



**GRADUATE
ENTRY
MEDICAL
SCHOOL**

Infection.....from the basics to Ebola

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UNIVERSITY of LIMERICK
OILSCOIL LUIMNIGH

Objectives

- Differentiate between infective organisms.
- Understand the chain of infection and how to prevent infection based on this.
- Gain an awareness of the history, symptoms and management of the Ebola virus.

Organisms

- Bacteria
- Viruses
- Fungi
- Parasites

Bacteria

Gram + Cocci

- *Staphylococci*
- *Streptococci*
- *Enterococci*

Gram - Cocci

- *Neisseria*
- *Moraxella*

Gram + Rods

- *Actinomyces*
- *Bacillus*
- *Clostridium*
- *Diphtheria*
- *Listeria monocytogens*

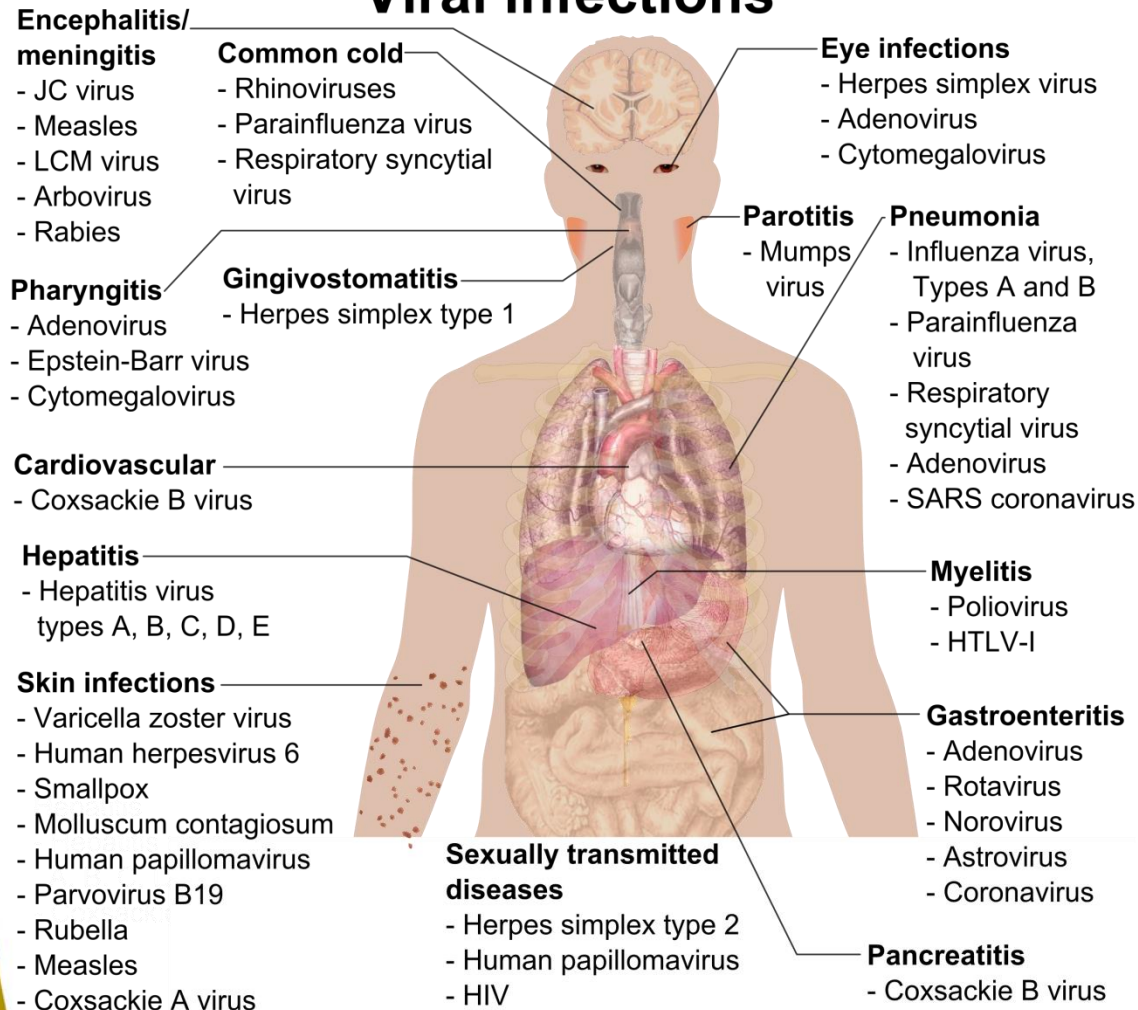
Gram - Rods

Most others! Including...

- *Legionella*
- *Campylobacter*
- *E coli*
- *Pseudomonas*
- *Proteus*
- *Salmonella*

