Nutritional Management of Tuberculosis Patient

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- No conflict of interests
- No relevant financial relationships with any commercial companies pertaining to this activity

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Nutritional Management of Tuberculosis Patient

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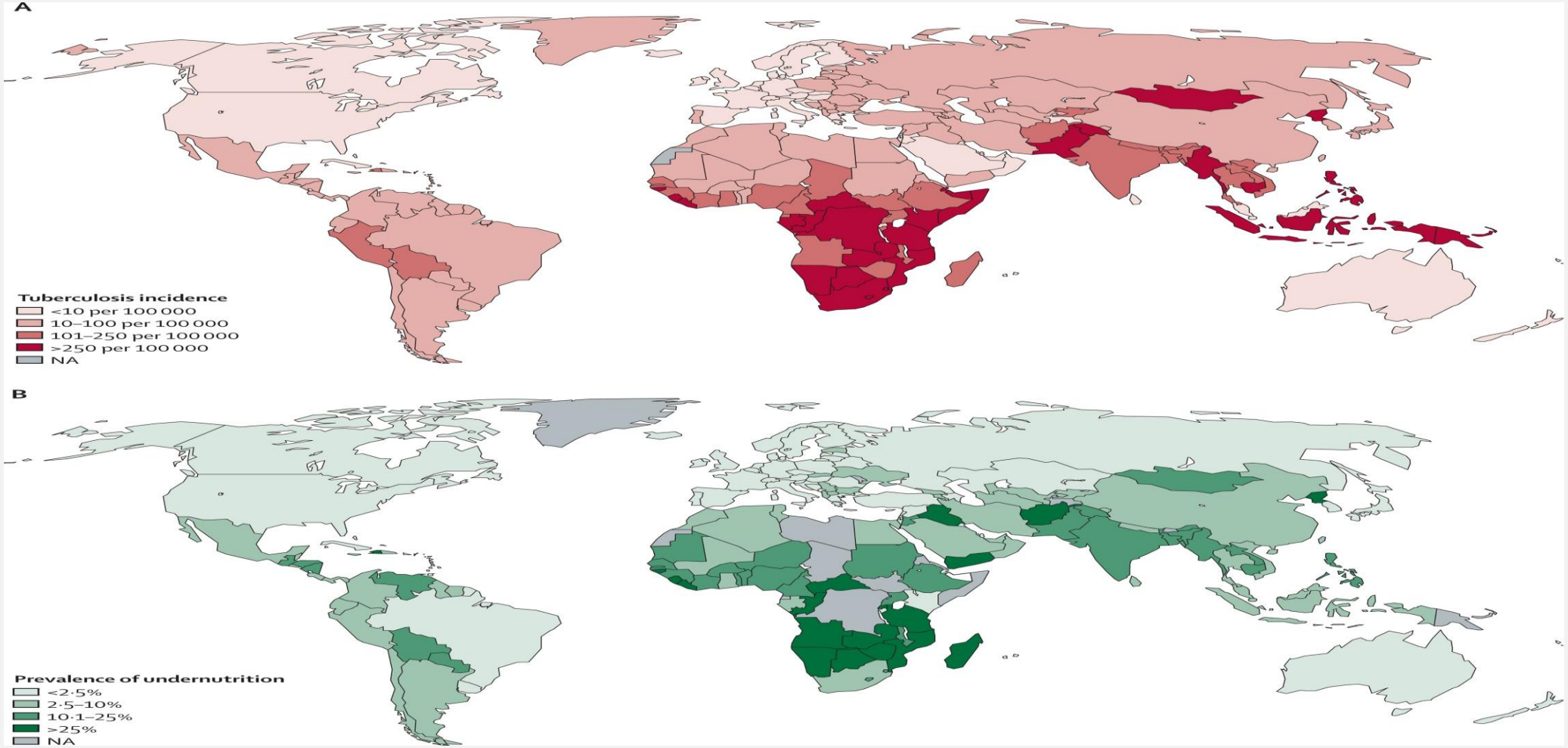
Objectives

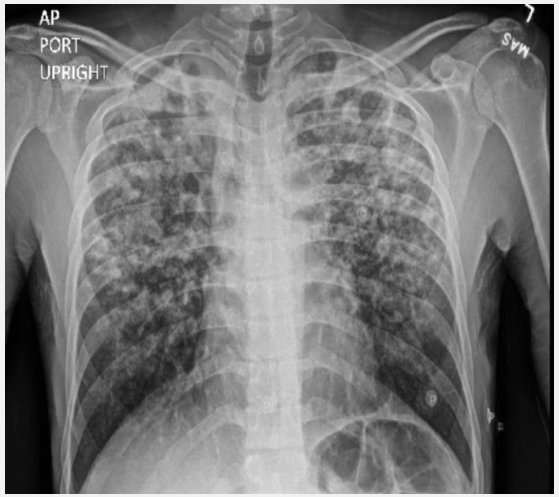
Identify nutritional

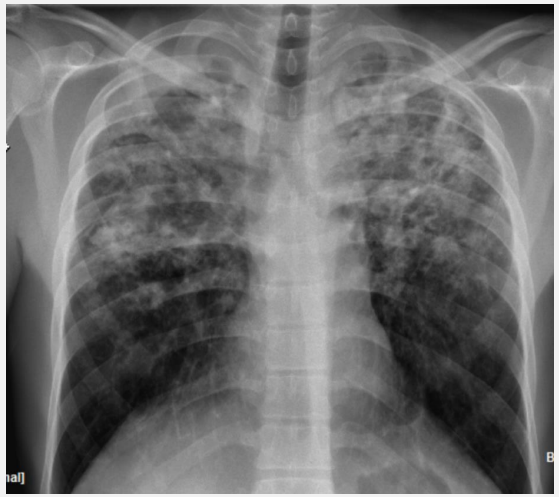
- risk factors in the development tuberculosis
- risk factors in the treatment of tuberculosis
- nursing and medical treatment assessment, goal and plan for tuberculosis patients
- impact on relapse of tuberculosis

