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Managing Patient with Renal Failure who is on Hemodialysis in hospital using Clinical Nutrition Management Software _iNutrimon

Case Study

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Abstract

iNutriMon is a clinically validated software endorsed by ISPEN, designed specifically to assist medical professionals in Screening, Assessing, Planning, Monitoring, and Managing Nutrition. With its host of features, iNutriMon empowers to deliver optimal care to patients while reducing the risks associated with underfeeding, overfeeding, and excess fluid intake.

Case Study _ Hospital Based

A 72-year-old female patient weighing 70 kg and standing 153 cm tall presents with a history of heart failure and osteoporosis. She is currently undergoing hemodialysis three times a week. She has a history of diabetes and HTN.

Biochemical Parameters as below:

Serum creatinine	6.5
BUN	60
Calcium	8
Potassium	5.8
HB	10.5
Sodium	135
TGL	240
HbA1C	10.5
FBS	152
PP	267
Uric Acid	7

The primary nutrition goals are to maintain her nutritional status and prevent malnutrition, manage fluid intake, and control phosphorus and potassium levels. Fluid restrictions of 800-1,000 mL per day, plus any urine output.

Below we are adding case in the iNutrimon software. Please have a look at the screenshots.

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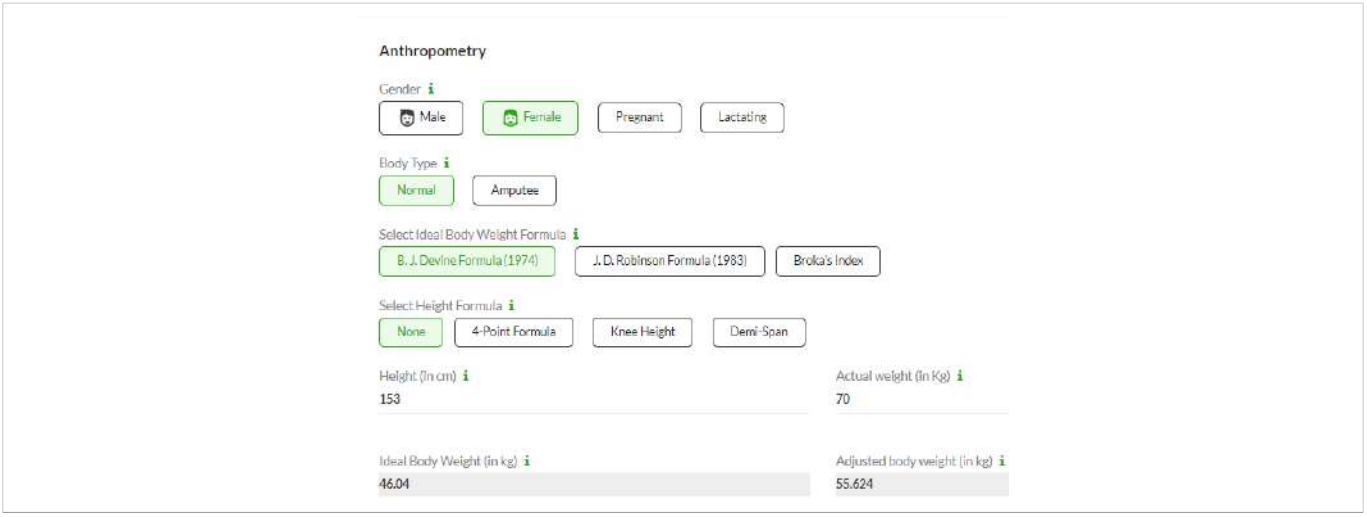
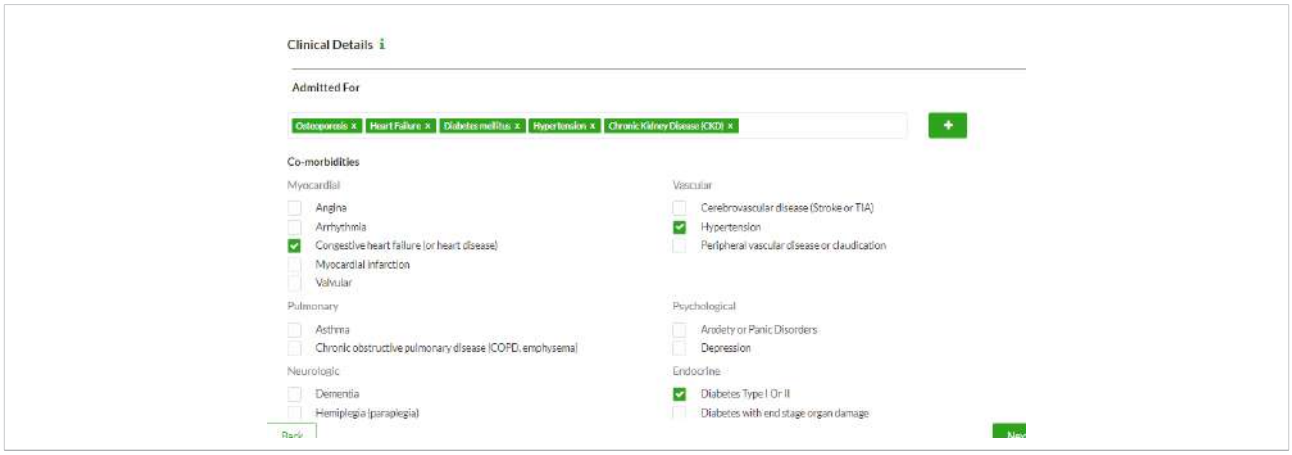
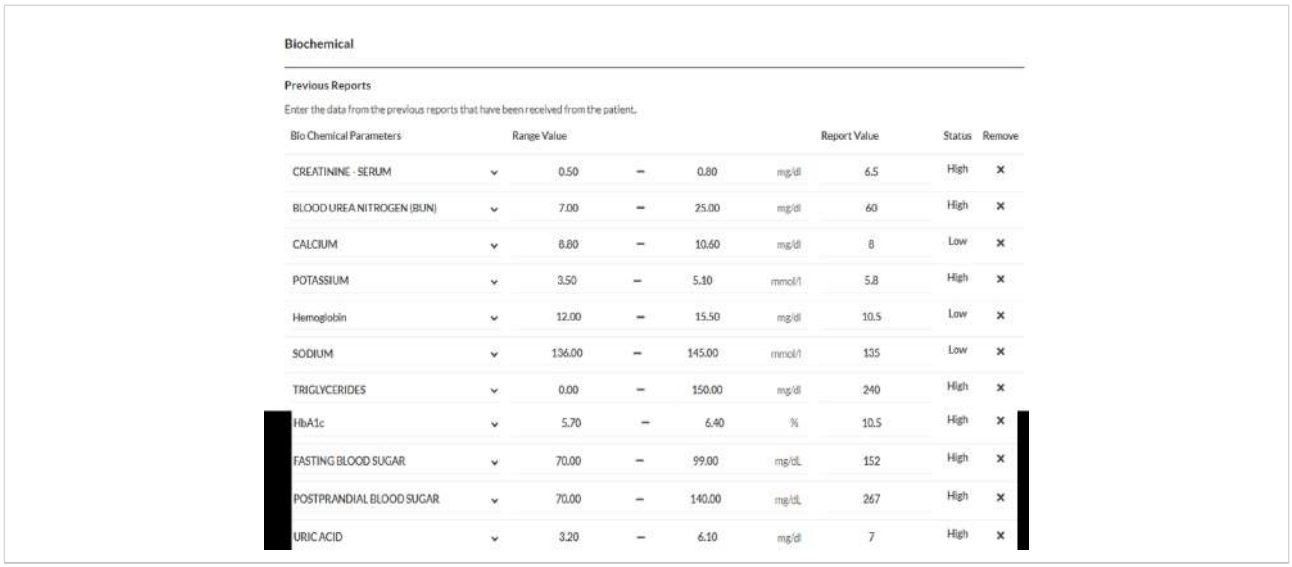
Patient's anthropometrical details are added below:



Now, Clinical details are added below:



Biochemical parameters are added in application as below:



Bio Chemical Parameters	Range Value				Report Value	Status	Remove
CREATININE - SERUM	0.50	–	0.80	mg/dl	6.5	High	×
BLOOD UREA NITROGEN (BUN)	7.00	–	25.00	mg/dl	60	High	×
CALCIUM	8.80	–	10.60	mg/dl	8	Low	×
POTASSIUM	3.50	–	5.10	mmol/l	5.8	High	×
Hemoglobin	12.00	–	15.50	mg/dl	10.5	Low	×
SODIUM	136.00	–	145.00	mmol/l	135	Low	×
TRIGLYCERIDES	0.00	–	150.00	mg/dl	240	High	×
HbA1c	5.70	–	6.40	%	10.5	High	×
FASTING BLOOD SUGAR	70.00	–	99.00	mg/dL	152	High	×
POSTPRANDIAL BLOOD SUGAR	70.00	–	140.00	mg/dL	267	High	×
URIC ACID	3.20	–	6.10	mg/dl	7	High	×

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We have provided the feature of biochemical parameters which has its normal ranges, and it notifies the status whether that particular parameter is low, normal or high which eventually helps to provide nutrient deficiency, toxicity and also the nutrition diagnosis of the patient. E.g., Hypernatremia, hyponatremia, hyperkalemia, hypokalemia etc.

Nutrition Screening and Assessment

Nutrition screening and assessment are crucial for identifying individuals at risk of malnutrition and developing effective interventions to improve their nutritional status considering multiple factors such as nutrition status, disease severity, patients current food intake, lab values etc.

Below are the available nutrition screening and assessment tools with some techniques. Healthcare professionals can choose any tool as per hospital protocol or disease state of the patient.

By using tools like the Malnutrition Universal Screening Tool (MUST) or the Mini Nutritional Assessment (MNA), SGA, NRS 2002, NUTRIC SCORE, Glim Criteria healthcare providers can identify individuals at risk of malnutrition based on criteria such as weight loss, BMI, and dietary intake.

Now, I will just brief about the nutritional assessment tools.

MUST - Malnutrition Universal Screening Tool

The Malnutrition Universal Screening Tool has been designed to help identify adults who are underweight and at risk of malnutrition, as well as those who are obese.

MNA - Mini Nutritional Assessment

The MNA is a validated nutrition screening and assessment tool that can identify geriatric patients aged 65 and above who are malnourished or at risk of malnutrition.

