



Review Article

Containing Cholera Outbreaks in Refugee Camps in Yemen: What a Medical Team Should Do?

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Abstract

This review aims to illustrate what a Medical Team (MT) should offer in a country such as Yemen, especially when support is limited, resources are scarce, and disease is endemic. Refugee camps provide basic necessities such as food, water, protection, medical treatment, and standard sanitary conditions. However, unsanitary conditions can lead to increased risks of foodborne illnesses. This can be due to overcrowding, poor hygienic attitudes, lack of clean water, improper waste disposal, and unhygienic cooking and storing of food, all of which can lead to increased risks of foodborne illnesses such as Cholera. The situation is even more complicated when there is war in the region and critical aid is not provided. A literature search was conducted to determine the role of the MT in such circumstances using the search engines: PubMed, Medline, EMBASE, and Google. This clearly illustrated the scarcity of the literature on effective risk relief strategies and the critical role of the MT as only several articles were found, and only a few guidelines from aid agencies were available. This review will discuss this topic and suggest preventative measures based on the evidence to help contain Cholera in refugee camps in Yemen.

Keywords: Cholera; Outbreak; Yemen; Refugee camps; Medical team

Introduction

Refugee camps have been increasing every year. Sadly, it is usually due to disasters, war, persecution, or violence in different parts of the world [1]. Many of these camps, which can be temporary or permanent residences for millions of people, require assistance because of health-related issues that develop within them [2]. One such example is the spread of Cholera. This disease usually happens in refugee camps because of the accumulation of people in small areas with a scarcity of clean water accompanied by a lack of cleanliness and hygiene [3,4]. These poor conditions usually increase the associated morbidity and mortality of the disease [5,6]. According to the WHO [7], mortality may increase up to 60% due to inadequate medical care if Cholera is not treated swiftly, especially in children under five. Thus, it has become a serious health issue in refugee camps [3,4,8,9].

A brief historical glimpse of Cholera outbreaks illustrates

that it has spread in refugee camps worldwide, such as in Nigeria, Somalia, South Sudan [10], and Haiti [11]. It is worth noting that many of these camps are supervised by well-known humanitarian agencies and supported by governments. However, not all countries have this advantage. In Yemen, which is the focus of this review, the situation is different. The country is at war with limited humanitarian agency support. This makes the control of infectious diseases within its refugee camps challenging, particularly Cholera, because of its association with hygiene and the presence of clean water [12]. The situation can worsen when pregnant women and young children are involved [13]. Federspiel and Ali [14] claim that there are around 40 organizations coordinated by the WHO under the name of the Yemen Health Cluster. There are also other organizations working independently in the country, such as United Hands Relief [15] and the King Salman Relief Centre [16]. Unfortunately, according to the OCHA [17] report, many of these organizations are scattered across different areas of the country and are affected by the armed conflict. Moreover, they are not fully supported because of Yemen's disunited government [14]. Most of their funds and management are usually from independent

resources [18]. Moreover, there might be differences in the camps due to an area's demography, the population cared for, and the location's infrastructure, all of which can contribute to different outcomes.

In comparison to the situation of the camps in Yemen in the seventies, the overall conditions have improved. However, it is worth noting that in this country, the population is about 27 million, of which 2.2 million live in refugee camps [10]. Unfortunately, despite the improved conditions, numerous Cholera outbreaks have badly affected many of these camps. In fact, they started appearing after the beginning of the war [19]. Moreover, these specific outbreaks are one of the largest in modern history affecting approximately one million Yemenis [3]. Accordingly, this review will discuss this issue and highlight the role of the Medical Team (MT) (e.g., clinicians, nurses and other allied health sciences combined) when a cholera outbreak emerges, and urgent solutions are required to contain it and prevent it from spreading.

