

<p><b>Institution:</b> University of Southampton</p>
<p><b>Unit of Assessment:</b> 01 Clinical Medicine</p>
<p><b>Title of case study:</b> 01-08 MUST: A new tool for combating malnutrition in the UK and overseas</p>
<p><b>1. Summary of the impact</b></p> <p>Research carried out at the University of Southampton has led to the development of a new tool for detecting and managing malnutrition. The Malnutrition Universal Screening Tool (MUST) has been rolled out to more than 80% of hospitals and care homes in England and 98% in Scotland, is part of national health policy in Finland and the Netherlands, and has attracted interest internationally. The National Institute for Health and Clinical Excellence bases its current quality standard for nutritional support in adults on the MUST framework; only two NICE guidelines have saved the NHS more money. MUST has become an integral part of the UK's health policy framework, embedded in routine clinical care and supported by bodies responsible for clinical and care excellence. It is central to learning programmes on managing malnutrition.</p> <p><b>2. Underpinning research</b></p> <p>Malnutrition affects every system and tissue of the body and can result in increased vulnerability to illness, reduced ability to fight infection, longer hospital stays and increased mortality. It is a common clinical and public health problem in the UK, affecting about 30% of hospital patients and around 35% of care home residents at a cost of more than £13 billion a year, according to a national report based on the work of Elia et al. [5.7]. In the past, malnutrition frequently went undiagnosed or was underestimated because measurements required to diagnose it have been hard to obtain in elderly and bed-bound patients or because methods of measurement were labour intensive, impractical for routine clinical use and based on unvalidated criteria. These deficits contributed to confusion and poorly integrated care.</p> <p>From 2000 to 2013, research undertaken by teams led by Marinos Elia, Professor of Clinical Nutrition and Metabolism (2001-present) at the University of Southampton's Institute of Human Nutrition, created and validated the Malnutrition Universal Screening Tool (MUST) for identifying and managing patients with or at risk of malnutrition [3.1-3.6]. Unlike many previous tools, MUST is designed to be user-friendly, making it suitable for routine use in both hospitals and the community for clinical and public health purposes, and even self-screening [3.5, 3.6].</p> <p>The academic research underpinning the MUST tool was conducted in Southampton between 2000 and 2006. It comprised literature reviews of surveys and researchers' own national prevalence surveys; clinical intervention and experimental starvation studies; and assessments of the link between malnutrition and complications and resource consumption in hospitals and the community. The studies demonstrated excellent inter-rater agreement associated with MUST screening, examined the relative value of different surrogate measures for estimating height and weight status in bed-bound patients and devised new predictive equations to estimate height from ulna length at the bedside. It also established the predictive validity of MUST with respect to clinical outcomes, such as mortality and length of stay in hospital, and healthcare use in nationally representative samples of older people living in the community [3.3].</p> <p>The research identified three simple risk indicators for malnutrition: past nutritional status of the patient (weight loss), present (current weight/body mass index) and future nutritional status (in cases where there has been or is likely to be no nutritional intake for more than five days) [3.1,3.2,3.4]. MUST used these factors to formulate a simple, valid, reproducible score that formed the basis of a care plan. Its efficacy was then demonstrated through another series of studies, including field testing in more than 200 centres throughout the UK.</p> <p>For bed-bound patients, for whom weight and height cannot readily be measured, the research demonstrated that alternative measures (e.g. estimating height from ulna length and weight from mid-upper arm circumference) provided a sufficiently reliable indicator to allow MUST to be used in elderly, infirm patients and unconscious, non-communicative patients.</p>

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Contributors to MUST research include Elia, Professor Alan Jackson (Professor of Human Nutrition, 1985-present) Dr Rebecca Stratton (Research Fellow 2001-2005; visiting Research Fellow 2006-present); Dr Abbie Cawood (visiting Research Fellow 2006-present, post-doctoral work 2003-2005); Professor Barrie Margetts (Lecturer/Senior Lecturer/Professor of Public Health Nutrition, 1993-present); Dr Mike Stroud (Lecturer/Senior Lecturer in Nutrition, 1995-present); and Dr Stephen Wootton (Lecturer/Senior Lecturer in Nutrition, 1984-present).

