

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

Primary Immunodeficiency

Inherited

Involve any part of the immune defenses

- B cell defect
- T cell defects
- combined B and T cell
- phagocytic defects
- complement

Secondary Immunodeficiency

Acquired

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

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

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.

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

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

Immunization

Live vaccines :

NOT recommended in

severely immunocompromised

uncertain immune status

benefits outweigh risk in less severe

immunocompromised

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

Immunization

Consider **unimmunized** :

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

Revaccinate 3 months after discontinuation of therapy.

CDC, Epidemiology and Prevention of Vaccine-Preventable Diseases, 4th Edition, September 1997.

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/ μ L

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.
- J Am Pharm Assoc 41(6):839-849, 2001

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

J Am Pharm Assoc 41(6):839-849, 2001

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

Canadian Immunization Guide 7th edition, 2006

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

Canadian Immunization Guide 7th edition, 2006

Immunization in Asplenic patients

- **Pneumococcal vaccine :**
Children :
reimmunized within 4 to 5 years
Adults and adolescents :
2nd 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

Green H, et al. *Cochrane Database of Systematic Reviews* 2007, Issue 3

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

Transmission Prevention

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

To reduce the risk for
cryptosporidiosis
giardiasis

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 !!!