

1 **STANDING UP TO EMERGING DISEASES**

By Nancy Dewhirst, RDH,BS

2 **EMERGING DISEASES**

- Disease transmission & Infection Control
- Drug resistance
- Biofilm diseases
- Bloodborne diseases
- Vector-borne diseases
- Airborne diseases
- Standard vs. transmission-based precautions
-

3 **A BRIEF HISTORY**

- 1928 – Fleming discovered penicillin mold. (90 yrs ago)
- By D-day, penicillin was mass-produced to fight staphylococcus (pneumonia, skin infections, food poisoning)
- > 100 antibiotics now used, but no new ab's since 1987
- Over-use of antibiotics & treating livestock has increased microbial resistance & drug allergies
- In U.S. >23,000 deaths / year caused by MDR pathogens
- Tetracycline, erythromycin, vancomycin = often ineffective

4 **ARE YOU ALLERGIC???**

5 **A BRIEF HISTORY**

- Colistin = last resort antibiotic (toxic side-effects)
- Now colistin-resistant pathogens
- WHO:
 - Gonorrhea “may soon be untreatable” due to resistance to cephalosporin (ceftriaxone)
 - Extensively drug-resistant TB is in 100 countries
 - World-wide resistance to carbapenem antibiotics prevents TX. of deadly intestinal enterobacteriaceae
- All surgeries; implants, transplants, cancer treatment..... Rely on antibiotics

6 **EMERGING DISEASES**

- Last 20 years: global pandemics
 - Influenza & SARS – Asia, Canada, Ebola – West Africa, Zika virus – Americas, Yellow fever – Angola, many are MDR pathogens,
 - mcr-1 gene found in microbes creates superbugs -(in humans & pigs; 2016)
 - Polio – Nigeria, 2016
 - TB – Cambodia, 2017

7 **MICROBIAL EMERGENCE FACTORS**

- Increased urban populations
 - Rapid, unplanned city growth
 - Crowded, poor sanitation & healthcare

- Easy transmission
- Global demand for meat
 - Industrial farming: microbes become pathogens
 - Use of colistin in livestock in China mcr-1 gene
 - Livestock near wild birds largest influenza pandemic in history
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8 **MICROBIAL EMERGENCE FACTORS**

- Thicker blanket of carbon dioxide allows insects and other vectors to enter new locations
 - Mosquitos & ticks, bats (vectors, reservoirs)

9 **YOU ARE MICROBIAL!**

- Microbiome: "collection of bacteria, fungi & other single-celled organisms"
- You have 10 X more bacterial cells than human
- 400 X more microbial genes than human
- Most microbes are biofilm dwellers
-

10 **THEY'RE NOT ALL BAD!**

11 **YOUR MICROBIAL SELF**

- Most are friendly & vital to:
 - Digest food, drugs
 - Stabilize immune system
 - Maintain health, balance
 - Protect against pathogens (imbalance)
- Disruptions in microbiota = related to:
 - Inflammatory bowel disease
 - Vaginal & bladder infections
 - Periodontal disease
 - Obesity or starvation
-
- Read "I Contain Multitudes" Ed Yong

12

Skin Microbiota: Staph. Aureus, Strept. Pyogenes, Skin pore, skin mite

•

13 **VIROME**

- You have 10 X more viruses than bacteria?
- Viruses = genetic material + protein shell
- Need cells to live & replicate
- Become part of host, cause disease, protect
- Viruses & bacteria = symbionts
-

14 **STANDING UP TO EMERGING DISEASES**

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15

WE'VE COME A LONG WAY....

YESTERDAY

TODAY

16

CHAIN OF INFECTION

17

BREAKING THE CHAIN

18

IC 101

- Isolate & separate
- Clean before disinfect / sterilize
- How do microbes die?
 - Heat (how hot? How cold?)
 - Chemicals (Which ones? What concentrations? How toxic?)
 - Is resistance likely?
- Host response is ½ of pathology
- Is IC safe enough for you?
- Can you confirm cleaning, disinfection, sterilization?
-

19

THE RULES

- CDC Recommendations
 - Based on research
 - Set standards, not "laws"
- OSHA: Occupational Safety & Health Administration
 - Based on CDC recs
 - Worker safety
 - Rules are laws
- State Board laws
 - Include CDC & OSHA & ADA standards
- Civil & Health Dept.. Laws
- Competition, marketing, reputation

20

RESOURCES

- Join osap www.osap.org
 - Organization for Safety, Asepsis and Prevention
- State Dental Board
- ADA
- State Dental Assoc.
- OSHA
- Safety consultants

21 **NEW CDC RECOMMENDATIONS**

<http://www.cdc.gov/OralHealth/infectioncontrol/guidelines/index.htm>

Checklists!

To be used along with 2003 Infection Control Recommendations

22 **STANDARD PRECAUTIONS
MINIMUM STANDARDS FOR ALL PATIENTS**

- Hand hygiene
- PPE
- Respiratory hygiene / cough etiquette
- Sharps safety
- Safe injections
- Instrument, device sterilization
- Environmental asepsis cleaning, disinfection, barriers

23 **STANDARD PRECAUTIONS**

- Proven effective for controlling
 - Bloodborne diseases
 - Contact diseases
 - Droplet diseases
-
- Not effective for airborne diseases
-
- Where are your weak links?

24 **STRETCH YOUR NECK: FRONT, BACK, SIDE TO SIDE.**25 **DRUG RESISTANCE: CHALLENGES PROTOCOL & TX**

- Incidence linked to exposure, susceptibility & over-use of antibiotics
- MRSA = resistant to methicillin, penicillin, amoxicillin, cephalosporins)
- Dr.'s now use Clindamycin & Bactrim, Zyxon, incision / drainage
- Vancomycin may cause thrombocytopenia, hearing & kidney damage
- IV instead of oral meds
-

26 **MRSA
MULTI-DRUG RESISTANT STAPH. AUREUS**

- Staph = common in flora of skin, nose, throat
- MRSA colonizes 1/3 of pop.
 - 64% more likely to die than non-colonized
 - Usually non or mildly infective
 - Unless enters bloodstream
-
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27

MRSA enters open skin.

Pimples, boils, lesions; may lead to pneumonia, severe skin, bone, bloodstream infections,

septic arthritis, endocarditis, deep abscesses, toxic shock

28 **RESISTANT SKIN INFECTIONS....
WHAT SHOULD YOU LOOK FOR?**

29 **TATTOO, PIERCING = PORTALS OF ENTRY**

30

- Transmitted on towels, clothes, surfaces, equipment, skin-to-skin contact
- Enters broken skin
- May Cause FEVER
- Often undiagnosed - allowed to progress
- TX may be IV AB's, high \$, side effects
- Follow CDC Recommendations – they work!
- Get a diagnosis!!!!
-
-

31 **E. COLI & SALMONELLA OUTBREAKS –DISTANT DISTRIBUTION & RESTAURANTS**

- Fecal contamination from food handlers' hands?
- Fields – to - table
-
- MDR organisms increase risk

32 **MDR ESCHERICHIA COLI**

- Contains mcr-1 gene, resists colistin (antibiotic of last resort)
- Gut colonization:
 - If healthy: asymptomatic unless enter blood
 - Immunocompromised: diarrheal disease
- Mcr-1 gene found in pig guts in U.S.

