



A PROJECT REPORT

On

Overview of Nutritional Management of COVID-19 Patients during and Post Hospitalization Periods - a Case Study of Imperial Hospital Ltd, Chittagong.

Submitted to

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LETTER OF TRANSMITTAL

Date: 19 July, 2021

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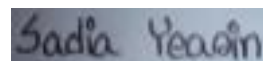
Subject: Submission of Project Report.

Dear Sir,

It is a great pleasure to submit my Project Report, as a partial requirement and a prerequisite for completion of the BSc. in Nutrition and Food Science Program. I believe it is one of my great achievements to pursue and successfully complete my project work under the supervision of **Dr. Amir Ahmed**, Head, Department of Real Estate, Daffodil International University. This report is based on my work entitled “Overview of Nutritional Management of COVID-19 Patients During and Post Hospitalization Periods - a Case Study of Imperial Hospital Ltd, Chittagong.” I have got the opportunity to work as an intern at icddr,b in the Health System and Population Study Division for four months, under the supervision of **Dr. Sabrina Rashid**, Associate Scientist. The concept and the research framework were greatly assisted by both of my supervisors. I have completed my data collection through an interactive procedure by visiting the Imperial Hospital, Chittagong. However, I strongly believe that I have maintained the ethical standard of research and also satisfied the basic research methodology in my project.

I shall be highly obliged if you are kind enough to accept this project report and provide me your valuable judgment. It would be my immense pleasure if you find this report useful and informative to have an apparent perspective on this issue.

Thank you again for your support and patience.



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DEDICATION

This research work is dedicated to my beloved father **Saydul Islam** and mother **Shahanaj Islam** who gave me the support and courage to fulfill this work successfully.

LETTER OF RECOMMENDATION

This is to certify that the project report entitled “**Overview of Nutritional Management of COVID-19 Patients During and Post Hospitalization Periods - a Case Study of Imperial Hospital Ltd, Chittagong.**” has been submitted for assessment to the examination committee by **Sadia Yeasin Mim** bearing **ID: 171-34-598**, Department of Nutrition and Food Engineering (NFE), Daffodil International University (DIU).

I am pleased to declare that this project report is entirely written by the author and all the related works have been conducted by the intern under my strong supervision and observation. This is a piece of original work and has not been submitted or published anywhere for any other purpose.

I strongly recommend the approval of the report by the authority and I also pursue a positive and fair evaluation of this work.

I wish her all the success in life.

Yours Sincerely




Dr. Amir Ahmed
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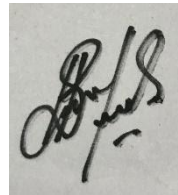
CERTIFICATE OF APPROVAL

I am pleased to certify that the project report on “**Overview of Nutritional Management of COVID-19 Patients During and Post Hospitalization Periods - a Case Study of Imperial Hospital Ltd, Chittagong.**” prepared by **Sadia Yeasin Mim** bearing **ID: 171-34-598**, of the Department of Nutrition and Food Engineering, Daffodil International University has been approved for presentation and defense/viva-voice.

I am pleased to hereby certify that the data and finding presented in the research report are the authentic work of **Sadia Yeasin Mim** bearing **ID: 171-34-598**, I strongly recommend the research report to be presented by **Sadia Yeasin Mim** for further academic recommendations and defense/viva voce. **Sadia Yeasin Mim** bears a strong moral character and a very pleasant personality. It has indeed a great pleasure working with her. I wish her all success in life.



18/07/2021



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My warmest thanks to our Coordination Officer **Mr. Emran Hossain**, Assistant Technical Officer **Mr. Reaz Mahmood** and Assistant Officer **Mr. Elahi Box**. My gratitude goes to the entire NFE Department of Daffodil International University for arranging this research opportunity and facilitating the work throughout.