NRS 2002

The purpose of the NRS-2002 system is to detect the presence of undernutrition and the risk of developing undernutrition in the hospital setting.

MUST

The purpose of the MUST system is to detect undernutrition on the basis of knowledge about the association between impaired nutritional status and impaired function.

NUTRIC Score

The Nutrition Risk in Critically ill (NUTRIC) score is the first nutritional risk assessment tool developed and validated specifically for ICU patients.

SGA

Subjective global assessment (SGA) is the gold standard for diagnosing malnutrition. SGA is a simple bedside method used to diagnose malnutrition and identify those who would benefit from nutrition care.

Glim Criteria

The GLIM includes three phenotypical criteria (weight loss, low BMI, and reduced muscle mass) and two etiological criteria (reduced food intake or absorption, and increased disease burden or inflammation).

Physical assessments, including muscle wasting and edema, can indicate malnutrition and related health issues.

Functional assessments evaluate physical strength and functionality (e.g., grip strength), providing insights into conditions like sarcopenia or frailty.

Now, here I have screened the patient using Nutritional Risk Screening Tool 2002 (NRS 2002) as below and at the left side automatically calculated score is available.

NRS 2002 score is 3. The patient is nutritionally at risk and nutrition care plan has to be initiated for this patient.

SGA - Subjective Global Assessment

Now this patient has been assessed under subjective global assessment tool, which has given the score B. According to score B the patient is moderately malnourished.

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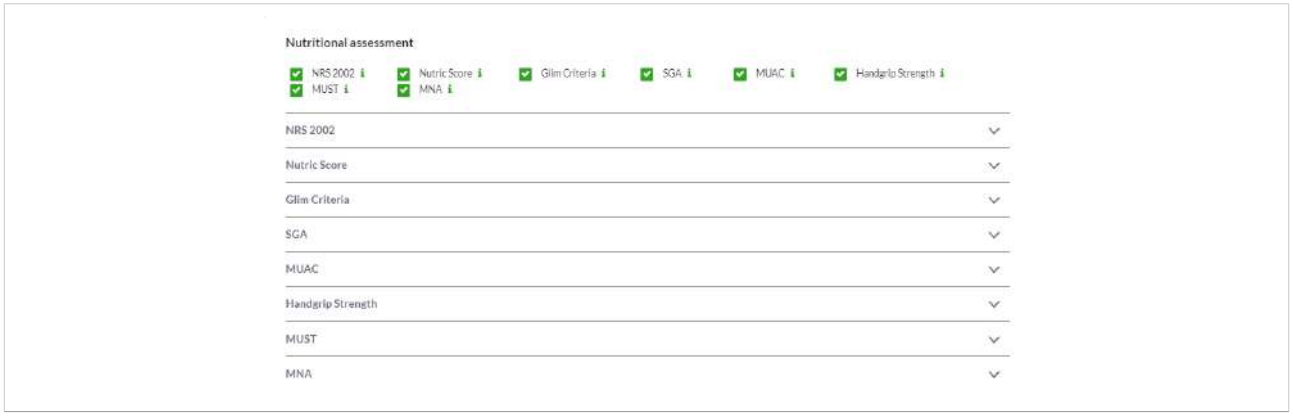