33 **MDR KLEBSIELLA**

- Klebsiella = normal intestinal flora
- May cause pneumonia, meningitis, blood infections
- Carbapenem resistant HAI

34 **MYCOBACTERIUM TUBERCULOSIS**

- Well controlled in U.S.
- World-wide: 9.6 mil. New cases - 2015
 - 100 countries reported XTR TB (extensively resistant)
 - India reported totally resistant cases
-

35 **INFLUENZA**

Worldwide:

- 3-5 mil cases yearly
- 250 K – 500 K deaths/year

- Most resistant to oseltamivir & zanamivir
- Some resistant to Tamiflu
- Evolve resistance rapidly
-
- Vaccines!
-

36 **SALMONELLA TYPHI**

Worldwide:

- Typhoid fever affects 21 mil. / yr
- 222 K deaths / yr - mostly children

U.S.:

- 5 K cases/yr (ingested abroad: food, water)
- Developing resistance
- Vaccines!

37 **PSEUDOMONAS AERUGINOSA**

- 51,000 healthcare-assoc. Infections / yr
 - 6,000 cases = MDR
 - 400 deaths / yr
- Risks: breathing machines, catheters, wounds

38 **MDR-CAMPYLOBACTER**

Food poisoning diarrhea

39 **MDR STREPTOCOCCUS PNEUMONIAE**

- Pneumonia
- Meningitis

40 **RISE IN MDR STD'S**

41 **MDR GONORRHEA U.S. CASES RISING SINCE 2009**

- Highly resistant strains becoming more prevalent
- 63% increase last 5 yrs ~ ½ are reported
- 75% cases = male
-

42 **MDR GONORRHEA U.S. CASES RISING SINCE 2009**

- Asymptomatic in 80% females & 50% males
- Left untreated: sterility, PID, ectopic pregnancies
- Need vaccine!
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43 **VACCINE SURPRISE**

- Vaccine vs. Bacterial meningitis (Neisseria meningitidis bacteria, New Zealand) protected vs.

Gonorrhea (*Neisseria gonorrhoeae* bacteria).

- Vaccine reduced Gonorrhea 31%

-
-
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44 **WHAT'S THE POINT?**

DRUG RESISTANCE:

- Makes treatment less successful
- Increases importance of prevention
- Creates need for other strategies
- Triclosan potentiates tobramycin - use together for CF & other BF diseases

45 **A SOLUTION!**

GENETIC RE-PROGRAMMING OF STAPHYLOCOCCUS AUREUS

- *S. aureus* turns on *fmtC* gene in biofilm
- *fmtC* causes resistance
- Chemicals & drugs can turn it off!
- Coming soon
- <http://www.msnbc.com/news/858649.asp#BODY>

46 **NEW CLASS OF ANTIBIOTICS**

47 **TEIXOBACTIN (IN HUMAN TRIALS)**

- Made by bacteria, kills wide range of resistant bacteria
- Prevents cell wall construction (holes in cell wall)
- Effective against:
 - TB, Septicemia, *Clostridium difficile colitis* (*C. dif*)
 - *Staphylococcus aureus* (Staph infection) and *Streptococcus pneumoniae* (Strep throat) (no side effects! Useful for orthopedic surgeries)
 - MRSA (100 X more effective than Vancomycin)
- NOT effective for gm (-) bacteria: *Klebsiella*, *E. coli* and *Pseudomonas*
-

48 **BIOFILM DISEASES**

Microbes co-operate and organize

49 **THE MOST SUCCESSFUL FORM OF LIFE**

50 **MIXED BIOFILM ZONES (MICRO-ENVIRONMENTS)**

- Cells change phenotype in BF
- Commensal behavior
- Aerobic cells protect anaerobes – (hidden)
- Cells live off waste & byproducts of other biofilm species
- Many spp. = viable but non-culturable: undetectable by tests used

51 **MECHANISMS OF BIOFILM PROTECTION**

- Antimicrobial depletion / neutralization b4 reaching bacteria (outer layers absorb)

- Slow penetration of agent: cells have time to initiate stress response
- Stress response: cells change activity
- Cell groups inactivate, but viable
persister cells (spore-like) survive

52 **MATRIX VARIATIONS**53 **HELICOBACTER PYLORI
IN SINGLE-SPECIES BIOFILM**54 **H PYLORI FORM ALTERATION**55 **IS HELICOBACTER PYLORI BAD?**

- Known to cause ulcers & stomach cancer
-
- BUT – protects against gastric reflux & esophageal cancer
-
- H pylori is an ancient human microbiome partner
-
- H pylori has been greatly reduced (last 20 years)

56 **BIOFILM INFECTIONS**

- Dental caries, periodontitis Strep., gm (-) anaerobes
- Otitis Media H. Influenzae
- Musculoskeletal infections staph.
- Necrotizing fasciitis Gp. A strep.
- Biliary tract infections E. coli
- Osteomyelitis mixed bact., fungal species.
- Infective endocarditis previously: Viridans gp. Strep., now
staph & candida
-
- Cystic fibrosis pneumonia P. Aeruginosa,
`Burkholderia cepacia.

Science Vol 284 21 may 1999

57 **PERIO - CARDIOVASCULAR DIS.**

- Inflammation is important in both
- Porphyromonas gingivalis & Strep. sanguis specifically ID'd
- Severe periodontitis = ~ 9 inches chronic open wound → Bacteremia
- P.D. = biofilm disease
- P.D. – source for implant infections

58 **IMMUNE CELLS DESIGNED TO ATTACK ONE CELL AT A TIME**59 **PMN'S ATTACKING BIOFILM, BUT DYING**60 **BIOFILM & INFLAMMATION WARS**

- PD = superficial disease, highly accessible
- Deeper tissue biofilms = hidden

- Inflammation: standoff between phagocytes & bacteria
 - Phagocytes can't engulf biofilm – shoot enzymes at it
 - Causes general destruction (collateral damage)
 - Fails to penetrate biofilm
 - Inflammatory response to biofilm infections = heightened

61 **BIOFILM DISEASES**

- Cystic fibrosis: pseudomonas & mucus
- Native valve endocarditis
 - Biofilm "vegetation" (high concentrations of antibiotics can cure in 6 weeks)
- Osteomyelitis
- Toxic shock – vaginal biofilms, tampons (staph)
 - Diagnosis = difficult
 - Cultures only grow when biofilm sheds!
 -

