

***The
child,
measles
and
the eye***



DEPARTMENT OF IMMUNIZATION, VACCINES AND BIOLOGICALS
DEPARTMENT OF CHILD AND ADOLESCENT HEALTH



***World Health Organization
Geneva
2004 updated***

THE CHILD, MEASLES AND THE EYE

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The child, measles and the eye



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Photographs and artwork used in this teaching set are acknowledged:

- Slide 1 - Dr C J Clements
 - Slide 2 - WHO/EPI graphic
 - Slide 3 - WHO graphic
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 - Slides 14, 16 - WHO/EPI graphic
 - Slide 17 - WHO/j Mohr
 - Slide 19 - WHO/M Sentis
 - Slide 20 - WHO graphic
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THE CHILD, MEASLES AND THE EYE

INTRODUCTION

This teaching aid is about measles, and its potentially harmful effects on the eyes of children.¹ Understanding the risks of damage to the eye from measles is the first step before learning what action to take to save sight.

Measles causes a great amount of unnecessary death and blindness in children, especially in Africa and parts of Asia. Death and loss of sight due to measles are health care disasters that simply should not occur.

Measles is a highly infectious disease preventable by immunization. Reducing deaths due to measles is a global health priority. Immunized children rarely get measles and the cost of immunization is low.

The road to good health is also the road to good vision. Since the eye problems due to measles are especially dangerous in children who eat less well, this teaching aid also presents good feeding habits and how to improve the diet for the malnourished child. Protein-energy malnutrition is the most widespread form of malnutrition. It is not easily preventable in poor communities or where there is serious shortage of food as in famine situations and civil strife.

Vitamin A deficiency is especially important in children with measles for several reasons:

- Vitamin A deficiency is associated with a high death rate
- Vitamin A deficiency makes the effects of measles on the eye far worse and vice versa
- Vitamin A deficiency is preventable

¹ Further details on primary eye care are given in the publication "Strategies for the Prevention of Blindness in National Programmes - A Primary Health Care Approach". Geneva: World Health Organization, 2nd edition, 1997.

THE CHILD, MEASLES AND THE EYE

The target audience for the PowerPoint presentation and booklet includes workers in immunization, eye care programmes, nutrition education, maternal and child health, and all those involved in Primary Health Care. Preventing blindness in childhood due to measles calls for collaboration between all these groups.

The presentation and the booklet show that:

- Measles is a serious, and potentially blinding, disease
- Simple actions can save sight and life

The downloadable booklet can be printed and used on its own. However, wherever possible the PowerPoint presentation should be projected. Depending on your knowledge of eye care or immunization, you may be familiar with some of the topics presented. Other subjects may be new to you. It is good to work and learn within a group, so that everyone can profit from the experience of others. Working in groups also helps less experienced members to gain from those with more experience.

KNOWLEDGE YOU WILL ACQUIRE OR STRENGTHEN

- Simple examination of the eye
- Primary eye care
- Nutritional support against infections

EXAMINING THE EYE

- All sick children should have their eyes examined
- Eye examination is especially critical with measles

THE CHILD, MEASLES AND THE EYE

- Always look at each eye separately
- Compare the two eyes, and compare also with examination of a normal eye

The questions you need to answer as you examine the eyes of a child are simple. Here is a checklist:

- Any recent change in sight?²
- Any discharge?
- Do the eyelids open and close properly?
- Is the white part of the eye white?
- Is the transparent part of the eye (the cornea) transparent?
- Is the black central part of the eye (pupil) black?

Always wash your hands before and after examining the eye, so as not to spread infection.

ACTIONS TO BE TAKEN TO PREVENT MEASLES ASSOCIATED BLINDNESS

The treatment of eye disease following measles will depend on the skills of local health personnel, as well as the medicines and facilities available. Overall guidelines are:

1. Consider eye involvement during measles as an emergency
2. Refer immediately a child with obvious loss of vision in an eye to a health worker specialized in eye care

² If vision cannot be tested directly by measurements, then you can judge change in sight from the child's own comments or by changes in behaviour noted by the parents and family.

3. Treat the eye using the following Primary Eye Care medicines and equipment

Medicines

- Tetracycline 1% eye ointment.³
- Vitamin A capsules (60 mg retinol: 200 000 IU retinol palmitate/acetate in oily solution, 30 mg retinol: 100 000 IU retinol palmitate/acetate, or 15 mg retinol: 50 000 IU retinol palmitate/acetate).

Never use eye medicines containing steroids for eye disease following measles.

Avoid traditional eye medicines which may be harmful and cause blindness.

Equipment and Supplies

- Torch and batteries
- Hand magnifying lens
- Eye pads and bandages
- Fluorescein strips⁴

³ Chloramphenicol 1% eye ointment can be used if no tetracycline is available.

⁴ Fluorescein strips are an optional item, but are very useful to facilitate the detection of corneal damage.

CHILD WITH MEASLES

Slide 1



Measles is a highly infectious disease due to a virus spread by droplets in the air. Whenever susceptible individuals are brought together, measles will follow. Virtually all unprotected children have measles during childhood. The incubation period - time from exposure to onset of symptoms - is generally 8 to 12 days.