Nutritional Impact on Tuberculosis Disease Risk

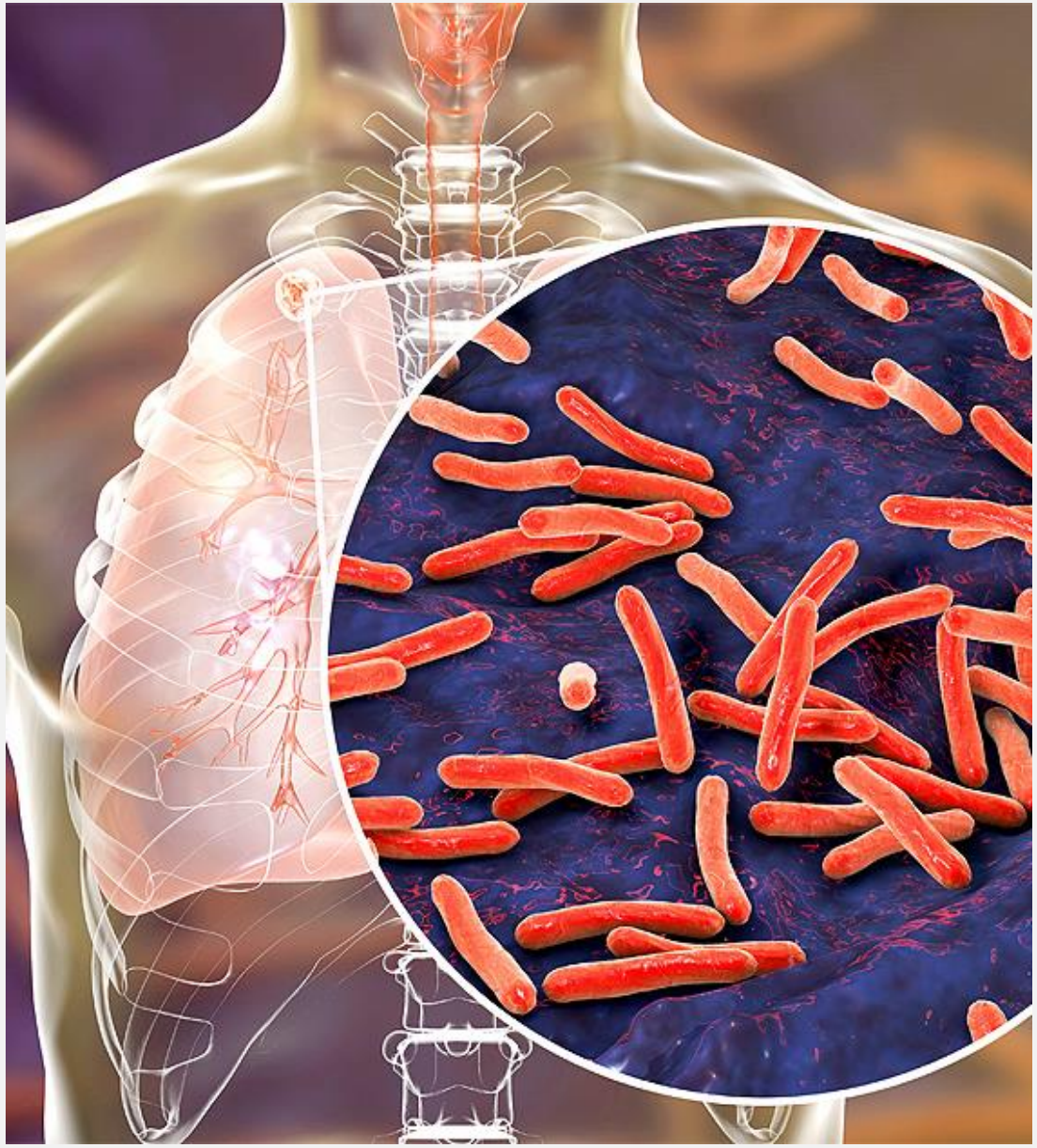


Nutritional Impact on Tuberculosis Severity



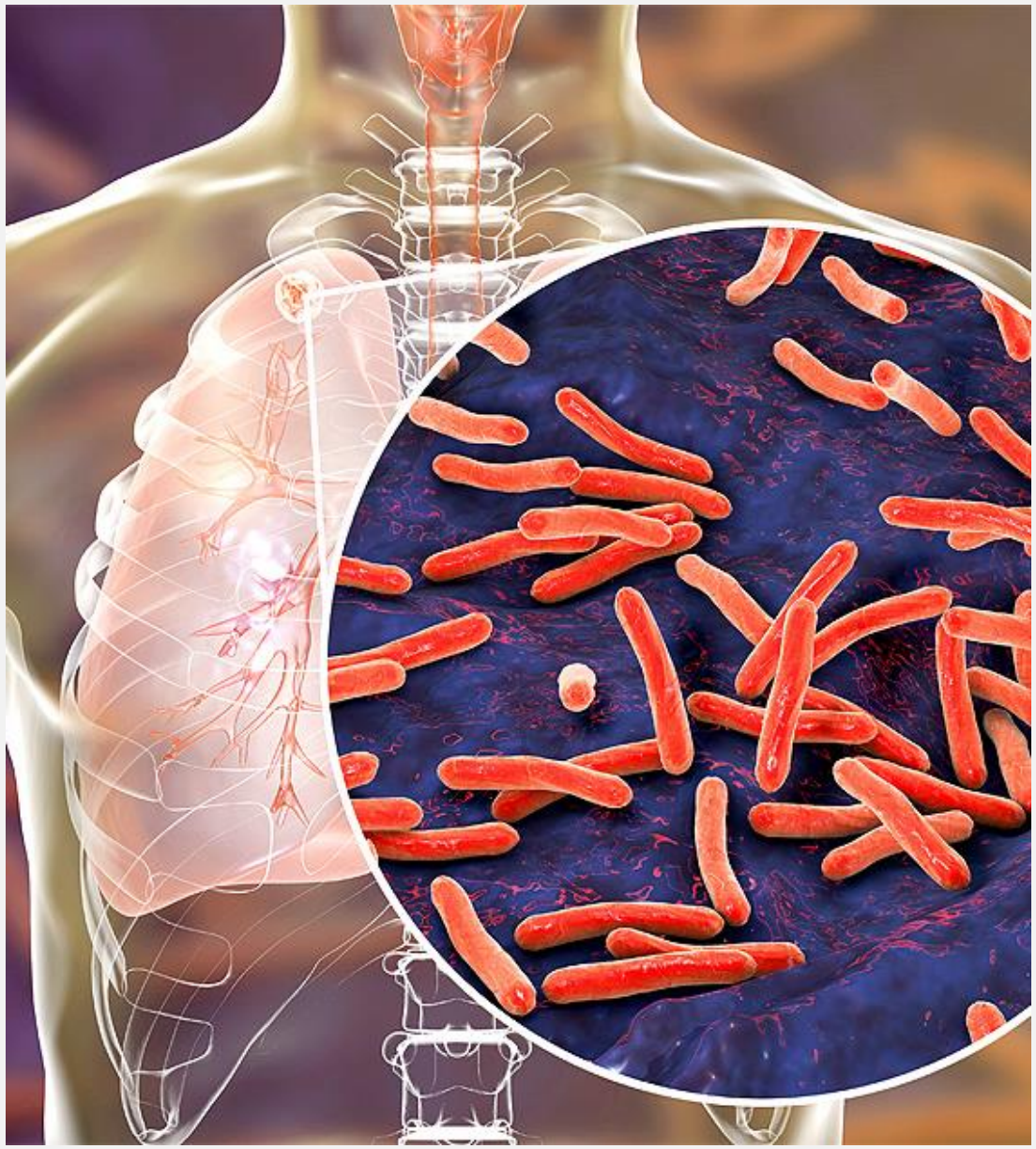


There is a direct correlation between nutrition and radiologic presentation and response to treatment. Patients with undernutrition tend to present with cavitary disease and require extended treatment regimens (Hoyt, et al. 2019)