62 **OSTEONECROSIS OF THE JAW**

- Bisphosphonates change binding of bacteria to hydroxyapatite of bone
- Bone = replaced with biofilm
- ***If bacteria get access to bone & bone has bisphosphonate in it → necrosis

63 **CYSTIC FIBROSIS PSEUDOMONAS**

64

- E. coli most common
- The remaining cases:
 - 75% = Pseudomonas aeruginosa
 - 25% = Legionella
- Heat dissipates disinfectants

65

66 **LYME DISEASE**

- Ticks carry Borrelia burgdorferi
- Chronic biofilm disease
- Borrelia forms:
 - Cystic form
 - Pleomorphic
 - Granules
 - Spirochetes
- Found in biofilms in joints, brain
-
- Dementia, mental illness
-

67 **HEALTH CARE ASSOCIATED BIOFILM INFECTIONS**

- 1 • Hospital Pneumonia

- Sutures, exit sites
- Arteriovenous shunts
- Contact lenses
- Urinary catheter cystitis
- Peritonitis
- IUD's
- Endotracheal tubes
- 2 •Catheters
- Mechanical heart valves
- Vascular grafts
- Orthopedic devices
- Prostheses
- 0% success w. Anti-biotics alone (must remove)
Science Vol 284 21 may 1999

68 **BIOFILMS IN CHRONIC WOUNDS**

- 60% chronic wounds have biofilms
- Poorly revealed with cultures
- 2 - 15 species present
 - Fusobacterium, bacillus, actinomyces, staph, strep, selenomonas, candida, 3 types of treponemes
 - No viruses addressed!
- Biofilms prevent healing
- Diabetic, venous, pressure ulcers
- MUST physically remove biofilm to treat

69 **CONTROLLING BIOFILMS**

70 **SIGNALING**

- Bacteria communicate chemically within biofilm (hormone-like signals)
- Allows biofilm to act collectively as a single force:
 - Aggregate
 - Swarm
 - Disperse
 - Secrete
 - Absorb
 - Replicate
 - Change cell phase (spore, dormant...)

71 **KLEBSIELLA PNEUMONIAE BIOFILM**

72 **SIGNALING**

- Signals in nature:
 - Some plants (marine) have biofilm inhibitors
 - Red algae
 - Orchids in jungle have 8 biofilm inhibitors
- Goal: manipulate signaling to:

- Prevent formation
- Slow growth
- Trigger detachment (swim away)
-

73 **SIGNALING CHALLENGES**

- Preventing signaling to beneficial bacteria and biofilms
- Keeping signal localized on target
- Bacteria use electrical charges, along nano-wire network within biofilm
- Maybe: disrupt biofilm communication through power grid

74 **BIOFILM RESEARCH**

- Probiotics: designing the "optimal" protective biofilms
 - Probably different for different people
- Controlling inflammation

75 **WILL BIOFILMS SAVE EARTH?**

- "Slime curtains" can isolate & separate toxic areas; protect ground water, streams, rivers
- Biofilm layer can prevent penetration of acid water drainage into under ground aquifers
- Engineered biofilms can metabolize toxins, accelerate bio-degradation of wastes
-

76 **BIOFILM GENETIC ENGINEERING**

- Drugs & drug delivery
- Environmental clean-up
- Toxic containment
- Bio-degradation
- Antimicrobial surfaces
- Pro-biotics
- Alternative fuels
-
-

77 **BIOFILM PROPERTY CLINICAL IMPLICATIONS**

- 1 • Behaves as primitive multi-cellular organism

- Formation is orderly
-
-
- Cell- to - cell communication required
-
-

- 2 • Target weak links

-
-
- Target early steps
-

- Find antagonists to intercept, or control signals

78 **BIOFILM PROPERTY CLINICAL IMPLICATIONS**

- 1 • Biofilms resist host immune responses & antimicrobials
 -
 - Biofilm phenotype different from planktonic
 -
 - Biofilms use & respond to electrical signals
 -
 -
 - No one method found successful
- 2 • Target and remove protective matrix + symbiotic species
 -
 - Target correct phenotypes
 -
 -
 - Use electric currents to weaken / disrupt microbes in biofilms, then use antibiotics, antimicrobials
 -
 - Combine physical, chemical and signaling strategies

79 **WATER CHALLENGES**

80 **WATER IN TUBES**

81 **DENTAL WATER QUALITY**

82

83 **TUBING = REACTOR**

84

85

86 **DUWL MICROBES**

- 1 • Pseudomonas sp.
- Pasteurella sp.
- Micrococcus sp.
- Klebsiella
- Legionella sp.
- Mycobacterium sp.
- Enterococcus sp.
- 2 • Actinomyces
- Salmonella
- Strep. ,Staph.

- Bacteroides
- E. coli
- Nematodes
- Protozoa, amoebas
- Fungi (Candida, Aspergillus sp.)

87 **ASSOCIATED ILLNESSES**

- Head, neck, dental infections
- Septicemia
- HCA surgical infections
- Pneumonia, Bronchitis
- Legionellosis
- Abscesses
- Appendicitis
- Salmonella poisoning
- Cryptosporidiosis

88 **BIOFILM DISEASES**

89 **ACANTHAMOEBA**

90 **LEGIONELLA PROTECTED INSIDE ACANTHAMOEBA:
TWO FORMS**

91 **DUWL – RELATED DEATH (2011)
LANCET**

- 82-yr old Italian Woman
- Legionnaires' dis (*L. pneumophila*)
- Proven from dentist's waterlines
- No other exposures

92 **2015 MYCOBACTERIUM ABSCESSUS
INFECTIONS - GEORGIA**

- 9 pediatric infections confirmed after pulpotomies
- All pts were immunocompetent
- No deaths; hospitalizations, IV antibiotics, surgeries
- Dept. of Health notified Atlanta Dentists:
 - Follow DUWL disinfection protocol
 - Meet DUWL potable & surgical standards
 - Monitor DUWL
 - Promptly report suspected outbreaks

93 **2016 MYCOBACTERIUM ABSCESSUS
INFECTIONS - CALIFORNIA**

- 57 pediatric infections confirmed after pulpotomies, children hospitalized
 - Symptoms start 15 – 85 days after TX.
 - TX = long term hospitalization, IV antibiotics
 - >500 patients notified
 - May – Sept, 2016, Children's Dental Clinic, OC

- *M. abscessus* = waterborne
- Health Dept. ordered office to cease use of & replace on-site water system
- Office closed, opened, problem returned – closed again
-

