HAND FOOT AND MOUTH DISEASE (HFMD) GUIDELINES
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1. INTRODUCTION

Hand foot and mouth disease (HFMD) is typically a benign and common illness among children and infants characterized by rapidly ulcerating vesicles in the mouth and lesions, usually vesicular, on the hands and feet.¹ HFMD is an endemic disease in Malaysia. HFMD has become an important public health disease due to its tendency to cause large outbreaks and deaths among children and infants. The purpose of the guidelines is to help health personnels and health authorities, at any levels;

- To update current knowledge about HFMD
- To detect and control epidemic of HFMD as early as possible
- To strengthen the capacity for emergency response to epidemics of HFMD
- To improve the outcome of HFMD cases through effective case management.

2. THE DISEASE

Hand foot and mouth disease (HFMD) is caused by systemic infections with human enteroviruses. Human enteroviruses comprise one genus in the family Picornaviridae, which also contains the genera rhinovirus, cardiovirus, aphthovirus, hepatovirus and parechovirus. The members of the enterovirus genus that infect humans include the polioviruses, the Coxsackie virus groups A and B, the echoviruses and the enteroviruses 68-71.²

2.1 Transmission

Hand foot and mouth disease (HFMD) is moderately contagious. Infection is spread from person to person by direct contact with nose and throat discharges, saliva, fluid from blisters, or the stool of infected persons. A person is most contagious during the first week of the illness.

2.2 Clinical Features

HFMD is characterised by vesicular eruptions on the hands, wrists, feet and within the mouth. Lesions on the hands are almost always present, but oral lesions are present in 90% of patients and can occasionally be the only manifestation of the disease. The oral vesicles are often on the palate, tongue, and buccal mucosa and may range from a few isolated lesions to a marked stomatitis.

In addition patients may suffer fever, malaise, conjunctival injection, headache, and abdominal pain and occasionally diarrhea. The lesions on the feet and hands are flaccid, grayish vesicles, most often on the sides of the fingers, instep and
toes. If the disease is confined to the oral cavity it is almost indistinguishable from primary herpetic gingivostomatitis.³

Hand foot and mouth disease may be related to coxsackieviruses A16, A5, A9, A10, B2, B5 and enterovirus 71. Coxsackievirus A16 (Cox A16) is a frequently encountered pathogen in cases of HFMD and its clinical course is usually uneventful, with full recovery.

Fatal cases of Cox A16 infection are rare. Literature search revealed only three fatal cases of Cox A16 since 1963. All the cases were infants. The first case was reported by Wright et al in 1963 involving a 10 month-old girl with respiratory infection.⁴ The second case involved a 7 month-old boy with grunting and tongue ulcers.⁵ The third case was reported by Wang et al involving a 15 month-old boy who presented with hand foot and mouth disease complicated with myocarditis and intractable shock.⁶

HFMD caused by enterovirus 71 (EV71) can be more severe and may be complicated with meningitis, encephalitis and neurogenic pulmonary edema. In Taiwan, based on 1998 epidemic, the significant difference in the clinical features of Coxsackievirus A16 infection and EV71 infection was that in EV71 the fever was usually higher than 39°C and longer than 3 days.⁷

Enterovirus 71 infection can be classified into 4 stages:

Stage 1 – Hand foot and mouth disease (HFMD), oral ulcers and vesicular rash appearing on the hands, feet, knees and/or buttocks; or herpangina including oral ulceration over anterior tonsillar pillars, the soft palate, buccal mucosa or uvula.

Stage 2 – CNS involvement - aseptic meningitis with headache, irritability or myoclonic jerk and CSF pleocytosis (> 5 x 10⁶ leucocytes / litre) but without altered level of consciousness and focal signs, or encephalitis with altered level of consciousness plus CSF pleocytosis or poliomyelitis like syndrome with acute limb weakness and decreased reflex and muscle strength, or encephalomyelitis with the occurrence of both encephalitis and poliomyelitis like syndrome.

Stage 3 – Cardiopulmonary failure, pulmonary edema or hemorrhage with decreased ejection fraction of left ventricle as assessed by echocardiography necessitating inotropic agent support.
Stage 4 – Convalescence - is defined as recovery from cardiopulmonary failure.

2.3 Magnitude of the disease

Hand foot and mouth disease (HFMD) generally is a common and self limiting disease among children. EV 71 infection is the more important public health concern. In temperate countries most HFMD cases occur in the summer and fall and the incubation period is 4 – 6 days.

EV 71 was first isolated from a child with aseptic meningitis in California in 1969, and by 1974, the virus had been described as a new serotype of genus Enterovirus. In the years following the initial isolation of EV71, outbreaks occurred in USA, Australia, Sweden and Japan. In 1975 EV71 gained global attention when it was responsible for an outbreak in Bulgaria that resulted in 705 cases of poliomyelitis-like disease and the deaths of 44 people; 93% of the poliomyelitis-like disease cases occurred in children under the age of five. A similar outbreak occurred in Hungary in 1978, which also involved many cases of poliomyelitis-like disease and 47 deaths. Since this time outbreaks of EV71 have continued to occur throughout the world.

More recently there has been an increase in EV71 activity in the Asia Pacific region with several epidemics of HFMD being reported, including multiple cases associated with brain stem encephalitis and pulmonary edema. The first such epidemic occurred in Sarawak (Malaysian Borneo) in 1997 followed by smaller outbreaks in peninsular Malaysia and Japan. In 1998 outbreaks continued in Singapore and Taiwan.

The outbreak that occurred in Taiwan is the largest recorded, with greater than 100,000 cases of HFMD. Of these 400 children were admitted to hospital with central nervous system (CNS) involvement and 78 died of brainstem encephalitis with neurogenic pulmonary oedema. In 1999, a large HFMD outbreak occurred in Perth, western Australia and in 2000, EV71 was the cause of epidemics in Korea, Japan, Singapore, Taiwan and peninsular Malaysia, resulting in a range of clinical presentations including HFMD, aseptic meningitis, encephalitis and poliomyelitis like disease. Another outbreak occurred in Sarawak in 2003 which coincide with the SARS outbreak in the region and the public health measures put into place during this time evidently served to control transmission of enteroviruses as well.
3. CLINICAL MANAGEMENT OF HFMD

HFMD is usually a mild and self-limiting. In general, most cases of HFMD do not require admission but can be managed as outpatients. Most fatal HFMD cases were due to enterovirus infection.

3.1 Symptomatic treatment

Mild HFMD cases only need symptomatic treatment. Treatment of fever and relief of symptoms, adequate hydration and rest are important. Parents and caretakers should be educated on hygiene and measures that they should take to prevent transmission to other children.

3.2 Hospitalisation.

3.2.1 Criteria for admission
- When the child is unable to tolerate oral feeds and there is a need for intravenous hydration;
- When the child is clinically very ill or toxic-looking;
- When some other more serious disease cannot be excluded;
- When there is persistent hyperpyrexia (e.g. >38°C) for >48 hours;
- When there is a suspicion of neurological complications, e.g increased lethargy, myoclonus, increased drowsiness, change in sensorium and/or seizures;
- When there is a suspicion of cardiac complications (myocarditis), e.g low blood pressure, low pulse volume, heart rhythm abnormalities, murmurs, gallop rhythm, displaced apex beat;
- When parents are unable to cope with child’s illness; and
- When there is inadequate family or social support in looking after the child at home.

3.2.2 Infection control
- Proper hygiene including mandatory hand washing after contact with patient, appropriate cleanliness during diaper changes is imperative;
- Personal items such as spoons, cups and utensils should not be shared and should be properly washed with detergent after use;
- The use of gowns may act as a useful protection for health personnel looking after these patients; and
- Patients with HFMD should be isolated and the usual isolation procedures followed for infection control.
3.3 Patients with neurologic complication

Huang et al reviewed HFMD cases in Taiwan in 1998 and they found that the mean age of patients with neurological manifestations was 2.5 (range, 3 months to 8.2 years). Higher incidence occurs in the younger age group. The neurologic disorders usually began 2 to 5 days after the onset of skin or mucosa lesion or fever.

Wu JM et al carried out a prospective study among infants confirmed to have enterovirus 71 and found that:

- EV71 infection can lead to severe neurologic complications and acute pulmonary edema with or without hemorrhage
- All patients with EV71 infection and pulmonary edema had brainstem lesions
- Viral myocarditis is not the direct cause of acute PE and cardiopulmonary failure in EV71 Infection
- The excessive central sympathetic activation resulting in vasoconstriction was not the major cause of PE or hemorrhage

Based on the findings, they suggested that:

- Vasodilators should be used with caution since pulmonary edema in EV71 infection is not resulting from excessive vasoconstriction alone
- Cardiopulmonary function usually returns to nearly normal within days but the neurologic sequelae are severe and usually permanent. Therefore the use of extracorporeal membrane oxygenation support or a heart assist device should be weighed carefully
- Direct intracardiac hemodynamic monitoring may provide additional information to guide critical care
3.4. ADVICE GIVEN UPON PATIENT’S DISCHARGE

Parents and guardians should be advised upon patients discharge on complications that may occur; a statement as shown below can be given:

“Your child has been diagnosed to have hand-foot-mouth disease. This disease is normally not dangerous but in the light of recent events, we advise that you bring back your child to this hospital if he / she has any of the following symptoms:

- High fever.
- Lethargy and weakness.
- Refusing feeds and passing less urine.
- Rapid breathing.
- Vomiting.
- Drowsiness or irritably.
- Fits.”
4. SURVEILLANCE

The actual burden of HFMD in this country is not known. HFMD surveillance in Malaysia started after the Sarawak outbreak in 1997 with sentinel surveillance. Both private and government clinics were included as sentinel sites for each district. The number of sentinel sites for each district depends on the assumed prevalence of HFMD in the district / state.

HFMD notification is administratively required and started since October 2005. However death of HFMD and admitted cases to the ward of children aged 10 years old and below is mandatory for notification. However due to frequent outbreaks and fatality in Sarawak, Sarawak State has required all HFMD cases in the state to be notified.

The notification of HFMD came into enforcement on 12 October 2006 under the PU.A 374 / 2006 (appendix 1).

3.1 Objective of surveillance

i. To detect impending outbreak.

ii. To monitor circulating infectious agent.

iii. To estimate the magnitude of HFMD in the population at risk.

iv. To estimate the magnitude of the HFMD complication in the population at risk.

3.2 Case definition

3.2.1 Clinical case definition

3.2.1.1 Case of HFMD:

Any child with:

a. mouth / tongue ulcer and

b. maculopapular rashes and / or vesicles on palms and soles

c. with OR without history of fever

3.2.1.2 HFMD myocarditis:

2(i) Suspected HFMD myocarditis

Asymptomatic child with unexplained tachycardia to fulminant congestive cardiac failure.
With history of diarrhoea or URTI.
Accompanied by fever, malaise, tachypnoea, tachycardia (above and beyond expected for age and fever) or dehydration. Pallor and shock in the absence of or obvious pulmonary sign or in the presence of crepitations (no murmurs) and / or a clinically enlarged heart.

2(i) **Confirmed HFMD myocarditis.**
   The above 2(i) with virologic confirmation of enteroviruses.

3.2.1.3 **HFMD meningoencephalitis / AFP**

3(i) **Suspected HFMD meningoencephalitis**
   Evidence of aseptic meningitis.
   Evidence of aseptic encephalitis.
   Evidence of AFP.

3(ii) **Confirmed HFMD meningoencephalitis / AFP.**
   The above 3(i) with virologic confirmation of enteroviruses

3.2.2 **Laboratory criteria**

Any case that has the clinical symptoms and positive for viruses (coxsackieviruses (Cox) A16, A5, A9, A10, B2, B5 and enterovirus (EV) 71) which could cause HFMD, isolated or detected from stool or vesicle fluid or mouth ulcer or saliva.

3.2.3 **Case classification**

**Suspected:** A case that meets the clinical case definition.

**Confirmed:** A suspected case in which laboratory investigation confirms the presence of virus OR when cases are epidemiologically linked to a laboratory confirmed case.

3.3 **Types of surveillance**

3.3.1 **Clinical surveillance**

It is mandatory to notify HFMD under the National Notification of Infectious Diseases (list of notifiable diseases). Notification must be done within 24 hours of diagnosis via telephone, then it should be followed by notification form.
All HFMD cases detected must be entered to CDCIS. If states have other methods of data storing, it must be shared with MOH.

Laboratory confirmation is **NOT** required for notification.

### 3.2.2 Laboratory surveillance

**Sentinel sites**

Enterovirus surveillance is done through state's sentinel sites. A state has to choose two sentinel sites. Preferably the sites have a considerable numbers of children cases as HFMD prevalence is higher among this age group. At least 5 specimens from 5 patients per centre should be taken and sent to the designated laboratory (as in table below). Please use the laboratory request form as in appendix 2(i).

**Designated laboratory involves in enterovirus surveillance**

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Contact number</th>
<th>Respective states</th>
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<tr>
<td>IMR</td>
<td>03-26988792</td>
<td>Johor, WPKL, Melaka, Pahang.</td>
</tr>
<tr>
<td>UMMC</td>
<td>03-79675756 /</td>
<td>Selangor.</td>
</tr>
<tr>
<td></td>
<td>79676678</td>
<td></td>
</tr>
<tr>
<td>NPHL</td>
<td>03-61402213</td>
<td>Perlis, Kedah, Perak, Penang</td>
</tr>
<tr>
<td>HUKM</td>
<td>03 - 91702203 /</td>
<td>Negeri Sembilan</td>
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<tr>
<td>USM</td>
<td>09 - 7664602 /</td>
<td>Terengganu, Kelantan</td>
</tr>
<tr>
<td></td>
<td>4609 / 3000 ext 4602</td>
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</tr>
</tbody>
</table>

Surveillance for Sarawak and Sabah is expected to start once Kota Kinabalu Public Health Laboratory is ready to function.
Clinical Specimen Collection, Handling And Transportation

**Patient**

**Blood serology**

- 2 ml - in plain sterile tube

**Swab For viral culture**

- Rectal - wet swab with sterile saline

**CSF**

- 1 ml - in plain sterile tube

**Mouth ulcer**

**Vesicle** - basal scraping

**Viral transport media**

Send clinical samples to respective laboratory within 24 hours of collection at 4 °C (on ice). DONOT STORE AT -20 °C.
3.4 Flow of surveillance data

Notification data should be entered in CDCIS as and when there is HFMD case. Other sources of data must be shared with Disease Control Division. Data must have the variables listed in appendix 1.

Laboratory results for enterovirus surveillance must be shared with respective states and Disease Control Division using the suggested format in appendix 2(ii).
### Flow of Information Management

**Clinics**

- **Suspected HFMD Case**
  - **CDCIS**
    - Case fulfilled criteria
    - **Investigate & Register**
  - **Cluster of cases?**
    - **Preventive and control activities**
    - **Report**
    - **Finish**

**Laboratories**

- **Lab-Confirmed Cases**
  - **LIS**
    - Positive EV71
    - **Investigate**
    - **Yes**
      - **Preventive and control activities**
      - **Report**
    - **No**
      - **Finish**
5. MANAGEMENT OF SPORADIC CASES

5.1 Definitions of sporadic case:
A single case of HFMD in the absence of previous known close contact with another case.

5.2 The public health measures

5.2.1 Case Investigation

Case investigation is required following the criteria below:

a. every notified HFMD case that fulfilled any one of the criteria below:
   i. case is admitted to hospital
   ii. case died.
   iii. case aged 6 years and below and goes to any pre-schools or nurseries.

The first two criteria indicate severity of illness and it is a proxy of possible EV71 infection. Meanwhile the third criterion is important in preventing spread of illness among the pre-school children (high risk group) and reducing public anxiety.

b. every case with positive EV71 laboratory result.

Investigation should be carried out to determine the course, source and severity of infection. Enquiries shall be made into;

1. Particulars of the person affected
2. Clinical signs and symptoms with date of onset. In addition, enquiries shall be elicited for associated complications e.g. seizures, weakness of limbs, staring episodes, drowsiness, profound lethargy and refusal to play.
   Enterovirus infections that are not associated with complications may not have cutaneous manifestations.
3. Duration of illness
4. Type of treatment sought, including details of hospitalization and reason for admission
5. History of travel especially to outbreak area in the past two weeks
6. Contacts with similar illness in an institution (child care centre or kindergarten), family or neighbourhood where relevant.
7. If newborn, antenatal history including maternal history of febrile illness, mode of delivery
5.2.2 Incidence management

Following steps should be taken to prevent further spread of disease / pathogen:

1. Ensure that the infected children remain away from the institution for at least ten days after onset of symptoms and must be certified free from infection by a registered medical practitioner prior to returning to school.