### 3. References to the research

#### Research outputs:

- 3.1 Stratton RJ, King CL, Stroud MA, Jackson AA, Elia M. 'Malnutrition Universal Screening Tool' predicts mortality and length of hospital stay in acutely ill elderly. *Br J Nutr* 2006; 95:325-30.
- 3.2 Stratton RJ, Hackston A, Longmore D, Dixon R, Price S, Stroud M, King C, Elia M. Malnutrition in hospital outpatients and inpatients: prevalence, concurrent validity and ease of use of the 'malnutrition universal screening tool' (MUST) for adults. *Br J Nutr* 2004; 92:799-808.
- 3.3 Elia M (chairman & editor) (2003) The 'MUST' report. Nutritional screening for adults: a multidisciplinary responsibility. Development and use of the 'Malnutrition Universal Screening Tool' (MUST) for adults. A report by the Malnutrition Advisory Group of the British Association for Parenteral and Enteral Nutrition. no. ISBN 1 899467 70X.
- 3.4 Elia M, Stratton RJ. An analytic appraisal of nutrition screening tools supported by original data with particular reference to age. *Nutrition* 2012; 28(5):477-94.
- 3.5 Cawood AL, Elia M, Sharp SK, Stratton RJ. Malnutrition self-screening by using MUST in hospital outpatients: validity, reliability, and ease of use. *Am J Clin Nutr* 2012; 96(5):1000-7.
- 3.6 McGurk P, Jackson JM, Elia M. Rapid and reliable self-screening for nutritional risk in hospital outpatients using an electronic system. *Nutrition* 2013; 29: 693-696.

#### Grants:

- Jackson A, Godfrey KM, Byrne C, Calder P, Cooper C, Elia M, Hanson M. NIHR: Southampton Nutrition BRU. £3.75M, plus £1.6M additional & £4M capital funding. 2008-12.
- Elia M (Consultant) et al. National Institute of Health (NIH): 2003-2008 (~\$1,780,000): DK-42618 Organ masses and tissue specific metabolic rates across age and race (Consultant).

### 4. Details of the impact

All the studies that contributed to the development of MUST were undertaken by the University of Southampton/NHS Trust partnership and, since 2007, at the Southampton NIHR Biomedical Research Centre for Nutrition, Lifestyle and Healthy Ageing.

Through the advocacy of Elia and Jackson, the research has informed a range of national government and non-government initiatives, several of which they have chaired. These include the British Association for Parenteral and Enteral Nutrition (BAPEN) and the Malnutrition Action Group (MAG). As a result, the roll-out of the MUST framework into clinical practice began in 2003 [5.1], but most of the uptake occurred after 2008. Since then, NICE [5.2] and several NHS-related bodies, including the National Patient Safety Agency [5.3], and Quality, Innovation, Productivity and Prevention (QIPP, a large-scale transformational programme for the NHS), NHS Quality Improvement Scotland [5.4], and Department of Health Northern Ireland [5.5] have supported the MUST framework as an appropriate basis for managing malnutrition.

The NICE 'Quality Standard on Nutrition Support in Adults' (QS24, 2012) [5.2] singles out MUST as a screening tool for routine use. It benefits both patients and staff through consistent malnutrition diagnostic criteria, facilitating care between hospital and community settings [5.2, 5.6], enabling meaningful audits, inspections by the Care Quality Commission and assessments of the

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clinical and economic burden of malnutrition.

Elia et al raised policymakers' awareness of the importance of malnutrition through the 2009 launch of two House of Commons reports based on the MUST framework: *Combating Malnutrition* [5.7] and *Calculating the Cost of Disease-related Malnutrition in the UK*, introduced by the Conservative Shadow Health Secretary, Stephen O'Brien, which called for the use of MUST across the NHS. *Screening for Malnutrition in Sheltered Housing* and *Good Practice Guide* were introduced by Paul Burstow, later Minister of State for Care Services. In February 2010, national media widely reported the Department of Health response to the final report of the Nutrition Action Plan Governance Board [5.8] commending the development of MUST as "valuable work", which also served to raise public awareness of the availability of the tool.

Later in 2010, the National Clinical Content Repository (publishes clinical data standards and NHS-licensed third party-owned content) and Connecting for Health (develops NHS national IT infrastructure) approved Elia's request to add MUST classification codes to an international coding system (SNOMED) used in the UK to configure NHS computing systems. This new, consistent electronic nomenclature reinforced the recognition of MUST as both a national and international screening tool.

By 2011, MUST was used in more than 80% of English and essentially all Scottish hospitals and care homes [5.6]. By November 2012, NICE documents showed that the annual cost saving associated with managing malnutrition, broadly based on the MUST framework, amounted to £71,800 per 100,000 population [5.2b], the third highest cost-saving figure associated with the implementation of all NICE guidelines.

As MUST became an integral part of the UK's health policy program, Elia signed an agreement (2008) with the Secretary of State for Health to incorporate MUST into the web-based NHS National Programme for IT, making it available to all NHS staff, hospitals and the armed forces outside the UK. Also in 2008, MUST was adopted as a central component of the core nutrition education pathway by NHS Education and NHS Quality Improvement Scotland [5.4]. Since then, Elia and his teams have received over 1,000 requests from organisations and individuals seeking advice and permission to use MUST appropriately, including NHS Trusts and commercial enterprises in the UK and abroad. Both Finland and the Netherlands have incorporated MUST into their national health policies and there are local policies in various countries including Portugal, Czech Republic, Spain, and Australia (hospitals in Adelaide and South Australia).