94 **N. A. MORALES POT-PULPOTOMY *MYCOBACTERIUM ABSCESSUS***

95 **N. A. MORALES, AFTER 1 MO. HOSPITALIZATION**

96 **2016 *MYCOBACTERIUM ABSCESSUS* INFECTIONS - CALIFORNIA**

- Pulpotomies must include pulp area “sterilization”
- Potable/or sterile standard
- Structural, plumbing, equipment, antimicrobial & protocol revisions required. Must maintain @ 500 CFU/mL (CDB, CDA, CDC)
- All DUWL should be tested to validate
 - www.ochealthinfo.com/dentaloutbreak
-

97 **2 STANDARDS FOR WATER SAFETY**

- Sterile - for surgery, (cutting bone, normally sterile tissue)
 - 0 CFU/mL of heterotrophic water bacteria
 - CDC special update, OSAP, Dental Board law
- Potable - for non- surgical procedures -
 - 500 CFU/mL of heterotrophic water bacteria (meets EPA safe drinking water standards)
 - CDC, OSAP, EPA, Dental Board

98 **2 STANDARDS FOR DENTAL TREATMENT WATER**

- Surgical Standard: USP sterile water & sterile delivery system
 - Bulb or other syringe
 - Peristaltic pump, sterile lines
 - Aqua-Sept
- Non-surgical dentistry: Potable (500 CFU/mL)
 - Chemical treatment
 - Reservoirs
 - Cartridges
-

99 **WHEN DOING SURGICAL PROCEDURES, DO YOU USE**

Sterile water & sterile separate delivery device?

100 **FOR POTABLE WATER YOUR OFFICE SHOULD:**

- Flush lines in AM for 2 min./line (handpieces off)
- Flush lines between patients for 20 sec.
- Shock/Purge lines @ 1 – 2 months if using disinfecting product in dental water
- D.

- D. Shock/Purge lines weekly if using only water in bottles.
- E. Follow Manufacturer's directions (dental unit & DUW product)
- F.

101 **SIMPLE FLUSHING OF WATERLINES**

- * Flushing is important: flushing removes planktonic contaminants
- BUT: flushing alone is NOT a reliable way to control DUWL biofilms.

-

102 **WATERLINE TREATMENT OPTIONS**

- Chemical "Shock" - removes biofilm
 - Sterilex, bleach
 - Caustic, may injure tissue. Rinse!
- Continuous chemical "maintenance" - prevents biofilm, keeps CFU's low.
 - DentaPure 1 /year (dry bottle at night)
 - BluTab (Silver ions) – ProEdge (keep bottle on)
 - ICX (Silver ions) – Adec
 - Team Vista - HuFriedy

103 **DENTISTRY AFTER
BOIL-WATER ADVISORIES**

- Do not deliver public water to patients through dental unit, ultrasonic scaler, or any dental equipment.
 - Do not use public water for dental treatment, patient rinsing, or handwashing
 - Use antimicrobial waterless hand sanitizers (alcohol rubs)
 - Wash soiled hands with bottled water or antiseptic towelette
- CDC

104 **AFTER BOIL-WATER ADVISORIES**

- Follow local water utility guidance re: flushing all waterlines
- If no guidance is given: flush waterlines and faucets for 1 - 5 minutes prior to patient care
- Disinfect dental waterlines as recommended by unit manufacturer

105 **HOW DO YOU KNOW YOUR WATERLINES ARE SAFE?**

- Loma Linda University Waterline Testing
- ProEdge Waterline Testing

106 **USE ASEPTIC TECHNIQUE TO DRAW SAMPLES**

107 **IN-OFFICE TESTING**

HPC sampler Aquasafe™

108 **YOU CAN DO IT!**

109 **TREAT, SHOCK, AND TEST ALL WATERLINES**

110 **BLOODBORNE DISEASES**

EXAMPLES: HIV, HEPATITIS

111 **HEPATITIS B**

- 1 1980 - 2013
- 2 Incidence declined since 1991
(infant vaccinations)
- 3 2015 CDC Report
- 4
 - At least 21% increase in acute HBV cases
 - Due to injected drug use
 - Grossly under-reported
 -
 - Chronic cases also under-reported
 - 850,000 – 2.2 mil cases???

112 **HBV BOOSTERS & TREATMENT**

Boosters?

- Vaccine gives immunologic memory \geq 23 years
 - No boosters formally recommended
- Boosters may be needed sooner for immunocompromised pts & hemodialysis pts.
- Get tested. Know your status!

Treatment:

- If exposed, TX = booster vaccine, maybe HBIG
- Vaccine MUST be offered, even to pre-vaccinated workers. Best within 24 hrs.)
- Antiviral drugs - IMPROVED

113 114 **CHIN TUCKS**

- Touch chin to chest
- Make a double chin in forward position
- Hold 5 sec
- Should feel stretch in back of neck

115 **HEPATITIS C (HCV)**

- Most common chronic bloodborne infection in U.S.
- 2.7 – 3.9 million Americans have chronic HCV
 - 4 X more than either HBV or HIV
- Most chronic HCV carriers are baby boomers
 - Born 1946 – 1964
 - ~75% = unaware of infection

116 **BOOMER GENERATION**117 **HEPATITIS C (HCV)**

- Some people clear infection
- 85% develop chronic HCV
- Can result in chronic liver disease, cirrhosis, liver cancer, death
- Subclinical, asymptomatic 10 – 20 years

- Some types of HCV can be cured
 - No vaccine
- HCV-related oral ulcerative lesions →

118 119 **TODAY'S TESTING REC'S**

- Test all high risk groups
- 1 time test for all baby boomers regardless of risk
 - 60% of DDS's = born 1945 – 1965
- New Rapid (40 min.) antibody tests
 - Venipuncture, finger-stick (less reliable)
 - OraQuick
 - Detect past or present HCV infection
 - Must be followed up with nucleic acid test (NAT) for viral RNA

120 **HIV UPDATE**

- 34 years since CDC first identified HIV
- NO cases of patient to dental worker HIV transmission
- No vaccine, but vital antiretroviral meds cut transmission to partners by 96% (lower viral load)
- 20% of infected = unaware of status
- Early TX saves lives!
- Education is the key!
-
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121 **HIV / AIDS - CURRENT STRATEGIES**

- Rapid HIV type 1 + 2 Test: OraQuick:
 - Mouth swab or blood test
 - 99% accurate, 1 min. result
 - For source person testing or gen. Screening
 - Pre-arrange with Occupational Health M. D.

