for screening for malnutrition among all adults (≥ 18 years), across all health care settings, and diagnoses or conditions in Norway. © 2022 The Author(s). Published by Elsevier Ltd on behalf of European Society for Clinical Nutrition and Metabolism. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The Norwegian Directorate of Health has the authority and mandate to develop national guidelines and other normative standards aimed at improving the health care services, to ensure good quality, give guidance on the right priorities, and to prevent unwanted variation in the health care services. The National guideline for prevention and treatment of malnutrition was first published in 2009, and a revised version was launched in 2022 [1]. The aim of the guideline is that malnourished patients and patients at risk of malnutrition are identified and receive targeted nutritional treatment and follow-up, so that malnutrition and its consequences can be prevented and treated. The main recommendation is both legally justified and professionally grounded, and states that the risk of malnutrition should be evaluated in all patients (≥ 18 years) in an institution, in municipal or specialist health care services, patients/users who receive health care services at home or practical assistance in food and food care, as well as in high-risk groups in the general practitioner service, outpatient clinics, and day activity services.

According to national quality indicators, malnutrition screening is inadequate among older adults in the primary health and care service in Norway [2–4]. In 2009, the Norwegian Directorate of Health recommended five different malnutrition screening tools. The use of various screening tools complicates the comparison of both clinical evaluations and research results on malnutrition, may lead to miscommunication between health care providers and levels of health care, and ultimately pose a risk to patient safety. Furthermore, the use of various screening tools serves as a barrier for monitoring malnutrition. Thus, one major objective for the guideline revision was a standardization and harmonization of the screening practice for malnutrition in adults across health care settings and diagnoses or conditions. The goal was to use evidence-based practice to decide upon one malnutrition screening tool to be recommended for all adults.

2. Materials and methods

The Norwegian Directorate of Health appointed a working group for the revision of the guideline. It consisted of representatives from professional interest groups, governmental and non-governmental organizations, participants with the users' perspective, and the Norwegian Directorate of Health (complete list under acknowledgements).

A pragmatic decision-making process based on the Grading of Recommendations Assessment, Development and Evaluation (GRADE) [5] and the DECIDE decision-making model [6] was used as a guidance in order to convert evidence into recommendations.

A systematic literature review of the validity and reliability of screening tools initiated by the Norwegian Directorate of Health was included in the consensus process [10]. The four most frequently validated tools were Mini Nutritional Assessment short form (MNA), Malnutrition Universal Screening Tool (MUST), Malnutrition Screening Tool (MST), and Nutritional Risk Screening 2002 (NRS-2002). In line with evidence-based practice, the choice

of tool should consider clinical experiences and the user's perspective (in this case both patients' and health care professionals' perspectives) in addition to results from the systematic review. Thus, included in this consensus process were the properties of the tool, the user's perspectives, feasibility for implementation in different health care settings, and the practicality of use. The variable called "generalizability" was based on an overall rating of the range of validation studies in the systematic review with regard to ages, settings, diagnoses or conditions, and the complexity of the tool (ease of use, the number of items or questions in the tool, the need for calculations or equipment and the estimated time used to complete the screening).

The working group identified and sorted screening tool criteria into three categories; 1) overall criteria, 2) criteria within generalizability, and 3) properties of the tool, and ranked the criteria by use of a 5-point Likert-type scale for importance for the screening tool to be recommended, ranging from 1 = not important to 5 = very important (Table 1). Each ranking was based on a consensus reached by discussion in the group.

3. Results

The working group ranked the criteria and properties of the malnutrition screening tools (Table 1). The results of the systematic literature review [10], the working group's prioritization of generalizability criteria, and the overall ranking of the screening tools, are summarized in Table 2. The working group decided that validity was the most important among the overall criteria (Table 1), given that the quality of evidence was satisfactory. Among the criteria for generalizability, a low complexity of the tool was rated as most important. Of the properties of the tools, the working group came to the consensus that a tool's ability to register *changes* in food intake and weight loss were more important than registration a body mass index (BMI) score (Table 1).

When summarizing the results, the working group prioritized the tools in the following order: 1: MST, 2: MUST, 3: NRS-2002, and 4: MNA (Table 2).

4. Discussion

Based on GRADE, DECIDE and the working group consensus, the Norwegian Directorate of Health recommends use of MST [7] for screening for malnutrition among all adults regardless of age (≥ 18 years), setting, or diagnosis or condition.

In addition to the scientific evidence (in this case the systematic review of validity and reliability), clinical experiences and the users' perspectives should be considered. A crucial step towards reaching a one-tool-consensus was to pursue an objective weighting of the screening tool criteria based on clinical experiences and the user's perspectives. When the group was reconciled on the importance of each criterion, it was easier for everyone to contribute to the discussion and come to an overall agreement. MST and MUST were ranked higher than NRS-2002 and MNA due to better ratings for generalizability, and also for quality of evidence for MNA. The criterion that was ranked highest, with a 5 on

Table 1
Ranking of the criteria and properties by the working group.