Initially the child with measles has a running nose, fever, cough, white spots inside the mouth and sore eyes. White spots inside the mouth are known as Koplik's spots and are only seen in measles. A skin rash develops after a few days, first across the forehead and behind the ears, then all over the face and down over the body and limbs. It begins to fade after three or four days, often leaving staining or peeling of the skin.

Measles always affects the eyes although not always seriously; but it may lead to loss of sight. Some 100 000 children become blind each year following measles. Measles also causes many other complications including pneumonia, diarrhoea, malnutrition, middle ear infection and damage to the brain. Eye and other complications are more likely to occur if the child's diet is poor - especially if inadequate in vitamin A.

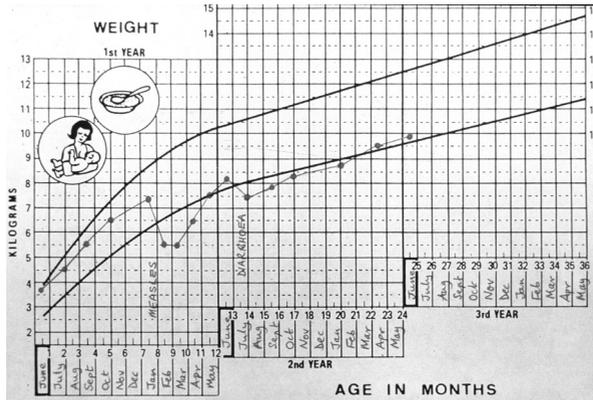
In developing countries, each year over 700 000 children die from the immediate effects of measles. Many more children die from delayed complications of measles. Death and severe eye disease particularly strike the poor and malnourished children living in large crowded families.

**What do people in your area
think causes measles?**

**How can you recognize
measles in a child?**

MEASLES AND GROWTH

Slide 2



Children who are healthy grow well. Using a growth chart is the best way to diagnose undernutrition. Every child needs to have their growth monitored regularly.

The Growth Chart shown follows the weight at different ages of a child over the first two years of life. The red points on the chart are the weight in kilograms. A healthy child should gain weight each month. The rapid rate of weight gain over the first three to four months of life seen in the slide is normal with a breast fed child. Breast fed children grow well because not only does breast milk contain the right balance of nutrients, but breast milk also contains substances which protect the young child against common infections.

The two solid lines are simply guides for average growth. The importance of the weight curve is not so much the absolute position on the chart, but that no weight should be lost from one month to the next. Weight loss, or failure to gain weight, is a sign of disease or undernutrition. Children who are below the lower solid line are also more at-risk.

Note that the weight curve in the slide starts off by following the upper of the two solid lines. In this example, the child then had measles at eight months and as a result lost weight. There is also one episode of weight loss, associated with diarrhoea, at the start of the second year of life.

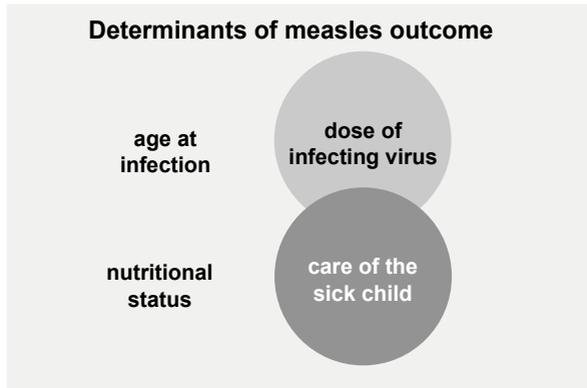
There are several possible reasons for the loss of weight which is frequently seen after measles. First, infants with measles develop a sore mouth which makes eating and drinking difficult. Second, at a time when the body needs more protein, energy and vitamins, fever and other complications such as pneumonia depress appetite. Third, diarrhoea reduces absorption of food. Fortunately for this child, recovery of normal growth was fast. Long term complications were also absent.

**Why is the Growth Chart
important for the management
of measles?**

**Why do breast fed children
grow so well?**

DETERMINANTS OF MEASLES OUTCOME

Slide 3



The outcome of measles infection is determined by several factors including:

- Age at infection
- Dose of infecting virus
- Nutritional status
- Care of the sick child

Newborn infants are protected from measles infection by the mother's antibodies. These antibodies cross the placenta into the baby's body before birth. There are also antibodies from the mother in breast milk, especially in the first milk (colostrum).

The age at which children develop measles is different in developing countries from the industrialized world. In developing countries, the chances of having measles at an early age are extremely high. For example, in some African countries, up to a quarter of measles cases are reported in infants between six and nine months of age. The mortality from measles is also highest between 6 and 24 months of age, during the time of weaning when protein-energy malnutrition is at its worst. In industrialized

countries epidemics of measles often occur in older children who have not been exposed to measles virus in the early years of life.

Early age of measles infection, protein-energy malnutrition and high levels of measles virus exposure are associated with a high risk of complications and mortality. There is a saying: "Count your children after measles." Some mothers do not name their children until they have had measles.

The dose of infecting virus affects measles outcome. Measles is more severe in children who live in crowded conditions where the dose of infecting virus is likely to be high, for example in urban slums or in secondary cases in large families. Measles is also more severe in children with protein-energy malnutrition and/or vitamin A deficiency. Early, and appropriate, care of the sick child with measles, as described in this training package, can reduce both measles deaths and complications.

