

1 **STANDING UP TO EMERGING DISEASES**

By Nancy Dewhirst, RDH,BS

2 **EMERGING DISEASES**

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

3 **A BRIEF HISTORY**

- 1928 – Fleming discovered penicillin mold.
- 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 **A BRIEF HISTORY**

- Colistin = last resort antibiotic (toxic side-effects)
- Now colistin-resistant pathogens
- WHO:
 - Gonorrhea “may soon be untreatable” due to resistance to ceftriaxone (cephalosporin class)
 - 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

5 **EMERGING DISEASES**

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

6 **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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7 **MICROBIAL EMERGENCE FACTORS**

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

8 **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
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9 **YOUR MICROBIAL SELF**

- Most are friendly & vital to:
 - Digest food
 - Metabolize drugs
 - Maintain health, balance
 - Protect against pathogens (imbalance)
- Disruptions in microbiota = related to:
 - Inflammatory bowel disease
 - Vaginal & bladder infections
 - Periodontal disease
 - Obesity (adenovirus-36 infection causes stem cells to become adipocytes)

10 **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
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11 **TOP 5 SAFETY GOALS**

- Have a plan
 - Written Safety Program
- Assign a person
 - Safety Manager
- Identify the enemy
 - Recognize & Understand Risks
- Keep everyone safe
 - Implement Standard Precautions
- Plan B

- Plan for exceptions and accidents

12 **UPDATE & EDIT YOUR IC PLAN**

- Injury & Illness Prevention Program
 - OSHA manual
- Standard Operating Procedures (SOP's) = written step-by-step plans
- Location? Training?
- Must be specific & accurate
 - Surface disinfection
 - Hand hygiene
 - Instrument processing
 - Dental waterlines

13 **RESOURCES**

- Join osap www.osap.org
 - Organization for Safety, Asepsis and Prevention
- State Dental Board, ADA, NY Dental Assoc.
 - The New York State Dental Association: 518-465-0044
 - 20 Corporate Woods Blvd. #602
 - Albany, New York 12211
- OSHA
 - Albany Area Office: (518) 464-4338
 - 401 New Karner Road, Ste 300
 - Albany, New York 12205-3809

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14 **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

15 **NEW CDC RECOMMENDATIONS**

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

Checklists!

To be used along with 2003 Infection Control Recommendations

16 **CHAIN OF**

INFECTION17 **BREAKING
THE CHAIN**18 **IC 101**

- Isolate & separate
- Cleaning before disinfection / sterilization
- How do microbes die?
 - Heat (how hot? How cold?)
 - Chemicals (Which ones? What concentrations? How toxic?)
 - Is resistance likely?
- Is IC safe enough for you?
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19 **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

20 **STANDARD PRECAUTIONS**

- Proven effective for controlling
 - Bloodborne diseases
 - Contact diseases
 - Droplet diseases
- Not effective for airborne diseases

21 **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, Zyvox, incision / drainage
- Vancomycin may cause thrombocytopenia, hearing & kidney damage
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22 **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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MRSA enters open skin.

Pimples, boils, lesions; may lead to pneumonia, severe skin, bone, bloodstream infections, septic arthritis, endocarditis, deep abscesses, toxic shock

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- 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!!!!
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25 **E. COLI & SALMONELLA OUTBREAKS –DISTANT DISTRIBUTION & RESTAURANTS**

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

26 **MDR ESCHERICHIA COLI**

- Contains mcr-1 gene, resists colistin (antibiotic of last resort)
- Mcr-1 = on mobile DNA, shared between many bacterial types
- Results of transient gut colonization:
 - If healthy: asymptomatic unless enter blood
 - Immunocompromised: diarrheal disease
- Mcr-1 gene spreading: Humans in Europe, Asia, Africa, S. America, U.S.
- Found in pig guts in U.S.