Viruses

Overview of Viral infections

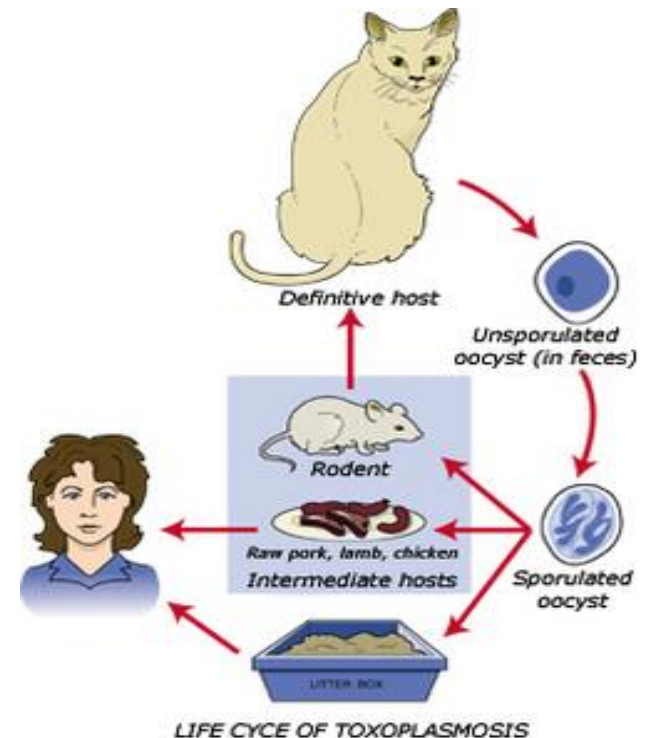


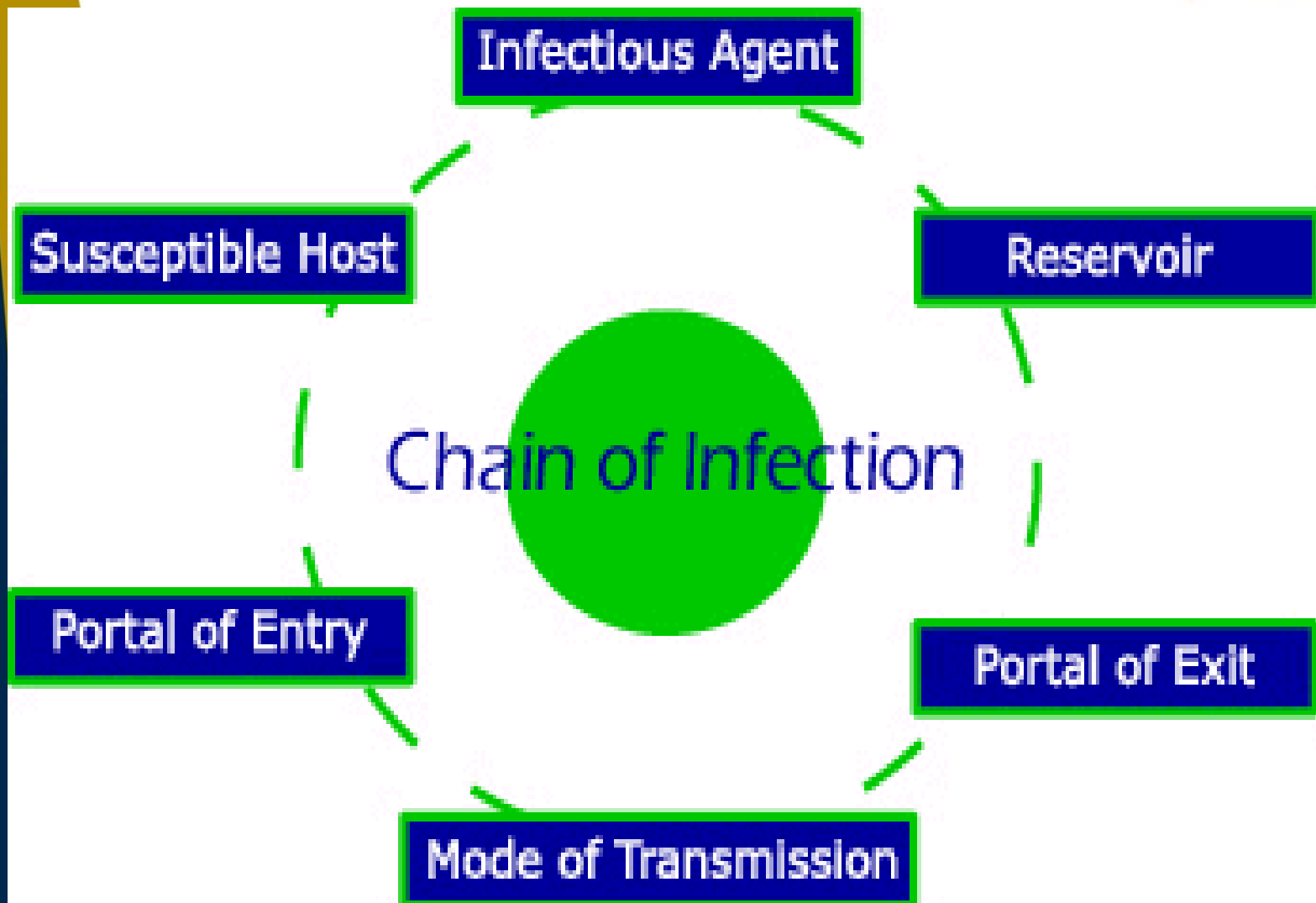
Fungi



Parasites

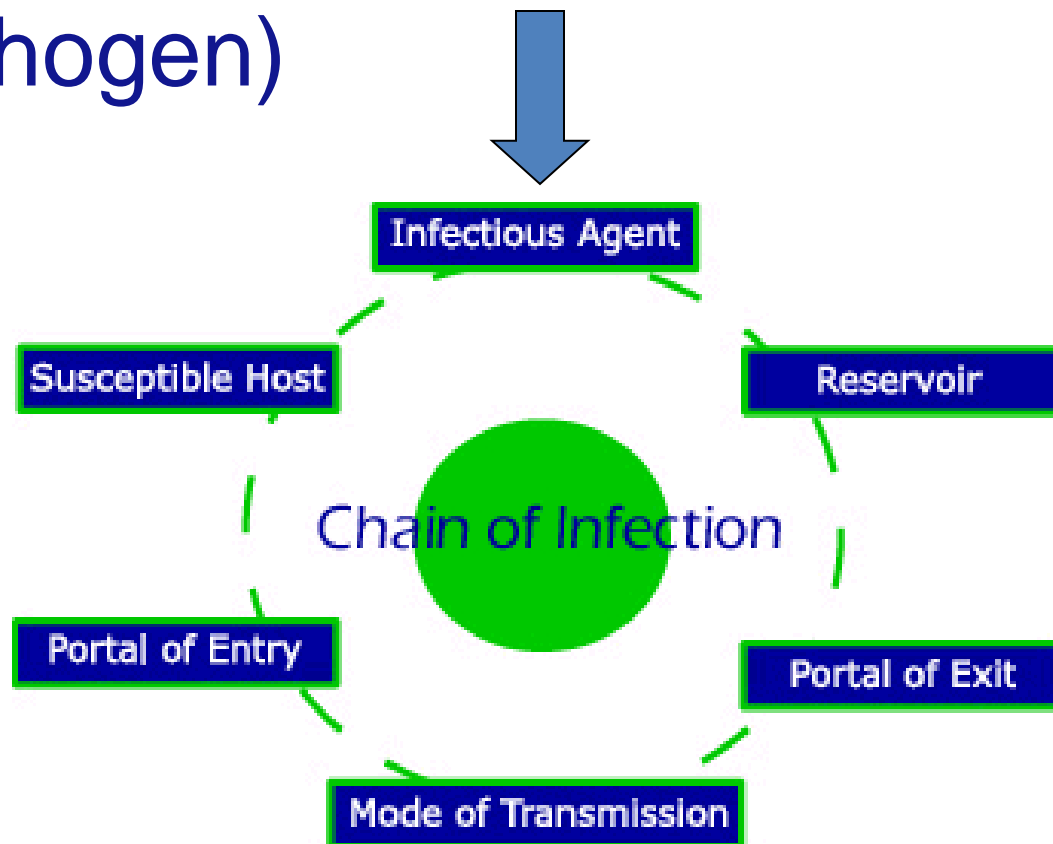
- A parasite is an organism that lives on or in a host and gets its food from or at the expense of its host





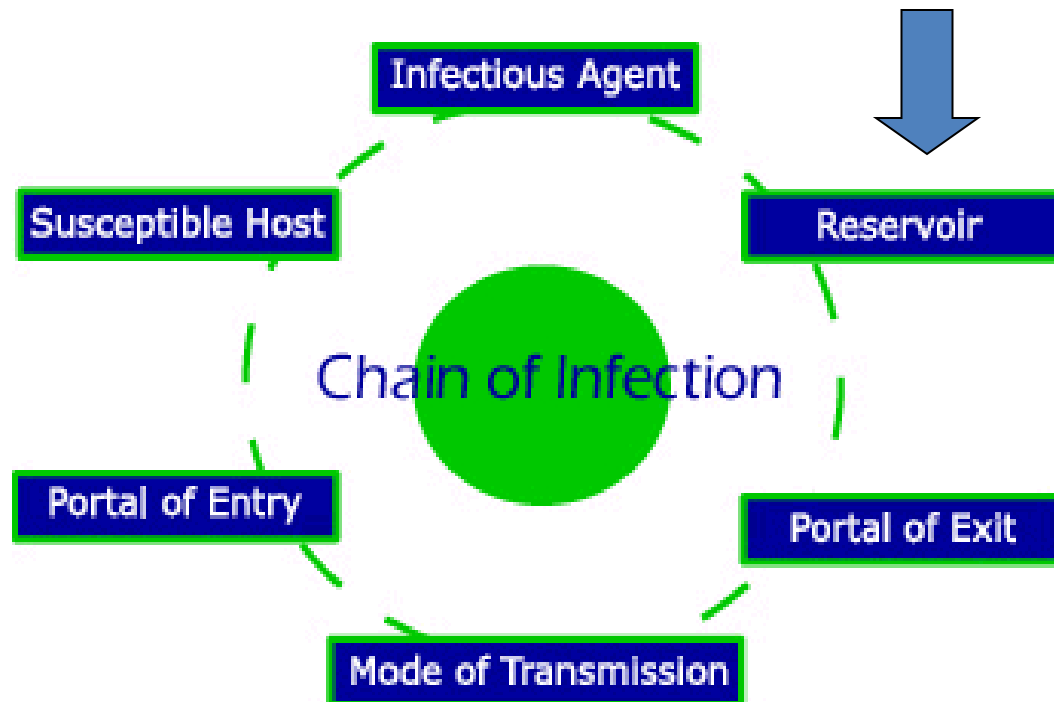
1 - The Infectious Agent

-any disease causing microorganism (pathogen)



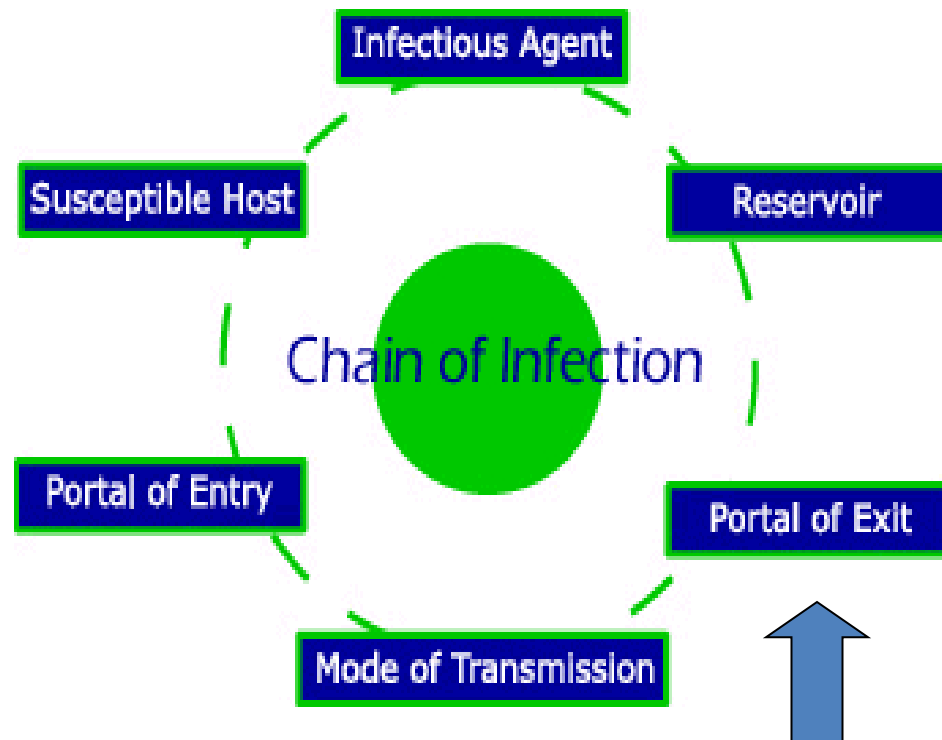
2 - The Reservoir

-Where a microorganism normally lives and reproduces



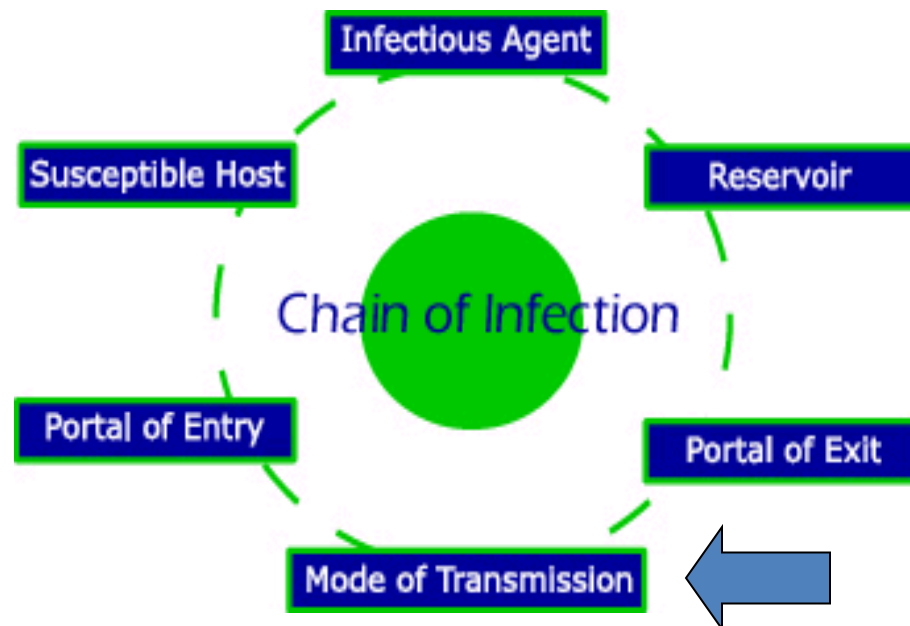
3 - The Portal of Exit

-route of escape of the pathogen from the reservoir.