If you have had measles, you cannot have it again. The body develops life long immunity to the measles virus by producing antibodies.

**How old were the last 3
children you saw with measles?**

**What difference does good child care
make to measles outcome in your area?**



Relief operations for famines or for refugees often involve large populations in overcrowded settings, where serious problems of acute and chronic undernutrition are found. Measles has been reported as the leading cause of mortality in refugee and displaced populations in many countries.

Measles control programmes in refugee and displaced community settings should focus on:

1. Measles prevention through immunization

Aim to immunize everyone in the target population initially by means of a mass campaign using measles vaccine. At a minimum, children from 6 months through 4 years of age must be immunized; ideally, immunization should include all children from 6 months through 14 years of age. The choice of ages covered will be influenced by vaccine availability, funding, human resources and local measles epidemiology. Vitamin A supplements should also be given to appropriate age groups at the same time as measles immunization.

An ongoing measles immunization programme should be targeted at:

- New arrivals
- infants aged 6 months or older who have not been immunized
- Children who were younger than the recommended age for immunization (nine months) when they first received measles vaccine

2. Measles outbreak control

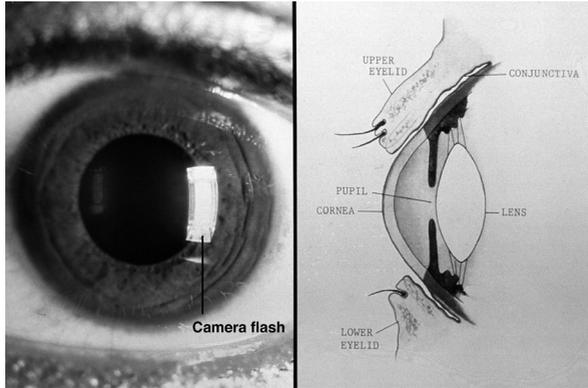
Prompt immunization of all children at risk is a priority, to prevent further cases during an epidemic. It is not too late to immunize with measles vaccine even if children have been exposed to the virus and you think they are incubating the disease. Immunize within three days of exposure and you may well prevent disease from developing. Large dose vitamin A supplements should also be given.

Isolation of patients with measles from the rest of the population, while desirable, is extremely difficult in refugee camp settings.

**What can be done to protect children
in refugee camps from measles?**

THE NORMAL EYE

Slide 5



In order to understand how measles affects the eye, it is important to know about the normal eye. Look at the picture on the left of the slide. This shows the front part of a normal eye; this is the part which can be damaged as a result of measles. Vitamin A deficiency also causes loss of sight due to damage to the front parts of the eye. On the right of the slide there is a diagram showing a cut section of the same part of the eye.

The white of the eye as seen on the left is the main outer coat of the eye - it is called the sclera. Covering the front part of the sclera as well as the inner surface of the eyelids is a thin layer or membrane called the conjunctiva. This membrane contains many blood vessels and becomes red when inflamed.

At the front of each eye is a circle of transparent tissue, the cornea. This is not seen in the photograph on the left because it is transparent, but it is shown in the picture on the right - slightly curved and pale blue in the slide.

Behind the transparent cornea is the coloured iris with a circular hole in its centre. The hole is the pupil. The iris is clearly seen in the photograph on the left because the cornea is transparent. The pupil appears black. The sclera is white and the iris is coloured - they do not allow light to pass through them. Light enters the eye through the clear transparent cornea and then passes through the pupil.

Between the cornea and the iris is the anterior chamber of the eye which contains a watery liquid. Behind the pupil is the transparent lens. The lens focuses light on the back of the eye so that we can see clearly.

**Name as many parts as you can
of the normal eye.**

MEASLES EYE INFECTION

Slide 6



Inflammation of the conjunctiva (conjunctivitis) and inflammation of the cornea (keratitis) due to the measles virus, are seen in the early stages of measles infection. The child typically has red and watery eyes and the characteristic measles rash appears 2 to 3 days later. Secondary bacterial infection of the conjunctiva may occur. Conjunctival infection, both viral and bacterial, is easily transmitted from the eyes of one child to another. Therefore always wash your hands before and after each eye examination. The characteristic features of early measles infection of the eye are:

- Watery discharge - "sticky eye"
- Redness of the eye
- Vision is unchanged

Measles virus in the cornea (keratitis) causes irritation of the eyes and a dislike for bright lights (photophobia). Children with keratitis protect their eyes from the light by keeping their eyes closed. The early changes of measles keratitis are best seen through a magnifying lens. The surface of the cornea becomes hazy and has a gray white appearance. The measles

keratitis will usually heal by itself without complications after 4 to 5 days. You should know that a damaged cornea associated with measles can have other causes such as:

- vitamin A deficiency
- harmful eye practices
- other viral infections

This slide shows a child with measles virus infection keratitis which is best treated by:

- Cleaning any discharge away from the eyes with a clean cloth and water
- Applying tetracycline 1% eye ointment three times daily
- Giving large doses of vitamin A by mouth (see Slides 15 and 16)

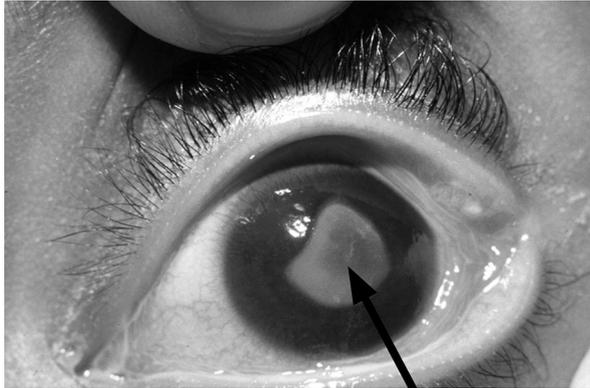
If there is no improvement after three days of treatment, refer the child for a full eye examination by a health worker specialized in eye care.

