

Infectious disease: Introduction

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Objectives

1. **Diagnosis of infectious disease**

- **History taking**
- **Physical examination**
- **Investigations**

2. **Management of infection**

3. **Rationale use of antibiotics**

4. **Prevention of common infections**

Infection

- Infection is the establishment of foreign organisms or infectious agents in or on a human or another living host
- It is the **greatest killers** of mankind
- The pathology of infection differs from all other disease processes

Infection

- **All systems of the body are susceptible to infection**
- **Understanding infection and its management** is integral to every medical specialty and all aspect of clinical care.

Infectious agent

- The **living organism** which can produce diseases in another living organism
- The **concept of an infectious agent** defined in the mid 19th century by a German physician “**Robert Koch**”

Infectious agent

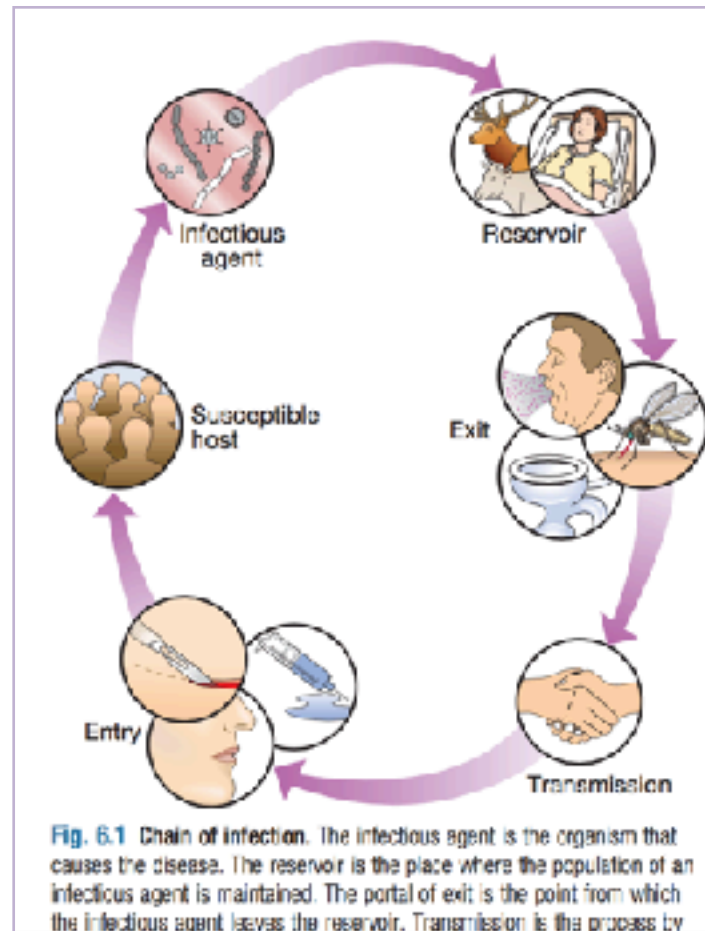
- **Koch's postulates**
 - The same organism must present in all infections
 - The organism must be isolated from the infectious host and grown in pure culture
 - The isolate must cause disease when inoculated into healthy susceptible animal
 - The organism must be isolated from the inoculated diseased animal

Infectious agent

- Prion (not a true infectious agent)
- Virus
- Bacteria
- Parasite
- Fungus

Chain of infection

- Infectious agent
- Reservoir
- Exit
- Transmission
- Entry
- Susceptible host



Infectious agents

- Prion
- Virus
- Bacteria
- Eukaryotes

Infectious agents

- **Prions**
 - **Simplest** infectious agents, consisting of a single protein molecule
 - **Able to change structure** in an endogenous protein (PrP)
 - Cause disease by change in **structural & function** of the cell

Infectious agents

- **Viruses**

- Viruses contain two types of macromolecule:
proteins and nucleic acids (either DNA or RNA)
- DNA & RNA can't reproduce autonomously
- Need to enter a prokaryotic or eukaryotic cell
- Divert' the intracellular mechanisms to viral reproduction

