PREVENTION OF INFECTIONS IN THE IMMUNOCOMPROMISED

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Four Major Components of the Immune System

Antibody-mediated (B cell) Immunity

Cell-mediated (T cell) Immunity

Phagocytic

Complement

Nelson, 18th edition, 2007
Primary Immunodeficiency

Inherited
Involve any part of the immune defenses
• B cell defect
• T cell defects
• combined B and T cell
• phagocytic defects
• complement

Nelson, 18th edition, 2007
Secondary Immunodeficiency

Acquired
- HIV, AIDS
- malignant neoplasms
- transplantation
- splenectomy
- receiving immunosuppressives
- antimetabolite
- radiation therapy

Red Book, 2006
Secondary Immunodeficiency

Other illnesses:

• severe malnutrition
• breach of mucosal and skin barriers
• disturbance of normal microbial flora
• protein loss
• uremia

Nelson, 18th edition, 2007
Red Book, 2006
Medications that cause severe immunosuppression

A. High-dose corticosteroids
   > 2 mg/kg of body weight
   or
   20 mg/day of prednisone or equivalent for persons who weigh >10 kg when administered for ≥2 weeks.
Exceptions:

- short or long term daily or alternate day treatment 20 mg or less of prednisone or equivalent
- long term, alternate day with short acting preparation
- Maintenance physiologic doses (replacement therapy)
EXCEPTIONS

- Steroid inhaler
- Topical steroids
- Intra-articular, bursal or tendon injection of steroids
- > 1 mo has passed since high dose steroids x 2 weeks
Medications that cause severe immunosuppression

B. alkylating agents  
(e.g., cyclophosphamide)  
C. antimetabolites  
(e.g., azathioprine, 6-mercaptopurine)  
D. transplant-related immunosuppressive drugs  
(e.g., cyclosporine, tacrolimus, sirolimus, and mycophenolate mofetil),
Medications that cause severe immunosuppression

E. mitoxantrone

F. most cancer chemotherapeutic agents

G. Methotrexate

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Medications that cause severe immunosuppression

H. Tumor necrosis factor (TNF)-blocking agents
  etanercept, adalimumab, and infliximab
  • activate latent mycobacterial infection
  • increase overall susceptibility to other serious infections.

CDC Health Info for International Travel, 2008
Organisms causing severe infections in the immunocompromised

- Common pathogens
- Less virulent organisms of commensal bacteria of oral pharynx or GIT
- Environmental fungi
- Common community viruses of low level pathogenicity

Nelson, 18th edition, 2007
Organisms causing severe infections in the immunocompromised

Encapsulated bacteria
asplenia
renal disease
complement deficiency

Nelson, 18th edition, 2007
Organisms causing severe infections in the immunocompromised

Viruses:
- common cause of serious infections of the LRT
- implicated are the herpesviruses—herpes simplex, VZV, and CMV

Chien and Johnson VOL 107 / NO 2 / Feb 2000 / POSTGRADUATE MEDICINE
Organisms causing severe infections in the immunocompromised

Pneumocystis jirovecii (formerly carinii)
- human immunodeficiency virus (HIV)
- cancer patients
- organ transplantation
- patients receiving immune suppressive medications

Organisms causing severe infections in the immunocompromised

Systemic fungal infections
- severe neutropenia
- undergoing solid-organ transplantation
- HIV infection

William G. Powderly, MD
39th ICAAC, Sept 28
Organisms causing severe infections in the immunocompromised

- risk for foodborne and waterborne infections amplified during travel to endemic areas
- *Salmonella*, *Campylobacter*, and *Cryptosporidium* maybe severe or chronic

CDC Health Info for International Travel, 2008
Prevention of Infections in the Immunocompromised

- Immunization
- Chemoprophylaxis
- Personal Hygiene
- Transmission prevention
Immunization

Inactivated, toxoid, subunit vaccines
- used when appropriate
- No increased risk of complications
- immune responses maybe inadequate
- Response depends on presence of immunosuppression during or within 2 weeks of immunization

Red Book, 2006
Live vaccines:
NOT recommended in:
severely immunocompromised
uncertain immune status
benefits outweigh risk in less severe
immunocompromised

Red Book, 2006
Immunization

Antibody defects (B cell)
Protected from vaccine preventable infections: IVIg
Vaccines which may be given:
- Pneumococcal
- Meningococcal
- Hib
- annual Influenza
- MMR / Varicella

all other live vaccines contraindicated

Red Book, 2006
Immunization

T cell, NK, mixed cell mediated antibody defects

- All live vaccines contraindicated
- Yearly influenza recommended

Red Book, 2006
Immunization

Phagocytic defects
Problems with: bacteria
  environment fungi
Live bacterial vaccines (BCG, Ty21A): Contraindicated
Yearly influenza vaccines recommended
MMR may be given
Consider **unimmunized**:

- vaccinated while on immunosuppressive therapy
- 2 weeks before starting therapy

Revaccinate 3 months after discontinuation of therapy.