**How do you recognize measles
eye involvement?**

**Why should you wash your hands
before and after examining the
eye of a child?**

CORNEAL DAMAGE AND VITAMIN A DEFICIENCY

Slide 7



Ulcer stained
by fluorescein.

Children with measles eat less and suffer from diarrhoea, so that there is lower intake of essential foods as well as poorer absorption. The result can be a shortage of vitamin A for critical parts of the body such as: the eye, the lining cells of the airways leading to the lungs, the gut, and the immune cells which are part of the defense system against infection.

Those children who have measles and already have low levels of vitamin A in their liver reserves may get severe vitamin A deficiency. One way severe vitamin A deficiency damages the eye and threatens sight is by drying and causing ulceration of the cornea. The child in the slide has a large corneal ulcer due to vitamin A deficiency after measles. The corneal ulcer appears yellow-green on the slide due to staining with fluorescein. Only one eye was affected in this child, although corneal ulcers due to vitamin A deficiency after measles may affect both eyes at the same time.

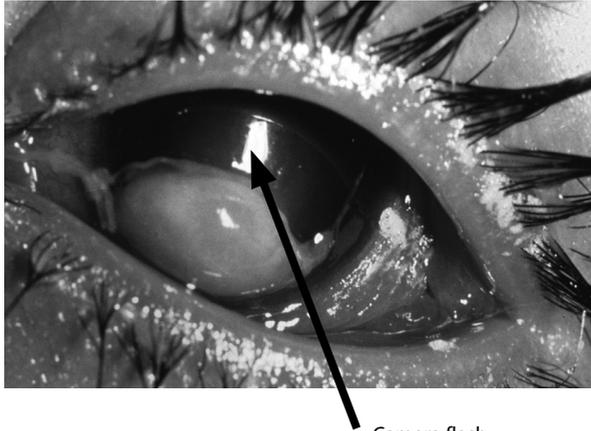
This child was treated with tetracycline 1% eye ointment three times daily for seven days, given a pad to protect the eye, and also given large doses of vitamin A supplements for two consecutive days. The child was then brought back by the parents a week later for examination of the eye and a further dose of vitamin A supplement. Eventually the child ended up with a white scar on the cornea, but still useful vision in the eye.

The point to note is that such severe corneal damage could have been prevented if the nutritional status of the child had been better before measles infection, or if vitamin A supplements had been given in the acute stage of measles infection. Delay in bringing the child to treatment can cost the child partial loss of sight. It could have been worse - the child might have been completely blind.

What can you do to prevent severe corneal damage after measles?

SEVERE CORNEAL DAMAGE

Slide 8



This is the eye of a three year old African child who had measles two weeks earlier. The most striking change is severe corneal damage. There is loss of transparency of the cornea with the formation of a gray slough involving a large part of the cornea. This appearance of softening and disintegration of the cornea is the end stage of severe corneal damage: it is known as keratomalacia. There is also marked inflammation of the conjunctiva, with increase in conjunctival blood vessels seen particularly on the right side of the picture.

When the child came back for a check-up six months later, there was a dense white scar affecting the central part of the eye so that the child had no useful vision in the eye. If this child had been seen promptly, and treated correctly, there would certainly not have been irreversible loss of sight in the affected eye.

Sight can be lost due to keratomalacia within a few hours or days. But dealing with this type of nutritional and eye involvement is not only a question of loss of sight, but also of life or death.

Without general case-management as many as two thirds of these children will be dead within a few months. Acute respiratory infections, such as pneumonia, as well as diarrhoea are among the major causes of death.

Correct general case-management of these children is not easy. To give them the best possible chance of surviving, you need to:

- Improve vitamin A status as rapidly as possible by giving large doses of vitamin A supplements (see Slide 16)
- Continue feeding and give nutrient and energy-rich foods
- Ensure that breast feeding continues
- Treat dehydration using oral rehydration therapy (ORT) if necessary
- Use antibiotics to eliminate secondary infections

What general case management should you use for a child with severe measles?

KERATITIS DUE TO EXPOSURE

Slide 9



This slide shows a malnourished child with measles who was suffering from dehydration and had a superficial corneal ulcer due to exposure of the eye. Children with severe measles are at high risk of death or prolonged illness, especially when they are malnourished. It is very important, therefore, to go on feeding such children because they need the food to give them the strength to recover from the measles infection. Breast feeding should always be continued in young children.

A child like the one shown in the slide should be given oral rehydration solution (ORS) to replace the loss of liquid and essential substances from the body. Older children also need frequent feeds of high energy nutrient-rich foods as well as rehydration and the specific treatment measures described below.

