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Pathology Newsletter

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Malaria

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Introduction

Although malaria is a preventable and treatable disease, there were still an estimated 241 million cases reported with 627 000 deaths worldwide in 2021.

Of these deaths, approximately 80% occur in sub-Saharan Africa[2] and 70% in children under the age of 5 years[3].

Pathogenesis

Malaria is a parasitic infection caused by Plasmodium spp. as transmitted by the infected female Anopheles mosquito.

Of the five species of the parasite, P. falciparum remains the most predominant in sub-Saharan Africa, however P. vivax, P. ovale, P. malariae and P. knowlesi also contribute to the disease burden worldwide, albeit with milder symptoms.

The disease requires two hosts for propagation. The female Anopheles mosquito bites a human and inoculates them with the sporozoites.

Following a maturation cycle within the human, which varies depending on the species of malaria in question, merozoites are present in the blood-stream where it infects red blood cells.

A portion of the parasites develop to the gametocyte stage, where the cycle is continued through retransmission to the mosquito upon feeding from human blood[3].

Disease Progression and Clinical Manifestations

Certain patients are at risk of severe infection. These include non-immune travellers to endemic areas, pregnant women, young children, the elderly, splenetomised and immunocompromised patients, including patients with HIV-1 infection (figure 1).

Treatment

Treatment is dependent on the type of species a patient is infected with, as well as the local resistance profiles.

This should best be approached using National Guidelines as established by the National Institute of Communicable Diseases (NICD)[3] and the Department of Health (DOH)[2].

Important Notes

Malaria remains to have a significant disease burden in South Africa and active prevention and effective treatment regimens are essential in reducing its mortality (figure 2).

References

1. https://www.who.int/news-room/fact-sheets/detail/malaria
2. https://www.health.gov.za/malaria/
3. https://www.nicd.ac.za/wp-content/uploads/2019/03/National -Guidelines-for-prevention-of-Malaria_updated-08012019-1.pdf

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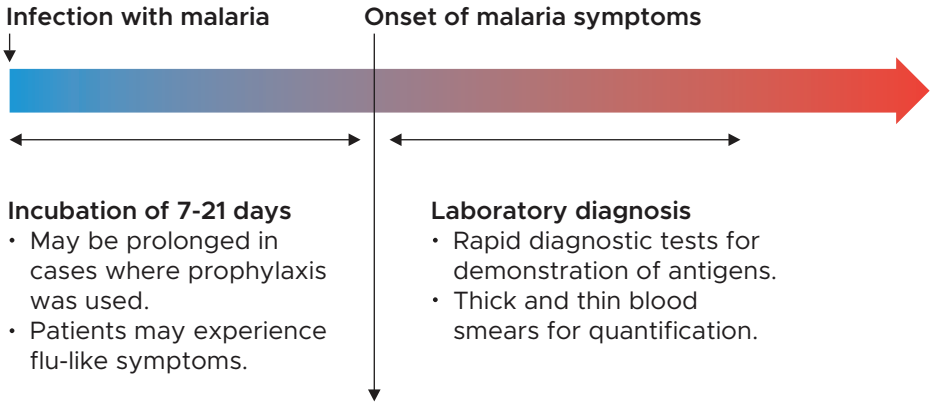
Figure 1. Summary of the disease progression of malaria.



Indications for hospitalization:

1. Less than 1 year of age
   (Resources permitting, this should be extended to 5 years of age)
2. Pregnant
3. Older than 65 years of age
4. All patients with symptoms of severe malaria

Clinical
- Prostration
- Depressed level of consciousness
- Convulsions
- Respiratory distress
- Circulatory collapse
- Pulmonary oedema
- ARDS
- Abnormal bleeding
- Jaundice
- Haemoglobinuria

Biochemical
- Renal impairment
- Acidosis
- Hepatic impairment
- Hypoglycaemia
- Hypoxia

Haematological
- ≥5% parasite count
- Hb<6g/dL
- ≥5% hemozoin noted
- P. falciparum schizonts noted
- DIC

Figure 2. Essential steps in reducing the disease burden of malaria.

Prevention

A Awareness of risk
- The female Anopheles mosquito's bite often does not produce an itch and can remain undetected.

B Bite avoidance
- High risk biting times include dawn and dusk.
- Use insect repellents and physical barriers.

C Chemoprophylaxis
- Although prophylaxis may mask or delay onset of symptoms, use is associated with lower mortality.

Mortality

D Detect early
- Always have a high index of suspicion, even in patient with no travel history.

E Effective treatment
- Identify risk factors and features of severe disease to ensure early supportive therapy.