

## Low-Cost Technology Prevents Infections, Reduces Diarrhea in Eritrea

by Cecilia Moya



Halibet hospital technician holds AQUACHLOR generator (white cylinder) which converts brine in blue tub into sodium hypochlorite. Photo by Waverly Rennie.

In many resource-constrained settings, inadequate infrastructure and poor infection prevention practices make hospitals “hotbeds of infection transmission,” placing patients—particularly the most vulnerable—at risk of hospital-acquired infections, with accompanying increases in costs of care, length of hospital stay, and even case fatality rates.

In Eritrea, USAID-supported technical assistance through URC’s TASC2 Project and Quality Assurance Project (QAP) helped the Ministry of Health to improving infection prevention policies and practices in the country’s public hospitals. Considerable progress was made in defining national standards and guidelines for infection prevention, organizing Infection Prevention (IP) Committees in facilities, and engaging committees in executing regular IP assessments to verify that appropriate infection prevention procedures were indeed being followed in key areas of each facility.

Despite these efforts, a persistent barrier to infection prevention in Ministry of Health hospitals was the scarcity of low cost disinfectant, which often had to be imported at high cost, due to the irregular quality of locally manufactured chlorine solutions and frequent interruptions in the supply network.

In 2005, TASC2 and QAP introduced in Eritrean hospitals a low-cost technology to overcome this problem: a sodium hypochlorite generator permitting the local production of disinfectant at each regional hospital. Sodium hypochlorite at a 0.6% solution is a safe and very effective disinfectant for health equipment and facilities. It can also be diluted for laundry, general hygiene and kitchen use within the facility. In small quantities, 0.6% sodium hypochlorite is the disinfectant of choice for point-of-use-water purification for drinking purposes and its use can assure a safe hospital water supply.



Jerricans furnished by TASC2 and QAP to enable Halibet Hospital to distribute sodium hypochlorite disinfectant solution to all health centers in the zone. Photo by Waverly Rennie.

URC worked with [RTI International](#) environmental health consultant Dennis Kalson to provide training in June 2005 to public health technicians and hospital maintenance staff from the Ministry of Health in the operation and maintenance of AQUACHLOR sodium hypochlorite generators, which are manufactured by [Equipment & Systems Engineering, Inc.](#) of Miami, Florida. A medium capacity AQUACHLOR generator can produce 200 liters of sodium hypochlorite at 0.6% in 24 hours with the same amount of water, six kilos of salt, and electricity. The generators are very simple and safe to use, and require very little maintenance. Cleaning is done with common vinegar. Electrical consumption is small (and can be supplied by solar panels). Therefore, operating costs are quite minimal, which makes them an ideal option for low-resource settings.

Through TASC2 and QAP, URC purchased the first two AQUACHLOR generators for use in Eritrea. One generator was installed in the premises of Halibet Central Hospital in the Maekel Zone and the other in Orotta Hospital in Asmara, the capital. URC staff worked with Kalson to adapt guidelines for chlorine production into a job aid to ensure the correct use and maintenance of the generators, as well as appropriate dosages for the various uses within the health care facility. Additionally, TASC2 and QAP provided the hospitals with other inputs needed for the installation and functioning of the generators, including: a fan to increase ventilation of the production site, several pairs of heavy duty gloves, extension cords, a 200 liter plastic barrel, and 150 yellow jerricans for chlorine distribution.

By September 2005, the Halibet team had started distributing chlorine to a neighboring smaller hospital and to a few health facilities on their own initiative. A series of meetings were then held to discuss a more formalized system for chlorine production, distribution, labeling and use in Maekel Zone. These meetings included the national QA manager, one of the public health technicians at the national Nursing School who had participated in the June training, the Halibet hospital director and administrator, the Maekel Zone medical administrator, and TASC2 technical staff. These meetings led to clarification of roles, responsibilities and procedures for production and distribution to Halibet hospital wards, all health facilities in the Zone, and from the health facilities to village health committees for water purification.

It was agreed that Halibet would hire a technician to produce chlorine each day and manage its distribution, and that a cost-recovery scheme would be put into place. The hospital would charge each health facility a low fee for each liter of the solution, and use the fee collected to pay for the chlorine production and distribution manager, for

recurrent costs such as salt and vinegar, and to save up for a replacement machine when needed.

By the time the TASC2 project closed in October 2005, five more AQUACHLOR machines had been procured for the Ministry of Health of Eritrea, to be placed in the Zone Hospital in each of the country's other five zones. Once the additional five machines are delivered to the remaining hospitals, the steps and guidelines followed in setting the system up in the Maekel zone will be used. The goal is to put in place sodium hypochlorite production and distribution systems to cover all health facilities in each zone. Such systems will help to institutionalize USAID's support to infection prevention in Eritrean health facilities by making the hospitals less dependent on purchasing chlorine from commercial providers and an unreliable suppliers, which demand cash in a cash-poor system, and enable hospitals to more consistently implement and monitor infection prevention practices.

The Ministry of Health of Eritrea also plans to pilot test use of the sodium hypochlorite solution for village-level point-of-use (and distribution point) water purification to reduce diarrhea incidence. Under this scheme, the newly formed cadre of public health technicians and sanitarians will regularly distribute the solution to village health committees and community-based distributors and promote its integration with water and sanitation and growth monitoring activities carried out at the community level. Given the relatively strong level of community organization, and the new technical capacity of local public health technicians, the technology holds great promise in the reduction of currently high levels of waterborne illness in Eritrea.

*For more information on the introduction of the sodium hypochlorite generators in Eritrea, contact Waverly Rennie at [wrennie@urc-chs.com](mailto:wrennie@urc-chs.com). or Dennis Kalson at [dkalson@hotmail.com](mailto:dkalson@hotmail.com).*