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RESEARCH ARTICLE

Nutritional management of adult patients hospitalised with COVID-19 by dietitians in KwaZulu-Natal

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Background: The outbreak of a novel coronavirus disease (COVID-19) in December 2019 led to a worldwide pandemic. Dietitians treated patients hospitalised with COVID-19 without published guidelines on the nutritional management of the disease or prior training on its management.
Objectives: To determine how dietitians managed adult patients hospitalised with COVID-19 in KwaZulu-Natal (KZN).
Design: A cross-sectional study was conducted.
Setting: KZN, South Africa.
Subjects: Forty-two dietitians who had treated adult COVID-19 patients in KZN participated in the study.
Outcome measures: A self-administered questionnaire was developed and used to collect data via the online platform, Google Forms.
Results: Most dietitians ($n = 29$; 68%) consulted a nutrition society for recommendations on the nutritional management of COVID-19 patients, particularly the European Society for Parenteral and Enteral Nutrition (ESPEN) ($n = 12$; 28.6%). Values used to calculate macronutrient requirements included: 25–30 kcal/kg/day for energy ($n = 12$; 28.6%), 50–60% of total energy requirement (TER) for carbohydrates ($n = 8$; 19.0%), 1.2–1.5 g/kg/day for protein ($n = 6$; 14.3%), and 30% of TER for fat ($n = 15$; 35.7%). Dietitians used actual bodyweight ($n = 13$; 31.0%), or estimated bodyweight ($n = 19$; 45.2%), to calculate nutritional requirements ($p = 0.004$). Half of the dietitians used a nutrition screening tool to screen for malnutrition ($n = 21$; 50%), with the Nutrition Risk Screening 2002 (NRS-2002) tool being the most used ($n = 13$; 61.9%) ($p < 0.05$).
Conclusions: Nutritional requirements used by dietitians to manage patients with COVID-19 were similar to those recommended by ESPEN for critically ill patients. Weight and height of bed-bound patients were estimated. Dietitians used the NRS-2002 tool to screen patients for malnutrition.

Keywords: adult patients, COVID-19, dietitians, KwaZulu-Natal, nutritional management

Introduction

The coronavirus disease (COVID-19), an extremely infectious disease caused by the severe acute respiratory coronavirus 2 (SARS-CoV-2),[1–3] was first identified in Wuhan, China, in December 2019, and it spread to most countries worldwide.[4,5] In January 2020, cases of COVID-19 were identified outside China, and this led to the rapid spread of SARS-CoV-2 between countries and continents. By 11 March 2020, the World Health Organization (WHO) declared the outbreak a global pandemic.[1,4,6–8] In just a few short months, many countries were completely overwhelmed and the current twenty-first century medicine was challenged, as health departments all over the world struggled to manage and prevent the further spread of SARS-CoV-2 effectively.[9] A SARS-CoV-2 infection can be asymptomatic,[10,11] or it may present with general flu-like symptoms.[1,12] Some of these include a fever (83–98%), a cough (50–82%), shortness of breath (19–55%), fatigue, muscle weakness (11–44%), anosmia (the loss of, or diminished sense of smell), and gastrointestinal disturbances (12–61%).[1–3,11,13] More serious symptoms include an upper respiratory tract infection and severe pneumonia, ultimately causing respiratory failure.[10]

Despite there being very limited information on the nutritional support of hospitalised patients infected with SARS-CoV-2, medical nutritional therapy is considered to be the first-line treatment for COVID-19 patients.[8] Individualised nutrition-care plans developed by dietitians are considered to be central to the recovery of COVID-19 patients.[8] Despite the emphasis on nutritional care and management, there were no specific guidelines on the nutritional management of patients with COVID-19 at the time of the pandemic. However, the European Society for Parenteral and Enteral Nutrition (ESPEN) published an article on the existing guidelines for critically ill patients, which was applicable to the nutritional management of COVID-19 patients.[14]

At the time of the pandemic, dietitians in both the public and private sectors treated COVID-19 without having any prior training or protocols on the nutritional management of the disease. In addition, there was no consensus on how COVID-19 should be managed nutritionally because of the paucity in the literature relating to specific nutritional guidelines and the assessment of the nutritional status in the COVID-19 population. Therefore, this study aimed to determine how dietitians managed adult patients who were hospitalised with COVID-19 in KwaZulu-Natal (KZN). It was conducted in KZN because it had the highest COVID-19 infection rate after the Gauteng province at the time of the study.[15] More specifically, this study determined which nutritional guidelines dietitians used in the management of adult COVID-19 patients, which methods were used to carry out an anthropometric assessment in COVID-19 patients, based on their degree of mobility as well as whether dietitians assessed the risk of malnutrition in adult COVID-19 patients, and, if so, which nutrition screening tools were used.

