Today's Topics Include . . .

- Tuberculin Skin Testing
- New Lab Tests for TB
- Drug Levels
- Inter-jurisdictional Referrals
- HIP
- MDR-XDR TB
- Resources for Case Management

Tuberculin Skin Testing
A Review
TB Prevention and Control Policies and Procedures

- Based on USPHS/CDC, ATS, IDSA and Pediatric "Red Book" guidelines

Mantoux Tuberculin Skin Test (TST)

- A test for TB infection only
  - Until recently – only test available
  - Interpretation of TST result based on:
    - Size of the induration (swelling) and
    - Person’s risk factors for TB
- IGRA – newer lab tests with limited availability

TB Skin Testing = TST

- Screening
- Planting (Administration)
- Measurement
- Interpretation
- Follow-up
Screening

Purpose of TB Screening

- Identify TB infection and TB disease
  - Provide appropriate treatment

Overall goals
- Reduce morbidity in community
- Reduce transmission

Why Screen?

- Assess for symptoms
- Assess for risk of acquiring LTBI
- Assess for risk factors for developing TB disease, if infected
- Need to know risk to determine the results
Remember!

- A decision to test is a decision to treat
- Symptom screening and assessment of risk is a must before planting the skin test
- Make sure client is available to return for reading in 48 to 72 hours

Planting

TST….. Who Can Administer?

- IN VIRGINIA - only prescribers (MD, NP & PA) RN’s and LPN’s (working under the direct supervision of an RN) can legally possess and administer tuberculin which is regulated as a class VI substance.
The Mantoux Test

- Different types of tuberculin tests are available
- The Mantoux method is the preferred test
- Purified protein derivative or “PPD”

How Is The Mantoux Skin Test Given?

- Inject 0.1 ml of 5 tuberculin units of liquid tuberculin (PPD) between the layers of the skin (intradernally)
- Usually on the forearm (dorsal or volar surface)
- Inject at 5-15 degree angle
- Tense white wheal – 6-10 mm

Instructions for Patient

- Information on return for reading
- Don’t scratch!
- Do not cover with bandage
- Shower, swimming, etc. okay.
Storage and Handling of PPD

- Date and initial when vial is opened
- Discard 30 days after opening
- Keep out of light
- Draw up just prior to injection – read the label – PREVENT MEDICATION ERRORS!
- Store at 35 to 46 degrees F in a refrigerator or cooler with ice packs

Emergency Box

- Anaphylaxis can occur with the administration of any drug, including a TST
- Have written protocols in place
- Periodically check expiration dates on drugs
- Provide annual training of personnel

Tubersol vs. Aplisol

Conclusions of a 2-part 4 year long CDC study:

- "Both Tubersol and Aplisol have equally high specificity and sensitivity"
- "False-positives not a worry"
- "Best way to avoid false-positives is not to test people unnecessarily"
- Pick one antigen product and stick with it
Giving the Mantoux tuberculin skin test
Measurement
Interpretation

Classifying the Tuberculin Reaction

- ≥ 5 mm is classified as positive in:
  - HIV-positive persons
  - Recent contacts of TB case
  - TNFα drugs
  - Persons with fibrotic changes on chest radiograph consistent with old healed TB
  - Patients with organ transplants and other immunosuppressed patients

- ≥ 10 mm is classified as positive in:
  - Recent arrivals from high-prevalence countries
  - Injection drug users
  - Residents and employees of high-risk congregate settings
  - Mycobacteriology laboratory personnel
  - Persons with clinical conditions that place them at high risk
  - Children <4 years of age, or children and adolescents exposed to adults in high-risk categories
Classifying the Tuberculin Reaction

- ≥ 15 mm is classified as positive in persons with no known risk factors for TB
- Testing programs should only be conducted among high-risk groups

Factors That Can Cause A False-Positive Reading

- Infection with non-tuberculous mycobacteria (mycobacterium, other than M.tb or MOTT)
- Vaccination with BCG
  - BCG is not a contraindication for TST!
- Follow-up of positive reaction the same
  - CXR
  - Evaluation for treatment

