DRAFT
HAND-FOOT-MOUTH DISEASE (HFMD) MANUAL

INTRODUCTION

Hand-foot-mouth disease (HFMD) is a common illness of infants and children mainly in children under 10 years old. But adults may also be at risk. It is caused by enteroviruses. Despite their name, gastroenteritis is not the dominant manifestation. They multiply in the gut.

This virus belongs to the family of picornavirus; encompasses 67 human serotypes, 3 serotypes of poliovirus, 23 serotype of Coxsackievirus A, 6 serotypes of Coxsackievirus B, 31 serotypes of Echovirus and enteroviruses 68 to 71 (Fauci et al 1998). Enteroviruses are stable in acidic environment as they don't have the lipid envelop.

EPIDEMIOLOGY

The disease is worldwide distribution. In United State it is estimated that 5 to 10 million cases of symptomatic enterovirus disease per year in the country. It is the major cause of aseptic meningitis and nonspecific febriles illnesses of neonates.

The incubation period ranges from 3 to 6 days. Enterovirus infection is common in socioeconomically disadvantaged areas especially in crowded areas and in tropic areas with poor hygiene.

Young children are the most frequent enterovirus shedders. They are most infectious shortly before and after the onset of symptoms. The virus presents in the throat and stool. Most enteroviruses are transmitted by fecal-oral route.

CLINICAL PRESENTATION

The cases of HFMD usually presented with fever, rashes (maculopapular / vesicle) at the palm and sole, mouth / tongue ulcers, symptoms and signs of URTI. The vesicles are tender. The disease is highly contagious with attack rates of close to 100 percent among young children.

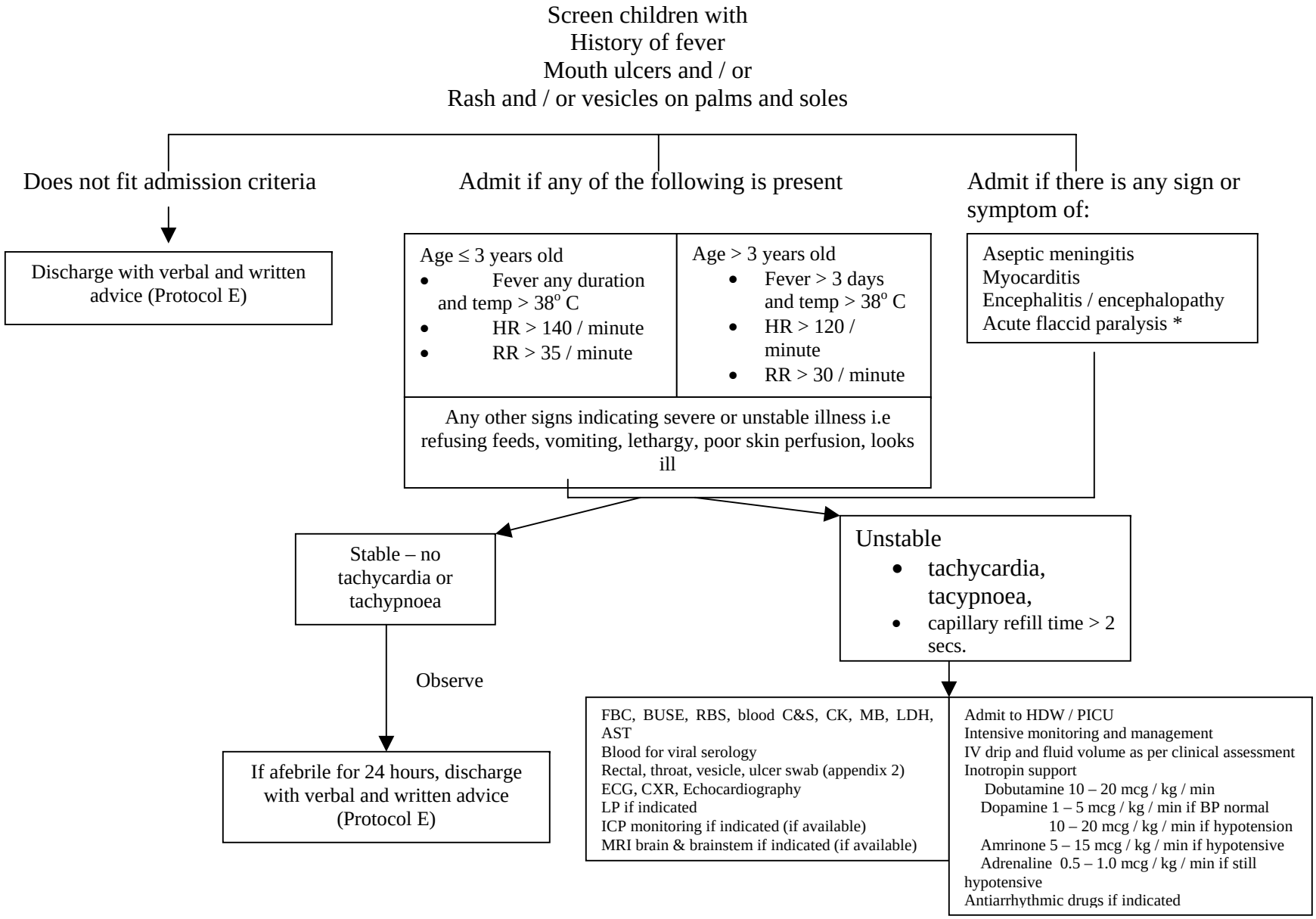
Nearly all cases of HFMD recover without medical treatment. HFMD usually resolves in 7 to 10 days. Complications are uncommon. Rarely, this illness may be associated with aseptic or viral meningoencephalitis and / or myocarditis.