Methods

Study design

A cross-sectional study was conducted.

Study population and sample selection

Dietitians who were registered with the Health Professions Council of South Africa (HPCSA) and employed in both the public and private sectors in KZN were invited to participate in the study. Only dietitians who had treated hospitalised adult patients with COVID-19 in KZN were included in the study, while those who had not treated hospitalised adult patients with COVID-19 in KZN were excluded. The province of KZN was selected because it had the second-highest number of COVID-19 cases in South Africa (SA) at the time of the study, and it accounted for 18% of the total infections, 16% of the total deaths, and 13% of all the active cases in the country.[15] The KZN Department of Health (DOH) and the KZN branch of the Association for Dietetics in South Africa (ADSA) were approached to assist with contacting dietitians for the study. An email or WhatsApp message with an accompanying link to the study was sent out to all the dietitians on the KZN DOH and ADSA mailing lists. A total of 295 dietitians (151 DOH-employed dietitians and 144 ADSA members) were identified at the start of the study. Assuming a margin of error of 0.05 and an alpha value of 0.05, the minimum sample required from a population of 295 individuals was calculated to be 167 individuals. It should be noted that the initially identified sample size was not mutually exclusive, and that there may have been an overlap between dietitians in the KZN DOH sector who were also ADSA members and vice versa. Due to the Protection of Personal Information Act (POPI Act) (SA Government Gazette No. 37067),[16] which was in place in SA at the time of the study, it was not possible to identify individuals from each group. This meant that some dietitians may have been invited to participate in the study more than once. In order to address this issue, dietitians were asked to answer the questionnaire only once, regardless of how many times they were invited to participate.

Electronic self-administered questionnaire

A self-administered questionnaire was developed to collect data, and it was administered electronically by using an online platform called Google Forms. The questionnaire was divided into four different sections. Section A covered the treatment of COVID-19 patients, Section B obtained their demographic information, Section C collected data on the nutritional assessment of COVID-19 patients, and Section D covered the therapeutic nutrition in COVID-19 patients. However, not all data are reported in this paper. At the time of developing the questionnaire for the current study, only a limited number of clinical studies offered guidelines for the nutritional management of COVID-19 patients. Therefore, many of the questions or topics in the questionnaire were developed from a medical perspective and from the meta-analyses that were available at the time.

In March 2020, ESPEN published the already-existing practical guidelines on nutrition in critically ill patients,[14] while the American Society for Parenteral and Enteral Nutrition (ASPEN)[17] and the South African Society for Parenteral and Enteral Nutrition (SASPEN)[18] published recommendations on nutrition in critically ill patients in April 2020, based on the ESPEN publication. All of these recommendations considered COVID-19 patients, and focused on the use of screening tools, the methods used to carry out an anthropometric assessment, and nutritional intervention. Furthermore, these papers provided an indication of the macronutrient requirements and micronutrient supplementation.

As COVID-19 was a relatively new infectious disease at the time of development and review of the questionnaire for the current study, there were not many experts on this infection. However, the following individuals were invited to be part of the expert panel to review the questionnaire: an intensive care unit (ICU) physician, an internal medicine physician, an academic in the dietetics field, and two clinical dietitians. The physicians and academic were based in KZN, while the dietitians were from the Western Cape province in SA. The expert review panel was asked to review and evaluate the questionnaire in terms of it meeting the objectives of the study, the suitability of its content, and the comprehensiveness of the questions. The researcher revised the questionnaire in line with the comments received from the expert review panel. A pilot study was conducted by using 15 dietitians who worked in the Gauteng province of SA, as they did not meet the inclusion criteria for participating in the main study. The questionnaire was revised in line with the feedback received from the dietitians who participated in the pilot study. The questionnaire contained a total of 16 questions. The information and consent form informed the dietitians that it would take a maximum of 10 minutes to complete the questionnaire.