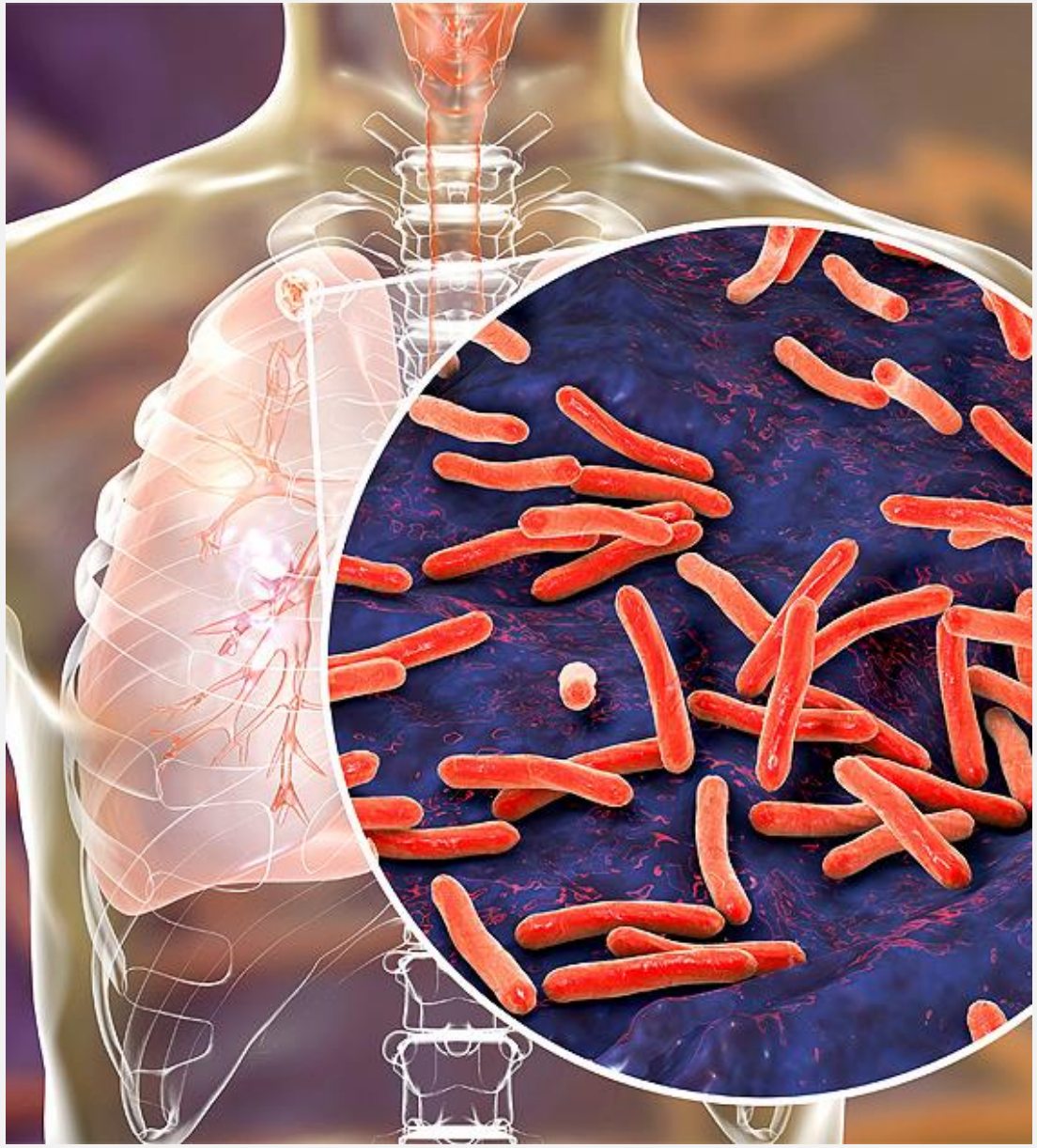
Nutritional Impact on Tuberculosis

- Malnutrition-under and over
- Undernutrition—suboptimal deficiencies, excesses, or imbalances
  - Macronutrient-proteins, carbohydrates, fats
  - Micronutrient-Vitamins A, C, D E, minerals iron, zinc and selenium



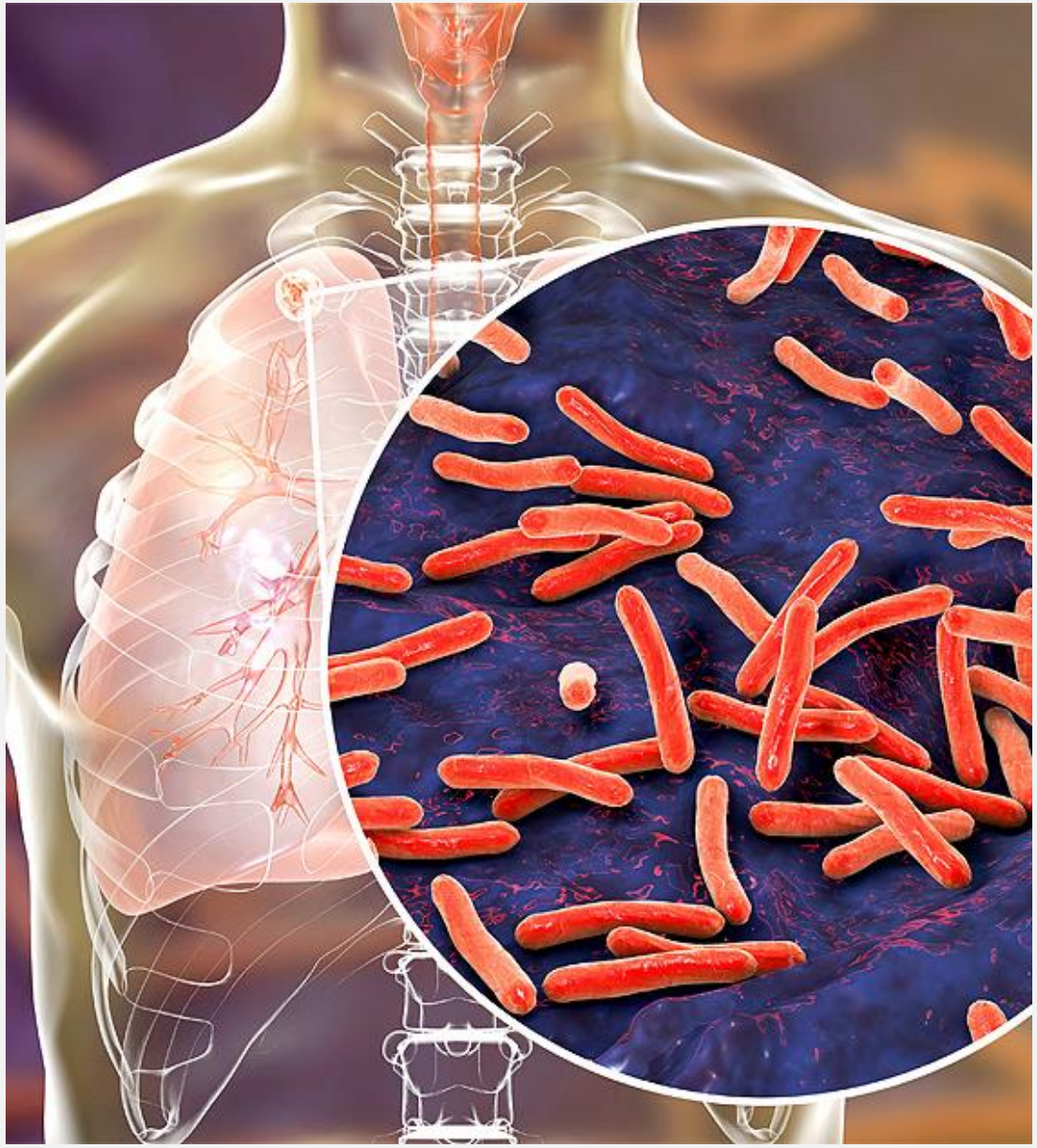
Nutritional Impact on Tuberculosis Treatment

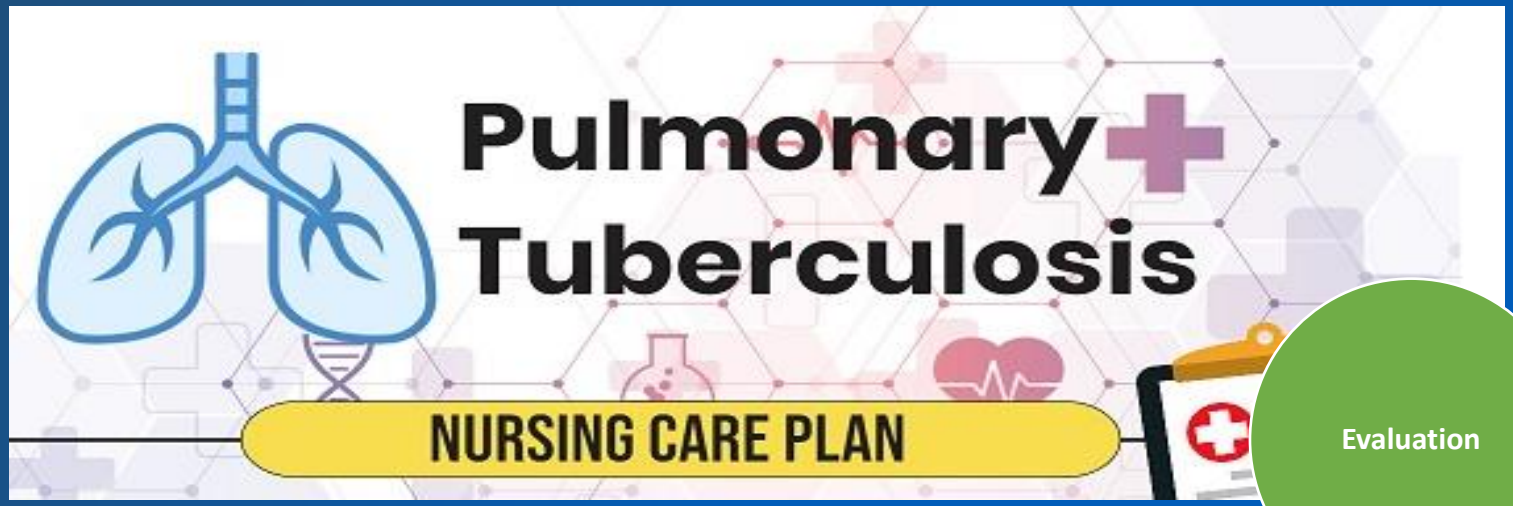
- Undernutrition—a leading risk factor for tuberculosis worldwide (second to HIV)—is associated with impaired immunity, more extensive disease, delayed sputum conversion, and worse treatment outcomes, including mortality.
- The disease process itself increases nutritional demands
- Comorbidities Diabetes, Alcoholism, surgery also contribute to nutritional status



