

بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ

Clinical Epidemiology and Control of Mumps

اپیدمیولوژی بالینی و کنترل اوریون

Shahid Beheshti University
of Medical Sciences, 2020

By: Hatami H. MD. MPH

Clinical Epidemiology of Mumps

الف - مقدمه و معرفی بیماری

- Definition and public health importance
- Etiologic agent

ب - اپیدمیولوژی توصیفی و وقوع

- Incubation period
- Natural course
- Geographical distribution
- Timeline trend
- Age, Gender, Occupation, Social situation
- Predisposing factors
- Susceptibility & Resistance
- Secondary attack rate
- Modes of transmission, period of communicability

Occurrence

ج - پیشگیری و کنترل

- **Prevention:** Primordial, Primary, Secondary, Tertiary, Quaternary

الف - مقدمه و معرفی بیماری

ب - اپیدمیولوژی توصیفی و
وقوع (Occurrence)

ج - پیشگیری و کنترل

۱- تعریف و اهمیت بهداشتی

۲- عامل اتیولوژیک

۳- تعریف مورد (Case definition)

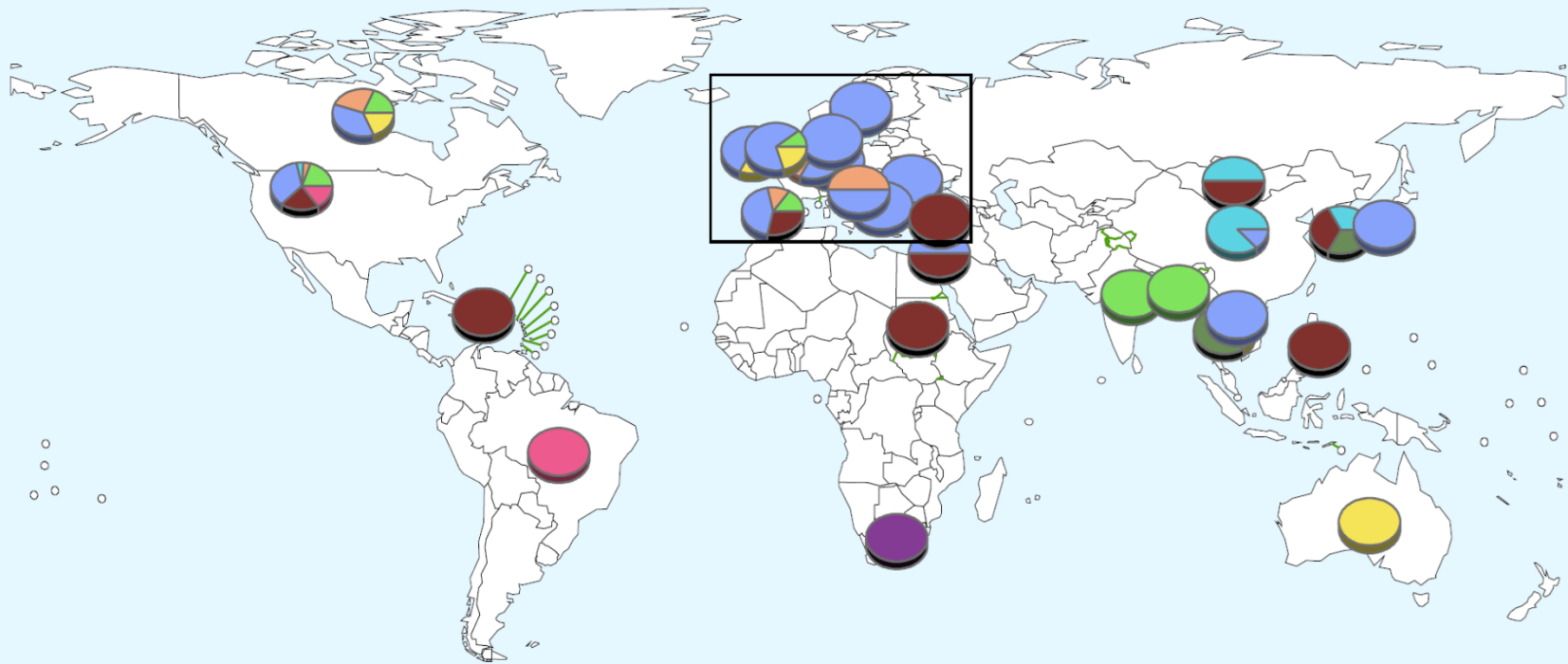
1-1. Definition of Mumps

- Mumps is an acute **viral** infection most commonly manifest as nonsuppurative swelling and tenderness of the **parotid** or other salivary glands caused by the **mumps virus** (M2020).