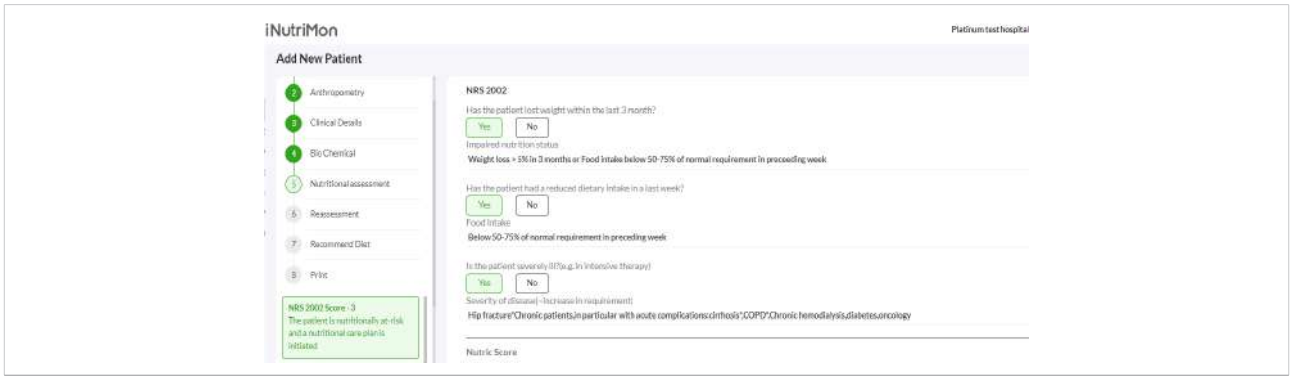

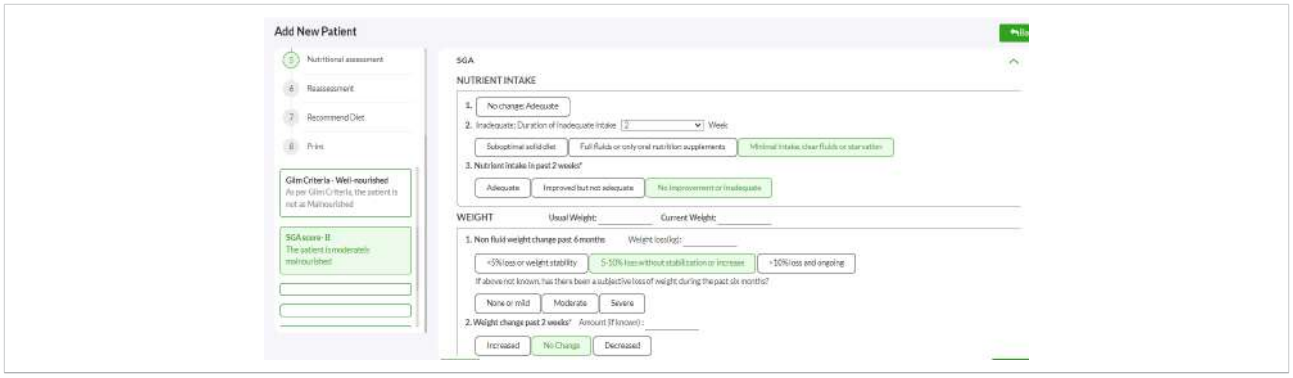

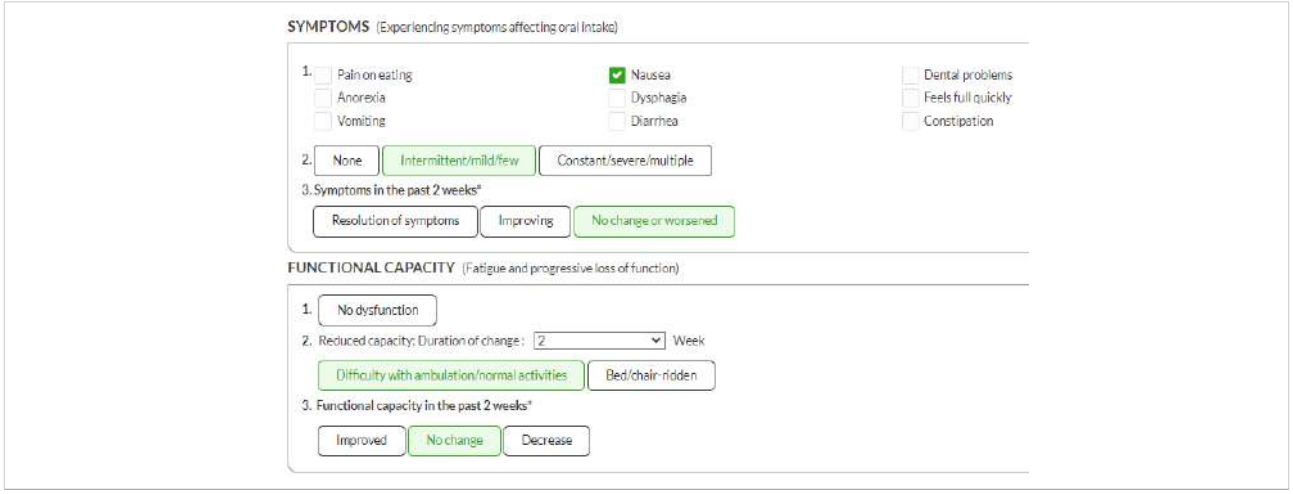

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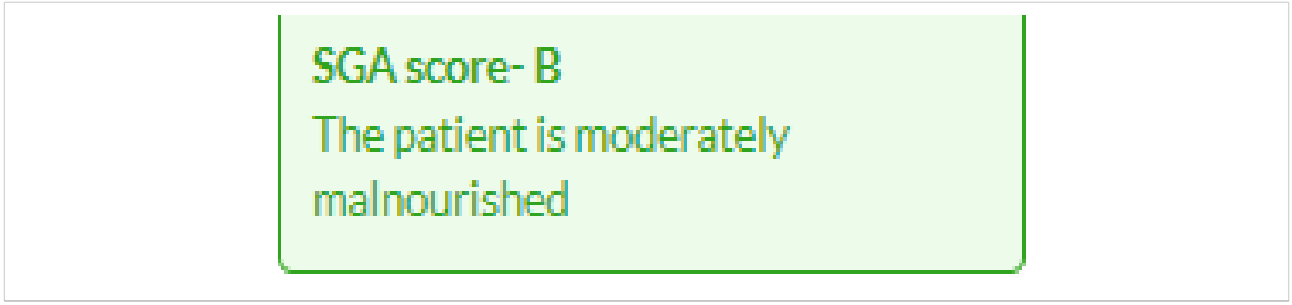
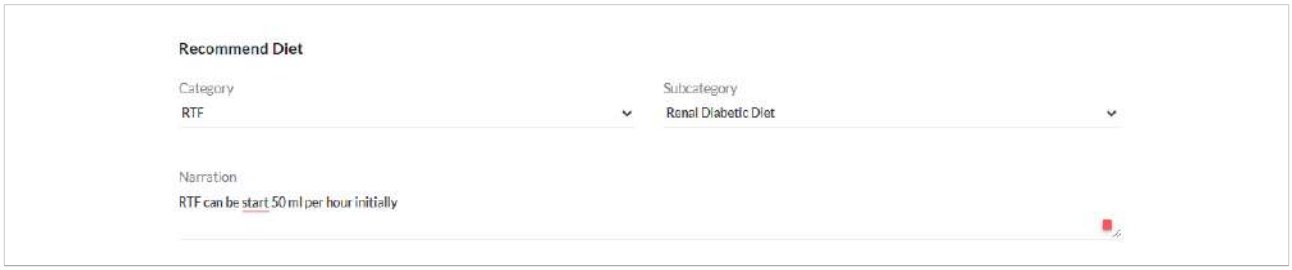


Functional assessment examples as below

As per MUAC technique patient is malnourished and weak by handgrip strength technique.