4 - The Route of Transmission (Spread)

-the way the pathogen gets from the reservoir to the new host

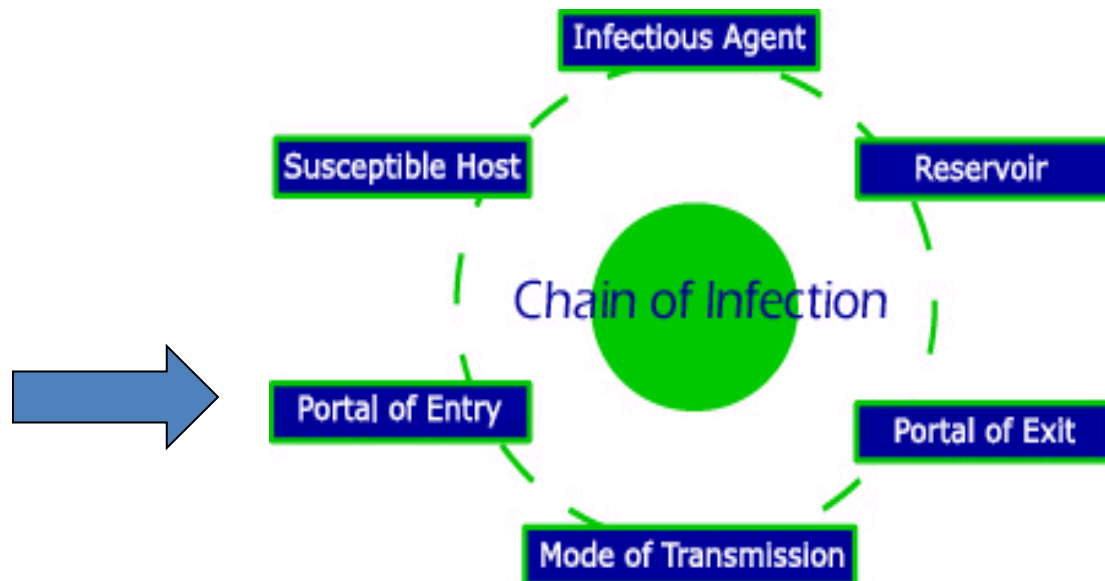


Modes of transmission

Contact	Non- Contact
Direct ..direct physical contact between infected person and susceptible host	Airborne..dust, ventilation systems
Indirect..infectious agent deposited onto an object or surface	Vehicle...a single contaminated source spreads the infection
Droplet..coughing or sneezing	Vector...transmission by insects or animal vectors

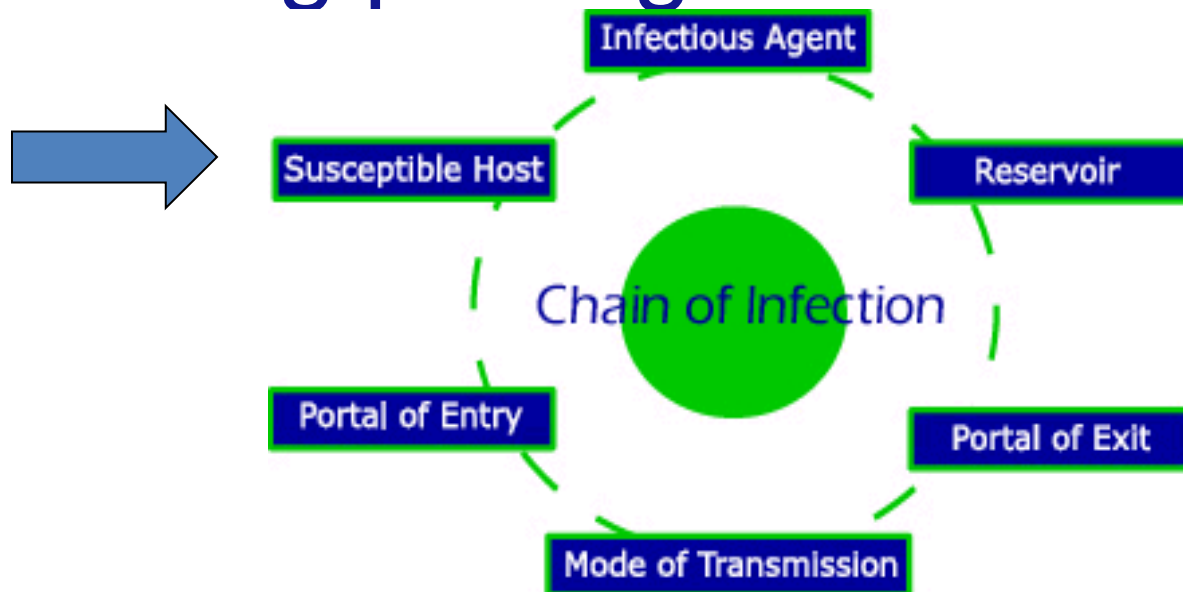
5 - The Portal of Entry

-route through which the pathogen enters its new host



6 - The Susceptible Host

-A person who can get sick when they are exposed to a disease causing pathogen



Prevention of the spread of infection



Prevention of the spread of infection

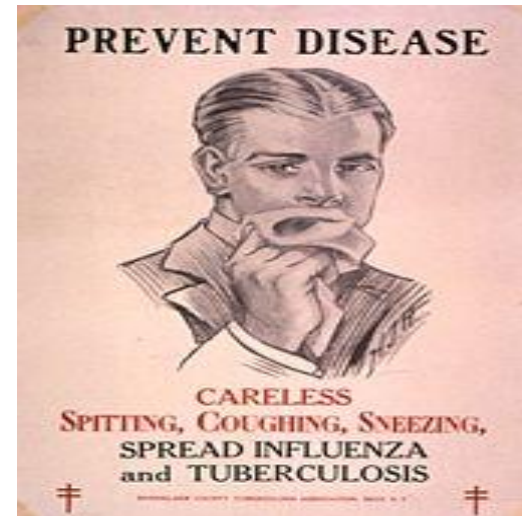
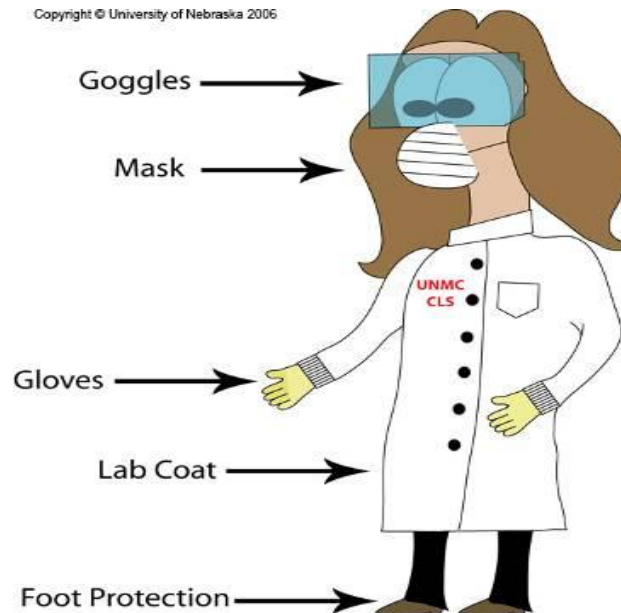
Hand hygiene



Respiratory hygiene

- PPE

Copyright © University of Nebraska 2006



EBOLA



Key Facts

- Ebola virus disease(Ebola Haemorrhagic Fever) is a severe often fatal illness in humans
- Transmitted to people from wild animals and by human to human transmission
- First appeared in 1976 in 2 simultaneous outbreaks, one in Nzara, Sudan, and the other in Yambuku, Democratic Republic of Congo.
- The latter occurred in a village near the Ebola River, from which the disease takes its name.

- Current outbreak, in West Africa(first notified in March 2014)..is the largest and most complex outbreak to date.
- There are more cases and deaths in this outbreak than in all other outbreaks combined.
- The most severely affected countries, Guinea, Sierra Leone and Liberia have very weak health systems, lacking human and infrastructural resources, having only recently emerged from long periods of conflict and instability.

(WHO 2014)

- On August 8, the WHO Director-General declared this outbreak a Public Health Emergency of International Concern.
- The Ebola virus is part of the virus family Filoviridae and the 2014 West Africa strain is the Zaire species

(WHO 2014)

Transmission



How is Ebola spread?

