

# NUTRITIONAL STATUS OF AN ELDERLY PATIENT WITH ACUTE MYOCARDIAL INFARCTION ADMITTED FOR MYOCARDIAL REVASCULARIZATION SURGERY IN THE PRE- AND POST-OPERATIVE PERIODS

## ESTADO NUTRICIONAL DE UM PACIENTE IDOSO COM INFARTO AGUDO DO MIOCÁRDIO INTERNADO PARA CIRURGIA DE REVASCULARIZAÇÃO DO MIOCÁRDIO NO PERÍODO PRÉ E PÓS-OPERATÓRIO

Anna Paula de Sousa Silva<sup>1</sup>, Carla Larissa Cunha Sottomaior<sup>1</sup>, Ramyne de Castro da Paz<sup>2</sup>, Lorrany Fernandes Gomes<sup>1</sup>, Melorie Kern Capovilla Sarubo Baptistella<sup>1</sup>, Renata Costa Fortes<sup>3</sup>

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### RESUMO

O objetivo desse estudo foi avaliar o estado nutricional, bem como o risco nutricional de um paciente com infarto agudo do miocárdio internado para cirurgia de revascularização do miocárdio. Trata-se de um relato de caso clínico de um paciente idoso internado no Instituto de Cardiologia do Distrito Federal em março de 2018, assistido nos períodos pré e pós-cirúrgico por meio da aplicação de métodos subjetivos e objetivos de avaliação nutricional. Observou-se presença de risco nutricional e/ou desnutrição, tanto no período pré quanto pós-operatório, por todos os métodos de triagem nutricional utilizados (Triagem de Risco Nutricional - NRS-2002; Instrumento Universal para Triagem de Desnutrição - MUST; Mini Avaliação Nutricional na Versão Reduzida - MNA-SF). A força de prensão palmar foi a medida antropométrica que apresentou redução no pós-operatório quando comparada aos valores iniciais (pré-operatório). A descrição deste caso chama a atenção para a necessidade de identificarmos precocemente o risco de desnutrição (ou a desnutrição) pela aplicação de protocolos capazes de permitir uma avaliação das condições agudas e crônicas, utilizados em conjunto.

**Descritores:** Idoso; Infarto agudo do miocárdio; Desnutrição.

### ABSTRACT

This study assesses the nutritional status and nutritional risk of a patient with acute myocardial infarction hospitalized for myocardial revascularization surgery. This is a clinical case report about an elderly patient admitted to the Federal District Cardiology Institute in March 2018, covering his pre- and postsurgical periods using subjective methods and a nutritional assessment. Nutritional risk and/or malnutrition were observed in this case both in the pre- and postoperative periods by all applied nutritional screening methods (Nutrition Risk Screening - NRS-2002; Malnutrition or Universal Nutrition Screening Tool - MUST; Mini-Nutrition Assessment in Reduced Version - MNA-FC or Mini Nutritional Assessment Short Form - MNA-SF). Palmar grip strength was the anthropometric measurement that experienced a decrease between the preoperative and postoperative periods. The description of this case draws attention to the need for an early identification of malnutrition risk (or malnutrition itself) by the combined use of protocols capable of enabling evaluations of acute and chronic conditions.

**Descriptors:** Elders and seniors; Acute myocardial infarction; Malnutrition.

# REVISA

<sup>1</sup> Undergraduate Medicine student. Fundação de Ensino e Pesquisa em Ciências da Saúde, Escola Superior em Ciências da Saúde. Federal District, Brazil

<sup>2</sup> Nutritionist. Clinical Nutrition Expert. Instituto de Cardiologia do Distrito Federal. Federal District, Brazil

<sup>3</sup> Nutricionist. PhD in Human Nutrition. Fundação de Ensino e Pesquisa em Ciências da Saúde, Escola Superior em Ciências da Saúde. Federal District, Brazil. rcfortes@gmail.com

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## INTRODUCTION

Acute myocardial infarction (AMI) is highly prevalent disease in the elderly population, due to a number of physiological factors inherent to the process of aging.<sup>1</sup> AMI is the third most frequent cardiovascular disease, and accounts for the largest relative number of deaths in Brazil. From 1996 to 2016, the number of AMI cases increased by 68%. In 2016, the disease accounted for 94,148 deaths in the country, according to data from Brazil's Mortality Information System (SIM).<sup>2</sup>

