Severe malaria is a medical emergency and is fatal if untreated. Every year an estimated 655,000 people die of malaria, 86% of whom are children under the age of 5. As death from severe malaria often occurs within hours of admission to a hospital or clinic, it is essential that patients receive effective treatment as soon as possible. The WHO strongly recommends injectable artesunate over quinine for the treatment of severe \textit{P. falciparum} malaria in both children and adults\textsuperscript{1}.

\textbf{Injectable artesunate can save more lives than quinine}

Clinical evidence from two large-scale, multi-centre trials in South East Asia (SEAQUAMAT)\textsuperscript{2} and Africa (AQUAMAT)\textsuperscript{3} showed a reduction in the risk of death using injectable artesunate compared to quinine. If used throughout Africa, injectable artesunate could save up to an additional 195,000 lives each year\textsuperscript{4}. This equates to saving one extra life for every 41 children treated. This life-saving benefit of artesunate for severe malaria derives from its rapid ability to kill the parasite across all its life stages unlike quinine which is slower and stage-specific, mainly affecting the mature blood stage\textsuperscript{5}.

\textbf{Treatment with artesunate is cost-effective}

Although the average cost of injectable artesunate is currently higher than quinine ($3.3 vs. $1.3), overall costs are found to be equivalent. Cost analysis from the trials in Asia and Africa show that if total costs are considered (in particular the cost of administering the drugs and management of side-effects) artesunate is found to be cost-effective\textsuperscript{6}.

\textbf{Case study}

The comparative benefits of injectable artesunate relative to quinine in the treatment of severe malaria are significant. A case study was prepared based on a hypothetical country with an average of 435,600 cases of severe malaria treated each year in health facilities, among which half are children under 5 years of age. The anticipated total cost of treatment would be $2,909,460\textsuperscript{8}. The clinical studies showed that the expected mortality rate would be 28.2\% higher with quinine compared to artesunate\textsuperscript{3}. Therefore artesunate can save 10,454 additional lives (5.05\% of the treated population).

For over a century, quinine administered by injection has been the best treatment available for treating severe malaria, but thanks to the development of the artemisinin compounds, we now have a safer and much more effective treatment\textsuperscript{7}.

\textsuperscript{Prof Nick White}
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Injectable artesunate is better tolerated than quinine and has fewer severe side effects
Clinical trials show that artesunate produces fewer life-threatening side-effects than quinine, with fewer recorded incidences of low blood sugar (hypoglycaemia), and anaemia. Furthermore, quinine can induce potentially serious hyperinsulinaemia hypoglycaemia, especially during pregnancy and cardiotoxicity. Quinine IM is also painful and locally toxic.8

Injectable artesunate is easier to administer than quinine
Injectable artesunate is simpler to administer, with the treatment delivered in five minutes. Due to risk of cardiotoxicity, intravenous quinine administration needs rate-controlled infusion 1 over four hours, three times a day, accompanied by cardiac monitoring if possible. A study examining malaria deaths showed that one in four patients had received incorrect dosing.10

Current production levels of injectable artesunate ensure continuity of supply
There is currently more than sufficient supply of injectable artesunate to meet demand. The present WHO pre-qualified supplier has reported excess capacity.

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The many advantages of injectable artesunate justify its adoption in line with WHO recommendations. This will need sustained support from national health ministries, WHO, malaria partnerships, manufacturers and donors.

7 «Major clinical trial prompts call for change to treatment guidelines for severe malaria worldwide», Medis release from Wellcome Trust, 6 Nov. 2010.

Supporting governments in the use of injectable artesunate

User-friendly pack
At present, only injectable artesunate 60mg has been prequalified by the WHO. To simplify its use, a new combi-pack including a saline vial should be soon on the shelves.

Job-Aid
MMV, with key partners, has developed a poster for health workers to facilitate the preparation and administration of the treatment. This material is available at www.mmv.org/access-delivery.

Funding calculator
MMV and MORU (Mahidol-Oxford Tropical Medicine Research Unit) have developed a calculator to estimate funding requirements and health impact in terms of estimated number of lives saved from injectable artesunate. This Excel-based calculator is available at www.mmv.org/access-delivery. The calculator is easy to use and allows country stakeholders to update the model with individual country data.

Injectable artesunate saves more lives