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ABBREVIATIONS

CVDs - Cardiovascular Diseases

FAO - Food and Agriculture Organization of the United Nations

ESPEN - European Society for Clinical Nutrition and Metabolism

IHL - Imperial Hospital limited

BRAT - Bland food diet recommended for adults and children

COPD - Chronic obstructive pulmonary disease

NGF - Nasogastric Feeding

ABSTRACT

Limited is a prominent quality healthcare service provider in Chittagong, the 2nd largest and important metropolitan city in Bangladesh. Based on some recent studies worldwide in regard to a fairly established relation between nutritional management of COVID-19 patients and rate of recovery, a case study on patients of this hospital was undertaken to explore, understand and screen the nutritional management of COVID-19 patients hospitalized during November 2020 to April 2021 with various symptoms and co-morbidities during hospitalization period and the post hospitalization home care. Hospital records and discharge sheets have been utilized as secondary data while face to face interviews of some nutritionists and health care providers have been recorded and analyzed as primary sources of investigation. Admitted COVID-19 patients are categorized into 4 different zones IUC, Red, Yellow and Green zones respectively depending on their physical condition and severity of the symptoms. Nutritional management of IUC patients are mainly advised by the unit specialist physician in consultation with the chief dietitian and mostly NGF. Patients in Red and Yellow zones are the core patients who receive intensive nutritional care with a case specific diet including therapeutic supplement considering the severity of the symptoms and more specifically the pathological condition as well as co-morbidity. Most challenging nutritional management is found in patients with diabetes (carbohydrates withdrawn) and renal impairment (protein withdrawn) in the lunch. On the other hand patients in the green zone are mostly treated with a high protein and high mineral diet as they have mild to moderate symptoms. There are several cases where nutritional management accelerated the rate of recovery of some critically ill patients. Patients with severe gut linkage have been treated with BRAT Diet, a special menu consisting of bread, apple puree or juice, raw banana curry and rice cakes. A special type of drink called Anti Inflammatory Drink was administered to patients in the Red and Yellow zone, 250 ml in each serve twice daily. A special type of Turmeric drink was recommended for patients in post hospitalization homestay 330ml before bed. Post COVID patients are also advised to have high protein and high mineral diets with Vitamin-C and Zinc supplements in pharmaceutical form. As observed in the study along with supported data, overall patient's management is a great success in this hospital with some innovative nutritional intervention in the dietary care of the patients. It is also recommended that other hospitals can test and practice the same nutritional management from the lesson learned in this study of Imperial Hospital Ltd.

CHAPTER-1

1. INTRODUCTION

1.1 COVID 19 an overview:

A newly discovered virus which is an infectious disease called Corona disease (COVID-19). Which people are infected through coronavirus they will mostly experience respiratory illness from mild to moderate as well as without requiring special treatment they can recover. People who are older in age and people with underlying diseases like chronic respiratory disease, cardiovascular disease, diabetes and cancer are provable to develop severe illness. (WHO, 2021)

To know the facts about the COVID-19 virus as an example of the causes of this disease and in what way it spreads is the most effective way to slow down and prevent transmission. People can protect themselves and others from infection by washing their hands or can use an alcohol based rub at every step and avoid touching the face.

The COVID-19 virus spreads primarily by droplets of saliva or nasal discharge while a contaminated person coughs or sneezes, so that it's important that practicing respiratory manners in particular through coughing towards a flexed elbow.(WHO 2021)

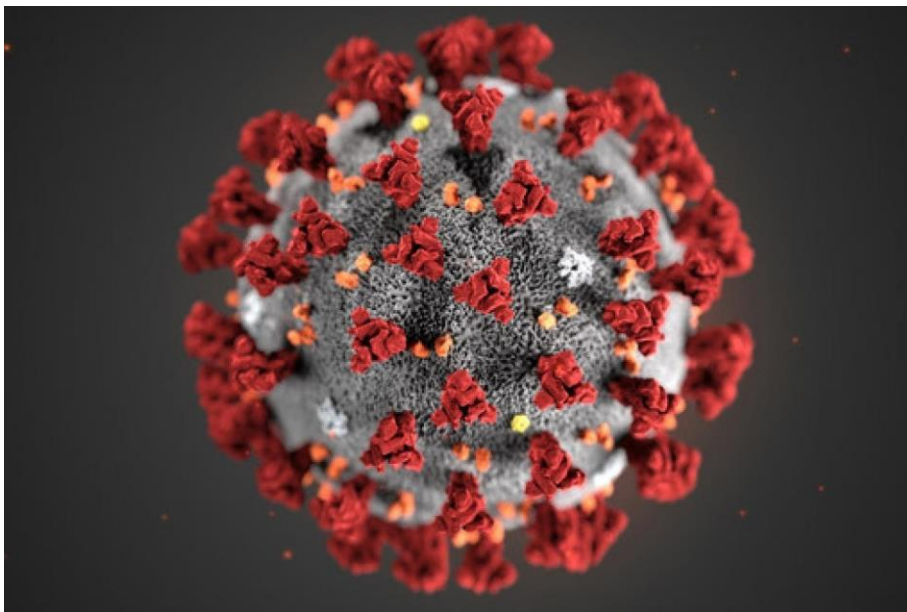


Figure 01: Coronavirus (3D Model)

COVID-19 virus causes respiratory illness in people and can spread to another person. People can be infected with COVID-19 commonly indicate symptoms near to that of a flu or cold, cough, fever, cough, or difficulty in breathing. The novel coronavirus can also attach to the lungs, which can cause symptoms of a respiratory tract illness.

There are seven types of coronavirus known to affect human. These are 229E, NL63, OC43, HKU1, MERS-CoV, SARS-CoV, SARS-CoV2 (WHO 2021).

1.2 How nutrition helps in combating COVID-19:

Nutrition plays a vital role in any disease. Especially when someone affected by COVID 19 body needs more nutrients and more energy. Because of this, healthy eating is essential in the time of COVID-19 pandemic. Good nutrition and proper dietary management can boost the immune system, though specific food or any vitamins and minerals cannot stop COVID-19 infection. Advantage of a proper diet is that it makes the body stronger to fight with viruses.