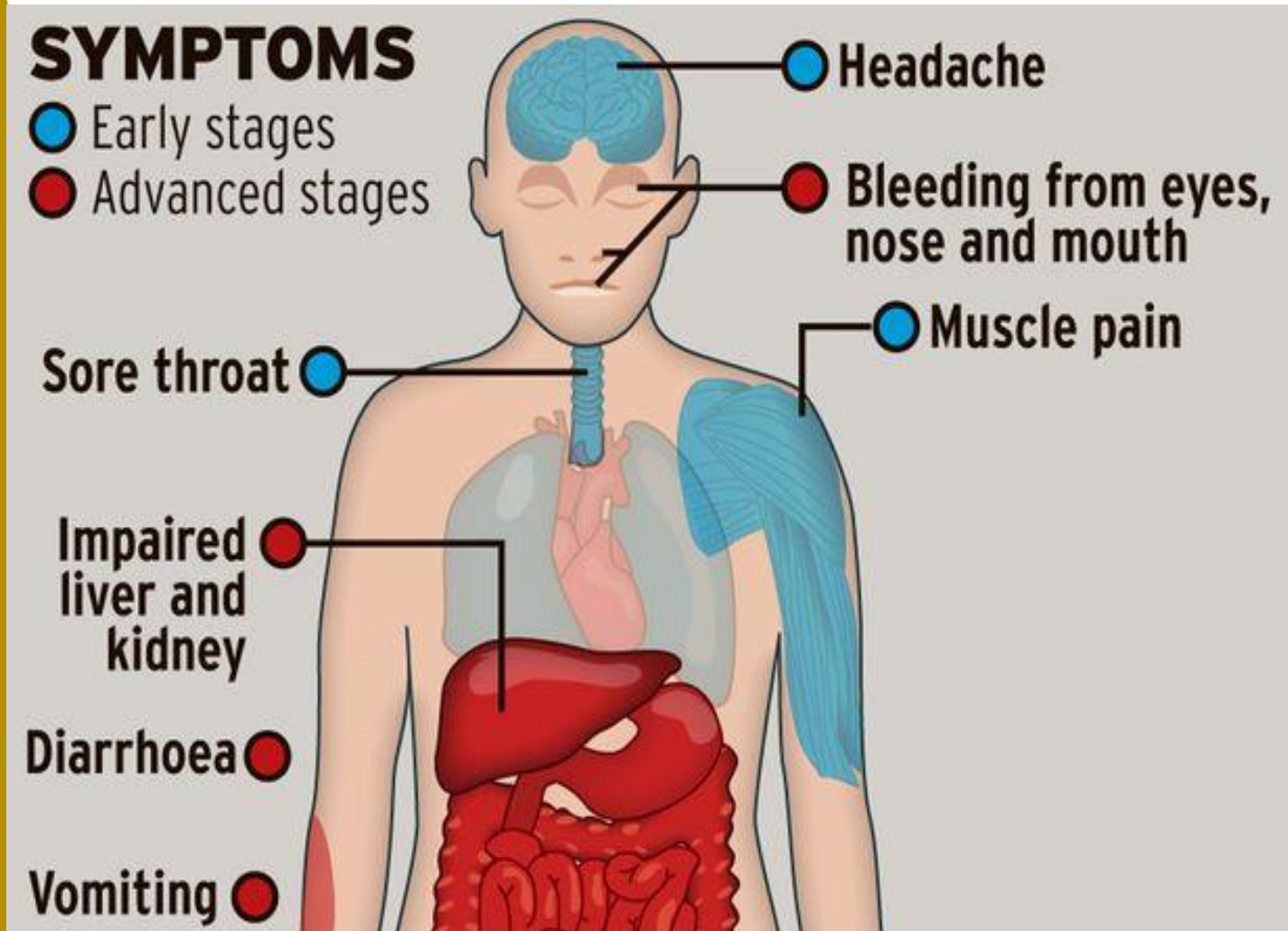
- ***Direct contact***-between broken skin or mucous membranes
and
- Blood or body fluids (including but not limited to urine, saliva, sweat, faeces, vomit, breast milk, and semen) of a person who is ***sick*** with Ebola
- Objects (like needles and syringes) that have been contaminated with the virus
- Infected fruit bats or primates (apes and monkeys)
(CDC 2014)

Presentation

- Incubation period is 2-21 days
- Humans are not infectious until they develop symptoms.

(CDC 2014)

Symptoms



Assessment and Management

- If a patient presents with fever and a history of travel to [Guinea, Liberia, or Sierra Leone](#) (or any VHF endemic area) in the last three weeks, use the risk assessment algorithm and clinical risk assessment form.
- (HSE 2014)



KEEP CALM
AND
PPE

nursetopia.net

Sources

- <http://www.cdc.gov/mrsa/>
- http://www.hse.ie/eng/about/Who/qualityandpatientsafety/safepatientcare/HCAI_Programme/HCAILinks/Staphylococcus.html
- <http://www.hpsc.ie/A-Z/Vectorborne/ViralHaemorrhagicFever/Assessingapossiblecase/File,14085,en.pdf>
(Hse advice re Ebola for EMS)
- <http://www.who.int/mediacentre/factsheets/fs103/en/>





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Infection in the Elderly

Sandra Rock



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Elderly and Infections



Common infections like UTI's and influenza can happen to anyone, but for adults over the age of 65, these illnesses may be much harder to diagnose leading to ongoing discomfort, chronic poor health, and a higher risk of hospitalization or even death. In fact, 1/3 of all deaths in seniors over 65 are as a result from infectious diseases, the elderly with dementia or those who are in long-term care may be at even greater risk.

[Ref: American Academy of Family Physicians](#)

Objective

Discuss the 5 most common
Infections in the Elderly

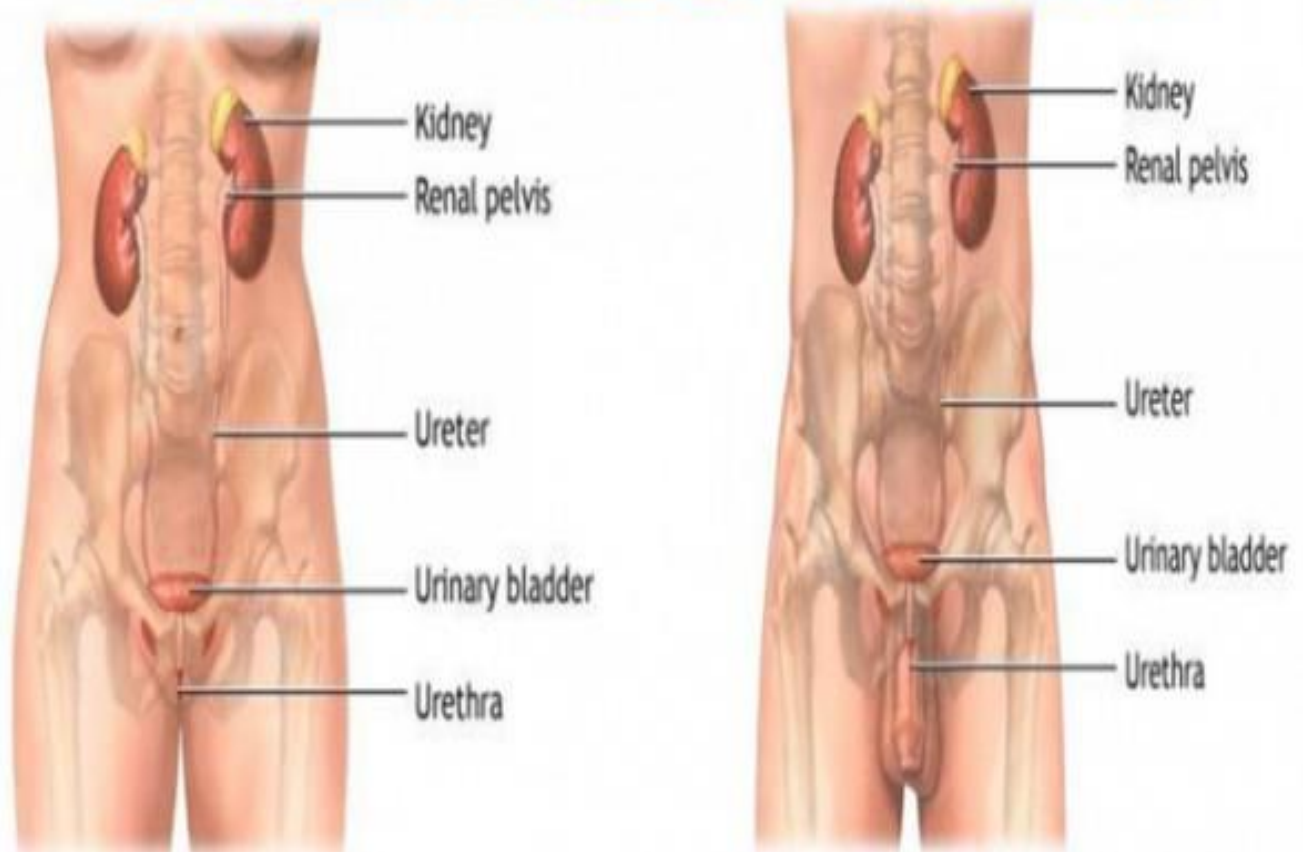


5 of Most Common Infections in the Elderly

- Urinary Tract Infection (UTI)
- Skin Infection's – MRSA, Shingles & Cellulites
- Bacterial Pneumonia
- Influenza - Flu
- Gastro Intestinal Infections – C-Diff & Pylori

Urinary Tract Infection

URINARY TRACT INFECTION



Ref: Image.net.com

UTI'S

- Urinary tract infections (UTI's) can cause serious health problems. A urinary tract infection occurs when bacteria in the bladder or kidney multiplies in the urine. If left untreated, a UTI can become more serious than merely a set of uncomfortable symptoms.
- UTIs can lead to acute or chronic kidney infections, which could permanently damage the kidneys and even lead to kidney failure.
- UTIs are also a leading cause of sepsis, a potentially life-threatening infection of the bloodstream.

Urinary Tract Infections in the Elderly



- Elderly people are more vulnerable to UTIs for many reasons including overall susceptibility to all infections due to the suppressed immune system that comes with age and certain age-related conditions
- Younger people tend to empty the bladder completely upon urination, which helps to keep bacteria from accumulating within the bladder. But elderly men and women experience a weakening of the muscles of the bladder, which leads to more urine being retained in the bladder, poor bladder emptying and incontinence, which can lead to UTIs.