	Criteria and properties	Score [1–5]
Overall criteria	Overall validity (sensitivity ^a , specificity ^a , PPV, and NPV)	4.5
	Quality of evidence ^b	4.25
Criteria within Generalizability	Reliability	4
	Generalizability	4
	Tested in all ages (≥ 18 years)	3.75
	Tested in different institutional settings	3.50
	Tested in different diagnostic groups	3.25
	No limitations in the tool itself	4
	No age limitations	3.75
Properties of the tool	Low complexity	5
	Changes in food intake	4
	BMI	3
	Weight loss	4

PPV: Positive predictive value; NPV: Negative predictive value; BMI: Body mass index.

^a If otherwise equal, sensitivity should weight more than specificity.

^b Provided that the quality of evidence is satisfactory, sensitivity and specificity weigh more than the quality of evidence.

Table 2
Summary of results.

	MNA	MUST	MST	NRS-2002
Total validity ^c	Moderate ^a	Low	Moderate	Moderate
Quality of evidence ^d	Neutral	Positive	Positive	Positive
Reliability ^e	Low ^b	Moderate ^b	Moderate	Moderate
Generalizability ^f	Moderate	High	High	Moderate
Working group priority based on ranking of criteria	4	2	1	3

MNA: Mini-Nutritional Assessment short form; MUST: Malnutrition Universal Screening Tool; MST: Malnutrition Screening Tool; NRS-2002: Nutritional Risk Screening 2002.

^a MNA against other comparisons than Full MNA.

^b Results based on <5 comparisons.

^c Interpretation of each of the validity measures sensitivity, specificity, positive predictive value; negative predictive value: High $\geq 90\%$; Medium 70–89%; Low <70%. Total validity based on algorithm shown in [Totland et al. 2022. Clin Nutr ESPEN].

^d The Quality Criteria Checklist by The Academy of Nutrition and Dietetics (indicates to what degree the report has clearly addressed issues of inclusion/exclusion, bias, generalizability, and data collection and analysis): Positive - most Positive; Neutral - most Neutral, Negative - most Negative.

^e Cohen's kappa: High ≥ 0.8 ; Medium 0.60–0.79; Low <0.60.

^f Generalizability based on an overall rating of the range of validation studies (ages, settings, and diagnoses/conditions), the complexity of the tool (including number of items), and time to complete the screening.

the Likert-type scale, was complexity of the tool within the generalizability category. Overall, the higher priority was given to MST based on the working group's high priority of changes in food intake and complexity of the tool.

The recommendation of one screening tool was the major change in the revised guideline. Even so, the guideline was updated and transformed into an online format (Norwegian only) [1]. In addition to the systematic review, the revision of the guideline was based on the British National Institute for Health and Care Excellence (NICE) guideline on nutrition support for adults [8], and the Swedish guidelines for prevention and treatment of malnutrition [9].

4.1. Implications for clinicians, institutions, and decision-makers

Norwegian clinicians should use MST for malnutrition screening of their patients. The recommendation of MST represents the first step in the process of good nutritional practice as recommended and described in the guideline. For persons at risk of malnutrition, a systematic nutritional assessment, an individual nutrition plan, and documentation and communication of the nutritional information should be completed after the malnutrition screening.

The Norwegian health trusts and the municipalities should ensure a solid organization and anchoring of the nutritional practice throughout the patient pathway in all levels of health and care services. Prevention and treatment of malnutrition is included in

the responsibilities the health trusts and municipalities have, to ensure adequate health care services. This responsibility also includes implementation of MST.

4.2. Concluding statement by the Norwegian Directorate of Health

The Norwegian Directorate of Health recommends use of MST for screening for malnutrition among all adults (≥ 18 years), across all health care settings, and diagnoses or conditions in Norway.

Use of MST across all levels of health care settings is expected to monitor and even out differences in health care services for malnourished patients and patients at risk of malnutrition, and to provide a seamless communication of malnutrition screening status along the patient pathway. The overall goal is to secure patient safety.

Statement of authorship

IP: Writing - Original Draft, Conceptualization, Investigation, Data Curation, Visualization, Writing - Review & Editing.

GBS, HWK: Conceptualization, Methodology, Writing - Review & Editing, Project Administration, Funding acquisition.

BH: Conceptualization, Methodology, Writing - Review & Editing, Funding acquisition.

AB, EE, TLF, HJJ, MM, TN, SO, GKS, LT, KS, EBA: Conceptualization, Investigation, Writing - Review & Editing.

THT: Conceptualization, Investigation, Data Curation, Visualization, Writing - Review & Editing.

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Declaration of competing interest

All authors declare no conflicts of interest.

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