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Enteric viruses
• Rotavirus
• Calcivirus (Norovirus)
• Astrovirus
• Calcivirus(sapovirus)
• Adenovirus
• Gastrovirus

Genitourinary viruses
• Bk virus
• Adenovirus
• HSV
• HPV
• Molluscum
Rotavirus

- Acute diarrheal illness
- Fecal-oral, food, water borne
- 50% of childhood diarrhea in industrial countries
- 300-400 mil neonatal diarrhea & 5 mil annual deaths in developing countries
-Usu. all children before 5y involved. Less common severe forms afterwards & in adults
Rota cont

• Acute watery dia. about 5 days
• Usually started with vomiting
• Sometimes fever & dehydration needed to be hospitalized
• Self limited lactase def.
• Breastfeeding, yougort, zinc sulfate
Amount of virus shed in stool:
- 10-100 billion virions/gram of stool!

Amount of ingested virus required to cause infection:
- As few as 10 infectious virions!

Amount of stool that needs to be ingested to potentially result in infection:
- \( \sim 0.000001 \) mg!

“My children don’t need a rotavirus vaccination. I constantly wash their hands.”
vaccination

- 1/75 hospitalization of <5y before vaccination in USA
- 2ndG vac. RotaTeq & Rotarix
- 90-100% prevents severe forms
- 70-80% in developed, 50% in low income countries prevents rota disease
• Fecal oral
• 1/3 asymptomatic
• <11y sudden vomiting start
• Neonates & prematures NEC
• Diarrhea, abd. pain, nausea, vomiting, fever
• , malaise
• 2-3days period
• No complications
Other enteric viruses

- Astrovirus; fecal oral, milder than rota. & noro
- Calcivirus (sapovirus); like noro
- Gastroviruses
- All but norovirus affects children <5
- Enteric adenoviruses
  1. Infantile GE
  2. Type 40-41
  3. Subtype F-G
  4. Found in 3.9-12% children with diarrhea
  5. Fever & nausea lasts 2 days but diarrhea till day 9
Polyomaviruses

- JC virus (PML)
- BK virus

1. 60%-80% of adults have antibodies
2. Primary infection virtually always asymptomatic
3. Reactivate in immunocompromised
4. Asymptomatic viruria in HPSC transplant pts, HIV+s, SLE, pregnancy, healthy individuals
BK virus

• Asymptomatic hematuria
• Haemorrhagic & nonhemorrhagic cystitis (within 2 months of transplant)
• Ureteral stenosis in renal transplants (no pain increased Cr. & rejection)
• Interstitial nephritis in HIV+ & renal transplants
Adenoviral haemorrhagic cystitis

- Boys>girls
- Adenoviruses11,21
- Acute onset of dys.&freq.
- Haematuria after12-24h(microscopic/gross,clot,obst.)
- No fever&HTN
- Sometimes prodromal upper resp.tract symptoms
Adenoviral GU infections

- Urethritis in some adults (19,37)
- Hem.cystitis & interstitial nephritis in immunodeficiency (11,34,35)
Mucocutaneous viruses

- HSV
- VZV
- Enterovirus
- HPV
HSV

HSV_1
HSV_2

Acute infection
Latent infection: inter&intra neuronally spread of infection to sensory&autonomic nerve ganglia
Cell mediated immunity
**HSV-1**

Above waist
Grouped/single vesicles>pustules>coalesce to form ulcers>
On dry surfaces>scab before healing
On mucous memb.>reepithelialize directly
Ectodermal involvement
•Skin
•Mouth
•Vagina
•Conjunctiva
•Nervous sys.
Primary infection usu. asymp
HSV
Gingivostomatitis/clinically evident Primary infection

Painful vesicular&ulcerative lesions
• Buccal mucosa
• Tongue
• Gums
• Pharynx
Fever
Usu. lasts 5-12 days

