

Right under our noses Emerging & re-emerging Diseases

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Standing up to Emerging Diseases

Drug resistance

Biofilm diseases

Vector-borne diseases

Bloodborne diseases

Airborne diseases

Precautions, prevention & planning

What's on the horizon?

Outbreak: sudden escalation in cases, local or widespread

Epidemic: Widespread, 1 or few areas

Pandemic: country-wide or worldwide

- Affects large % of population

- Often novel pathogen, no immunity

- More deaths

- Social disruption, economic loss

Endemic: imbedded, constant or cyclical

Safety in perspective

"recent" pandemics & epidemics that changed safety standards

1918-1919 "Spanish flu" A(H1N1)

1957-1958 "Asian flu" A(H2N2)

1968-69 "Hong Kong flu" A(H3N2)

1980's HIV / AIDS

- Bloodborne Pathogen Standard

2002-4 SARS (coronavirus)

2009 "Swine flu" A(H1N1)

2013 Avian flu A(H7N9)

2019 SARS-CoV-2

- Respiratory protection standards

Emerging Diseases

Last 20 years: global pandemics

- Ebola - West Africa,

Zika virus – Americas,
Yellow fever – Angola, many are MDR pathogens,
COVID
Polio – Nigeria: 2016, NY: 2022
TB – Cambodia: 2017, U.S. surge 2023 post COVID

Factors impacting Microbial Pathogen emergence

Increased urban populations Easy transmission

Rapid, unplanned city growth
War, refugees
Crowding
Poor sanitation & healthcare

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

Microbial emergence factors

Global warming

Thicker blanket of carbon dioxide allows insects and other vectors to enter new locations

Mosquitos & ticks, bats (vectors, reservoirs)

In a world of microbes, which ones are our enemies?

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 & protective if in balance

Virome: you have ~10 x more viruses than bacteria

Bacteria & viruses - symbiotic

Once Upon A Time,

There was the Antibiotic Golden Age.....(45 yrs)



Man ID'd, studied & targeted specific pathogens



Broad-spectrum antibiotics

And then.....

Pathogens developed resistance

Rise of chronic, recalcitrant infections

Cystic fibrosis (CF) *Pseudomonas aeruginosa*

Meanwhile.... Researchers found environmental mixed communities of microbes vs.

Isolated single organisms

Now know: BF costs billions of dollars / year

energy losses

equipment damage

product contamination
medical infections

A Brief history

> 100 antibiotics now used, but almost no new ab's since 1987

Over-use of antibiotics & treating livestock has increased microbial resistance & drug allergies

2016: mcr-1 gene found in humans & pigs (gene creates superbugs)

A Brief history

Tetracycline, erythromycin, vancomycin = often ineffective

All surgeries; implants, transplants, cancer treatment..... Rely on antibiotics

WHO ID's drug resistance as major human threat

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

Enters through open skin

Pimples, boils, lesions at point of entry

MRSA forms biofilms & spreads

Infection may lead to pneumonia, severe skin, bone, bloodstream infections, septic arthritis, endocarditis, deep abscesses, toxic shock

Drug Resistance: challenges protocol & TX

Incidence linked to exposure, susceptibility & over-use of antibiotics

Resistance requires more toxic, dangerous drugs

Need IV instead of oral meds

Targeted IC had improved MRSA control in hospitals until COVID (crisis lowered control)

Resistant skin infections....