Factors That Can Cause A False-Negative Reading

- Recent TB infection
  - It takes 2 - 10 weeks after TB infection for the body’s immune system to be able to react to the tuberculin
- Very young age (< 6 months old)
- Live virus vaccination (e.g., MMR, varicella)
  - Defer TST 4-6 weeks
- Immunosuppressive drugs (corticosteroids, new class of arthritis drugs)
- Overwhelming active TB
Recording the PPD Test Reaction

- Recording the skin test reading is a two-step process
  - Determine the measurement of the TST reaction in mm of induration
  - Determine the significance of the reaction
    - Based on individual’s risk factors
      - 11 mm, positive or 11 mm, negative or 0 mm, negative

Follow-up

Follow-up of Reactors

- Refer all positive TST for CXR and evaluation for treatment

- Assure treatment
Two-Step Testing

- Perform on all newly employed health care workers who
  - Have an initial negative TB skin test result, and
  - Have not had a documented negative TB skin test result during the preceding 12 months
- Repeat TST 1-3 weeks after first test
  - Timing of repeat dependent on work status

TST: Infection Control Reminders

- Needles should not be recapped, bent, broken, or removed from syringes
- Gloves are not necessary for administering intradermal injections
- Safety needles preferred

Important Things to Remember

- A decision to test is a decision to treat
- TST must be read 48 - 72 hrs past placement. Make sure client can come back within that time, or schedule another time for placement.
- Positive test can be read up to one week per CDC
- Documentation is important. If not documented not done. Includes reading.
- TST may be placed the same day as a live vaccine is given. However, if live vaccine given must wait 1 month before TST.
New Laboratory Tests for Tuberculosis

Interferon Gamma Release Assays (IGRAs)

- New CDC recommendations
  - MMWR June 25, 2010
  - Can be used for children over age 5
  - HIV
  - Use in contact investigations

The Dictionary of Acronyms

- NAA – nucleic acid amplification – amplifies IS6110 – all rapid tests based on this
- PCR – polymerase chain reaction – most widely used NAA test
- MTD – Mycobacterium tuberculosis direct test or detection
  - DCLS October 2009
QuantiFERON®

- FDA approved in 2005 – QFT-G InTube approved 10/07
- Detects release of interferon-gamma in fresh heparinized whole blood when incubated with synthetic peptides present in M. tb.
  - ESAT6 – early secretory antigenic target-6
  - CFP-10 – culture filtrate protein
- May be useful in contact investigations, evaluation of recent immigrants, and testing for infection control purposes
- Caution for use in selected populations (young children, immune compromised, suspects)
- Time requirements and access remain limitations

T-SPOT.TB

- Now FDA approved – July 30, 2008
- Uses same peptides to determine presence of infection – (ESAT6 & CFP-10)
- Provides reliable results in all targeted groups, including*:
  - Immunosuppressed
  - BCG vaccinated
  - TB suspects
  - TB contacts
  - Health Care Workers
- Sensitivity of 95.6%
- Specificity of 97.1%
Molecular Susceptibilities

- Now available at limited public health laboratories
- Provide rapid testing for isoniazid and rifampin – can rule out (or in) MDR-TB!
- Authorized through TB Control

When to Consider Drug Levels...

- Patient is on appropriate treatment, but...
  - Less than expected clinical response
    - Continued cough
    - Poor appetite, no weight gain
  - Prolonged sputum AFB smear positivity
    - Especially if remain 3-4+ without decrease
  - AFB cultures remain positive
    - Past 2 months after start of treatment

Drug Levels...

- ... may also be useful when
  - the patient has underlying medical problems that may effect clearance of TB drugs
  - drug-drug interactions may be influencing TB drug levels
  - the patient requires second line drugs (drug resistant TB or intolerant of first line drugs); therapeutic-but-not-toxic drug levels critical
Drug levels...

- Sub-therapeutic drug levels as reason for poor response to treatment may be more common than previously recognized
  - Elderly
  - Advanced TB disease/ very debilitated patient
  - HIV/AIDS
  - Unknown reasons
  - Other medications, role of food, variations in drugs

What To Do While We Consider Drug Levels...

- Review chart and talk to patient
  - Review microbiology lab results
  - Recalculate drug dosages (weigh the patient again)
  - Look at meds – correct medication, correct dosage dispensed
  - Verify DOT – ingested, correct dose administered
  - Question patient about vomiting, diarrhea
  - Review medical history, use of other medications
- Call state program and TB consultant to discuss

When Drug Levels Are Indicated...