2. Active case detection shall be carried out among contacts in the institution and family, and all those with illness shall be referred for treatment at the nearest health clinics.

3. Swabs from oral ulcers and vesicular lesions on the hands and feet shall be collected for virus isolation at identified laboratories (IMR or NPHL). If these ulcers and vesicles are no longer present, stool specimens shall be sent. Always consult pathologist for specimens taking, handling and transportation.

4. Health education of supervisors of institutions on the disease, mode of transmission, importance of good personal hygiene and isolation of infected children shall be carried out.

5. Principals, teachers and supervisors shall be alerted to look out for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer *Buku Panduan Latihan Taska dan Prasekolah*).

6. If there are two or case in the premise, advice the premise to be closed to cut disease transmission. It should be closed for two incubation period (10 days) from the date of onset of the last case.

7. Supervision on disinfection procedures shall be given to the premise operators. Articles such as toys contaminated by infected cases are disinfected with 0.5% sodium hypochlorite solutions (please refer *Buku Panduan Latihan Taska dan Prasekolah*).
6. MANAGEMENT OF OUTBREAK

6.1 Definitions of outbreak

The occurrence of two or more cases in the same locality within the incubation period.

Organisation based outbreak – two or more cases with onset in two weeks interval in a group which makes epidemiological sense.

6.2 Identification of outbreaks

Surveillance data on HFMD cases should be reviewed on continuous basis to identify cases and detects outbreaks.

6.3 Risk factors for outbreaks

Risk factors for outbreaks are not completely understood. A combination of conditions (environment, host and organism) is necessary for an epidemic to occur. However large HFMD outbreaks have been associated with EV71 infection.

6.4 Management of outbreaks

When a suspected outbreak is reported, it is important to determine rapidly whether a true outbreak is occurring based on the definition above.

Similar steps as in sporadic case management should be carried out together with following measures;

1. Ensure that the infected children remain away from the institution for at least ten days after onset of symptoms and must be certified free from infection by a registered medical practitioner prior to returning to school.

2. An assessment of the number of cases and susceptible population involved shall be made, and the overall attack rate and age-specific attack rate computed.

3. Active case detection shall be carried out among contacts in the institution and family, and all those with illness shall be referred for treatment at the nearest health clinics.

4. Where a case is observed or suspected to have unusual signs and symptoms e.g. seizures, weakness of limbs, profound lethargy, refusal to play, the case shall be immediately referred to hospital.

5. Swabs from oral ulcers and vesicular lesions on the hands and feet shall be collected for virus isolation at identified laboratories (IMR or NPHL). If these ulcers and vesicles are no longer present, stool specimens shall be sent. Always consult pathologist for specimens taking, handling and transportation.
6. Principals, teachers and supervisors shall be alerted to look out for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer Buku Panduan Latihan Taska dan Prasekolah).

7. Health education of supervisors of institutions on the disease, mode of transmission, importance of good personal hygiene and isolation of infected children shall be carried out.

8. Close the premise closed for two incubation period (10 days) from the date of onset of the last case. Supervision on disinfection procedures shall be given to the premise operators.

In addition the investigating team shall also look into environmental sanitation and hygiene to ensure that:

a. Articles such as toys contaminated by infected cases are disinfected with 0.5% sodium hypochlorite solutions (please refer Buku Panduan Latihan Taska dan Prasekolah).

b. A high standard of food and personal hygiene is maintained by the institution involved which include proper waste and diapers disposal.

c. The approved enrolment of Department of Social Welfare (JKM), Ministry of Education, Department of National Integration and other relevant parties, where applicable, and shall notify the relevant authorities if regulations not complied.

If the outbreak occurs in primary schools;

i. Ensure that the infected students remain away from the institution for at least ten days.

ii. Health education to the students on the disease, mode of transmission, importance of good personal hygiene.

iii. Principals, teachers and supervisors shall be look for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer Buku Panduan Latihan Taska dan Prasekolah).

iv. If closure is necessary, just closed the affected class. Closure of the whole school is unnecessary as HFMD in older children is usually very mild and so far no complication has been documented from this agegroup.
6.5 Documentation and review

Disease activity and emergency response should be adequately documented so that further outbreaks can be handled more effectively. A summary report should be prepared within a month from the last date of case; and distributed to all the stakeholders for feedback. Format of report, dissemination and tabling of report is discussed in more details in Infectious Disease Outbreak Rapid Response Manual.\textsuperscript{12}
Appendix 1

Variables required in HFMD surveillance database

1. Epid week
2. Name
3. Age
4. Sex
5. Ethnic
6. Home address
7. Locality
8. District
9. Name of school / preschool / nursery
10. Address of school / preschool / nursery
11. Date of onset
12. Case definition fulfilled
13. Symptoms and signs of CNS
14. Contact with HFMD case
15. Address of contact
16. Date of seen
17. Name of clinic / hospital
18. Government or private health facility
19. Outpatient or inpatient treatment
20. Date of admitted
21. Date of discharge
22. Date of death
# NATIONAL ENTEROVIRUS SURVEILLANCE
## DIAGNOSTIC REQUEST FORM

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### B. MAKLUMAT KLINIKAL

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### C. SPESIMEN KLINIKAL

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### E. MAKLAM (Untuk Kegunaan Makmal)

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<th>Nama dan tandatangan Pegawai Makmal</th>
<th>Tarikh</th>
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Nota * : All samples except blood / serum and stool must be in the viral transport media (VTM) and send immediately in ice pack to HUKM Microbiological Laboratory.
Variables Required for Enterovirus Surveillance Database

Name of Centre / Laboratory: ________________

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BORANG SIASATAN PESAKIT DI WAD
PENYAKIT TANGAN, KAKI DAN MULUT (HFMD)
BAHAGIAN KAWALAN PENYAKIT, KEMENTERIAN KESIHATAN MALAYSIA

BAHAGIAN 1

Tarikh masuk wad: ___________________________ Masa: ___________________________
Tarikh discaj: ___________________________ Masa: ___________________________
Tarikh kematian ____________ Masa: ___________________________

A. PERIHAL PESAKIT

1. Nama pesakit: ___________________________ 2. Tariikh lahir: ___________________________
Kedudukan rumah (GPS): X: ___________________________ Y: ___________________________
7. Jantina: [ ] Lelaki [ ] Perempuan
8. Kumpulan etnik
   [ ] Melayu [ ] Kadazan/Dusun
   [ ] Cina [ ] Murut
   [ ] India [ ] Bajau
   [ ] Asli semenanjung [ ] Melanau
   [ ] Bidayuh [ ] Iban
   [ ] Lain-lain pribumi [ ] Lain-lain (nyatakan)
   [ ] Sabah/Sarawak
10. Menghadiri sekolah / taska
    [ ] Ya
    [ ] Tidak

   [ ] Taska / Nurseri
   [ ] Prasekolah
   [ ] Sekolah
   Nyatakan nama: ___________________________

B. MAKLUMAT KLINIKAL

1. Tarikh mula sakt (onset) [ ] [ ] [ ] [ ] [ ]

2. Tanda dan gejala:
   [ ] [ ] Riwayat demam
   Ya [ ] Tidak
Ulser mulut
Ruam (rash) tapak tangan / kaki
vesicles di tapak tangan / kaki

3. Kompliksi

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Jika ya, sila nyatakan bahagian anggota: ____________________

Kematian

C. MAKLUMAT UJIAN MAKMAL

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D. MAKLUMAT PEGAWAI YANG MERAWAT

1. Nama Pakar / Pegawai Perubatan: __________________________    Tandatangan: ____________
2. Nama Wad: __________________________    Tarikh notifikasi: _________
3. Nama hospital: __________________________    Tarih notifikasi: _________
7. REFERENCES


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7. N. Sembilan  Dr. Zulfa Vety Dol Bakri
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1. INTRODUCTION

Hand foot and mouth disease (HFMD) is typically a benign and common illness among children and infants characterized by rapidly ulcerating vesicles in the mouth and lesions, usually vesicular, on the hands and feet.\(^1\) HFMD is an endemic disease in Malaysia. HFMD has become an important public health disease due to its tendency to cause large outbreaks and deaths among children and infants. The purpose of the guidelines is to help health personnel and health authorities, at any levels;

- To update current knowledge about HFMD
- To detect and control epidemic of HFMD as early as possible
- To strengthen the capacity for emergency response to epidemics of HFMD
- To improve the outcome of HFMD cases through effective case management.

2. THE DISEASE

Hand foot and mouth disease (HFMD) is caused by systemic infections with human enteroviruses. Human enteroviruses comprise one genus in the family Picornaviridae, which also contains the genera rhinovirus, cardiovirus, aphthovirus, hepatovirus and parechovirus. The members of the enterovirus genus that infect humans include the polioviruses, the Coxsackie virus groups A and B, the echoviruses and the enteroviruses 68-71.\(^2\)

2.1 Transmission

Hand foot and mouth disease (HFMD) is moderately contagious. Infection is spread from person to person by direct contact with nose and throat discharges, saliva, fluid from blisters, or the stool of infected persons. A person is most contagious during the first week of the illness.

2.2 Clinical Features

HFMD is characterised by vesicular eruptions on the hands, wrists, feet and within the mouth. Lesions on the hands are almost always present, but oral lesions are present in 90% of patients and can occasionally be the only manifestation of the disease. The oral vesicles are often on the palate, tongue, and buccal mucosa and may range from a few isolated lesions to a marked stomatitis.

In addition patients may suffer fever, malaise, conjunctival injection, headache, and abdominal pain and occasionally diarrhea. The lesions on the feet and hands are flaccid, grayish vesicles, most often on the sides of the fingers, instep and
toes. If the disease is confined to the oral cavity it is almost indistinguishable from primary herpetic gingivostomatitis.³

Hand foot and mouth disease may be related to coxsackieviruses A16, A5, A9, A10, B2, B5 and enterovirus 71. Coxsackievirus A16 (Cox A16) is a frequently encountered pathogen in cases of HFMD and its clinical course is usually uneventful, with full recovery.

Fatal cases of Cox A16 infection are rare. Literature search revealed only three fatal cases of Cox A16 since 1963. All the cases were infants. The first case was reported by Wright et al in 1963 involving a 10 month-old girl with respiratory infection.⁴ The second case involved a 7 month-old boy with grunting and tongue ulcers.⁵ The third case was reported by Wang et al involving a 15 month-old boy who presented with hand foot and mouth disease complicated with myocarditis and intractable shock.⁶

HFMD caused by enterovirus 71 (EV71) can be more severe and may be complicated with meningitis, encephalitis and neurogenic pulmonary edema. In Taiwan, based on 1998 epidemic, the significant difference in the clinical features of Coxsackievirus A16 infection and EV 71 infection was that in EV71 the fever was usually higher than 39°C and longer than 3 days.⁷

Enterovirus 71 infection can be classified into 4 stages:

- **Stage 1** – Hand foot and mouth disease (HFMD), oral ulcers and vesicular rash appearing on the hands, feet, knees and / or buttocks; or herpangina including oral ulceration over anterior tonsillar pillars, the soft palate, buccal mucosa or uvula.

- **Stage 2** – CNS involvement - aseptic meningitis with headache, irritability or myoclonic jerk and CSF pleocytosis (> 5 x 10⁶ leucocytes / litre) but without altered level of consciousness and focal signs, or encephalitis with altered level of consciousness plus CSF pleocytosis or poliomyelitis like syndrome with acute limb weakness and decreased reflex and muscle strength, or encephalomyelitis with the occurrence of both encephalitis and poliomyelitis like syndrome.

- **Stage 3** – Cardiopulmonary failure, pulmonary edema or hemorrhage with decreased ejection fraction of left ventricle as assessed by echocardiography necessitating inotropic agent support.
Stage 4 – Convalescence - is defined as recovery from cardiopulmonary failure.

2.3 Magnitude of the disease

Hand foot and mouth disease (HFMD) generally is a common and self limiting disease among children. EV 71 infection is the more important public health concern. In temperate countries most HFMD cases occur in the summer and fall and the incubation period is 4 – 6 days.

EV 71 was first isolated from a child with aseptic meningitis in California in 1969, and by 1974, the virus had been described as a new serotype of genus Enterovirus. In the years following the initial isolation of EV71, outbreaks occurred in USA, Australia, Sweden and Japan. In 1975 EV71 gained global attention when it was responsible for an outbreak in Bulgaria that resulted in 705 cases of poliomyelitis-like disease and the deaths of 44 people; 93% of the poliomyelitis-like disease cases occurred in children under the age of five. A similar outbreak occurred in Hungary in 1978, which also involved many cases of poliomyelitis-like disease and 47 deaths. Since this time outbreaks of EV71 have continued to occur throughout the world.

More recently there has been an increase in EV71 activity in the Asia Pacific region with several epidemics of HFMD being reported, including multiple cases associated with brain stem encephalitis and pulmonary edema. The first such epidemic occurred in Sarawak (Malaysian Borneo) in 1997 followed by smaller outbreaks in peninsular Malaysia and Japan. In 1998 outbreaks continued in Singapore and Taiwan.

The outbreak that occurred in Taiwan is the largest recorded, with greater than 100,000 cases of HFMD. Of these 400 children were admitted to hospital with central nervous system (CNS) involvement and 78 died of brainstem encephalitis with neurogenic pulmonary oedema. In 1999, a large HFMD outbreak occurred in Perth, western Australia and in 2000, EV71 was the cause of epidemics in Korea, Japan, Singapore, Taiwan and peninsular Malaysia, resulting in a range of clinical presentations including HFMD, aseptic meningitis, encephalitis and poliomyelitis like disease. Another outbreak occurred in Sarawak in 2003 which coincide with the SARS outbreak in the region and the public health measures put into place during this time evidently served to control transmission of enteroviruses as well.
3. CLINICAL MANAGEMENT OF HFMD

HFMD is usually a mild and self-limiting. In general, most cases of HFMD do not require admission but can be managed as outpatients. Most fatal HFMD cases were due to enterovirus infection.

3.1 Symptomatic treatment

Mild HFMD cases only need symptomatic treatment. Treatment of fever and relief of symptoms, adequate hydration and rest are important. Parents and caretakers should be educated on hygiene and measures that they should take to prevent transmission to other children.

3.2 Hospitalisation.

3.2.1 Criteria for admission

- When the child is unable to tolerate oral feeds and there is a need for intravenous hydration;
- When the child is clinically very ill or toxic-looking;
- When some other more serious disease cannot be excluded;
- When there is persistent hyperpyrexia (e.g. >38°C) for >48 hours;
- When there is a suspicion of neurological complications, e.g. increased lethargy, myoclonus, increased drowsiness, change in sensorium and/or seizures;
- When there is a suspicion of cardiac complications (myocarditis), e.g. low blood pressure, low pulse volume, heart rhythm abnormalities, murmurs, gallop rhythm, displaced apex beat;
- When parents are unable to cope with child’s illness; and
- When there is inadequate family or social support in looking after the child at home.

3.2.2 Infection control

- Proper hygiene including mandatory hand washing after contact with patient, appropriate cleanliness during diaper changes is imperative;
- Personal items such as spoons, cups and utensils should not be shared and should be properly washed with detergent after use;
- The use of gowns may act as a useful protection for health personnel looking after these patients; and
- Patients with HFMD should be isolated and the usual isolation procedures followed for infection control.
3.3 Patients with neurologic complication

Huang et al reviewed HFMD cases in Taiwan in 1998 and they found that the mean age of patients with neurological manifestations was 2.5 (range, 3 months to 8.2 years). Higher incidence occurs in the younger age group. The neurologic disorders usually began 2 to 5 days after the onset of skin or mucosa lesion or fever.