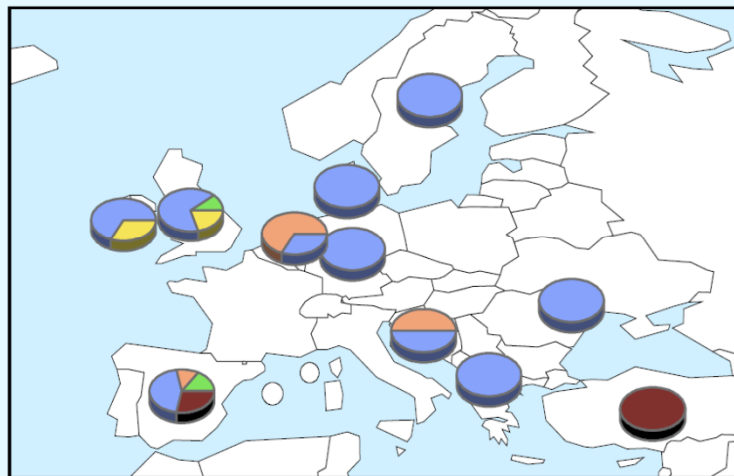
2-1. Etiologic agent

- Mumps virus
- RNA virus
- Genus: *Rubulavirus*
- Family: *Paramyxoviridae* (C).
- Only one serotype of mumps virus exists, but there are 13 genotypes (M2020).

Distribution of reported mumps genotypes, 2005-2011. Data as of 20 April 2012



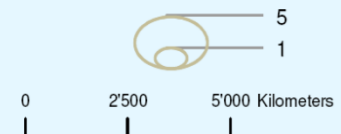
West Europe



Legend

- B
- C
- D
- F
- G
- H
- I
- J
- K

Pie slice size proportional to the number of years each genotype was reported 2005-2011.



Acknowledgement: WHO LabNet.

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.
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2-2. Mumps Pathogenesis

PATHOGENESIS

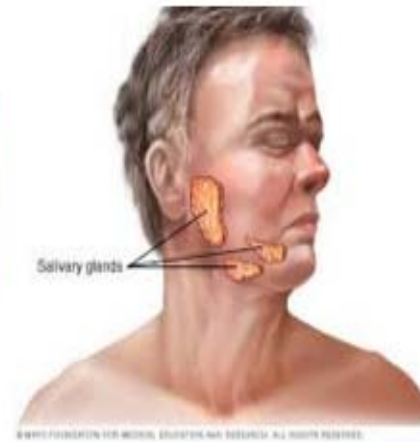
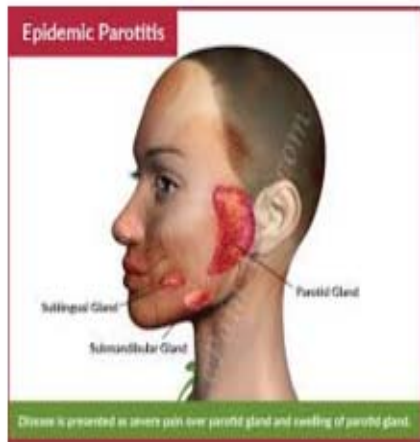
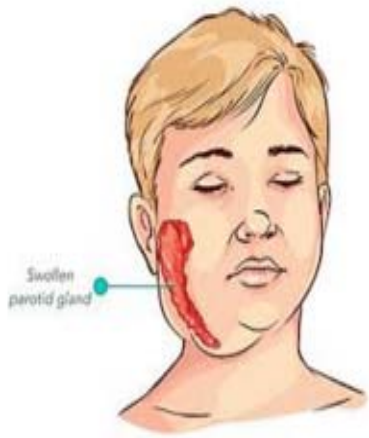
During the incubation period, the virus proliferates in the upper respiratory tract epithelium and viremia ensues, with secondary dissemination and localization to glandular and neural tissue.