Data collection

The online platform used in this study was Google Forms, which was selected as it has many useful features. Some of these include: the unlimited survey questions and responses, the automatic collection of survey data into Google spreadsheets, multiple customisation options, the ability to insert images and videos into the survey, and the allowance for page branching and skip question logic. It also allows multiple collaborators to work on the development of the survey.[19]

KwaZulu-Natal Department of Health dietitians

The KZN Nutrition Directorate distributed the link to the study via email to the dietetics departments of all DOH hospitals in KZN on 14 August 2022. At the end of the initial data collection period, which closed on 30 September 2022, there was a poor response to the study, as less than 12% of the minimum sample of dietitians had participated. The closing date was extended to 31 March 2023, in order to improve the response rate.

Association for Dietetics in South Africa members

The ADSA in KZN posted the link to the study on the KZN WhatsApp group. According to the ADSA, there were 144 ADSA members at the commencement of data collection, 60 of whom were part of the WhatsApp group. The link to the study was distributed on 16 August 2022 and the concluding date for data collection was given as 30 September 2022. Once again, due to a poor initial response, the data collection period was extended to 31 March 2023, in order to improve the response rate. To improve participation in the study, the KZN dietitians listed on the "Find a Dietitian" webpage on the ADSA website were contacted via email or telephone, depending on which details were available. A standard email containing information on the study and the informed consent document, as well as the link, were sent out individually to the dietitians, inviting them to participate in the study.

Statistical analysis

The data were analysed by using the Statistical Package for the Social Sciences (SPSS) Version 25 (IBM Corp, Armonk, NY, USA). The statistical tests that were used to analyse the data included descriptive statistics, as well as the chi-square goodness-of-fit and binomial tests. A p-value of < 0.05 was considered as statistically significant.

Ethics approval

Ethical approval was obtained from the University of KwaZulu-Natal (UKZN) Biomedical Research Ethics Committee (BREC) (reference number: BREC/00003865/2022). In addition, the Nutrition Directorate of the KZN DOH issued a letter of support for the study. Ethics approval was obtained from the National Health Research Database (NHRD). A letter of support from the ADSA KZN allowed the researcher to contact dietitians in the private sector. An information document and consent form were distributed, together with the link to the study. When participants opened the link to the study, they viewed the information document and consent form, and were informed that by clicking on the button labelled "Next" they were consenting to participate in this study and would then be allowed to continue to the questionnaire. Participants were free to withdraw from the study at any time, without penalty.

Results

Forty-eight dietitians began answering the questionnaire; however, six were excluded at the start of the questionnaire, as they had not treated any COVID-19 patients. They were not allowed to proceed any further, which resulted in a sample of 42 dietitians.

The affiliations and primary work locations of the dietitians who participated in the study are presented in Table 1.

About half ($n = 22$; 52.4%) of the dietitians were KZN DOH employees, while 31.0% ($n = 13$) were ADSA members. Sixteen dietitians (38.1%) worked at a private hospital and 16 (38.1%) worked at a district-level hospital. Two dietitians (4.8%) selected the option of "other" for their primary work location and when prompted to specify, one of them (2.4%) indicated that they worked in both regional and private hospitals during the pandemic, while the other ($n = 1$; 2.4%) indicated that they worked in a specialised hospital (Table 1).

Table 1: Affiliations and primary work locations of the dietitians ($n = 42$)

Factor	*n* (%)*
Affiliations	
KZN DOH employee	22 (52.4)
ADSA member	13 (31.0)
Both KZN DOH employee and ADSA member	3 (7.1)
Neither KZN DOH employee nor ADSA member	4 (9.5)
Primary work locations	
Private hospital	16 (38.1)
Tertiary-level hospital	4 (9.5)
Regional-level hospital	3 (7.1)
District-level hospital	16 (38.1)
Community health centre	0
Clinic	0
Private practice	1 (2.4)
Other	2 (4.8)

*Percentage of sample ($n = 42$).
KZN DOH = KwaZulu-Natal Department of Health; ADSA = Association for Dietetics in South Africa.

Table 2 indicates the nutrition societies that the dietitians consulted for guidelines or nutritional recommendations on the management of patients with COVID-19.