FAO encourages people maintain a healthy to:

- To ensure enough intake of proper nutrients one needs to eat different types of food within an individual food group including over all the food group. FAO has drawn up many countries' food based dietary guidelines for advice on a healthy diet in a country.
- Adequate fruits and vegetables to eat .We need to maintain a healthy diet for that we have to consume fresh fruits and vegetables. Because fruits and vegetables have lots of vitamins and minerals. Due to COVID-19 limit going to the market or supermarket, people can also buy canned or frozen fruits and vegetables. Canned products also contain vitamins and minerals. But sometimes for processing some ingredients are added in canned products as an example salt, sugar or preservation. For that reason labels should be read carefully so people can choose the best for them and their family to limit consumption of these ingredients.
- Eat a diet rich in nuts, whole grains and healthy fats as an example in sesame, olive, peanut or other oils which are rich in unsaturated fatty acids. These diets may help to reduce inflammation and also support a strong immune system.
- Observe the consumption of fats, salt and sugar. Sometimes people eat food as a comfort in stressful situations at that time which can cause overconsumption. In which food we find

comfort that is very tasty because these foods are high in fat and calories. For that reason we have to limit the consumption of these foods. Once more, labeling of food is helpful here so that consumers can limit buying these foods.

- Maintain good practice food hygiene. Due to COVID-19 pandemic, we have to be more concerned about the safety of food. But, COVID-19 is not a food-borne disease, it is a respiratory virus. This disease cannot be spread through contact with purchased food.
- However, here are practicing five keys to support food safety:
 1. Keep clean;
 2. Separate raw and cooked;
 3. Cook thoroughly;
 4. Keep food at safe temperatures;
 5. Use safe water and raw materials.
- Drink water every day. Proper amount of water keeps body well hydrated. Body needs 6-8 glasses a day for most adults. It also helps our immune system. Drinking plain water is best instead of sweetened beverages, also helps reduce the risk of consuming too many calories for maintaining a healthy weight.(FAO 2020)

1.3 Role of Nutritional Intervention in Management of COVID Patients:

A healthy diet is very essential for Covid-19 patients. Basically dietary supplements and foods cannot prevent COVID-19 infection but for building an immune system maintaining a healthy diet is a must. When countries execute strict lockdown and social distancing regulation, also put in mind proper food supply.

The United Nations (FAO) and other United Nations (UN) agencies are sharing best practices to help governments ensure the food supply continues to be stable. It is still possible to purchase and consume a healthy diet during these difficult times. Diets vary greatly from place to place based on many factors including eating habits and culture. Yet, when it comes to food, there is a lot that we know about how to select the right combination of food to attain a healthy diet regardless of where we live (FAO 2020).

1.4 About Imperial Hospital and their COVID 19 Management:

Imperial Hospital Limited (IHL) which is a private hospital. It is located in Chittagong, Bangladesh. In April 2019 IHL was opened with a grand opening launched by Devi Shetty, who is a renowned Indian cardiac surgeon.

With advanced medical equipment spread out with a floor area of 660,000 square meters (7,100,000 sq. ft.), the 375-bed Imperial Hospital is situated into five buildings with four interconnected areas. In other facilities the hospital has 88 single cabins, 76 double cabins, 14 modular operating theatres, 16 nurses stations, 62 consulting rooms with outpatient department facilities, 64 critical care beds, 44 beds for newborn, Neonatal intensive care unit with 44 beds, and eight pediatric intensive care unit (pICU) and 19 special care beds for selected COVID 19 patients.

They have local patients and foreigners patients too. Foreign patients from NGOs, they worked on NGOs in many sectors. Their age range is 30 to 40 years. In short, approximately they find 80 to 90% comorbidity. Because they start the ICU ventilator, yellow zone and red zone. As they couldn't start normal isolation that's why their maximum patients were comorbid and they did not have that many COVID patients who are mild to moderate condition. In Chittagong there are VIP patients who are economically solvent, if they have COVID positive then they want isolation and also with hospital care. For their isolation and their treatment they made 19 bed, which name is cabin block. In this bed mild to moderate patients, without comorbidity or with comorbidity but under control patients can admit to this. They allow one attendant with COVID patient, they can come and they can stay in the cabin block, their every need will be fulfilled and patient's treatment will happen in the cabin block. After treatment when patients report will be negative then they can discharge and go home. And on the other hand 2nd category they have more comorbidity patients. They are treated in ICU, yellow zone and red zone. Depending on the oxygen saturation, the patents are placed in the ICU, Yellow Zone and Red Zone.

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Figure-2: The Imperial Hospital Chittagong

There are some extra marks such as D-dimer, ferritin, CVC level should be checked for how much oxygen saturation of the patient has decreased as well as the condition of his co-morbidities. Those who are a little less ill are being kept in the yellow zone, those who are a little more ill are being kept in the red zone and those who need high flow nasal cannula are in the ICU. Thus they distribute patients.