Children with measles should always have their eyes examined. If the child has an ulcer of the cornea due to exposure, you should:

- Give three doses of vitamin A supplements (see Slide 16)
- Apply tetracycline 1% eye ointment three times daily
- Close the eyelids carefully: use either a pad or tape the upper eye lid to the cheek until healing is complete

**Do you see many dehydrated children
in your area?**

**Do you see more dehydrated and
seriously ill children during
measles epidemics?**

SCARRING OF THE CORNEA

Slide 10



This young boy was photographed in a refugee camp on the eastern border of Sudan. He came with his family to the camp during a famine. Living in a small isolated village, he had not been exposed to measles until arrival in the camp. He was extremely malnourished at the time of measles infection and only survived because of the intensive nutritional support and medical care available in the camp. But there were no large dose vitamin A supplements available at the time.

No direct treatment was given to the eyes since the eyes were only properly examined when he was already recovering from measles. It was then too late for any useful treatment. This boy rapidly lost the sight in one eye due to corneal damage because the risks of eye damage in measles were not understood. Fortunately vision in the other eye remained normal.

Blindness due to extensive corneal scarring is very difficult to treat. Only very rarely can operations on the eye give some useful sight. This is the reason why prevention of measles, including eye damage, is so important.

In communities with severe malnutrition and over crowding - as in refugee camps or in urban slums where there may also be vitamin A deficiency - as many as one child in 1,000 may be blind. However, this figure includes only the survivors - like this child. Most children who become blind in these settings die from malnutrition and infection within a few months or a year.

**When was the last epidemic of measles
in your area?**

**What can be done to prevent
epidemics of measles?**

POST-MEASLES BLINDNESS

Slide 11



An eye that looks like the one in the slide is one result of severe corneal damage following measles. In this case, the cornea was weakened and thinned but not perforated.

Due to the pressure inside the eye, the iris was pressed against the cornea and both were blown outwards like a balloon. These changes are known as staphyloma.

With a large perforation all the contents of the eye may be pushed out: the eyeball then becomes shrunken and useless (*phthisis bulbi*).

This child from a farming household had measles at the age of two to three years, three weeks before the photo was taken. Apart from the eye problem he also had severe diarrhoea. None of the children in his village was immunized. The village was not far from a health centre and in a good farming area with many vegetables, mango, papaya, yellow marrow and other sources of vitamin A.

The eye remained painful with a watery discharge for many months. Finally, the eye was taken out and replaced with an artificial eye. The other eye fortunately retained good vision.

This child was unlucky for several reasons. First, the village he lived in had not been reached yet by immunization services. Second, his parents did not take him to the health clinic which was only a few minutes walk away. Thirdly, he had measles after the age of weaning. Although there was plenty of vitamin A containing food in the area, it was not the village custom to give such food to children of his age.

What could be done to improve immunization coverage in your area?

EXAMINING THE EYE

Slide 12



- Take the history of the illness from the mother or caretaker, and the child if old enough
- Look at each eye separately using a torch
- Children with measles often try to avoid the light and keep their eyes closed. You may have to open the eyelids in order to examine the eyes by using your fingers, but do not press on the eye

For Small Children:

- Wrap the child, with the arms at the side, in a sheet or similar piece of material
- The parent or another person places the child firmly over their knees (or lies the child on a bed or table)

The examiner gently holds the child's head between his knees

- An assistant shines a torch in the child's eyes
- The examiner can now use both hands to gently open the eyes

Always wash your hands before and after examining the eye of every child.

Go through the following checklist during examination of the eyes:

- Is there a recent change in sight? If so, it means that there is probably corneal involvement
- Do the eyelids not open properly? If so, there may be discharge sticking them together. Note that if the child does not close the eyelids properly, it may also be a warning sign of dehydration and life threatening illness
- Is the white part of the eye white? If not, the eye is not healthy. If the white part is red this can be a sign of infection
- Is the pupil black? If not, the child should be referred to an eye specialist
- Is the cornea transparent? If not, this is an eye emergency because it could be a corneal ulcer

How often do you send sick children to a health worker specialized in eye care?

What can you do for eye diseases, even without a health worker specialized in eye care?

AVOIDING HARMFUL EYE MEDICINES

Slide 13



Descemetocoele

Aware of the risk of blindness, parents of children with measles may treat the conjunctivitis or corneal lesions following measles with local eye remedies or with inappropriate modern medicines. For example, in different parts of Asia or Africa a variety of traditional remedies such as crushed snail shells, caustic lime, the juice of aloe plants, cow's and goat's urine are put into the eyes of sick children. Such treatment may damage the eye in different ways - by the action of harmful chemicals or by introducing bacterial or fungal infection.

This slide shows severe corneal damage - the cornea is perforated due to ulcers in several places - following use of traditional eye medicines on the eye.

Not all harmful eye medicines are traditional. Modern eye medicines containing steroids can be very dangerous and lead to rapid blindness, if given to children whose cornea is damaged during measles infection.

