

MAXIMIZING THE BENEFITS FROM WATER AND ENVIRONMENTAL SANITATION

Handwashing hardware implementation imperatives

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This paper considers ways that the practice of handwashing can be implemented in a community or family context. Given that handwashing has proven to be an effective barrier against diarrhoeal disease and respiratory infections and that people are particularly vulnerable to these diseases in low-income communities, it is vital that this practice is implemented. Yet little work has focused on implementation of the practise at a grass roots level. The paper further discusses why handwashing is difficult to implement and proposes a technical solution that may enable handwashing to be more accessible, convenient and possible.

Introduction

One hundred and fifty eight years after the Hungarian doctor, Ignaz Semmelweis discovered the benefits of handwashing, we are still struggling to implement this vital yet simple practice in developing countries. Nine studies conducted in developing countries showed that no more than 20% of child carers washed their hands after cleaning a child's bottom or after defecating themselves (Cairncross & Curtis 2003:279).

Though hygiene promotional literature speaks loud and clear of the necessity of handwashing and the need for handwashing facilities, there exists a large knowledge gap, which could be defined as, 'handwashing implementation'. Despite the weighty emphasis placed on the importance of the practice and the amount of literary material testifying to the effectiveness of the intervention, there is no publication, to the author's knowledge, that is dedicated to the practicalities of implementing the practice at a community or family level. This article will therefore only briefly outline the benefits of handwashing before becoming dedicated to the subject of handwashing implementation.

Why is handwash important?

Diarrhoeal disease is of faecal origin and kills 3.3million children each year (Curtis et al., 2000). Preventing faecal matter from entering the domestic environment should therefore be of utmost importance to all public health specialists. Recent studies provide overwhelming evidence that suggest handwashing can reduce the incidence of diarrhoea by between 27 and 89% (Curtis et al., 2000).

Added to the benefit of reduced diarrhoeal disease, recent studies (Cairncross 2003:677-678) suggest that Acute Respiratory Infections (ARIs) which kill nearly 4 million children each year, mostly in developing countries could be prevented by handwashing.

The eye disease Trachoma is a disease of underprivileged

populations with poor conditions of hygiene and is the leading cause of preventable blindness in the world (Kanski, 2003:71). Because the disease is transmitted by fingers (amongst other routes), handwashing can prevent the spread of Trachoma (Sight Savers international, Undated).

The hard sell item

Handwashing promotion is the hard sell item of hygiene promotion. It is a uniquely ambiguous and awkward activity because ones hands must be used for the task of washing ones hands. A unique solution is required.

Furthermore, given the fact that increased convenience is the greatest motivating factor for behavioural change it should be highlighted that it is very difficult to make handwashing more convenient than not handwashing at all. It is more difficult still to establish the practice at the correct times using soap or an alternative.

In addition to the issue of convenience is the issue of unrealised consequence that also makes handwashing promotion difficult. People already realise the consequences of not collecting water; it is just a matter of where they collect water from. People are already well aware that they have to defecate somewhere; it is just a matter of where. It is quite likely however that people from low-income communities are not aware at all of the consequences of not washing their hands at the appropriate times with a cleaning agent and in the proper way. What is more they are not compelled to do so naturally by a thirst that must be quenched or a bowel or bladder that causes discomfort when full.

Because handwashing promotion is the hard sell item of hygiene promotion It requires an intensive effort to promote. It must be made as convenient to the users as possible by the existence of appropriate handwashing hardware.

Existing handwashing hardware

A few handwashing solutions have been used in the past

to make handwashing easier, more convenient and more accessible. The container fitted with a tap is the most common hardware used for handwashing. This implement has however proved to be most unsatisfactory. Taps are often too expensive or not available for families or communities to purchase, the taps leak or break before long and using a tap means that water is wasted. Water wastage is a big issue for those that are responsible for carrying it. The containers are also likely to be stolen for personal use.

Taps are also problematic in that they become contaminated by dirty hands when they are turned on and then transfer the contamination back onto the clean hands when the tap is turned off. Given the importance of the practice it is clear that a new hardware is needed.

Handwashing implementation

Handwashing implementation will require handwashing stations to be established close to latrines. Recently in Banda Aceh, Indonesia the author noted that in no case where he observed post tsunami latrines to have been built, were there handwashing facilities close to the latrines. Yet Shordt (2004) of IRC makes a clear point with her comment that having well maintained latrines without consistent handwashing will not result in the intended health benefits.

Handwashing stations should include appropriate handwashing hardware, some cleaning agent and a drainage system to dispose of waste water. The drainage system can be as simple as a hole in the ground filled with stones, beneath the handwashing area.

To ensure that the implementation of hardware is sustainable the author has fashioned some design parameters which any handwashing hardware should meet. The hardware must:

- Be replicable using local materials and skills
- Use less than 300mls of water per handwashing procedure
- Be child, cross gender and cross generation friendly
- Be affordable
- Be robust - Strength and durability
- Be theft resistant
- Have fitness and function for purpose, it must work well enough to meet the needs of the users
- Have time economy - complete handwashing in less than 40sec.
- Have a one-touch-action, the device stems the flow of water negating the need for the user to touch device after handwashing

The author has designed a device that meets the above parameters. The device has been field tested in an Internally Displaced Peoples camp in Liberia in conjunction with Oxfam. The device is called 'The Captap'. The Captap was found to increase the compliance of handwashing and resolve recurrent problems such as water wastage and leaky or broken taps.

The Captap

The Captap is a spring loaded device that fits into the cap of any jerry-can. It dispenses water through the center of the cap by moving the handle up or down. The Captap stems the flow of water by using a rubber seal that is pulled against the inside of the cap under the tension of a spring. The seal is made out of a bicycle or car tyre tube (See Photograph 1).