Several different viruses can cause HFMD. The most common is Coxsackievirus A16 as shown in table below (Fauci et al 1998); occasionally, moderately contagious. The person is most contagious during the first week of the illness.

Manifestation commonly associated with Enterovirus Serotypes.

Manifestation	Serotype(s) of indicated virus	
	Coxsackievirus	Echovirus (E) and Enterovirus (Ent)
Aseptic meningitis	A2, 4, 7, 9, 10, B1 - 5	E4, 6, 7, 9, 11, 16, 18, 30, 33, Ent70, 71
Exanthem	A4, 5, 9, 10, 16, B1, 3 – 5	E4 – 7, 9, 11, 16 – 19, 25, 30, Ent71
Generalised disease of the newborn	B2 – 5	E4 – 6, 9, 11, 14, 16, 19
Hand-foot-mouth disease	A5, 7, 9, 10, 16, B2, 5	Ent71
Herpangina	A1 – 10, 16, 22, B1 – 5	E6, 9, 11, 16, 17, 22, 25
Myocarditis, pericarditis	A4, 9, 16, B1 – 5	E6, 9, 11, 22
Paralysis	A4, 7, 9, B1 – 5	E2, 4, 6, 9, 11, 30, Ent70, 71
Pleurodynia	A1, 2, 4, 6, 9, 10, 16, B1 – 6	E1 – 3, 6 – 9, 11, 12, 14, 16, 19, 23 – 25, 30
Pneumonia	A9, 16, B1 - 5	E6, 7, 9, 11, 12, 19, 20, 30, Ent68, 71

MANAGEMENT OF PATIENTS
WITH HAND-FOOT-MOUTH DISEASE



The previous diagram is a summary of the management of HFMD case. Te details are as follows:

1. Criteria for admission :
   Refer to Protocol A.

2. Collection, package and dispatch of specimen:
   Refer to Protocol B

3. If vomiting and not tolerating feeding:
   - May need an intravenous drip.
   - Correct dehydration.
   - Strict input and output chart.
   - Monitor vital signs and skin perfusion regularly.
   - Watch for symptoms and signs of increased intracranial pressure (may need to restrict fluid)

4. Management of patients with possible central nervous system involvement:
   Refer to Protocol C.

5. Management of patients with possible myocarditis and shock:
   Refer to Protocol D

6. Discharge:
   - If clinically well and afebrile for 24 hours or more with verbal and written advice – refer to Protocol E.
   - Patients with confirmed myocarditis should be followed up by a Paediatrician for cardiac assessment. Those with CNS involvement for neurological / developmental assessment.
   - Give appointment for a second serum virology if a first specimen has been taken.