Infectious agents

- **Bacteria**

- Known as '**prokaryotes**'

- Bacteria share the following essential features:

- they contain both RNA and DNA

- Have facilities for protein metabolism

- Generally free living

- Reproduce autonomously

Infectious agents

- **Eukaryotes**

- Have sub cellular compartmentalisation (nucleus, chloroplasts, mitochondria and Golgi apparatus)
- Eukaryotes in human infection include fungi, protozoa, and parasitic worms

Host/organism interaction

- **Primary pathogens**
- **Opportunistic pathogen**
- **Host response**
- **Pathogenesis of infection**
 - **Tissue injury**
 - **Organ dysfunction**
 - **Protective actions**

Source of infection

- **Endogenous**
- **Exogenous**
 - Other person
 - Zoonoses
 - Environmental

Routes of transmission

- Endogenous infection
- Airborne infection
- Faecal-oral
- Vector borne
- Direct person to person spread
- Direct inoculation
- Consumption of infected material

Pathogenesis of infection

- Specificity
- Epithelial attachment
- Colonisation
 - Invasion to body fluid, cell surface, intracellular location

Pathogenesis of infection

- Tissue destruction or damage
 - Toxins
 - TNF
 - Tissue invasion
 - Immunological phenomenon

Approach to a patient with infection

- History
- Physical examination
- Investigations
- Management
- Prevention and control

History

- **Presenting manifestations of infectious diseases**
 - **Fever**
 - **Diarrhoea**
 - **Organomegaly**
 - **Rash**
 - **Eosinophilia**
 - **Altered consciousness**
- **Special aspect of history taking in infection**

Presenting manifestations

- Fever
- Diarrhoea
- Fatigue
- Muscle aches
- Coughing
- sepsis

Relevant medical history

- H/O animal bite
- Breathing problem
- Coughing for more than a week
- Headache with fever
- Rash or swelling
- Unexplained or prolonged fever
- Sudden vision problems
- Altered consciousness

Analysis of symptom

The mnemonic acronym **SOCRATES/OPQRST-AAA** summarises most symptoms.

SOCRATES:

1. Site
2. Onset
3. Character
4. Radiation (if the symptom is discomfort or pain)
5. Alleviating factors
6. Timing
7. Exacerbating Factors
8. Severity