The following have also helped embed the MUST framework into routine practice [5.9]:

1) MUST aids: Elia et al (2011-13) developed MUST charts, a MUST calculator and MUST app for iphones (Android app is scheduled for launch late 2013) for use across all care settings by front-line staff. International demand sustained translation of these aids into Spanish, French, Portuguese, Italian and German. Expressions of interest were also received from other countries, including China and Finland. These aids, available from the BAPEN website, have been used by commercial enterprises and most Trusts in the UK.

2) Education and training: Instruction manuals for the use of MUST were rolled out in 2011-13, with the DH's QIPP programme supporting, promoting and distributing MUST e-learning modules using NHS IT compliant systems and portals, with facilities for customisation and certification, especially in Trusts where MUST training has become mandatory. MUST became part of standard medical and nutrition texts (eg 7<sup>th</sup> and 8<sup>th</sup> editions of Kumar and Clark's *Clinical Medicine* 2009, 2012).

3) Media: e.g. publication in 2009 of the *Combating Malnutrition* report was widely covered in national media, quoting Elia in BBC News Online, The Guardian and several other national newspapers.

MUST was recognised in the 2008 NHS Business Awards for 'Innovation' [5.10]. In the same year, Elia, as Chair of BAPEN, also received the Medical Nutrition International Industry Award for the

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organisation's work in combating malnutrition. The MUST app for iphones was selected by the DH for presentation at a showcase event of the 'Map and App project' in 2011, attended by the Minister of State for Health. NICE has already indicated its 'Commissioning Outcomes' and 'Quality and Outcomes' Frameworks will consider NICE quality standards/indicators, including nutritional screening in 2013/14.

**5. Sources to corroborate the impact**

- 5.1** Elia M (chairman & editor).(2003).The MUST report. Nutritional screening for adults: a multidisciplinary responsibility. Development and use of the 'Malnutrition Universal Screening Tool' (MUST) for adults. A report by the Malnutrition Advisory Group of the British Association for Parenteral and Enteral Nutrition.
- a) <http://www.bapen.org.uk/screening-for-malnutrition/must/must-report> accompanied by the
- b) MUST explanatory booklet, [http://www.bapen.org.uk/pdfs/must/must\\_explan.pdf](http://www.bapen.org.uk/pdfs/must/must_explan.pdf) (updated 2011)
- 5.2** a) NICE quality standard for nutrition support in adults  
<http://publications.nice.org.uk/quality-standard-for-nutrition-support-in-adults-qs24>
- b) NICE: QS24 Nutrition support in adults: NICE support for commissioners and others  
<http://www.nice.org.uk/nicemedia/live/13977/61747/61747.pdf>
- c)<http://www.nice.org.uk/usingguidance/education/ElearningResourceMUSTNutritionalScreeningTool.jsp>
- 5.3** National Patient Safety Agency <http://www.nrls.npsa.nhs.uk/resources/?entryid45=59865> (2009), and Fact sheet 5
- 5.4** NHS Quality Improvement Scotland and NHS Education for Scotland (2008) *Improving Nutritional Care: Supporting NHS Scotland staff through practice and development of education*. Edinburgh and Glasgow: NHS Quality Improvement Scotland; Core Nutrition Pathway <http://www.nutritioncare.scot.nhs.uk/home.aspx>
- 5.5** Department of Health, Social Services and Public Safety. A strategy for good nutritional care for adults in all care settings in Northern Ireland 2011-2016 (e.g. sections on screening and MUST) [http://www.dhsspsni.gov.uk/promoting\\_good\\_nutrition-2.pdf](http://www.dhsspsni.gov.uk/promoting_good_nutrition-2.pdf)
- 5.6** Nutrition Screening Week Survey 2011 <http://www.bapen.org.uk/pdfs/nsw/nsw-2011-report.pdf>
- 5.7** Combating malnutrition: Recommendations for Action  
<http://www.bapen.org.uk/professionals/publications-and-resources/bapen-reports/combating-malnutrition-recommendations-for-action>
- 5.8** Nutrition Action Plan Delivery Board.(2009).Nutrition Action Plan Delivery Board End of Year Progress Report: an independent Report by the Nutrition Action Plan Delivery Board ; Department of Health.(2007). Improving Nutritional Care: A joint Action Plan from the Department of Health and Nutrition Summit stakeholders.
- 5.9** MUST app (iphone - <http://www.bapen.org.uk/screening-for-malnutrition/must/must-app>) and MUST charts; MUST calculator <http://www.bapen.org.uk/screening-for-malnutrition/must-calculator>; MUST charts and toolkit (5 languages) <http://www.bapen.org.uk/screening-for-malnutrition/must/must-toolkit/the-must-itself>
- 5.10** NHS Health Business Award 2008 (IT innovation category)  
[http://www.bapen.org.uk/pdfs/press\\_releases/press\\_40.pdf](http://www.bapen.org.uk/pdfs/press_releases/press_40.pdf)