Reassessments can be managed as per protocol and clinical scenarios.

After the assessment nutrition interventions can be planned.



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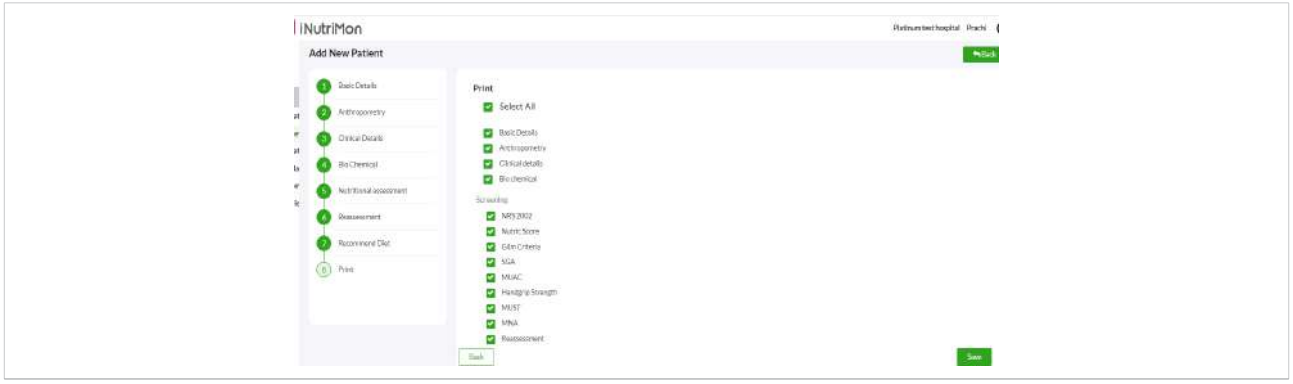
Healthcare professionals can print all the assessment details for records and can keep in system as well.

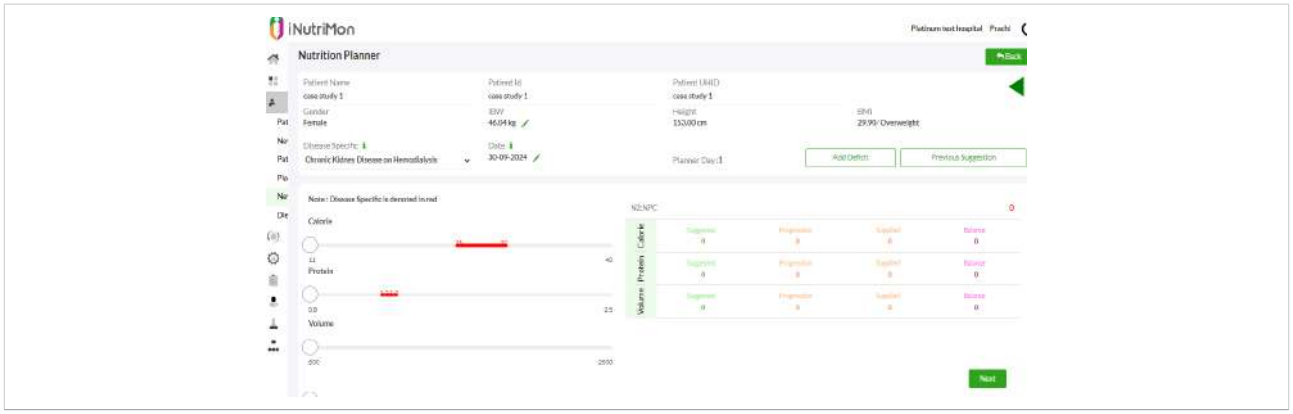
As per NABH mandate, Nutrition screening and assessment has to be done within 24 hours of admission and iNutriMon fulfills those requirements.



Nutrition Planning

Now in the planner below I have selected disease specific therapy which is chronic kidney disease on hemodialysis. So as per the ASPEN (American society of Parenteral and Enteral nutrition guidelines software has recommended calories and protein in red drag bar but healthcare professionals can always progress the diet as per patient's hemodynamic stability and tolerance to the food considering gastrointestinal status.

As per the guidelines iNutriMon has suggested 25 to 30 kcal per kg body weight and protein 1.5 to 2 g per kg body weight.



Now in Green bar below we have calculated nutritional requirements and supplying 50% only if tolerated well can reach up to 100 % of the nutritional requirements.

I have selected 25 kcal per kg body weight and 1 g protein per kg body weight to initiate nutrition care plan.