- Coordinate with TB Control
  - Authorization needed prior to shipment
- Timing of medications and blood draws is critical – time varies with drug
- Specimens accepted **M-F only**
  - Overnight shipment on dry ice – find dry ice supplies before the day of collection!
- Now available through SNTC – approval required
Drug Level Procedures

Test Day
- Timing of medications and blood draws is critical; time varies with drug. Follow time guidelines on requisition slip
  - Big 4 – all can be done at 2 hours post ingestion
  - Occasionally a second sample is collected 4 hours after peak
- Observe patient taking medications and record exact time and date.

Drug Level Procedures

After Test Day
- Levels take 3-7 days to complete (not including shipping)
- Call if you have not received results 10 days after shipment

When Test Results Indicate Changes Are Needed
- Make sure case manager and all clinicians are working together on changes to drug regimen
- Reports may include desired levels, suggestions on dosing
  - Other resources available
- Contact TB Control for assistance in developing new drug regimen
- Repeat levels may be needed in several weeks once new regimen stabilized
Interjurisdictional Referrals

Types

- Interjurisdictional
  - Cases and suspects
  - Contacts

- International

TB Cases.....Who is Responsible?

- WHERE THE CASE IS COUNTED
  - Is responsible for maintaining contact with locality that case moved to until treatment complete
  - Follow-up forms
Interjurisdictional Follow-up Form

- Thirty day initial report
- Interim information
- Final disposition
- All forms should be routed through state TB Control offices
- Maintain copies in client record

International Form

- Used when clients leave US
- Form available on CDC web site and VDH Tb Control web site.
- Other resources for Mexico and some Latin American countries
  - Cure TB, TBNet
- Route all international referrals through state TB Control office
- Maintain copy in client record

MDR –XDR TB
Have germs, will travel…
Migrating populations in the 1990s

Compared to 1960-75, four-fold increase in migration

Source: Population Action International 1994

Countries with XDR-TB
Confirmed cases to date

XDR TB Cases in the United States (Initial DST), 1993–2007*

* Preliminary data- not for distribution
Drug Resistance

- MDR (Multiple Drug Resistance)
  INH AND Rifampin

- XDR (Extreme Drug Resistance)
  INH and Rifampin plus any fluoroquinolone AND
  at least one of the three injectable second-line drugs (amikacin, kanamycin or capreomycin)

Antituberculosis Drugs Currently in Use in the US

First-line Drugs
- Isoniazid
- Rifampin
- Rifapentine
- Rifabutin
- Ethambutol
- Pyrazinamide

Second-line Drugs
- Cycloserine
- Ethionamide
- Levofloxacin
- Moxifloxacin
- Gatifloxacin
- P-Aminosalicylic acid
- Streptomycin
- Amikacin/Kanamycin
- Capreomycin
- Linezolid

Definitions

- Primary drug resistance:
  - Infected with TB which is already drug resistant

- Secondary (acquired) drug resistance:
  - Drug resistance develops during treatment
What Causes Secondary Drug Resistance?

- Treatment Failure
  - Client issues
  - Healthcare provider issues

Who is at Higher Risk of MDR-TB?

- History of previous TB Tx especially if recent
- Foreign-born patients from countries or ethnicities with high prevalence of MDR
- Poor response to standard 4 drug regimen
- Known exposure to MDR-TB case
- HIV+

Step 1

Use any available PLUS One of these PLUS One of these

First-line drugs
- Pyrazinamide
- Ethambutol

Fluoroquinolones
- Levofloxacin
- Moxifloxacin

Injectable agents
- Amikacin
- Capreomycin
- Dapsone
- Kanamycin
- Streptomycin
Step 1
Use any available
Begin with any First line agents to Which the isolate is Susceptible
Add a Fluoroquinolone AND an injectable Drug based on susceptibilities

Fluoroquinolones
Levofloxacin
Moxifloxacin
Injectable agents
Amikacin
Capreomycin
Streptomycin
Kanamycin

First-line drugs
Pyrazinamide
Ethambutol

Step 2
Pick one or more of these
Oral second line drugs
Cycloserine
Ethionamide
PAS

Step 3
Consider use of these
Third line drugs
Imipenem
Linezolid
Macrolides
Amoxicillin/Clavulanate

MDR –XDR Case???