Their clinical treatment has two parts one is medicinal and another is dietetics. What is the status of the symptoms above the two zones. For example, some patients with an oxygen saturation level of 80-85 may be covered in 2-3 liters of oxygen, but after two or three days they are deteriorating, their oxygen is not being fully filled or their gut is leaking uncontrolled water emotion. . Then the patient goes from yellow to red zone. Depending on what treatment patients are getting, the management is looking after their diet. (Source from Imperial hospital).

In Chittagong there are two private hospitals to treat COVID-19 patients and one is Imperial Hospital Limited in Khulsi another is Bangabandhu Memorial Hospital (BBM). These hospitals were instructed to take required measures to treat those who have been infected with coronavirus, said a press release issued through the Health Ministry.



Figure-3: Patients in COVID-19 ward, Imperial Hospital, Chittagong.

1.5 Differences of Nutritional Management of COVID during and post hospitalization period:

There is a significant relationship among nutrition, the immune system and coronavirus diseases. Nutrition develops the immune system and protects our body from many diseases. So the influence of nutrition is notable. Deficiency of nutrition is probably because of vomiting, diarrhea, excessive nitrogen loss, nausea etc. Nutritional therapy seems as first-line treatment and must be implemented into standard practice. Optimal intake of all nutrients should be assured through well-balanced diet. Nevertheless, in order to reduce the risk and consequences of infections, one should intake for some micronutrients may exceed the recommended dietary allowances since infections and other stressors can reduce micronutrient status. Natural bioactive compounds can also reduce the inflammatory response induced by SARS-CoV-2. These compounds are potential beneficial elements in the nutritional management of COVID-19 patients during and post hospitalization period. And so there are some differences between nutritional management of COVID patients during and post hospitalization period.

When COVID-19 patients are very ill at hospital admission and experience severe respiratory symptoms or multi-organ failure at that time patients need special support. A major cause of morbidity are acute respiratory complications, requiring lengthy ICU stays. Most COVID patients rapidly progress from cough to dyspnea, and then to respiratory failure requiring mechanical ventilation. Consequently, the timing of nutritional intervention appears to be critical. Therefore, nutritionists should choose the most appropriate way to recover the subject's health.

As with any other critically ill patients, nutritional management is an integral component of good supportive care. The European Society for Clinical Nutrition and Metabolism (ESPEN) has recently published some guidelines for the nutritional management of patients with SARS-CoV-2 infection. In these guidelines specific recommendations are included for patients hospitalized in ICUs, among them early enteral nutrition (when possible), use of agents that promote gastric emptying, initiation of parenteral nutrition in situations in which enteral nutrition is not possible/tolerated and use of enteral nutrition after extubation when oral feeding is not tolerated.

1.6 Significant of this study

Whole world is now facing COVID-19. Many people are dying every day because of COVID-19. To fight against this virus people need to increase their body immunity which can only be achieved by adopting a healthy eating habit. People need proper nutritional management in this pandemic for a strong immune system. It is evident that proper nutritional management is one of the key factors for quick recovery of corona patients during and post hospitalization period. The findings of the study will help other researchers to get an insight of how patients infected with corona virus have been treated in the hospital and what nutritional factors were evaluated in connection with their comorbidities. The study findings have also incorporated few case studies of patents with critical conditions where nutritional management has played a significant role in improving some pathophysiological conditions during the hospitalization period and after releasing from hospital.

CHAPTER-2

2. Objectives:

2.1 General objectives

This exploratory study aims to determine the level of nutrition management of COVID-19 patients during and after hospitalization period in a hospital located in Chittagong District. At the same time, it will also interpret the approach, appropriateness and practice of dietary information provided to the patients infected with Corona Virus with multiple co-morbidities. In addition, this exploration also aims to establish perceptual links between the role of dietary management and rate of recovery of corona infected patients admitted in this hospital.

2.2 Specific objectives

1. Gain preliminary knowledge about the contemporary practice of nutritional management of COVID-19 patients.
2. Evaluating nutrition management of COVID-19 patients during and after hospitalization period in Imperial Hospital Ltd.
3. Observing and gaining knowledge of how some critically ill COVID-19 patients with multiple Co-morbidities have been management with extra nutritional support in addition to general medical treatment.

CHAPTER-3

Literature review:

Crawford, Davidson, Hirsch, McGinn, Narasimhan and Richardson (2020) found in a study of 5700 patients hospitalized in the New York City area that Clinical results through treatment, including invasive instrumental ventilation, kidney replacement therapy, and death. statistics, basis symptomatology, presenting essential signs, and test results were collected as well.

Arieta, Bongiovanni, Demontis, Formisano, Giudice, Ivaldi, Maio, Panizi, Sferrazzo, and Valentino (2021), found in a study of 143 patients that the nutritional treatment was well overcome throughout the patients. 19.1% died from non-ICU patients. They were mainly women, with higher body mass indices and older in age. ICU patients 53.1% died. 94 non-ICU patients, 72 scored positive on at least one nutritional risk selection item (excluding age). Of the 94 non-ICU patients, 68 were >70 y of age. Non-ICU patients whose energy and protein needs were not met were older ($P = 0.01$) and had a higher death rate than patients whose needs were met ($P < 0.001$).