AMI is an acute coronary syndrome classified into two categories: acute myocardial infarction with ST segment elevation (STEMI) and acute myocardial infarction without ST segment elevation (NSTEMI). NSTEMI is further divided into two subtypes: unstable angina and acute myocardial infarction without ST segment elevation. Diagnoses are based on biochemical necrosis markers, electrocardiogram changes and modifications in patients' clinical condition. The main forms of treatment are therapeutic interventions with thrombolytic medication or angioplasty.<sup>3</sup>

AMI has linkages with patients' nutritional state. Patients who suffered an AMI with low weight are more susceptible to death, compared with patients with normal weight, especially after surgical treatment and hospitalization.<sup>1</sup> This higher likelihood can be explained in relation to the patient's increased energy demands after surgical procedures, which involve high levels of tissue recovery, and comorbidity associations or difficulties to adjust the energetic necessities of hospitalized patients.<sup>3</sup> Therefore, nutritional screening before and after surgeries to enable the early identification of patients at nutritional risk is indispensable.

The aim of this study is to assess the nutritional status, as well as the nutritional risk, of an elderly patient with acute myocardial infarction admitted for a myocardial revascularization surgery.

## METHODOLOGY

This study assesses the clinical case of an elderly patient admitted to a Cardiology referral hospital in the Federal District in March 2018 for cardiac surgery. The patient voluntarily signed a Free and Informed Consent Form after receiving clarifications about the study's aims and procedures.

His nutritional screening was carried out by applying three protocols, in the following order: 1) Nutritional Risk Screening (NRS-2002); 2) Malnutrition Universal Screening Tool (MUST); and 3) Mini Nutritional Assessment Short Form (MNA-SF) – which can be used both as a malnutrition risk screening tool and as a nutritional status (malnutrition) tool.

NRS-2002 is divided into two stages. In the first stage, patient's body mass index (BMI) below 20.5kg/m<sup>2</sup> is examined, as well as involuntary weight loss in the past three months, food consumption changes in the previous week and the severity of the disease. In case of a positive response, the NRS protocol continues to examine the patient's nutritional status and metabolic stress in connection with the increase in his or her energy demands. Patients with a total score of  $\geq 3$  points are classified as cases of nutritional risk. Another point is added to patient's final score if he or she is above 70 years old.<sup>4-6</sup>

MUST, on its turn, has three categories: BMI, unintentional weight loss in the past three to six months and acute diseases, in addition to reduced food intake or expected fasting for over five days. MUST scores range from 0 to 2 points per sub-item. Patients are classified as low-risk (0 points), medium risk (1 point) and high risk (2 points or above). MUST then indicates interventions

to address each score.<sup>7-8</sup>

On its turn, MNA-SF is a survey with six questions linked to reduced food intake as a result of decreased appetite, digestive problems or chewing and/or swallowing difficulties in the previous three months; weight loss in the previous three months; mobility; stress or acute illness in the previous three months; neuropsychological problems; and BMI, when calf circumference data cannot be obtained. Each item of the questions adds up to a maximum score of 14 points. A score of 12-14 points denotes a normal nutritional status; a score of 8-11 points indicates malnutrition risk; and a score of 0-7 indicates malnutrition.<sup>8,9</sup>

Additional anthropometric measurements were obtained, such as weight (kg), height (meters), calf circumference (CC), arm circumference (AC) and palmar grip strength (PGS), as well as BMI. Body weight was obtained using a Techline® scientific scale; height was measured using a Sanny® stadiometer; CC and AC were obtained using a Wiso® flexible and non-extensible anthropometric measuring tape.

Body weight was obtained using a previously calibrated scale placed far from room walls on a plain, firm and smooth surface. The patient was asked to remove his shoes, wear light-weight clothes and remove any heavy object that could interfere in the measurements. Patient height was obtained on standing position, barefoot with parallel feet together, straight back, outstretched arms on the sides and straight head facing the Frankfort horizontal plane. Patient was asked to touch the stadiometer or wall with his heels, calves, gluteus, scapula and posterior head (occipital region).<sup>10</sup>

For AC measurements, the patient stood up with the palms of his hand facing his thigh, and the measurement tape was placed around his non-dominant arm. The measuring tape was then placed around the midpoint between his acromion and olecranon, with his arm flexed at 90°. The AC value was obtained with his arm relaxed and without compressing his soft parts. Arm circumference was measured in centimeters (cm). CC was measured with the patient seated with legs slightly separated and a knee-angle of 45°, with the measuring tape placed on the most protuberant part of the calf.<sup>11-12</sup>

A person's BMI is the ratio between one's actual weight in kilograms and one's height in square meters (kg/m<sup>2</sup>). This patient's BMI was assessed following the classification of Lipschitz (1994), in which BMI < 22.0 kg/m<sup>2</sup> = thinness, BMI 22-27.0 kg/m<sup>2</sup> = eutrophic, and BMI > 27 kg/m<sup>2</sup> = overweight.<sup>13</sup> BMI measurements considered eventual fluid changes (edema and/or ascites).