Some traditional health practices are good, others may be bad and others harmless. As health workers you should look at healing traditions in your communities. By encouraging those practices which are good, and pointing out practices which are harmful, you win people's confidence and respect. List those traditional health practices which are good, and should be used, in your area; those practices which are bad and should not be used and those practices which are harmless. The practices shown below come from a rural community in Africa.

| Practice | Reasoning (if any) | Good | Bad | Harmless | Why |
|--------------------------|-----------------------------------|------|-----|----------|--------------------------------|
| Isolation of child | Prevent contact with 'bad' people | X | | | Reduces spread of infection |
| Put goat's urine in eyes | Prevent blindness | | X | | Introduces infection into eyes |
| Wearing charms | Gives special protection | | | X | |

What are the traditional practices for treating measles in your area?

Have you any local medicines for eyes?

PRIMARY EYE CARE IN MEASLES

Slide 14

Primary Eye Care in Measles

For conjunctivitis (sticky eye):

- Clean the eye
- Use tetracycline 1% eye ointment

For corneal damage:

- Give large dose vitamin A
- Clean the eye
- Use tetracycline 1% eye ointment
- Apply an eye pad

If there is recent change in sight: refer urgently to a health worker specialized in eye care⁵.

If the eyelids remains open without blinking: it is a warning sign of dehydration and life threatening illness. The child needs urgent rehydration, as well as specific treatment of other complications. The eyes should be closed with a pad (or by taping the lids to the cheek) and tetracycline 1 % eye ointment used three times a day.

For conjunctivitis (sticky eye):

- Clean the eye with cotton or a clean piece of cloth
- Use tetracycline 1% eye ointment, three times a day for seven days

⁵ Night blindness - difficulty in seeing at dusk after sunset - should be treated immediately by giving a first dose of vitamin A supplement, and a second dose the next day. Night blindness due to vitamin A deficiency will disappear within 24-48 hours after being given a vitamin A supplement. Make sure also that mother understands about good feeding habits (slides 17 and 18).

The mother needs careful instructions, and a demonstration, how to apply eye ointment. Teach the mother to:

- Wash her hands before and after applying eye ointment
- Pull the lower lid down so that the conjunctiva can be seen
- Put a little amount of the medicine at the outer third of the lower conjunctiva
- Keep the eye closed for at least two minutes

For corneal damage:

- Immediately give vitamin A supplements orally (see slide 16)
- Clean the eye
- Use tetracycline eye ointment 1%, three times a day seven days
- Apply a protective eye pad

If there is no improvement within three days, refer if possible to a health worker specialized in eye care.

Never Use Eye Ointments Containing Steroids For Measles.

**Why should eye care be a priority
for your area?**

**What eye diseases are people most
worried about?**

VITAMIN A FOR MEASLES

Slide 15



Vitamin A cannot be made in the body and must come from food or be provided as a supplement. Extra vitamin A is stored in the liver so that it is available at times of need. When insufficient vitamin A is eaten, or there is increased demand due to infections, the body becomes depleted. Vitamin A plays an important role in protecting against infections as well as in maintaining normal sight and healthy eyes.

Night blindness is an early sign of vitamin A deficiency. Communities where vitamin A deficiency is a serious public health problem will often have a special local word for night blindness.

The immune system which fights infection is less effective when a person is vitamin A deficient. The cells which protect the air tubes of the lungs and the gut may also be damaged.

In measles:

- Vitamin A reserves fall rapidly, especially in already malnourished children
- The resistance of the body is weakened
- Giving vitamin A supplements limits eye damage, helps replace depleted body reserves and increases the chance of survival

WHO and UNICEF recommend that large doses of vitamin A supplements should be given to all children diagnosed with measles in communities where measles case-fatality is high and/or vitamin A deficiency is a problem. Giving vitamin A supplements can halve the number of deaths from measles, as well as reduce the rate of serious complications such as pneumonia and diarrhoea.

The slide shows a capsule of vitamin A supplement being given to a young child. Vitamin A supplement should always be given directly to children to make sure that it really reaches the child. Vitamin A supplements should not be left for parents to administer afterwards.

**Why is vitamin A so important
for children?**

VITAMIN A SCHEDULE

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| Age | Immediately on diagnosis | Next day | 2-4 weeks later (if eye signs) |
|----------------------------------|--------------------------|------------|--------------------------------|
| Infants less than 6 months old | 50 000 IU | 50 000 IU | 50 000 IU |
| Infants aged 6-11 months | 100 000 IU | 100 000 IU | 100 000 IU |
| Children aged 12 months and over | 200 000 IU | 200 000 IU | 200 000 IU |

Giving vitamin A supplements for measles saves lives in many countries. In areas where case fatality is high or there is a serious problem of vitamin A deficiency, give the first dose of vitamin A as soon as you see a child with measles.

The dose of vitamin A supplement for children with measles, immediately on diagnosis, should be 100 000 IU, by mouth, for children 6-12 months of age, and 200 000 IU for children above the age of one year. Measles is rare under the age of six months, but such young children may be given 50 000 IU vitamin A. A second dose of vitamin A should be given the following day. If any of the eye signs of vitamin A deficiency are present, a third dose of vitamin A should be given 2-4 weeks later.

Be as convincing as possible with the mother to make sure she will bring her child back to the health centre. Check to see whether the instructions are understood.

If you have only capsules with 200 000 IU vitamin A, open the capsule (if possible with a scissors or nail clipper) and give as near as possible half of the contents to infants under one year of age. There is no need to give vitamin A by injection since oral vitamin A is just as effective.