27 **MDR KLEBSIELLA**

- Klebsiella = normal intestinal flora
- May cause pneumonia, meningitis, blood infections
- Carbapenem resistant
- Risk for exposure: hospitalization
 - IV catheter
 - Ventilator
 - Long course antibiotics
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28 **MYCOBACTERIUM TUBERCULOSIS**

- Well controlled in U.S.
- World-wide: 9.6 mil. New cases - 2015
 - 1.5 mil. = fatal
 - 480,000 MDR TB cases

- 100 countries reported XTR TB (extensively resistant)
- India reported totally resistant cases

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29 **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

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- Vaccines!

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30 **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!

31 **PSEUDOMONAS AERUGINOSA**

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

32 **MDR-CAMPYLOBACTER**

Food poisoning diarrhea

33 **MDR STREPTOCOCCUS PNEUMONIAE**

- Pneumonia
- Meningitis

34 **MDR GONORRHEA**

U.S. CASES RISING SINCE 2009

- Highly resistant strains becoming more prevalent
- 63% increase last 5 yrs (Australia), higher in U.S. ~ 800K new cases/yr BUT ~ ½ are reported
- 75% cases = male
- Mostly 15 – 29 YO – but all ages
- Mostly urban trend

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35 **MDR GONORRHEA**

U.S. CASES RISING SINCE 2009

- Reasons? lower condom usage or new strains?
- 80% females & 50% males = asymptomatic
- Left untreated: sterility, PID, ectopic pregnancies
- Need vaccine!
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36 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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37 WHAT'S THE POINT? DRUG RESISTANCE:

- Makes treatment less successful
- Increases importance of prevention
- Creates need for other strategies

38 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>

39 TEIXOBACTIN (HUMAN TRIALS PENDING)

- Made by bacteria, kills wide range of resistant bacteria
- Prevents cell wall construction (holes in cell wall)
- Effective vs:
 - 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*
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40 MIXED BIOFILM ZONES (MICRO-ENVIRONMENTS)

- Commensal behavior
- Aerobic cells require O₂ & nutrients
 - Substrate
 - Flowing fluids

- Anaerobes - below aerobes
- Cells live off waste & byproducts of other biofilm species
- Many spp. = viable but non-culturable: undetectable by tests used

41 **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

42 **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

43 **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

44 **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

45 **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

46 **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!
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47 **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

48 **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

49

- E. coli most common
- 75% of other infections = Pseudomonas aeruginosa
- 25% of other infections = Legionella
- Heat dissipates disinfectants

50 **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
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51 **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...)

52 **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)
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53 **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

54 **BIOFILM RESEARCH**

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

55 **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
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56 **BIOFILM GENETIC ENGINEERING**

- Drugs & drug delivery
- Environmental clean-up
- Toxic containment
- Bio-degradation
- Antimicrobial surfaces
- Pro-biotics
- Alternative fuels
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57 **BIOFILM PROPERTY CLINICAL IMPLICATIONS**

- 1 • Behaves as primitive multi-cellular organism

- Formation is orderly
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- Cell- to - cell communication required
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- 2 • Target weak links

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- Target early steps
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- Find antagonists to intercept, or control signals

58 **BIOFILM PROPERTY CLINICAL IMPLICATIONS**

- 1 • Biofilms resist host immune responses & antimicrobials

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- Biofilm phenotype different from planktonic
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- Biofilms use & respond to electrical signals
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- No one method found successful

- 2 • Target and remove protective matrix + symbiotic species

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- Target correct phenotypes
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- Use electric currents to weaken / disrupt microbes in biofilms, then use antibiotics, antimicrobials
-

- Combine physical, chemical and signaling strategies

59 **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.)

60 **ASSOCIATED ILLNESSES**

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

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

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

- 82-yr old Italian Woman
- Legionnaires' dis (*L. pneumophila*)
- Proven from dentist's waterlines
- No other exposures
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63 **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

64 **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
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65 **N. A. MORALES, AFTER 1 MO. HOSPITALIZATION**

66 **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
-

67 **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

68 **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

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

Sterile water & sterile separate delivery device?

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

- A. Flush lines in AM for 2 min./line (handpieces off)
- B. Flush lines between patients for 20 sec.
- C. 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.