PROTOCOL A

CRITERIA FOR ADMISSION TO THE HOSPITAL

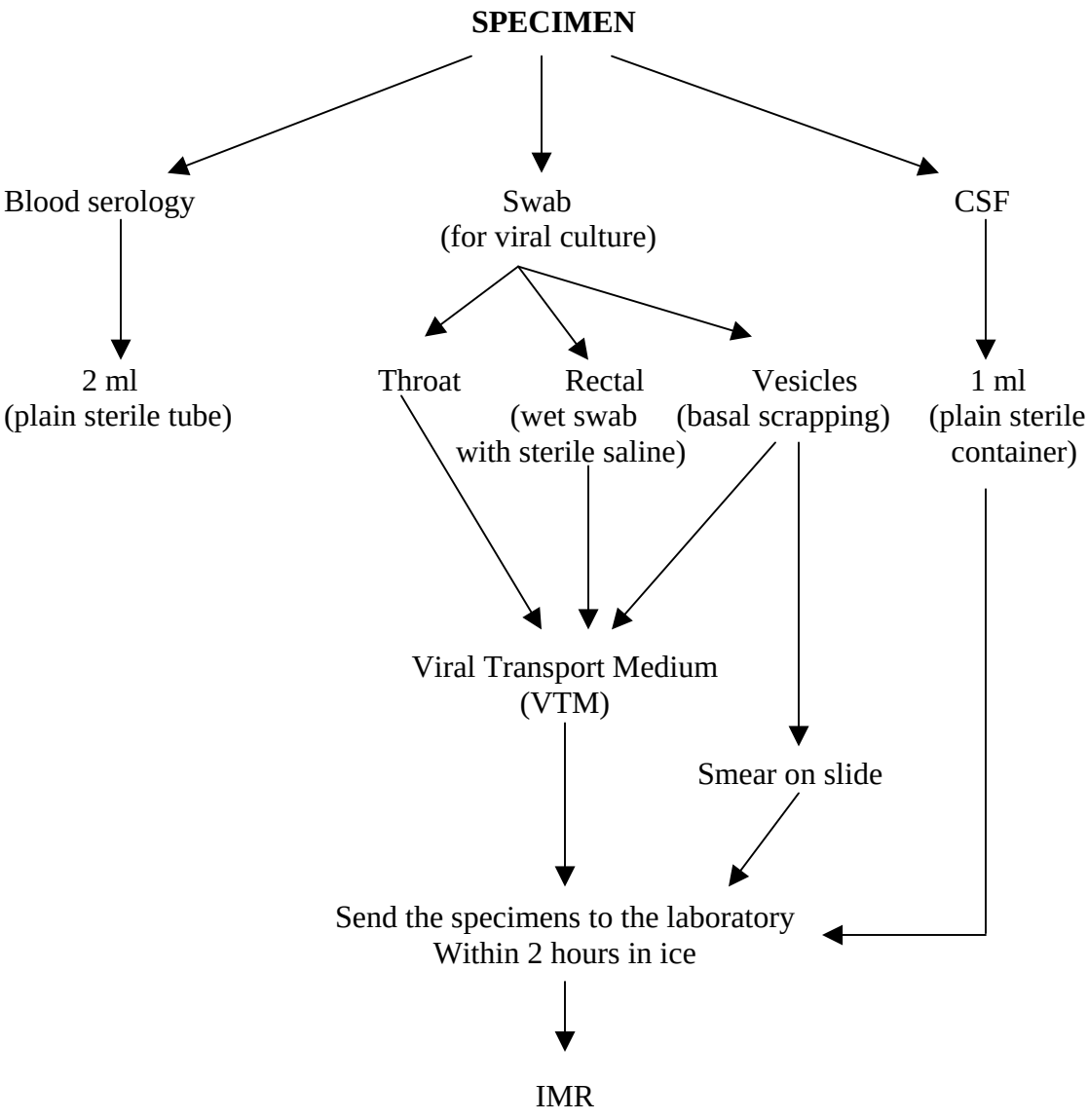
	≤ 3 years old	> 3 years old
Fever	Any duration with temperature > 38 ^{o}C	Fever > 3 days with temperature > 38 ^{o}C
Tachycardia	Heart rate > 140 beats per minute	Heart rate > 120 beats per minute
Tachypnoea	Respiratory rate > 35 per minute	Respiratory rate > 30 per minute
Any other signs indicating severe or unstable illness i.e.: • Refuse feeding • Vomiting • Lethargy • Poor skin perfusion • Looks ill		
If has symptoms and signs of the following: • Aseptic meningitis. • Myocarditis. • Encephalitis / encephalopathy. • Acute flaccid paralysis*		

* need to fill the AFP protocol. Case has to be notified as AFP (under elimination program).

Any death suspected cause by HFMD must undergo a post-mortem to confirm the cause of death.