Watch Points of entry & signs of systemic infection

MDR Gonorrhea

U.S. Cases rising since 2009

Highly resistant strains becoming more prevalent

63% increase last 5 yrs ~ 1/2 are reported

75% cases = male

MDR Gonorrhea

U.S. Cases rising since 2009

Asymptomatic in 80% females & 50% males

Gonorrhea - one of 1st pan-resistant diseases (totally incurable)

Prevention: same as HIV

Does not respond to cephalosporins

Vaccine in development

Oral, Ocular Gonorrhea
Sore, hoarse, throat
Or asymptomatic
Eyes = painful, red suppuration
(Usually both eyes)

Chlamydia
Most common bacterial STD
Mostly teen females (immature mucosal columnar cells: vulnerable)
90% asymptomatic
Chlamydial Pharyngitis
No identifying lesions
Fever, flu-like symptoms
Wear your eye protection!
Screen patients: take temp

Ocular Chlamydial Conjunctivitis
Red eye
Mild discharge,
Foreign body sensation, tearing
Blurred vision
Swollen eye lid
Usually single eye
Pre-auricular nodes swollen
Usually direct contact
Tx: oral doxycycline 100 mg -1 month
Syphilis
25% increase – 2015-2019
Many cases multi-drug resistant
Primary lesion: chancre
Highly infectious spirochete

Emerging resistant diseases

Aspergillosis

Aspergillus (mold, fungus) – inhaled, usually over time
60% mortality rate
Damp buildings, soil, seeds, damp, decaying vegetation

Candidiasis (fungus)

Candida auris
Hospital infection – breathing, feeding tubes, IV lines

Emerging resistant diseases

Candida auris (yeast, fungus) discovered – 2009

Colonizes skin, room surfaces
Resistant to antifungals
Causes sepsis

2021: 1st totally resistant case
Shigella (bacteria)
fecal-oral, contact
MDR E-coli (bacteria)
Contact, ingestion

What's the point?

Drug resistance:

Makes treatment less successful

Increases importance of prevention

Antibiotic stewardship

Creates need for new strategies: Tethered macrocyclic peptides, a new class of antibiotics
treat drug-resistant *Acinetobacter baumannii*

Biofilms: the most successful form of life

Biofilms:

This is how most microbes live

- Structured heterogeneous (mixed) communities (bacteria, fungi, protozoa, nematodes)
- Preferred bacterial state (over planktonic)
 - Homeostasis: stabilize pH, temp., minerals, food, O₂ concentrations
 - Aerobic – anaerobic zones
 - Interdependence & communication

Biofilms

- Protective polymeric matrix:
- 50% - 80% = matrix
- 20% = microbial
- Bacteria replicate → clonal groups
- Some die, leave holes

Pathogens attach to pre-existing biofilms.....

Where Do Biofilms Form?

Widespread in nature

lakes

streams

mud

(Require moisture, nutrients, a surface)

*** Key role in food webs**

Rhizosphere

Live tissue

- **Industry and healthcare:**

- **Piping**

- **Tubing
Tanks**

- **Potable water supplies**

- **Distilled**

- **Filtered**

- **Commercial**

Coliforms (some fecal) in ~48% of Beverage machines, ice makers
"Hospital's water purification stripped chlorine", killed 3
3 deaths linked to ice cubes & drinking water

Brigham and Women's Hospital in Boston on Dec. 16, 2021

Removed chlorine to improve taste

Prolonged exposure

Mycobacterium abscessus

Linked to abscesses following pulpotomies

10 – 50 CFU/mL in municipal water

2,000 – 8,000 CFU/mL in exposure source

Home & office drinking water

Clean to prevent biofilm

coffee machines, distillers, humidifiers....

Eyewash & fountains must be flushed/ cleaned

Equipment & devices:

Endoscopes

Flexible Endoscope Cross-contamination

Reasons

Poor cleaning

Damaged instruments

Poor chemical disinfection

Biofilm pathogens

Pseudomonas aeruginosa

Serratia sp.