Henderson, (2020) founds 431 patients in a study that During recovery of Covid 19 here small scale clinical guidance showed, even if it can affect recovery time and people's capability to return to doing the object that substance most to them. For sustaining skeletal muscle nutrition is crucial and keep away from metabolic disturbances as well as when patients are expanding about two weeks in ICU, these can turn out to be serious issues. Final result of this research in the assumption of practical guidelines on combining nutritional care in the treatment and recovery of patients.

Sharma (2020) found in a study in 324 patients that Post- recovery care is even more vital in current times as cases of COVID infections are only rising and one cannot undermine the importance of a healthy diet while recovering from any infections. Moderate exercise helps in flu-fighting power of individuals. Exercise which can be done alone like cycling, jogging, jumping rope, dance workout and yoga etc can also help in building immunity. One should also work on reducing stress levels meditation, through healthy breathing exercises, talking to a therapist, working out and walking into nature. Getting enough adequate sleep can also help in building natural infection resistance

Cena and Chieppa (2020) study founds in 500 patients that General advice especially for healthy adults above 50 years of age observance at a time of quarantine and consequently with bounded choice especially for exercise should concentrate on healthy nutritional patterns. Authors suggest paying close awareness to nutrition, which may be devoted to regulating some important outcomes of COVID-19 infection, as a result pro- inflammatory cytokine storms.

Fondazione Policlinico Universitario “Agostino Gemelli” IRCCS, Catholic University of the Sacred Heart, L.go F. Vito 8, 00168 Rome, Italy, Gemelli Against COVID-19 Post-Acute Care Study Group(2020) finds 643 patients in a study that SARS-CoV-2 infection epidemic is a matter of anxiety in the present world. It creates various kinds of difficulties in our human body. Many people are affected and die. The severe phase is confined and little is familiar about mid- and long-term results. In the pandemic situation, proper healthcare services can ensure the rate of death.

In a study of recent past it was found in a study 32 patients that the effectuation of a structural management of the nutritional absorption of COVID-19 patients is mandatory to assure an ideal nutritional status and to evolve clinical outcomes. Other clinical studies are in progress to compose adequate nutritional guidelines. Nutrition is a determining factor for health (Alemanno, et al., 2020).

In a study of 93 experts the researchers found that Structure of pulmonary rehabilitation may suit as a framework, especially in a subgroup of patients with long-term respiratory outcomes. This multinational task force suggested earlier, bedside rehabilitation for patients infected by severe COVID-19. The present study contributes agreement-based recommendation for the screening and the rehabilitation process during and after a hospital admission for severe COVID-19 infection (Holland, et al., 2020).

Barazzoni, Bischoff, Breda, Pirlich, Krznaric, Tzan, Singer and Wickramasinghe (2020) study founds in 900 patients that Nutrition involvement and therapy as required to be taken into account as an essential part of the approach to the patient's sufferer of SARS-CoV-2 infection in the ICU setting, inside the medicine ward setting as well as in general healthcare. At every step of the

treatment, diet therapy should be part of patient care, as regards for older adults, fragile and comorbid individuals. Ideal consequences can be improved executing obedience to recommendations to ensure survival of this life-threatening disease as well as better and shorter recovery, particularly but not limited to the post-ICU period.

A study of recent past finds that 632 patients of COVID affected people are admitted to ICU for better treatment. COVID-19 infection reduces the Oxygen saturation of patients and in this case ICU is must for the patients in most of the cases. Medical therapy is needed in the Intensive Care Unit(ICU) where nutrition implications should be considered (Asrani, et. al., 2020).

CHAPTER-4

4. Methodology:

This is an exploratory study which has mainly incorporated secondary data recorded while patients were treated in the hospital and in the information's in the discharge sheet while patients were recovered and left for home. Some data has also been collected from the hospital archives, as well. In addition some doctors and nutritionists were also interviewed in this regard. It has also incorporated qualitative data obtained from few nurses, patients and caregiver of the patients in the hospital. The study involves following methods:

4.1 Design

This exploratory research was designed on some primary and mostly secondary data collated by the researcher from the hospital records, patients' discharge sheets and personal interviews.

4.2 Sampling

Population:

COVID-19 infected patients regardless of age and sex admitted in the hospital during November 2020 to February 2020.

Size:

- A total of 36 patients' nutritional management data were analyzed.
- Purposive Sampling was adapted for interviewing doctors, nurses and nutritionists.

Sample Inclusion Criteria:

- Corona infected patients with mild to moderate complications without comorbidity.
- Corona infected patients with mild to moderate complications with comorbidity.
- OPD patients.
- Patients discharged after recovery.

4.3 Data Collection Method:

- Secondary data has been collected from hospital records.
 - Primary data has been collected through personal interviews of the dietitians and duty doctors.
- Some data have been collected from the nutritional management advice record of the patients. Few nurses and caregiver (family members) of the patients were also recorded.