The Captap comprises of eight pieces (or nine if the knob is included) all of which are likely to be found in a medium sized market place within a low-income community. There is scope within the design to allow different sized pieces to be used. For example if a 70 x 8mm bolt cannot be found a 4" x 5/16" will work just as well. The most difficult component to find will be the spring. Again however an exact size is not necessary because the tension of the spring can be easily adjusted by tightening the nut.

The water dispensed from the Captap flows into a hand-wash reservoir that is suspended by string or wire from the jerry-can handle (See Photograph 2). The container has two 3mm holes drilled into the bottom, which allows the water to flow out at a rate of approximately 10ml/second. The hand-wash reservoir affords the user hands free handwashing, thus avoiding the recontamination of clean hands by having to touch the device a second time (See photograph 3). Photographs 2 and 3 show the hand-wash reservoir and the two steps required to complete hand-washing. The Captap uses between 200 and 300ml of water to complete one hand-washing procedure.



Photograph 1.
The Captap operation



Photograph 2.
Utilisation of Captap



Photograph 3. Utilisation of Captap 2

The Captap: How to make it

The Captap is made in 5 easy Steps (See Figure 1 for schematic detail):

1. **Collect all necessary components.**
2. **Drill the center of the cap out to 11mm.** A small diameter pilot hole may need to be drilled to guide the larger drill bit through the plastic. If a hand or power drill and drill bits are not available; pierce the centre of the cap and carefully, using a sharp knife enlarge the hole to approximately 11mm.
3. **Cut out the rubber seal.** Take a 50mm wide section of car or bicycle tyre tube, lay it on a flat surface and place one of the penny washers on top. Draw around it and draw around the inside of the washer too. Then cut the shape out with a pair of scissors making sure that the seal is 1-2mm bigger than the washer all the way around. The inside circle must also be cut out 1-2mm bigger than the central hole of the washer to allow the water to flow through.
4. **Assemble and fix the bolt and the nuts.** The washers require cementing or welding to the bolt. This is so that when the bolt is moved in operation, the washer that holds tension on the seal moves responsively. The washes can be cemented to each other and to the bolt using a two-pot glue such as araldite epoxy resin. Or alternatively they can be welded or braized. If the option of welding is chosen, the weld and surrounding area will require thorough cleaning and painting to guard against corrosion.
5. **Assembly.** Assemble the components as per the diagram below. Only a little spring tension is required to force a water tight seal. It should be remembered that children must be able to use the device. So do not use too much spring tension. If the Captap leaks, then apply more tension by winding in the hex nut.

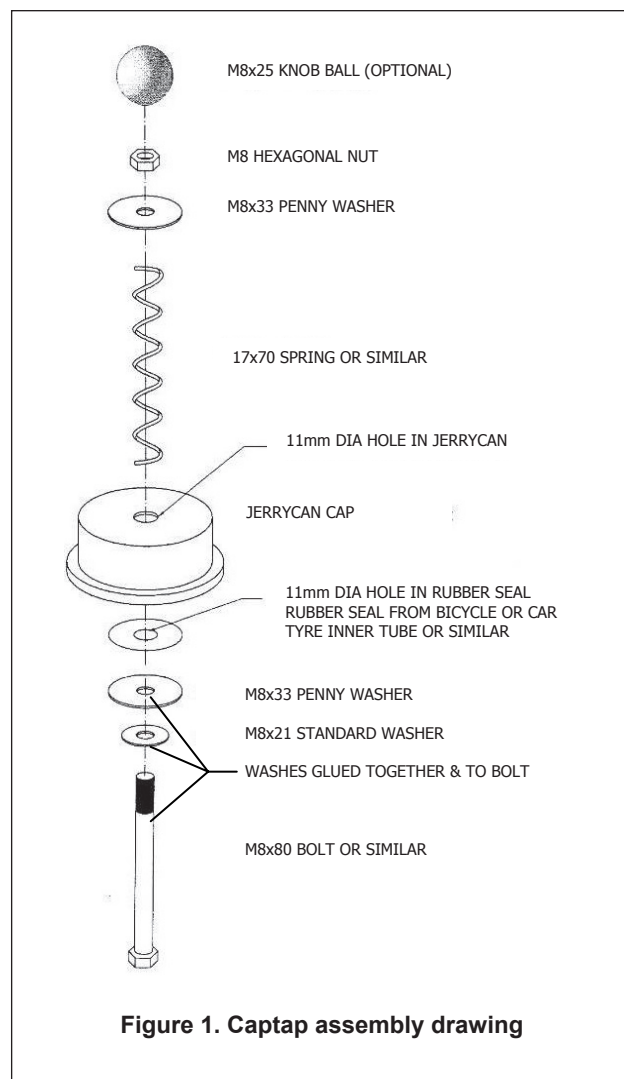
An opening can be cut into the top of the Jerry-can making it easier to fill and rendering it unsuitable for use as a water carrying or storage vessel, thus making it theft resistant.

Handwashing software

Handwashing promotion is also necessary if the practice is to be sustained. Though the scope of this paper does not allow for discussion of this topic it should not be ignored. For information on handwashing promotion ideas and activities, contact the author using the details below.

Conclusion

Without a commitment to implementing the vital practise of handwashing at a grass roots level, the valuable contribution of those that discovered and have since studied the practise, is emancipated.



If Semmelweiss (1983) could survey the impact of his work today he would be proud of the progress made in North America, Europe and Australasia, for in these places, there are handwashing facilities suited to each and every need. But because Semmelweiss was a man with a concern for the sick and the dying, he would be disappointed to notice that the most vulnerable people in low-income communities still are not aware of the need to wash their hands and still do not have the appropriate facilities to do so.

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