122 **HTLV-1****HUMAN T-CELL LEUKEMIA VIRUS**

- "cousin of HIV"
- Ancient virus (found in 1500 YO Andean mummies)
- Causes leukemia, lymphoma, diseases of NS, bronchiectasis (lung disease) weakens immune system
- Global virus,
- large cluster in central Australia (> 40% of indigenous pop.)
-

123 **HTLV-1****HUMAN T-CELL LEUKEMIA VIRUS**

- ID'd 1979 ~ same time as HIV
- Transmission:

- Sex
- Birth, breastfeeding
- Blood, transfusions, organ transplants
- Only Japan tests babies for HTLV-1
- Donated tissues & blood often tested in U.S., Australia, few other countries
- No vaccine, little research
-

124 **IS YOUR TEAM SAFE?**

125 **TREATING PATIENTS:
MOST LIKELY DENTAL EXPOSURES**

- Percutaneous
 - Needles
 - Burs
 - Instruments, files
- Compromised skin
- Mucosal exposure
- HBV = efficiently transmitted directly & indirectly (survives on surfaces – 7 days)

126 **POST EXPOSURE PROPHYLAXIS**

- Exposure packet
 - Phone numbers, forms, driving directions, payment arrangements
- Direct MD re: testing, disclosure, include HCV!
- Rapid HIV, HCV testing
- Response windows for maximum effect:
 - HIV - ART – 2 hours
 - HBV – 24 hours
 - HCV – 24 hours
- PEP follow-up: after exposure test 3-6 weeks, 3-6 months, 9 months
- Counseling
-
-

127 **ARE YOU SET UP?**

- National Clinicians' PEP Hotline
- 1-888-448-4911
- Call 24/7

128 **STRETCH CHEST**

- Clasp hands behind head
- Inhale slowly, bringing elbows back
- Exhale slowly, bring elbows together, bend head forward

129 **VECTOR-BORNE DISEASES**

- Malaria, Dengue, Zika, Yellow fever, Lyme, West Nile, chikungunya
- Primarily vector transmitted
- Treat as bloodborne disease

130 **MOSQUITO – WATER LINKS**

- Emergence of year around biting mosquitoes
- West Nile - Spread to 47 states in 5 yrs
 - ~20% - flu-like symptoms
 - ~1% encephalitis or neurological symptoms
- Spread by ticks and mosquitos
- Dengue (Bone-Break Fever) rivals Malaria
 - Endemic in tropical destinations
 - Outbreaks in Puerto Rico, S. Amer.

131 **AEDES AEGYPTI MOSQUITOS**

- Aedes aegypti mosquito
- City dweller, loves humans
- Can breed in a capful of water
- Serial biter - rapid spread of pathogens if infected
-
-

132 **MALARIA
(PLASMODIUM PARASITE)**

- Rampant in US until WW 2
- Globally: 1.5 - 3 mil deaths / year ,
 - 80% in Africa, > 1 mil/yr are children
- Present vaccine = 33% effective & costly
- New vaccines being tested
- Asian Tiger mosquito invading U. S. (tires)
- Bloodborne disease

133 **DENGUE “BONE-BREAK FEVER”**

- Leading cause of illness / death in tropics
- Over 400 mil infected yearly
- Increasing since 1950's
- Endemic in Puerto Rico, Latin America, Southeast Asia, Pacific Islands
- 2010: reached Florida
- Eradication has failed
- Vaccinations – only hope

134 **DENGUE SYMPTOMS**

- Headache, eye pain
- Muscle, joint or bone pain
- Rash, nausea / vomiting
- Unusual bleeding, bruising (nose, gingiva, skin)
- Severe cases: 24-48 hrs. after fever ends, shock, internal bleeding, death
- Preventable but not curable. Avoid aspirin & ibuprofen

135 **DENGUE DANGERS**

- 4 viral types
- Infection with one type confers permanent immunity
- Infection with another type may activate immune system, but also enhance viral growth
- 95% of severe cases are repeated infections with different types
- Need vaccine for all 4 types, or may cause severe hemorrhagic disease

136 **CHIKUNGUNYA**137 **CHIKUNGUNYA**

- Worldwide dissemination of *Aedes* mosquitos
- Arbovirus first isolated – 1950s in Tanzania & Mozambique
- Resembles dengue fever – more arthralgia
- Confined to sub-Saharan Africa, SE Asia for 50 yrs
-

138 **CHIKUNGUNYA**

- “Emerging” in 1992
- Mutated, abruptly exploded - 2005-2006
- 2014, Caribbean: 35K cases, 6 fatalities
- Since 2013 - 1.7 mil. cases in Americas
- Worldwide spread = much greater risk than Ebola or MERS-CoV
- ~700 U.S. Cases in 2015, 175 in 2016

- Charrel RN, et.al. Chikungunya outbreaks – the globalization of vectorborne diseases. N Engl J Med 2007; 356: 769=771.

- www.CDC.gov

-
-

139 **ZIKA VIRUS ACTIVE AREAS**140 **ZIKA VIRUS**

- Spread by *Aedes* mosquitos (also spread dengue, yellow fever, malaria)
 - Aggressive daytime biters (also night)
- Sexual transmission
- Symptoms:
 - fever, rash, headache, Myalgia, conjunctivitis (or asymptomatic), Guillain-Barré syndrome: immune cells attack nerves

- In dentistry - Standard Precautions!

141 **ZIKA VIRUS**

- Zika kills brain cells
- Microcephaly
- Long term neurological problems = unknown
 - Science News, Jan. 21, 2017

-

142 **CONTROL EFFORTS**

- Spray malathion (concern)
- Reduce mosquito breeding areas
- Chemically treated mosquito netting (night) & clothing (day)
- Education
- Genetically engineered male mosquitos

143 **LARVA OF Aedes Aegypti MOSQUITOS GENETICALLY MODIFIED TO DIE (OXITEC, BRITISH CO.)**

- Tests show release of GMO mosquitos reduces wild Aedes mosquitos 85-90%

144 **LYME DISEASE**145 **LYME DISEASE**

- Ticks carry Borrelia burgdorferi
- Headaches
- Fever
- Fatigue
- Rash
- Chronic biofilm disease

146 **LYME DISEASE**

- Borrelia forms:
- Cystic form
- Pleomorphic
- Granules
- Spirochetes
- Found in biofilms in joints, brain,
- Dementia, mental illness

147 **STRETCH YOUR NECK: FRONT, BACK, SIDE TO SIDE.**148 **2014-2015****& IT'S BACK**149 **EBOLA VIRUS**
5 ENVELOPED VIRUSES
4 INFECT HUMANS150 **EBOLA VIRUS TRANSMISSION**

- Direct contact with all body fluids / substances of a symptomatic person or animal (bats, bush meat)
 - Blood, urine, feces, vomit, sweat (CDC)

151 **EBOLA TRANSMISSION**

- Exposure to contaminated objects (sharps: needles = highest risk...)
- Sexually transmitted, > 1 year after male recovers

152 **UPDATED PPE TO TREAT SUSPECTED / KNOWN EBOLA PATIENTS**

- Full body suit, no skin exposed
- Double gloves
- Fit-tested respirator
- Training to safely don, remove, use PPE
- Trained helper to don & remove PPE
-