Wu JM et al carried out a prospective study among infants confirmed to have enterovirus 71 and found that:\n
- EV71 infection can lead to severe neurologic complications and acute pulmonary edema with or without hemorrhage
- All patients with EV71 infection and pulmonary edema had brainstem lesions
- Viral myocarditis is not the direct cause of acute PE and cardiopulmonary failure in EV71 Infection
- The excessive central sympathetic activation resulting in vasoconstriction was not the major cause of PE or hemorrhage

Based on the findings, they suggested that:

- Vasodilators should be used with caution since pulmonary edema in EV71 infection is not resulting from excessive vasoconstriction alone
- Cardiopulmonary function usually returns to nearly normal within days but the neurologic sequelae are severe and usually permanent. Therefore the use of extracorporeal membrane oxygenation support or a heart assist device should be weighed carefully
- Direct intracardiac hemodynamic monitoring may provide additional information to guide critical care
3.4. ADVICE GIVEN UPON PATIENT’S DISCHARGE

Parents and guardians should be advised upon patients discharge on complications that may occur; a statement as shown below can be given:

“Your child has been diagnosed to have hand-foot-mouth disease. This disease is normally not dangerous but in the light of recent events, we advise that you bring back your child to this hospital if he / she has any of the following symptoms:

- High fever.
- Lethargy and weakness.
- Refusing feeds and passing less urine.
- Rapid breathing.
- Vomiting.
- Drowsiness or irritably.
- Fits.”
4. SURVEILLANCE

The actual burden of HFMD in this country is not known. HFMD surveillance in Malaysia started after the Sarawak outbreak in 1997 with sentinel surveillance. Both private and government clinics were included as sentinel sites for each district. The number of sentinel sites for each district depends on the assumed prevalence of HFMD in the district / state.

HFMD notification is administratively required and started since October 2005. However death of HFMD and admitted cases to the ward of children aged 10 years old and below is mandatory for notification. However due to frequent outbreaks and fatality in Sarawak, Sarawak State has required all HFMD cases in the state to be notified.

The notification of HFMD came into enforcement on 12 October 2006 under the PU.A 374 / 2006 (appendix 1).

3.1 Objective of surveillance
   i. To detect impending outbreak.
   ii. To monitor circulating infectious agent.
   iii. To estimate the magnitude of HFMD in the population at risk.
   iv. To estimate the magnitude of the HFMD complication in the population at risk.

3.2 Case definition

3.2.1 Clinical case definition
   3.2.1.1 Case of HFMD:
   Any child with:
   a. mouth / tongue ulcer and
   b. maculopapular rashes and / or vesicles on palms and soles
   c. with OR without history of fever

   3.2.1.2 HFMD myocarditis:

   2(i) Suspected HFMD myocarditis
   Asymptomatic child with unexplained tachycardia to fulminant congestive cardiac failure.
   With history of diarrhoea or URTI.
Accompanied by fever, malaise, tachypnoea, tachycardia (above and beyond expected for age and fever) or dehydration. Pallor and shock in the absence of or obvious pulmonary sign or in the presence of crepitations (no murmurs) and/or a clinically enlarged heart.

2(i) **Confirmed HFMD myocarditis.**
   The above 2(i) with virologic confirmation of enteroviruses.

3.2.1.3 **HFMD meningoencephalitis / AFP**

3(i) **Suspected HFMD meningoencephalitis**
   Evidence of aseptic meningitis.
   Evidence of aseptic encephalitis.
   Evidence of AFP.

3(ii) **Confirmed HFMD meningoencephalitis / AFP.**
   The above 3(i) with virologic confirmation of enteroviruses

**3.2.2 Laboratory criteria**

Any case that has the clinical symptoms and positive for viruses (coxsackieviruses (Cox) A16, A5, A9, A10, B2, B5 and enterovirus (EV) 71) which could cause HFMD, isolated or detected from stool or vesicle fluid or mouth ulcer or saliva.

**3.2.3 Case classification**

**Suspected:** A case that meets the clinical case definition.

**Confirmed:** A suspected case in which laboratory investigation confirms the presence of virus OR when cases are epidemiologically linked to a laboratory confirmed case.

**3.3 Types of surveillance**

**3.3.1 Clinical surveillance**

It is mandatory to notify HFMD under the National Notification of Infectious Diseases (list of notifiable diseases). Notification must be done within 24 hours of diagnosis via telephone, then it should be followed by notification form.
All HFMD cases detected must be entered to CDCIS. If states have other methods of data storing, it must be shared with MOH.

Laboratory confirmation is **NOT** required for notification.

### 3.2.2 Laboratory surveillance

**Sentinel sites**

Enterovirus surveillance is done through state's sentinel sites. A state has to choose two sentinel sites. Preferably the sites have a considerable numbers of children cases as HFMD prevalence is higher among this age group. At least 5 specimens from 5 patients per centre should be taken and sent to the designated laboratory (as in table below). Please use the laboratory request form as in appendix 2(l).

**Designated laboratory involves in enterovirus surveillance**

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<td>USM</td>
<td>09 - 7664602 / 4609 / 3000 ext 4602</td>
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Surveillance for Sarawak and Sabah is expected to start once Kota Kinabalu Public Health Laboratory is ready to function.
Clinical Specimen Collection, Handling And Transportation

Patient

Blood serology

Swab
For viral culture

CSF

2 ml
- in plain sterile tube

1 ml
- in plain sterile tube

Mouth ulcer

Rectal
- wet swab with sterile saline

Vesicle
- basal scrapping

Viral transport media

Smear on slide

Send clinical samples to respective laboratory within 24 hours of collection at 4 °C (on ice).
DO NOT STORE AT -20 °C
3.4 **Flow of surveillance data**

Notification data should be entered in CDCIS as and when there is HFMD case. Other sources of data must be shared with Disease Control Division. Data must have the variables listed in appendix 1.

Laboratory results for enterovirus surveillance must be shared with respective states and Disease Control Division using the suggested format in appendix 2(ii).
5. MANAGEMENT OF SPORADIC CASES

5.1 Definitions of sporadic case:
A single case of HFMD in the absence of previous known close contact with another case.

5.2 The public health measures

5.2.1 Case Investigation

Case investigation is required following the criteria below:

a. every notified HFMD case that fulfilled any one of the criteria below:
   i. case is admitted to hospital
   ii. case died.
   iii. case aged 6 years and below and goes to any pre-schools or nurseries.

The first two criteria indicate severity of illness and it is a proxy of possible EV71 infection. Meanwhile the third criterion is important in preventing spread of illness among the pre-school children (high risk group) and reducing public anxiety.

b. every case with positive EV71 laboratory result.

Investigation should be carried out to determine the course, source and severity of infection. Enquiries shall be made into;

1. Particulars of the person affected
2. Clinical signs and symptoms with date of onset. In addition, enquiries shall be elicited for associated complications e.g. seizures, weakness of limbs, staring episodes, drowsiness, profound lethargy and refusal to play.
   Enterovirus infections that are not associated with complications may not have cutaneous manifestations.
3. Duration of illness
4. Type of treatment sought, including details of hospitalization and reason for admission
5. History of travel especially to outbreak area in the past two weeks
6. Contacts with similar illness in an institution (child care centre or kindergarten), family or neighbourhood where relevant.
7. If newborn, antenatal history including maternal history of febrile illness, mode of delivery
5.2.2 Incidence management

Following steps should be taken to prevent further spread of disease / pathogen:

1. Ensure that the infected children remain away from the institution for at least ten days after onset of symptoms and must be certified free from infection by a registered medical practitioner prior to returning to school.

2. Active case detection shall be carried out among contacts in the institution and family, and all those with illness shall be referred for treatment at the nearest health clinics.

3. Swabs from oral ulcers and vesicular lesions on the hands and feet shall be collected for virus isolation at identified laboratories (IMR or NPHL). If these ulcers and vesicles are no longer present, stool specimens shall be sent. Always consult pathologist for specimens taking, handling and transportation.

4. Health education of supervisors of institutions on the disease, mode of transmission, importance of good personal hygiene and isolation of infected children shall be carried out.

5. Principals, teachers and supervisors shall be alerted to look out for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer Buku Panduan Latihan Taska dan Prasekolah).

6. If there are two or case in the premise, advice the premise to be closed to cut disease transmission. It should be closed for two incubation period (10 days) from the date of onset of the last case.

7. Supervision on disinfection procedures shall be given to the premise operators. Articles such as toys contaminated by infected cases are disinfected with 0.5% sodium hypochlorite solutions (please refer Buku Panduan Latihan Taska dan Prasekolah).
6. **MANAGEMENT OF OUTBREAK**

6.1 **Definitions of outbreak**
The occurrence of two or more cases in the same locality within the incubation period.

**Organisation based outbreak** – two or more cases with onset in two weeks interval in a group which makes epidemiological sense.

6.2 **Identification of outbreaks**
Surveillance data on HFMD cases should be reviewed on continuous basis to identify cases and detects outbreaks.

6.3 **Risk factors for outbreaks**
Risk factors for outbreaks are not completely understood. A combination of conditions (environment, host and organism) is necessary for an epidemic to occur. However large HFMD outbreaks have been associated with EV71 infection.

6.4 **Management of outbreaks**
When a suspected outbreak is reported, it is important to determine rapidly whether a true outbreak is occurring based on the definition above.

Similar steps as in sporadic case management should be carried out together with following measures;

1. Ensure that the infected children remain away from the institution for at least ten days after onset of symptoms and must be certified free from infection by a registered medical practitioner prior to returning to school.
2. An assessment of the number of cases and susceptible population involved shall be made, and the overall attack rate and age-specific attack rate computed.
3. Active case detection shall be carried out among contacts in the institution and family, and all those with illness shall be referred for treatment at the nearest health clinics.
4. Where a case is observed or suspected to have unusual signs and symptoms e.g. seizures, weakness of limbs, profound lethargy, refusal to play, the case shall be immediately referred to hospital.
5. Swabs from oral ulcers and vesicular lesions on the hands and feet shall be collected for virus isolation at identified laboratories (IMR or NPHL). If these ulcers and vesicles are no longer present, stool specimens shall be sent. Always consult pathologist for specimens taking, handling and transportation.
6. Principals, teachers and supervisors shall be alerted to look out for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer *Buku Panduan Latihan Taska dan Prasekolah*).

7. Health education of supervisors of institutions on the disease, mode of transmission, importance of good personal hygiene and isolation of infected children shall be carried out.

8. Close the premise closed for two incubation period (10 days) from the date of onset of the last case. Supervision on disinfection procedures shall be given to the premise operators.

In addition the investigating team shall also look into environmental sanitation and hygiene to ensure that:

a. Articles such as toys contaminated by infected cases are disinfected with 0.5% sodium hypochlorite solutions (please refer *Buku Panduan Latihan Taska dan Prasekolah*).

b. A high standard of food and personal hygiene is maintained by the institution involved which include proper waste and diapers disposal.

c. The approved enrolment of Department of Social Welfare (JKM), Ministry of Education, Department of National Integration and other relevant parties, where applicable, and shall notify the relevant authorities if regulations not complied.

If the outbreak occurs in primary schools;

i. Ensure that the infected students remain away from the institution for at least ten days.

ii. Health education to the students on the disease, mode of transmission, importance of good personal hygiene.

iii. Principals, teachers and supervisors shall be look for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer *Buku Panduan Latihan Taska dan Prasekolah*).

iv. If closure is necessary, just closed the affected class. Closure of the whole school is unnecessary as HFMD in older children is usually very mild and so far no complication has been documented from this agegroup.
6.5 Documentation and review

Disease activity and emergency response should be adequately documented so that further outbreaks can be handled more effectively. A summary report should be prepared within a month from the last date of case; and distributed to all the stakeholders for feedback. Format of report, dissemination and tabling of report is discussed in more details in Infectious Disease Outbreak Rapid Response Manual.¹²
### Appendix 1

**Variables required in HFMD surveillance database**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
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<tbody>
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</tr>
<tr>
<td>2</td>
<td>Name</td>
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<td>Age</td>
</tr>
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<td>Sex</td>
</tr>
<tr>
<td>5</td>
<td>Ethnic</td>
</tr>
<tr>
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<td>Home address</td>
</tr>
<tr>
<td>7</td>
<td>Locality</td>
</tr>
<tr>
<td>8</td>
<td>District</td>
</tr>
<tr>
<td>9</td>
<td>Name of school / preschool / nursery</td>
</tr>
<tr>
<td>10</td>
<td>Address of school / preschool / nursery</td>
</tr>
<tr>
<td>11</td>
<td>Date of onset</td>
</tr>
<tr>
<td>12</td>
<td>Case definition fulfilled</td>
</tr>
<tr>
<td>13</td>
<td>Symptoms and signs of CNS</td>
</tr>
<tr>
<td>14</td>
<td>Contact with HFMD case</td>
</tr>
<tr>
<td>15</td>
<td>Address of contact</td>
</tr>
<tr>
<td>16</td>
<td>Date of seen</td>
</tr>
<tr>
<td>17</td>
<td>Name of clinic / hospital</td>
</tr>
<tr>
<td>18</td>
<td>Government or private health facility</td>
</tr>
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<td>Date of admitted</td>
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<tr>
<td>21</td>
<td>Date of discharge</td>
</tr>
<tr>
<td>22</td>
<td>Date of death</td>
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</tbody>
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### A. MAKLUMAT PESAKIT

Negeri :  
Daerah :  
Hospital (wad) / Klinik Kesihatan  
No. R/N :  
Nama Pesakit :  
No. K/P :  
Umur :  
Jantina : L / P  
Bangsa :  
Tarikh lahir :  

### B. MAKLUMAT KLINIKAL

<table>
<thead>
<tr>
<th>Gejala (Simptom)</th>
<th>Ada / Tiada (Tandakan √)</th>
<th>Tarikh mula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demam &gt; 38°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ulser di mulut &amp; tekak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maculopapular rashes dan / Vesikel pada tapak tangan dan tapak kaki</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanda dan gejala URTI</td>
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</table>

### C. SPESIMEN KLINIKAL

<table>
<thead>
<tr>
<th>Spesimen</th>
<th>Tarikh diambil</th>
<th>Tarikh penghantaran</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectal swab</td>
<td>/</td>
<td>/</td>
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<tr>
<td>Mouth ulcer</td>
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<td>Vesicle swab</td>
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<td>Stool</td>
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</table>

### D. MAKLUMAT PEMOHON

Nama dan Cop Pegawai :  
Tandatangan :  
No. telefon :  
No. fax :  
e-mail :  

### E. MAKMAL (Untuk Kegunaan Makmal)

<table>
<thead>
<tr>
<th>Spesimen</th>
<th>Jenis ujian</th>
<th>Keputusan ujian</th>
<th>Komen</th>
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<tbody>
<tr>
<td>Rectal swab</td>
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<td>Stool</td>
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Nama dan tandatangan Pegawai Makmal :  
Jawatan Pegawai Makmal dan Cop Makmal :  
Tarikh :  

Nota * : All samples except blood / serum and stool must be in the viral transport media (VTM) and send immediately in ice pack to HUKM Microbiological Laboratory.
Variables Required for Enterovirus Surveillance Database

Name of Centre / Laboratory: ________________

<table>
<thead>
<tr>
<th>No</th>
<th>Date Sample Received</th>
<th>Date Sample Collected</th>
<th>LN</th>
<th>RN</th>
<th>Name</th>
<th>Ethnic</th>
<th>Age</th>
<th>Sex</th>
<th>Source</th>
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<th>Type of spec</th>
<th>Result</th>
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</table>
BORANG SIASATAN PESAKIT DI WAD
PENYAKIT TANGAN, KAKI DAN MULUT (HFMD)
BAHAGIAN KAWALAN PENYAKIT, KEMENTERIAN KESIHATAN MALAYSIA

BAHAGIAN 1

Tarikh masuk wad: __________________________ Masa: __________________

Tarikh discaj: __________________________ Masa: __________________

Tarikh kematian __________________________ Masa: __________________

A. PERIHAL PESAKIT

1. Nama pesakit: __________________________ 2. Tarikh lahir: __________________________
5. Alamat rumah: __________________________ 6. No telefon: (rumah)
Kedudukan rumah (GPS): X: __________ Y: __________

7. Jantina: Lelaki □ Perempuan □

8. Kumpulan etnik
Melayu □ Kadazan/Dusun □
Cina □ Murut □
India □ Bajau □
Asli semenanjung □ Melanau □
Bidayuh □ Iban □
Lain-lain pribumi □ Lain-lain (nyatakan) □
Sabah/Sarawak □

9. Kewarganegaraan: Malaysia □ Warga asing □

10. Menghadiri sekolah / taska
Ya □ Tidak □
Taska / Nurseri □
Prasekolah □
Sekolah □
Nyatakan nama: __________________________

B. MAKLUMAT KLINIKAL

1. Tarikh mula sakit (onset) __________________________

2. Tanda dan gejala: Riwayat demam
Ya □ Tidak □
Ulser mulut
Ruam (rash) tapak tangan / kaki
vesicles di tapak tangan / kaki