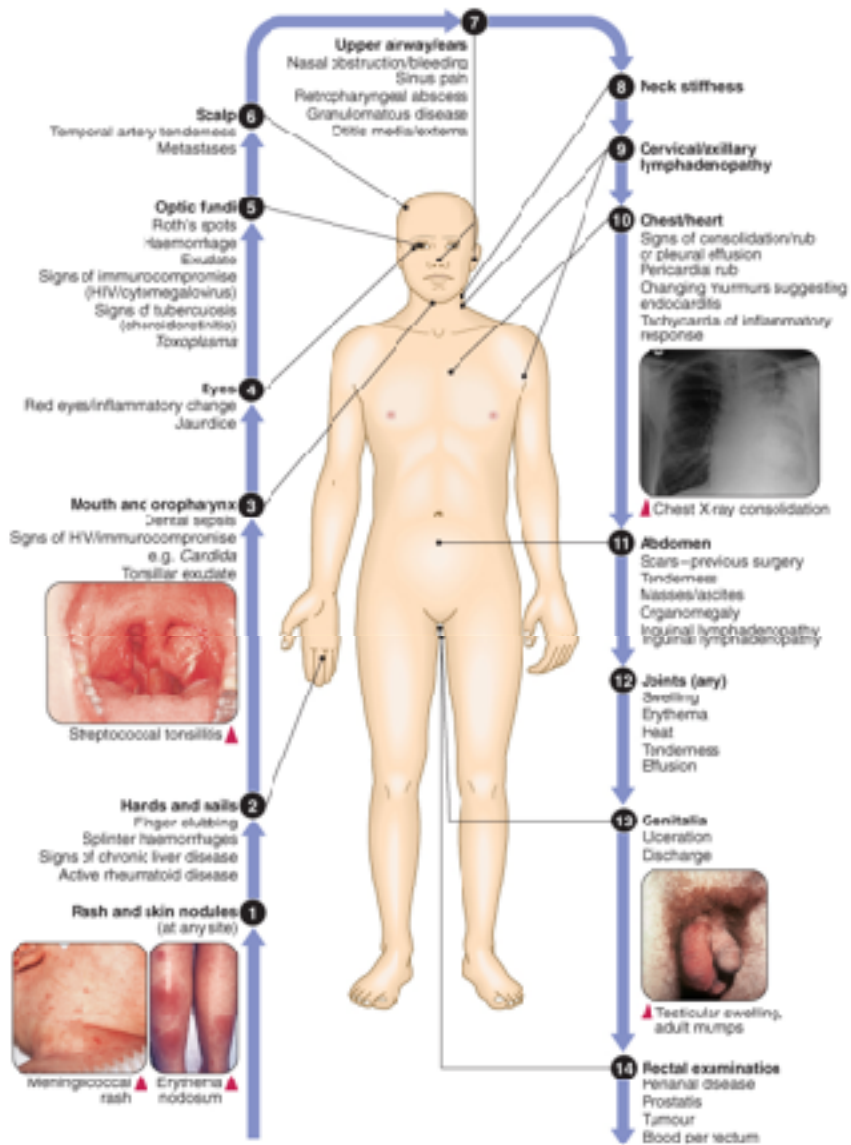
Analysis of symptom

OPQRST - AAA:

- Onset
- Provocation/
palliation
- Quality/character
- Region/radiation
- Severity
- Treatment
- Aggravating/
alleviating factors
- Associated
symptoms
- Attributions/
adaptations

Physical examination

- General examination
- Systemic examination
- Local or regional examination
- Relevant examination



Physical examination

Investigations

Objectives of investigations

- To confirm diagnosis
- To rule out other possibility(D/D)
- To determine severity
- To see the complications
- To see the effects of treatment
- To follow up

Investigations for infections

- Routine investigations
- Radiology & imaging
- Microbiological investigations
- Immunological

Investigations for infections

- Molecular
- Cytology and histopathology
- Disease marker
- Sensitivity (to antibiotic)

Investigations

- **Routine/non specific investigation**
 - CBC & ESR
 - Plasma CRP
 - CSF examination

Investigations

- **Microbiological**
 - Direct detection
 - Detection of organism component
 - Nucleic acid amplification (PCR)
 - Culture

Investigation

- **Immunological test**
 - Ag-Antibody detection
 - T-cell stimulation test

Investigation

- **Microbiological investigation**
 - To identify causative organism
 - Microscopy and culture
 - Immunologic tests
 - Nucleic acid detection

Management of infectious disease

- General management
- Symptomatic management
- Specific management
- Management of complications
- Followup
- Prevention and control

Principles of management

- Address any predisposing factor like diabetes etc
- Antimicrobial therapy
- Adjuvant therapy
- Treatment of the complications

Outcome of infection

- **Metabolic and immunologic**
 - Fever
 - Protein metabolism
 - Nutrition and host defence
 - Mineral and acid base balance

Outcome of infections

- **Infectious disease:** when the interaction between host and the pathogenic organism induce tissue damage and clinical illness
- **Colonisation:** if the micro-organism exist in an anatomical site without tissue injury

Outcome of infection

- **Communicable disease**
 - Caused by organism transmitted between hosts
- **Endogenous disease**
 - Caused by colonizing organism in the host
- **Opportunistic infection**
 - Arise only in individual with impaired host defense
 - Maybe communicable or endogenous

Control & prevention of infection

- Treat and control infection
- Prevent contact
- Maintain hygiene & healthy life style
- Health education
- Immunisation