153 154 155 **PPE**156 **AFTER EBOLA....**157 **EBOLA SURVIVORS' AILMENTS**

- Neurological symptoms (~75% of pts.)
 - Memory loss, cognitive disorders
 - Headaches, Parkinson's-like symptoms
 - Extreme fatigue, anxiety, depression, sleep disorders
- Eyes (~60% of pts):
 - Cataracts, blurred vision, redness, pain, light sensitivity, detached retina, blindness, light flashes
- Muscles: pain, weakness
- Joints & cartilage: pain
- Ears: ringing (tinnitus), deafness / hearing loss

158 **EBOLA (LIKE HIV) HIDES IN RESERVOIRS & RECURS IN EPISODES**

- Virus hides in reservoirs with "immune privilege"
 - Eyes
 - Testes (> 1 year after recovery, even with (-) blood test)
 - Joints, joint cartilage
 - Brain
 - Uterus?
- Immune (macrophage) response to Ebola virus may set off cytokine storm in brain, joints (like HIV) fatigue, pain.
-
-
-

159 **EBOLA VACCINE TRIALS**

- STRIVE = rVSV-ZEBOV (recombinant Vesicular Stomatitis Virus *Zaire ebolavirus* vaccine.
- Protects against *Zaire ebolavirus*
- Vaccine cannot cause Ebola because it does not contain the whole Ebola virus
- "As of April 28, 2016, no Ebola cases and no vaccine-related serious adverse events.." But limited study due to control of epidemic (CDC)

160 **EDUCATION NEEDED**

- > ½ of polled Africans have mis-conceptions:
 - “mosquitos or ambient air spread ebola”
- Majority improved handwashing & touching suspected ebola victims
-

161 162 **BURNING CLOTHES, BELONGINGS OF PATIENTS**163 **ENVIRONMENTAL PRECAUTIONS
EBOLA = CATEGORY A INFECTIOUS SUBSTANCE**

- No products specifically list Ebola
- Use high potency EPA-registered disinfectant with label claim vs. Non-enveloped virus (norovirus, toravirus, adenovirus, poliovirus)
 - Ebola = enveloped virus
 - Margin of safety: will inactivate both classes of viruses (U.S. DOT Haz. Mat. Reg 49 D.F.R, Parts 171-180)

164 **INTERMEDIATE LEVEL DISINFECTANTS KILL ALL BELOW:**

- Mycobacteria - *Mycobacterium tuberculosis*
- Nonlipid or small viruses (Non enveloped) - *Polio virus, enteroviruses*
- Fungi - *Trichophyton spp.*
(Low level hospital disinfectants kill only):
- Vegetative bacteria - *Pseudomonas aeruginosa, Staphylococcus aureus*
- Lipid (enveloped) or medium-sized viruses - *Herpes simplex virus, hepatitis A, B & C virus, HIV, Ebola* (CDC)

165 **STANDARD PRECAUTIONS:
ARE YOU CLEANING BEFORE DISINFECTING???**

It depends on technique
And product selection

166 **WHAT IS THE ACTIVE INGREDIENT?
WHICH PRODUCTS CLEAN?**167 **CLEAN BEFORE DISINFECTING**168 **LEAVE FOR STATED TIME**

- Factors:
 - Wipe material
 - Wipe saturation
 - Alcohol content

169 170 **BACK, HIP STRETCH**171

172 173 **HAND HYGIENE**

- Hand hygiene is the single most important factor in transmission of disease
- 88% of dis. Trans. Is by hand contact
- 'Resident' skin flora is permanent (IN skin)
- 'Transient' flora is temporary (ON skin)

174 **1 MINUTE****FIRST WASH OF THE DAY**

- Start with clean hands
- Subsequent hand hygiene will be more effective

175 176 **HOW LONG SHOULD YOU LATHER WHILE WASHING REPEATEDLY DURING DAY?**

- A. 1 minute
- B. 15 seconds
- C. 20 seconds
- D. 30 seconds

177 **HOW LONG SHOULD YOU LATHER WHILE WASHING REPEATEDLY DURING DAY?**

- A. 1 minute
- B. 15 seconds
- C. 20 seconds
- D. 30 seconds

178 179 **WHERE DO YOU MISS?**180 **MOST RECOMMENDED:
COMBINED PROTOCOL**

- 1 Plain soap – routine handwashing
- 2 Antimicrobial / alcohol hand rub on unsoiled hands

181 **IS WATERLESS HAND-RUB EFFECTIVE?**

- Should have ethanol, not isopropyl alcohol
 - Less drying to skin
 - More effective vs. Viruses
- Must have enough emollients for heavy clinical use
- FDA cleared for medical use
 - "Safe and effective"
- Contact time: 15 sec.

182 **IF YOU DON'T USE ALCOHOL SANITIZER**

- 1 Plain soap – routine handwashing

- 2 Antimicrobial soap periodically

183 **COMMON MISTAKES
(THAT HARBOR ORGANISMS &
MAY DAMAGE GLOVES)**

- False nails, Nail polish & applications
- Un-manicured nails
- Jewelry
- Petroleum-based products
- Have written policy

184

Broken skin management:

- Protect skin openings
- Finger cots, double glove
- Change dressings often.
- Illegal to treat patients with infection or weeping dermatitis

185 **WHAT'S THE MOST IMPORTANT THING ABOUT WEARING GLOVES?**

186 **HOW LONG DO GLOVES LAST?**

- 2
- No exact data
 - Change per patient & when compromised
 - No longer than 1 hour
 -
 - 4% may have pin-holes
 -

187 **RESPECT GLOVE LIMITS
WHAT DESTROYS GLOVES?**

- Soap
- Water
- Oils – all types
 - Petroleum
 - Emollients in products
 - Make-up
- Sweat, dental materials
- Stretching, donning, removing
- Use!!!-

CDC MMWR 2003

188 **2016 FDA BAN ON POWDERED GLOVES**

- Rule applies to:
 - All glove types
 - Exam & surgical gloves
 - Absorbable powder for lubricating surgical gloves
- Powder risks:

- Increased aerosolized allergens (with latex gloves)
- Severe airway inflammation
- Surgical & wound inflammation & post-surgical adhesions

189 190 **ARMS CLASPED BEHIND**191 192 193 **AEROSOL-TRANSMITTED-DISEASES (ATD)**

- Inhalation of suspended particles
- Small fluid droplets dry in nano-seconds, float
- Particles remain indefinitely
- Require special building design & PPE for safety
- ATD patients must be screened and referred

194 **AIRBORNE DISEASES**

- Measles, mumps
- Varicella (including disseminated zoster) Tuberculosis , Flu, SARS, Pertussis
-

195 **SCREENING FOR ACTIVE CASES
LOOK FOR SYMPTOMS**

- Goals = reduce transmission by:
 - Early detection @ check-in
 - Prompt isolation
 - Implement respiratory hygiene / cough etiquette
 - Defer elective TX
 - Refer emergency / acute cases
 - For dental emergencies
 - For medical care
 - Implement appropriate precautions
 -
 - Cal OSHA Title 8, Ch 4
 - Section 5199 Aerosol Transmissible Diseases.
 - California-only regulation.