2-2. Mumps Pathogenesis

PATHOGENESIS

- Transmitted via **direct contact, droplet nuclei**, or fomites and **enters** through the nose or mouth.
- Diffuse **interstitial edema** in parotid glands, along with a **serofibrinous exudate** consisting primarily of mononuclear leukocytes.
- Neutrophils and necrotic debris accumulate within the ductal lumen, and the ductal epithelium shows **degenerative changes** (M2020).



ویژگی‌های مهم عامل عفونتزا

- ۱ - عفونت‌زایی (Infectivity)
- ۲ - آسیب‌زایی (Pathogenicity)
- ۳ - حدّت (Virulence)
- ۴ - خاصیت آنتی‌ژنی (Antigenicity)
- ۵ - خاصیت ایمنی‌زایی (Immunogenicity)

ویژگی‌های مهم عامل عفونتزا

Infectivity:

- More intimate contact is necessary to transmit mumps than for measles or varicella. مقایسه قابلیت سرایت با سرخک و سرخجه؟
- The period of peak contagion is just before or at the onset of parotitis (M2020).



اوج قابلیت سرایت؟

ویژگی‌های مهم عامل عفونتزا

Immunogenicity:

- One attack of mumps, whether inapparent or clinically manifested, confers lifelong immunity (M2020).

تعريف مورد (Case definition)

Clinical evidence:

مورد بالینی

- Acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary gland, lasting greater than two days, and without other apparent cause.
- Infection with mumps virus may present as aseptic meningitis, encephalitis, hearing loss, orchitis, oophoritis, parotitis or other salivary gland swelling, mastitis or pancreatitis (C).

تعريف مورد (Case definition)

Probable Case

مورد محتمل

- Clinically compatible signs and symptoms in the absence of appropriate laboratory tests and without an epidemiological link to a laboratory confirmed case (C).

تعریف مورد (Case definition)

Confirmed Case

مورد قطعی

- Isolation of mumps virus from an appropriate clinical specimen (e.g. buccal swab, throat swab and urine culture)

OR

- Detection of mumps virus ribonucleic acid (RNA) from an appropriate clinical specimen

OR

- Seroconversion or significant rise (e.g. fourfold or greater) in mumps **IgG titre** by any standard serologic assay between acute and convalescent sera (C).

OR

تعريف مورد (Case definition)

Confirmed Case

مورد قطعی

- Detection of mumps immunoglobulin M (IgM) antibody in a person who is either **epidemiologically** linked to a **laboratory-**confirmed case or has recently **traveled** to an area of known mumps activity .

OR

- **Clinically** compatible signs and symptoms in a person who has been **epidemiologically** linked to a **laboratory-**confirmed case (C).

تعریف مورد (Case definition)

Laboratory confirmation

تایید آزمایشگاهی؟

Any of the following will constitute a confirmed case of mumps:

- Positive mumps virus culture
- Positive RT-PCR for mumps virus RNA
- Positive for mumps IgM with clinical illness with an epidemiological link or travel history
- Seroconversion or significant rise (e.g. fourfold or greater) in mumps IgG titre between acute and convalescent sera (C).