4.4 Variable Measured by the nutritionist for nutritional management:

Anthropometry: Height, usual weight, BMI, waist circumference-Weight progression over time (current weight, weight 1 week prior, weight 1 month and 6 months prior) Body impedance analysis(?) when possible (Gallagher-formula, Omron, Biostat, Tanita)Upper arm circumference
Functionality: Current and usual physical activity-Functional limitations-Fatigue-Handgrip strength (if possible for dietitian to measure, check with appropriate physiotherapist) -Leg muscle strength, walking test, fitness test

Relevant laboratory markers if co-morbidities present (if applicable)

Table1: Common Symptoms.

Symptoms	
Fatigue	Unintentional weight loss
Nausea	Problems with swallowing and chewing
Vomiting	Loss of taste and/or smell (decreased/changed)
Decreased appetite	Constipation; frequency and Bristol Stool Chart-Shortness of breath (degree of oxygen support level, saturation)
Intestinal problems	Ageusia;l loss of taste and/or smell (decreased/altere), -Gastroparesis
Bloatedness, diarrhea	Severe stomach pains, watery stools, blood in the stool

Table2: Comorbidity

Hypertension
Hypercholesterolemia and hyperlipidemia
heart failure-Diabetes Mellitus

Table3: Wight chart for obesity

Classification	BMI
Unintentional weight loss	
Malnutrition	
Underweight	< 18.5
Overweight	25-30 adult
Overweight	30-35 adult
Overweight	35-40 adult
Overweight	> 40 adult

Table 4: 7 resulting co-morbidity:

Intestinal complaints
Apnea

Asthma-COPD-

Gastro-intestinal problems/constipation and malabsorption

Sarcopenia

Sarcopenia obesity

Intestinal complaints

CHAPTER-5

5.1 Findings and Observations:

Case-1: International Patients from Philippine.

A group of 7 Korean Patients have been admitted in the hospital all with Corona (+) ve with common symptoms and comorbidity.

Patients' Details

Table-5: Summery diagnosis of patients.

Sl	Age	Fever	Cough	Loose Motion	Breathing Problem	Vomit	Body Pain	Lung Problem	Comorbidity
P1	31	Y	Y	N	Y	N	N	N	Nil
P2	31	Y	Y	Y	Y	Y	N	Y	Obesity
P3	51	Y	Y	N	Y	Y	Y	N	Cardiac Patient
P4	53	Y	N	N	Y	N	Y	Y	Diabetes
P5	57	Y	Y	N	Y	Y	N	Y	Diabetes
P6	62	Y	Y	Y	Y	Y	N	Y	Renal Patient
P7	63	Y	Y	Y	Y	N	Y	Y	Renal Patient

Treatment:

1. **Oxygen saturation** < 80% = ICU

Diet = Liquid

2. **Oxygen saturation** > 90%, Persistent complication = Red Zone

Diet = Semi Solid / Soft

3. **Patients with Muscle resting** = Yellow

Diet = High Protein

4. **Patients with Diabetes**

Diet = Carbohydrate withdrawn in lunch

5. **Patients with High Flow Nasal Cannula**

Diet = Nasogastric (NG) Feeding

6. **Patients with Mild to Moderate Symptoms** = Yellow Zone

Diet = Protein rich, high liquid intake

Case-2: High Risk Patients

There are 4 patients of whom 1 patient was vegetarian. Following is description of the patients and the meal plan given to them.

Table 6: Status and diet of the patients

Patient Name	Age	Weight	Diagnosis	Dietary Information	Daily Requirement
P1	34	62	Covid-19 with Multi Organ Failure	Diet advised : Balance diet Food Habits: Non vegetarian Food Allergies: N/A	Oil: 4-5 tsp 1 cup = 120 ml Salt: 4-5 gm 1 Tea spoon= 5 gm Measurements: Water: 1.5 L

				Findings: COVID 19, AKI, Liver Impairment	1 glass = 200 ml 1 Table spoon =15 gm
P2	48	78	Covid-19	Diet advised: High protein diet Food Habits: Non vegetarian Food Allergies: N/A Findings: COVID 19 Positive;	Oil: 4-5 tsp 1 cup = 120 ml Salt: 4-5 gm 1 Tea spoon= 5 gm Measurements: Water: 1.5 L 1 glass = 200 ml 1 Table spoon =15 gm
P3	71	70	Covid-19 with COPD	Diet advised: High protein diet Food Habits: Non vegetarian Food Allergies: N/A Findings: COVID 19 Positive	Oil: 4-5 tsp 1 cup = 120 ml Salt: 4-5 gm 1 Tea spoon= 5 gm Measurements: Water: 1.5 L 1 glass = 200 ml 1 Table spoon =15 gm
P4	53	67	Covid-19 with Mild Hepatic Disorder	Diet advised: Selected protein diet Food Habits: Vegetarian Food Allergies: N/A Findings: COVID 19 Positive;	Oil: 4-5 tsp 1 cup = 120 ml Salt: 4-5 gm 1 Tea spoon= 5 gm Measurements: Water: 1.5 L 1 glass = 200 ml

						1 Table spoon =15 gm
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Table 7: Details of meal plan for 24 hours of the 4 patients.

