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HEARTLAND NATIONAL TB CENTER
A PARTNERSHIP OF UT HEALTH SCIENCE CENTER AND TCID
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TBeat

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Calling Attention to the Relationship between Nutrition and Tuberculosis

In recent years, many international organizations and researchers within the tuberculosis community have made an effort to focus on the association between poverty, malnutrition, and TB. Available data suggests that malnutrition affects cell-mediated immunity, which is critical for controlling TB infection, and may increase the risk of active TB disease development by six to ten times.[1] Looking at the dynamics of the relationship between TB and nutritional status can help health care professionals identify individuals at high risk of developing active TB disease as well as those at risk of TB relapse and treatment failure. Thus current research and educational efforts are working to develop more effective and innovative health care practices and interventions in the case management of malnourished individuals.

Among these developments are several ongoing clinical trials that are looking at supplementing TB treatments with vitamins and nutrients in hopes of eliciting a better immune response. Vitamin D and Vitamin A, both of which were used to treat TB before the discovery of antibiotic therapy, as well as micronutrients such as zinc and folic acid are being studied in conjunction with TB treatment. These studies are comparatively looking at a variety of factors in patients, including time to sputum and culture conversion, rate of survival, rate of relapse, radiographic improvement, and weight gain, among others.[2] While more research is necessary, the limited data suggests that TB patients with nutritional deficiencies may have improved nutritional status, improved clinical treatment, and reduced mortality with daily micronutrient supplementation.[3]

In the fields of education and consultation, Heartland National TB Center is also developing tools to assist in

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the case management of TB patients suffering from malnutrition. In 2008, Heartland's consultation team developed a poster for the National Tuberculosis Controllers Association (NTCA) meeting entitled, "Human Resource Development: Enhancing the Expertise and Achieving Certification Competencies for Tuberculosis Nurse Consultants." This first place award-winning poster chronicled the development and methodology behind providing intensive training to TB nurses. This training included achieving competency in performing nutritional assessments and identifying potential problems for poor patient outcomes. After showcasing this effective training on a national level, nurse consultants at Heartland developed an educational product entitled ***Impact of Poor Nutrition on TB Relapse***, which is introduced on page 4 of this newsletter. This product builds on clinical studies as well as the aforementioned educational methodologies for use as a clinical tool in case management.

As the study of TB and nutrition progresses, it is important for TB programs and organizations to consider utilizing innovative tools to better care for malnourished patients. This newsletter edition provides a variety of educational resources on the subject in the form of online links, clinical products, and case presentations for review.

FOOTNOTES:

[1]United States Agency for International Development. Academy for Educational Development. *Nutrition and Tuberculosis: A review of the literature and considerations for TB control programs*. ONLINE. 2008. Available: http://www.aidsportal.org/repos/Nutrition%20and%20TB_Final.pdf

[2]U.S. National Institutes of Health. National Library of Medicine. Available: http://clinicaltrials.gov/

[3]*Nutrition and Tuberculosis: A review of the literature and considerations for TB control programs* Available: http://www.aidsportal.org/repos/Nutrition%20and%20TB_Final.pdf

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The VISION of the Heartland is to provide *excellence*, *expertise*, and *innovation* in training, medical consultation, and product development to reduce the impact of tuberculosis in our region.

Weight and Body Mass Index as Predictors for TB Outcomes

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%	18.9%
No		4.2%	18.3%

*p = 0.06
** p = 0.02

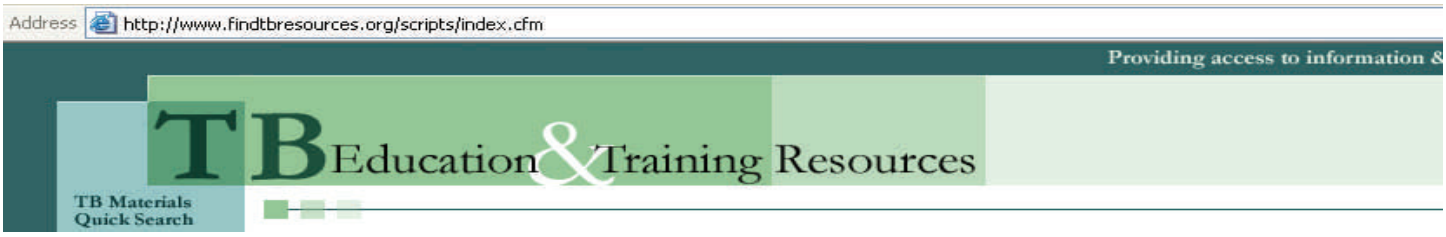
Body Mass Index	Relapse (%)
< 18.5	19.5
18.51 – 19.0	10.7
> 19.0	5.48

From: Seaworth, Barbara. (2008). *Treatment Failure.* Presented at TB Case Review, Oklahoma University Health Sciences Center, Oklahoma City, Oklahoma.