196 197 **ANNUAL FLU**198 **INFLUENZA SIGNS & SYMPTOMS**

- Fever & chills – sudden onset (102 – 106 degrees)
- Cough (loose, then dry)
- Breathing difficulty

- Sore throat
 - Intense body aches, skin sensitivity
 - Headache, sinus / nasal pain
 - Diarrhea, vomiting
- 199
- 200 **MEASLES – EXTREMELY INFECTIOUS**
- Leading cause of death in children (worldwide)
 - 10-12 day incubation
 - High fever (1 wk), runny nose, cough, white spots in mouth: precede rash
- 201 **KOLPIKS SPOTS**
- 202 **WHOOPING COUGH ADULT**
- 203 **VIOLENT “PAROXYSMS”**
- Uncontrollable “100 day cough”
 - Breaks ribs, causes vomiting, urination...
 - Etiology: bacterium *Bordetella pertussis*
 - Strips cilia, mucus stagnates, airways = raw, sensitive to touch, air, water...
 - Confused with cold, symptoms build
 - light fever
- 204 **SCARLET FEVER (SCARLATINA)**
- Caused by Gp A Streptococcus pyogenes (strep throat)
 - Mostly children 5 – 15
 - Antibiotics
 - Untreated: may cause serious illness, rheumatic fever, kidney damage
 - # of cases & deaths decreased since early 1900’s
 - Recent increase in cases. Cause unknown
 - East Asia, England - @ 50 year high
 - Droplet & contact transmission
- 205 **SCARLET FEVER**
- Red rash: looks like sunburn, feels like sandpaper
 - Begins on face, neck, spreads everywhere
 - Redness blanches
 - Later skin peels
- 206 **SCARLET FEVER**
- Red lines at skin folds
 -
- 207 **SCARLET FEVER**
- Flushed face, pale ring around mouth
- 208 **SCARLET FEVER**
- Strawberry tongue or coated

209 **SCARLET FEVER**

- Fever \geq 101 degrees
- Lymphadenopathy
- Difficulty swallowing
- Nausea, vomiting
- Headache

210 **MAKE SURE YOU ARE PROTECTED!**

1 • HBV

- Influenza
- Measles
- Mumps
- Rubella
- Varicella-Zoster
- Pertussis
-
- www.CDC.gov: new adult vaccine recs
- OSHA policies:
 - New hires & employees
-

2 • Tetanus

- Polio
- Pneumonia
- Meningitis
- HPV

211 **TUBERCULOSIS POLICY**

- MDR TB = worldwide risk
- Develop TB program appropriate to risk
- Tuberculin skin test (TST) when hired & per risk
- Ask all pts:
 - History of TB?
 - Symptoms of TB?

212 **2017: CAMBODIA TB EPIDEMIC**213 **ACTIVE TB**214 **SCREEN FOR ACTIVE TB:**

- Productive cough (> 3 weeks)
 - Bloody sputum
- Night sweats
- Fatigue
- Malaise
- Fever
- Unexplained weight loss
- If yes: medical referral, (reportable)

215 **MYCOBACTERIUM TUBERCULOSIS**

- Mtb infection is NOT synonymous with ACTIVE TB!
- Positive skin test does NOT mean ACTIVE TB!

216 217 **HAVE YOU BEEN VACCINATED AGAINST TB?:**

- TB blood tests (interferon-gamma release assays or IGRAs), unlike the TB skin test are not affected by prior BCG vaccination
- Symptom tests
- ATD screening form
- Chest X-ray?

218 **TB, FLU & OTHER ATD'S**
ASK: DO YOU HAVE....

1 • TB

- Fever, cough....
- Flu
 - Fever?
 - Body aches?
 - Runny nose?
 - Sore throat?
 - Headache?
 - Nausea?
 - Vomiting or diarrhea?

•

If yes, re-appoint, refer

•

2 • Pertussis, measles, mumps, rubella, chicken pox, meningitis

- Fever, respiratory symptoms +
- Severe coughing spasms
- Painful, swollen glands
- Skin rash, blisters
- Stiff neck, mental changes

219 **CHRONIC RESPIRATORY DISEASES**
(NOT ATD'S, NO FEVER)

- Asthma
- Allergies
- Chronic upper airway cough syndrome "postnasal drip"
- Gastroesophageal reflux disease (GERD)
- Chronic obstructive pulmonary disease (COPD)
- Emphysema
- Bronchitis
- Dry cough from ACE inhibitors

220 **RESPIRATORY HYGIENE /
COUGH ETIQUETTE**

221

222

223

224

225

226 **COVER YOUR COUGH SUPPLIES**

227 **RESPIRATORY HYGIENE, COUGH ETIQUETTE
POST SIGNS**

- Cover your cough (lists symptoms patients should report to staff)
- <http://www.cdc.gov/ncidod/dhqp/pdf/Infdis/RespiratoryPoster.pdf>
- Cover your cough instructions and fliers in several languages
- <http://www.cdc.gov/flu/protect/covercough.htm>

228 **DENTAL WORKER HEALTH**

- Symptomatic workers must be evaluated promptly
- No work until:
 - MD rules out ATD or
 - Worker is on therapy & is noninfectious

229

230 **STRETCH BACK OF NECK**

- Turn head away from tight side
- Look down, feel stretch
- Hold chair on tight side
- Pull head forward with other hand
- Repeat, looking up

231 **SURGICAL MASKS: HOW SAFE ARE YOU?**

Depends on:

- Mask level
 - Filtration (particles, germs)
 - Fluid protection
-
- Fit - Coverage (mouth & nose)
- Compliance
-
-

232 **MASKS "SINGLE-USE, DISPOSABLE"
CHANGE BETWEEN PATIENTS OR SOONER**

233 **MASK FILTRATION**234 **ASTM LEVELS**235 **KNOW MASK LIMITS**

- Mask degrades from;
 - Perspiration
 - Talking
 - Sneezing
 - Length of time mask is worn
 - Dust, spray
- Shield may lengthen use-life
- Position mask to "stand out" from face
- 20 min - 1 hour!
-

236 **MASK FIT**237 **LASER RESPIRATORY PROTECTION**

- N95 / N100 respirators
- Or: full face shield & level 3 mask
- Facial fit = vital
- Fluid resistance
- Suction / filtration placed 1" from site
- Eye protection

238 239 **NEVER RE-USE MASKS!**240 241 **STRETCH**242 **INSTRUMENT PROCESSING:
HIGHEST LEVEL OF ASEPSIS**243 **INSTRUMENT PROCESSING
"TRAFFIC FLOW" – SEPARATE DIRTY FROM CLEAN**244 **USE CASSETTES TO ORGANIZE, TRANSPORT, PROTECT INSTRUMENTS**245 246 **COMMON CLEANING ERRORS**