Klebsiella pneumoniae,

Mycobacterium tuberculosis

Important Global Waterborne Diseases

Developing Countries:

10% of diseases are from water supply

Diarrhea (2nd leading cause of death for children <5 Years old)

Fevers, parasitic infections

Bacteria, viruses, Intestinal worms

No safe drinking water
Waterborne Diseases here

● **Developed Countries:**

- Facing drinking water crisis.
- Decrepit equipment
- > Population
- Need for upgraded filtration & treatment
- Extreme weather events
- “Safe water can no longer be taken for granted...” (American Academy of Microbiology)

Waterborne Diseases
Developed Countries

- **Waterborne pathogens increase significantly each year.**
- **Pathogens = resistant to treatment chemicals.**
 - Cryptosporidium
 - Giardia
 - Cyclospora

● **People live longer, immunocompromised**

● **Requires multi-discipline approach**

Cryptosporidium

Most common non-viral cause of diarrhea

Waterborne parasite

Cryptosporidium (“Crypto”)

Spore phase resists chlorine, desiccation, lives 10 days

Cryptosporidium

Causes watery diarrhea

Causes 54% of outbreaks (pools & water parks) (CDC)

Spread by fecal contamination

Don't drink pool water

Keep ill swimmers home!

Take frequent bathroom breaks and wash!

E. coli most common

The remaining cases:

75% = Pseudomonas aeruginosa

25% = Legionella

Heat dissipates disinfectants

Physical removal works best but may not be possible

Factoids about biofilms

(key to managing, using & controlling biofilms everywhere)

Commensal behavior within biofilm = protective

- **Outer layers absorb antimicrobial agents - outer cells “warn” inner cells to initiate stress response**

- **Stress response: cells change activity & form**

- This alters targets of immune systems or chemicals

- **Persister cells (spore-like) survive = viable but non-culturable: undetectable by tests used**

Target: Matrix variations

Biofilm & Inflammation wars

- **Inflammation: standoff between phagocytes & bacteria**

- **Can't penetrate BF**

- **Phagocytes can't engulf biofilm – shoot enzymes at it**

- **Causes general destruction (collateral damage)**

- **Inflammatory response to biofilm infections = heightened, chronic, locally destructive**

Biofilm Diseases

Native valve endocarditis =

Biofilm “vegetation” (extremely high concentrations of antibiotics can cure in 6 weeks)

Osteomyelitis

Toxic shock – vaginal biofilms, tampons (staph)

Cystic fibrosis: pseudomonas & mucus

UTI's

Diagnosis = difficult

Cultures only grow when biofilm sheds!

Biofilm Diseases

Biofilms in Chronic Wounds

> 60% chronic wounds have biofilms

Poorly revealed with cultures

2 - 15 bacterial species present

Fusobacterium, bacillus, actinomyces, staph, strep, pseudomonas, candida,
3 types of treponemes

Fungi (yeast), no viruses addressed!

Biofilms prevent healing

Diabetic, venous, pressure ulcers

MUST physically remove biofilm to treat

Signaling research & challenges

Research goal: hijack & control quorum sensing: gain control

Challenge:

Protect beneficial bacteria and biofilms

Keeping signal localized on target

Signaling: quorum sensing

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....)

Signaling action plans

Goal: manipulate signaling to:

Prevent formation

Slow growth

Trigger detachment (swim away)

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

Biofilm Research

Probiotics: designing the “optimal” protective biofilms

Probably different for different people

Controlling inflammation

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

Recap:

Biofilm Property Clinical Implications

Behaves as primitive multi-cellular organism

Formation is orderly

Cell- to - cell communication required

Target weak links

Target early steps

Find antagonists to intercept, or control signals

Biofilm Property Clinical Implications
Biofilms resist host immune responses & antimicrobials

Biofilm phenotype = different from planktonic

Biofilms use & respond to electrical signals

No one method found successful

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

DUWL Microbes

Pseudomonas sp.

Pasteurella sp.

Micrococcus sp.

Klebsiella

Legionella sp.

Mycobacterium sp.

Enterococcus sp.

Actinomyces

Salmonella

Strep. ,Staph.

Bacteroides

E. coli

Nematodes

Protozoa, amoebas

Fungi (Candida, Aspergillus sp.)