الف - مقدمه و معرفی بیماری

۱- تعریف و اهمیت بهداشتی

۲- عامل یا عوامل اتیولوژیک

۳- تعریف مورد (Case definition)

**ب - اپیدمیولوژی توصیفی
و وقوع (Occurrence)**

ج - پیشگیری و کنترل

ب - اپیدمیولوژی توصیفی و وقوع (Occurrence)

- ۱ - دوره نهفتگی (Incubation period)
- ۲ - سیر طبیعی (Natural course)
- ۳ - انتشار جغرافیائی (Geographical distribution)
- ۴ - روند زمانی (Timeline trend)
- ۵ - تاثیر سن، جنس، شغل و موقعیت اجتماعی
- ۶ - تاثیر عوامل مساعد کننده (Predisposing factors)
- ۷ - حساسیت و مقاومت (Susceptibility & Resistance)
- ۸ - میزان حمله های ثانویه (Secondary attack rate)
- ۹ - نحوه انتقال و دوره قابلیت سرایت
(Mode of transmission & period of communicability)

1. Incubation period

- Incubation period is usually 16 to 18 days with a range of 2 to 4 weeks (M2020).

2. Natural course

- میزان موارد بدون علامت (ساب کلینیکال)
- میزان موارد حاد
- میزان موارد مزمن
- میزان موارد بهبودی خودبخودی
- سیر بعدی بیماری با درمان و بدون درمان
- میزان مرتالیتی و مریدیتی
- میزان مصونیت بعد از بهبودی

Frequency of Common Clinical Manifestations of Mumps

MANIFESTATION	FREQUENCY (%)
Glandular	
Parotitis	60–70
Submandibular and/or sublingual sialadenitis	10
Epididymo-orchitis ^a	25 (postpubertal men)
Oophoritis ^a	5 (postpubertal women)
Neural	
Cerebrospinal fluid pleocytosis	50
Meningitis	1–10
Encephalitis	0.1
Transient high-frequency deafness	4
Other	
Electrocardiographic abnormalities	5–15
Renal function abnormalities (mild)	>60

^aRare before puberty and usually unilateral.

2. Natural course

- In approximately 20% to 30% of mumps cases, infections are **subclinical**,
- **Fever, swelling and tenderness** of one or more salivary glands are characteristic of mumps
- In general, permanent **sequelae** are rare, although mumps infection **in adults** is more likely to be **severe** and result in **complications** (C).

-

2. Natural course

- Although persistent infections in cultured cells are commonly established by mumps virus, a carrier state is not known to exist in humans (M2020).

حالت ناقلی مزمن؟

2. Natural course

- The disease is benign and self-limited
- Meningitis and epididymoorchitis represent the two most important of the less frequent manifestations of this disease (M2020).

2. Natural course

Complications

Complications of parotitis are rare but are reported to include:

- **Sialectasia** resulting in recurrent acute and chronic sialadenitis
- **Oophoritis** develops in 5% of postpubertal women with mumps.
- **Impaired fertility** and **premature menopause** have been reported as a consequence of ovarian involvement but must be considered to be rare

2. Natural course

Complications

- Even those with bilateral involvement should be assured that **impotence** is not a sequela and that **sterility** is rare.

2. Natural course

Complications

- In large surveys of **infertile men**, mumps is **infrequently** implicated as the causative disorder.
- Twenty-eight cases of testicular **malignancy** in men with **atrophy** of the testis due to mumps orchitis have been reported (M2020).