Nutritional Impact on Tuberculosis Treatment

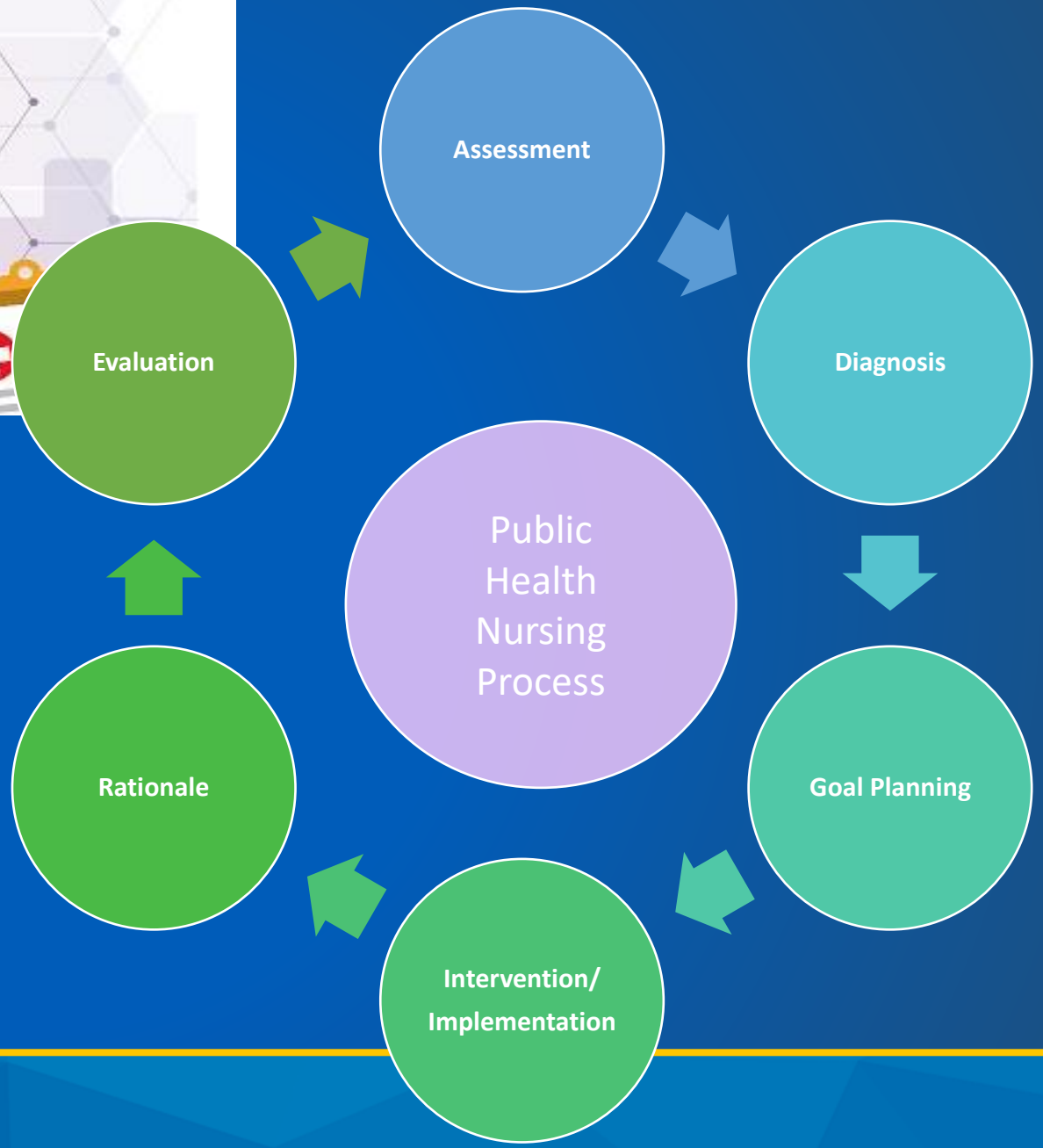
- CURE patient while minimizing risk for temporary or permanent disability and/or death
- provide the safest and shortest effective patient centered therapy possible





Nursing Process & Diagnosis

Psychosocial	Nutrition
Oxygenation	Safety
Activity	Elimination
Self Perception	Comfort



Tuberculosis Nursing Care Plan- Alteration in Nutrition

Assessment and Diagnosis-

- nutritional vital signs extend beyond temperature, pulse, blood pressure to include height, weight, BMI, IDBW, sex-z score for pediatrics, LMAC
- laboratory values (anemia) Hemoglobin, Hematocrit, (current status) Albumin, preAlbumin, total protein
- BMI <18.5
- BMI >40
- What foods are they eating
- Food security

