

Dentaid toothpaste dispenser to revolutionise school brushing programmes

In 2002, the oral health charity Dentaid set about overcoming one of the main undermining causes of failed school oral health programmes. The seemingly simple project proved an epic journey but now provides the opportunity to revolutionise school oral health programmes worldwide. Luke Wordley, Dentaid's Chief Executive explains: -

Imagine you are a schoolteacher in Africa. You have 50 children in your class and ten minutes at the end of lunch break to help all of them brush their teeth. You can't give tubes to the children to administer their own toothpaste, as toothpaste is such a rare commodity, and the children so poor, that the temptation you would place them under is unfair. Therefore, you have to load all the brushes from one teacher's tube as quickly as you can. However, you're under strict instructions to carefully squeeze the right amount out each time as too little toothpaste isn't effective while too much toothpaste per brush will mean the class runs out before the end of the term! It's taking forever and you're not getting the chance to check if they're even brushing properly. Twenty minutes later, the brushing is finally over, but you're stressed and the kids have missed out on the first ten minutes of their maths lesson in preparation for an exam next week.....

Now imagine you are a schoolteacher in the UK. You only have 30 children in your class but risk assessments have dictated that you cannot squeeze and scrape toothpaste from the same tube on to the heads of different toothbrushes, for risk of cross infection. You're therefore forced to squeeze dollops of toothpaste on to sheets of laminated paper, from where they're scraped onto the toothbrushes. You're trying to measure pea-sized amounts but it's impossible to achieve in a hurry. Meanwhile, you notice a child putting their sleeve into one dollop while trying to scrape another dollop on to their brush. Before you can warn her, she lifts her arm, and the laminate paper sticks momentarily before falling to the floor toothpaste side down.....

The World Health Organisation (WHO) identifies schools as one of the best environments for implementing oral health programmes. But school brushing programmes around the world have floundered time and time again due to one or a combination of the problems outlined above, with the traditional tube of toothpaste being one of the principal culprits. Designed for individual or family use, a tube just does not lend itself to a school or any other mass tooth brushing environment.

Therefore, in 2002, Dentaid set out to overcome this problem once and for all. A simple solution to the problems outlined above seemed obvious – some kind of toothpaste dispenser! Amazed that no one had done it already, the charity set about this 'simple' sounding project! The charity sought to achieve the following in particular - to design a dispenser which: -

- Dispensed an accurate and consistent dose
- Was quick to use and administer to many children
- Had improved cross contamination control
- Made theft of toothpaste less likely/easy
- Similar or cheaper (scaled up) packaging costs to conventional tubes
- Simple to use in community-based programmes

This was a challenging set of requirements! Not surprisingly, a string of prototypes came and went over a couple of years until, in partnership with a packaging expert (Rieke Packaging Systems Ltd), a final design (pictured) was arrived at. This comprised of a plastic bracket, attached to the head of a conventional pump and bottle, which provides a guide to help position the head of the toothbrush under the pump nozzle without the portion of the brush which enters a child's mouth actually coming into physical contact with anything. The bracket also serves as a limiter on the dose of the dispenser, as very few 2-litre systems

(e.g. catering tomato ketchup) dispense such a small quantity (less than 0.5ml!) per dispense.

The challenges didn't stop with designing the bracket however! Next we needed a toothpaste manufacturer who liked the idea and was willing to develop the specially formulated toothpaste necessary to work with such a pump and dispenser. After a lot of chasing, a major toothpaste manufacturer offered to formulate the liquid toothpaste for a trial and quickly achieved the viscosity and properties necessary – our toothpaste dispenser functioned!

Nevertheless, Dentaïd realised that the challenge to prove it worked and brought the anticipated benefits, lay-ahead. First and foremost, the charity needed to design and develop some trials, including robust scientific analysis of the dispensing system. Cardiff University stepped forward, agreeing to hold some laboratory studies testing the cross infection benefits and also to test the 'accuracy of dosage' and 'speed of administration' properties, both in a laboratory environment and also within a nursery supervised brushing programme they were involved with in South Wales. However, Dentaïd felt it was vital that a dispenser, predominantly designed to benefit the developing world, should be subject to a major trial in a developing country too. Fortunately, Ugandan charity BEAM, a long-term Dentaïd partner headed by Chris & Polly Barton, had expressed to Dentaïd the desire to run a community based oral health programme in the Kabale community of South-West Uganda. Dentaïd realised this might be the ideal opportunity to support BEAM's vision whilst trialling the dispenser in the field, and a programme was co-developed. As part of the holistic oral health programme, initially 5,000 children in six schools would not only be able to brush their teeth daily using the Dentaïd toothpaste dispenser, but also receive free dental screening and treatment and oral health education using culturally appropriate education materials Dentaïd had also helped develop.