ایمنی بعد از بهبودی؟

2. Natural course

Immunity after recovery

- Lifelong immunity

ایمنی بعد از بهبودی؟

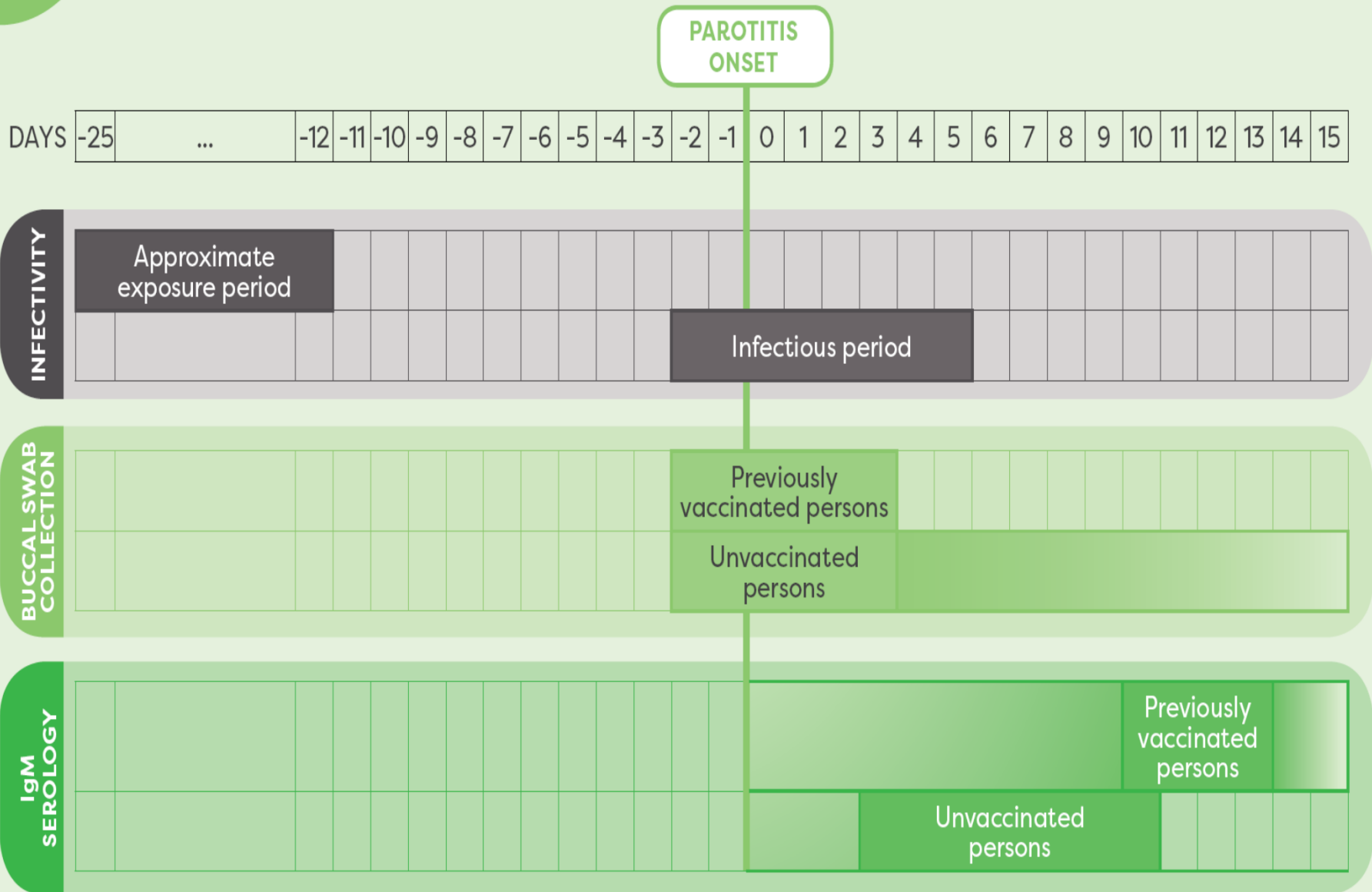
2. Natural course

- میزان موارد بدون علامت (ساب کلینیکال)
- میزان موارد حاد
- میزان موارد مزمن
- میزان موارد بهبودی خودبخودی
- سیر بعدی بیماری با درمان و بدون درمان
- میزان مرتالیتی و مریدیتی
- میزان مصونیت بعد از بهبودی

FIGURE

1

Timing of mumps infectivity and specimen collection



3. Geographical distribution

- Mumps is endemic throughout the world (M2020).