Associated Illnesses

Head, neck, dental infections

Septicemia

HCA surgical infections

Pneumonia, Bronchitis

Legionellosis

Abscesses

Appendicitis

Salmonella poisoning

Cryptosporidiosis

DUWL – Related Death (2011)

Lancet

82-yr old Italian Woman

Legionnaires' dis (*L. pneumophila*)

Proven from dentist's waterlines

No other exposures

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

For Potable Water

Your office should:

- Flush lines in AM for 2 min./line (handpieces off)
- Flush lines between patients for 20 sec.
- Add antimicrobial product to patient treatment water
- Shock periodically – remove attached biofilm
- Follow Manufacturer's directions for use (dental unit & DUW product)
- Monitor water (test)

Treat, Shock, and Test ALL waterlines

Biofilms in Buildings

HVAC filters, traps & seams become sources of biofilm

Moisture Intrusion Cascade

Moisture intrusion→

Mold growth□

Bacterial invasion□

Insects □

Rodents □ amplification, spread

Secondary Bacteria, mold, viruses □

Rot, chemical, microbial off-gassing

Eco-system perpetuates itself, further damages structure (holes, deterioration)

More water

Vector-transmitted
diseases

Zoonotic & vector-borne diseases = increasing with global warming & contact with nature

Aedes aegypti mosquito

Black-legged tick transmits Lyme disease (considered climate indicator)

Hemorrhagic fevers

vector-borne Diseases

Malaria, Dengue, Zika, Yellow fever, Lyme, West Nile, chikungunya

Aedes scapularis now in Florida: yellow fever!

Primarily vector transmitted – treat as bloodborne disease

Be alert

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

Lyme Disease

Ticks carry *Borrelia burgdorferi*

Headaches

Fever

Fatigue

Rash

Chronic biofilm disease

Vaccine in development

Lyme Disease

Borrelia forms:

Cystic form

Pleomorphic

Granules

Spirochetes

Found in biofilms in joints, brain,

Dementia, mental illness

Gene editing may work! (CRISPR/Cas9)

Lyme disease vaccine

Ticks: population explosion

Lyme disease rose 357% in rural areas, 65% in urban (2007 to 2021)

Ticks expanding areas – global warming

Antibiotic tx works if early

Previous vaccine discontinued in 2002: little demand

Pfizer's VLA15: 3-dose regimen over 5-9 months, booster 12 mos. Later

Targets *Borrelia burgdorferi*

Goal: submit to FDA - 2025

polio

1980's – eradicated in U.S.

July/August, 2022: 1 w/ paralysis
Tip of the iceberg
Don't forget iron lungs
Unvaccinated children!

Oral-fecal transmission

Wild-Type vs. Vaccine-derived Polio

Wild virus is not vaccine related

Vaccine-derived polio virus:

Outside U.S.: oral (Sabin) polio vaccine – **live attenuated virus**
Can become contagious, infect unvaccinated people
Low cost, no needles, robust immunity, administered to mouth, portal of entry

U.S. Uses injectable (Salk) inactivated virus since 2000

3-4 shots before age 6 = 99% effective vs. paralysis
Boosters now recommended to healthcare & wastewater workers
ALL unvaccinated people should get vaccinated

Respiratory syncytial virus (rsv)

Incubation: 4-6 days

Symptoms:

Runny nose
Cough, sneezing, wheezing
Fever
Low appetite

Common under 2 yrs of age

Recently in all ages, may be more serious

No treatment (relieve symptoms)

Vaccine available

norovirus

Most common cause - acute gastroenteritis in U.S.