Thirteen dietitians (31.0%) reported that they did not consult a nutrition society for guidelines or nutritional recommendations on how to manage patients with COVID-19, while 12 (28.6%) consulted ESPEN. The five dietitians (11.9%) who selected the option of "other" were broken down further as follows: two dietitians (4.8%) consulted the first three options, namely ASPEN, ESPEN and SASPEN, one dietitian (2.4%) consulted online platforms, including the Nestlé Nutrition Institute Africa (NNIA) and De Nova Medica, one dietitian (2.4%) consulted studies published during the COVID-19 pandemic by Paul Wischmeyer (a critical care, peri-operative and nutrition physician-researcher who specialised in surgical recovery, critical care, and COVID-19), and one dietitian (2.4%) reported attending three webinars that provided information from various nutrition societies and organisations (see Table 2).

Table 3 presents the values/ranges that the dietitians used to calculate the energy, carbohydrate, protein, and fat requirements for patients with COVID-19.

According to Table 3, 28.6% of dietitians ($n = 12$) reported using a range of 25–30 kcal/kg/day when calculating the energy requirements for patients with COVID-19. This was followed by six dietitians (14.3%) who reported using a range of 25–35 kcal/kg/day. Three dietitians (7.1%) stated that they did not calculate the energy requirements of patients with COVID-19. Six dietitians (14.3%) were categorised into "other" and provided the following explanations:

- "150–200" (kJ/kg/day).
- "20–25 kcal initially in unstable (patients), or 10 kcal/kg with re-feeding (syndrome) and 25–30 kcal/kg in stable (patients)."
- "Day 1: 10 kcal/kg; Day 2: 15 kCcal/kg; Day 3: 20 kcal/kg; Day 4: 25 kcal/kg."
- "It depended on their nutritional status and underlying medical condition."
- "Schofield equation with adjusted stress factors."
- "Ventilated patients (on) Days 0–4: 15 kcal/kg/day energy (and) Day 4 onwards: 25–35 kcal/kg/day."

Table 2: Nutrition societies that the dietitians consulted for guidelines or nutritional recommendations on the management of patients with COVID-19 ($n = 42$)

Nutrition society	*n* (%)*
American Society for Parenteral and Enteral Nutrition (ASPEN)	7 (16.7)
European Society for Parenteral and Enteral Nutrition (ESPEN)	12 (28.6)
South African Society for Parenteral and Enteral Nutrition (SASPEN)	5 (11.9)
I did not consult a nutrition society	13 (31.0)
Other	5 (11.9)

*Percentage of sample ($n = 42$).

Table 3: Values/ranges that dietitians used to calculate energy, carbohydrate, protein and fat requirements for patients with COVID-19 ($n = 42$)

Energy (kcal/kg/day)	*n* (%)*	Carbohydrate (% TER)	*n* (%)*	Protein (g/kg/day)	*n* (%)*	Fat (% TER)	*n* (%)*
14	1 (2.4)	15	1 (2.4)	0.8–1.1	1 (2.4)	15–20	1 (2.4)
20–23	1 (2.4)	40–45	1 (2.4)	0.8–1.5	1 (2.4)	15–25	1 (2.4)
20–25	1 (2.4)	40–50	3 (7.1)	0.8–2.0	1 (2.4)	15–40	1 (2.4)
25	3 (7.1)	40–60	1 (2.4)	1.0–1.2	1 (2.4)	20	1 (2.4)
25–30	12 (28.6)	45–50	1 (2.4)	1.0–1.3	1 (2.4)	20–25	1 (2.4)
25–35	6 (14.3)	45–55	1 (2.4)	1.0–1.5	3 (7.1)	20–30	3 (7.1)
28–35	1 (2.4)	45–60	1 (2.4)	1.0–2.0	2 (4.8)	25	2 (4.8)
30	2 (4.8)	50	2 (4.8)	1.2	2 (4.8)	25–30	4 (9.5)
30–35	3 (7.1)	50–55	2 (4.8)	1.2–1.5	6 (14.3)	30	15 (35.7)
30–50	1 (2.4)	50–60	8 (19.0)	1.2–1.6	2 (4.8)	30–35	1 (2.4)
35	1 (2.4)	55	6 (14.3)	1.2–2.0	4 (9.5)	30–40	2 (4.8)
35–45	1 (2.4)	55–60	4 (9.5)	1.3	2 (4.8)	40	1 (2.4)
Other	6 (14.3)	60	4 (9.5)	1.3–1.5	1 (2.4)	Other	4 (9.5)
Did not calculate	3 (7.1)	Other	3 (7.1)	1.3–2.0	2 (4.8)	Did not calculate	5 (11.9)
		Did not calculate	4 (9.5)	1.5	3 (7.1)		
				1.5–1.8	1 (2.4)		
				1.5–2.0	3 (7.1)		
				Other	3 (7.1)		
				Did not calculate	3 (7.1)		

*Percentage of sample ($n = 42$).
TER = total energy requirement.