During his muscular strength measurements via PGS, the patient was seated on a chair with his bent elbows at 90° exerting his maximum strength on a dynamometer. This measurement was made thrice with a one-minute interval between measurements. The largest measurement was the considered one. The reference value for identifying muscular weakness was the specific one for males, i.e., below 30 kgf.<sup>14</sup>

Secrecy and anonymity in regard to the patient's identity were observed in conformity with Resolution 466 of 2012 of the National Health Council of the Brazilian Ministry of Health. This case study was also approved by the Ethics Committee for Researches with Human Beings, of the Federal District Cardiology Institute (Opinion # 2.567.883).

## **CASE REPORT**

Patient J.G.C, male, 76 years old, born in the city of Januária, Minas Gerais. Arrived from Gama, Federal District. Retired machine operator, married. Declared not to have smoking or drinking habits. Admitted to the Federal District Cardiology Institute on March 20, 2018 for myocardial

revascularization surgery. Reported family history of systemic arterial hypertension. On January 18, 2018, patient felt intense chest pains and burning sensation, with no irradiation, initially as he was hiking. He was referred to the Gama Regional Hospital (HRG), where he was diagnosed with NSTEMI. In November 2017, he had a moderate angina episode.

As a consequence of the disease, patient was catheterized on February 6, 2018. Occlusion was found in the proximal third, anterior descending right coronary artery, with segmental lesion in the proximal third and 95%-blockage in its critical point; circumflex artery with obstructive lesion (70%) reaching the distal portion of left atrioventricular sulcus; ostio-proximal obstructive lesion (70%) in diagonal artery's first and second branches; obstructive lesion (70%) in proximal third of the first left marginal branch. In addition to the catheterization, patient was submitted to a transthoracic echocardiogram on February 26, 2018; mitral valve reflux and grade I dysfunction in left ventricle; 10mm interventricular septum, with a 10mm posterior wall; left ventricle's dimensions: 54x35g/m<sup>2</sup>. A carotid echocardiogram was made on the same day, and found a small right bulb plaque.

Patient's daily continuous-use medication includes: acetylsalicylic acid 100mg, simvastatin 40mg, losartan 50mg (every 12 hours), Sustrate 10mg (every 12 hours), Carvedilol 12.5mg (every 12 hours), Isossorbida 5mg and Clopidogrel 75mg. A myocardial revascularization surgery was carried out on March 22, 2018. Regarding this research, patient's nutritional screening and assessment were carried out before seven and after seven days of surgical intervention (Tables 1 and 2).

**Table 1:** Nutritional screening and assessment before myocardial revascularization surgery.

<b>Protocol</b>	<b>Results</b>	<b>Finding</b>
NRS 2002	Patient with reduced food intake in the previous week; weight loss of 1.5kg in three months; BMI above 20.5kg/m <sup>2</sup> and acute complications of the disease. Total score: 4 points.	Nutritional risk
MUST	Patient with BMI above 20kg/m <sup>2</sup> , involuntary weight loss in the previous three to six months below 5%; absence of severe consequences of the disease. Total score: 0 points.	Low nutritional risk
MNA-SF	Patient with moderately decreased food intake; weight loss of 1.5kg during the previous three months; normal mobility; patient under psychological stress in the previous three months; absence of neuropsychological problems; BMI above 23kg/m <sup>2</sup> . Total score: 8 points.	Malnutrition risk

**Note:** Assessment carried out on March 20, 2018.

**Table 2:** Nutritional screening and assessment after myocardial revascularization surgery.

<b>Protocol</b>	<b>Results</b>	<b>Finding</b>
NRS 2002	Patient with reduced food intake in the previous week; weight loss of 1.5kg for the previous three months; BMI above 20.5kg/m <sup>2</sup> ; with acute complications of the disease. Total score: 4 points.	Nutritional risk
MUST	Patient with BMI above 20kg/m <sup>2</sup> ; involuntary weight loss in the previous three to six months below 5%; absence of severe consequences of the disease: Total score: 0 points.	Low nutritional risk
MAN-SF	Patient with moderate food intake reduction; weight loss of 1.5kg in the previous three months; walking with difficulties; under psychological stress in the previous three months; absence of neuropsychological problems; BMI above 23g/m <sup>2</sup> . Total score: 7 points.	Malnutrition

**Note:** Assessment carried out on March 27, 2018.

There were no noticeable anthropometric changes between the pre- and postsurgical measurements after his myocardial revascularization surgery, but reduced palmar grip strength was observed seven days after the surgery, in comparison to the initial results (see Table 3). Patient reported oral nutrition difficulties during the entire hospitalization period.