Symptoms: extreme vomiting & diarrhea

Most common Nov. to April (but year around)

Ingestion: food, water, hand-to-mouth (restaurants), recreational & drinking water

Infective dose: <100 virions. Ill people shed billions even >2 weeks after symptoms resolve

No vaccine, hand sanitizers not effective

Zoonotic transmission to humans

Coronaviruses – bats

Hantavirus – rodents

Influenza – birds, pigs

Ebola – primates, bats

Insect-borne diseases

Parasitic infections

Antigenic shift: two viruses (1 from human) share DNA in a common host (influenza a)

Cutaneous leishmaniasis

Tropical disease

Endemic in Middle East, Asia, Africa, Latin America

Global warming: now endemic in U.S.
Caused by parasites spread by sand fly bites

Cutaneous leishmaniasis
Facial scarring for life
Depression, stigma

Aggressive invasive group A streptococcus 2023-4 surge
Strep commonly infects throats, skin
Hyperimmune responses: sepsis, scarlet fever
Invasive gp. A: spreads to bloodstream, meninges (meningitis), organs, soft tissue (necrotizing fasciitis)
"Flesh-eating Strep"

Global increase in cases: 50% - 200% more cases
¾ cases - hospitalized, ~10% fatal

Aggressive invasive group A streptococcus 2023-4 surge
Severe sore throat & fever, no cough or cold symptoms
Fine, sandpaper-like skin rash, extreme lethargy
Often with flu, chickenpox, COVID-19

Antibiotics needed early

Mpx – zoonotic pathogen

Endemic in West Africa – prior to now: direct exposure to bush meat & rodents, limited person – person transmission

2017-2020 increased cases in Nigeria linked to:

Deforestation, exposure to forest sources

Waning smallpox immunity (1970's vaccinations)

2022: world transmissions – novel event

Spread domestically, (intimate contact, children, pets)

U.S. Had largest MPX outbreak in world (>28,000 cases)

Mpx

Mpx virus

Signs / symptoms: fever, chills, headache, muscle ache, lymphadenopathy, then rash, vesicles, pustules, umbilication, crusts - on face, hands, trunk, genitals

Some recent cases start with rash, seen in gay community

Spread by body fluids, close & intimate contact, close-up respiratory droplet exposure (throat lesions shedding), surfaces, materials (bedding)

Port of entry: broken skin, mucosal /ocular absorption

Most infectious phase = rash, lesions: confused with STD's: herpes, syphilis, varicella zoster

Mpx

infectious until lesions totally resolved: new skin formed

Smallpox vaccine

Attenuated virus

Only effective prior to symptoms

Multiple puncture technique with bifurcated needle

Adverse effects common:

Papule at vaccination site (2-5 days)
Inadvertent inoculation of other sites

Requires boosters

What about vaccines?

**How Do We Combat
Fear & dis-information?**

With science & logic

Vaccine basics:

All vaccines: ~5-10% of vaccinated may not respond (or weakly)

Vaccines assist immunity,

Build antibodies ~ 2 weeks

**Host's immune system determines the strength of both recovered (convalescent)
& vaccine immunity**

Immunocompromised likely to have less & shorter immunity

science & logic: Vaccine basics

Vaccines prevent infection

Polio

Measles

Smallpox

Vaccines may prevent infection, or REDUCE SEVERITY

Influenza, COVID

Pathogens mutate

Vaccines do not make PPE unnecessary

Vaccines are specific to one pathogen

What about the others?

Bloodborne Diseases

(blood & fluids = infectious)

Examples: HIV, hepatitis

Hepatitis B CDC 2023 Updates

Screen all >18 years at least once - triple panel test

HBsAg = chronic or acute infection (or recent vaccine, temporarily)

Antibody to HBsAg (Anti-HBs) - indicates infection recovery, indicates immunity in never infected vaccinated

Total antibody to core antigen (anti-HBc) indicates HBV infection, lasts for life

Chronic infection: total anti-HBc & HBsAg (+)

HBV DNA measures viral load

HBeAg indicates viral replication, high infectivity

Hepatitis B CDC 2023 Updates

Screen all pregnant, each pregnancy for HBsAg

Regardless of history of tests or vaccine

Risk-based testing for:

Incarcerated
Multiple sex partners
HCV (+)

Test anyone who asks for test

https://www.cdc.gov/mmwr/volumes/72/rr/rr7201a1.htm?s_cid=rr7201a1_w

Ebola Virus

5 Enveloped Viruses

4 infect humans

Ebola Virus Transmission

Direct contact with all body fluids / substances of a symptomatic person or animal (bats, bush meat)

Blood, urine, feces, vomit, sweat

Ebola Transmission

Exposure to contaminated objects (sharps: needles = highest risk...)