Eight dietitians (19%) reported using a range of 50–60% of the total energy requirement (TER) when calculating the carbohydrate requirements for patients with COVID-19, followed by six (14.3%) who indicated that they used 55% of the TER. Four dietitians (9.5%) indicated that they did not calculate carbohydrate requirements for patients with COVID-19. Three dietitians (7.1%) were categorised into "other" and provided the following explanations:

- "50–70% dependent on whether the patient is in distress or not."
- "It depended on their nutritional status, and other underlying medical conditions."
- "In theory, max 4–5 mg/kg/min. In practice, not possible. Again, the most critically ill were on total parenteral nutrition (TPN). Volumes were limited or dictated by the physician, blood sugars were usually uncontrolled."

Six dietitians (14.3%) reported using a range of 1.2–1.5 g/kg/day when calculating the protein requirements, followed by four dietitians (9.5%) who reported using a range of 1.2–2.0 g/kg/day. Three dietitians (7.1%) indicated that they used a value of 1.5 g/kg/day to calculate the protein requirements. Three dietitians (7.1%) stated that they did not calculate the protein requirements for COVID-19 patients. About 7% ($n = 3$) of the dietitians were categorised into "other" and provided the following explanations:

- "> 2.0 g/kg due to the majority being obese."
- "1.2/1.3–2.0 g/kg or 0.8–1.0 g/kg in (patients with) renal failure not on haemodialysis."
- "It depended on their nutritional status, and other underlying medical conditions."

Just over one-third of the dietitians ($n = 15$) reported using 30% of TER when calculating the fat requirements for patients with COVID-19. This was followed by four dietitians (9.5%) who indicated using a range of 25–30% of TER, and three dietitians (7.1%) who reported using a range of 20–30% of TER. Five dietitians (11.9%) stated that they did not calculate the fat requirements for patients with COVID-19. About 10% ($n = 4$) of the dietitians were categorised into "other" and provided the following explanations:

- "< 30%."
- "30% fat, if not in respiratory distress, and 50% for ventilated patients."
- "It depended on their nutritional status and other underlying medical conditions."
- "In theory, 0.7–1.5 g/kg per day. Not applicable in clinical practice, the most critically ill were on TPN due to continuous positive airway pressure (CPAP) masks – soybean, medium-chain triglyceride (MCT), olive and fish oil (SMOF) lipids were of preference."

Dietitians were asked to indicate whether they carried out an anthropometric assessment or not, based on the patient's degree of mobility. If they answered "yes", they were asked to select the methods used from the options provided. Dietitians could select more than one option (Table 4).

For bed-bound patients who could not move and/or who were unconscious, 76.2% ($n = 32$) of the dietitians carried out an anthropometric assessment ($p = 0.001$), and 73.8% ($n = 31$) used the estimated weight, height and body mass index (BMI) ($p = 0.003$). Just over 40% of dietitians ($n = 17$) used the MUAC, while a few used the ulna length ($n = 1$; 2.4%) and knee height ($n = 2$; 4.8%). About 64% ($n = 27$) of dietitians estimated the weight, height, and BMI in patients who were bed-bound, but who could sit up ($p = 0.088$), while 42.9% ($n = 18$) used the MUAC and only a few used the ulna length ($n = 1$; 2.4%) and knee height ($n = 4$; 9.5%). About 83% ($n = 35$) measured the actual weight, height, and BMI in fully mobile

Table 4: Methods used to carry out anthropometric assessment in patients with COVID-19, based on their degree of mobility ($n = 42$)