Lower urinary tract infection

The symptoms of a lower urinary tract infection (UTI) include:

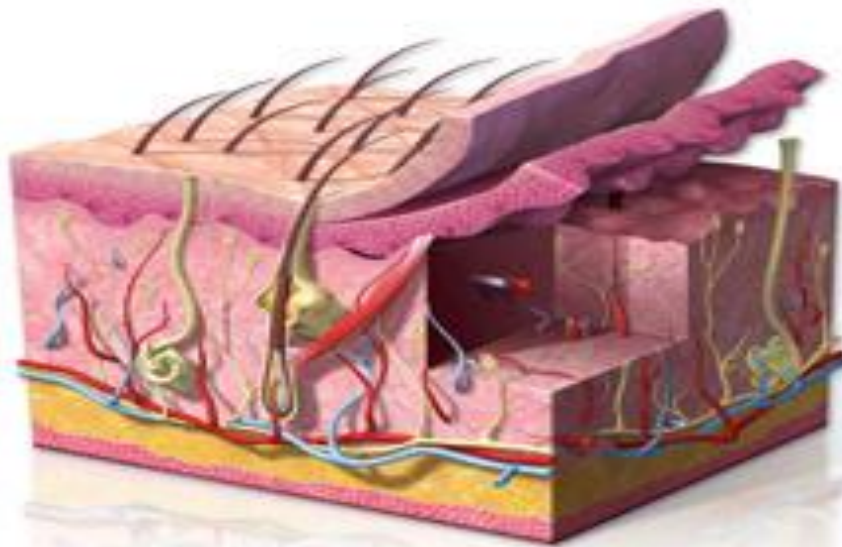
- Cloudy urine
- A need to urinate more frequently, either during the day, or night, or both
- Pain or discomfort when passing urine
- An urgent need to urinate (holding in your urine becomes more difficult)
- Unusually unpleasant smelling urine
- Blood in your urine (haematuria)
- Abdominal pain
- A feeling of tenderness around your pelvis
- Back pain
- A general sense of feeling unwell

Upper urinary tract infection

The symptoms of an upper UTI include:

- A high temperature (fever) of 38°C (100.4°F) or above
- Uncontrollable shivering
- Nausea
- Vomiting
- Diarrhoea
- You may also experience pain in your side, back or groin. The pain can range from moderate to severe, and it is often worse when you are urinating.
- In addition, you may experience the symptoms of a lower UTI because the infection can spread from your kidneys to your lower urinary tract.

Skin Infections



Skin Infections

Changes to aging skin and its ability to heal and resist disease mean that skin infections get much more common as we get older. These include viral infections like herpes zoster (shingles), pressure ulcers, bacterial or fungal foot infections (which can be more common in those with diabetes), cellulitis, and even drug-resistant infections like Methicillin Resistant *Staphylococcus aureus* (MRSA).

Types of Skin Infection's

Skin infections presenting with erythema, blisters, pustules, and ulcerations or in body folds are described in detail. Cellulitis and infected ulcers are the most commonly encountered cutaneous infections in the elderly.

Cellulitis should be clinically distinguished from erysipelas and necrotising fasciitis. The latter is a life-threatening condition, which in the majority of cases requires surgical debridement of the infected tissue.

Pub Med Laumbe s, Farrell AM 2002;19(5):331

Some examples of Skin Infections



Ref:<http://images.emedicinehealth.com/images/4453/4453-4482-12996-21145.jpg>

Folliculitis is a commonly seen skin infection, it can be due to infection, occlusion (blockage), irritation and various skin diseases. This skin infection responds well to the use of antiseptics and Topical antibacterials



www.medicinetoday.com

Blisters and honey-coloured crusts are typical features of Impetigo. It is very contagious and close contacts should be examined.



www.medicinetoday.com



Secondary skin infections are often the result of persistent pruritus associated with increasing dryness of the aging skin.



www.medicinetoday.com

MRSA

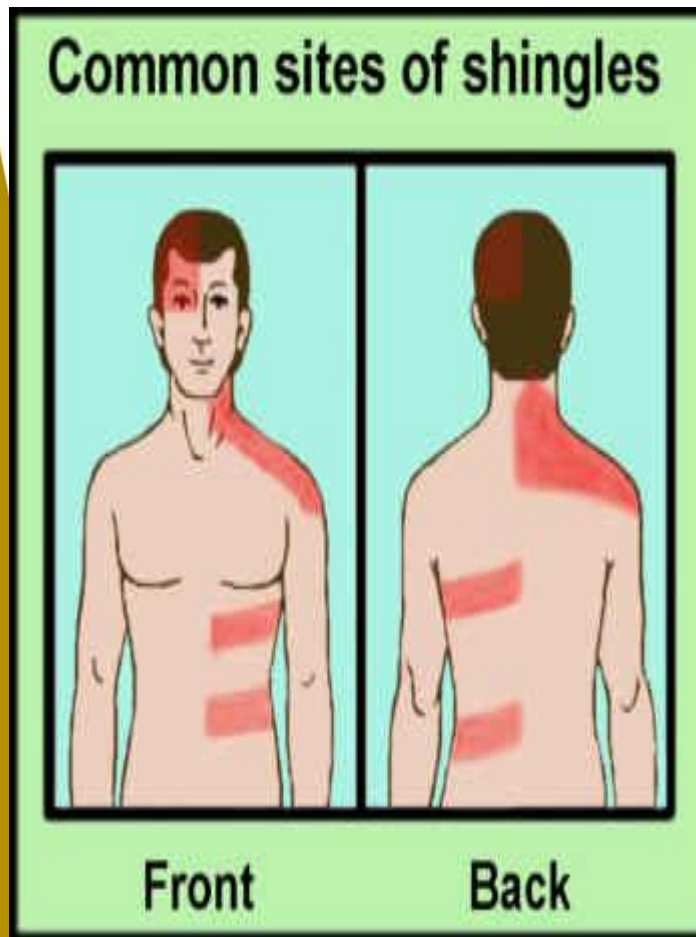


Shingles

Shingles is an extraordinarily painful condition that involves inflammation of sensory nerves. It causes numbness, itching, or pain followed by the appearance of clusters of little blisters in a strip pattern on one side of the body, shingles often girdles part of the body. The pain can persist for weeks, months, or even years.

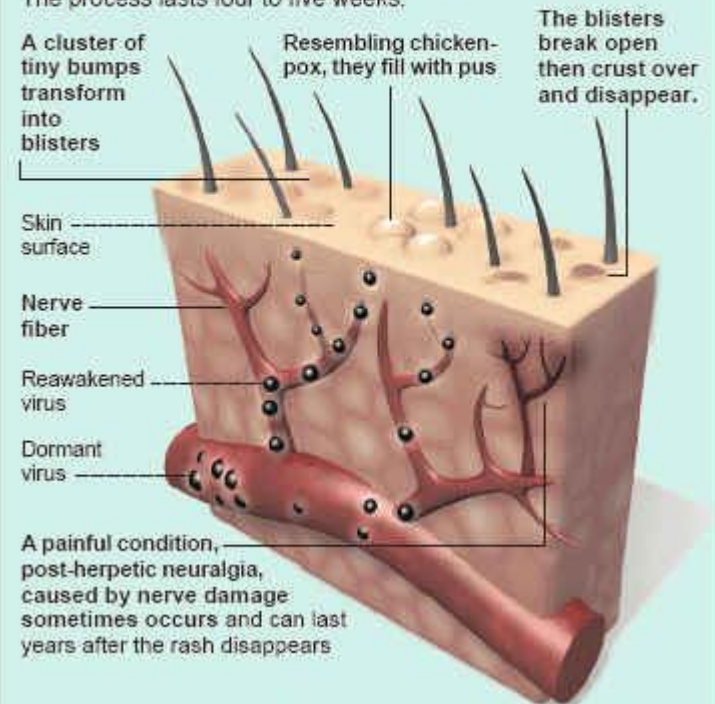


Shingles



Dormant chickenpox can cause shingles

A rash called shingles can attack anyone who has had chickenpox. The virus can lie dormant in the body and resurface years later. Initially causing a burning or tingling sensation on the skin, two to five days after symptoms first appear, a painful rash occurs. The process lasts four to five weeks.