- Consult with TB Control office or TB Consultant
- 804-864-7906
Homeless Incentive Program HIP

- Policy located online:
  http://www.vdh.virginia.gov/epidemiology/Disease
  Prevention/Programs/Tuberculosis/Policies/documents/
  HIPGuidelines_2009.pdf
- Smear + clients
- If eligible, covers:
  - Rent/mortgage
  - Food
  - Motel

Code of Virginia -TB

- TB Suspects and TB Disease 24 hours
- Children under age 4 with TST+
- TB Treatment Plan 32.1-50.1
- Labs 32.1-50.E
**TB Guidebook 2001**


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**TB Treatment Plan**

- Required for all clients with confirmed TB disease and those who are suspects
- Whenever treatment is started a treatment plan must be in place
- Must be submitted and approved by health department prior to d/c from any medical facility, correctional center or other similar facility

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**Templates for Use with TB Guidebook**

- Template forms available on web site
  - Examination Request
  - Counseling Order
  - Outpatient Treatment Order
  - Emergency Detention Order
- Collaboration with TB Control a must
  - Consultation with Office of Attorney General needed to proceed to Emergency Detention Order
  - Handled by TB Control
Websites

- VDH TB Control:
  - Policies, Forms, Epidemiology, Patients, MD & RN, Links, Staff, Video Conference Programs
- Find TB
- Regional Medical Consultation and Training Centers
- CDC

VDH TB Control – Site address & Policies page

http://www.vdh.virginia.gov/epidemiology/DiseasePrevention/Programs/Tuberculosis/index.htm

- Policies
  - VA TB Laws Guidebook
  - Emergency Detention Procedures
  - HIP Guidebook
  - Standards of Care
  - Contact Investigation Guidelines and Forms

VDH TB Control – Forms Page

- Medical record forms
  - Case management record, NOT DBE
  - Do not use DBE forms in TB record
- Contact Investigation forms
- Interjurisdictional forms
- Risk assessment form
- Screening report forms
VDH TB Control – Patient page

- Patients
  - 7 pamphlets developed by TB Control & VDHNC
  - Available in 15 languages in print version
  - Available in 9 languages in multimedia/audio form
- Fact sheets
- Links to other sites
  - Ethnomed
  - Minnesota

VDH TB Control - Links

- Links include:
  - Southeastern National TB Center – our regional medical consultation and training center
  - Centers for Disease Control and Prevention
  - World Health Organization

Find TB Resources

- Site is: [http://www.findtbresources.org](http://www.findtbresources.org)
- Search for TB education and training materials
- Get information about TB organizations
- Find out about upcoming events
- Sign up for TB-related Electronic Mailing List and digests
- Locate TB images
- Locate TB-related web links
- Find out about the TB Education & Training Network (TB ETN)
Curry Center Drug-Resistant Manual

- Joint publication of CNTC and the Tuberculosis Control Branch of the California Department of Public Health
- Information and user-friendly tools and templates for use in the management of patients with drug-resistant TB
- Useful with pansensitive patients too!

Regional Medical Consultation and Training Centers

- Southeastern National TB Center
  - [http://sntc.medicine.ufl.edu/](http://sntc.medicine.ufl.edu/)
- Francis J. Curry National TB Center
  - [http://www.nationaltbcenter.edu/](http://www.nationaltbcenter.edu/)
- Heartland National TB Center
  - [http://www.heartlandntbc.org/](http://www.heartlandntbc.org/)
- Northeast National TB Center
  - [http://www.umdnj.edu/globaltb/home.htm](http://www.umdnj.edu/globaltb/home.htm)

Centers for Disease Control & Prevention

- [www.cdc.gov/tb](http://www.cdc.gov/tb)
- Guidelines
- Fact sheets
- Surveillance information
- Ordering publications
Patient Education Materials

- Series of 7 patient education pamphlets developed by VDH Nursing Council Patient Education committee
  - Do I Need a TB Test?
  - Just the Facts about BCG and TB
  - Stop TB Infection Before it Makes You Sick
  - TB Disease: You Need Treatment to Make You Well
  - TB & HIV: A Dangerous Partnership
  - What is a TB Test?
  - What you Should Know About Taking Tuberculosis Medicines