- 1 Ultrasonic
- 2
 - Insufficient time
 - Detergent concentration
 - Ineffective cavitation
 - Inappropriate temperature
 - Overloading

- 3 Washer-Disinfector
- 4 • Wrong cycle ("rinse-hold")
 - Inadequate water spray: spray impingement
 - Clogged spray arms
 - Pump/line clog or malfunction
 - Overloading

247 **MONITOR CLEANING!**

VISUALIZE SOIL REMOVAL

NON-TOXIC SYNTHETIC BLOOD/DEBRIS

HOLDER ↓

248 **CHECK ULTRASONICS OR WASHERS**

249 **WHAT'S WRONG?**

250

251 **STERILIZER MONITORING**

- Old: Indicators: per package
 - Heat
- New: Class 5 indicators: per load / package
 - Time, temperature, pressure
- Biological Monitors: weekly
 - Non - pathogenic spores
- Keep logs & written reports

252 **CLASS 5 CHEMICAL INDICATORS**

253 **2 STERILIZATION LOGS**

- 1: Log of each cycle for each sterilizer
 - Class 5 Indicator strip results
 - Sterilizer
 - Date
 - Indicator pass/fail
 - Initial
 - Machine print-out
 -
- 2: Biological test results

254 **TRANSMISSION-BASED PRECAUTIONS
CONTACT, DROPLET, AIRBORNE**

- Additional to Standard precautions
- Based on -
 - Disease Infectivity
 - How transmitted

- Used in controlled settings when –
 - Infective patients must be treated
 - In hospital, institutional settings
 - HCW becomes infected
 - Exceptional
- 255 **PATHOGENS DISTINGUISHED BY:**
- Infectivity
 - Reservoir
 - How transmitted
 - Route of entry
 - Strategies to kill / neutralize
- 256 **CONTACT DISEASE TRANSMISSION**
- 1 Direct
 - 2 • Touching the source
 - 3 Indirect
 - 4 • Touching and transferring pathogens from surfaces
- 257 **CONTACT DISEASES**
- GI, respiratory, skin, wound: infections or colonization with resistant pathogens
 - Enteric infections
 - Clostridium difficile
 - E coli 0157:H7, Shigella, HAV, rotavirus (diapered pts.)
 - Influenza
 - Conjunctivitis
- 258 **CONTACT DISEASES**
- Highly contagious skin inf. on dry or wet skin
 - Herpes simplex virus (neonatal, mucocutaneous)
 - Impetigo
 - Major abscesses, cellulitis
 - Lice
 - Scabies
 - Staph., MRSA
 - Zoster* (disseminated or in immunocompromised)
- May require >1 precaution
- 259 **HEPATITIS A & E**
- Fecal – oral transmission
 - Poor hand hygiene
 - Caring for children & diapered people
 - Survives outside body for months
- 260 **CONTACT PRECAUTIONS**
- Private room
 - Glove when entering room
 - Remove gloves before leaving room

- Immediate hand hyg.
 - Antimicrobial or alcohol agent
- No bare handed contact w/ pt., items

261 **CONTACT PRECAUTIONS**

- Gown when entering room, remove before leaving room
- Isolate used gown
- Limit pt. Transport
- Maintain precautions if pt. = moved, transported
- Dedicate non-critical equip. to pt., disinfect & barrier if re-used

262 **DROPLET TRANSMISSION**

- 3 • Spray, spatter, coughs, sneezes propel droplets
- Droplets absorbed by mucosa in nose, mouth & ocular tissue
- Most risk = within 3 feet

263 **DROPLET DISEASES**

- Meningitis, pneumonia, sepsis from:
 - Invasive Haemophilus influenzae b
 - Neisseria meningitidis
- Serious bacterial respiratory inf.'s:
 - Diphtheria (pharyngeal)
 - Mycoplasma pneumonia
 - Pertussis
 - Strept. Gp A pharyngitis, pneumonia or scarlet fever in children
 -
 -

264 **DROPLET DISEASES**

- Serious viral inf.
 - Adenovirus[‡]
 - Influenza
 - Mumps
 - Parvovirus B19
 - Rubella

[‡] requires >1 precaution

265 **DROPLET PRECAUTIONS**

- Private room / cohort, open door =OK
- Maintain \geq 3 ft. Between pts.
- No special air handling
- Mask to enter room, & \leq 3 ft. of pt.

- Move pt out of room only if essential, mask on pt.

266 **TOP (GENERAL) SAFETY GOALS**

- Written Safety Program
- Safety Manager
- Recognize & Understand Risks
- Implement Standard Precautions
- Plan for exceptions and accidents
-

267 **TOP 3 SAFETY GOALS**

1. Written Safety Program
 - OSHA manual – personalize & update it
 - Enforce it
 - IC laws
 - Download CDC recommendations!
 - Instructions for use, operation manuals...
2. Safety Manager
3. Recognize & Understand Risks

268 **TOP SAFETY GOALS**

4. Hand Hygiene
 - Calibrate staff
 - Technique
 - Hand care rules
 - Supplies & set-up
 - Products
 - Facility
- 5. Surface asepsis
 - Follow directions
 - Clean & disinfect
 - Barriers

•

269 **TOP SAFETY GOAL**

6. PPE – Use correctly & respect their limits
 - Gloves
 - Select for fit, reliability
 - Change 20 min – 1 hr.
 - Masks
 - Select appropriate ASTM levels
 - Avoid cross-contamination
 - Change 20 min – 1 hr.

•

•

270 **TOP SAFETY GOALS**

7. Vaccines
 - Educate staff (CDC.gov)
8. Sharps safety
 - Handling & waste
9. Instrument sterilization
 - Organize sterilization pathway
 - Instrument cassettes
 - Instrument washer
 - Monitor cleaning
 - Use class 5 indicators
 - Keep logs
 -
 -

271 **TOP SAFETY GOALS**

10. Dental waterline management
 - Insure sterile water for surgeries
 - Insure potable standard for non-surgeries
 - Control waterline contamination
 - Monitor waterline safety
 -

272 **TOP SAFETY GOALS**

11. Screen patients for active ATD's
 - Take temperatures
 - Know symptoms
 - Notify patients & staff about ATD policy
 - TB policy: test staff
 - Respiratory hygiene, cough etiquette
 -

273 **TOP SAFETY GOALS**

12. PEP "Plan B"
 - Exposure incident package
 - Records
 - Follow-up
 - Stay alert for extraordinary cases
 -
 -

274 **WHAT YOU DO OVER & OVER**275 **TEAMWORK!**276

277  **STRETCH CHEST AND SHOULDERS**

- Place hands behind hips
- Inhale slowly, bringing elbows back
- Exhale slowly, bring elbows together, bend head forward
- Stretch shoulders across your chest