Tuberculosis – A Global Public Health Issue

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Tuberculosis – A global public health issue

- Recent TB issues – Virginia vs. the world
- Overview of TB
- TB as a global public health problem
- TB laws, regulations and guidelines
- TB in the real world – 2008
  - As a medical issue
  - As a public health issue
  - As an economic issue
  - As a public safety vs. personal freedom issue

Modified 11/08

Recent cases

- Case 1
  - US born, history of frequent international travel
  - Known pulmonary TB, AFB smear negative, flew from ATL to Europe and returned via Canada despite instructions not to travel
  - Thought to have XDR TB – turned out to be MDR
  - Had surgery, on meds, doing well
  - Resulted in 1) contact investigation on plane(s); 2) review of isolation and quarantine laws; 3) test of international and US infectious disease notification and containment measures; 4) massive media interest
  - Investigations continue (CDC, other state and federal including Congress)
Recent cases

- Case 2
  - Nepalese woman enters US after flight from Nepal (Nepal-Doha-Dulles)
  - Travels to Wisconsin where hospitalized w/ AFB+ pulmonary TB
  - M.tb isolate is resistant to all 4 first line TB drugs
  - ~35 passengers seated in near-by rows on plane
  - 15 gave destinations in Virginia
  - Efforts to locate, screen, follow contacts are underway

"Issues" raised by recent cases

- Communicable disease related restrictions on travel
  - From US – mostly airlines, limited ability of USG
  - To US – "old" quarantine laws - Federal
  - To from other countries – individual countries, limited role of WHO, IHR
  - Roles of individual nations vs. international organizations – nations rule – agencies advisory
  - Roles of state – powers not Federal
  - Overseas medical screening of immigrants and refugees – US DOS as part of visa process – immigrants and refugees only

More issues...

- Determining real risks of TB transmission on airplanes
  - Details of air circulation on airplanes
  - Identifying and locating passengers – customs declarations, flight manifests
  - Timing of screening
    - Available screening tools – TST vs Quantiferon
    - “Baseline” and follow-up testing US vs. other countries’ decisions on screening – most of world less concerned about LTBI
- Management of infected contacts
  - Early vs. follow-up positives
- LTBI therapy for contacts of drug resistant cases
- Communication (local, states, federal, international)
- Role of mass media (television, internet)
Even more issues…

• Role of travel in spread of DR, MDR, XDR TB – lots of anecdotal evidence; little data
• Treatment of DR, MDR, XDR TB – guidelines evolving
• Dealing with the uncooperative patient or the patient for whom no effective TB medications are available
  – Protection of public vs. rights of patient
  – Varies by state
  – New CDC guidelines

TB: Airborne Transmission

- Person w/ pulmonary TB
- Person coughing AFB into air
- “Shared air”
  - Hut, igloo, cabin, house, room, hospital room, prison cell, homeless shelter, office, classroom
  - Car, bus, airplane
  - Ship, submarine
- Susceptible person breathing “shared air”
- Usually requires hours/days

TB Transmission
Mycobacterium tuberculosis - an acid-fast bacillus (“AFB”)

TB Invades/Infects the Lung

Effective immune response
Infection limited to small area of lung
Immune response insufficient

TB – A Multi-system Infection
Natural History of TB Infection

Exposure to TB

- No infection (70-90%)
- Infection (10-30%)

Latent TB (90%)

- Never develop Active disease
- Active TB (10%)

Untreated
- Die within 2 years
- Never develop Active disease

Treated
- Survive
- Cured
- Die

Treatment of TB Disease

- TB is a bacterial infection
- Effective antimicrobial agents are available
- Challenges
  - Diagnosis may be delayed
  - Requires multiple drugs (2 or 3 minimum)
  - Prolonged treatment (6-9 months or longer)
  - Antimicrobial resistance common
  - Cost significant to prohibitive
  - Requires infrastructure to diagnose, procure, deliver medications
  - Medication side effects common
- Ability to meet challenges often political and economic more than medical

TB as a worldwide public health issue

- World population ~ 6 billion
- ~ 1 in 3 people in world infected
- ~ 8 million new cases of active TB/year
- 2+ million deaths/year

- US standard dx and rx not feasible in most of world
Global TB Control Issues

• Characteristics of TB infection/disease
  – Mode of Transmission
  – Large reservoir of latent infection
  – Prolonged illness
  – Long, complicated treatment regimens
  – No satisfactory vaccine

Global TB Control Issues

• Political and Economic Factors
  – Stable governments
  – Adequate financial resources
  – Political will
  – Public health infrastructure
    • Supply and distribution system for TB meds
    • Skilled personnel (admin, medical, DOT)
    • Laboratory capability