Introducing
Impact of Poor Nutrition on TB Relapse

As part of Heartland's commitment to designing innovative educational products, we have developed a new pocket guide to aid in the clinical assessment of a patient's weight and nutritional status. Product highlights include a Body Mass Index (BMI) chart, clinical definitions, and nutritional formulas. This pocket clinical guide is now available on the Heartland website (http://www.heartlandntbc.org/products.asp) for ordering and downloading in PDF format.

Related Links



- Division of TB Elimination, CDC
- World Health Organization, Tuberculosis
- Find TB Resources
- Joint RTMCC Products Page
- National Tuberculosis Curriculum Consortium
- National Information Prevention Network—TB, CDC
- International Union against Tuberculosis and Lung Disease
- Stop TB Partnership
- Global Health Facts on TB
- Tuberculosis Research Today
- Migrant Clinicians Network: Tuberculosis and Nutrition
- Nutrition and TB: A review of the literature and considerations for TB control programs

Upcoming Trainings

Heartland National TB Center — 2009 Trainings

Please go to http://www.heartlandntbc.org/training.asp for course information, staff contact information and registration dates for each course. Proposed topics and dates are subject to change; check the website for the latest updates.

Date	Course	Location
March	TB 101 Teach Back	Phoenix, Arizona
March 31-April 2	TB Nurse Case Management	Waukesha, Wisconsin
April 3	MDR Primer	Waukesha, Wisconsin
April 21-23	TB Program Management	Overland, Kansas
April 21 or 23	TB in Corrections	Collinsville, Illinois
Spring 2009	TB Nurse Case Management	San Antonio, Texas
June	TB in the US Born	Chicago, Illinois
June 2-4	TB Intensive	Tyler, Texas
June 19	TB Updates for the Physician	Rochester, Minnesota
July 13-16	TB Nurse Case Management	Arlington, Texas
September	TB in Corrections	Minnesota
Fall	Infection Control	Oklahoma City, OK
October 20-22	TB Nurse Case Management	Salina, Kansas
Winter	TB Intensive	Houston, Texas
Winter	Pediatric TB Intensive	Houston, Texas

Plus several regional webinars and a national webinar; dates and topics to be announced.

In the Works

Heartland National TB Center is in the process of expanding and improving our mini-fellowship program. This year we offered educational training opportunities in adult and pediatric tuberculosis targeted to infectious disease fellows and TB clinicians. We also offered an intensive nursing mini-fellowship for advanced practice nurses, RNs, and LVNs. The goal of each of our mini-fellowship programs is to provide an interactive and innovative curriculum with comprehensive topics in the management of tuberculosis. In addition to these programs we are currently developing for 2009 a programmatic mini-fellowship targeted to TB control program managers. We are also in the process of updating the application and selection process for the 2009 mini-fellowships. Please watch for more new details and information in our upcoming newsletters and on our website.

Regional News

New Hospital at the Texas Center for Infectious Disease

The Texas Center for Infectious Disease (TCID), located in San Antonio, Texas, is a public healthcare facility of the Department of State Health Services specializing in the treatment of tuberculosis. The facility currently includes a 72-bed hospital as well as an outpatient clinic. With the approval of a constitutional amendment appropriating funds to the new hospital project, a 75-bed replacement inpatient facility has been authorized for TCID.

The current design proposal includes replacement of the current facilities with an 82,000 sq ft. building. According to the TCID website, "The patient care units in this building are designed to assist the patients to complete the long-term treatment required for tuberculosis. Each spacious patient room will be private, with bath/toilet that is handicapped accessible. A television, shelving, table and side chairs, additional seating, closet and hospital headwall unit and bed will furnish each room. Hardware, finish and trim in each patient unit will meet healthcare standards, but also will be 'hard constructed' to selected mental health standards to build durability, flexibility and security into the new facility. Patient activity, therapy, counseling and spiritual support spaces are also planned for the new facility."