Tuberculosis Nursing Care Plan- Alteration in Nutrition

METROPOLITAN LIFE TABLE FOR MEDIUM FRAME ADULT

Ideal Weight For Women

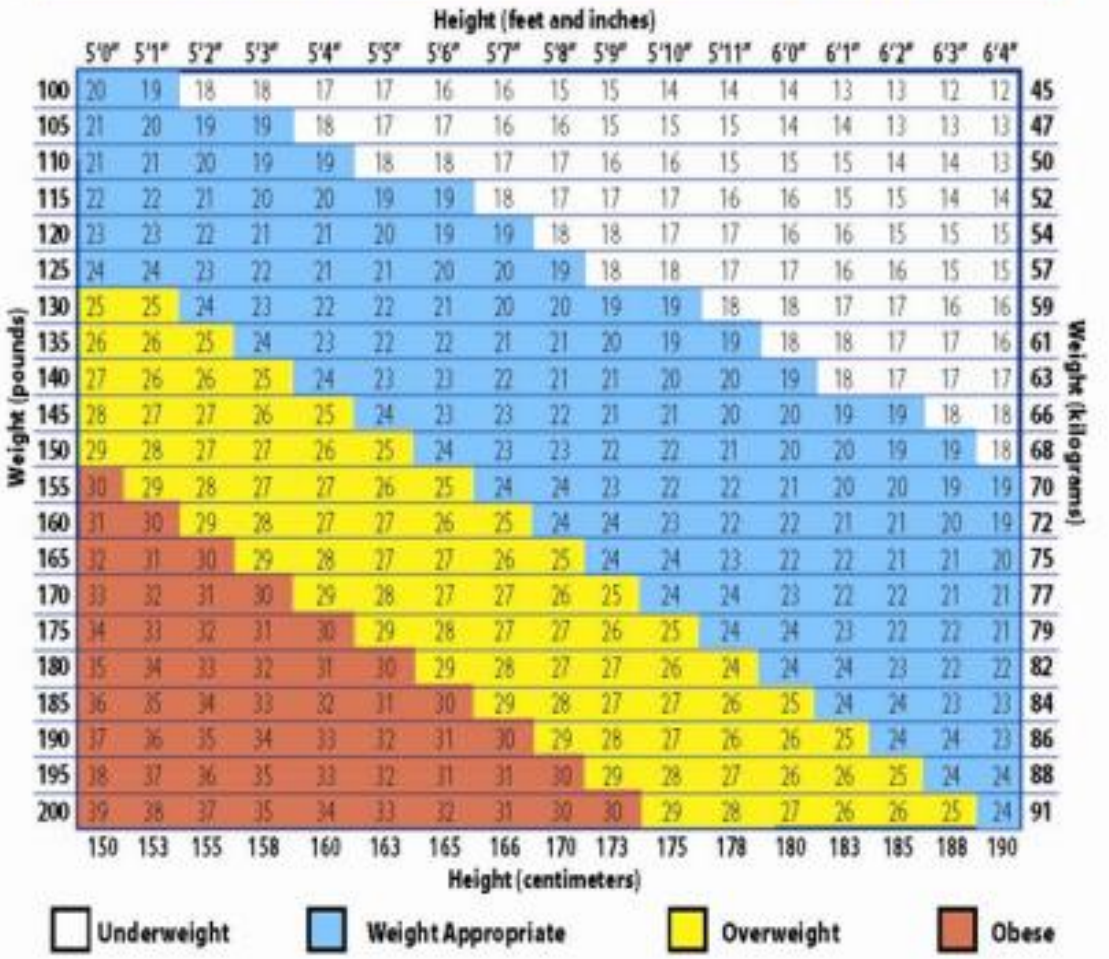
Height in Shoes	Medium Frame
6′	148 to 162 lb
5′11″	145 to 159 lb
5′10″	142 to 156 lb
5′9″	139 to 153 lb
5′8″	136 to 150 lb
5′7″	133 to 147 lb
5′6″	130 to 144 lb
5′5″	127 to 141 lb
5′4″	124 to 138 lb
5′3″	121 to 135 lb
5′2″	118 to 132 lb
5′1″	115 to 129 lb
5′	113 to 126 lb
4′11″	111 to 123 lb
4′10″	109 to 121 lb

Ideal Weight For Men

Height in Shoes	Medium Frame
6′4″	171 to 187 lb
6′3″	167 to 182 lb
6′2″	164 to 178 lb
6′1″	160 to 174 lb
6′	157 to 170 lb
5′11″	154 to 166 lb
5′10″	151 to 163 lb
5′9″	148 to 160 lb
5′8″	145 to 157 lb
5′7″	142 to 154 lb
5′6″	139 to 151 lb
5′5″	137 to 148 lb
5′4″	135 to 145 lb
5′3″	133 to 143 lb
5′2″	131 to 141 lb

From height and weight tables of the Metropolitan Life Insurance Company, 1983. The ideal weights given in these tables are for ages 25 to 59. The weights assume you are wearing shoes with 1-inch heels and indoor clothing weighing 3 pounds.

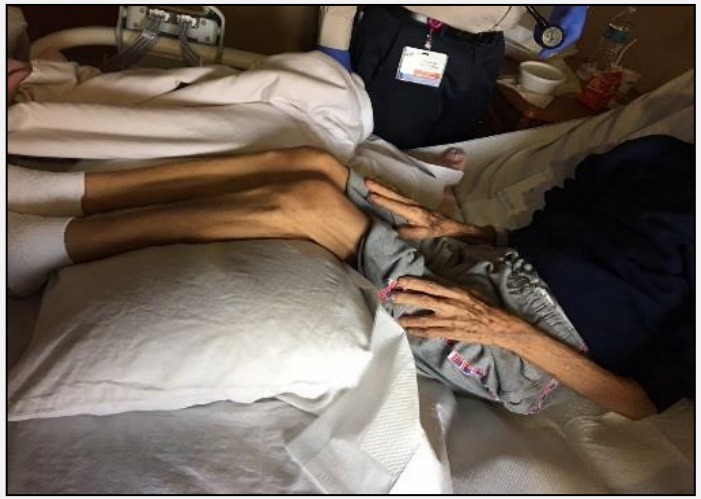
CHART 1. BODY MASS INDEX (BMI)



Tuberculosis Nursing Care Plan- Alteration in Nutrition

Weight Classification	Percentage of IBW
Minimal Survival	**48 – 55%**
Severely Underweight	**< 75%**
Underweight	**75 – 84%**
Normal Weight	85 – 119%
Overweight	120 – 129%
Obese	130 – 140%
Morbidly Obese	> 140 %

Tuberculosis Nursing Care Plan- Alteration in Nutrition



Tuberculosis Nursing Care Plan- Alteration in Nutrition

Goal planning- Patient will demonstrate

- 5% weight gain upon completion of initial phase
- 1lb/week weight gain until Ideal Body Weight obtained
- Laboratory values within normal limits by end of treatment
- Tolerate therapeutic drug regimen
- Anemia (prn) resolved
- Radiologic stability at 2 months of treatment
- Radiologic improvement by completion of treatment

Tuberculosis Nursing Care Plan- Alteration in Nutrition

Interventions

- Administer and monitor therapeutic drug regimen
- Weight assessment weekly until stable, then monthly
- Increase total caloric intake to 1800-2000 k/cal/day
- Monitor for sputa AFB smear conversion and culture conversion
- Perform monthly laboratory assessments as indicated
- Perform monthly and prn symptom and toxicity assessments
- Provide nutritional counselling monthly and prn
- Provide nutritional supplements
- Monitor radiologic response at completion of 8 weeks of therapy and q 2 month
- *Medical- Supplemental iron per provider orders
- Manage side effects

Tuberculosis Nursing Care Plan-Nutrition

Macros based on 2000kcal/day

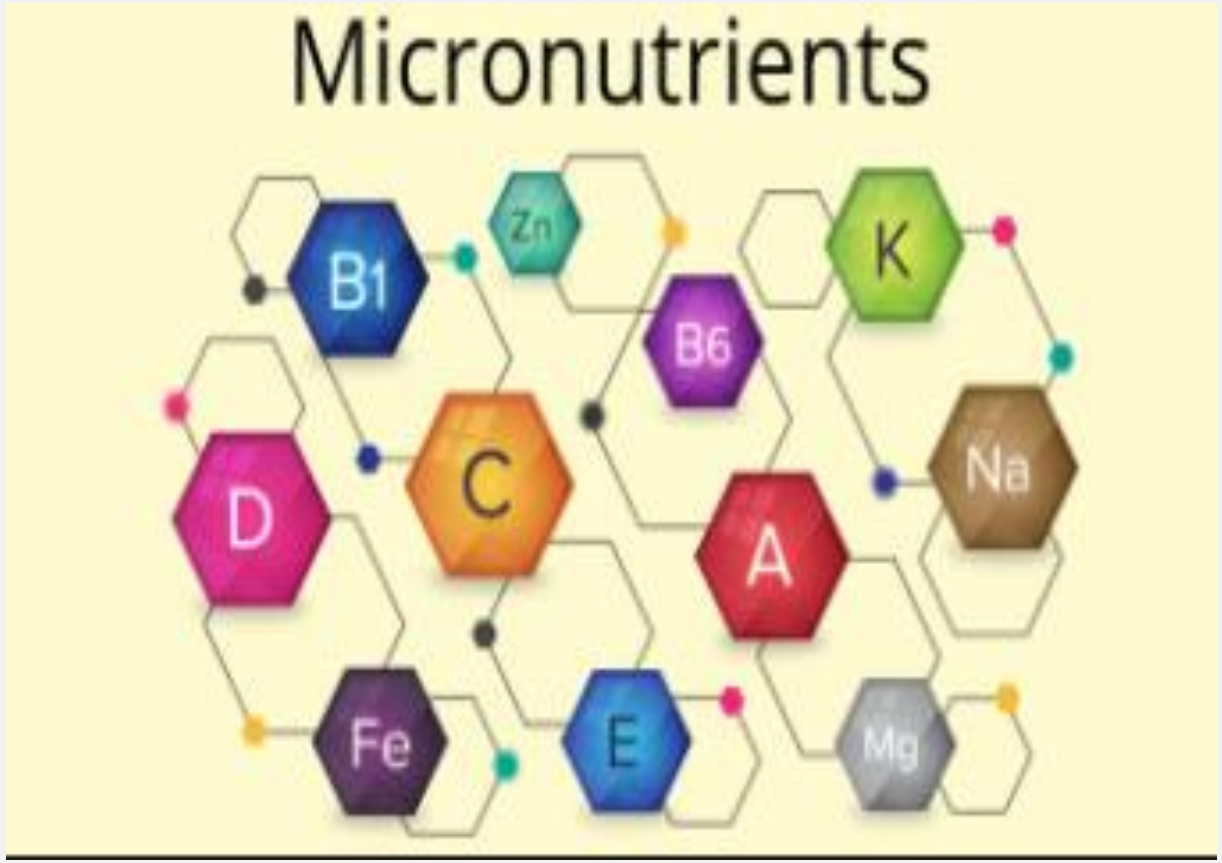
Protein 15-30% (50g)