PROTOCOL B

FLOW CHART
OF CLINICAL SPECIMEN



PROTOCOL C

MANAGEMENT OF PATIENTS WITH POSSIBLE CENTRAL NERVOUS SYSTEM INVOLVEMENT

1. Lumbar puncture is indicated (provided patient is stable) in the following condition:
    - Evidence of aseptic meningitis.
    - Evidence of encephalitis.
    - Acute flaccid paralysis.

2. CSF should be sent for the following test:
    - FEME.
    - Biochemistry.
    - Viral studies (CSF for IgM, PCR and culture for neuropathic viruses, minimum CSF volume of 0.5 ml to be put in sterile bottle and transported as soon as possible to the laboratory in cold ice).
    - Bacterial culture.

3. CSF opening pressure should be measured when lumbar punctute is performed. Pressure > 15 mm Hg (20 cm H_2O) indicates raised intracranial pressure that needs to be treated.

4. Management of raised intracranial pressure:
    - Position head in midline at 15 – 30 degrees above horizontal level.
    - Maintain circulation. Mean arterial pressure must maintain at 55 – 60 mm Hg or more to ensure adequate cerebral perfusion pressure. Use inotropes if necessary.
    - Monitor fluid balance (strictly) and osmolarity. If BP is stable and hydration is satisfactory, restrict intake to 2/3 of daily requirements.
    - Give intravenous dexamethasone (0.5 – 1 mg / kg 6 – 8 hourly; maximum daily dose is 2 mg / kg). This should only be given for a day and the drug is then tapered off.
    - If renal perfusion is adequate, give intravenous mannitol (0.25 gm / kg 6 hourly; maximum daily dose 2 gm / kg). Serum osmolarity should not raise above 300 mmol/L. IV mannitol should only be used in conjunction with fluid restriction. Prior administration of dexamethasone may prevent rebound oedema by preventing mannitol leakage into the interstitial space.

- Hyperventilate to maintain pCO_2 3.5 – 4.0 kPa or 30 – 35 mm Hg. The child must be paralysed and adequately sedated. However if the child is fitting, do not paralyse, treat seizures aggressively and ensure adequate sedation. Overzealous hyperventilation may increase the pH gradient between blood and CSF resulting CSF acidosis. Suddeen swings in pCO_2 should also be avoided.
- Maintain normothermia.
- Manage seizures aggressively with anticonvulsants.
- Do MRI brain and brainstem if indicated.
- Do CSF drainage via ventricular catheter if indicated.

PROTOCOL D

MANAGEMENT OF PATIENTS WITH POSSIBLE MYOCARDITIS AND SHOCK

Definition:
Myocarditis is defined as a generalized interstitial myocardial inflammation. Endomyocardial biopsy is currently the standard method used to diagnose myocarditis. However, it is invasive and has a low diagnostic yield.

Clinical manifestation:
Clinical spectrum ranges from the asymptomatic child witn unexplained tachycardia to fulminant congestive cardiac failure. A history of preceding diarrhoea or upper respiratory infection accompanied by fever, malaise, tachypnoea, tachycardia (above and beyond expected for age and fever or dehydration), pallor and shock in the absence or obvious pulmonary signs or in the presence of crepitations (no murmurs) and / or a clinically large heart would lead to a suspicion of myocarditis.

In the suspected cases of myocarditis, the following additional investigation should be performed:

1. CXR.
   Look for pulmonary oedema and cardiomegaly.

2. Electrocardiography (ECG).
   The ECG changes include:
   - prolongation of PR interval.
   - Low voltage QRS complexes.
   - T-wave inversion or flattening.
   - Prolonged QT interval.
   - ST segment depression.
   - Rarely atrioventricular blocks and ventricular arrhythmias.

