

# Water Wastage At The Scrub Sink: Critical evaluation and recommendations

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## Abstract

**Objectives:** To look critically at wastage of water during the process of surgical hand-scrub in the operating theatre at a time water is scarce and one of the most precious commodities in many parts of the world, and to recommend efficient methods of scrubbing with no or minimal waste of water. **Methods:** A prospective single-blinded study conducted in the operating theatre of the Armed Forces Hospital, Wadi Al-Dawasir, Kingdom of Saudi Arabia during the month of April 2008, where subjects were unaware of being timed during scrubbing. The amount of water collected in a bucket from the scrub tap over a minute is measured. Unaware members of the surgical team will be timed while scrubbing for the actual contact of hands to water when rinsing the antiseptic with predetermined 3- and 10-minute amount of flowing water. Then the estimated amount wasted in a year will be calculated. Seven other hospitals were visited to observe their hand-scrub techniques. A telephone inquiry was also conducted to establish the type of hand-scrub system in 18 hospitals at different locations in the Kingdom of Saudi Arabia. **Results:** The amount of water collected in the bucket in a minute in the scrub sink of the Armed Forces Hospital, Wadi Al-Dawasir, was 4320ml. During the month of the study, there were 815 scrub cycles performed by members of the surgical team, 118 times with 3-minute short scrub cycle and 697 times using the 10-minute scrub cycle. The mean actual time the hands came in contact with the flowing water was 0.7 min (range: 0.5-0.9 min) in the 3-minute scrub cycle, and 1.6 min (range: 1.2-2.2 min) in the 10-minute scrub cycle. This represents an actual washing time of 23.3% in the 3-minute and 16% in the 10-minute scrub cycles. Following calculations, the annual average of wasted water was 318588.3 liters. Out of the 7 hospitals visited and the 18 hospitals contacted, only one uses the light-sensor activated water taps. **Conclusion:** The medical profession is not practising in isolation of society's concerns. To prevent the huge water loss at the scrub sink we recommend the use of surgical hand rub or the installation of light-sensor activated water taps.

## INTRODUCTION

Hand washing has been recognised as one of the most important measures for reducing transmission of micro-organisms and preventing infection for more than 150 years.<sup>1</sup> In the operating theatre, the purpose of surgical hand scrub is to mechanically remove soil, debris and transient organisms and to reduce resident flora for the duration of surgery. Here, the goal is to prevent wound contamination by microorganisms from the hands and arms of the operator and assistants. This study was conducted following observations that current methods of hand scrub consume a considerable amount of water while the actual amount used in scrubbing is only a fraction of the total. This is happening amidst regional and global rain shortfall and campaigns organized by different authorities appealing to the public to save water. We conducted this study as part of contribution of the medical profession to the national call for water saving and

as part of cost containment programmes in our Hospital, without compromising patients' safety.

## METHODS

Following approval of the Hospital Research and Ethics Committee, this prospective single-blinded study was performed during the month of April 2008 in the OT of the Armed Forces Hospital, Wadi Al-Dawasir, Saudi Arabia. Our hand-scrub system (Automatic Scrub Sink, Continental Metal Products Co., Inc, Woburn, MA 01888, USA) has buttons for a predetermined 3- and 10-minute period of running water to cover a short or normal scrub period, respectively. A third button is for aborting the scrub procedure by cutting-off running water if needed before the specified time. All buttons need activation or discontinuation by directly pressing on the concerning button. The volume of water delivered in one minute was collected in a bucket and measured. Using a stopwatch, surgeons and nurses were

timed during scrubbing without being aware. The time that hands or arms were actually in contact with water during the process of scrubbing was measured. Each individual was timed on 3 occasions and an average was taken.

A telephone inquiry to the operating theatres of 18 other hospitals at different locations in Saudi Arabia was conducted to establish the type of hand-scrub system used in these centers. Seven of these hospitals were visited by the authors to observe operators while hand scrubbing.