3. Kompliksi
   Ya  Tidak
   Aseptic meningitis
   Myocarditis
   Encephalitis
   Acute flaccid paralysis
   Jika ya, sila nyatakan bahagian anggota: ____________________
   Kematian

C. MAKLUMAT UJIAN MAKMAL

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<th>SAMPEL</th>
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<th>Keputusan</th>
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<tr>
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<td>Blood</td>
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<td>Biopsy _______</td>
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D. MAKLUMAT PEGAWAI YANG MERAWAT
1. Nama Pakar / Pegawai Perubatan: __________________________ Tandatangan: ____________
2. Nama Wad: __________________
3. Nama hospital: __________________________ Tarih notifikasi: ____________
7. REFERENCES


## CONTRIBUTORS

**State Epidemiologists 2006 – 2007**

<table>
<thead>
<tr>
<th>No.</th>
<th>State</th>
<th>Name 1</th>
<th>Name 2</th>
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<tbody>
<tr>
<td>1.</td>
<td>Pulau Pinang</td>
<td>Dr. Saraswathi Bina Rai</td>
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<tr>
<td>2.</td>
<td>Kedah</td>
<td>Dr. Uma Salamah Abdul Kadir</td>
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<td>3.</td>
<td>Perlis</td>
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<td>4.</td>
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<td>Dr. Asiah Ayob</td>
<td>Dr. Zamri Md Ali</td>
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<td>5.</td>
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<td>Dr. B. Venugopalan</td>
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<tr>
<td>6.</td>
<td>WPKL</td>
<td>Dr. Norbizura Abdul Hamid</td>
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<td>7.</td>
<td>N. Sembilan</td>
<td>Dr. Zulfa Vety Dol Bakri</td>
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<td>Dr. Hashimah Hasan</td>
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<td>Johor</td>
<td>Dr. Shaharom Nor Azian Che Mat Din</td>
<td>Dr. Fatimah Othman</td>
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<td>Dr. Shaari Ngadiman</td>
<td>Dr. Adibah Hani Harun</td>
</tr>
<tr>
<td>11.</td>
<td>Terengganu</td>
<td>Dr. Anita Surani Abdul Shukor</td>
<td>Dr. Balkis Ab Karim</td>
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<td>Kelantan</td>
<td>Dr. Hani Mat Hussin</td>
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<td>Dr. Ooi Choo Huck</td>
<td>Dr. Kamaliah Mohd Nor</td>
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<td>Dr. Jenarun Jelip</td>
<td>Dr. Kristina Rundi</td>
</tr>
<tr>
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<td>Bahagian Kawalan Penyakit</td>
<td>Dr. Husnina Ibrahim</td>
<td>Dr. Nazarudin Safian</td>
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<td>Dr. Mohd Hanif Zailani</td>
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<tr>
<td>16.</td>
<td>Laboratory</td>
<td>Dr. Chua Kaw Bing</td>
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</tbody>
</table>
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Disease Control Division, MOH.
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1. INTRODUCTION

Hand foot and mouth disease (HFMD) is typically a benign and common illness among children and infants characterized by rapidly ulcerating vesicles in the mouth and lesions, usually vesicular, on the hands and feet.\textsuperscript{1} HFMD is an endemic disease in Malaysia. HFMD has become an important public health disease due to its tendency to cause large outbreaks and deaths among children and infants. The purpose of the guidelines is to help health personnel and health authorities, at any levels;

- To update current knowledge about HFMD
- To detect and control epidemic of HFMD as early as possible
- To strengthen the capacity for emergency response to epidemics of HFMD
- To improve the outcome of HFMD cases through effective case management.

2. THE DISEASE

Hand foot and mouth disease (HFMD) is caused by systemic infections with human enteroviruses. Human enteroviruses comprise one genus in the family Picornaviridae, which also contains the genera rhinovirus, cardiovirus, aphthovirus, hepatovirus and parechovirus. The members of the enterovirus genus that infect humans include the polioviruses, the Coxsackie virus groups A and B, the echoviruses and the enteroviruses 68-71.\textsuperscript{2}

2.1 Transmission

Hand foot and mouth disease (HFMD) is moderately contagious. Infection is spread from person to person by direct contact with nose and throat discharges, saliva, fluid from blisters, or the stool of infected persons. A person is most contagious during the first week of the illness.

2.2 Clinical Features

HFMD is characterised by vesicular eruptions on the hands, wrists, feet and within the mouth. Lesions on the hands are almost always present, but oral lesions are present in 90% of patients and can occasionally be the only manifestation of the disease. The oral vesicles are often on the palate, tongue, and buccal mucosa and may range from a few isolated lesions to a marked stomatitis.

In addition patients may suffer fever, malaise, conjunctival injection, headache, and abdominal pain and occasionally diarrhea. The lesions on the feet and hands are flaccid, grayish vesicles, most often on the sides of the fingers, instep and
toes. If the disease is confined to the oral cavity it is almost indistinguishable from primary herpetic gingivostomatitis.³

Hand foot and mouth disease may be related to coxsackieviruses A16, A5, A9, A10, B2, B5 and enterovirus 71. Coxsackievirus A16 (Cox A16) is a frequently encountered pathogen in cases of HFMD and its clinical course is usually uneventful, with full recovery.

Fatal cases of Cox A16 infection are rare. Literature search revealed only three fatal cases of Cox A16 since 1963. All the cases were infants. The first case was reported by Wright et al in 1963 involving a 10 month-old girl with respiratory infection.⁴ The second case involved a 7 month-old boy with grunting and tongue ulcers.⁵ The third case was reported by Wang et al involving a 15 month-old boy who presented with hand foot and mouth disease complicated with myocarditis and intractable shock.⁶

HFMD caused by enterovirus 71 (EV71) can be more severe and may be complicated with meningitis, encephalitis and neurogenic pulmonary edema. In Taiwan, based on 1998 epidemic, the significant difference in the clinical features of Coxsackievirus A16 infection and EV 71 infection was that in EV71 the fever was usually higher than 39°C and longer than 3 days.⁷

Enterovirus 71 infection can be classified into 4 stages:

Stage 1 – Hand foot and mouth disease (HFMD), oral ulcers and vesicular rash appearing on the hands, feet, knees and / or buttocks; or herpangina including oral ulceration over anterior tonsillar pillars, the soft palate, buccal mucosa or uvula.

Stage 2 – CNS involvement - aseptic meningitis with headache, irritability or myoclonic jerk and CSF pleocytosis (> 5 x 10⁶ leucocytes / litre) but without altered level of consciousness and focal signs, or encephalitis with altered level of consciousness plus CSF pleocytosis or poliomyelitis like syndrome with acute limb weakness and decreased reflex and muscle strength, or encephalomyelitis with the occurrence of both encephalitis and poliomyelitis like syndrome.

Stage 3 – Cardiopulmonary failure, pulmonary edema or hemorrhage with decreased ejection fraction of left ventricle as assessed by echocardiography necessitating inotropic agent support.
Stage 4 – Convalescence - is defined as recovery from cardiopulmonary failure.

2.3 Magnitude of the disease

Hand foot and mouth disease (HFMD) generally is a common and self limiting disease among children. EV 71 infection is the more important public health concern. In temperate countries most HFMD cases occur in the summer and fall and the incubation period is 4 – 6 days.

EV 71 was first isolated from a child with aseptic meningitis in California in 1969, and by 1974, the virus had been described as a new serotype of genus *Enterovirus*. In the years following the initial isolation of EV71, outbreaks occurred in USA, Australia, Sweden and Japan. In 1975 EV71 gained global attention when it was responsible for an outbreak in Bulgaria that resulted in 705 cases of poliomyelitis-like disease and the deaths of 44 people; 93% of the poliomyelitis-like disease cases occurred in children under the age of five. A similar outbreak occurred in Hungary in 1978, which also involved many cases of poliomyelitis-like disease and 47 deaths. Since this time outbreaks of EV71 have continued to occur throughout the world.

More recently there has been an increase in EV71 activity in the Asia Pacific region with several epidemics of HFMD being reported, including multiple cases associated with brain stem encephalitis and pulmonary edema. The first such epidemic occurred in Sarawak (Malaysian Borneo) in 1997 followed by smaller outbreaks in peninsular Malaysia and Japan. In 1998 outbreaks continued in Singapore and Taiwan.

The outbreak that occurred in Taiwan is the largest recorded, with greater than 100,000 cases of HFMD. Of these 400 children were admitted to hospital with central nervous system (CNS) involvement and 78 died of brainstem encephalitis with neurogenic pulmonary oedema. In 1999, a large HFMD outbreak occurred in Perth, western Australia and in 2000, EV71 was the cause of epidemics in Korea, Japan, Singapore, Taiwan and peninsular Malaysia, resulting in a range of clinical presentations including HFMD, aseptic meningitis, encephalitis and poliomyelitis like disease. Another outbreak occurred in Sarawak in 2003 which coincide with the SARS outbreak in the region and the public health measures put into place during this time evidently served to control transmission of enteroviruses as well.
3. CLINICAL MANAGEMENT OF HFMD

HFMD is usually a mild and self-limiting. In general, most cases of HFMD do not require admission but can be managed as outpatients. Most fatal HFMD cases were due to enterovirus infection.

3.1 Symptomatic treatment

Mild HFMD cases only need symptomatic treatment. Treatment of fever and relief of symptoms, adequate hydration and rest are important. Parents and caretakers should be educated on hygiene and measures that they should take to prevent transmission to other children.

3.2 Hospitalisation.

3.2.1 Criteria for admission

- When the child is unable to tolerate oral feeds and there is a need for intravenous hydration;
- When the child is clinically very ill or toxic-looking;
- When some other more serious disease cannot be excluded;
- When there is persistent hyperpyrexia (e.g. >38°C) for >48 hours;
- When there is a suspicion of neurological complications, e.g. increased lethargy, myoclonus, increased drowsiness, change in sensorium and/or seizures;
- When there is a suspicion of cardiac complications (myocarditis), e.g. low blood pressure, low pulse volume, heart rhythm abnormalities, murmurs, gallop rhythm, displaced apex beat;
- When parents are unable to cope with child’s illness; and
- When there is inadequate family or social support in looking after the child at home.

3.2.2 Infection control

- Proper hygiene including mandatory hand washing after contact with patient, appropriate cleanliness during diaper changes is imperative;
- Personal items such as spoons, cups and utensils should not be shared and should be properly washed with detergent after use;
- The use of gowns may act as a useful protection for health personnel looking after these patients; and
- Patients with HFMD should be isolated and the usual isolation procedures followed for infection control.
3.3 Patients with neurologic complication

Huang et al reviewed HFMD cases in Taiwan in 1998 and they found that the mean age of patients with neurological manifestations was 2.5 (range, 3 months to 8.2 years\textsuperscript{10}. Higher incidence occurs in the younger age group. The neurologic disorders usually began 2 to 5 days after the onset of skin or mucosa lesion or fever.

Wu JM et al carried out a prospective study among infants confirmed to have enterovirus 71 and found that\textsuperscript{11};

- EV71 infection can lead to severe neurologic complications and acute pulmonary edema with or without hemorrhage
- All patients with EV71 infection and pulmonary edema had brainstem lesions
- Viral myocarditis is not the direct cause of acute PE and cardiopulmonary failure in EV71 Infection
- The excessive central sympathetic activation resulting in vasoconstriction was not the major cause of PE or hemorrhage

Based on the findings, they suggested that;

- Vasodilators should be used with caution since pulmonary edema in EV71 infection is not resulting from excessive vasoconstriction alone
- Cardiopulmonary function usually returns to nearly normal within days but the neurologic sequelae are severe and usually permanent. Therefore the use of extracorporeal membrane oxygenation support or a heart assist device should be weighed carefully
- Direct intracardiac hemodynamic monitoring may provide additional information to guide critical care
3.4. ADVICE GIVEN UPON PATIENT’S DISCHARGE

Parents and guardians should be advised upon patients discharge on complications that may occur; a statement as shown below can be given:

“Your child has been diagnosed to have hand-foot-mouth disease. This disease is normally not dangerous but in the light of recent events, we advise that you bring back your child to this hospital if he / she has any of the following symptoms:

- High fever.
- Lethargy and weakness.
- Refusing feeds and passing less urine.
- Rapid breathing.
- Vomiting.
- Drowsiness or irritably.
- Fits.”
4. SURVEILLANCE

The actual burden of HFMD in this country is not known. HFMD surveillance in Malaysia started after the Sarawak outbreak in 1997 with sentinel surveillance. Both private and government clinics were included as sentinel sites for each district. The number of sentinel sites for each district depends on the assumed prevalence of HFMD in the district / state.

HFMD notification is administratively required and started since October 2005. However death of HFMD and admitted cases to the ward of children aged 10 years old and below is mandatory for notification. However due to frequent outbreaks and fatality in Sarawak, Sarawak State has required all HFMD cases in the state to be notified.

The notification of HFMD came into enforcement on 12 October 2006 under the PU.A 374 / 2006 (appendix 1).

3.1 Objective of surveillance

i. To detect impending outbreak.

ii. To monitor circulating infectious agent.

iii. To estimate the magnitude of HFMD in the population at risk.

iv. To estimate the magnitude of the HFMD complication in the population at risk.

3.2 Case definition

3.2.1 Clinical case definition

3.2.1.1 Case of HFMD:
Any child with:

a. mouth / tongue ulcer and

b. maculopapular rashes and / or vesicles on palms and soles

c. with OR without history of fever

3.2.1.2 HFMD myocarditis:

2(i) Suspected HFMD myocarditis
Asymptomatic child with unexplained tachycardia to fulminant congestive cardiac failure.
With history of diarrhoea or URTI.
Accompanied by fever, malaise, tachypnoea, tachycardia (above and beyond expected for age and fever) or dehydration. Pallor and shock in the absence of or obvious pulmonary sign or in the presence of crepitations (no murmurs) and/or a clinically enlarged heart.

2(i) **Confirmed HFMD myocarditis.**
The above 2(i) with virologic confirmation of enteroviruses.

3.2.1.3 **HFMD meningoencephalitis / AFP**

3(i) **Suspected HFMD meningoencephalitis**
Evidence of aseptic meningitis.
Evidence of aseptic encephalitis.
Evidence of AFP.

3(ii) **Confirmed HFMD meningoencephalitis / AFP.**
The above 3(i) with virologic confirmation of enteroviruses

3.2.2 **Laboratory criteria**

Any case that has the clinical symptoms and positive for viruses (coxsackieviruses (Cox) A16, A5, A9, A10, B2, B5 and enterovirus (EV) 71) which could cause HFMD, isolated or detected from stool or vesicle fluid or mouth ulcer or saliva.

3.2.3 **Case classification**

**Suspected:** A case that meets the clinical case definition.

**Confirmed:** A suspected case in which laboratory investigation confirms the presence of virus OR when cases are epidemiologically linked to a laboratory confirmed case.

3.3 **Types of surveillance**

3.3.1 **Clinical surveillance**

It is mandatory to notify HFMD under the National Notification of Infectious Diseases (list of notifiable diseases). Notification must be done within 24 hours of diagnosis via telephone, then it should be followed by notification form.
All HFMD cases detected must be entered to CDCIS. If states have other methods of data storing, it must be shared with MOH.

Laboratory confirmation is **NOT** required for notification.

### 3.2.2 Laboratory surveillance

**Sentinel sites**

Enterovirus surveillance is done through state's sentinel sites. A state has to choose two sentinel sites. Preferably the sites have a considerable numbers of children cases as HFMD prevalence is higher among this age group. At least 5 specimens from 5 patients per centre should be taken and sent to the designated laboratory (as in table below). Please use the laboratory request form as in appendix 2(i).