3. Cardiac enzyme.
   Creatine kinase (including MB fraction), lactate dehydrogenase and aspatate aminitransferase.

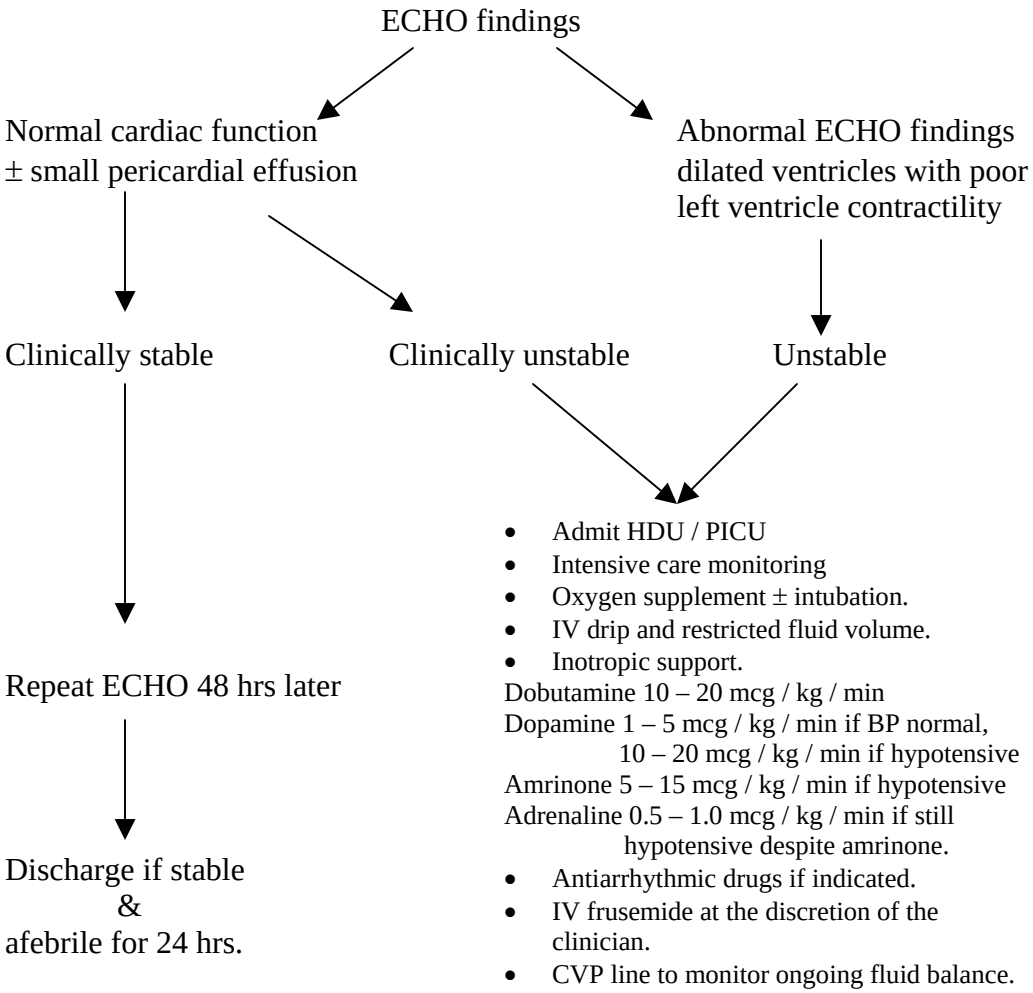
4. Echocardiography.
   Most useful investigation and typically shows enlarged heart, especially left ventricular dilatation and impaired left ventricle contractility with ejection fraction below normal. As there are interobserver and intraobserver differences in measurements, repeated serial

echocardiography examinations need to be performed. Ideally, it should be recorded onto a video-tape, one tape for one patient.

Indication for echocardiography:

Age	Heart rate / min
< 6 months	>200
6/12 – 1 year	>180
1-2 years	>160
> 2 years old	> 150
> 4 years old	>130

Management for findings:



MANAGEMENT OF SHOCK

Recognition of shock

- Presence of tachycardia (refer appendix A) and one or more of the following:
- Rapid respiration (breathing).
- Weak or absent of peripheral pulses.
- Poor skin perfusion (pale, cyanosed, mottled, capillary refill time > 2 secs.)
- Altered conscious level.
- Decreased urine output.
- Blood pressure normal (compensated shock) or low (decompensated shock).

↓

Airway protection

Maintain breathing
(oxygen supplement (via face mask) / intubate if necessary

↙ ↘

Shock of other causes

↓

Fluid restriction

- IV / intraosseous access
- Fluid boluses of 20 ml/kg of Crystalloids (normal saline / Ringer's Lactate) or colloids (5 % albumin / FFP)

↓

Reassess

↓

May require repeated fluid boluses
(caution: watch out for pulmonary oedema)

↙ ↘

No improvement → Inotropic support

Improve → ↓

Cardiogenic shock following myocarditis / neurogenic pulmonary oedema, suggested by:

- Clinical signs of acute heart failure, shock, arrhythmias,
- Clinical signs of pulmonary oedema (tachypnoea, pink frothy sputum, crepitations in the lungs)

↓

CXR showed pulmonary oedema with / without cardiomegaly. Echo showed left ventricular dilatation and poor cyocardial contractility.