After primary inf. HSV
May become latent within sensory nerve root ganglia of trigeminal nerve
**Recurrent lesions**

Lip / adjacent skin
Cold sores
Fever blisters
Usu. Unilateral
Signaled by tingling/burning sensation
Approximately 7 days
No systemic complaints

HSV may reactivate & excreted into the saliva with no apparent mucosal lesions present
Herpetic withlow

Inoculation of infectious secretions through minor skin cuts
Painful vesicules > pustules
HCWs & respiratory therapists
Ddx. bacterial paronychia & dactylitis
Herpes Keratitis on the cornea
HSV infection of the eye

Conjunctiva&cornea
Characteristic dendritic ulceration
Corneal damage scaring&blindness
If corticosteroid use>deeper structures involvement

Topical TFT
3%acyclovir gel
3% vidarabin oint
**HSV encephalitis**

Rare 1-10 human/million/year
But about 10% of documented viral encephalitis
Mostly in adults with high level of anti-HSV antibody
Reactivation of latent virus in trigeminal nerve root ganglion & extension of lytic infection into temporoparietal area of brain
Usu. ass. With focal neurologic deficit < 1 wk + fever
CSF abn
Ct scan & MRI
DDx with brain abscess, tumor, ICH
Genital herpes
A common STI
Both HSV_2&HSV_1
In US 70% of first episodes by HSV_2
The majority of genital infections are asymptomatic without lesions & may have culture+ /PCR+ genital secretions
Primary genital herpes

Mean inc. p from sexual contact to onset of lesions 5 days

Small erythematous papule>vesicle>pustule

Within 3-5 days vesiculopustules break
Painful coalesced ulcer>dry>some form crusts&heal without scar
Usu. Ass.with multiple bilateral extensive lesions
The urethra&cervix also frequently infected
Bilateral enlarged&tender inguinal lymph nodes present&may persist wks.to mths.
One third of pts.show systemic symptoms:fever,malaise,myalgia
1-10% aseptic meningitis
First episode usu. Lasts 20-30days
Recurrent genital herpes

Shorter duration

Usu. localized to genital region

Without systemic symptoms

Prodromal paresthesia in the perineum/genitalia/buttocks 12-24h before lesions appear
Local symptoms of pain & mild itching 4-5 days

Lesions usu. Last 10-14 days

Recurrent meningitis due to HSV-2 do occur
Madre con infección activa por herpes (aún si la infección activa no es aparente)

Ampollas por herpes congénito
**Neonatal herpes**

Viral transmission during delivery
Infected genital secretions of mother
True congenital in utero infection is uncommon
1/2500 live births in US
Manifestations vary due to maternal Ab. status;
If she is experiencing primary herpes infection & no Ab. => severe consequences:

- Disseminated skin infections, widespread internal organ involvement & CNS involvement

If reactivation => the baby can be completely protected
Less commonly HSV_1 causes neonatal herpes
**Treatment**

Acyclovir significantly decreases the duration of primary infection but has much less effect on recurrent infection.

Valacyclovir, famcyclovir

At least 80% primary HSV inf => recurrent episodes in 12mths

Recurrences 4-5/year

Not evenly spaced

Most from dorsal root ganglion reactivation

Rarely reinfection with different HSV

Diminishes to recur

Untreated encephalitis => 70% mortality

Neonatal

HSV => 60% mortality & sequelae
prevention

• Avoiding contact with individuals with lesions
• Sexual intercourse avoidance when lesions present
• Condoms wear for those with hx of HSV-2 or Ab.+ when contact with susceptible persons
• Suppresant daily acyclovir,...in frequent recurrent HSV attacks
• C/S if PROM not occurred
Chicken pox
varicella

Nearly all contract v. before adulthood
90% before the age of 10
Winter & spring
Inc. period 11-21 days
Transmission respiratory and direct contact