Influenza



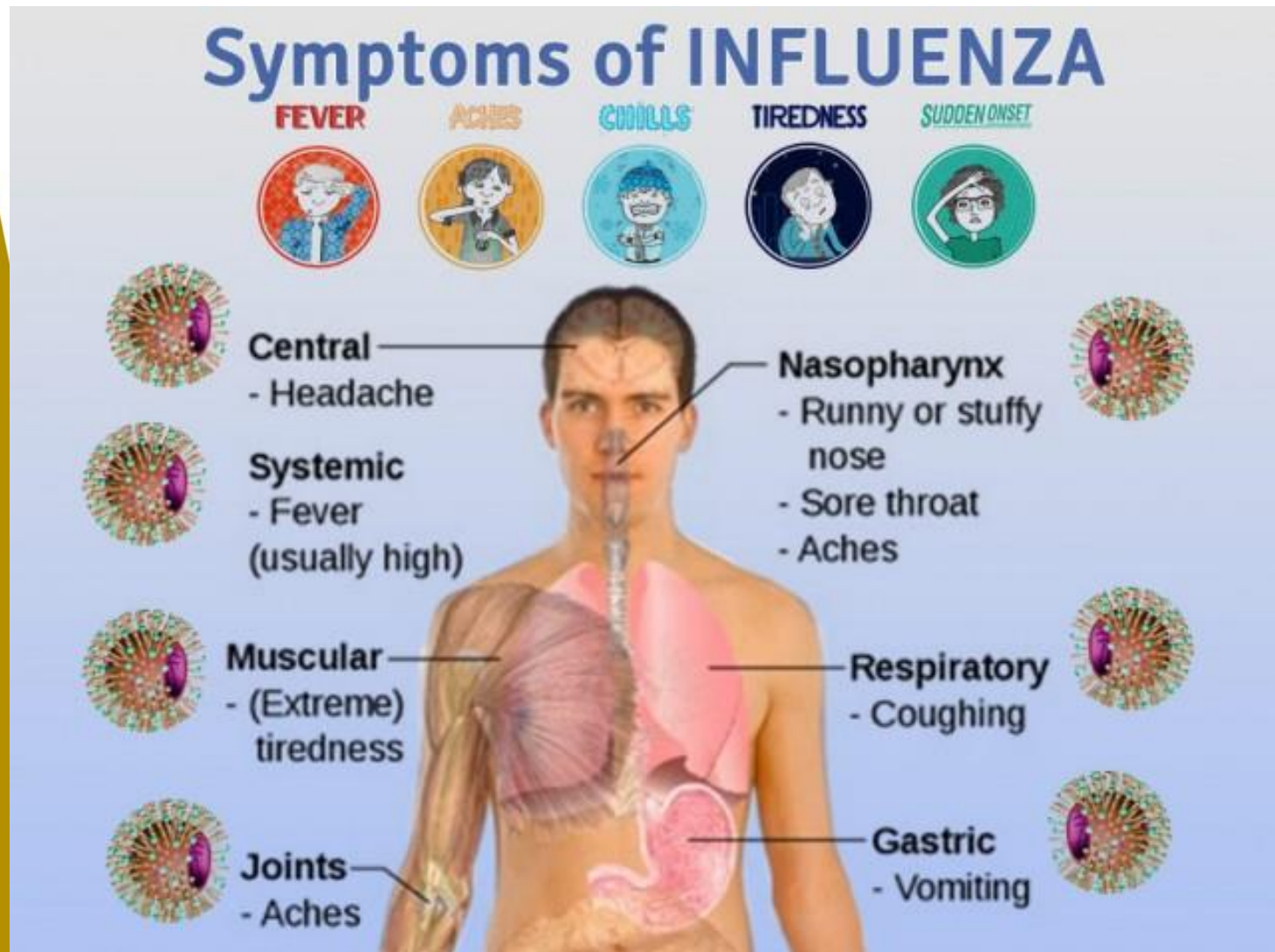
Influenza

- 200,000 people will be hospitalized because of the flu
- 36,000 will die.
- Those in their 70's and 80's are at higher risk from the flu than those in their 60's, because of declining immunity to illnesses as they age
- Flu season October - February, Some years it runs into March and April as well

Influenza

- Influenza (also known as the flu) is a contagious respiratory illness caused by flu viruses.
- It can cause mild to severe illness, and at times can lead to death.
- The flu is different from a cold. The flu usually comes on suddenly.
- It is spread by "respiratory drops" - coughing and sneezing. People with flu can spread it to others up to about 6 feet away.
- Touching something with the flu virus on it e.g. door knobs, telephones, shopping trolley handles and then unwittingly touching their mouth or nose.

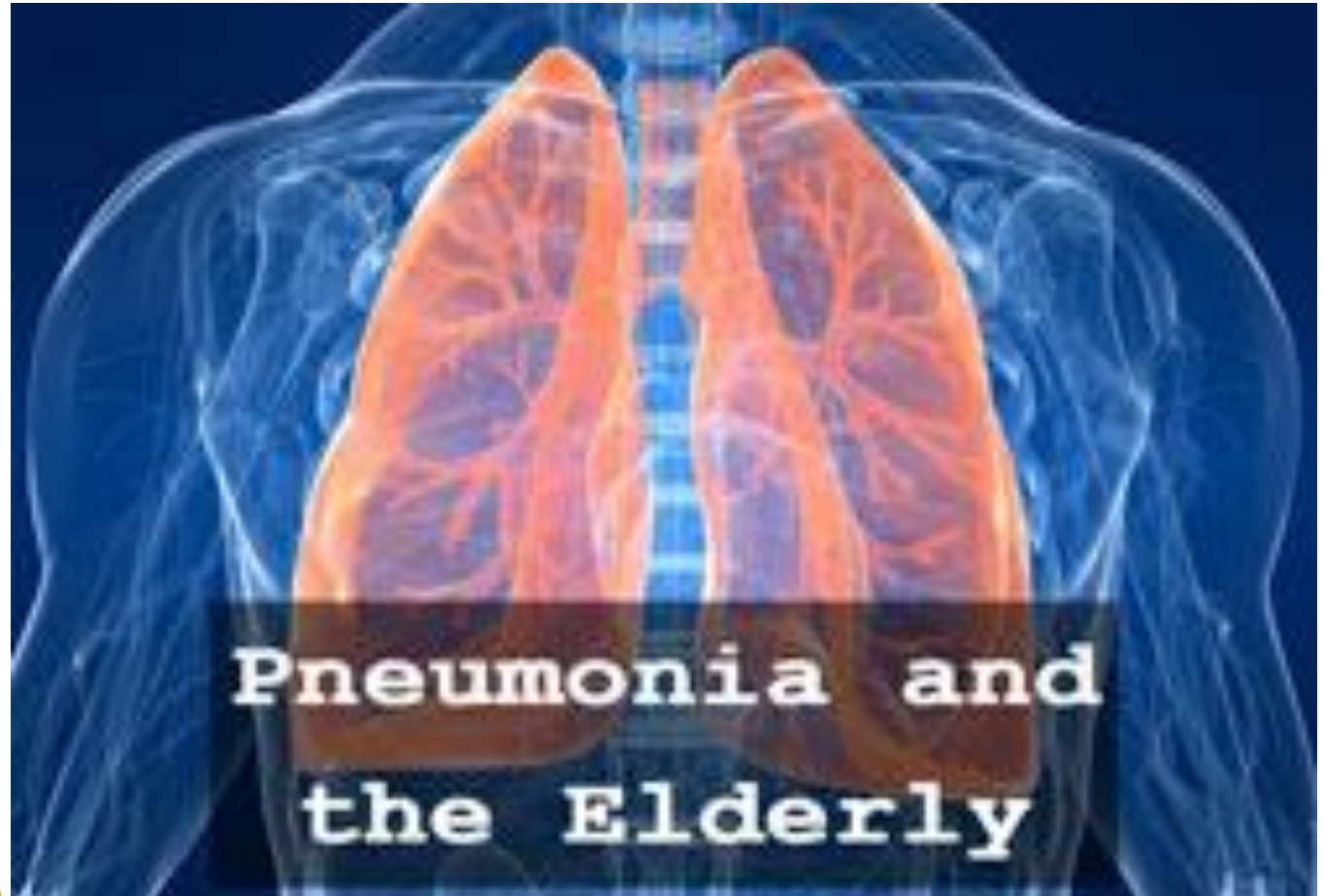
Influenza Symptoms



The Flu Is Contagious

- Most healthy adults may be able to infect other people beginning 1 day **before** symptoms develop and up to 5 to 7 days **after** becoming sick.
- Children may pass the virus for longer than 7 days.
- Symptoms start 1 to 4 days after the virus enters the body.
- **You may be able to pass on the flu to someone else before you know you are sick, as well as while you are sick.**
- Some people can be infected with the flu virus but have no symptoms. During this time, those persons may still spread the virus to others.

Pneumonia



Pneumonia

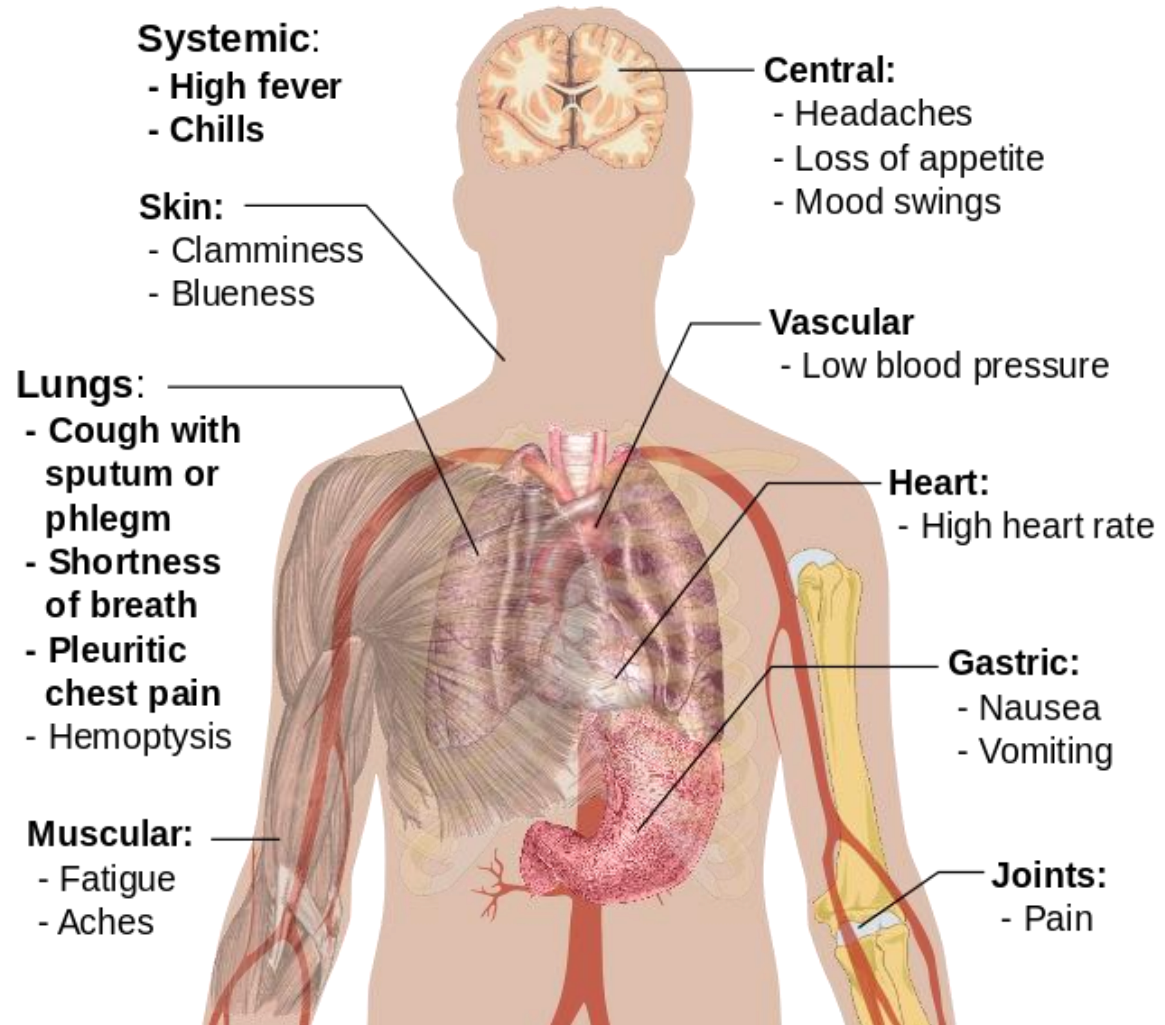
More than 60% of people over 65 get admitted to hospitals due to pneumonia for a variety of reasons, including changes in lung capacity and in some cases increased exposure to disease in Community settings, Cardiac/pulmonary Disease or diabetes.