Causes and Transmission

Cholera is a disease that affects the small intestine in humans, with about 20% of those infected developing acute watery diarrhea (usually described as rice-water stool) resulting in dehydration and in some patients, it might be accompanied by vomiting [5]. They also claim that the disease can be acquired directly through post-consumption of *Vibrio cholerae* contaminated water. Direct contact with an infected person can be another source of the disease as it can be acquired through an oral-fecal route; therefore, contaminated hands can also play a significant role in its spread [20]. Moreover, other factors are also responsible for its spread, such as inadequate water chlorination, shortage of sanitation facilities, inappropriate waste disposal, and poor hygiene [5]. An interesting finding that has been reported states that Khat leaves, a well-known local herbal stimulant, is a Cholera risk factor as well [8]. Traditionally, many male Yemenis chew the leaves daily. However, these leaves are usually washed in unchlorinated and potentially contaminated water oblivious to those consuming it. Therefore, the frequent use of Khat leaves can be a reservoir of the disease and another source for Cholera. After exposure to this disease, an incubation period that ranges from a few hours to a few days may occur based on the degree of exposure and a person's immunity. The shorter the incubation period, the faster the spread of the disease. In addition to the latter, a slow response rate after exposure, a delay in implementing Cholera control measures, limited cholera-specific training, or lack of supplies can all lead to its spread and eventual complications [5,20].

Microbiology

Cholera-causing bacteria has both a specific shape and growth. It can be observed under the microscope as a comma-

shaped Gram-negative rod, and in the microbiology lab, it needs a selective media to grow [21]. They emphasize that specimens need to be collected and transported in an enriched alkaline solution to be protected from dying until processed. Two well-known toxigenic serogroups, O1 and O139, are responsible for the disease's severity, spread, emerging outbreaks, and associated deaths [22,23]. This mainly happens if patients are not treated properly, efficiently, or quickly. Complications are associated with massive fluid and electrolyte (i.e., sodium, potassium bicarbonate, and chloride) depletion and fluid loss can reach 1L in an hour in infected adults [24]. According to the WHO [25], a diagnosis can be based on the clinical picture when laboratory testing cannot be provided because of limited resources. They claim it can also be found on previously diagnosed patients who have been clinically identified because of an emerging outbreak in an area where Cholera has become endemic.

The Role of the Medical Team

The MT or healthcare workers who join such camps usually have two main roles when a Cholera outbreak happens. The first one is the establishment of a cholera treatment center and all related organizing requirements. The second one is helping increase the awareness of the community outside the treatment center about the disease and its control. Staff working in these camps usually want to care for refugee camp patients. Although the latter might be a good cause, it is not enough as many other requirements are also needed. As stated earlier, Yemen refugee camps are different from other camps. Thus, the MT is not only accountable for a specific kind of medical care but also are responsible for other camp-related issues as well. They must hold a supervisory role, be knowledgeable, and have the needed skills about the camp's location layout, overall planning, sufficient water facilities, and sanitation system [26]. Therefore, early planning for a refugee camp and its location are important as they can lead to better care outcomes and low mortality rates [27]. Plans relating to a camp's role and expected consequences should be applied where Cholera is identified. Before the initiation of this project, a specific committee must be set up and definite roles must be assigned. The committee will work on establishing the treatment center and setting up applicable guidelines that will cover several areas: the planning and structuring, surveillance for the disease, training protocols for new MT, water treatment and sanitation, refugee awareness plans, and coordination with humanitarian agencies when possible [27]. The committee will also coordinate and share all the relevant information about resources, needs, and strategic considerations with any governmental agency when needed [28].

The "Doctors without Borders" agency [29] put in place a practical approach for establishing a Cholera treatment center. They argue that they should be established in a large flat space

divided into four separated areas (Figure 1). The first three areas are for patients, which include: observation (for early assessment), hospitalization (for patients with severe symptoms to receive the needed treatment with a space of 30m² for each patient), and recovery (to monitor improved patients). However, the fourth area is restricted to staff only. They must first go through a basin of chlorinated water to move between the areas. The center should also have a clean water supply, pharmacy and medical supplies store, laundry, kitchens, latrines for patients use, and a specific area for waste management [29]. Therefore, caring for Cholera symptomatic patients must be done with complete segregation from

other patients in the center, especially when it comes to latrine use [30]. These are made specifically for affected patients as they have been developed over the years to reach their present form [31]. These toilets have well-maintained odor control through special engineered vent pipes. Furthermore, they also have fly control managed by a special screen at the top of the pipes. This screen prevents flies from being drawn to the smell coming from the vent pipes. It is important to remember that symptomatic patient latrines are not to be used by any other patients in this center [26]. After clinical improvement, which usually ranges from 3-5 days, patients can be transferred to the recovery area where they can drink independently and are monitored carefully until complete recovery.