### **RESULTS**

The amount of water collected during a one-minute period was 4320ml. Accordingly, the water volume during the 3-minute and the 10-minute-scrub period was 12.960 and 43.2, liters respectively. During the month of study there were 815 scrub cycles performed by medical and nursing members of the surgical team. This figure included 33 cycles performed by anesthetists scrubbing for administration of regional analgesia (spinal, epidural, caudal and plexus block) and central venous line insertion. There were 118 times with 3-minute short scrub cycle and 697 times using the 10-minute scrub cycle. This resulted in a total of 31639.68 liters of water used for scrubbing during the study month. From the operative record, the number of scrub cycles during the month of study was found to be the average per month for the year 2008. Hence, the average water consumed in the process of hand scrub in our operating theater during the year 2008 was 379676.16 liters. It was observed that the mean actual time the hands came in contact with the flowing water (actual washing time) was 0.7 min (range: 0.5-0.9 min) in the 3-minute scrub cycle, and 1.6 min (range: 1.2-2.2 min) in the 10-minute scrub cycle. This represents an actual washing time of 23.3% in the 3-minute and 16% in the 10-minute scrub cycles, and an annual average of wasted water of 318588.3 liters. Telephone inquiry revealed that out of the 18 hospitals contacted, 9 use the foot-pedal option, 8 use elbow-operated taps, and 1 uses the light-sensor activated taps. Seven of these hospitals were visited by the authors and it was observed that some members of the surgical team using the taps operated with foot pedal were reluctant to remove the foot while the hands were not in actual contact with water.

### **DISCUSSION**

The cost of water in the process of pre-operative scrubbing must be considered along with the cost of anti-microbial scrub preparations. A 2-minute hand scrub is clinically as effective as a 3-minute scrub,<sup>2</sup> and a 3 or 4-minute hand

scrub is as effective as a 5-minute scrub.<sup>3,4,5</sup> The trend towards decreased pre-operative hand scrub time is attributed to more than one factor: the efficacy of modern antimicrobial hand scrub agents has improved, there has been no increase in surgical wound infection as hand scrub times have decreased, and greater awareness of the fact that excessive hand scrubbing results in skin damage.

Performance characteristics for a surgical scrub agent generally fall into four categories: antimicrobial action, persistent activity, safety, and acceptance. An ideal agent would have a broad spectrum of antimicrobial activity against pathogenic organisms and have to work rapidly to provide adequate bacterial reduction before being rinsed off. It is not unusual for a surgery to last in excess of two hours, and studies show bacteria grow faster under gloved than ungloved hands.<sup>6</sup> The agent should be non-irritating and non-sensitizing. However, acceptance of any product is important to achieve compliance by the end user.

Surgical scrub agents come in many forms. Not all forms meet all characteristics. The liquid or foam soaps are the most common products for surgical scrubs and are used in conjunction with water and dry scrub brushes or sponges. The most common antimicrobial agents in these products are CHG (chlorhexidine gluconate), iodophor, or PCMX (parachlorometaxylenol). These agents are very drying and with repeated scrubbing with the scrub brush can cause skin damage. Other types are the impregnated scrub brushes/sponges. Scrub brushes/sponges are preloaded with CHG, iodophor, or PCMX and are water-aided products. The brush-free surgical scrub products use an antimicrobial agent and water but no scrub brush resulting in no skin damage. All hand washing involves some skin damage and the damaged skin harbours increased numbers of bacteria.<sup>7,8</sup> Thus a long scrub time may be counterproductive.

In surgical procedures, hand disinfection using alcohol-based hand rubs (AHRs) instead of unmedicated soap or antiseptic soap is gaining in popularity.<sup>9,10</sup> Although surgical hand scrubbing (SHS) using antiseptic soap is the traditional technique, surgical hand rubbing (SHR; surgical hand disinfection with AHR) should be considered as an effective cost-alternative both inside and outside the operating theatre.<sup>11,12,13,14</sup> Easy use and acceptable skin tolerance are predictive factors for AHR use in surgical hand disinfection. These factors were previously described for antiseptic hand disinfection using AHR.<sup>15</sup>

The use of light-sensor activated water taps has the

advantage of eliminating the tremendous amount of wasted water during hand scrubbing as the water flows only during actual washing.<sup>16</sup>

In conclusion, the medical profession is not practising in isolation of society's concerns and should positively respond to national calls related to environmental and cost-saving issues without compromising the patient's safety. If water is allowed to be saved and not wasted, hospitals should replace their current hand scrub system with either surgical hand rubbing (SHR) or with the light-sensor activated water taps. This should also extend to the outside of the operating theatre where water is used in hand washing.

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