**Designated laboratory involves in enterovirus surveillance**

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Contact number</th>
<th>Respective states</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMR</td>
<td>03-26988792</td>
<td>Johor, WPKL, Melaka, Terengganu, Pahang.</td>
</tr>
<tr>
<td>UMMC</td>
<td>03-79675756 / 79676678</td>
<td>Selangor.</td>
</tr>
<tr>
<td>NPHL</td>
<td>03-61402213</td>
<td>Perlis, Kedah, Perak, Penang</td>
</tr>
<tr>
<td>'HUKM</td>
<td>03 - 91702203 / 2208</td>
<td>Negeri Sembilan</td>
</tr>
<tr>
<td>USM</td>
<td>09 - 7664602 / 4609 / 3000 ext 4602</td>
<td>Kelantan</td>
</tr>
</tbody>
</table>

Surveillance for Sarawak and Sabah is expected to start once Kota Kinabalu Public Health Laboratory is ready to function.
Clinical Specimen Collection, Handling And Transportation

Patient

Blood serology

Swab
For viral culture

CSF

2 ml - in plain sterile tube

Mouth ulcer

Rectal - wet swab with sterile saline

Vesicle - basal scrapping

Viral transport media

Smear on slide

Send clinical samples to respective laboratory within 24 hours of collection at 4 °C (on ice).
DO NOT STORE AT -20 °C
3.4 Flow of surveillance data

Notification data should be entered in CDCIS as and when there is HFMD case. Other sources of data must be shared with Disease Control Division. Data must have the variables listed in appendix 1.

Laboratory results for enterovirus surveillance must be shared with respective states and Disease Control Division using the suggested format in appendix 2(ii).
Flow of Information Management

- Suspected HFMD Case
  - CDCIS
    - Case fulfilled criteria
      - Investigate & Register
        - Cluster of cases?
          - Yes
            - Preventive and control activities
            - Report
          - No
            - Finish

- Lab-Confirmed Cases
  - LIS
    - Positive EV71
      - Investigate
        - Cluster of cases?
          - Yes
            - Preventive and control activities
            - Report
          - No
            - Finish
5. MANAGEMENT OF SPORADIC CASES

5.1 Definitions of sporadic case:
A single case of HFMD in the absence of previous known close contact with another case.

5.2 The public health measures

5.2.1 Case Investigation

Case investigation is required following the criteria below:

a. every notified HFMD case that fulfilled any one of the criteria below:

i. case is admitted to hospital
ii. case died.
iii. case aged 6 years and below and goes to any pre-schools or nurseries.

The first two criteria indicate severity of illness and it is a proxy of possible EV71 infection. Meanwhile the third criterion is important in preventing spread of illness among the pre-school children (high risk group) and reducing public anxiety.

b. every case with positive EV71 laboratory result.

Investigation should be carried out to determine the course, source and severity of infection. Enquiries shall be made into:

1. Particulars of the person affected
2. Clinical signs and symptoms with date of onset. In addition, enquiries shall be elicited for associated complications e.g. seizures, weakness of limbs, staring episodes, drowsiness, profound lethargy and refusal to play.

Enterovirus infections that are not associated with complications may not have cutaneous manifestations.

3. Duration of illness
4. Type of treatment sought, including details of hospitalization and reason for admission
5. History of travel especially to outbreak area in the past two weeks
6. Contacts with similar illness in an institution (child care centre or kindergarten), family or neighbourhood where relevant.
7. If newborn, antenatal history including maternal history of febrile illness, mode of delivery
5.2.2 Incidence management

Following steps should be taken to prevent further spread of disease / pathogen:

1. Ensure that the infected children remain away from the institution for at least ten days after onset of symptoms and must be certified free from infection by a registered medical practitioner prior to returning to school.

2. Active case detection shall be carried out among contacts in the institution and family, and all those with illness shall be referred for treatment at the nearest health clinics.

3. Swabs from oral ulcers and vesicular lesions on the hands and feet shall be collected for virus isolation at identified laboratories (IMR or NPHL). If these ulcers and vesicles are no longer present, stool specimens shall be sent. Always consult pathologist for specimens taking, handling and transportation.

4. Health education of supervisors of institutions on the disease, mode of transmission, importance of good personal hygiene and isolation of infected children shall be carried out.

5. Principals, teachers and supervisors shall be alerted to look out for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer Buku Panduan Latihan Taska dan Prasekolah).

6. If there are two or case in the premise, advice the premise to be closed to cut disease transmission. It should be closed for two incubation period (10 days) from the date of onset of the last case.

7. Supervision on disinfection procedures shall be given to the premise operators. Articles such as toys contaminated by infected cases are disinfected with 0.5% sodium hypochlorite solutions (please refer Buku Panduan Latihan Taska dan Prasekolah).
6. MANAGEMENT OF OUTBREAK

6.1 Definitions of outbreak
The occurrence of two or more cases in the same locality within the incubation period.

Organisation based outbreak – two or more cases with onset in two weeks interval in a group which makes epidemiological sense.

6.2 Identification of outbreaks
Surveillance data on HFMD cases should be reviewed on continuous basis to identify cases and detects outbreaks.

6.3 Risk factors for outbreaks
Risk factors for outbreaks are not completely understood. A combination of conditions (environment, host and organism) is necessary for an epidemic to occur. However large HFMD outbreaks have been associated with EV71 infection.

6.4 Management of outbreaks
When a suspected outbreak is reported, it is important to determine rapidly whether a true outbreak is occurring based on the definition above.

Similar steps as in sporadic case management should be carried out together with following measures;

1. Ensure that the infected children remain away from the institution for at least ten days after onset of symptoms and must be certified free from infection by a registered medical practitioner prior to returning to school.

2. An assessment of the number of cases and susceptible population involved shall be made, and the overall attack rate and age-specific attack rate computed.

3. Active case detection shall be carried out among contacts in the institution and family, and all those with illness shall be referred for treatment at the nearest health clinics.

4. Where a case is observed or suspected to have unusual signs and symptoms e.g. seizures, weakness of limbs, profound lethargy, refusal to play, the case shall be immediately referred to hospital.

5. Swabs from oral ulcers and vesicular lesions on the hands and feet shall be collected for virus isolation at identified laboratories (IMR or NPHL). If these ulcers and vesicles are no longer present, stool specimens shall be sent. Always consult pathologist for specimens taking, handling and transportation.
6. Principals, teachers and supervisors shall be alerted to look out for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer Buku Panduan Latihan Taska dan Prasekolah).

7. Health education of supervisors of institutions on the disease, mode of transmission, importance of good personal hygiene and isolation of infected children shall be carried out.

8. Close the premise closed for two incubation period (10 days) from the date of onset of the last case. Supervision on disinfection procedures shall be given to the premise operators.

In addition the investigating team shall also look into environmental sanitation and hygiene to ensure that:

a. Articles such as toys contaminated by infected cases are disinfected with 0.5% sodium hypochlorite solutions (please refer Buku Panduan Latihan Taska dan Prasekolah).

b. A high standard of food and personal hygiene is maintained by the institution involved which include proper waste and diapers disposal.

c. The approved enrolment of Department of Social Welfare (JKM), Ministry of Education, Department of National Integration and other relevant parties, where applicable, and shall notify the relevant authorities if regulations not complied.

If the outbreak occurs in primary schools;

i. Ensure that the infected students remain away from the institution for at least ten days.

ii. Health education to the students on the disease, mode of transmission, importance of good personal hygiene.

iii. Principals, teachers and supervisors shall be look for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer Buku Panduan Latihan Taska dan Prasekolah).

iv. If closure is necessary, just closed the affected class. Closure of the whole school is unnecessary as HFMD in older children is usually very mild and so far no complication has been documented from this agegroup.
6.5 Documentation and review

Disease activity and emergency response should be adequately documented so that further outbreaks can be handled more effectively. A summary report should be prepared within a month from the last date of case; and distributed to all the stakeholders for feedback. Format of report, dissemination and tabling of report is discussed in more details in Infectious Disease Outbreak Rapid Response Manual.\textsuperscript{12}
Appendix 1

Variables required in HFMD surveillance database

1 Epid week
2 Name
3 Age
4 Sex
5 Ethnic
6 Home address
7 Locality
8 District
9 Name of school / preschool / nursery
10 Address of school / preschool / nursery
11 Date of onset
12 Case definition fulfilled
13 Symptoms and signs of CNS
14 Contact with HFMD case
15 Address of contact
16 Date of seen
17 Name of clinic / hospital
18 Government or private health facility
19 Outpatient or inpatient treatment
20 Date of admitted
21 Date of discharge
22 Date of death
# NATIONAL ENTEROVIRUS SURVEILLANCE
## DIAGNOSTIC REQUEST FORM

### A. MAKLUMAT PESAKIT
- **Negeri:**
- **Daerah:**
- **Hospital (wad) / Klinik Kesihatan:**
- **Nama Pesakit:**
- **No. K/P:**
- **Umur:**
- **Jantina:** L / P
- **Bangsa:**
- **Tarikh lahir:**

### B. MAKLUMAT KLINIKAL
<table>
<thead>
<tr>
<th>Gejala (Simptom)</th>
<th>Ada / Tiada (Tandakan √)</th>
<th>Tarikh mula</th>
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<tbody>
<tr>
<td>Demam &gt; 38 °C</td>
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<tr>
<td>Ulser di mulut &amp; tekak</td>
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<tr>
<td>Maculopapular rashes dan / Vesikel pada tapak tangan dan tapak kaki</td>
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<tr>
<td>Tanda dan gejala URTI</td>
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### C. SPESIMEN KLINIKAL

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<td>Vesicle swab</td>
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<tr>
<td>Stool</td>
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### D. MAKLUMAT PEMOHON
- **Nama dan Cop Pegawai:**
- **Tandatangan:**
- **No. telefon:**
- **No. fax:**
- **e-mail:**

### E. MAKMAL (Untuk Kegunaan Makmal)
- **Keadaan spesimen:**
- **Tarikh terima spesimen:**

<table>
<thead>
<tr>
<th>Spesimen</th>
<th>Jenis ujian</th>
<th>Keputusan ujian</th>
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<tr>
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<td>Vesicle swab</td>
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<td>Stool</td>
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**Nama dan tandatangan Pegawai Makmal:**

**Jawatan Pegawai Makmal dan Cop Makmal:**

**Tarikh:**

**Nota * :** All samples except blood / serum and stool must be in the viral transport media (VTM) and send immediately in ice pack to HUKM Microbiological Laboratory.
Variables Required for Enterovirus Surveillance Database

Name of Centre / Laboratory: ________________

<table>
<thead>
<tr>
<th>No</th>
<th>Date Sample Received</th>
<th>Date Sample Collected</th>
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<th>RN</th>
<th>Name</th>
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<th>Sex</th>
<th>Source</th>
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<th>Type of spec</th>
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BORANG SIASATAN PESAKIT DI WAD
PENYAKIT TANGAN, KAKI DAN MULUT (HFMD)
BAHAGIAN KAWALAN PENYAKIT, KEMENTERIAN KESIHATAN MALAYSIA

BAHAGIAN 1

<table>
<thead>
<tr>
<th>Tarikh masuk wad:</th>
<th>Masa:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Tarikh discaj:</th>
<th>Masa:</th>
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<table>
<thead>
<tr>
<th>Tarikh kematian</th>
<th>Masa:</th>
</tr>
</thead>
</table>

A. PERIHAL PESAKIT

1. Nama pesakit:  
2. Tarikh lahir:  
3. Nama ibu:  
4. No K/P ibu:  
5. Alamat rumah:  
6. No telefon: (rumah)  
   (H/P)

Kedudukan rumah (GPS):  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>

7. Jantina:  
   Lelaki  
   Perempuan  

8. Kumpulan etnik  
   Melayu  
   Kadazan/Dusun  
   Cina  
   Murut  
   India  
   Bajau  
   Asli semenanjung  
   Melanau  
   Bidayuh  
   Iban  
   Lain-lain pribumi  
   Lain-lain (nyatakan)  
   Sabah/ Sarawak

9. Kewarganegaraan:  
   Malaysia  
   Warga asing

10. Menghadiri sekolah / taska  
    Ya  
    Taska / Nurseri  
    Prasekolah  
    Sekolah  
    Nyatakan nama: ________________________________  
    Tidak

B. MAKLUMAT KLINIKAL

1. Tarikh mula sakit (onset)  

2. Tanda dan gejala:  
   Ya  
   Tidak
   Riwayat demam  
   ☐  
   ☐
Ulser mulut
Ruam (rash) tapak tangan / kaki
vesicles di tapak tangan / kaki

3. Kompliksi

<table>
<thead>
<tr>
<th>Ya</th>
<th>Tidak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aseptic meningitis</td>
<td></td>
</tr>
<tr>
<td>Myocarditis</td>
<td></td>
</tr>
<tr>
<td>Encephalitis</td>
<td></td>
</tr>
<tr>
<td>Acute flaccid paralysis</td>
<td></td>
</tr>
</tbody>
</table>

Jika ya, sila nyatakan bahagian anggota: ____________________

Kematian

C. MAKLUMAT UJIAN MAKMAL

<table>
<thead>
<tr>
<th>SAMPEL</th>
<th>Tarikh diambil</th>
<th>Keputusan</th>
<th>Tarikh keputusan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throat swab</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectal swab</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vesicle swab</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stool</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biopsy ______(Nyatakan tisu)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

D. MAKLUMAT PEGAWAI YANG MERAWAT

1. Nama Pakar / Pegawai Perubatan: __________________________ Tandatangan: ____________
2. Nama Wad: _____________________
3. Nama hospital: ___________________________ Tarikh notifikasi: _________
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1. INTRODUCTION

Hand foot and mouth disease (HFMD) is typically a benign and common illness among children and infants characterized by rapidly ulcerating vesicles in the mouth and lesions, usually vesicular, on the hands and feet.\(^1\) HFMD is an endemic disease in Malaysia. HFMD has become an important public health disease due to its tendency to cause large outbreaks and deaths among children and infants. The purpose of the guidelines is to help health personnel and health authorities, at any levels;

- To update current knowledge about HFMD
- To detect and control epidemic of HFMD as early as possible
- To strengthen the capacity for emergency response to epidemics of HFMD
- To improve the outcome of HFMD cases through effective case management.

2. THE DISEASE

Hand foot and mouth disease (HFMD) is caused by systemic infections with human enteroviruses. Human enteroviruses comprise one genus in the family Picornaviridae, which also contains the genera rhinovirus, cardiovirus, aphthovirus, hepatovirus and parechovirus. The members of the enterovirus genus that infect humans include the polioviruses, the Coxsackie virus groups A and B, the echoviruses and the enteroviruses 68-71.\(^2\)

2.1 Transmission

Hand foot and mouth disease (HFMD) is moderately contagious. Infection is spread from person to person by direct contact with nose and throat discharges, saliva, fluid from blisters, or the stool of infected persons. A person is most contagious during the first week of the illness.

2.2 Clinical Features

HFMD is characterised by vesicular eruptions on the hands, wrists, feet and within the mouth. Lesions on the hands are almost always present, but oral lesions are present in 90% of patients and can occasionally be the only manifestation of the disease. The oral vesicles are often on the palate, tongue, and buccal mucosa and may range from a few isolated lesions to a marked stomatitis.

In addition patients may suffer fever, malaise, conjunctival injection, headache, and abdominal pain and occasionally diarrhea. The lesions on the feet and hands are flaccid, grayish vesicles, most often on the sides of the fingers, instep and
toes. If the disease is confined to the oral cavity it is almost indistinguishable from primary herpetic gingivostomatitis.3

Hand foot and mouth disease may be related to coxsackieviruses A16, A5, A9, A10, B2, B5 and enterovirus 71. Coxsackievirus A16 (Cox A16) is a frequently encountered pathogen in cases of HFMD and its clinical course is usually uneventful, with full recovery.

Fatal cases of Cox A16 infection are rare. Literature search revealed only three fatal cases of Cox A16 since 1963. All the cases were infants. The first case was reported by Wright et al in 1963 involving a 10 month-old girl with respiratory infection.4 The second case involved a 7 month-old boy with grunting and tongue ulcers.5 The third case was reported by Wang et al involving a 15 month-old boy who presented with hand foot and mouth disease complicated with myocarditis and intractable shock.6

HFMD caused by enterovirus 71 (EV71) can be more severe and may be complicated with meningitis, encephalitis and neurogenic pulmonary edema. In Taiwan, based on 1998 epidemic, the significant difference in the clinical features of Coxsackievirus A16 infection and EV 71 infection was that in EV71 the fever was usually higher than 39°C and longer than 3 days.7

Enterovirus 71 infection can be classified into 4 stages:

Stage 1 – Hand foot and mouth disease (HFMD), oral ulcers and vesicular rash appearing on the hands, feet, knees and / or buttocks; or herpangina including oral ulceration over anterior tonsillar pillars, the soft palate, buccal mucosa or uvula.

