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Subject: Advisory- Detection, Prevention and Control of *Naegleria fowleri* Infection/Primary Amebic Meningoencephalitis (PAM)

In Pakistan since 2012, a total of 43 fatal cases of *Naegleria fowleri* Infection/ Meningoencephalitis (PAM) have been reported from different tertiary care hospitals of Karachi. During April 2017, one fatal case resident of Tando Allahyar district has been reported from a hospital in Karachi. It is therefore imperative to remain vigilant for timely detection of any suspected case having symptoms compatible with primary amebic meningoencephalitis (PAM). The objective of this advisory is to sensitize health care authorities to further strengthen and improve the level of preparedness in prevention and control of PAM Infection.

Background:

- Primary amebic meningoencephalitis (PAM) is a disease of the central nervous system. It is a rare disease with mortality rate of >95%.
- The causative agent is *Naegleria fowleri*, the only species of *Naegleria* amoeba that infects humans is a thermophilic, free-living amoeba found in freshwater environments.
- Since detection of first case in Australia during 1965; more than 300 documented cases have so far been reported from 16 countries.
- Clinical features of PAM are similar to meningitis; including headache, fever, stiff neck, anorexia, vomiting, altered mental status, seizure, and coma. Death typically occurs in 3–7 days.

Mode of Transmission:

- Most *Naegleria fowleri* infections are associated with swimming in warm freshwater lakes.
- This infection has also been reported when people submerge their heads or irrigate their nostrils during ablution using contaminated tap water. It then travels up the nose to the brain where it damages the brain tissue.
- It does not spread via water vapor or aerosol droplets (shower mist or vapor from a humidifier).

Incubation period:

With an incubation period between 3 to 7 days, PAM symptoms progress as follows:

- Sore throat, severe frontal headache, fever, nausea and vomiting (1-7 days)
- Stiff neck, irritability, altered mental status and confusion (1-12 days)
- Hallucinations, seizures, coma and death (7-12 days)

Clinical presentation:

Signs and symptoms of the PAM infection include:

Stage 1: Severe frontal headache, fever, nausea and vomiting

Stage 2: Stiff neck, seizures, altered mental status, hallucinations and coma

Treatment:

- Suspected cases should immediately be reported to health authorities.
- Even with antibiotic treatment, most people with PAM die within 10 days of onset of symptoms.

- Rapid diagnosis, intensive supportive care and treatment may increase the likelihood of survival.
- In 02 documented cases of survival, the combination of three drugs; **Amphotericin B** (IV/ Intrathecal), Rifampicin (Oral 10 mg/ Kg/ day) and **Fluconazole** (IV/ oral 10 mg/ kg/ day) was used along with steroids.
- **Azithromycin** has both *in vitro* and *in vivo* efficacy against *Naegleria fowleri* and may be tried as an adjunct to Amphotericin B.


Prevention & Control measures:

- *Naegleria fowleri* cannot survive in clean, cool and chlorinated water.
- Chlorine kills *Naegleria fowleri* and is the most effective way to disinfect swimming pools and reticulated water supplies.
- Filtration and UV treatment systems may be effective in controlling *Naegleria fowleri*.
- Avoid jumping or diving into warm fresh water or thermal pools.
- Keep your head above water in spas, thermal pools and warm fresh water.
- Empty and clean small collapsible wading pools daily.
- Ensure swimming pools and spas are adequately chlorinated and well maintained.
- Flush stagnant water from hoses before allowing children to play with hoses or sprinklers.
- If you are using unchlorinated water:
 - Don't allow water to go up your nose when bathing, showering or washing your face.
 - Supervise children playing with hoses or sprinklers and teach them not to squirt water up their nose
- Potentially contaminated water should not be used for any form of nasal irrigation or nasal lavage.
- **Enhancing Disease Surveillance and Notification:** Strengthening surveillance and notification of PAM infection should be enhanced with the dissemination of standard case definitions and diagnostics to areas of transmission and areas at risk.
- **Risk Communications:** Symptoms of *N. fowleri* infection are clinically similar to viral & bacterial meningitis and these conditions are much more common than amoebic meningoencephalitis. Making doctors more aware about the disease might improve case detection. Such information might enable earlier detection of infections, provide insight into the human or environmental determinants of infection and allow improved assessment of treatment effectiveness.
- **Health Education:** Awareness and education in the affected areas must also be undertaken to educate people on requisite preventive measures.
- The diagnosis is based on history, clinical examination, signs and symptoms. CSF sample may be collected for microscopy and advanced referral testing.

NIH support:

The NIH has already communicated about PAM in the 38th issue of Seasonal Awareness and Alert Letter (SAAL) disseminated to the healthcare providers and authorities during March 2017. It is imperative that the concerned public sector departments be motivated to enhance the preventive efforts / steps. The situation may please be continuously monitored and updates along with the actions taken be kindly communicated to the NIH regularly on phone No. +92-51-9255237, Fax: +92-51-9255575, E-mail: eic.nih@gmail.com. The updated guidelines for the prevention and control of Primary Amebic Meningoencephalitis (PAM) (annexed herewith for ready reference) are also available on NIH website: www.nih.org.pk.

The above 'Advisory' may please be circulated widely to all concerned.



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