Infectivity 24-48 h before rash till 3-4 days into rash

Circulatory immune globulins prevent reinfection

Cellular immunity controls reactivation
**Primary inf./chickenpox**

Lesions appear on head & ear - centrifugally spread to face, neck, trunk, extremities

Different stages of evolution
Lesions are pruritic
10 - several hundreds
Mucous membrane involvement
Fever
In immunocompromised children:
• Progressive varicella 20% mortality rate
• Prolonged viremia
• Visceral dissemination (pneumonia, encephalitis, hepatitis, nephritis)
In thrombocytopenics > hemorrhagic rash
Adults more ill than children
May have pneumonia
**Zoster/VZV reactivation**

Older ages
Decreased cell mediated immunity

Pain in sensory nerve distribution

Eruption after several days to a week or two later
Usu. Vesicular lesions unilaterally

1-3 dermatomes

New lesions over 5-7 days

multiple attacks are uncommon

If multiple attacks in one area =>consider HSV
Zoster complications

Post herpetic neuralgia

Visseral dissemination in immunocompromised

Bacterial superinfection usu. gram+cocci

encephalitis
Treatment of VZV/varicella

Acyclovir decreases fever & skin lesions in varicella>16-18 year

Treatment before 24-48h of rash

Immunosuppressed should be treated with acyclovir

Treatment within 3 days of zoster rash

Rx Little or no impact on P.H.N

VZV is less susceptible to acyclovir than HSV

Corticosteroids>=50-60 years if not contraindicated
**Prevention & control**

High titer immune globulin within 72-96h after exposure to varicella prevents/ameliorates disease in susceptibles

Immunosuppressed children who are household/play contact of pts. with primary varicella are candidates for immunoprophylaxis

Rigid Isolation precautions for hospitalized pts.

Live vaccine 12mths.-12years
- Poxvirus
- Discrete papules 2-5mm
- Slightly umbilicated
- Fleshy & dome shaped
- Autoinoculated through scratching/contact
- Pubic & genital area in adults
- No palmar & plantar lesions
Genital area M.C in children may be a sign of sexual abuse

A sign of end stage HIV infection

Genital lesions should be treated to reduce the spread
Enteroviral infections

Poliovirus

Coxsackieviruses & echoviruses

Children:
• Febrile rash
• Meningitis
• Hand foot mouth disease
• Herpangina
• Neonatal sepsis

Adults:
• Meningitis
• Pleurodynia
• myopericarditis
poliomyelitis

1. Asymptomatic 90% at least
2. Abortive polio (minor illness) about 5%

Fever, headache, malaise, sore throat, vomiting 3-4 days after exposure
3. Nonparalytic polio./aseptic meningitis 1-2%

4. Paralytic polio. 0.1-2%(major illness)
   3-4 days after minor illness, a biphasic illness
   Blood->ant.horn cells of spinal cord&the motor cortex
   Asymmetric flaccid paralysis of 1-4 ext.
   May progress in few days & may result to complete recovery (in 6 mths) or residual paralysis or death
Hand foot mouth disease

Coxsackie A16

Vesicular exanthem on hands, feet, mouth, tongue

Mild fever
**herpangina**

Inappropriately named

Coxsackie A virus (several types)

Fever, sore throat, pain on swallowing, anorexia, vomiting

Typically vesicular ulcerated lesions on soft palate & uvula less on hard palate

DDx HSV Ant. & Post.
Severe brain stem encephalitis

- Adenovirus 71
- A prodrom of H.F.M./herpangina
- Myoclonus, ataxia, tremors, cranial n. abns
- Rapid onset of nurogenic pul. edema, shock, coma & apnea
- Up to 70% mortality
Pleurodynia

• Coxackie B
• Sudden onset of high fever & unilateral lower thoracic pleuritic chest pain (may be excruciating)
• Pain appears & disappears abruptly & repeatedly
• Abdominal pain & vomiting
• Lasts an average of 4 days & may relapse
• CXR & WBC normal
Enteroviral exanthems