Stage 2 – CNS involvement - aseptic meningitis with headache, irritability or myoclonic jerk and CSF pleocytosis (> 5 x 10^6 leucocytes / litre) but without altered level of consciousness and focal signs, or encephalitis with altered level of consciousness plus CSF pleocytosis or poliomyelitis like syndrome with acute limb weakness and decreased reflex and muscle strength, or encephalomyelitis with the occurrence of both encephalitis and poliomyelitis like syndrome.

Stage 3 – Cardiopulmonary failure, pulmonary edema or hemorrhage with decreased ejection fraction of left ventricle as assessed by echocardiography necessitating inotropic agent support.
Stage 4 – Convalescence - is defined as recovery from cardiopulmonary failure.

2.3 Magnitude of the disease

Hand foot and mouth disease (HFMD) generally is a common and self limiting disease among children. EV 71 infection is the more important public health concern. In temperate countries most HFMD cases occur in the summer and fall and the incubation period is 4 – 6 days.

EV 71 was first isolated from a child with aseptic meningitis in California in 1969, and by 1974, the virus had been described as a new serotype of genus Enterovirus. In the years following the initial isolation of EV71, outbreaks occurred in USA, Australia, Sweden and Japan. In 1975 EV71 gained global attention when it was responsible for an outbreak in Bulgaria that resulted in 705 cases of poliomyelitis-like disease and the deaths of 44 people; 93% of the poliomyelitis-like disease cases occurred in children under the age of five. A similar outbreak occurred in Hungary in 1978, which also involved many cases of poliomyelitis-like disease and 47 deaths. Since this time outbreaks of EV71 have continued to occur throughout the world.

More recently there has been an increase in EV71 activity in the Asia Pacific region with several epidemics of HFMD being reported, including multiple cases associated with brain stem encephalitis and pulmonary edema. The first such epidemic occurred in Sarawak (Malaysian Borneo) in 1997 followed by smaller outbreaks in peninsular Malaysia and Japan. In 1998 outbreaks continued in Singapore and Taiwan.

The outbreak that occurred in Taiwan is the largest recorded, with greater than 100,000 cases of HFMD. Of these 400 children were admitted to hospital with central nervous system (CNS) involvement and 78 died of brainstem encephalitis with neurogenic pulmonary oedema. In 1999, a large HFMD outbreak occurred in Perth, western Australia and in 2000, EV71 was the cause of epidemics in Korea, Japan, Singapore, Taiwan and peninsular Malaysia, resulting in a range of clinical presentations including HFMD, aseptic meningitis, encephalitis and poliomyelitis like disease. Another outbreak occurred in Sarawak in 2003 which coincide with the SARS outbreak in the region and the public health measures put into place during this time evidently served to control transmission of enteroviruses as well.
3. CLINICAL MANAGEMENT OF HFMD

HFMD is usually a mild and self limiting. In general, most cases of HFMD do not require admission but can be managed as outpatients. Most fatal HFMD cases were due to enterovirus infection.

3.1 Symptomatic treatment

Mild HFMD cases only need symptomatic treatment. Treatment of fever and relief of symptoms, adequate hydration and rest are important. Parents and care takers should be educated on hygiene and measures that they should take to prevent transmission to other children.

3.2 Hospitalisation.

3.2.1 Criteria for admission

- When the child is unable to tolerate oral feeds and there is a need for intravenous hydration;
- When the child is clinically very ill or toxic-looking
- When some other more serious disease cannot be excluded
- When there is persistent hyperpyrexia (e.g. >38°C) for >48 hours;
- When there is a suspicion of neurological complications, e.g increased lethargy, myoclonus, increased drowsiness, change in sensorium and/or seizures;
- When there is a suspicion of cardiac complications (myocarditis), e.g low blood pressure, low pulse volume, heart rhythm abnormalities, murmurs, gallop rhythm, displaced apex beat;
- When parents are unable to cope with child’s illness; and
- When there is inadequate family or social support in looking after the child at home.

3.2.2 Infection control

- Proper hygiene including mandatory hand washing after contact with patient, appropriate cleanliness during diaper changes is imperative
- Personal items such as spoons, cups and utensils should not be shared and should be properly washed with detergent after use;
- The use of gowns may act as a useful protection for health personnel looking after these patients; and
- Patients with HFMD should be isolated and the usual isolation procedures followed for infection control.
3.3 Patients with neurologic complication

Huang et al reviewed HFMD cases in Taiwan in 1998 and they found that the mean age of patients with neurological manifestations was 2.5 (range, 3 months to 8.2 years\textsuperscript{10}. Higher incidence occurs in the younger age group. The neurologic disorders usually began 2 to 5 days after the onset of skin or mucosa lesion or fever.

Wu JM et al carried out a prospective study among infants confirmed to have enterovirus 71 and found that\textsuperscript{11};

- EV71 infection can lead to severe neurologic complications and acute pulmonary edema with or without hemorrhage
- All patients with EV71 infection and pulmonary edema had brainstem lesions
- Viral myocarditis is not the direct cause of acute PE and cardiopulmonary failure in EV71 Infection
- The excessive central sympathetic activation resulting in vasoconstriction was not the major cause of PE or hemorrhage

Based on the findings, they suggested that;

- Vasodilators should be used with caution since pulmonary edema in EV71 infection is not resulting from excessive vasoconstriction alone
- Cardiopulmonary function usually returns to nearly normal within days but the neurologic sequelae are severe and usually permanent. Therefore the use of extracorporeal membrane oxygenation support or a heart assist device should be weighed carefully
- Direct intracardiac hemodynamic monitoring may provide additional information to guide critical care
3.4. ADVICE GIVEN UPON PATIENT’S DISCHARGE

Parents and guardians should be advised upon patients discharge on complications that may occur; a statement as shown below can be given:

“Your child has been diagnosed to have hand-foot-mouth disease. This disease is normally not dangerous but in the light of recent events, we advise that you bring back your child to this hospital if he / she has any of the following symptoms:

- High fever.
- Lethargy and weakness.
- Refusing feeds and passing less urine.
- Rapid breathing.
- Vomiting.
- Drowsiness or irritably.
- Fits.”
4. SURVEILLANCE

The actual burden of HFMD in this country is not known. HFMD surveillance in Malaysia started after the Sarawak outbreak in 1997 with sentinel surveillance. Both private and government clinics were included as sentinel sites for each district. The number of sentinel sites for each district depends on the assumed prevalence of HFMD in the district / state.

HFMD notification is administratively required and started since October 2005. However death of HFMD and admitted cases to the ward of children aged 10 years old and below is mandatory for notification. However due to frequent outbreaks and fatality in Sarawak, Sarawak State has required all HFMD cases in the state to be notified.

The notification of HFMD came into enforcement on 12 October 2006 under the PU.A 374 / 2006 (appendix 1).

3.1 Objective of surveillance
   i. To detect impending outbreak.
   ii. To monitor circulating infectious agent.
   iii. To estimate the magnitude of HFMD in the population at risk.
   iv. To estimate the magnitude of the HFMD complication in the population at risk.

3.2 Case definition

3.2.1 Clinical case definition

3.2.1.1 Case of HFMD:
   Any child with:
   a. mouth / tongue ulcer and
   b. maculopapular rashes and / or vesicles on palms and soles
   c. with OR without history of fever

3.2.1.2 HFMD myocarditis:

   2(i) Suspected HFMD myocarditis
   Asymptomatic child with unexplained tachycardia to fulminant congestive cardiac failure.
   With history of diarrhoea or URTI.
Accompanied by fever, malaise, tachypnoea, tachycardia (above and beyond expected for age and fever) or dehydration. Pallor and shock in the absence of or obvious pulmonary sign or in the presence of crepitations (no murmurs) and / or a clinically enlarged heart.

2(i) **Confirmed HFMD myocarditis.**
The above 2(i) with virologic confirmation of enteroviruses.

### 3.2.1.3 HFMD meningoencephalitis / AFP

3(i) **Suspected HFMD meningoencephalitis**
- Evidence of aseptic meningitis.
- Evidence of aseptic encephalitis.
- Evidence of AFP.

3(ii) **Confirmed HFMD meningoencephalitis / AFP.**
The above 3(i) with virologic confirmation of enteroviruses

#### 3.2.2 Laboratory criteria

Any case that has the clinical symptoms and positive for viruses (coxsackieviruses (Cox) A16, A5, A9, A10, B2, B5 and enterovirus (EV) 71) which could cause HFMD, isolated or detected from stool or vesicle fluid or mouth ulcer or saliva.

#### 3.2.3 Case classification

**Suspected:** A case that meets the clinical case definition.

**Confirmed:** A suspected case in which laboratory investigation confirms the presence of virus OR when cases are epidemiologically linked to a laboratory confirmed case.

### 3.3 Types of surveillance

#### 3.3.1 Clinical surveillance

It is mandatory to notify HFMD under the National Notification of Infectious Diseases (list of notifiable diseases). Notification must be done within 24 hours of diagnosis via telephone, then it should be followed by notification form.
All HFMD cases detected must be entered to CDCIS. If states have other methods of data storing, it must be shared with MOH.

Laboratory confirmation is **NOT** required for notification.

### 3.2.2 Laboratory surveillance

**Sentinel sites**

Enterovirus surveillance is done through state's sentinel sites. A state has to choose two sentinel sites. Preferably the sites have a considerable numbers of children cases as HFMD prevalence is higher among this age group. At least 5 specimens from 5 patients per centre should be taken and sent to the designated laboratory (as in table below). Please use the laboratory request form as in appendix 2(i).

Designated laboratory involves in enterovirus surveillance

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Contact number</th>
<th>Respective states</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMR</td>
<td>03-26988792</td>
<td>Johor, WPKL, Melaka, Terengganu, Pahang.</td>
</tr>
<tr>
<td>UMMC</td>
<td>03-79675756 / 79676678</td>
<td>Selangor.</td>
</tr>
<tr>
<td>NPHL</td>
<td>03-61402213</td>
<td>Perlis, Kedah, Perak, Penang</td>
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<tr>
<td>'HUKM</td>
<td>03 - 91702203 / 2208</td>
<td>Negeri Sembilan</td>
</tr>
<tr>
<td>USM</td>
<td>09 - 7664602 / 4609 / 3000 ext 4602</td>
<td>Kelantan</td>
</tr>
</tbody>
</table>

Surveillance for Sarawak and Sabah is expected to start once Kota Kinabalu Public Health Laboratory is ready to function.
Clinical Specimen Collection, Handling And Transportation

Patient

Blood serology

2 ml - in plain sterile tube

Swab
For viral culture

1 ml - in plain sterile tube

CSF

Mouth ulcer

Rectal - wet swab with sterile saline

Vesicle - basal scrapping

Viral transport media

Send clinical samples to respective laboratory within 24 hours of collection at 4 °C (on ice). DO NOT STORE AT -20 °C
3.4 Flow of surveillance data

Notification data should be entered in CDCIS as and when there is HFMD case. Other sources of data must be shared with Disease Control Division. Data must have the variables listed in appendix 1.

Laboratory results for enterovirus surveillance must be shared with respective states and Disease Control Division using the suggested format in appendix 2(ii).
Flow of Information Management

Clinics

Suspected HFMD Case

CDCIS
Case fulfilled criteria

Investigate & Register

Cluster of cases?

Laboratories

Lab-Confirmed Cases

LIS
Positive EV71

Investigate

Finish
No
Yes

Preventive and control activities

Report
5. MANAGEMENT OF SPORADIC CASES

5.1 Definitions of sporadic case:
A single case of HFMD in the absence of previous known close contact with another case.

5.2 The public health measures

5.2.1 Case Investigation

Case investigation is required following the criteria below:

a. every notified HFMD case that fulfilled any one of the criteria below:
   i. case is admitted to hospital
   ii. case died.
   iii. case aged 6 years and below and goes to any pre-schools or nurseries.

The first two criteria indicate severity of illness and it is a proxy of possible EV71 infection. Meanwhile the third criterion is important in preventing spread of illness among the pre-school children (high risk group) and reducing public anxiety.

b. every case with positive EV71 laboratory result.

Investigation should be carried out to determine the course, source and severity of infection. Enquiries shall be made into;

1. Particulars of the person affected
2. Clinical signs and symptoms with date of onset. In addition, enquiries shall be elicited for associated complications e.g. seizures, weakness of limbs, staring episodes, drowsiness, profound lethargy and refusal to play.
   Enterovirus infections that are not associated with complications may not have cutaneous manifestations.
3. Duration of illness
4. Type of treatment sought, including details of hospitalization and reason for admission
5. History of travel especially to outbreak area in the past two weeks
6. Contacts with similar illness in an institution (child care centre or kindergarten), family or neighbourhood where relevant.
7. If newborn, antenatal history including maternal history of febrile illness, mode of delivery
5.2.2 Incidence management

Following steps should be taken to prevent further spread of disease / pathogen:

1. Ensure that the infected children remain away from the institution for at least ten days after onset of symptoms and must be certified free from infection by a registered medical practitioner prior to returning to school.

2. Active case detection shall be carried out among contacts in the institution and family, and all those with illness shall be referred for treatment at the nearest health clinics.

3. Swabs from oral ulcers and vesicular lesions on the hands and feet shall be collected for virus isolation at identified laboratories (IMR or NPHL). If these ulcers and vesicles are no longer present, stool specimens shall be sent. Always consult pathologist for specimens taking, handling and transportation.

4. Health education of supervisors of institutions on the disease, mode of transmission, importance of good personal hygiene and isolation of infected children shall be carried out.

5. Principals, teachers and supervisors shall be alerted to look out for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer Buku Panduan Latihan Taska dan Prasekolah).

6. If there are two or case in the premise, advice the premise to be closed to cut disease transmission. It should be closed for two incubation period (10 days) from the date of onset of the last case.

7. Supervision on disinfection procedures shall be given to the premise operators. Articles such as toys contaminated by infected cases are disinfected with 0.5% sodium hypochlorite solutions (please refer Buku Panduan Latihan Taska dan Prasekolah).
6. **MANAGEMENT OF OUTBREAK**

6.1 **Definitions of outbreak**
The occurrence of two or more cases in the same locality within the incubation period.

**Organisation based outbreak** – two or more cases with onset in two weeks interval in a group which makes epidemiological sense.

6.2 **Identification of outbreaks**
Surveillance data on HFMD cases should be reviewed on continuous basis to identify cases and detects outbreaks.

6.3 **Risk factors for outbreaks**
Risk factors for outbreaks are not completely understood. A combination of conditions (environment, host and organism) is necessary for an epidemic to occur. However large HFMD outbreaks have been associated with EV71 infection.

6.4 **Management of outbreaks**
When a suspected outbreak is reported, it is important to determine rapidly whether a true outbreak is occurring based on the definition above.

Similar steps as in sporadic case management should be carried out together with following measures;

1. Ensure that the infected children remain away from the institution for at least ten days after onset of symptoms and must be certified free from infection by a registered medical practitioner prior to returning to school.

2. An assessment of the number of cases and susceptible population involved shall be made, and the overall attack rate and age-specific attack rate computed.

3. Active case detection shall be carried out among contacts in the institution and family, and all those with illness shall be referred for treatment at the nearest health clinics.

4. Where a case is observed or suspected to have unusual signs and symptoms e.g. seizures, weakness of limbs, profound lethargy, refusal to play, the case shall be immediately referred to hospital.

5. Swabs from oral ulcers and vesicular lesions on the hands and feet shall be collected for virus isolation at identified laboratories (IMR or NPHL). If these ulcers and vesicles are no longer present, stool specimens shall be sent. Always consult pathologist for specimens taking, handling and transportation.
6. Principals, teachers and supervisors shall be alerted to look out for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer *Buku Panduan Latihan Taska dan Prasekolah*).

7. Health education of supervisors of institutions on the disease, mode of transmission, importance of good personal hygiene and isolation of infected children shall be carried out.

8. Close the premise closed for two incubation period (10 days) from the date of onset of the last case. Supervision on disinfection procedures shall be given to the premise operators.

In addition the investigating team shall also look into environmental sanitation and hygiene to ensure that:

a. Articles such as toys contaminated by infected cases are disinfected with 0.5% sodium hypochlorite solutions (please refer *Buku Panduan Latihan Taska dan Prasekolah*).

b. A high standard of food and personal hygiene is maintained by the institution involved which include proper waste and diapers disposal.

c. The approved enrolment of Department of Social Welfare (JKM), Ministry of Education, Department of National Integration and other relevant parties, where applicable, and shall notify the relevant authorities if regulations not complied.