۴- روند زمانی

- پاندمی ها ؟ (Pandemics)
- اپیدمی ها ؟ (Epidemics)
- طغیان ها ؟ (Outbreaks)
- تناوب زمانی ؟ (Duration)
- الگوی فصلی ؟ (Seasonality)

4. Timeline trend Seasonality

- Before the introduction of the mumps vaccine, epidemics occurred every 2 to 5 years
- Peak incidence between January and May (M2020).

فصل زمستان و اوایل بهار

۵- تاثیر سن، جنس، شغل و موقعیت اجتماعی

● تاثیر سن

● بر میزان بروز، موارد با علامت و بدون علامت و شدید و خفیف و میزان مرگ

● تاثیر جنس بر عوامل مذکور

● شغل و موقعیت اجتماعی ؟

۵- تاثیر سن، جنس، شغل و موقعیت اجتماعی

- Mumps is uncommon in **infants** younger than 1 year. در شیرخواران؟
- Due to **maternal antibody**.
- In the pre-vaccine era, more than 50% of cases occurred in the **5-9-** year-old age group, and **90%** of the cases occurred in children **younger than 14 years** (M2020).

سن اوج موارد؟

۵- تاثیر سن، جنس، شغل و موقعیت اجتماعی

ارتباط سن و شدت بیماری؟

Age:

- Mumps is usually a more severe illness in persons past the age of **puberty** than in children
- More commonly leads to **extrasalivary** gland involvement in these older patients (M2020).

تظاهرات غالب بالینی در سنین بالاتر؟

٥ - تأثير سن، جنس، شغل و موقعيت اجتماعي

Sex:

Men and women have the same frequency of development of parotitis with mumps infection (M2020).

۶- تأثیر عوامل مساعد کننده

- عوامل فرهنگی و عقیدتی
- زمینه هایی نظیر ضعف ایمنی، ابتلاء به بیماریهای سرکوبگر ایمنی، مصرف داروهای تضعیف سیستم ایمنی
- استرس های مختلف
- فقر و بی خانمانی

- عوامل تماسی
- عوامل میزبانی
- عوامل محیطی



6. Predisposing factors

- ??

۷ - حساسیت و مقاومت در مقابل بیماری

- مقاومت طبیعی
- مصونیت اکتسابی بعد از ابتلاء
- مصونیت اکتسابی بعد از واکسیناسیون

7. Susceptibility & Resistance

- Transplacental transfer of maternal mumps antibodies has been demonstrated.
- Mumps is uncommon in infants younger than 1 year.

مقاومت شیرخواران

7. Susceptibility & Resistance

- After natural infection, **immunity** is generally lifelong.
- Effectiveness of mumps vaccination after one dose is estimated to be between 62%-91% and between 76% - 95% after two doses.
- There is also evidence to suggest **waning immunity** after both one and two doses of vaccine (C).

مدت زمان تداوم ایمنی ناشی از ابتلاء به اوریون؟
مدت زمان تداوم ایمنی ناشی از واکسن؟

8. Secondary attack rate

- More intimate contact is necessary to transmit mumps than for measles or varicella (M2020).

مقایسه عفونت‌زایی اوریون با سرخک و آبله مرغان؟

9-1. Modes of transmission

- Transmission is generally by **droplet** spread during face-to-face contact and **direct contact with** saliva or **respiratory droplets** from the nose or throat of an infected person.
- Mumps is spread through **coughing, sneezing, sharing drinks, kissing**, or from contact with any surface that has been contaminated with droplets containing the mumps virus (C).