Estimated TB Incidence Rates, 2001
TB treatment – industrialized vs. developing countries

- Industrialized countries (usually <10 cases/100,000 population)
- Developing counties (usually >100 cases/100,000 population)
- “Middle income” countries

- Economic and political factors impact on TB control efforts

Treatment of TB Disease
(Industrialized Countries)

Evaluate to determine site/extent of disease
Look for Co-infection (HIV); other diseases
Obtain material for culture and antimicrobial sensitivity tests
Start treatment
- Four drugs (Isoniazid, Rifampin, Ethambutol, Pyrazinamide)
- Modify drug regimen after antimicrobial sensitivity results available

Treatment of TB Disease
(Industrialized Countries) (2)

Treat to cure patient
- Plan to continue treatment 6-9+ months
- DOT

Treat to prevent transmission to others
- Isolate if necessary
- Contact investigation – treat infected contacts to prevent disease

Cure rate >95% in US, w/proper treatment
Cost - $$ thousands/case
Treatment of TB Disease (developing countries)

- Case rates >100/100,000/year
- TB a public health problem
- TB may not be high on list of health issues (if it is on list at all)
- Treatment for symptomatic, infectious cases only
- Access to x-ray, laboratory limited or absent
- Access to medications limited
- TB control programs w/ surveillance, oversight of medication delivery limited or absent

Treatment of TB Disease (middle income countries)

- Access to medications
- Limited or absent national TB programs
  - Limited diagnostic capability
  - No standard treatment regimens
  - No DOT
- Emergence of drug resistant TB inevitable

Current status of global TB control (and hoped for improvements)

- Developing nations – international assistance, availability of drugs at lowest possible cost, emphasis on DOT, improved laboratory access, improved dx/rx of HIV
- Middle income nations – stronger national programs, restrictions on drugs, DOT, better surveillance
- Industrialized nations – improved awareness of TB (a rare diagnosis), more rapid diagnosis, standardized treatment guidelines, case management, DOT, case-contact investigations to identify cases and LTBI, treatment of LTBI
Current status of isolation and quarantine laws/

- Review of recent cases for lessons learned
- Much discussion
- Congressional hearings
- Legislative changes under consideration by several states
- MMWR September 2008 – Federal Air Travel Restrictions for Public Health Purposes

Federal Travel Restrictions for Public Health Purposes

- Effort to prevent persons with communicable diseases from traveling on commercial flights
- Developed as result of concern over transmission of TB on long flights (>8 hours)
- Uses “Do Not Board” list
- Managed by CDC and US Department of Homeland Security (DHS)
- Supplements state and local restrictions on movement by infected individuals

Federal Travel Restrictions for Public Health Purposes

- Decision on “infectiousness” made by CDC in consultation with local health authorities
- Inclusion on list requires:
  - Infectious
  - Non-adherent to local restrictions
  - Likely to fly
- Airline notified not to issue boarding pass
  - Domestic and international flights out of and into US
“Infectiousness”

- Ability to transmit infection to others
- Infectiousness of TB
  - Pulmonary
  - AFB positive sputum
  - Able to isolate M.tb in culture
  - Not on adequate treatment
- Limitations
  - NTM are acid fast
  - Cultures require several weeks
  - Drug sensitivities may be delayed
  - Multiple host and environmental factors impact

Federal Travel Restrictions for Public Health Purposes

- Through 6/08: 42 requests for DNB status; 33 placed on list
- Time on list determined by infectiousness – 33 listed remained on 1-364 days
- Removal based on review by CDC, state and local health officials

Federal Travel Restrictions for Public Health Purposes

- Limitations/potential problems
  - So far tested only for TB
  - Determination of infectiousness difficult
  - Requires multiple entities to consider, grant requests (local, state, federal agencies)
  - Removal from list requires review, communication of decision to multiple agencies
  - Applies only to commercial air transport
  - Not yet tested in courts of law
  - May be big solution to small problem
    - Limited evidence for transmission of TB on flights
In Conclusion…

- See handouts for websites….
- Listen to the news ….
- Call me….
- Thank you

References

- CDC: http://www.cdc.gov/tb/
- Georgetown University Law Center: http://www.publichealthlaw.net/
- NJMS National Tuberculosis Center: http://www.umdnj.edu/globaltb/products/legalinterventions.htm
- Curry Center (management of DR TB): http://www.nationaltbcenter.edu/products/product_details.cfm?productId=WPT-11%20C

New (and not so new)
References

- Federal Air Travel Restrictions for Public Health Purposes — United States, June 2007-May 2008

http://www.cdc.gov/tb/pubs/mmwr/mmwr_travelt.htm

Added 11/08