71 **SIMPLE FLUSHING OF WATERLINES**

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

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72 **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

73 **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

74 **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

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

- Loma Linda University Waterline Testing
- ProEdge Waterline Testing

76 **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)

77 **RISK OF INFECTION AFTER NEEDLESTICK**

1 Source

HBV (+)
HCV (+)
HIV (+)

2 Risk

6.0-30.0%
1.8%
0.3%

78 **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

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- Chronic cases also under-reported
 - 850,000 – 2.2 mil cases???

79 **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

80 **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

81 **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 →

82 **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

83 **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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84 **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.

85 **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.)
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86 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
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87 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
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88 ARE YOU SET UP?

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

89 VECTOR-BORNE DISEASES

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

90 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.

91 **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
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92 **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

93 **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

94 **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

95 **DENGUE DANGERS**

- 4 viral types
- Infection with one type confers permanent immunity
- Infection with another type may activate immune system, but 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

96 **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
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97 **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

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98 **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!

99 **ZIKA VIRUS**

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

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100 **CONTROL EFFORTS**

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

- 101 **LARVA OF AEDES AEGYPTI MOSQUITOS GENETICALLY MODIFIED TO DIE (OXITEC, BRITISH CO.)**
- Tests show release of GMO mosquitos reduces wild Aedes mosquitos 85-90%
- 102 **LYME DISEASE**
- Ticks carry *Borrelia burgdorferi*
 - Headaches
 - Fever
 - Fatigue
 - Rash
 - Chronic biofilm disease
- 103 **LYME DISEASE**
- *Borrelia* forms:
 - Cystic form
 - Pleomorphic
 - Granules
 - Spirochetes
 - Found in biofilms in joints, brain,
 - Dementia, mental illness
- 104 **EBOLA VIRUS**
5 ENVELOPED VIRUSES
4 INFECT HUMANS
- 105 **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)
- 106 **EBOLA TRANSMISSION**
- Exposure to contaminated objects (sharps: needles = highest risk...)
 - Sexually transmitted, > 1 year after male recovers
- 107 **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
 -
- 108 **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

109 **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.
-
-
-

110 **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)

111 **EDUCATION NEEDED**

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

112 **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)

113 **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)

114 **ARE YOU CLEANING BEFORE DISINFECTING???**

It depends on technique
And product selection

115 **WHICH PRODUCTS CLEAN?**

116 **EFFECTS OF ALCOHOL CONCENTRATION**

117 **WHAT IS THE ACTIVE INGREDIENT?
WHICH PRODUCTS CLEAN?**

118 **LEAVE FOR STATED TIME**

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

119 **SIMPLIFY SURFACES**

Environmental disinfection = cardinal feature in dentistry

120 **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)

121 **1 MINUTE
FIRST WASH OF THE DAY**

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

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

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

123 **MOST RECOMMENDED:
COMBINED PROTOCOL**

- 1 Plain soap – routine handwashing

- 2 Antimicrobial / alcohol hand rub on unsoiled hands

124 **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.

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

- 1 Plain soap – routine handwashing
- 2 Antimicrobial soap periodically

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

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

127

Broken skin management:

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

128 **WHAT'S YOUR WEAKEST LINK?**

129 **SHE RUBBED HER EYE**

- Ocular herpes is usually unilateral
- May migrate up nerve from oral infection.
- Recurs, leading to blindness
- 90% of U.S. adults carry herpes
- Neonates contract type 2 at birth

130 **GLOVES**

- How do they fit?
- Are you allergic or sensitive?
 - Latex?
 - Accelerators?
 - Thiuram
 - Carbamate

- Do you trust your gloves?
- 4% may leak
 - Buy quality
-

131 **HOW LONG DO GLOVES LAST?**

- 2
- No exact data
 - Change per patient & when compromised
 - No longer than 1 hour
 -

132 **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

133 **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

134 **DONNING & REMOVAL
TECHNIQUE & SEQUENCE
DON IMMEDIATELY B4 USE
REMOVE IMMEDIATELY AFTER**

135 **WHAT'S YOUR WEAKEST LINK?**

136 **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

137 **AIRBORNE DISEASES**

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

138 **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.