↓

- Early intubation is advisable in cardiogenic shock.
- IV fluids restricted to 2/3 maintenance.
- Start inotropic support as in acute myocarditis with hypotension.
- IV Frusemide 1 – 2 mg / kg / dose 8 – 12 hourly if indicated.

↙

If in hospitals without Paediatrician
refer to Paediatrician.

PROTOCOL E

ADVICE GIVEN UPON PATIENT'S DISCHARGE

"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."

TREATMENT & PREVENTION

Currently there is no specific cure for HFMD. Treatment is only symptomatic. Hence, prevention is very important. The viral infection can be prevented through :

- Practising good personal hygiene susch as washing hands with soap and clean water after going to toilet, before preparing food, after changing diapers and after handling stool soiled material.
- Covering the mouth and nose when coughing or sneezing.
- Washing toys and other surfaces which are contaminated with saliva.
- Keeping away young children from crowded public places like market, supermarket, shopping complexes, bus stations, swimming pools etc.
- Sending children with symptoms of enteroviral infection to hospital or clinic; not to send them to kindergartens, school and other child-care center as the virus can be spread to other children.
- Closing kindergartens and nurseries if there is a case of HFMD or suspected death due to enteroviral infection at the center.
- Disinfection of kindergarten and nurseries before they are re-opened.
- Closing the public swimming pools during the peak of the outbreak.
- Keeping house and its surroundings clean to avoid flies, cockcroaches and rats.
- Cleaning oneself when return from work or outdoors before handling babies and small children.

HFMD SURVEILLANCE

OBJECTIVES

1. To detect impending outbreak.
2. To monitor circulating infectious agent.
3. To estimate the magnitude of HFMD in the population at risk.
4. To estimate the magnitude of the HFMD complication in the population at risk.

CASE DEFINITION

1. **Case of HFMD**:

   A child aged 6 years or below with:

   a. history of fever
   b. mouth / tongue ulcer and
   c. maculopapular rashes and / or vesicles on palms and soles.

2. **HFMD myocarditis**:

   2(i) **Suspected HFMDmyocarditis**

   Asymptomatic child with unexplained tachycardia to fulminant congestive cardiac failure.
   History of preceding dirrhoea 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. 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.

SURVEILLANCE MECHANISM

1. Sentinel surveillance is used for surveillance of uncomplicated HFMD treated as outpatients. Both private clinics and government clinics are included as sentinel clinics for each district. The number of sentinel sites for each district depends on the assumed prevalence of HFMD in the district / state.

2. In the event of occurrence of case outside the sentinel catchment's area, all clinics must notify case using notification form Borang Health 1 Rev. 2001.

