A spoonful of sugar really can help the medicine go down.

Scientists in Britain at Oxford University have developed a way to use sugars to preserve vaccinations in transit. One of the biggest difficulties in the distribution of vaccinations to developing countries is the infrastructure needed to keep the vaccines themselves cold. There just isn't the electricity, cold transportation and cold storage available in many remote areas of the world where vaccines are needed most.

The method involves mixing the vaccine with the sugars trehalose and sucrose. The mixture is then left to slowly dry out on a simple filter or membrane. As it dries and the water evaporates the vaccine mixture turns into a syrup and then fully solidifies on the membrane.

The thin sugary film that forms on the membrane preserves the active part of the vaccine in a kind of suspended animation, protected from degradation even at high temperature. Flushing the membrane with water rehydrates the vaccine from the membrane in an instant.

The beauty is that the technology works even in tropical climates, one of the most difficult areas to get vaccines to because of the lacking medical infrastructure.

The work, funded by the Grand Challenges in Global Health partnership with other funds from the Wellcome Trust, is published in the journal Science Translational Medicine.

Oxford University carried out the proof-of-concept study, showing that vaccines they are developing could be stabilised for months using Nova Laboratory's patented Hypodermic Rehydration Injection System (HydRIS).

The team demonstrated it was possible to store two different virus-based vaccines on sugar-stabilised membranes for 4-6 months at 45°C without any degradation. The vaccines could be kept for a year and more at 37°C with only tiny losses in the amount of viral vaccine re-obtained from the membrane.

Current childhood vaccines require refrigeration to maintain stability and viability. Transportation, storage, and delivery up to the point of use require an intact cold chain, which is difficult and exceedingly costly to maintain. Successful development of heat-stable vaccine products will simplify vaccine storage and delivery, reduce waste, and improve vaccine efficacy.

Under the World Health Organisation's (WHO) immunisation programme, nearly 80% of children are vaccinated against six killer diseases -- polio, diphtheria, tuberculosis, whooping cough, measles and tetanus.

But one of the biggest costs of that programme is maintaining the so-called "cold chain" -- ensuring vaccines are refrigerated all the way from the manufacturer to the child, whether in a developed nation or a remote village in Africa.

The WHO estimates that maintaining the cold chain costs up to US$200 million a year in developed countries, increasing the cost of vaccination by as much as 20%.

In poorer nations, parts of the infrastructure can be missing or damaged, presenting a hurdle for effective vaccination schemes. Several teams of scientists around the world are working on ways to try to overcome the problem.

The scientists used viruses that are being used as the basis for some of the latest vaccines in development. These are live viruses that have been engineered so that they can enter a cell in the body and stimulate an effective immune response, but they cannot replicate and so cannot cause an infection. It is crucial for this new type of live-virus-based vaccine that the viruses remain alive over long shelf-lives, which this method is able to achieve. The team at Oxford University has pioneered the use of these viruses as the basis for developing promising new vaccines against TB, malaria, HIV/AIDS and flu, all of which are currently in clinical trials.

Isis Innovation, Oxford University's technology transfer company, is working with the inventors to put a commercial strategy in place for the development of the technology.

The next steps are to show the process can be scaled up to industrial manufacturing levels and demonstrate it works with a standard or newly licensed human vaccine.