If the outbreak occurs in primary schools;

   i. Ensure that the infected students remain away from the institution for at least ten days.

   ii. Health education to the students on the disease, mode of transmission, importance of good personal hygiene.

   iii. Principals, teachers and supervisors shall be look for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer *Buku Panduan Latihan Taska dan Prasekolah*).

   iv. If closure is necessary, just closed the affected class. Closure of the whole school is unnecessary as HFMD in older children is usually very mild and so far no complication has been documented from this agegroup.
6.5 Documentation and review

Disease activity and emergency response should be adequately documented so that further outbreaks can be handled more effectively. A summary report should be prepared within a month from the last date of case; and distributed to all the stakeholders for feedback. Format of report, dissemination and tabling of report is discussed in more details in Infectious Disease Outbreak Rapid Response Manual.12
Appendix 1

Variables required in HFMD surveillance database

1  Epid week
2  Name
3  Age
4  Sex
5  Ethnic
6  Home address
7  Locality
8  District
9  Name of school / preschool / nursery
10 Address of school / preschool / nursery
11 Date of onset
12 Case definition fulfilled
13 Symptoms and signs of CNS
14 Contact with HFMD case
15 Address of contact
16 Date of seen
17 Name of clinic / hospital
18 Government or private health facility
19 Outpatient or inpatient treatment
20 Date of admitted
21 Date of discharge
22 Date of death
# NATIONAL ENTEROVIRUS SURVEILLANCE
## DIAGNOSTIC REQUEST FORM

### A. MAKLUMAT PESAKIT

<table>
<thead>
<tr>
<th>Negeri</th>
<th>Daerah</th>
<th>Hospital (wad) / Klinik Kesihatan</th>
<th>No. R/N</th>
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<tr>
<th>No. K/P</th>
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<th>Jantina</th>
<th>L / P</th>
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<th>Tarikh lahir</th>
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### B. MAKLUMAT KLINIKAL

<table>
<thead>
<tr>
<th>Gejala (Simptom)</th>
<th>Ada / Tiada (Tandakan √)</th>
<th>Tarikh mula</th>
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</thead>
<tbody>
<tr>
<td>Demam &gt; 38 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ulser di mulut &amp; tekak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maculopapular rashes dan / Vesikel pada tapak tangan dan tapak kaki</td>
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</tr>
<tr>
<td>Tanda dan gejala URTI</td>
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</table>

### C. SPESIMEN KLINIKAL

<table>
<thead>
<tr>
<th>Spesimen</th>
<th>Tarikh diambil</th>
<th>Tarikh penghantaran</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectal swab</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Mouth ulcer</td>
<td>/</td>
<td>/</td>
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<tr>
<td>Vesicle swab</td>
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<td>Stool</td>
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### D. MAKLUMAT PEMOHON

<table>
<thead>
<tr>
<th>Nama dan Cop Pegawai</th>
<th>No. telefon</th>
<th>No. fax</th>
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| Tandatangan | |
|-------------| |

### E. MAKLAM (Untuk Kegunaan Makmal)

<table>
<thead>
<tr>
<th>Spesimen</th>
<th>Jenis ujian</th>
<th>Keputusan ujian</th>
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<td>Mouth ulcer</td>
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<table>
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<th>Tarikh</th>
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</table>

Nota * : All samples except blood / serum and stool must be in the viral transport media (VTM) and send immediately in ice pack to HUKM Microbiological Laboratory.
Appendix 2(ii)

Variables Required for Enterovirus Surveillance Database

Name of Centre / Laboratory: ________________

<table>
<thead>
<tr>
<th>No</th>
<th>Date Sample Received</th>
<th>Date Sample Collected</th>
<th>LN</th>
<th>RN</th>
<th>Name</th>
<th>Ethnic</th>
<th>Age</th>
<th>Sex</th>
<th>Source</th>
<th>Case diagnosis</th>
<th>Type of spec</th>
<th>Result</th>
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BORANG SIASATAN PESAKIT DI WAD
PENYAKIT TANGAN, KAKI DAN MULUT (HFMD)
BAHAGIAN KAWALAN PENYAKIT, KEMENTERIAN KESIHATAN MALAYSIA

BAHAGIAN 1

<table>
<thead>
<tr>
<th>Tarikh masuk wad:</th>
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<thead>
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<th>Tarikh kematian</th>
<th>Masa:</th>
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</tbody>
</table>

A. PERIHAL PESAKIT

1. Nama pesakit:  
2. Tarikh lahir:  
3. Nama ibu:  
4. No K/P ibu:  
5. Alamat rumah:  
6. No telefon: (rumah) (H/P)

Kedudukan rumah (GPS): X : __________________   Y : __________________

7. Jantina:  
   - Lelaki  
   - Perempuan

8. Kumpulan etnik  
   - Melayu  
   - Kadazan/Dusun  
   - Cina  
   - Murut  
   - India  
   - Bajau  
   - Asli semenanjung  
   - Melanau  
   - Bidayuh  
   - Iban  
   - Lain-lain pribumi  
   - Lain-lain (nyatakan)  
   - Sabah/Sarawak

9. Kewarganegaraan:  
   - Malaysia  
   - Warga asing

10. Menghadiri sekolah / taska

   - Ya  
   - Tidak  
   - Taska/Nurseri  
   - Prasekolah  
   - Sekolah  
   - Nyatakan nama: ________________________________

B. MAKLUMAT KLINIKAL

1. Tarikh mula sakit (onset)  

2. Tanda dan gejala:  
   - Ya  
   - Tidak  
   - Riwayat demam  
   -  
   -  

24
Ulser mulut
Ruam (rash) tapak tangan / kaki
vesicles di tapak tangan / kaki

3. Kompliksi
Ya    Tidak
Aseptic meningitis
Myocarditis
Encephalitis
Acute flaccid paralysis

Jika ya, sila nyatakan bahagian anggota: ____________________
Kematian

C. MAKLUMAT UJIAN MAKMAL

<table>
<thead>
<tr>
<th>SAMPEL</th>
<th>Tarikh diambil</th>
<th>Keputusan</th>
<th>Tarikh keputusan</th>
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<tbody>
<tr>
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<td>CSF</td>
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<tr>
<td>Biopsy ________</td>
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</tr>
</tbody>
</table>
                     (Nyatakan tisu)

D. MAKLUMAT PEGAWAI YANG MERAWAT
1. Nama Pakar / Pegawai Perubatan: __________________________ Tandatangan: ____________
2. Nama Wad: __________________________
3. Nama hospital: __________________________ Tarih notifikasi: _________
7. REFERENCES


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1. INTRODUCTION

Hand foot and mouth disease (HFMD) is typically a benign and common illness among children and infants characterized by rapidly ulcerating vesicles in the mouth and lesions, usually vesicular, on the hands and feet. HFMD is an endemic disease in Malaysia. HFMD has become an important public health disease due to its tendency to cause large outbreaks and deaths among children and infants. The purpose of the guidelines is to help health personnels and health authorities, at any levels;

- To update current knowledge about HFMD
- To detect and control epidemic of HFMD as early as possible
- To strengthen the capacity for emergency response to epidemics of HFMD
- To improve the outcome of HFMD cases through effective case management.

2. THE DISEASE

Hand foot and mouth disease (HFMD) is caused by systemic infections with human enteroviruses. Human enteroviruses comprise one genus in the family Picornaviridae, which also contains the genera rhinovirus, cardiomyovirus, aphthovirus, hepatovirus and parechovirus. The members of the enterovirus genus that infect humans include the polioviruses, the Coxsackie virus groups A and B, the echoviruses and the enteroviruses 68-71.

2.1 Transmission

Hand foot and mouth disease (HFMD) is moderately contagious. Infection is spread from person to person by direct contact with nose and throat discharges, saliva, fluid from blisters, or the stool of infected persons. A person is most contagious during the first week of the illness.

2.2 Clinical Features

HFMD is characterised by vesicular eruptions on the hands, wrists, feet and within the mouth. Lesions on the hands are almost always present, but oral lesions are present in 90% of patients and can occasionally be the only manifestation of the disease. The oral vesicles are often on the palate, tongue, and buccal mucosa and may range from a few isolated lesions to a marked stomatitis.

In addition patients may suffer fever, malaise, conjunctival injection, headache, and abdominal pain and occasionally diarrhea. The lesions on the feet and hands are flaccid, grayish vesicles, most often on the sides of the fingers, instep and
toes. If the disease is confined to the oral cavity it is almost indistinguishable from primary herpetic gingivostomatitis.³

Hand foot and mouth disease may be related to coxsackieviruses A16, A5, A9, A10, B2, B5 and enterovirus 71. Coxsackievirus A16 (Cox A16) is a frequently encountered pathogen in cases of HFMD and its clinical course is usually uneventful, with full recovery.

Fatal cases of Cox A16 infection are rare. Literature search revealed only three fatal cases of Cox A16 since 1963. All the cases were infants. The first case was reported by Wright et al in 1963 involving a 10 month-old girl with respiratory infection.⁴ The second case involved a 7 month-old boy with grunting and tongue ulcers.⁵ The third case was reported by Wang et al involving a 15 month-old boy who presented with hand foot and mouth disease complicated with myocarditis and intractable shock.⁶

HFMD caused by enterovirus 71 (EV71) can be more severe and may be complicated with meningitis, encephalitis and neurogenic pulmonary edema. In Taiwan, based on 1998 epidemic, the significant difference in the clinical features of Coxsackievirus A16 infection and EV 71 infection was that in EV71 the fever was usually higher than 39°C and longer than 3 days.⁷

Enterovirus 71 infection can be classified into 4 stages:

Stage 1 – Hand foot and mouth disease (HFMD), oral ulcers and vesicular rash appearing on the hands, feet, knees and / or buttocks; or herpangina including oral ulceration over anterior tonsillar pillars, the soft palate, buccal mucosa or uvula.

Stage 2 – CNS involvement - aseptic meningitis with headache, irritability or myoclonic jerk and CSF pleocytosis (> 5 x 10⁶ leucocytes / litre) but without altered level of consciousness and focal signs, or encephalitis with altered level of consciousness plus CSF pleocytosis or poliomyelitis like syndrome with acute limb weakness and decreased reflex and muscle strength, or encephalomyelitis with the occurrence of both encephalitis and poliomyelitis like syndrome.

Stage 3 – Cardiopulmonary failure, pulmonary edema or hemorrhage with decreased ejection fraction of left ventricle as assessed by echocardiography necessitating inotropic agent support.
Stage 4 – Convalescence - is defined as recovery from cardiopulmonary failure.

2.3 Magnitude of the disease

Hand foot and mouth disease (HFMD) generally is a common and self limiting disease among children. EV 71 infection is the more important public health concern. In temperate countries most HFMD cases occur in the summer and fall and the incubation period is 4 – 6 days.

EV 71 was first isolated from a child with aseptic meningitis in California in 1969, and by 1974, the virus had been described as a new serotype of genus Enterovirus. In the years following the initial isolation of EV71, outbreaks occurred in USA, Australia, Sweden and Japan. In 1975 EV71 gained global attention when it was responsible for an outbreak in Bulgaria that resulted in 705 cases of poliomyelitis-like disease and the deaths of 44 people; 93% of the poliomyelitis-like disease cases occurred in children under the age of five. A similar outbreak occurred in Hungary in 1978, which also involved many cases of poliomyelitis-like disease and 47 deaths. Since this time outbreaks of EV71 have continued to occur throughout the world.

More recently there has been an increase in EV71 activity in the Asia Pacific region with several epidemics of HFMD being reported, including multiple cases associated with brain stem encephalitis and pulmonary edema. The first such epidemic occurred in Sarawak (Malaysian Borneo) in 1997 followed by smaller outbreaks in peninsular Malaysia and Japan. In 1998 outbreaks continued in Singapore and Taiwan.

The outbreak that occurred in Taiwan is the largest recorded, with greater than 100,000 cases of HFMD. Of these 400 children were admitted to hospital with central nervous system (CNS) involvement and 78 died of brainstem encephalitis with neurogenic pulmonary oedema. In 1999, a large HFMD outbreak occurred in Perth, western Australia and in 2000, EV71 was the cause of epidemics in Korea, Japan, Singapore, Taiwan and peninsular Malaysia, resulting in a range of clinical presentations including HFMD, aseptic meningitis, encephalitis and poliomyelitis like disease. Another outbreak occurred in Sarawak in 2003 which coincide with the SARS outbreak in the region and the public health measures put into place during this time evidently served to control transmission of enteroviruses as well.
3. CLINICAL MANAGEMENT OF HFMD

HFMD is usually a mild and self limiting. In general, most cases of HFMD do not require admission but can be managed as outpatients. Most fatal HFMD cases were due to enterovirus infection.

3.1 Symptomatic treatment

Mild HFMD cases only need symptomatic treatment. Treatment of fever and relief of symptoms, adequate hydration and rest are important. Parents and care takers should be educated on hygiene and measures that they should take to prevent transmission to other children.

3.2 Hospitalisation.

3.2.1 Criteria for admission

- When the child is unable to tolerate oral feeds and there is a need for intravenous hydration;
- When the child is clinically very ill or toxic-looking
- When some other more serious disease cannot be excluded
- When there is persistent hyperpyrexia (e.g >38°C) for >48 hours;
- When there is a suspicion of neurological complications, e.g increased lethargy, myoclonus, increased drowsiness, change in sensorium and/or seizures;
- When there is a suspicion of cardiac complications (myocarditis), e.g low blood pressure, low pulse volume, heart rhythm abnormalities, murmurs, gallop rhythm, displaced apex beat;
- When parents are unable to cope with child’s illness; and
- When there is inadequate family or social support in looking after the child at home.

3.2.2 Infection control

- Proper hygiene including mandatory hand washing after contact with patient, appropriate cleanliness during diaper changes is imperative
- Personal items such as spoons, cups and utensils should not be shared and should be properly washed with detergent after use;
- The use of gowns may act as a useful protection for health personnel looking after these patients; and
- Patients with HFMD should be isolated and the usual isolation procedures followed for infection control.
3.3 Patients with neurologic complication

Huang et al reviewed HFMD cases in Taiwan in 1998 and they found that the mean age of patients with neurological manifestations was 2.5 (range, 3 months to 8.2 years\textsuperscript{10}. Higher incidence occurs in the younger age group. The neurologic disorders usually began 2 to 5 days after the onset of skin or mucosa lesion or fever.

Wu JM et al carried out a prospective study among infants confirmed to have enterovirus 71 and found that\textsuperscript{11};

- EV71 infection can lead to severe neurologic complications and acute pulmonary edema with or without hemorrhage
- All patients with EV71 infection and pulmonary edema had brainstem lesions
- Viral myocarditis is not the direct cause of acute PE and cardiopulmonary failure in EV71 Infection
- The excessive central sympathetic activation resulting in vasoconstriction was not the major cause of PE or hemorrhage

Based on the findings, they suggested that;

- Vasodilators should be used with caution since pulmonary edema in EV71 infection is not resulting from excessive vasoconstriction alone
- Cardiopulmonary function usually returns to nearly normal within days but the neurologic sequelae are severe and usually permanent. Therefore the use of extracorporeal membrane oxygenation support or a heart assist device should be weighed carefully
- Direct intracardiac hemodynamic monitoring may provide additional information to guide critical care
3.4. ADVICE GIVEN UPON PATIENT’S DISCHARGE

Parents and guardians should be advised upon patients discharge on complications that may occur; a statement as shown below can be given:

“Your child has been diagnosed to have hand-foot-mouth disease. This disease is normally not dangerous but in the light of recent events, we advise that you bring back your child to this hospital if he / she has any of the following symptoms:

- High fever.
- Lethargy and weakness.
- Refusing feeds and passing less urine.
- Rapid breathing.
- Vomiting.
- Drowsiness or irritably.
- Fits.”
4. SURVEILLANCE

The actual burden of HFMD in this country is not known. HFMD surveillance in Malaysia started after the Sarawak outbreak in 1997 with sentinel surveillance. Both private and government clinics were included as sentinel sites for each district. The number of sentinel sites for each district depends on the assumed prevalence of HFMD in the district / state.

HFMD notification is administratively required and started since October 2005. However death of HFMD and admitted cases to the ward of children aged 10 years old and below is mandatory for notification. However due to frequent outbreaks and fatality in Sarawak, Sarawak State has required all HFMD cases in the state to be notified.

The notification of HFMD came into enforcement on 12 October 2006 under the PU.A 374 / 2006 (appendix 1).