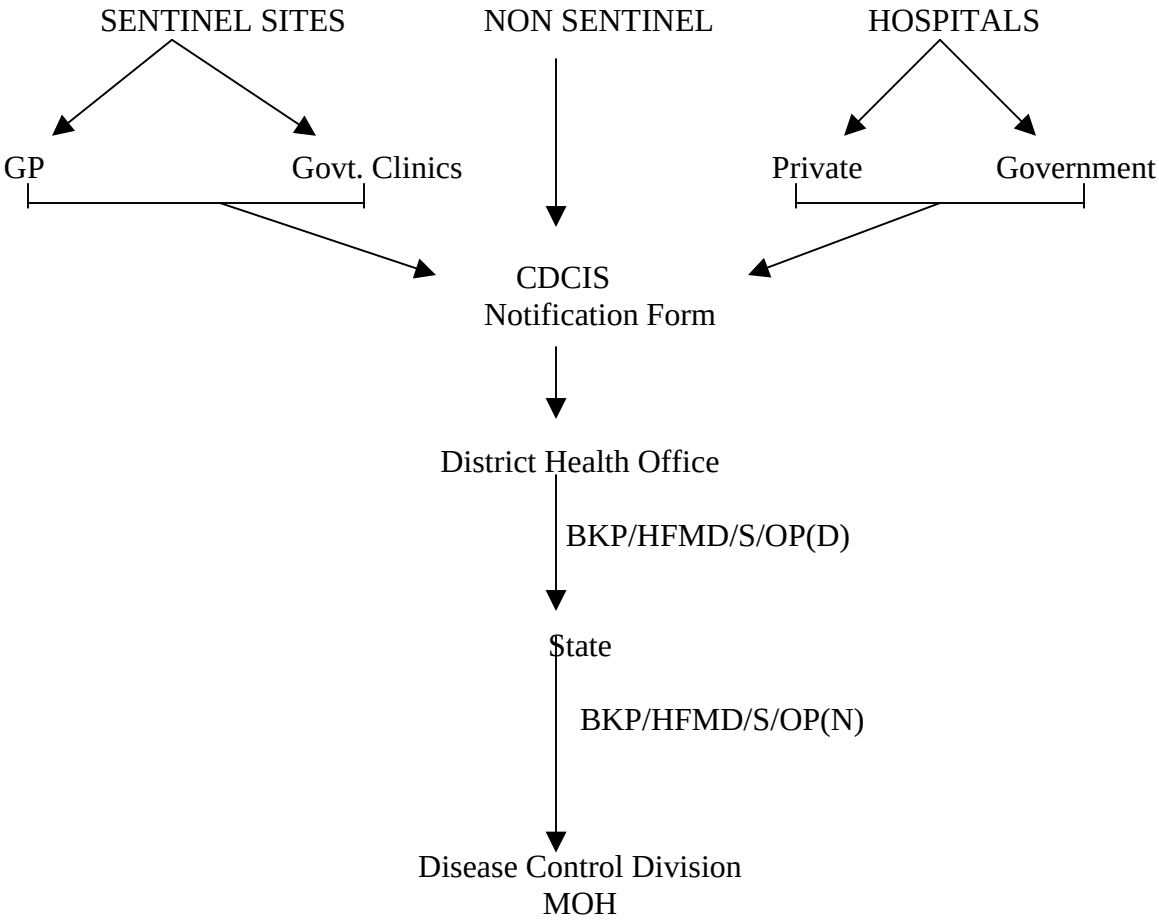
3. All HFMD cases admitted to all hospitals, whether government or private hospitals must be notified using Borang Health 1 Rev. 2001.

4. Districts should submit the weekly data to State Health Office using Form BKP/HFMD/S/OP(D) for sentinel sites report.

5. States then will compile and submit the weekly data for the sate using Form BKP/HFMD/S/OP(N) and submit it to Disease Control Division, MOH.

6. Surveillance of circulating infectious agent is done by obtaining virology investigation data from the virology laboratory in IMR / UNIMAS / UMMC. The Surveillance Section, MOH is responsible for analysing the data..

FLOW OF SURVEILLANCE DATA



RINGKASAN FORMAT UNTUK SURVEILAN KES PENYAKIT TANGAN, KAKI DAN MULUT (HFMD)

DAERAH:
NEGERI:
MINGGU EPID:

BIL		UMUR									JANTINA			ETNIK													KLINIK			
		<1	1	2	3	4	5	6	>6	Jum	L	P	Jum	M	C	I	OA	K/D	MR	B	Mel.	Ib	Bid	LB	Lain	Jum	KK	GP	Lain	Jum
1	OPD Sentinel																													
2	OPD Nonsentinel																													
3	Inpatient																													
	JUMLAH																													

NOTA:

1	JANTINA	L : LELAKI		
		P : PEREMPUAN		
2	ETNIK	M : MELAYU	MR : MURUT	LB : LAIN-LAIN BUMIPUTRA SABAH
		C : CINA	B : BAJAU	DAN SARAWAK
		I : INDIA	Mel : MELANAU	Lain : LAIN-LAIN
		OA : ORANG ASLI SEMENANJUNG	Ib : IBAN	
		K/D : KADAZAN / DUSUN	Bid : BIDAYUH	
3	KLINIK	KK : KLINIK KESIHATAN		
		GP : KLINIK SWASTA		
		Lain : LAIN-LAIN		

BKP/HFMD / S / OP(N)

RINGKASAN FORMAT UNTUK SURVEILAN KES PENYAKIT TANGAN, KAKI DAN MULUT (HFMD)

NEGERI:

MINGGU EPID:

BIL	DAERAH	UMUR								JANTINA			ETNIK													KLINIK			
		<1	1	2	3	4	5	6	>6	Jum	L	P	Jum	M	C	I	OA	K/D	MR	B	Mel.	Ib	Bid	LB	Lain	Jum	KK	GP	Lain	Jum
1																														
	OPD Sentinel																													
	OPD Nonsentinel																													
	Inpatient																													
2																														
	OPD Sentinel																													
	OPD Nonsentinel																													
	Inpatient																													
3																														
	JUMLAH																													