139 **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

140 141 **MEASLES – STILL KILLING KIDS**

- Leading cause of death in children (worldwide)
- 10-12 day incubation
- High fever (1 wk), runny nose, cough, white spots in mouth: precede rash

142 **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

143 **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

144 **SCARLET FEVER**

- Red rash: looks like sunburn, feels like sandpaper
 - Begins on face, neck, spreads everywhere
 - Redness blanches
 - Later skin peels

145 **SCARLET FEVER**

- Red lines at skin folds
-

146 **SCARLET FEVER**

- Flushed face, pale ring around mouth

147 **SCARLET FEVER**

Strawberry tongue or coated

148 **SCARLET FEVER**

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

149 **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

150 **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?

151 **SCREEN FOR ACTIVE TB:**

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

152 **MYCOBACTERIUM TUBERCULOSIS**

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

153 **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?

154 **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

155 **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

156 **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>

157 **DENTAL WORKER HEALTH**

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

158 **WHAT'S YOUR WEAKEST LINK?**

159 **PPE: SURGICAL MASKS**

- Masks are bi-directional barriers
- You & patients depend on them for:
 - Coverage (mouth & nose)
 - Filtration (particles, germs)
 - Fluid protection
-
-

160 **ASTM LEVELS**

161 **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!
-

162 **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

163 **WHAT’S YOUR WEAKEST LINK?**164 **IF YOU DON’T CLEAN IT**

- You can’t disinfect it
- You can’t sterilize it

165 **INSTRUMENT PROCESSING:
HIGHEST LEVEL OF ASEPSIS**166 **INSTRUMENT PROCESSING
“TRAFFIC FLOW”**167 **CASSETTES, TUBS, TRAYS WITH LIDS**168 **PRE-CLEANING / HOLDING**169 **ENZYME PREVENTS DEBRIS ADHERENCE – AVOID SCRUBBING**170 **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

171 **ONLY SCRUB IF DEBRIS REMAINS AFTER CLEANING....**

172 **MONITORS HELP VISUALIZE SOIL REMOVAL**

NON-TOXIC SYNTHETIC BLOOD/DEBRIS

HOLDER ↓

173 **CDC, ADA, OSAP REC:**

Must heat sterilize ALL removable handpieces, even slow speeds

174 **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

175 **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

176 **WHY LABEL PACKAGES?**

- To re-sterilize after 3 months
- To identify date of sterilization in case of (+) growth spore test
- To identify person sterilizing items

177 **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

178 **PATHOGENS DISTINGUISHED BY:**

- Infectivity
- Reservoir
- How transmitted
- Route of entry
- Strategies to kill / neutralize

179 **CONTACT DISEASE TRANSMISSION**

- 1 Direct
- 2 • Touching the source
- 3 Indirect
- 4 • Touching and transferring pathogens from surfaces

180 **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

181 **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

182 **HEPATITIS A & E**

- Fecal – oral transmission
- Poor hand hygiene
- Caring for children & diapered people
- Survives outside body for months

183 **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

184 **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

185 **DROPLET TRANSMISSION**

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

186 **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
 -
 -

187 **DROPLET DISEASES**

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

‡ requires >1 precaution

188 **DROPLET PRECAUTIONS**

- Private room / cohort, open door =OK
- Maintain ≥ 3 ft. Between pts.
- No special air handling
- Mask to enter room, & ≤ 3 ft. of pt.
- Move pt out of room only if essential, mask on pt.

189 **TOP (GENERAL) SAFETY GOALS**

- Written Safety Program
- Safety Manager

- Recognize & Understand Risks
- Implement Standard Precautions
- Plan for exceptions and accidents
-

190 **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

191 **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

•

192 **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.

•

•

193 **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
 -
 -

194 **TOP SAFETY GOALS**

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

195 **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
-

196 **TOP SAFETY GOALS**

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

197 **WHAT YOU DO OVER & OVER**