Carbohydrates 45-65% (260g)

Fats 24-35% (70g)

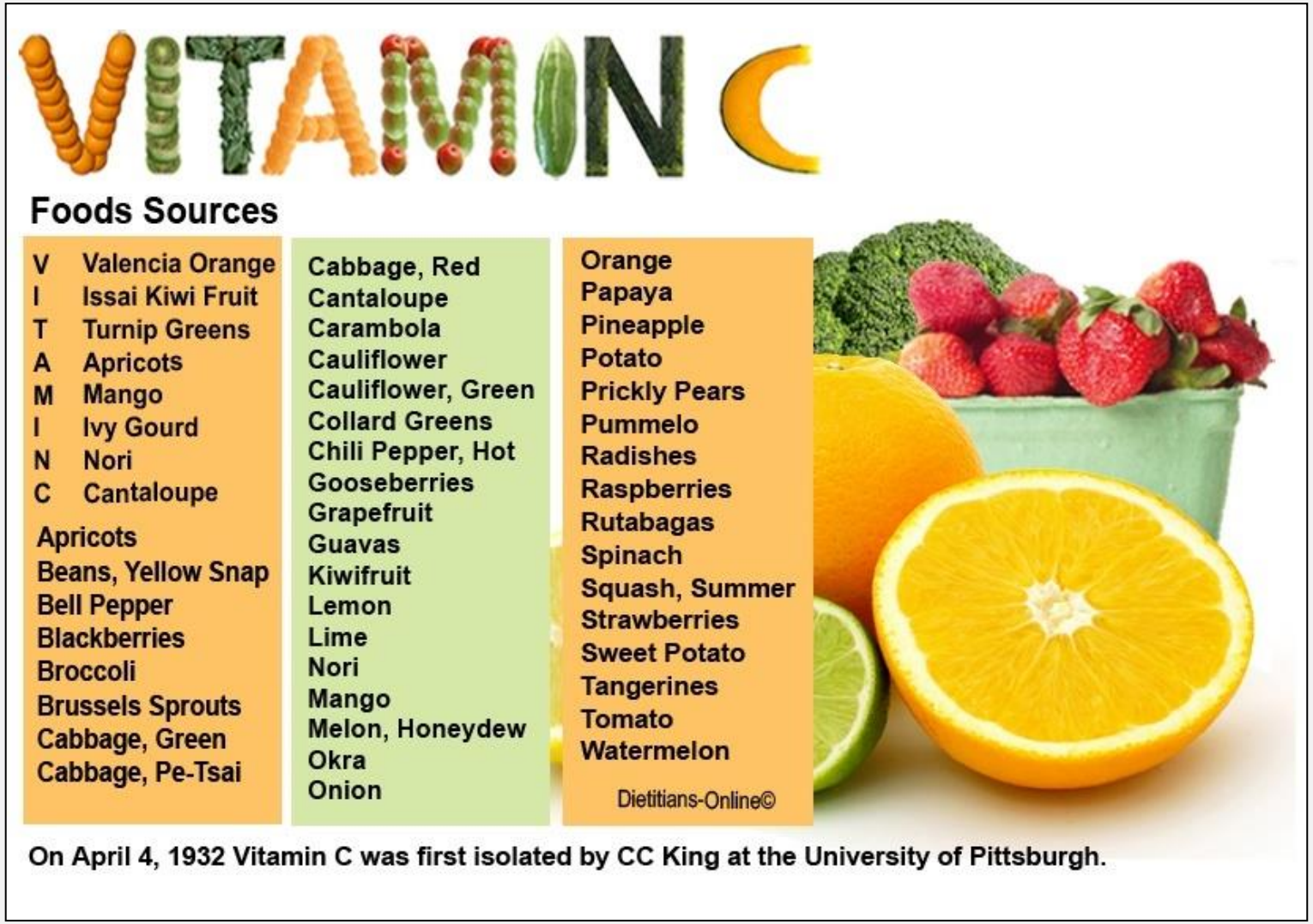
* Disease site dependent

Tuberculosis Nursing Care Plan-Nutrition



- Micronutrients
- Minerals
- Vitamins

Tuberculosis Nursing Care Plan-Nutrition



Tuberculosis Nursing Care Plan-Nutrition

Effects of Vitamin D Supplementation on the Outcomes of Patients With Pulmonary Tuberculosis

A Systematic Review and Meta-Analysis

Hong-xia Wu; Xiao-feng Xiong; Min Zhu; Jia Wei; Kai-quan Zhuo; De-yun Cheng Disclosures BMC Pulm Med. 2018;18(108)

CONCLUSIONS:

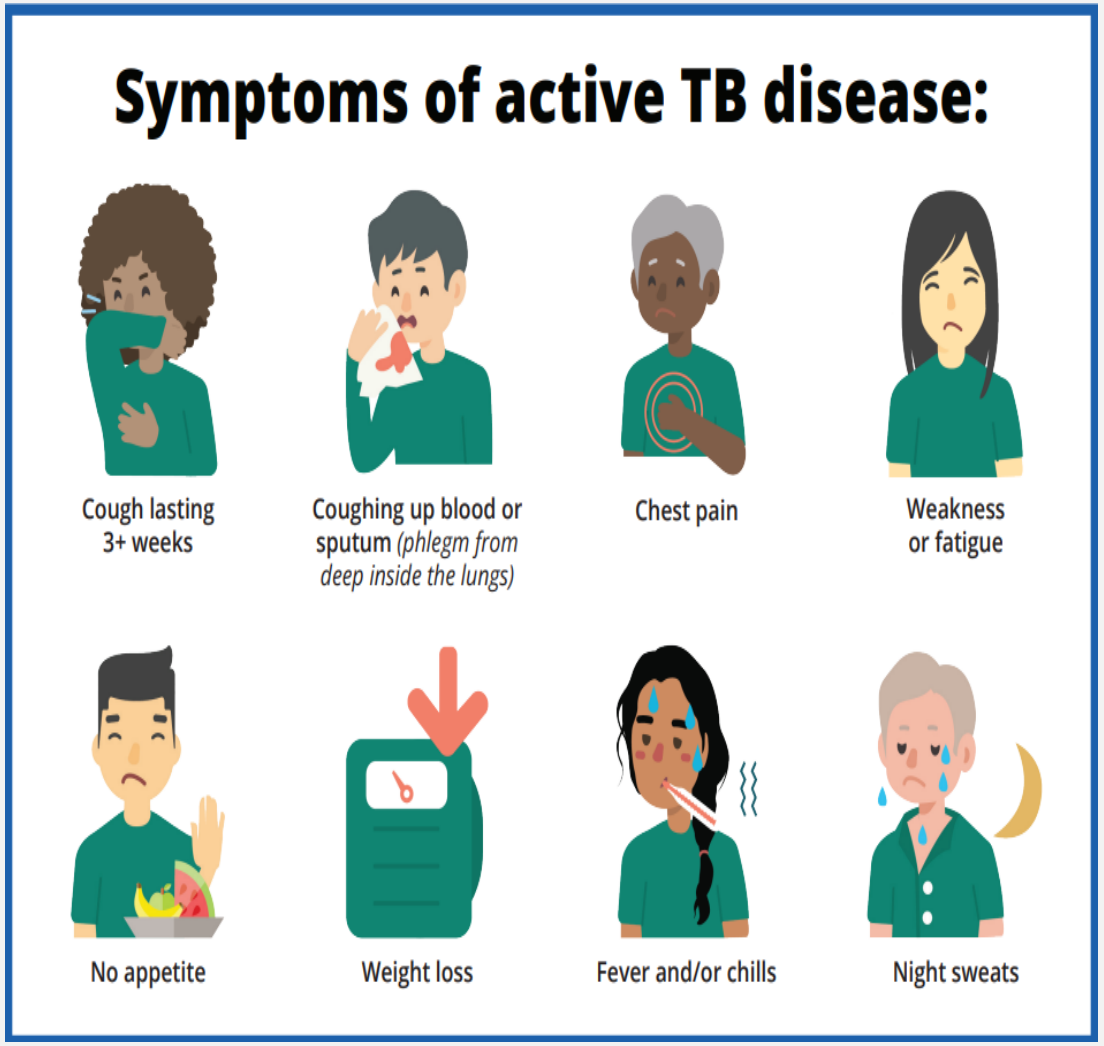
Vitamin D supplementation can be considered as a combination therapy in patients with Pulmonary TB.