Infectious Disease Clinics of North America (Medscape)

Classic Symptoms like fever, chills and cough are less frequent in the elderly and they may display Non Respiratory symptoms like weakness, confusion, or delirium.

Pneumonia is caused by more than thirty Types of organisms; these different strains mean that symptoms can vary from case to case.

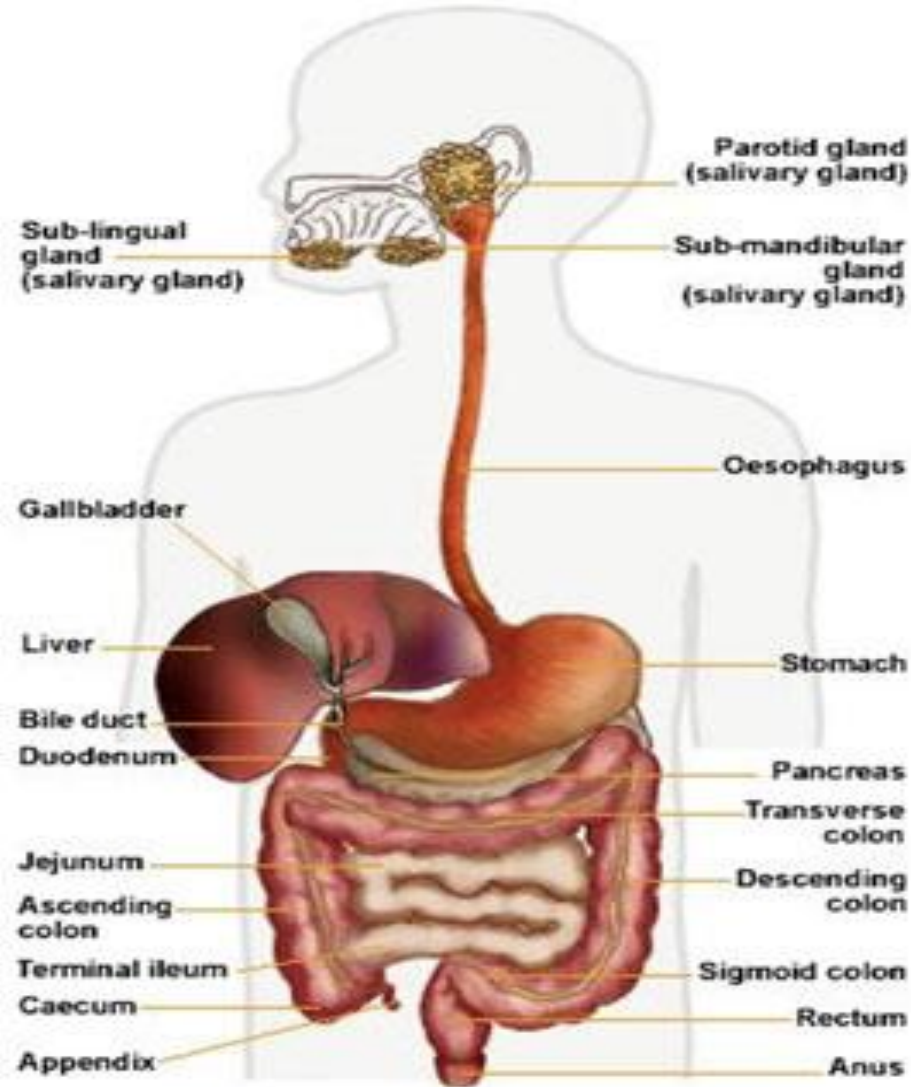
Main symptoms of infectious Pneumonia



https://en.wikiversity.org/wiki/Medical_gallery_of_Mikael_H%C3%A4ggstr%C3%B6m_2014

Gastro-Intestinal (GI)





Gastro Intestinal

- Age-related changes to digestion and gastrointestinal flora put the elderly at increased risk of developing gastrointestinal infections (GI).

Two of the most common infections are

- *Helicobacter pylori*, which may cause nausea, upper abdominal pain, and fever as well as leading to long-term illness such as ulcer or gastritis
- *H. pylori* is treated using a combination of drug therapies

- *Clostridium difficile*, (C-diff) an increasingly common diarrhea - causing infection, which usually occurs due to antibiotic treatments that suppress healthy gastrointestinal flora.
- *C. Diff* infection usually occurs in people receiving long courses of antibiotics that limit the growth of the harmless bacteria that are usually present in the intestine.
- Treatment of *C. Diff* involves halting the use of the antibiotic causing the problem.

- In healthy people, intestinal infections rarely cause complications. Mild dehydration is the most common consequence. Infants and the elderly are most at risk for severe dehydration. Weak immune systems (such as patients undergoing chemotherapy or people with HIV or AIDS *), the infectious agent may spread throughout the body, causing widespread disease and even death. In some cases of long-lasting illness, malnutrition may occur because the infection interfere's with the individuals nourishment.

<http://www.humanillnesses.com/Infectious-Diseases-He-My/Intestinal-Infections.html#ixzz3l3Dx60Af>



- The infections **Pylori** and **C-Diff** are more common in long term care facilities.
- Nosocomial infections happen when Health care workers and family spread bacteria by touching infected patients or contaminated surfaces and then touching non infected patients
or
- Administering medicine, without first washing their hands, and/or not taking simple precautions.



Conclusion

- Early recognition and its importance
- 5 most common infections in the elderly
- Healthcare facilities, Primary care, Home environment and Pre-hospital care all have a role to play.

References



- *National Standards for the Prevention and Control of Healthcare Associated Infections 20 May 2009 Hiqa.ie*
- *Infectious Disease Clinics of North America (Medscape)*
- *HSE.IE*
- *Age Action Ireland*
- *HIQUA.IE*
- *Ref: American Academy of Family Physicians*
- *Ref: Image.net.com*
- *www.humanillnesses.com/Infectious-Diseases-He-My/Intestinal-Infections.html*
- *https://en.wikiversity.org/wiki/Medical_gallery_of_Mikael_H%C3%A4ggstr%C3%B6m_2014*
-

Thank You







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SEPSIS

Niamh Daly



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Objectives

- Define Sepsis
- Outline the following terms:
 - SIRS,
 - Sepsis
 - Severe Sepsis
 - Septic Shock
- Management as per PHECC CPG's
- Case Studies

Sepsis

“Sepsis is a life-threatening condition that arises when the body's response to an infection injures its own tissues and organs. It can lead to shock, multiple organ failure, and death, especially if it is not recognized early and treated promptly”

Statistics

Worldwide

- 1 person dies from sepsis every 3-4 seconds
- 18 million cases per year
- Accountable for 60-80% of deaths in developing world

In Ireland

- 26% of Irish ICU admissions
- 2/3 of these were over 65
- Mortality for severe sepsis 24.6%

Video

<https://www.youtube.com/watch?v=69s6ezhwTWQ>

The Sepsis Pathway

- Systemic Inflammatory Response Syndrome (SIRS)



- Sepsis



- Severe Sepsis



- Septic Shock

The Sepsis Pathway

- Systemic Inflammatory Response Syndrome (SIRS)