3.1 Objective of surveillance
   i. To detect impending outbreak.
   ii. To monitor circulating infectious agent.
   iii. To estimate the magnitude of HFMD in the population at risk.
   iv. To estimate the magnitude of the HFMD complication in the population at risk.

3.2 Case definition

3.2.1 Clinical case definition
   3.2.1.1 Case of HFMD:
       Any child with:
       a. mouth / tongue ulcer and
       b. maculopapular rashes and / or vesicles on palms and soles
       c. with OR without history of fever

   3.2.1.2 HFMD myocarditis:

       2(i) Suspected HFMD myocarditis
       Asymptomatic child with unexplained tachycardia to fulminating congestive cardiac failure.
       With history of diarrhoea or URTI.
Accompanied by fever, malaise, tachypnoea, tachycardia (above and beyond expected for age and fever) or dehydration. Pallor and shock in the absence of or obvious pulmonary sign or in the presence of crepitations (no murmurs) and / or a clinically enlarged heart.

2(i) **Confirmed HFMD myocarditis.**

The above 2(i) with virologic confirmation of enteroviruses.

3.2.1.3 **HFMD meningoencephalitis / AFP**

3(i) **Suspected HFMD meningoencephalitis**

Evidence of aseptic meningitis.
Evidence of aseptic encephalitis.
Evidence of AFP.

3(ii) **Confirmed HFMD meningoencephalitis / AFP.**

The above 3(i) with virologic confirmation of enteroviruses

3.2.2 **Laboratory criteria**

Any case that has the clinical symptoms and positive for viruses (coxsackieviruses (Cox) A16, A5, A9, A10, B2, B5 and enterovirus (EV) 71) which could cause HFMD, isolated or detected from stool or vesicle fluid or mouth ulcer or saliva.

3.2.3 **Case classification**

**Suspected:** A case that meets the clinical case definition.

**Confirmed:** A suspected case in which laboratory investigation confirms the presence of virus OR when cases are epidemiologically linked to a laboratory confirmed case.

3.3 **Types of surveillance**

3.3.1 **Clinical surveillance**

It is mandatory to notify HFMD under the National Notification of Infectious Diseases (list of notifiable diseases). Notification must be done within 24 hours of diagnosis via telephone, then it should be followed by notification form.
All HFMD cases detected must be entered to CDCIS. If states have other methods of data storing, it must be shared with MOH.

Laboratory confirmation is **NOT** required for notification.

### 3.2.2 Laboratory surveillance

#### Sentinel sites

Enterovirus surveillance is done through state's sentinel sites. A state has to choose two sentinel sites. Preferably the sites have a considerable numbers of children cases as HFMD prevalence is higher among this age group. At least 5 specimens from 5 patients per centre should be taken and sent to the designated laboratory (as in table below). Please use the laboratory request form as in appendix 2(i).

**Designated laboratory involves in enterovirus surveillance**

<table>
<thead>
<tr>
<th>Laboratory</th>
<th>Contact number</th>
<th>Respective states</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMR</td>
<td>03-26988792</td>
<td>Johor, WPKL, Melaka, Terengganu, Pahang.</td>
</tr>
<tr>
<td>UMMC</td>
<td>03-79675756 / 79676678</td>
<td>Selangor.</td>
</tr>
<tr>
<td>NPHL</td>
<td>03-61402213</td>
<td>Perlis, Kedah, Perak, Penang</td>
</tr>
<tr>
<td>'HUKM</td>
<td>03 - 91702203 / 2208</td>
<td>Negeri Sembilan</td>
</tr>
<tr>
<td>USM</td>
<td>09 - 7664602 / 4609 / 3000 ext 4602</td>
<td>Kelantan</td>
</tr>
</tbody>
</table>

Surveillance for Sarawak and Sabah is expected to start once Kota Kinabalu Public Health Laboratory is ready to function.
Clinical Specimen Collection, Handling And Transportation

Patient

Blood serology

Swab
For viral culture

CSF

2 ml
- in plain sterile tube

1 ml
- in plain sterile tube

Mouth ulcer

Rectal
- wet swab with sterile saline

Vesicle
- basal scraping

Viral transport media

Send clinical samples to respective laboratory within 24 hours of collection at 4 °C (on ice).
DO NOT STORE AT -20 °C

Smear on slide
3.4 Flow of surveillance data

Notification data should be entered in CDCIS as and when there is HFMD case. Other sources of data must be shared with Disease Control Division. Data must have the variables listed in appendix 1.

Laboratory results for enterovirus surveillance must be shared with respective states and Disease Control Division using the suggested format in appendix 2(ii).
Flow of Information Management

Clinics

Suspected HFMD Case

CDCIS

Case fulfilled criteria

Investigate & Register

Cluster of cases?

Laboratories

Lab-Confirmed Cases

LIS

Positive EV71

Investigate

Finish

No

Yes

Preventive and control activities

Report

Report
5. MANAGEMENT OF SPORADIC CASES

5.1 Definitions of sporadic case:
A single case of HFMD in the absence of previous known close contact with another case.

5.2 The public health measures

5.2.1 Case Investigation

Case investigation is required following the criteria below:

a. every notified HFMD case that fulfilled any one of the criteria below:
   i. case is admitted to hospital
   ii. case died.
   iii. case aged 6 years and below and goes to any pre-schools or nurseries.

The first two criteria indicate severity of illness and it is a proxy of possible EV71 infection. Meanwhile the third criterion is important in preventing spread of illness among the pre-school children (high risk group) and reducing public anxiety.

b. every case with positive EV71 laboratory result.

Investigation should be carried out to determine the course, source and severity of infection. Enquiries shall be made into;

1. Particulars of the person affected
2. Clinical signs and symptoms with date of onset. In addition, enquiries shall be elicited for associated complications e.g. seizures, weakness of limbs, staring episodes, drowsiness, profound lethargy and refusal to play.

Enterovirus infections that are not associated with complications may not have cutaneous manifestations.

3. Duration of illness
4. Type of treatment sought, including details of hospitalization and reason for admission
5. History of travel especially to outbreak area in the past two weeks
6. Contacts with similar illness in an institution (child care centre or kindergarten), family or neighbourhood where relevant.
7. If newborn, antenatal history including maternal history of febrile illness, mode of delivery
5.2.2 Incidence management

Following steps should be taken to prevent further spread of disease / pathogen:

1. Ensure that the infected children remain away from the institution for at least ten days after onset of symptoms and must be certified free from infection by a registered medical practitioner prior to returning to school.

2. Active case detection shall be carried out among contacts in the institution and family, and all those with illness shall be referred for treatment at the nearest health clinics.

3. Swabs from oral ulcers and vesicular lesions on the hands and feet shall be collected for virus isolation at identified laboratories (IMR or NPHL). If these ulcers and vesicles are no longer present, stool specimens shall be sent. Always consult pathologist for specimens taking, handling and transportation.

4. Health education of supervisors of institutions on the disease, mode of transmission, importance of good personal hygiene and isolation of infected children shall be carried out.

5. Principals, teachers and supervisors shall be alerted to look out for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer Buku Panduan Latihan Taska dan Prasekolah).

6. If there are two or case in the premise, advice the premise to be closed to cut disease transmission. It should be closed for two incubation period (10 days) from the date of onset of the last case.

7. Supervision on disinfection procedures shall be given to the premise operators. Articles such as toys contaminated by infected cases are disinfected with 0.5% sodium hypochlorite solutions (please refer Buku Panduan Latihan Taska dan Prasekolah).
6. MANAGEMENT OF OUTBREAK

6.1 Definitions of outbreak
The occurrence of two or more cases in the same locality within the incubation period.

**Organisation based outbreak** – two or more cases with onset in two weeks interval in a group which makes epidemiological sense.

6.2 Identification of outbreaks
Surveillance data on HFMD cases should be reviewed on continuous basis to identify cases and detects outbreaks.

6.3 Risk factors for outbreaks
Risk factors for outbreaks are not completely understood. A combination of conditions (environment, host and organism) is necessary for an epidemic to occur. However large HFMD outbreaks have been associated with EV71 infection.

6.4 Management of outbreaks
When a suspected outbreak is reported, it is important to determine rapidly whether a true outbreak is occurring based on the definition above.

Similar steps as in sporadic case management should be carried out together with following measures;

1. Ensure that the infected children remain away from the institution for at least ten days after onset of symptoms and must be certified free from infection by a registered medical practitioner prior to returning to school.

2. An assessment of the number of cases and susceptible population involved shall be made, and the overall attack rate and age-specific attack rate computed.

3. Active case detection shall be carried out among contacts in the institution and family, and all those with illness shall be referred for treatment at the nearest health clinics.

4. Where a case is observed or suspected to have unusual signs and symptoms e.g. seizures, weakness of limbs, profound lethargy, refusal to play, the case shall be immediately referred to hospital.

5. Swabs from oral ulcers and vesicular lesions on the hands and feet shall be collected for virus isolation at identified laboratories (IMR or NPHL). If these ulcers and vesicles are no longer present, stool specimens shall be sent. Always consult pathologist for specimens taking, handling and transportation.
6. Principals, teachers and supervisors shall be alerted to look out for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer Buku Panduan Latihan Taska dan Prasekolah).

7. Health education of supervisors of institutions on the disease, mode of transmission, importance of good personal hygiene and isolation of infected children shall be carried out.

8. Close the premise closed for two incubation period (10 days) from the date of onset of the last case. Supervision on disinfection procedures shall be given to the premise operators.

In addition the investigating team shall also look into environmental sanitation and hygiene to ensure that:

   a. Articles such as toys contaminated by infected cases are disinfected with 0.5% sodium hypochlorite solutions (please refer Buku Panduan Latihan Taska dan Prasekolah).

   b. A high standard of food and personal hygiene is maintained by the institution involved which include proper waste and diapers disposal.

   c. The approved enrolment of Department of Social Welfare (JKM), Ministry of Education, Department of National Integration and other relevant parties, where applicable, and shall notify the relevant authorities if regulations not complied.

If the outbreak occurs in primary schools;

   i. Ensure that the infected students remain away from the institution for at least ten days.

   ii. Health education to the students on the disease, mode of transmission, importance of good personal hygiene.

   iii. Principals, teachers and supervisors shall be look for children with fever, rash / blisters on palms and soles and to isolate them immediately. Screening before coming to class is recommended (please refer Buku Panduan Latihan Taska dan Prasekolah).

   iv. If closure is necessary, just closed the affected class. Closure of the whole school is unnecessary as HFMD in older children is usually very mild and so far no complication has been documented from this agegroup.
6.5 Documentation and review

Disease activity and emergency response should be adequately documented so that further outbreaks can be handled more effectively. A summary report should be prepared within a month from the last date of case; and distributed to all the stakeholders for feedback. Format of report, dissemination and tabling of report is discussed in more details in Infectious Disease Outbreak Rapid Response Manual.¹²
Appendix 1

Variables required in HFMD surveillance database

1 Epid week
2 Name
3 Age
4 Sex
5 Ethnic
6 Home address
7 Locality
8 District
9 Name of school / preschool / nursery
10 Address of school / preschool / nursery
11 Date of onset
12 Case definition fulfilled
13 Symptoms and signs of CNS
14 Contact with HFMD case
15 Address of contact
16 Date of seen
17 Name of clinic / hospital
18 Government or private health facility
19 Outpatient or inpatient treatment
20 Date of admitted
21 Date of discharge
22 Date of death
A. MAKLUMAT PESAKIT

<table>
<thead>
<tr>
<th>Negeri</th>
<th>Daerah</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital (wad)</td>
<td>Klinik Kesihatan</td>
</tr>
<tr>
<td>No. R/N</td>
<td></td>
</tr>
</tbody>
</table>

Nama Pesakit:
No. K/P: Umur: Jantina: L / P
Bangsa: Tarikh lahir:

B. MAKLUMAT KLINIKAL

<table>
<thead>
<tr>
<th>Gejala (Simptom)</th>
<th>Ada / Tiada (Tandakan √)</th>
<th>Tarikh mula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demam &gt; 38 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ulser di mulut &amp; tekak</td>
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<td></td>
</tr>
<tr>
<td>Maculopapular rashes dan / Vesikel pada tapak tangan dan tapak kaki</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanda dan gejala URTI</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C. SPESIMEN KLINIKAL

<table>
<thead>
<tr>
<th>Spesimen</th>
<th>Tarikh diambil</th>
<th>Tarikh penghantaran</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectal swab</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Mouth ulcer</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Vesicle swab</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Stool</td>
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</tbody>
</table>

D. MAKLUMAT PEMOHON

Nama dan Cop Pegawai:
Tandatangan:
No. telefon:
No. fax:
e-mail:

E. MAKLAL (Untuk Kegunaan Makmal)

<table>
<thead>
<tr>
<th>Spesimen</th>
<th>Jenis ujian</th>
<th>Keputusan ujian</th>
<th>Komen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectal swab</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mouth ulcer</td>
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<td>Vesicle swab</td>
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<td>Stool</td>
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</table>

Nama dan tandatangan Pegawai Makmal:
Jawatan Pegawai Makmal dan Cop Makmal:
Tarikh:

Nota *: All samples except blood / serum and stool must be in the viral transport media (VTM) and send immediately in ice pack to HUKM Microbiological Laboratory.
Variables Required for Enterovirus Surveillance Database

Name of Centre / Laboratory: ________________

<table>
<thead>
<tr>
<th>No</th>
<th>Date Sample Received</th>
<th>Date Sample Collected</th>
<th>LN</th>
<th>RN</th>
<th>Name</th>
<th>Ethnic</th>
<th>Age</th>
<th>Sex</th>
<th>Source</th>
<th>Case diagnosis</th>
<th>Type of spec</th>
<th>Result</th>
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</tbody>
</table>
BORANG SIASATAN PESAKIT DI WAD
PENYAKIT TANGAN, KAKI DAN MULUT (HFMD)
BAHAGIAN KAWALAN PENYAKIT, KEMENTERIAN KESIHATAN MALAYSIA

BAHAGIAN 1

<table>
<thead>
<tr>
<th>Tarikh masuk wad:</th>
<th>Masa:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Tarikh discaj:</th>
<th>Masa:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tarikh kematian</th>
<th>Masa:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A. PERIHAL PESAKIT

1. Nama pesakit:  
2. Tarih lahir:  
3. Nama ibu:    
4. No K/P ibu:  
5. Alamat rumah:  
6. No telefon:  (rumah)  
7. Kedudukan rumah (GPS):  
8. Perkara Klinik:
   8.1. Tarikh mula sakit (onset):  
8.2. Tanda dan gejala:  

B. MAKLUMAT KLINIKAL

1. Tarih mula sakit (onset):  

2. Tanda dan gejala:  
   Ya  
   Tidak
Ulser mulut   
Ruang (rash) tapak tangan / kaki   
vesicles di tapak tangan / kaki

3. Kompliksi

<table>
<thead>
<tr>
<th>Komplikasi</th>
<th>Ya</th>
<th>Tidak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aseptic meningitis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myocarditis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encephalitis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute flaccid paralysis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Jika ya, sila nyatakan bahagian anggota: ____________________

Kematian

C. MAKLUMAT UJIAN MAKMAL

<table>
<thead>
<tr>
<th>SAMPEL</th>
<th>Tarikh diambil</th>
<th>Keputusan</th>
<th>Tarikh keputusan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throat swab</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectal swab</td>
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<td></td>
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<tr>
<td>Vesicle swab</td>
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<td></td>
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</tr>
<tr>
<td>Stool</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood</td>
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<tr>
<td>CSF</td>
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<tr>
<td>Biopsy _______</td>
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<td>(Nyatakan tisu)</td>
<td></td>
<td></td>
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</tbody>
</table>

D. MAKLUMAT PEGAWAI YANG MERAWAT

1. Nama Pakar / Pegawai Perubatan: __________________________ Tandatangan: ____________
2. Nama Wad: ______________________
3. Nama hospital: __________________________ Tarikh notifikasi: ____________
7. REFERENCES


CONTRIBUTORS

State Epidemiologists 2006 – 2007

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2. Kedah          Dr. Uma Salamah Abdul Kadir
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                     Dr. Zamri Md Ali
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                     Dr. B. Venugopalan
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7. N. Sembilan    Dr. Zulfa Vety Dol Bakri
8. Melaka         Dr. Hashimah Hasan
9. Johor          Dr. Shaharom Nor Azian Che Mat Din
                     Dr. Fatimah Othman
10. Pahang        Dr. Shaari Ngadiman
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