Even if a child with measles has diarrhoea enough vitamin A from the large dose given will be absorbed to be effective.

Vitamin A supplementation is safe if used as recommended. Sometimes the child may have lack of appetite, or even vomit, but this resolves within 24-48 hours without treatment.

Vitamin A preparations are relatively stable, especially when protected from the light. Even so, capsules or liquid dispensers should preferably be kept below 30° C. Vitamin A capsules or solution can be put in a refrigerator, but should not be frozen. Opened bottles should be used within two months.

Children with measles also need to eat and drink as much as possible. Complications such as pneumonia will need treatment with antibiotics. Even though vitamin A has been given, check the eyes of the child on every possible occasion.

**In your clinic or health centre, have you
vitamin A supplements
to use for measles?**

**When was the last epidemic
of measles in your area?**

**What were the most serious
complications?**

How many children died?

BREASTFEEDING AND WEANING

Slide 17



Every child who has measles needs to be given enough nutritious food and water to help the body fight the illness. Children should continue to be breast fed during measles.

Energy is needed as fuel for the body and protein to build muscle and internal structures. Vitamins and minerals are also essential. Good nutrition, including adequate vitamin A, reduces complications and helps in recovery from measles.

Until the age of six months of life, breast milk alone is the best food. Breast milk in the first days after birth, called colostrum, is especially rich in vitamin A as well as containing antibodies from the mother which protect the newborn. Breast milk is also the best source of vitamin A in the first few months of life. Foods to complement breast milk should be added at 6 months of age. But it is important to continue breast feeding at least during the first 2 years of life.

Children who are breast fed are much less likely to be short of vitamin A than those who are not breast fed; the protection lasts for a few years, even after breast feeding has stopped. Even mothers who are themselves deficient in vitamin A provide enough vitamin A in breast milk to give some protection for the young infant.

The infant grows very fast and therefore complementary foods need to contain adequate amounts of energy and protein, as well as essential vitamins and minerals. Cereal based weaning foods, to which vegetables with protein such as lentils or ground peanuts can be added, have more energy content if a small amount of oil (a tablespoon per serving) is added as well. Young children need also to be fed frequently throughout the day.

Vitamin A is found in whole milk and relatively expensive animal source foods such as liver and some fish. Good and also inexpensive sources of vitamin A are dark green leafy vegetables, yellow marrows and fruits such as papaya and mango as well as red palm oil.

**Until what age do mothers usually
breast feed in your area?**

**What weaning foods are traditionally
used and which are rich in vitamin A?**

GROWING AND EATING HEALTHY FOOD

Slide 18



Learn the best vitamin A rich foods for families to grow in their gardens, and something about methods of food production and storage. Find out to whom you can turn for further advice.

In many communities, the best foods from the fields are often produced for selling in the market. Cereals that are produced over large areas of the world, like rice in Asia, may not contain all the elements for a balanced diet. Rice (unless a specially fortified variety) has no vitamin A and important substances, such as other vitamins, may be lost during milling.

Home gardens are, therefore, a good place to grow special foods such as beans which contain vegetable protein, and green and yellow vegetables and fruits rich in vitamin A. School gardens are another place where vegetables and fruit rich in vitamin A can be grown. Look at the slide and see how many vitamin A-rich foods you can identify.

Carrots are a well-known vegetable high in vitamin A. But spinach type vegetables (Amaranth) with dark green leaves which are very rich in vitamin A grow better in many areas where the climate is hot and humid.

Slices of yellow marrow, sweet potato, pumpkin, papaya or mango are also rich in vitamin A. In good conditions, a papaya tree will give fruit within a year: one papaya tree is enough for a family.

Vitamin A, especially from vegetables and fruits, needs oil or fat in the diet so that absorption into the body is good; for example, by adding a small amount of oil, (especially red palm oil) to cereals or by preparing fried foods. Proteins are also needed so that vitamin A can be utilized in the body.

Cooking and food preservation practices affect the vitamin A content of food. Prolonged boiling reduces the vitamin A content of food. Sun drying, on the other hand, can be very useful as a method of preserving foods rich in vitamin A that are only available during limited seasons.

**Which foods would you advise mothers
to feed to small children to prevent
vitamin A deficiency?**

**How much oil or fat can people
afford to use each week?**

MEASLES IMMUNIZATION

Slide 19



To immunize a person, you give a vaccine - that is a weakened or killed form of the same micro-organism (virus or bacteria) which causes the disease. The vaccine makes the body produce antibodies, but it does not give the disease. These antibodies work only against a particular disease for which the vaccine has been prepared, not against others.

Measles immunization is a powerful weapon to prevent measles, and therefore deaths due to measles. Because the vaccine prevents children contracting measles infection, they do not get complications of the disease either - namely malnutrition, loss of sight, diarrhoea and respiratory disease.

Vaccine in good condition is able to make a child immune against measles. Damaged vaccine is not able to make a child immune. Care of vaccine is therefore essential in order to provide the best possible protection against disease. All vaccines lose their potency (capacity to immunize) after a certain time even with good care. Therefore always check that the expiry date printed on the label has not passed.

Measles vaccine is very safe. However some children may develop mild fever for a few days after immunization. Sometimes there is a rash like a mild measles rash. Serious complications are very rare.