Is naturally transmitted via direct contact, droplets, or fomites

9-2. period of communicability

- Mumps can be communicable from **seven days before and up to five days after** the onset of parotitis.
- There is a significant reduction in viral secretion by five days after symptom onset, thereby reducing the risk of transmission (C).
- The period of peak contagion is **just before or at the onset of parotitis** (M2020).

9-3. Reservoir

- **Humans** are the only known natural host; however, **monkeys** and other **laboratory animals** have been experimentally infected (M2020).

الف - مقدمه و معرفی بیماری

ب - اپیدمیولوژی توصیفی و وقوع (Occurrence)

ج - پیشگیری و کنترل

۰ - مقدماتی (Primordial)

۱ - سطح اول (Primary)

۲ - سطح دوم (Secondary)

۳ - سطح سوم (Tertiary)

۴ - سطح چهارم (Quaternary)

ج - پیشگیری و کنترول اوریون

- Primordial Prevention: “...minimize hazards to health”
- Primary Prevention:
 - Prevention of disease in “well” individuals
 - Reduce the incidence of disease
- Secondary Prevention:
 - Identification and intervention in early stages of disease (usually at asymptomatic stage)
 - May improve effectiveness of intervention
 - Reduce the prevalence of disease
- Tertiary Prevention:
 - Prevention of further deterioration, reduction in complications
 - Reduce the impact of complications
- Quaternary Prevention

1. Primary prevention

- **Educate population**
- **Immunoprophylaxis**
- All children older than 12 months should be immunized.
- Vaccination should take place at 12 to 15 months **and again at 4 to 6 years** of age, as part of immunization with the combined live measles-mumps-rubella (MMR) virus vaccine (M2020).

واکسیناسیون در منابع خارجی؟

1. Primary prevention

- **Immunoprophylaxis**

- **In IRAN, is recommended, starting at 12 months of age, followed by additional doses after an interval of 6 months (I.R.IRAN).**
- The Advisory Committee on Immunization Practices recommended that a third dose of MMR be administered to individuals at increased risk of mumps during an outbreak

واکسیناسیون در ایران؟

برنامه ایمنسازی کودکان در جمهوری اسلامی ایران

نوع واکسن	سن
BCG، هیپاتیت B، فلج اطفال خوراکی	بدو تولد
پنجگانه، فلج اطفال خوراکی	۲ ماهگی
پنجگانه، فلج اطفال خوراکی و فلج اطفال تزریقی	۴ ماهگی
پنجگانه، فلج اطفال خوراکی	۶ ماهگی
MMR	۱۲ ماهگی
سه گانه، فلج اطفال خوراکی، MMR	۱۸ ماهگی
سه گانه، فلج اطفال خوراکی	۶ سالگی

برنامه ایمنسازی کودکان در جمهوری اسلامی ایران

مراجعه ۶-۱ سالگی

واکسن	زمان مراجعه
پنجگانه (تا ۵۹ ماهگی) یا هپاتیت B و سه گانه (از ۶۰ ماهگی به بعد)، فلج اطفال خوراکی و تزریقی، MMR	اولین مراجعه
سه گانه، فلج اطفال خوراکی، هپاتیت B، MMR	یک ماه بعد از اولین مراجعه
سه گانه، فلج اطفال خوراکی	یک ماه بعد از دومین مراجعه
سه گانه، فلج اطفال خوراکی، هپاتیت B	۶ ماه تا یک سال بعد از سومین مراجعه
سه گانه (حداقل یک سال فاصله با نوبت قبلی)، فلج اطفال خوراکی	۶ سالگی

1. Primary prevention

میزان تاثیر واکسن و ماندگاری آن؟

- **Immunoprophylaxis**

- A single subcutaneous immunization produces protective levels of mumps-neutralizing antibodies in more than **95% of vaccinees**.
- Although the antibody levels produced are lower than after natural infection, adequate titers are maintained for at least **10.5 years** (M2020).