NOTA:

1	JANTINA	L : LELAKI P : PEREMPUAN		
2	ETNIK	M : MELAYU	MR : MURUT	LB : LAIN-LAIN BUMIPUTRA SABAH
		C : CINA	B : BAJAU	DAN SARAWAK
		I : INDIA	MEL : MELANAU	Lain : LAIN-LAIN
		OA : ORANG ASLI SEMENANJUNG	IB : IBAN	
		K/D : KADAZAN / DUSUN	BID : BIDAYUH	
3	KLINIK	KK : KLINIK KESIHATAN GP : KLINIK SWASTA Lain : LAIN-LAIN		

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

BAHAGIAN 1
PERHATIAN: Bahagian ini perlu diisi oleh Pakar / Pegawai Perubatan yang merawat kes)

Tarikh masuk wad: ☐☐☐☐☐☐ Masa: ☐☐☐☐

Tarikh discaj: ☐☐☐☐☐☐ Masa: ☐☐☐☐

Tarikh kematian ☐☐☐☐☐☐ Masa: ☐☐☐☐

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)

7. Jantina: ☐ Lelaki ☐ Perempuan

9. Kewarganegaraan: ☐ Malaysia ☐ Warga asing

8. Kumpulan etnik

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

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	Ya	Tidak
Aseptic meningitis	☐	☐
Myocarditis	☐	☐
Encephalitis	☐	☐
Acute flaccid paralysis	☐	☐

Jika ya, sila nyatakan bahagian anggota: _____

Kematian ☐ ☐

C. MAKLUMAT UJIAN MAKMAL

SAMPEL	Tarikh diambil	Keputusan	Tarikh keputusan
Throat swab			
Rectal swab			
Vesicle swab			
Stool			
Blood			
CSF			
Biopsy _____ (Nyatakan tisu)			

D. MAKLUMAT PEGAWAI YANG MERAWAT

1. Nama Pakar / Pegawai Perubatan: _____ Tandatangan: _____
2. Nama Wad: _____
3. Nama hospital: _____ Tarikh notifikasi: _____

PENGAWASAN TADIKA / TASKA / NURSERI /
PUSAT JAGAAN HARIAN KANAK-KANAK

Nama premis: _____

Alamat: _____
Mukim: _____
Daerah: _____
Negeri: _____
Tel.: _____

Enrolmen kanak-kanak: _____
Jumlah kehadiran _____

Adakah terdapat kanak-kanak dengan tanda-tanda penyakit kaki, tangan dan mulut dalam tempoh sebulan?

☐ Ya
☐ Tidak
☐ Tidak pasti

Jika ada kanak-kanak yang mempunyai tanda-tanda HFMD
berapa orang: _____ orang

Nama	Alamat	Hadir

Pemeriksaan kanak-kanak
Bilangan diperiksa: _____ orang
yang mempunyai tanda: _____ orang
Tindakan: _____

Pemeriksaan premis
Jenis premis

☐ Rumah teres setingkat
☐ Rumah teres dua tingkat
☐ Rumah berkembar dua
☐ Rumah kedai
☐ Balai raya
☐ Lain-lain (nyatakan):

Keluasan lantai : _____ meter persegi

Kesesakan

☐ Ya ☐ Tidak

_____

Bilangan tingkap

☐ Mencukupi ☐ Tidak mencukupi

Alat hawa dingin

☐ Ada ☐ Tiada

Pengudaraan

☐ Memuaskan ☐ Tidak Memuaskan

Pencahayaan

☐ Memuaskan ☐ Tidak Memuaskan

Bilangan sinki:

Sabun di sinki

☐ Ada ☐ Tiada

Tuala / Tisu

☐ Ada ☐ Tiada

Bakul sampah

☐ Mencukupi ☐ Tiada bakul sampah

☐ Tidak mencukupi

Pembuangan sampah

☐ Sempurna ☐ Tidak sempurna

Bilangan tandas: _____

Kebersihan tandas

☐ Memuaskan ☐ Tidak memuaskan

Perparitan

☐ Memuaskan ☐ Tidak memuaskan

Pendidikan kesihatan diberi

☐ Ya ☐ Tidak

Bilangan risalah diedarkan: _____

Ulasan keseluruhan:

Tarikh pemeriksaan:

_____

Nama pemeriksa:

_____

Jawatan:

_____

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