The right-hand column will show how much nutritional requirements are suggested by iNutriMon software, how much iNutrimon user have prescribed and how much is balanced.

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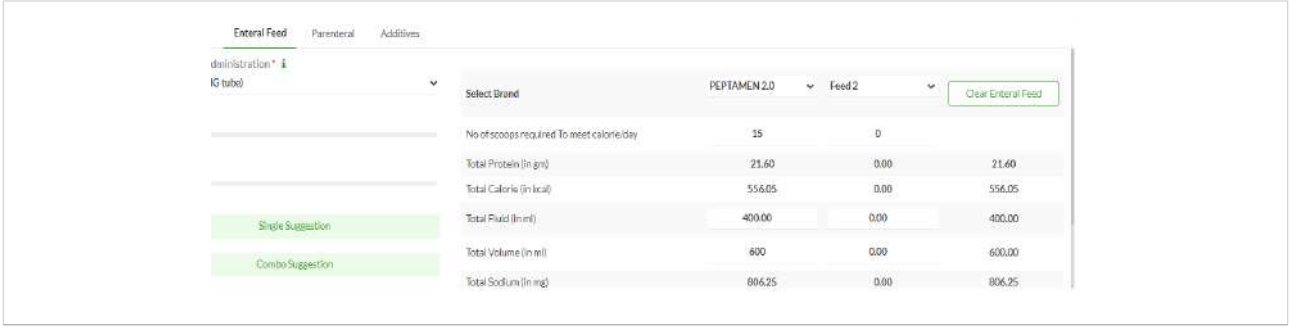
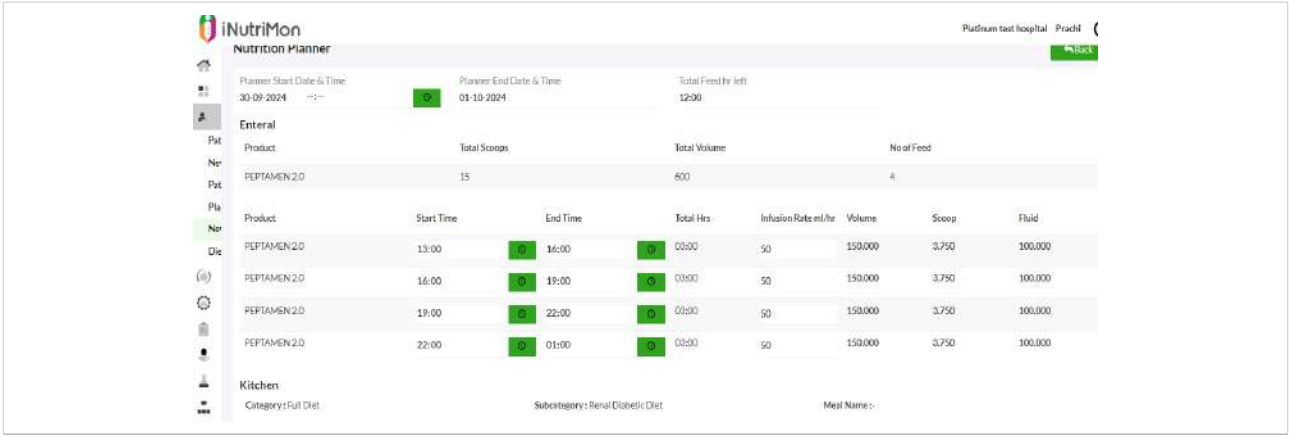
In the image below, I have set the total volume 600 ml as we have initiated 50 % feed of the total requirement.

Once we start giving 100 percent feed we can achieve target nutritional requirements.

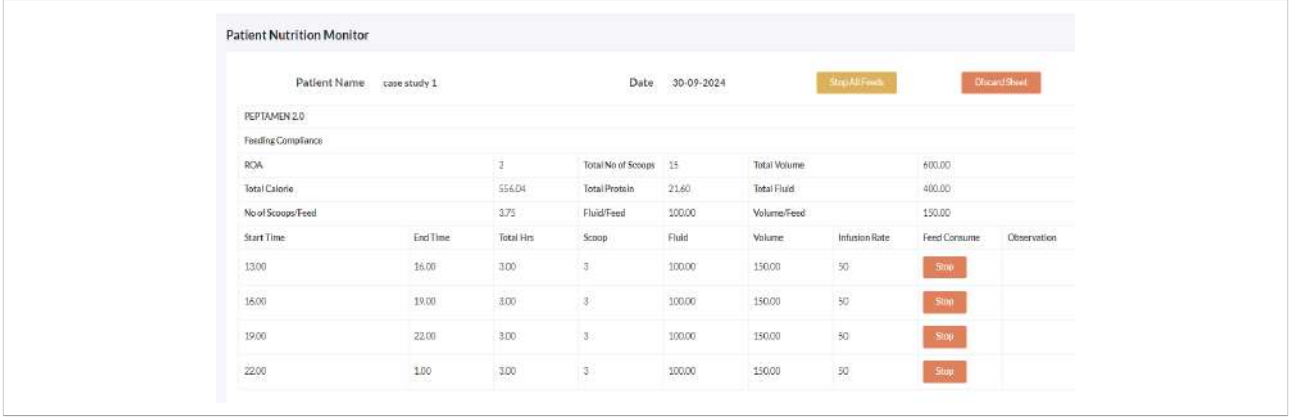


Final Planner



Now, healthcare professional wants to keep patient nil by mouth for any reason such as procedure or any other diagnostic or lab test, they can initiate NBM.