Tuberculosis Nursing Care Plan-Nutrition

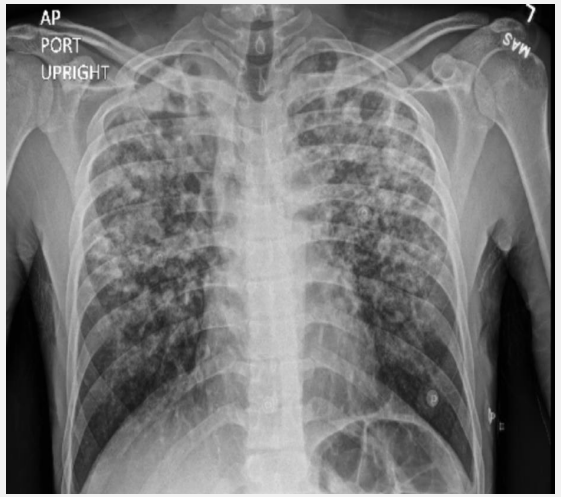
Evaluation-Met or Unmet Goals

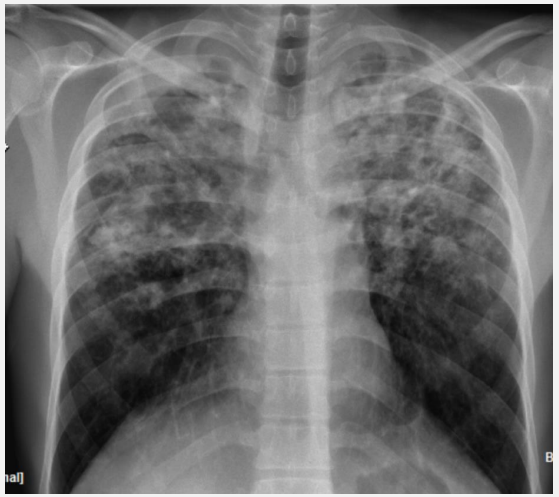
- Assessing for goal obtainment monthly
- Reassessing
- Side effect management

Treatment Response Monitoring - Symptoms



Bacteriology Date	Smear	Measure	Culture	Source
3/19/2026	Positive	<1/field	positive	Sputum
3/19/2026	Positive	<1/field	positive	Sputum
3/20/2026	Positive	<1/field	positive	Sputum
3/24/2026	Negative		positive	Sputum
3/25/2026	Negative		positive	Sputum
3/25/2026	Positive	<1/field	positive	Sputum
3/31/2026	Negative		positive	Sputum
3/31/2026	Negative		positive	Sputum
4/1/2026	Negative		positive	Sputum
5/1/2026	Negative		negative	sputum





Treatment Response Monitoring- Bacteriology

Body mass index predictive of sputum culture conversion among MDR-TB patients in Indonesia.

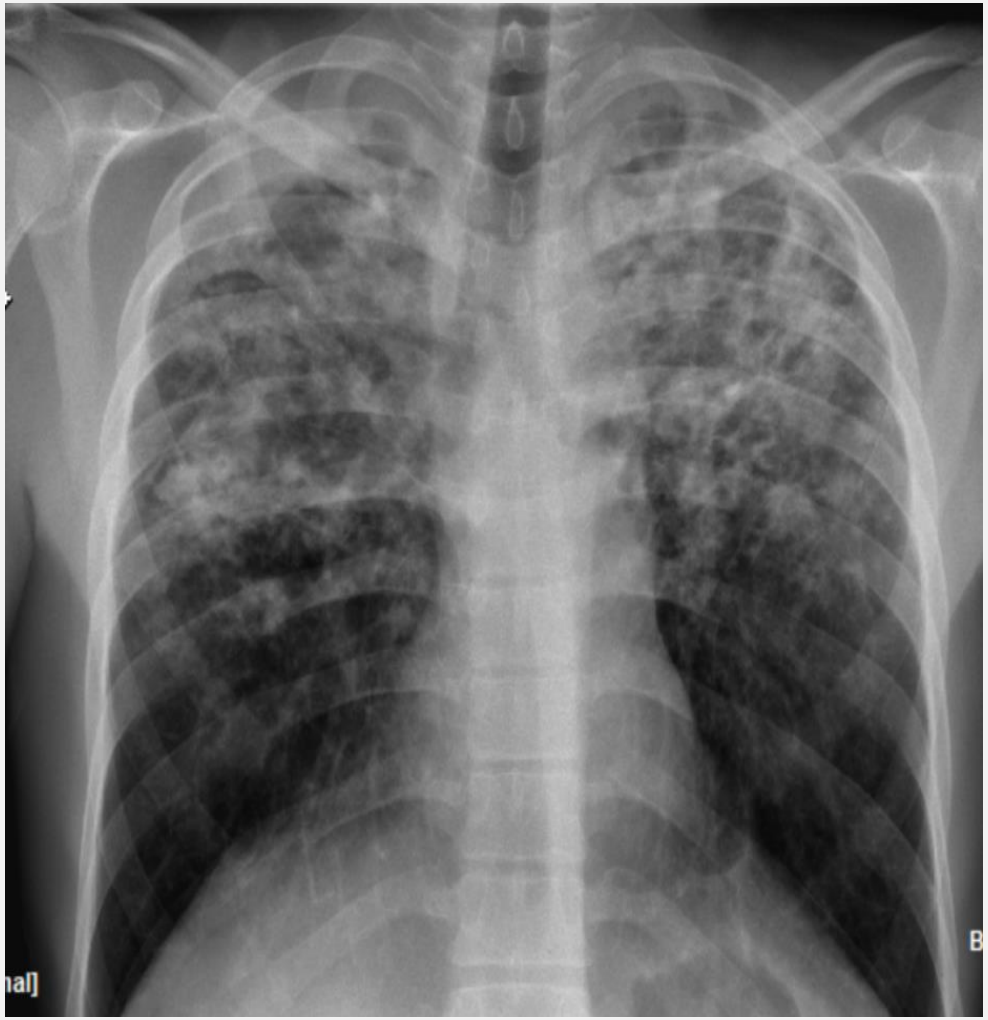
Compared to patients with normal weight (BMI ≥18.5), severely underweight patients (BMI <16) had longer time to initial conversion and a lower probability of sputum culture conversion within 4 months.

Conclusion:

Severely underweight status = longer time to initial sputum culture conversion among MDR-TB patients.