Degree of mobility	*n* (%)*		*p*-value#
	Yes	No	
Bed-bound, cannot move, unconscious			
Anthropometric assessment carried out	32 (76.2)	10 (23.8)	**0.001**
Measured actual weight, height, and BMI	2 (4.8)	40 (95.2)	**<0.001**
Estimated weight, height, and BMI	31 (73.8)	11 (26.2)	**0.003**
MUAC	17 (40.5)	25 (59.5)	0.280
Ulna length	1 (2.4)	41 (97.6)	**<0.001**
Knee height	2 (4.8)	40 (95.2)	**<0.001**
Other	0 (0)	42 (100.0)	**<0.001**
Bed-bound, but can sit up			
Anthropometric assessment carried out	33 (78.6)	9 (21.4)	**<0.001**
Measured actual weight, height, and BMI	7 (16.7)	35 (83.3)	**<0.001**
Estimated weight, height, and BMI	27 (64.3)	15 (35.7)	0.088
MUAC	18 (42.9)	24 (57.1)	0.441
Ulna length	1 (2.4)	41 (97.6)	**<0.001**
Knee height	4 (9.5)	38 (90.5)	**<0.001**
Other	1 (2.4)	41 (97.6)	**<0.001**
Fully mobile			
Anthropometric assessment carried out	38 (90.5)	4 (9.5)	**<0.001**
Measured actual weight, height, and BMI	35 (83.3)	7 (16.7)	**<0.001**
Estimated weight, height, and BMI	4 (9.5)	38 (90.5)	**<0.001**
MUAC	13 (31.0)	29 (69.0)	**0.020**
Ulna length	0 (0)	42 (100.0)	**<0.001**
Knee height	0 (0)	42 (100.0)	**<0.001**
Other	1 (2.4)	41 (97.6)	**<0.001**

*Percentage of sample ($n = 42$).
#Binomial test; *p*-values in bold are statistically significant.
BMI = body mass index; MUAC = mid-upper arm circumference.

patients, while 31.0% ($n = 13$) used the MUAC, and no dietitians used the ulna length and knee height ($p < 0.001$) (see Table 4).

Half of the dietitians ($n = 21$) reported using a nutrition screening tool to screen for malnutrition in patients with COVID-19. Of these dietitians, a significant proportion ($n = 13$; 61.9%) used the Nutrition Risk Screening 2002 (NRS-2002) tool ($p < 0.001$), followed by the Malnutrition Universal Screening Tool (MUST) ($n = 4$; 19.0%) (Table 5).

Table 5: Use of nutrition screening tools by dietitians to screen for malnutrition ($n = 21$)

Screening tool used	*n* (%)*	*p*-value#
Yes	21 (50.0)	**1.000**
No	21 (50.0)	
Names of screening tools used		
Geriatric Nutrition Risk Index (GNRI)	0 (0)	
Global Leadership Initiative on Malnutrition (GLIM)	1 (4.8)	
Malnutrition Universal Screening Tool (MUST)	4 (19.0)	
Mini Nutritional Assessment-Short Form (MNA-SF)	1 (4.8)	
Nutrition Risk in the Critically Ill (NUTRIC)	1 (4.8)	
Nutrition Risk Screening 2002 (NRS-2002)	13 (61.9)	**< 0.001**
Short Nutritional Assessment Questionnaire (SNAQ)	0 (0)	
Subjective Global Assessment (SGA)	1 (4.8)	
Other	0 (0)	

*Percentage of sample ($n = 21$).
#Chi-square goodness of fit test; *p*-values in bold are statistically significant.

Discussion

This study aimed to determine how dietitians managed adult patients who were hospitalised with COVID-19 in KZN. More specifically, the study determined which nutritional guidelines the dietitians used in the management of adult COVID-19 patients, which methods were used to carry out an anthropometric assessment in COVID-19 patients, based on their degree of mobility, and whether dietitians assessed the malnutrition risk in adult COVID-19 patients, and if so, which nutrition screening tools were used.

It is common for dietitians to consult nutrition societies for recommendations or guidelines on the nutritional management of various nutrition-related diseases. However, in the current study, many dietitians reported that they did not consult a nutrition society for guidelines on the nutritional management of COVID-19. This was unexpected, given that COVID-19 was a new disease at the time of the study, without any published medical or nutritional management guidelines. The novelty of COVID-19 and the swiftness with which it spread[11] should have been an indication for dietitians to consult colleagues, nutrition organisations and other reliable sources for information on the nutritional management of COVID-19. Of the dietitians who consulted a nutrition society for guidelines on the nutritional management of COVID-19, most consulted ESPEN, followed by ASPEN and SASPEN, all of which are reliable nutritional sources. Most of the available published articles referred to the ESPEN guidelines and recommendations on the management of critically ill patients, as most COVID-19 patients worldwide were critically ill or at an advanced age.