**Table 3:** Anthropometric assessment and palmar grip strength before and after myocardial revascularization surgery.

<b>Presurgical anthropometric parameters</b> On March 20, 2018		<b>Postsurgical anthropometric parameters</b> On March 27, 2018	
<b>Weight</b>	66.6kg (with ankle edema)	<b>Weight</b>	71.0kg (with ankle edema)
<b>Dry weight</b>	65.6kg	<b>Dry weight</b>	65.0kg
<b>Height</b>	1.60m	<b>Height</b>	1.6m
<b>BMI</b>	25.62kg/m <sup>2</sup>	<b>BMI</b>	25.39kg/m <sup>2</sup>
<b>AC</b>	30cm	<b>AC</b>	30cm
<b>CC</b>	37cm	<b>CC</b>	37cm
<b>PGS</b>	22kgf	<b>PGS</b>	14kgf

**Notes:** AC = Arm circumference; BMI = Body mass index; CC = Calf circumference; PGS = Palmar grip strength.

## DISCUSSION

The nutritional status of hospitalized patients can affect their clinical evolution, since malnutrition can both worsen clinical prognoses and increase morbidity and mortality risks.<sup>15</sup> Adequate and timely nutritional screenings allow identifying the risk of malnutrition and/or malnutrition worsening, thus helping health professionals decide in regard to early nutritional

interventions with positive impacts for the patient.<sup>5-6</sup>

Several nutritional screening tools are currently available. This high number of options renders the selection of the most appropriate method more difficult for hospitals' nutritional protocols.<sup>5</sup> Thus, it is extremely important that hospital nutritional care includes nutritional screening as a service protocol and standardizes the best possible tool to suit their patients' needs, also adopting standardized procedures in relation to their application time.<sup>16</sup> In this research, the tools NRS-2002, MUST and MNA-SF enabled identifying the nutritional risk, severity level and the malnutrition status of the patient.

According to NRS-2002 and MUST, the patient was experiencing low malnutrition risk levels throughout his hospitalization period. But the MNA-SF tool identified a malnutrition status in the patient's postsurgical period. This finding is especially related to patient's mobility difficulties at a moment when he was bedridden after the surgery. It is important to highlight that the main similarity of these three tools is that all of them consider involuntary weight loss as an indispensable factor for detecting a patient's nutritional risk.<sup>17</sup>