Sexually transmitted, > 1 year after male recovers

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

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

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.

Ebola vaccine: Ervebo

STRIVE = rVSV-ZEBOV (recombinant Vesicular Stomatitis Virus *Zaire ebolavirus* vaccine)
approved in 2019

Protects against *Zaire ebolavirus*

Hindered by fear!!!

Vaccine cannot cause Ebola because it does not contain the whole Ebola virus

Single-dose injection, and is a live, attenuated vaccine

Education needed

> ½ of polled Africans still have mis-conceptions:

“mosquitos or ambient air spread Ebola”

Majority improved handwashing & touching suspected Ebola victims

Burning clothes, belongings of patients

Ebola = Category A infectious substance

No products specifically list Ebola

Use high potency 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

Microbial resistance to killing

Prions

Bacterial endospores

Fungal spores

Mycobacteria - *Mycobacterium tuberculosis*

Nonlipid or small viruses (Non enveloped) - *Polio virus, enteroviruses*

Fungi - *Trichophyton spp.*

Vegetative bacteria - *Pseudomonas aeruginosa, Staphylococcus aureus*

Lipid (enveloped) or medium-sized viruses - *Herpes simplex virus, hepatitis A, B & C virus, HIV, Ebola, SARS-CoV-2*
(CDC)

Follow Label Directions

Clean before disinfecting

Proteins neutralize disinfectants

Infectious diseases

Bloodborne diseases are critical, but...

80% of common infections (colds, flu, diarrhea) – spread by contact, air, water, food, fomites

Stay informed:

ADA.org, CDC.gov, OSAP.org, AGD.org, CDA.org

Aerosol Transmissible Diseases

Pathogens capable of surviving air suspension:

Desiccation

Travel on dust particles, air currents

Particles < 5µ large enough for viral load, small enough to travel > 20'

Absorbed through conjunctivae, mucosal tissue of nose, respiratory tract

6' distancing is not enough

Covid concerns

New variants – evade immunity

Current surge (detected in wastewater)

Long COVID???? (1 month after illness) ~10% of U.S. cases

Fatigue, respiratory, cardiac, neuropsychiatric and GI dysfunctions....

Immunocompromised, diabetes, heart, lung, kidney diseases...

Autoantibodies

Covid concerns

SARS-CoV-2 linked to newly diagnosed diabetes & heart damage & attacks, arrhythmias, strokes, clots

≥ 30 days after infection

All ages! (Not just <18)

Post-COVID (even mild); screen for:

Frequent urination, increased thirst & hunger, weight loss, fatigue, stomach pain, nausea, vomiting

Arrhythmias, heart attack & stroke symptoms

Ask patients & be self-aware

Criteria for determining risk

is it safe????

Disease activity locally

Specific pathogen features (mode of transmission, transmissibility, severity)

Mitigation strategies in place

Eliminate/reduce contact & exposure

Tele-dentistry, distancing, barriers

Engineered safety devices / technology

Suction, HVAC, **Air filtration & changes**

Rules, protocol, management (screening, source control...)

PPE

Vaccination status + immune profile

Aerosol generating procedures

Airborne Transmission of SARS-CoV-2

Influenza

Highly infectious respiratory disease

Epidemics since 1510

Mild to severe, usually targets very young, elderly, weak

All flu viruses originate in birds most stay there

SARS-CoV-2 has changed dental safety standards

Consider everyone infectious for ALL types of diseases, including aerosol-transmitted diseases

Plan for safer buildings, more air management

Upgrade traditional PPE
Exposure response
Apply today's lessons to your healthy future!
Understand each type of disease
Use appropriate precautions
Right under our noses
Emerging & re-emerging Diseases

By Nancy Dewhirst, RDH,BS