Patient name	Breakfast	Mid-morning	Lunch	Mid afternoon	Dinner	Bed time
P1	Bread / oats /porridge 2piece /3-4table tablespoon/1 cup(100gm) egg(Whole) 1piece vegetable ½ cup Fruit / fruit juice / coconut water 1 (any) / 100 g / 100 ml	chicken egg soup 1cup(120ml) Penta Sure Renal 1 sachet in 50 ml water	Rice (porridge / soft) 2 cups (200 gm) Vegetable s (gourd, papaya, rice, pumpkin, potato) 1 cup / 100g 1 slice of lemon Fish / Meat 2 Pieces (100g)	Suji / Sagu 1 cup Penta Sure Renal 1 sachet	Rice Cup (200g) Fish / Meat 2 Pieces (100g) 1 cup of vegetables (100 g)	Egg soup 100ml

P2	Roti / bread / oats 2 pieces / 3- 4 tablespoons Eggs (whole) 1piece Vegetables / pulses 1/2 cup 1 cup of red tea Fruit / fruit juice / coconut water 1 (any) / 100 g / 200 ml	Chicken Egg Soup / Milk 1 Cup (120 ml) Almonds 8 piece / 20 grams Penta Sure HP 1 sachet in 100 ml water	Rice (porridge / soft) 2 cups 1 cup of vegetable s / 100 grams 1 slice of lemon Fish / Meat 2 Pieces (200g) 1 cup of pulses	1 cup of milk oats (3 tablespoon s + 150 ml) Banana 1 piece The white part of the egg is 2 piece Penta Sure HP 1 sachet in 100 ml water	Rice / Khichuri 2 cups Fish / Meat 2 Pieces (200g) 1 cup of pulses 1 cup of vegetables (100 g)	1 cup of sour yogurt
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P3	Roti/ bread / oats 2 pieces / 3-4 tablespoons Eggs (whole) 1 piece Vegetables / pulses 1/2 cup 1 cup of red tea Fruit / fruit juice / coconut water 1 (any) / 100 g / 200 ml	Chicken Egg Soup / Milk 1 Cup (120 ml) Almonds (powder) 8piece / 20 gm Penta Sure HP 1 sachet in 100 ml water	Rice (porridge / soft) 2 cups 1 cup of vegetable s / 100 grams 1 slice of lemon Fish / Meat 2 Pieces (200g) 1 cup of pulses	Milk oats 1/2 cup (2 tablespoon s + 150 ml) Banana 1 piece The white part of the egg is 2 piece Or, Penta Sure HP 1 sachet in 100 ml water Or, Suji/ Sagu1 cup Penta Sure HP 1 sachet in 100 ml water	1 Cup and half of rice / khichuri Fish / Meat 2 Pieces (200g) 1 cup of pulses 1 cup of vegetables (100 g)	sour yogurt + Kalojir a 1/2 cup + 1 teaspoo n
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P4	Roti / bread / oats 2 pieces / 3- 4 tablespoons Vegetables / pulses 1/2 cup 1 cup of red tea Fruit / fruit juice / coconut water 1 (any) / 100 g / 200 ml	Vegetable Soup/ Milk 1.5 Cup (240 ml) Almonds 8 piece / 20 grams Dal .5 cup	Rice (porridge / soft) 2 cups 1.5 cup of vegetable s / 100 grams 1 slice of lemon 1 cup of pulses (Thick)	1 cup of milk oats (3 tablespoon s + 150 ml) Banana 1 piece The white part of the egg is 2 piece Penta Sure HP 1 sachet in 100 ml water	Rice / Khichuri 2 cups Vegetable(200 g) 1 cup of pulses 1 cup of vegetables (100 g)	1 cup of sour yogurt
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Case-3: Patients with severe gut leakage.

Symptoms:

Heavy watery loose motion, mild to moderate cough and fever.

Medicinal Treatment:

Napa Extra, Phexo, Vita-C (no antibiotic required)

Diet:

BRAT DIET: Consists of bread toast with honey, rice porridge, raw banana, carrot and potato, apple pure, apple juice without skin, apple.

It is blunt, no spices, slight salt, no soybean oil, only olive oil is used, and a tiny amount of white pepper is also used. It is distributed as per calorie measurement of the patients.

- **Breakfast:** Toast, honey, apple puree, apple juice
- **Mid-morning:** Rice soup / rice powder / chicken clear soup with chicken stock.
- **Lunch:** Rice porridge (polaw r chal er jau bhat), raw banana curry, potato, carrot and egg white or chicken (loose motion) or fish occasionally.
- **Afternoon snacks:** Apple juice, Apple puree, rice cake.
- **Dinner:** Soft rice, raw banana thin curry with or without fish.

Note: Patients are respected: lintel, milk, fibrous vegetables. Green coconut water to prevent electrolyte imbalance (electrolyte screening is required on a daily basis).

Case-4: Anti-inflammatory Drink for Patients with Mild Symptoms or Post Recovery Period.