Int J Tuberc. Lung Dis. 2014 May;18(5):564-70. doi: 10.5588/ijtld.13.0602.

Treatment Response Monitoring- Radiology



Treatment Response Monitoring- Laboratory

Anemia

Hemoglobin

Hematocrit

TiBC

Ferritin

Nutritional Panels

Electrolytes

Total Protein

Albumin

PreAlbumin

OTHER

HgA1c

TSH

Magnesium

Uric Acid

serum drug levels

OTHER

Vitamin D

HIV

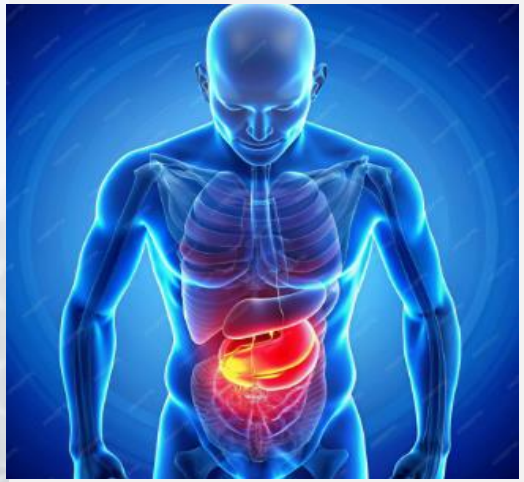
Viral Load

CD4 Counts

Treatment Response Monitoring- Laboratory

Albumin:	**3.8 – 5.2g/dl** (Major protein. Low levels in poor diets, ↓ iron intake)	
Total Protein:	**6.0-8.5g/dl** (Low levels indicate poor nutrition)	
Hemoglobin:	**11.5 – 16g/dl (female)**	**13.2 – 17.1 g/dl(male)**
Hematocrit:	**36.0 – 45.0 % (female)**	**38.5 – 50.5 %(male)**
Glucose:	**65 – 110 mg/dl**	
WBC:	**3.8 – 10.8**	
Lymph:	**18-48 %** (decreases with progressive malnutrition)	

Identification and Monitoring of Side Effects



- Nausea- ondansetron,
- Abdominal pain
- GERD-ppi, protonix, h2receptor blockers

*caution with antacids and herbals

Treatment Response Monitoring-

FAILURE Patients remain culture **positive** throughout treatment

RELAPSE Patients become culture positive or radiological deterioration after treatment within 1 year post treatment

Treatment Response Monitoring-

WEIGHT AS A RISK FACTOR FOR TB RELAPSE

Underweight at Diagnosis ≥ 10% Below Ideal Body Weight			
	Weight gain after 2 months Rx	**Relapse (%)**	**Cavitary AND Positive 2 months culture**
Yes	≤ 5%	20.3%*	50.5%**
	> 5%	11.9%	18.5%
No		4.2%	18.3%

*p=0.06 **p=0.02

BMI	RELAPSE (5)
< 18.5	19.5%
18.51-19.0	10.7%
>19.0	6.1%

Body Mass Index (BMI) is optimal weight for health. Adults with a BMI between 19 and 24 have less risk for illnesses such as heart disease and diabetes than individuals with a BMI between 25 and 29. A BMI greater than 30 indicates greatest risk for obesity-related diseases. (See Chart 1.)

Adapted from The National Institute of Health, NHLBI Clinical Guidelines on Overweight and Obesity June 1998. www.nhlbi.nih.gov/guidelines.

BMI	RELAPSE (5)
< 18.5	19.5%
18.51-19.0	10.7%
>19.0	6.1%

Underweight at Diagnosis ≥ 10% Below Ideal Body Weight			
	Weight gain after 2 months Rx	**Relapse (%)**	**Cavitary AND Positive 2 months culture**
Yes	≤ 5%	20.3%*	50.5%**
	> 5%	11.9%	18.5%
No		4.2%	18.3%

Tuberculosis Nursing Care Plan- Alteration in Nutrition

Goal planning- Patient will demonstrate

- 5% weight gain upon completion of initial phase (8 weeks)

patients <10% IDBW at diagnosis that do not meet this goal and maintain poor radiologic response and remain AFB culture positive

50% chance of RELAPSE

Tuberculosis Nursing Resources

Criteria* for Collecting Serum Drug Levels

Bacteriological Criteria (consider at 8 weeks of therapy)	Medical Criteria (consider at 2-4 weeks of therapy)	Clinical Criteria (consider at 8 weeks of therapy)	Criteria based on TB Diagnosis**
Slow response to adequate therapy at **8 weeks** of treatment, evidenced by the following: • Patient remains AFB sputum smear positive 2+ or greater (unless easily explained) And/or • Sputum smear results not decreasing as expected (4+ to 3+, 2+, etc.)	• TB/poorly controlled diabetes comorbidity • Mal-absorption due to chronic or acute co-morbidity • Chronic or excessive vomiting or diarrhea • HIV infection and CD-4 count <100** • Low or high body mass index (>10% above or below ideal body weight)	• No improvement of TB symptoms (i.e., no weight gain, no reduction in cough, etc.) at 8 weeks • Worsening CXR anytime during course of adequate therapy • New clinical deterioration, likely related to TB (i.e., new evaluation for TB relapse or concern for drug resistance**)	• Patient Relapse: When signs and symptoms of TB return within two years of a prior episode of disease and there was a good possibility that relapse was due to low drug levels (exclude previous poor adherence, missed doses, or N/V) • When second line drugs need monitoring, as per consult recommendations • TB meningitis

* **Therapeutic Drug Monitoring should be reserved for patients who are not responding to adequate therapy,** and not necessarily for patients who meet some of the stated criteria and are otherwise doing well.

** Consultation recommended by a DSHS-recognized TB medical consultant, see list here: dshs.texas.gov/idcu/disease/tb/consultants/

"Giving people medicine for TB and not giving them food is like washing your hands and drying them in the dirt"

Quote by a Haitian public health worker

Book: Mountains Beyond Mountains

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Case Study # 2

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Case Study # 2

Ms. RM: 82-year-old Hispanic female

- Admitted to hospital with **septic shock** and **multifocal pneumonia**
- Generalized weakness; non-ambulatory for the past 2-3 months
- Transferred to **ICU** for intensive care

Case Study # 2

- Declining health with severe malnutrition and cachexia
- Significant dental issues (poor dentition)
- 20 Lb weight loss
- Incontinence of urine and stool for the past 2 weeks
- Pulmonary tuberculosis with cavitary lesions on chest X-ray
- Poor prognosis

Case study # 2

RM 82 y/o female
Admitted to TCID

Diagnosis: Pulmonary cavitary TB
Malnutrition

Age:	Sex:	Ht:	Wt:	Usual Body Weight:
82	F	4'8''	65.7 Lb	
Frame Size:	**Ideal Body Weight:**	**% IBW:**	**BMI:**	**Classification**
Small	97lb	67.7lb	14.1	Underweight/ Severely underweight

Labs:

ALB: 1.1
Hgb: 7.7
Hto: 24.2
GLUC:
WBC: 5.4

Risk Factors:
->20% underweight
-Infectious disease
- Poor dentition

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Nutritional Assessment
Follow Up Case # 2

Marked improvement during TB treatment. Soft diet with ensure. Good response to treatment and eating better after dental work

Age:	Sex:	Ht:	Wt:	Usual Body Weight:
82	F	4'8"	98lb ↑	
Frame Size:	**Ideal Body Weight:**	**% IBW:**	**BMI:**	**Classification**
Small	97 Lb	100%	22	Appropriate weight

Labs:

ALB:	3.2
HGB:	12.9
HTO:	**39.4**
GLUC:	**97**
WBC:	3.8

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CONCLUSION

- The impact of nutrition is directly correlated to treatment outcomes for Tuberculosis management.
- Nutritional assessment and treatment is a required component of Tuberculosis treatment

Questions and Wrap Up

Thank You!

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