Mumps Vaccine

Adverse Reactions

- Adverse reactions to the vaccine are **uncommon**;
- Transient **suppression of tuberculin**-delayed hypersensitivity has been reported, and **parotitis** and **orchitis** have been recognized rarely (M2020).

عوارض واکسن؟

Mumps Vaccine

Adverse Reactions

- In Japan, aseptic **meningitis** associated with mumps vaccine virus occurred in 0.05% to 0.3% of recipients of the Urabe AM 9 mumps vaccine; manifestations began **2 to 4 weeks after immunization** (M2020).

Mumps Vaccine

Contraindications and Precautions:

- **Pregnant** women,
- Patients receiving **immunosuppressive** therapy,
- **Severe febrile illnesses,**
- Advanced **malignancies,**
- Congenital or acquired **immunodeficiencies**
(M2020).

موارد ممنوعیت واکسن؟



Mumps Vaccine

Contraindications and Precautions:

Individuals with **HIV** infection who are not severely immunocompromised may be immunized with **MMR** vaccine (M2020).

موارد ممنوعیت واکسن؟

Vaccination coverage

- Vaccine virus is not present in secretions of immunized children.

احتمال انتشار ویروس واکسن، پس از تلقیح آن؟

Vaccination coverage

- Mumps vaccine had been introduced nationwide in 122 countries by the end of 2017.

پوشش واکسن؟

Vaccination coverage WHO, 2020



- Introduced (Includes partial introduction)
- Not Available, Not Introduced/No Plans
- Not applicable

Date of slide: 2020-10-22

Map production: Immunization, Vaccines and Biologicals (IVB), World Health Organization(WHO)

Data source: IVB database

Disclaimer:

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate

Waiting for www.who.int...

0 875 1750



2. Secondary prevention

Diagnosis

- The **clinical diagnosis** is made on the basis of a history of exposure and of parotid swelling and tenderness.
- The diagnosis is confirmed by isolation of **mumps virus** or detection of mumps nucleic acid by **PCR** from clinical specimens or the presence of **mumps-specific IgM** or a fourfold rise in **mumps IgG** antibodies in serum (M2020).

2. Secondary prevention

Differential diagnosis

- Infectious mononucleosis
- Parotitis
- ...

2. Secondary prevention

Treatment:

- Therapy for mumps is symptomatic and supportive (M2020).

4. Tertiary prevention

زمانی که پیوند بیضه، تخمدان، پانکراس، مغز و ... در کسانی که به علت ابتلاء به این بیماری دچار عقیمی، تخریب پانکراس یا آنسفالیت مخرب و غیرقابل برگشت شده‌اند، امکانپذیر شود، اینگونه اقدامات، مثال‌های بارزی از پیشگیری سطح سوم، به شمار خواهد آمد.

4. Quaternary prevention

اجتناب از انجام اقدامات تشخیصی -
درمانی غیرلازم و تحمیل هزینه‌های
ذیربط

Mumps

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- Sarika Gupta, Diphtheria, Pertussis, Mumps.
- **WHO. Vaccination coverage Fact sheet 2018.**

اپیدمیولوژی بالینی و کنترل بیماری‌های عفونی (اوریون)

آدرس اسلایدها و کتب الکترونیک در سایت‌های اینترنتی :

↑ <https://sites.google.com/site/drhatamibrary> در سایت گوگل
https://sites.google.com/site/drhatamibrary7/mph_class/clinical_epidemiology_inf-htm

↑ <https://sapp.ir/drhatamibrary> در پیام رسان سروش

↑ <https://eitaa.com/drhatamibrary> در پیام رسان ایتا

<https://youtu.be/O6NR7vbOjo8>

فیلم آموزشی اوریون در Youtube

لطفا ویدیوی ۶ دقیقه‌ای را نیز مشاهده فرمایید