Immunization in patients receiving high dose steroids

- wait at least 1 month after discontinuation of high dose systemically absorbed corticosteroid therapy before administering a live-virus vaccine.
Immunization in persons with Malignant Neoplasms

- delaying the administration of influenza vaccine for 3 months risky for patient
- wait 3 to 4 weeks after immunosuppressive therapy before administering influenza immunization.
- Reasonable response if peripheral granulocytes and lymphocytes exceed 1,000 cells/$\mu$L

AAP, 2006
Immunization in immunosuppressed oncology patients.

- Live vaccines generally avoided
- Leukemia patients in remission may receive live-virus vaccines 3 months after their last round of chemotherapy
- VZV indicated for children with ALL in remission for at least 1 year must have lymphocyte counts > 700 cells/mL platelet counts > 100,000 cells/mL 24 hours before the immunization
Immunization in Transplant recipients

- vaccinate at least 2 weeks before transplantation
- Live vaccines deferred once transplant has been performed
- all inactivated vaccines recommended plus those vaccines recommended for patients with chronic diseases
- household contacts should also be immunized.
Immunization in transplant recipients

• Post renal transplantation, immunization may not be effective for 6 to 8 months

• Prophylactic antibiotics and antivirals can serve as valuable adjuncts

Immunization in Chronic liver disease

- Hepatitis A and B vaccines
- Should be done early in the course of the disease

Immunization in Chronic renal disease undergoing dialysis

- Bacterial and viral infection
- All standard immunization required
- Ensure optimal protection varicella, hepatitis B, influenza, pneumococcal disease
- Yearly influenza immunization
- Household contact

Immunization in patients undergoing dialysis

- Hepatitis B: double dose booster for antiHBsAg < 10 IU/L

- Varicella

Immunization in Asplenic Patients

- NO contraindication for any vaccines
- Receive all routine immunization
- Optimal protection:
  - S. pneumonia, H. influenzae,
  - N. meningitidis
- Yearly influenza vaccination

Immunization in Asplenic patients

• Pneumococcal vaccine:
  Children: reimmunized within 4 to 5 years
  Adults and adolescents:
  \(2^{\text{nd}}\) dose \(> 6\) years have elapsed

• Meningococcal vaccine: booster q 2-5 yrs

Immunization in Asplenic Patients

- elective splenectomy immunized at least 2 weeks before the operation

- emergency splenectomy, patients should receive the vaccines soon after acute recovery.
Immunization For Certain Hosts

Complete revaccination: 12 months after Bone marrow transplant patients (BMT)
- MMR: 24 months after BMT
- Influenza: 6 months after BMT and annually thereafter.

Persons with chronic lymphocytic leukemia
- poor humoral immunity
- rarely respond to vaccines.

Household contacts may be given live-virus vaccines
- yellow fever, MMR, or varicella vaccine
- not: live intranasal influenza vaccine.
Chemoprophylaxis

Prophylaxis for Pneumocystis jiroveci pneumonia (TMP-SMX) considered for:

- hematological malignancies
- Bone marrow transplantation
- solid organ transplantation

Red Book, 2006

Personal Hygiene

General Steps in Elimination of Sources of Oral Infection

- Eliminate pulpal infections
- Eliminate periapical infections
- Eliminate periodontal infections
- Extract hopeless teeth
- Extract partially erupted teeth
- Frequent dental prophylaxis
- Frequent topical fluoride application
- Use sealants on all exposed tooth surfaces
Transmission Prevention

Food and water precautions

- Foods and beverages
- specifically raw fruits and vegetables
- raw or undercooked seafood or meat
- tap water, ice made with tap water
- unpasteurized milk and dairy products
- items purchased from street vendors

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Transmission Prevention

- Avoid: swallowing water during swimming
  swimming in water that might be contaminated

To reduce the risk for
  cryptosporidiosis
  giardiasis

CDC Health Info for International Travel 2008
Transmission Prevention

- Special air filtration systems cut down on bacterial and fungal colonization and infection
- Avoid dusty area, crowds, sick people
- Keep mouth, rectal areas clean after chemotherapy

Childrens Infection Defense Center (CIDC)
St Jude Children’s Research Hospital
Transmission Prevention

- Hand hygiene, is the best prevention against gastroenteritis
- after any contact with animals and their living areas
- counseling regarding the symptoms of enteric infections

CDC Health Info for International Travel 2008
SUMMARY

Immunocompromised patients are susceptible to
- common infections of childhood
- bacterial, fungal and viral infections
SUMMARY

Prevention

- Immunization
  No contraindications for inactivated vaccines
  most live vaccines contraindicated
- Chemoprophylaxis
- Hygiene
- Transmission prevention
THANK YOU AND GOOD DAY !!!
KUNG HEI
FAT CHOY !!!