A few dietitians in the current study referred to other sources for information on the nutritional management of COVID-19 patients. These sources included reputable organisations, such as the WHO and NNIA. The WHO had created a special hub for COVID-19 and included COVID-19-related publications for easy access. The NNIA website was a nutrition-related website that healthcare professionals could access for publications, webinars, and other valuable information on COVID-19. Webinars and early published literature on best practices were popular,[20] which is consistent with what some dietitians reported in the current study. This study highlights that it is important for dietitians to use evidence-based information and guidelines when applying medical nutrition therapy.

Energy values, in various increments, ranging between 20 and 35 kcal/kg/day, were typically used by dietitians in the current study. This is in line with the recommended ESPEN energy values of 27 kcal/kg/day to 30 kcal/kg/day for critically ill patients, which may be adjusted to account for their physical activity, metabolic stress, and gastrointestinal (GIT) tolerance.[14] Interestingly, only one dietitian reported using predictive equations, such as the Schofield equation, with adjustments

made for stress factors, to calculate the energy requirements. Both ESPEN and ASPEN mention that this is an acceptable practice in the management of COVID-19.[14,17] ASPEN recommends a more cautious approach to meeting the energy requirements in COVID-19 patients, beginning with 15–20 kcal/kg/day and gradually increasing this until the full energy requirements are met.[17] Some dietitians in the current study adopted this method of cautious feeding, especially in unstable or ventilated patients. A few dietitians in the current study reported not calculating the energy requirements in the current study, which was not unexpected, as there were limited studies and guidelines on the nutritional management of COVID-19 in the early stages of the pandemic, which resulted in uncertainty among some dietitians.

Dietitians reported meeting the protein requirements of COVID-19 patients, but they also considered their pre-existing medical conditions, such as obesity and renal failure, when calculating these requirements. As many COVID-19 patients presented with such co-morbidities, an individualised approach was prudent. In obese patients, ESPEN recommends a 1.3 g/kg/day adjusted body weight (Adj-BW) to preserve the muscle mass.[14] However, in the current study, dietitians reported providing > 2 g/kg/day to obese patients with COVID-19. Furthermore, COVID-19 patients with renal failure were given less than 1 g/kg/day of protein, which is in line with the ESPEN recommendations. Most dietitians in the current study frequently used protein values in increments that ranged between 1 and 2 g/kg/day. This is consistent with both the ESPEN and ASPEN guidelines, as ESPEN recommends using 1–1.3 g/kg/day of protein, while ASPEN recommends using 1.2–2 g/kg/day.[14,17] When aiming to provide an optimal amount of protein to safely meet their patient's increased requirements, dietitians should always consider the nutritional and medical status of their patient on an individualised basis.[14] An international, multi-centre and randomised clinical trial that included data from 16 countries compared the use of high-dose protein (≥ 2.2 g/kg/day) with usual-dose protein (≤ 1.2 g/kg/day) in 1 301 mechanically ventilated ICU patients.[21] The findings indicated that a higher dose of protein in mechanically ventilated ICU patients did not appear to improve the mortality and discharge rates.[21]

The percentage of TER for fat and carbohydrate may differ in COVID-19 patients, particularly in those on mechanical ventilation, or with acute respiratory distress syndrome (ARDS). According to ESPEN recommendations, for TER, a fat-to-carbohydrate ratio of 30:70 is suitable for non-ventilated patients without ARDS, and a ratio of 50:50 is appropriate for ventilated patients with ARDS.[14] The reason for a lower recommendation of carbohydrate in ventilated patients, or those with ARDS, is that there are reduced body stores of carbon dioxide, which reduces the ratio of the partial pressure of the arterial carbon dioxide (PaCO2) levels, and decreases the amount of time spent on the ventilator.[22] In the current study, dietitians reported using lower values for fat (less than 40% of TER), and slightly higher values for carbohydrates (ranging between 50% and 60% of TER), which could suggest that some of the COVID-19 patients who were seen were not being mechanically ventilated. These values should also be adjusted based on other factors, such as increasing the blood glucose levels, the fluid restrictions, the blood parameters, and the patients on TPN.[17,23]