Echo/coxsackie viruses

Fever+maculopapular/petechial or even vesicular rash

DDx meningococcemia:not that much ill& no leukocytosis
Acute hemmorrhagic conjunctivitis

Enterovirus 70
A variant of coxsackieA24
Extremely contagious ocular disease
Inc. period 24-48h
Palpebral edema, lacrimation
Photophobia, blurred vision
Severe ocular pain
Petechial or blotchy
Subconjunctival hemorrhage
transient keratitis rarely sub.ep opacities
Resolves within 1-2 weeks
Adenoviral conjunctivitis

Follicular conj. (pebbled & nodular mucosa)

Frequently bilateral

Both palpebral & bulbar conj.

Sporadic/outbreaks

Corneal involvement in epidemic keratoconjunctivitis

Coexisting acute resp illness & preauricular adenopathies

Itchy eyes but no ocular pain
papillomaviruses

Skin warts

Laryngeal papillomas

AnoGenital warts

Genital HPV infection in 20% of females ass. With cervical dysplasia, neoplasia or both
**Skin warts**

Flat or superficial

Common HPV types 1 through 4 infect keratinized surfaces

Regress spontaneously if given enough time
skin warts
Plantar warts
Deep growths
May be infected
painful
Oral papillomas
Usu. Single, pedunculated

Papillary surfaces

Rarely recur after surgical excision
Laryngeal papillomas
Most common type HPV-11

Most common benign tumor of larynx
Laryngeal papillomatosis
Life threatening in children

Danger of airway obstruction
Genital warts:
Found on shaft of penis (male), vagina, vulva, cervix (female) and around anus
Anogenital warts
Condyloma acuminata

Almost exclusively occur on the squamous epithelium of ext. genitalia & perianal area

90% caused by HPV6-11

Rarely progress from benign to malignant
HPV
30–40 Genital Types

Types 6 and 11

causes 90% of genital warts cases

Types 16 and 18

cause 70% of cervical cancer cases
~40%–50% of vulvar cancer cases
~70% of vaginal cancer cases

View of cervix as seen through the vagina

Uterus
Cervix
Vagina

Normal
Early stage IB
Late stage IB
Stage IIB
Cervical HPV & koilocyte

Vacuolated epithelial cells characteristic for cytologic changes in PAP smear

Oncogenic peak of HPV: 15-25 years of age & 6th decade
Cervical dysplasia & neoplasia

Infection of female genital tract by HPV16-18
30% other types 45, 31, ...
40% of pts. Infected with more than 1 type of HPV

Associated with cervical dysplasia & neoplasia the 2nd most common malignancy in women worldwide

About 40-70% of dysplasias undergo spontaneous regression

Cervical cancer: continuum of progressive cellular changes from mild (CIN I) to moderate (CIN II) to severe (CIN III) dysplasia, carcinoma in situ, or both
It takes 1-4 years
prevention

Bivalent Cervarix(16,18)& quadrivalent Gardasil(16,18,6,11) L1 VLP vaccines
Not live vaccines
Gardasil at 0,2,6 mth IM injections for girls&women 9-26 years of age
recommended by ACIP &ACOG

Gardasil prevents half of high grade(CIN II,III)& two thirds of invasive cancers
&80% of genital warts

Cytologic screening for any sexually active woman for 3 or more years; or above 21

HPV immunization is NOT effective in clearing cytologically evident disease or infection
HPV vaccine can still protect women with current HPV infection from acquisition of additional HPV types& those with past exposure(serology+but DNA-) from reinfection with the same HPV type
**Prevention cntd**

Condoms role unclear, manual foreplay, nonvaginal sex, scrotum to vulva

The spermicide Nanoxyynol-9 is not active against HPV

Sodium dodecyl sulfate detergent, do inactivate HPV
Spermicide/SDS combination
Male circumcision