Nutrition Monitoring



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By Nutrition Monitoring and nutrition reassessment, we can keep a track on nutritional status and recovery of the patient.

iNutrimon helps to monitor actual nutrition intake which eventually helps to identify underfeeding and overfeeding and then can re-initiate appropriate nutrition therapy.

iNutrimon has a feature where dietician or nurses can maintain a record of actual nutrition intake of the patient.

As mentioned earlier we can save biochemical reports from day one and keep on adding latest parameters everyday which will help us to track the progress of the patient towards treatment.

Patient Discharge

Now we can see how we have managed patient discharge with iNutriMon. Patient basic details are automatically updated in discharge card. Diagnosis, comorbidities, Nutrition status on admission as well as on discharge, Lab investigation, surgical procedure, Nutrition therapy during hospital stay followed by nutrition advice at home and follow up is managed by iNutriMon.

Discharge Card

Patient Name: case study 1	**Report Date:** 03-10-2024 14:32:00
Address:	**Hospital:** Platinum test hospital
Contact No: 8956234185	**Address:** mulund, Mumbai, Maharashtra, 400081
Age: **Sex:** Female	**Contact No:** 9022893100
Ward: C Wing ICU/MJPJY/3	**Consultant:** Test
Discharge Date: 03/10/2024 14:26:15	**RMO:** Test
	Dietitian: Prachi

Diagnosis:
Renal Failure, Electrolyte Imbalance, Elevated Blood Sugar Levels

Co-morbidities:
Congestive heart failure (or heart disease), Hypertension, Diabetes Type I Or II , Moderate or severe renal disease

Nutrition status on admission:
SGA score B

Nutritional status on discharge:
Score B but slowly improving

Relevant Laboratory examination:

Surgical Procedure:
HD Catheter

Nutrition therapy during hospital stay:
RTF+Soft diet+Full Diet

Discharge diet prescription:

Follow up:
After 10 days

Discharge Diet Plan:

Patient Name: case study 1	**Date:** 03-10-2024 14:32:00
Age:	**Height:** 153.00
	Weight: 70.00
Sex: Female	**BMI:**
Diagnosis: Renal Failure, Electrolyte Imbalance, Elevated Blood Sugar Levels	**IBW:** 46.04
Recommended Calorie 1650.00	**Recommended Protien** 55.00

Early Morning (7.00 - 9.00)
Soaked Nuts

Breakfast (9.00 - 11.00)
Cereal Pulse Combination Milk or Eggwhite

Mid Morning (11.00 - 13.00)
Fruit

Lunch (13.00 - 15.00)
Salad 3 Phulka 1 bowl Vegetable dal curd

Tea (16.00 - 17.00)
Black tea

Mid Evening (18.00 - 20.00)
makhana/ cutlet

Dinner (21.00 - 22.00)
Same as Lunch

Bed Time (22.00 - 23.00)
Milk

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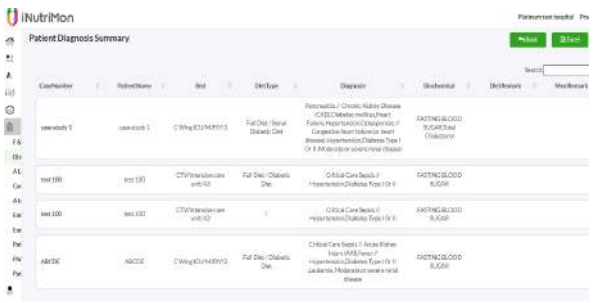
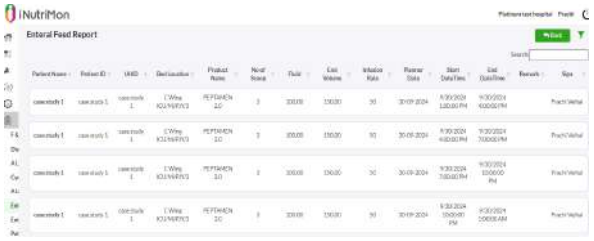
Summary of the patient diagnosis as below can be generated.



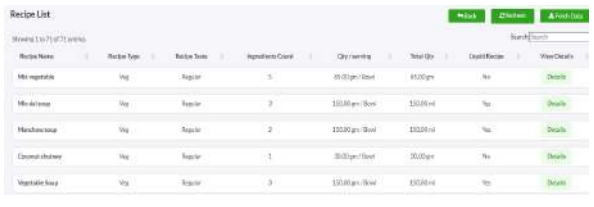
Patient Report - Nutrition feeding

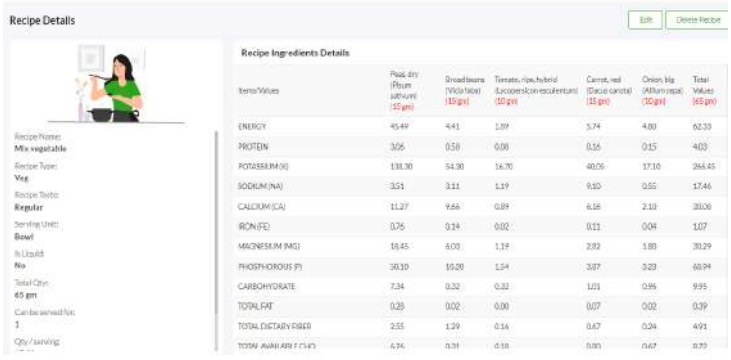


Kitchen Diet - Recipe Creation

We can create the recipes in iNutriMon.