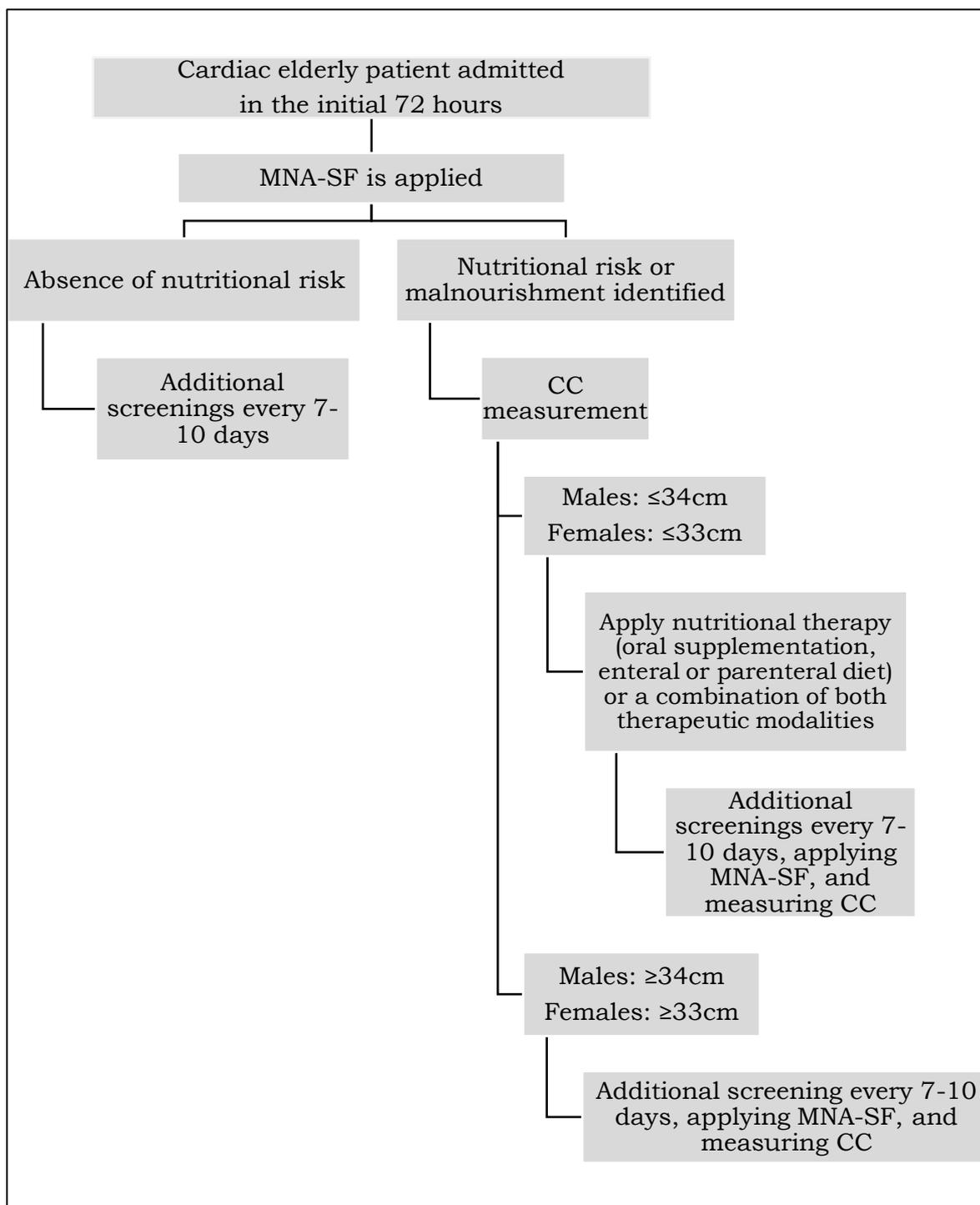
Postsurgical impacts in this case were expressed by patient's reduced PGS, considering the fact that this particular patient is an elder and, thus, that his recovery had some limitations. PGS is directly linked to the activities of an individual's daily life. It is an accurate expression of the functional integrity of the upper limbs and is normally observed in the monitoring of human motor function as an indication of overall health. Therefore, PGS is considered a precise, reliable and authoritative clinical method for estimating the overall strength of individuals, and it has a relation with morbidity and mortality rates for all causes both among young and elderly persons.<sup>18</sup>

No anthropometrical changes were observed in the patient's assessed parameters. These results corroborate the findings of Boban et al,<sup>19</sup> who found no correlation with the anthropometric data and the results of the nutritional screening carried out in their study. It is important to highlight that in clinical practice, despite the existence of many nutritional practices, there is not yet a complete method for determining an individual's nutritional status, i.e., there is not yet a completely bias-free method.<sup>20</sup>

CC has also been used as a predictor of muscular tissue functionality and quantity. For males, it is considered as adequate above 34cm. It is also observed that the larger an individual's CC measurement, the better are his or her functional activities, and the more reduced are his or her risks in regard to elderly fragility. This measurement can be used as an early diagnosis tool and can point to malnutrition risks, or malnutrition in hospitalized patients.<sup>21</sup>

Given the scarcity of specific nutritional screening and/or assessment tools for cardiac patients, Paz et al. (2018)<sup>21</sup> developed a protocol for the early identification of nutritional risks (or malnutrition itself) in hospitalized elderly cardiac patients, which associates some parameters that are consolidated in the specialized literature (Figure 1).

**Figure 1:** Nutritional screening flowchart for cardiac elderly patients



Source: Paz et al., 2018<sup>21</sup>

### FINAL REMARKS

Assessing the nutritional status of hospitalized elderly patients requires multidisciplinary monitoring and is extremely important for enhanced postsurgical recovery. The specialized literature does not point at a best nutritional screening method. For this reason, it is necessary to select the method that best addresses the priority factors in each context. Applying a combination of many (subjective and objective) nutritional status assessment methods is a current consensus among field experts.

This case study draws attention to the need for the early identification of malnutrition risks (or malnutrition) by applying a set of combined protocols that may identify and allow the assessment of acute and chronic conditions. Changes in body part measurements must also be assessed, with a priority for muscular mass, considering that both fragility and sarcopenia are frequent outcomes among elderly patients, which increase mortality risks.

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