But before this could be achieved, a major sponsor was needed! Up until now, development of this initiative had been funded by Dentaïd's general funds from Partners-in-Action (regular monthly donors) and through the fundraising efforts of Dentaïd supporters including the 28 China trekkers from the "Walk the Wall" Challenge in 2004. However, to meet specific costs of injection moulding for, and production of, the brackets, 10,000 toothbrushes and procuring over half a tonne of toothpaste, not to mention the wider costs of the programme including wages of 3 Ugandan dental workers, provision of specialist portable dental equipment and a new surgery for the nearby regional referral centre at Rugarama, a specific sponsor was now needed! Fortunately, the wonderful Lion's Club of UK and Ireland, who had been supporting Dentaïd with smaller projects for several years, stepped in, and between their network of clubs around the UK, over a year raised over £18,000 for the development of the dispenser project and sponsorship of the Uganda schools programme.

Everything now seemed to be falling into place with, simultaneously, injection moulds were being built in China, toothbrushes and equipment being shipped to Uganda, scientific trials being designed in Wales and half a tonne of toothpaste being formulated and produced in Southern Europe to fill 300 plastic dispensers sent from England!

But then - a catastrophic problem! Just as the shipment of toothpaste was bottled, labelled and about to leave the toothpaste factory, during the toothpaste manufacturers final release approval, a problem surfaced. Unbeknown to all Dentaïd's advisors to the project, an obscure part of an ISO (International Standards Organisation) recommendation written a decade earlier put the entire project in jeopardy.

Because of the perceived risk of fluoride poisoning from consuming toothpaste, a proviso had been added to the ISO standard, putting an upper limit on the maximum amount of toothpaste allowed in one container (tube). Despite there never having been a case of fluoride poisoning from consuming normal toothpaste (1000 – 1500 fluoride ppm) due to

inevitable vomiting long before toxic levels are reached, as no manufacturer planned to produce giant tubes of toothpaste anyway, none had objected. Unwittingly, this ISO recommendation implicated the development of dispensing systems for specialist environments like school brushing programmes – a system which, even if there were risk, is surely safer than liberally distributing tubes of toothpaste direct to children, as happens in many current programmes, to perhaps hoard at home.

So suddenly, Dentaïd had a longer-term advocacy challenge to influence a revision of the ISO recommendation as well as a short-term challenge of how to reach a compromise to get the trials underway! With the multi-national manufacturer's risk averse lawyers now involved and seemingly very willing to scupper the project on this technicality, the only compromise Dentaïd could achieve during six months of negotiation was an agreement to supply a proportion of the dispensers with the maximum quantity of toothpaste under ISO recommendations in each. Hence, 100 nearly empty dispensers were finally supplied to Dentaïd's pilots in Uganda and the UK! Nevertheless, this still allowed the functionality of the dispenser to be tested and the pilots in Uganda and the UK went ahead. Meanwhile, Dentaïd found out that the approximately every ten years revision of ISO standards in relation to fluoride was due to start soon – in fact a little too soon with the first meeting scheduled just one month later! Dentaïd therefore spent a frantic month putting together a coalition of experts and organisations to argue the safety of a dispensing system of fluoride toothpaste (1000 – 1500 fluoride p.p.m), and lobby for an exemption for dispensing systems designed for mass brushing environment like schools. This was duly accepted adopted in the new draft standard, and although another two years of committee stages lie ahead before the new ISO standard is officially adopted, had this come to light just one month later, such a revision might have taken another 12 years to bring about!

While the screening, treatment and oral health education had been underway in the Uganda school programme since 2005, finally, after all the delays the 100 dispensers arrived in May 2006, and the tooth brushing component got underway. Finally, almost four years after its first conception, thousands of school children in Uganda are today brushing their teeth for the very first time, thanks to the Dentaïd toothpaste dispenser.

While final evaluation won't take place until the dispensers have been in use for a year, early findings indicate that it will achieve success in all its six target criteria, and many observers believe the dispensing system has the potential to revolutionise the success of supervised school brushing programmes around the world. However, a couple of challenges still lie ahead!

For the small-scale pilot programmes, the initial bracket design used a cheap moulding process (£1500), to keep down overall costs but resulted in each individual bracket for the pilot costing £15 each! This was a wise decision as following the pilots a couple of small design changes need to be implemented before the final bracket moulds can be built. Remarkably, this per unit bracket cost can be reduced massively to just 28 pence each, but the moulding in this process will cost a whopping £6,500 – funds which Dentaïd currently doesn't have!

The second challenge is a very positive one! The holistic school oral health programme in Uganda has become a runaway success. In fact, the oral health programme has proved so popular in the Kabale region that the schools currently taking part have actually found their enrolment of pupils increasing – as parents have been choosing the schools for their children over others because of this programme! While this is an incredible endorsement of the value of the programme to the local community, inequality between schools is not something Dentaïd wanted to achieve and so is desperate to expand the programme to other schools in the area. However, the project was only designed and funded for one year as a trial of the dispenser. Therefore, Dentaïd needs to find 15 individuals, groups or dental practices to fundraise or donate £1500 each, to each sponsor a school for 2007 and give thousands of Ugandan school children something to truly smile about!

In return for your generous donation you will receive:

- A letter from the head teacher of the school.
- Background information on the school and the district.
- Photographs of the school
- Pictures of the oral health programme being implemented.
- Acknowledgement of your support on Dentaaid's website.