In 2001, about 72% of young children in developing countries had received measles vaccine. The 30% of children not presently reached are at very high risk of measles complications and death.

To achieve a sustainable reduction in measles deaths a comprehensive vaccination strategy is needed. Since 2000, WHO and UNICEF have recommended the achievement and maintenance of high routine coverage (> 90%) with the first dose of measles vaccine. In addition, all children should be provided with a “second opportunity” for measles immunization to assure that those not reached by routine services, and those who were vaccinated but did not develop immunity, are protected. The second opportunity can be provided through the routine schedule or periodic measles immunization campaigns.

(For further information see: WHO/UNICEF Measles Mortality Reduction and Regional Elimination Strategic Plan 2001-2005. WHO, Geneva 2001)

Are there more or less children in your area with measles than in the past?

If there has been a change in the number of children with measles, what do you think is the cause?

IMMUNIZATION SCHEDULE

RECOMMENDED INFANT IMMUNIZATION SCHEDULE

| Age | Vaccine |
|-------------|---|
| At birth | BCG, OPV-0, HepB*-0 |
| At 6 weeks | DPT1, OPV-1, HepB-1, Hib |
| At 10 weeks | DPT2, OPV-2, HepB-2, Hib |
| At 14 weeks | DPT3, OPV-3, HepB-3, Hib |
| At 9 months | Measles** Yellow fever*** Vitamin A**** |

BCG - Bacillus Calmette-Guérin vaccine against tuberculosis

OPV - Oral poliovaccine against poliomyelitis (+OPV-0 in polio-endemic countries)

DPT - Triple vaccine against diphtheria, pertussis and tetanus

Hepatitis B vaccine - (*) Various options exist for three and four dose schedules for Hepatitis B vaccine depending on the epidemiologic situation and programmatic issues (such as the use of combination vaccines).

Hib - *Haemophilus influenzae* type b against childhood meningitis and bacterial pneumonia

Measles - (**) All children should be provided with a "second opportunity" for measles immunization to assure that those not reached by routine services, and those that were vaccinated but did not develop immunity are protected. This second opportunity can be provided through routine schedule or periodic campaigns.

Yellow fever vaccine - (***) in countries where yellow fever is endemic; give at nine months with measles vaccine.

Vitamin A - (****) In countries (or areas) where vitamin A deficiency is a public health problem, the measles immunization contact can provide an opportunity to give vitamin A to children. Immunization contacts (at birth or 6 weeks) are also important opportunities to give vitamin A to post-partum mothers and thereby benefit the infant via increased vitamin A content of breastmilk.

In addition, administration of tetanus toxoid is recommended for women of child-bearing age.

This slide shows the basic schedule recommended by the WHO for immunization of infants in developing countries. Some countries will use different timing of initial or repeat doses because of their own circumstances. Measles immunization is generally recommended at nine months of age.

Here are some points to remember:

1. A single dose of measles vaccine, properly administered, will protect more than 85% of children permanently. The timing of the measles immunization is critical. Immunize too early and the mothers' own antibodies make the vaccine ineffective. Immunize too late, and the child may already have had measles. The national immunization schedule should be followed regarding the age of administration. All children should be provided with a "second opportunity" to receive measles immunization. This may be done either as part of the routine schedule or in a campaign.
2. Measles vaccine is given by injection. A sterile needle and syringe for each injection and correct injection technique are essential.
3. Measles vaccine contains a live, though weakened, measles virus which is easily killed by heat. If this happens before the vaccine is used, the immunization is ineffective. The Cold Chain is a system for distributing vaccine in a potent state to children and mothers. Make sure the vaccine is stored in the Cold Chain at the proper temperature until used.
4. A child, or a woman of child bearing age, is only fully protected when all the immunizations in the schedule have been completed. For a woman, protection of both her and her newborn, against tetanus throughout the childbearing years needs at least five doses of tetanus toxoid, with the right intervals between doses.
5. Measles vaccine is usually the last vaccine to be given to complete a child's schedule. When you see a child for measles immunization, check also:
 - If the child still needs any other vaccine doses. For example BCG, DPT or Polio, or is due for vitamin A supplementation
 - If the mother needs any doses of tetanus toxoid to protect future children against neonatal tetanus

**What diseases of childhood are preventable by vaccines?
If you have children, are they fully protected against all these diseases?**

NOTES

SUMMARY OF MEASLES CASE MANAGEMENT

- Give vitamin A supplements immediately on diagnosis in all areas where measles is recognized as a serious disease, as well as to any child in other areas with severe measles. A second dose of vitamin A should be given the following day.

- Pay attention to maintaining and improving general nutritional status, for example by continuing breast feeding, increasing the frequency of feeding and including nutrient and energy-rich foods.

- Treat complications of measles such as lower respiratory tract infections, pneumonia and otitis media with appropriate antibiotics.

- Use oral rehydration treatment for children with severe diarrhoea, following WHO recommended guidelines.

- Examine the eyes of all children carefully, particularly checking for corneal damage. If there is conjunctivitis, apply tetracycline 1% eye ointment three times daily for seven days. If there is corneal damage, or change in sight, immediately give vitamin A supplements and a further dose of vitamin A on the following day. Refer urgently, where possible, to a health worker specialized in eye care. A third dose of vitamin A should be given 2-4 weeks later.