The new hospital will be the largest construction project for a tuberculosis inpatient facility in the last fifty years. The ground breaking ceremony is scheduled for December 15, 2008.

http://www.dshs.state.tx.us/tcid/default.shtm

TB*it*

Greetings Heartland Region! I would like to introduce myself as the new editor of our regional newsletter, *TBeat*. We hope that our newsletter will serve as an up-to-date resource and communication tool throughout the Heartland region. I also hope to incorporate relevant articles, helpful links, and interesting case presentations from around the region and beyond. With that being said, I would like to open up the newsletter to all of you. Please feel free to send us suggested topics, case studies, and regional news from your areas. We hope to have input from all 13 states. This is your regional TB education and training center, and your newsletter!

Sincerely,

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Case Presentation
The Impact of Nutrition on TB Treatment Outcomes

Case History:

A 49 year old male was diagnosed with recurrent pulmonary tuberculosis after presenting to an emergency room with a 3 month history of malaise, chills, subjective fevers, shortness of breath, productive cough; and weight loss over the past year. A sputum specimen was positive for AFB and grew *M. tuberculosis* susceptible to all first line drugs. The chest radiograph was abnormal with bilateral patchy alveolar opacifications in the upper lobes and a CT scan of the chest noted tree-in-bud parenchymal opacifications and consolidation bilaterally, cavitation in the right apex and right lower lobe, and diffuse centrilobular nodules in both lungs. The patient was coughing and appeared malnourished and chronically ill. His height was 5'7 1/2" and weight at diagnosis was 114lbs. His BMI was 18 (underweight). Labs indicated anemia, with a borderline low serum folate level (3.6, normal >5.4), and iron deficiency (iron 28, normal range 50-160).

His previous episode of tuberculosis was treated by directly observed therapy 7 years earlier. Because of a presumed allergic reaction to pyrazinamide (PZA), he received treatment with isoniazid (INH), rifampin (RIF), and ethambutol (EMB) alone. For unclear reasons, treatment was stopped after only 8 months despite a slow clinical and bacteriological response. His weight gain was poor and sputum cultures took more than 2 months to convert to negative.

Treatment was reinstituted with the standard four drug daily regimen of INH, RIF, EMB, and PZA but he was not able to tolerate the PZA and it was discontinued. Without PZA, a minimum of 9 months of treatment was planned. After 2 months of treatment, he had not gained any weight and during the third month he only gained 1 pound. A CBC indicated mild anemia. Serum drug levels showed a rifampin level of 8.01mcg/ml which was at the low end of normal (8-21 mcg/ml normal range), and a border line low INH level of 3.14 mcg/ml (normal 3 – 5). Rifampin was increased to 750 mg daily. Repeat rifampin serum drug levels were normal at 20.17 mcg/ml. The patient tolerated the increased rifampin dose without any evidence of toxicity so INH was increased to 450 mg daily. Repeat levels were within normal limits.

Sputum smears and cultures were positive through the third month of therapy but converted to negative before the fourth month. Treatment was complicated by poor appetite, intermittent nausea, and vomiting after taking his TB medications. He improved with decreased cough, resolution of fevers and night sweats, and increased energy. After 4 months of treatment, he had gained 2 additional pounds and his appetite improved. By the fifth month, the weight was 119lbs, but his chest x-ray showed increased lucencies, necrosis, and cavitations. His weight increased further by month 7 of treatment but he continued to note mild daily nausea and at least 2 episodes of vomiting each week.

Treatment was extended to 12 months due to treatment without PZA, slow clinical and bacteriological response, and extensive radiographic disease. He continued on daily therapy throughout the course of his treatment.

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Case Presentation *continued from Page 7*

Teaching Points:

This patient had several risk factors for a poor treatment outcome. We will note these but focus our discussion on the impact of nutrition on TB treatment outcomes.

- One primary treatment-related risk factor present in our patient was a regimen without PZA. The risk of TB relapse is increased in regimens that do not include PZA as this drug is critical to short course regimens because it targets bacterial persisters. When treatment does not include PZA for 8 weeks, treatment must be extended to at least nine months. Other treatment-related factors associated with an increased relapse risk include intermittent dosing, adherence, a non-rifampin regimen, and the duration of therapy.