We have to write a recipe name, add ingredients and amount and then iNutriMon will provide recipes with nutritive value which is based on IFCT - Indian Food Composition Table.





Cyclic Menu

Every hospital has their own cyclic menu which is being served to the patients as per therapeutic diets such as full diet, soft diet, diabetic diet, renal diet, liquid diet etc.

These all menus can be managed by iNutriMon along with nutritional information.

This food and beverage management system of iNutriMon helps to track patient food service during hospital stay.

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Summary

We have managed 72-year-old female patient with Diabetes, Hypertension and Renal failure who is on hemodialysis using clinical nutrition management software. Right from patient got admitted to hospital till she gets discharge from hospital iNutrimon has managed entire nutrition care process. The time patient got admitted iNutrimon had absorbed all basic history of the patient and then We have to assess the patient nutritionally using two different tools and we got the nutritional status of the patient i.e., patient is at nutrition risk by NRS 2002 and patient is malnourished by SGA score B. which was helpful to take appropriate decision of initiation of nutrition intervention. After nutritional assessment software has calculated nutritional requirements of the patients based on anthropometry, biochemical parameters clinical condition and nutrition assessments score. Based on evidence based guidelines ASPEN (American Society of Parenteral and Enteral Nutrition) and ESPEN (European Society of Parenteral and Enteral Nutrition) and Critical Care Nutrition Guidelines iNutriMon has suggested nutritional recommendations such as calories, protein and fluid along with micronutrients which can be gradually initiated as per patients hemodynamic stability and tolerance to the feed. Initially patient was on RTF and then gradually progressed to semisolid to soft to full diet. Diet Progression was absolutely possible because of nutritional monitoring feature of iNutriMon which was helpful to track under or overfeeding of the patient/s which eventually helps to achieve target nutritional requirements hence speedy recovery was possible.

Along with Ryles tube feed planning, iNutrimon is equipped with Indian food composition table which is helpful to auto calculate nutritive value of the planned recipes and track actual intake of micronutrients along with macronutrients.

We have seen in the above case in hospital settings, but we can utilize iNutrimon in outpatient departments and clinics as well as we have developed the feature considering OPD patients and flow of how it works such as basic details, vitals, nutritional requirements followed by prescription and manage follow ups etc.

Conclusion

iNutrimon plays an important role in enhancing patient care across critical such as ICU and hospitals as well as non-critical care area i.e., OPD and clinics. ICU patients have specific nutritional needs due to critical illness then the software like iNutriMon calculates precise nutritional requirements based on evidence-based guidelines and also ensures the accurate amount of nutrient delivery as per the prescription by nutrition monitoring feature. Critically ill patients are at high risk of malnutrition which can negatively impact recovery. iNutrimon helps in early identification of malnutrition risk ensuring timely intervention to optimize nutritional support.

In the OPD and Clinical set up the software is assisted in developing customized nutrition plans for patients with chronic conditions like diabetes, obesity, cardiovascular diseases. It allows healthcare professionals to track patient progress followed by modification if required.

Overall, softwares like iNutriMon facilitates communication between dieticians, doctors and other healthcare professionals ensures appropriate nutrition care plan is aligned. Proper nutrition management through the software aids in faster recovery, reduced infection rates, and overall better patient health, especially in high-risk patients like those in ICUs.

Reviews iNutrimon in various publications

1. Comparison of Nutric Score, Nutritional Risk Screening 2002, Subjective Global Assessment in the ICU: a cohort study

https://symbiosisonlinepublishing.com/nutritionalhealth-foodscience/nutritionalhealth-foodscience165.pdf

2. Making Nutrition Management Scientific, Objective and Simple with the Help of Technology

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5713792/

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3. Cost of Enteral Formulae Feed in Critically Ill Patients in a Tertiary Care Centre: An Observational Study from India

https://www.opensciencepublications.com/fulltextarticles/IJN-2395-2326-6-205.html

4. Nutrition Management practices in critical care in tertiary hospitals _a survey from India

https://ijirms.in/index.php/ijirms/article/view/196/182

5. The application of AI in clinical nutrition

https://drive.google.com/file/d/1m4cIHxyxvxnPc_j05BrIN82Lfk9V7Kv/view?usp=sharing

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5. https://www.health.qld.gov.au/__data/assets/pdf_file/0030/143877/hphe_sga.pdf
6. https://www.bapen.org.uk/pdfs/must/must_full.pdf
7. https://www.mna-elderly.com/sites/default/files/2021-10/mna-mini-english.pdf
8. https://www.espen.org/files/GLIM_criteria.pdf
9. https://www.criticalcarenutrition.com/resources/nutric-score
10. https://www.nutritioncare.org/uploadedFiles/Documents/Malnutrition/Nutritional%20Risk%20Screening%202002.pdf

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