Some Corona (+ve) patients were admitted in VIP Cabin with mild symptoms and nil comorbidity have been given following drink:

Drink-1: 250 ml (lukewarm) BD = 500 ml / day

Composition : 1000 ml water + Raw Ginger, Cardamom, Cinnamon, Bay Leaf and Tea Leaf (for Tannic Acid) +1 tsp Honey (nondiabetic patient)

Drink-2: 250 ml (lukewarm) before sleep (10.00 pm)

Composition : 250 ml Milk (Whole Milk, Low Fat Milk or Skimmed Milk)* + Turmeric powder 10g + 1 tsp Honey

*depending on patients' lipid profile.

Case-4 Post COVID or Post Hospitalization Nutritional Advice:

1	COVID Negative No anorexia No anosmia	High Protein and High Mineral Diet Hot drinks, lemon ginger tea, Green Tea.
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2	COVID Positive No anorexia No anosmia	High Protein and High Mineral Diet Hot drinks, lemon ginger tea, Green Tea. Supplement: Vitamin-C, Vitamin-B and Zinc in pharmaceutical form.
3	COVID Positive Mild Symptoms Oxygen saturation > 92%	High Protein and High Mineral Diet Hot drinks, lemon ginger tea, Green Tea. Supplement: Vitamin-C in pharmaceutical form.

CHAPTER-6

6.1 Conclusion:

In recent days there are many studies that attempt to establish a relationship between nutritional management of COVID-19 patients and their satisfactory rate of recovery. Based on the evidence and widely available data a case study has been conducted in the Imperial Hospital Limited a prominent quality healthcare survival provider in Chittagong, the 2nd largest and most important metropolitan city in Bangladesh. This study aims to explore, understand and screen the nutritional management of COVID-19 patients during the period of severe infection period from November 2020 to April 2021. Hospitalized patients with various symptoms and co-morbidities have been screened and observed during their hospitalization period and the post hospitalization home care facilities. There are 4 (four) different groups of patients who have been screened including patients released from hospital and advised nutritional management in a home care environment. In this study hospital nutritional management and dietary records along with discharge sheets have been utilized as secondary sources of data while face to face interviews of some nutritionist and health care providers have been recorded and analyzed as primary sources of investigation. At the studies hospital all admitted COVID-19 patients are being categorized into 4 different zones. Patients with critical condition with less than 90% Oxygen saturation and other clinical complexities are shifted to IUC. Patients with moderate to severe symptoms with oxygen saturation more than 90% are isolated in the Red zone, Yellow zone mostly deals with patients with moderate symptoms with unadjusted co-morbidities while the Green zone is designated for patients with mild to nil symptoms but need hospitalization for other clinical conditions. Nutritional management of IUC patients are mostly advised by the unit specialist doctors in charge and occasionally in consultation with the chief dietitian and most of the ICU patients receive Nasogastric Feedings (NGF). Patients in Red and Yellow zones are the main patients who require intensive nutritional care with customized diet including therapeutic supplement considering the symptoms and more specifically the pathological condition and co-morbidity of the patients. Most challenging nutritional management is found in patients with diabetes where in most cases carbohydrates have been withdrawn in the lunch and renal impairment where protein has been withdrawn in the lunch time. On the other hand patients in the green zone are mostly treated with a high protein and high mineral diet as they have mild to moderate symptoms. There are several cases where nutritional

management accelerated the rate of recovery of some critically ill patients. Such as patients with bilateral lung damage, patients with kidney transplant. Patients with severe gut linkage have been treated with BRAT Diet, a special menu consisting of bread toast, apple puree or juice, raw banana curry and rice cakes served in different combinations in 3 main meals: breakfast, lunch and dinner. A special type of drink called Anti Inflammatory Drink was administered to patients in the Red and Yellow zone 250ml in each serve 2 times a day. A special type of turmeric drink (prepared by turmeric in milk) was recommended for patients in post hospitalization home stay at 330 ml before bed time. Post COVID patients are also advised to have high protein and high mineral diets with Vitamin-C and Zinc in pharmaceutical form. Dietary supplements are sometimes found inadequate due to severe food loss. As observed in the study with supported data, overall patient's management is a great success in Imperial hospitals with some striking and innovative nutritional intervention in the dietary care of the patients.

6.2 Recommendations:

An early nutritional supplement protocol for noncritical COVID-19 patients is highly effective. Based on the personal observation that almost all patients present at the time of hospitalization had a severe inflammatory status and anorexia, which led to a strong reduction in food intake. Doctors provided a rapid intravenous administration of whey proteins, vitamins, and minerals (and cholecalciferol if insufficient) up to the achievement of the recommended dietary allowance. Furthermore, assessment of the nutritional status early with consequent addition of oral food supplements or, if not tolerated, transition to artificial nutrition.

Not a cure for COVID-19 but healthy patterns of eating optimize the function of the immune system, improve immune metabolism, and are a modifiable contributor to the development of chronic disease that is highly associated with COVID-19 deaths. May have a positive impact on COVID-19 as it may be a way to support people at higher risk for the disease i.e. older people and people with pre-existing conditions.

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