The current study showed that the estimated weight, height, and BMI were most often used in bed-bound patients. The actual bodyweight was the second most frequently used weight parameter for calculating the nutritional requirements, and it was mostly measured in mobile patients. Less than a quarter of the dietitians in the current study stated that they used the ideal body weight (IBW) or Adj-BW, when calculating the nutritional requirements. This is interesting, because ESPEN mentions that IBW and Adj-BW should be used in certain energy and protein calculations, for example in polymorbid obese adults,[14] which was frequently observed during the COVID-19 pandemic. In addition, IBW and Adj-BW should also be considered for patients who are severely malnourished, or who have existing amputations or ascites.[24]

During the COVID-19 pandemic, many patients were bed-bound due to severe illness.[10] Thus, estimating their height may have been more difficult, as immobile patients would not always have been lying in a supine position and it may not have been appropriate to move the patient. Although predictive equations and measurements, such as the ulna length, knee height and arm span, are available to estimate the patient's height,[25] these parameters were seldom used by dietitians in the current study. Dietitians can estimate the BMI by using other body parameters, such as the MUAC.[26] A retrospective study between 2004 and 2013, which included 1 373 patients in Spain, found a significant and positive correlation between the MUAC and BMI.[26] This indicates that the MUAC can be used as an alternative for assessing the BMI, when the weight and height of a patient cannot be easily obtained. The current study supports this, as the MUAC was the second most common method used to carry out an anthropometric assessment in COVID-19 patients. This may be because it is relatively easy to assess, it does not require expensive equipment,[26] and it would have required little physical contact between the dietitian and patient.

Malnutrition screening tools were used by half of the dietitians in the current study, and the NRS-2002 was the screening tool of choice for approximately 62% of these dietitians. Several studies[14,27–30] have supported the use of the NRS-2002 as a prognostic tool for determining the length of hospital stay and mortality of older hospitalised patients, with or without COVID-19. A cross-sectional study that included 100 COVID-19 patients admitted to a hospital in Iran found that, for an increase in one unit of the NRS-2002 score, the mortality odds rose by 354%.[31] This shows that the NRS-2002 is highly sensitive in predicting the disease outcome in COVID-19 patients, based on their nutritional status and malnutrition risk.[31] Despite there being no gold-standard nutrition screening tool,[30] the NRS-2002 is considered to be well validated and it is widely used in a hospital setting.[2] The NRS-2002 appears to be appropriate for COVID-19 patients, as it considers different aspects, such as their nutritional status, medical condition, and age, yet it is relatively quick to use.[31]

By identifying malnutrition early, dietitians are in a better position to provide aggressive nutritional intervention, which can improve both the short- and long-term prognosis of patients, with or without COVID-19.[2] As only half of the dietitians used nutrition screening tools for COVID-19 patients in the current study, there is a need to increase awareness of their benefits for the screening of malnutrition in hospitalised patients. This was one of the first studies in SA to investigate how dietitians managed adult patients who were hospitalised with COVID-19. Although the participating dietitians used the ESPEN recommendations on the nutritional management of critically ill patients to manage their COVID-19 patients, this study highlights the need

for local nutritional guidelines for the management of adult patients who are hospitalised with COVID-19.

Study limitations

The small sample size did not allow for any generalised conclusions to be drawn by dietitians in KZN regarding the nutritional management of adult patients hospitalised with COVID-19. Because the data were collected late in the pandemic (between August 2022 and March 2023), the number of adult patients who were hospitalised with COVID-19 would have been reduced. This would also have reduced the number of dietitians who were able to meet the study inclusion criteria. At the time of conceptualising this study, the focus was on hospitalised adult COVID-19 patients only, and it did not consider outpatient care and follow-up management. There were no studies with which to compare the results of the current study, as there was a lack of research by dietitians in SA on the nutritional management of COVID-19. This has limited the discussion of the results.

Conclusion

Although dietitians were involved in treating COVID-19 patients from the onset of the pandemic, most of them were not treating any COVID-19 patients at the time of data collection. Most dietitians consulted the ESPEN recommendations on the nutritional management of critically ill patients to manage their COVID-19 patients. The values, or ranges, for the energy, protein, fat, and carbohydrate requirements used by the dietitians in the current study were similar to those recommended by ESPEN for critically ill patients. Dietitians carried out an anthropometric assessment of hospitalised COVID-19 patients mainly by estimating their weight, height, and BMI. When possible, their actual weight, height, and BMI were assessed. Dietitians used a nutrition-screening tool to screen for malnutrition in patients with COVID-19, with the NRS-2002 being the most popular screening tool, followed by the MUST.

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