- Medical risk factors present in our patient included: a low BMI and slow weight gain in the initial months of therapy; extensive radiographic or cavitary disease; prior TB treatment; and slow sputum culture conversion (> 2 months). Other medical factors associated with relapse include: associated medical conditions like diabetes or HIV, tuberculosis lymphadenitis, drug resistant disease, and prior treatment for tuberculosis.

- Patients who are underweight at diagnosis have an increased likelihood of treatment failure and/or relapse. Body weight has long been recognized as associated with an enhanced risk of progression of latent TB infection to disease. Studies of over 823,000 navy recruits found that tuberculosis developed three times more often in young men 10% or more below their ideal body weight than in those 10% or more above it.[1]

- Underweight is defined by the Metropolitan Life Table as: 10% or more below ideal body weight at diagnosis. The patient from this case study was underweight at the beginning of treatment. According to the BMI chart, his BMI was 18. Relapse of TB is higher among persons who are underweight at diagnosis or who have a body mass index of less than 18.5 Kg/m^2.

- Underweight patients, at the beginning of treatment, are at high risk to relapse if given a standard treatment regimen. In the case study, the therapy was prolonged from 9 to 12 months to limit the impact of his poor weight gain during treatment.

- Lack of weight gain during TB therapy increases the risk of relapse. Khan and coworkers concluded that among persons who were underweight at diagnosis, a weight gain of 5% or less between diagnosis and completion of 2 month intensive phase therapy was moderately associated with an increase relapse risk (18.4 vs. 10.3%). Our patient was very close to treatment failure (treatment failure is defined as positive sputum cultures after 4 months of therapy) as he only converted his culture to negative during the third month of treatment. His slow bacteriological response was likely related at least in part to his poor nutritional status and failure to gain weight during the initial months of therapy.

- Wasting has long been recognized as a cardinal feature of tuberculosis. It is likely caused by a combination of reduction in appetite leading to a decrease in energy intake and increased weight loss due to altered metabolism as part of the inflammatory and immune responses.

- Early increase of nutritional intake has been shown to increase body weight, total lean mass, and physical function.

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Case Presentation *continued from Page 8*

- Clinical staff and TB case managers play a critical role in encouraging patients to increase their nutritional intake. Nutritional supplementation can be facilitated through the introduction of financial aid and incentives as part of the holistic care for patients during TB therapy. However it is important to keep in mind the patient's economic status and the family's food habits. Resources and referrals should be given as needed.

- If the initial chest radiograph shows cavitation and the two month sputum culture is positive, there is a 50% chance of relapse. Prolongation of the continuation phase should be considered if a patient is slow to respond clinically or radiographically, or has a positive sputum culture at 2 months of treatment. If there is either a positive two month culture, cavitary disease, or the patient is < 10% of his ideal body weight, extending therapy can be considered.

FOOTNOTES:

[1]Cegielski JP, McMurray DN. The Relationship between Malnutrition and Tuberculosis: Evidence from Studies in Humans and Experimental Animals. *Int J Tuberc Lung Dis* 2004; 8(3):286-298.

REFERENCES:

Khan A, Sterling TR, Reves R, Vernon A, Horsburgh CR: Tuberculosis Trials Consortium. Lack of weight gain and relapse risk in a large tuberculosis treatment trial. *Am J Respir Crit Care Med* 2006;174:344-348.

Yew WW, Leung CC. Prognostic significance of early weight gain in underweight patients with tuberculosis. *Am J Respir Crit Care Med* 2006; 174:236-237.

American Thoracic Society; Centers for Disease Control and Prevention; Infectious Diseases Society of American. Treatment of tuberculosis. *Am J Respir Crit Care Med* 2003; 167:603-662.

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Heartland National TB Center provides a ***Medical Consultation Line*** that is staffed Monday to Friday, 8:00 AM to 5:00 PM (CST). After business hours, voice mail is available and will be returned in one business day:

Toll Free Telephone Number: 1-800-TEX-LUNG (1-800-839-5864)

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The MISSION of the Heartland National TB Center is to build capacity with our partners. We will share expertise in the treatment and prevention of tuberculosis by: developing and implementing cutting-edge trainings, delivering expert medical consultation, providing technical assistance, and designing innovative educational and consultative products.