Background

- Initially translated into 9 languages – expanded to 15 languages
  - Albanian | Amharic | Arabic | Chinese (Traditional Script | English | Farsi | Hindi | Indonesian | Korean | Russian | Somali | Spanish | Tagalog | Tigrinya | Urdu | Vietnamese
- Language decisions based on analysis of morbidity
- Original project - print versions only
  - not all literate in own language

Background

- Partnership with Healthy Roads Media
  - An opportunity presents; partners served different roles
  - Grant from Greater Midwest Region of the National Network of Libraries of Medicine to support project
  - Development of culture neutral materials from original pamphlets
  - First versions: English, Spanish, Vietnamese & Somali
  - Expanded to total of 9 languages
  - Initially only print, multimedia, and audio versions
  - Formats now include web-video and mobile video
Use of Culture Neutral Images

A Variety of Teaching Options

- One-on-one teaching using laptop in clinic or home setting
- DVD version played in waiting rooms
- Audio on MP3 player used in conjunction with print version
- New mobile phone versions – the possibilities are endless
Practical Facts

- Materials free of charge
- Downloadable MPeG Video for Closed Circuit TV for use in large clinics now available
  - Small fee for this format
- Run time varies with topic and language
  - Shortest – 1 minute 50 seconds
  - Longest – over 6 minutes
- All print versions formatted for single page

Fun Facts

For the past 6 months 55-64 countries have downloaded materials

- Australia
- Canada
- Indonesia
- United Kingdom
- Spain
- Germany
- Hong Kong
- Philippines
- Taiwan
- India

More Fun Facts

- Most Downloaded Languages
  - English – top language
  - Tagalog
  - Indonesian
  - Arabic
  - Vietnamese
  - Hindi
  - Urdu
More Fun Facts

- Most Downloaded Topics
  - What is a TB Test?
  - TB & HIV: A Dangerous Partnership
  - What you Should Know About Taking Tuberculosis Medicines
  - TB Disease: You Need Treatment to Make You Well
  - Stop TB Infection Before it Makes You Sick
Vous devriez passer le test si:
- vous présentez des symptômes de tuberculose (toux, fatigue, transpiration excessive pendant la nuit, fièvre, perte de poids, toux avec crachats de sang)

Le test cutané de dépistage de la tuberculose n'est conseillé qu'aux personnes qui:
- présentent des symptômes de la tuberculose
- des risques élevés d'être infectés par les germes de la tuberculose
- des risques élevés de tomber malade s'ils sont infectés par la tuberculose.
هل يجب أن أختار؟

إن البداية كان يُمكن أن يساعد في هذا اللغة. ذلك
بالإضافة إلى العقل النابض مرفوع وفيرة موقعا.

نعم لا
Print Version

- Baa labaalka Cicallada ama Tiliyada ee yita waxaa lagula tekniyays daahana hosa ku nuun oo ka shi ah.
- Ciicinta een caabtaada Cicallada, ama
- Aadd hala ugu ah joqaba ay u baahnaan jaamiga cicallada uu u gaarika dhalinyar ama
- Ma ni lehna iska dhalin

Laga goobka inaad u baahan karaay in lagu baahni hadii ugu badan.
- Weeshaan: caabtadaan cicallada ah, yahay, daabka, babayn shiladka, garowlad, mi'aashaad 4-8, dhig-galad.
- Si loo tahay ama u dhiirjaysa cicallada oo kala duwan.

Used with a Variety of Technology

Other Formats

- Audio – use iPod or MP3 player
- Mobile video – iPhone or similar
Where You Can Find It!

- Link to the multimedia materials viewed today [www.healthyroadsmedia.org](http://www.healthyroadsmedia.org)

- Link to the VDH DTC pamphlets in 15 languages
  [http://www.vdh.virginia.gov/epidemiology/DiseasePrevention/Programs/Tuberculosis/Patients/brochureLanguage.htm](http://www.vdh.virginia.gov/epidemiology/DiseasePrevention/Programs/Tuberculosis/Patients/brochureLanguage.htm)

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