- Sepsis



- Severe Sepsis



- Septic Shock

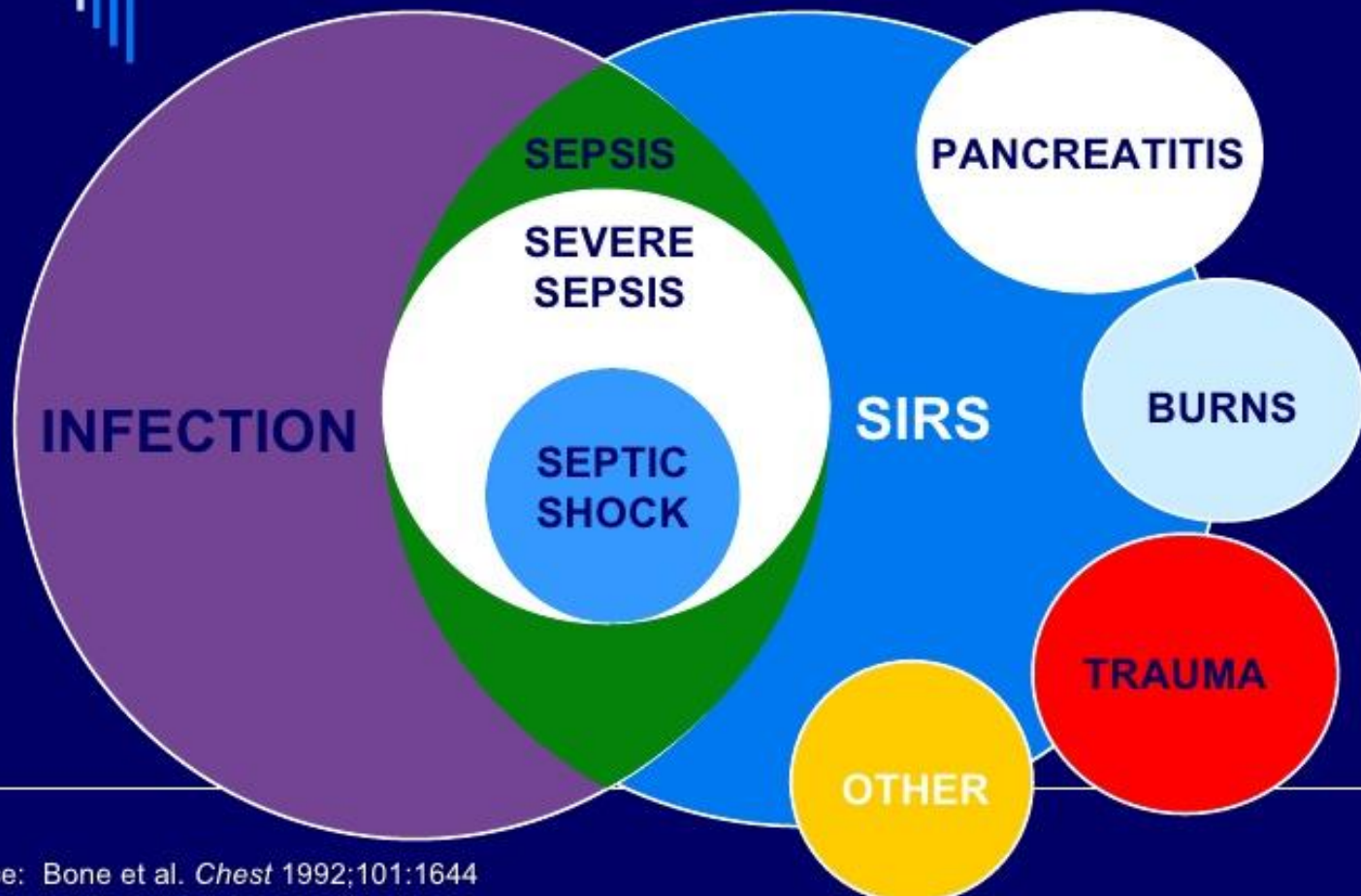
Inflammation

- Body's natural defence response to an injury or insult caused by:
 - Disease
 - Infection
 - Trauma
- Localised response of the immune system
- May progress to a systemic level

What is SIRS

- Systemic Inflammatory Response Syndrome
- Exaggerated inflammatory immune response involving multiple organ systems

SIRS Continuum



SIRS Criteria

- 2 or more of the following:
 - Temp $>38.3^{\circ}\text{C}$ or $<36^{\circ}\text{C}$
 - HR >90 beats/min
 - RR >20
 - Acutely confused
 - Glucose $>7.7\text{mmol/l}$ (non diabetic)

The Sepsis Pathway

- Systemic Inflammatory Response Syndrome (SIRS)



+ infection

- Sepsis



- Severe Sepsis



- Septic Shock

The Sepsis Pathway

- Systemic Inflammatory Response Syndrome (SIRS)



- Sepsis



- Severe Sepsis



- Septic Shock

Sepsis

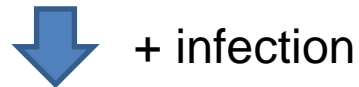
- SIRS + infection – potential sepsis
- May be simple or uncomplicated sepsis which will resolve
- May progress to severe sepsis

Sepsis

- Severe shortness of breath
- Extremely cold hands/feet
- Palpitations/racing heart
- Slurred speech
- “I have never felt so bad”
- Shivering uncontrollably

The Sepsis Pathway

- Systemic Inflammatory Response Syndrome (SIRS)



- Sepsis



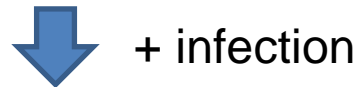
- Severe Sepsis



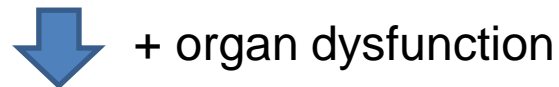
- Septic Shock

The Sepsis Pathway

- Systemic Inflammatory Response Syndrome (SIRS)



- Sepsis



- **Severe Sepsis**



- Septic Shock

Severe Sepsis

“The acute dysfunction of one major organ system due to infection”. – Levy 2003

Cascade of events leading to the failure of organ systems to function effectively.

Organ Dysfunction

Signs & Symptoms



Absent radial pulse

SpO₂ < 90%

SBP < 90mmHg

Cold or mottled peripheries

Bruising or purpuric rash

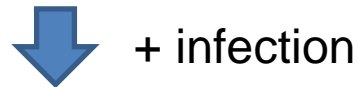
Prolonged bleeding from minor injury or gums

Ischuria > 8 hrs

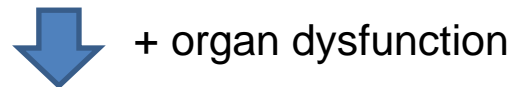
Serum lactate level >2mmol/l

The Sepsis Pathway

- Systemic Inflammatory Response Syndrome (SIRS)



- Sepsis



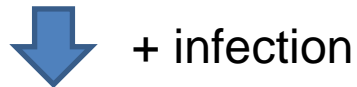
- Severe Sepsis



- Septic Shock

The Sepsis Pathway

- Systemic Inflammatory Response Syndrome (SIRS)



- Sepsis



- Severe Sepsis



- Septic Shock

Septic Shock

- Septic Shock is defined as the presence of sepsis and refractory hypotension*. (Levy 2003)

*Sepsis induced hypotension which does not respond to fluid treatment



Sepsis – Risk Factors

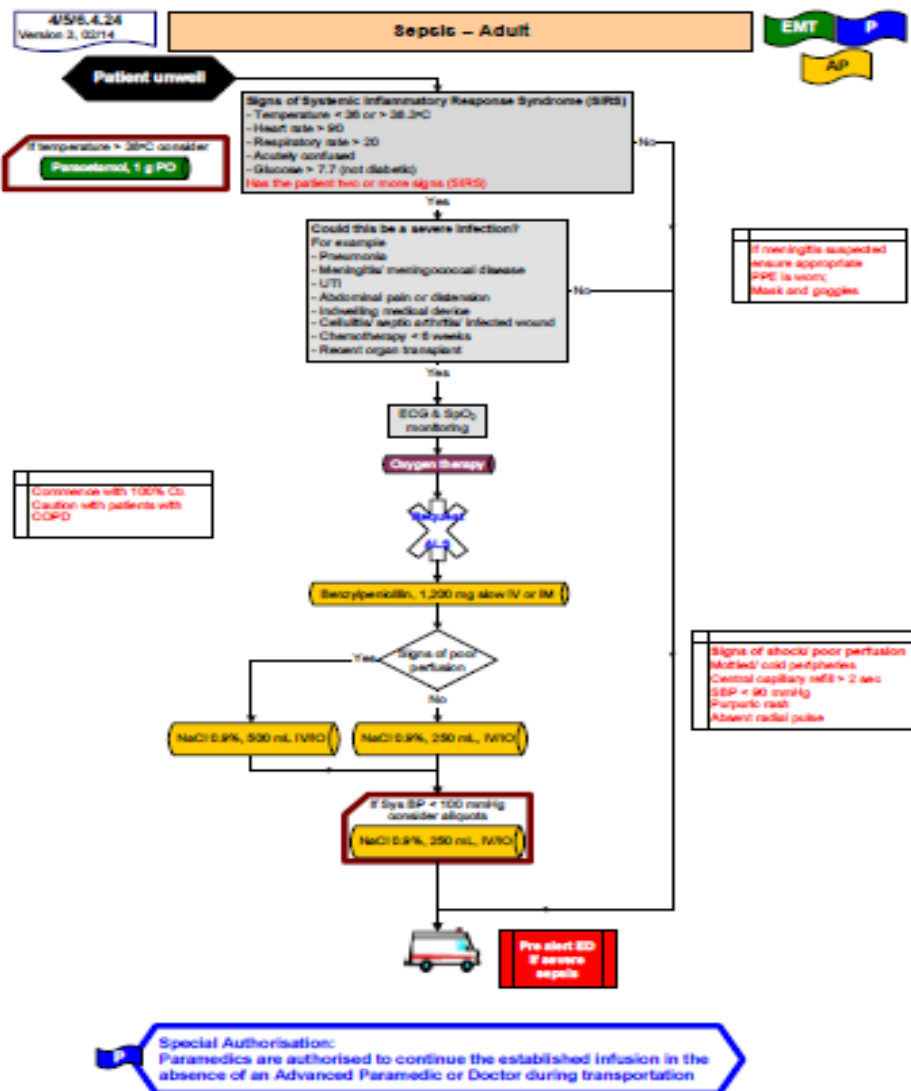
- Higher Risk
 - Elderly and the very young
 - Multiple co-morbidities
 - Recent hospitalisation
 - 5.2% incidence of HAI in Ireland
 - Wound/injury
 - Indwelling catheter
 - Recent antibiotic use
 - Immune compromise
 - Diabetes; Cancer; HIV etc.

Sepsis and EMS

- 1990's – Early identification of sepsis primarily remit of ICU
- 2000's – remit moves to the ED
- 2010's – EMS identification of sepsis pre-hospital and pre-alerting the ED can trigger more timely interventions in sepsis patients

SECTION 4

MEDICAL EMERGENCIES



Management

- ABCDE's + Glucose
- SAMPLE Hx
- CPG
 - ECG & SATS monitor
 - Oxygen therapy
 - Consider Paracetamol
 - Benzylpenicillin (AP)
 - 0.9% NaCl
 - Pre-alert ED

Case Study 1

- 63 year old female
- Witnessed seizure
- HR 136
- Temp 38.8c
- BP – no radial pulse
- Glucose 18.8mmol/L

Case Study 1

- History
 - Flu like symptoms
 - Weakness x 3 days
 - NIDDM
 - Headaches
- Allergic to Codeine
- Medications: non compliant

Case study 2

- 3 yr old male
- Just completed antibiotics for chest infection
- Still c/o low grade fever, tachypnoea



Case Study 2

- Presentation - pale, irritable, respiratory distress
- Temperature 37.2o
- HR 120 bpm,
- BP 96/40 mmHg
- Capillary refill time 2 sec
- RS: RR 50, rapid shallow breaths
SaO2 100% in oxygen
- NS: Agitated, no neck stiffness

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- UK Sepsis Trust
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