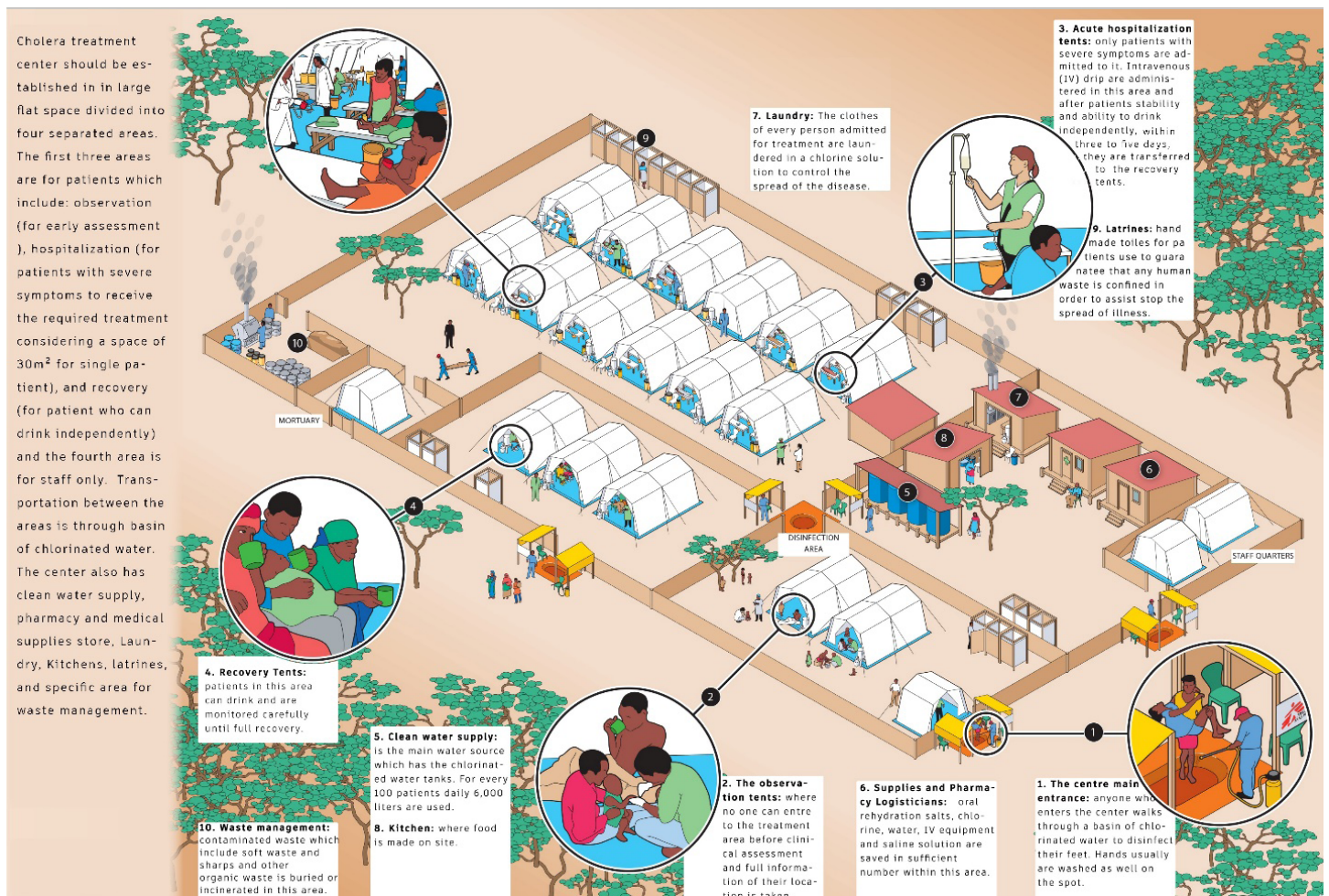


Figure 1: Cholera treatment center adapted from Doctors Without Borders with permission.

Since Cholera is endemic in Yemen, its frequent occurrence is expected at any time without warning in the shape of outbreak waves [19]. New staff members who join the camp should immediately be trained once they arrive by more experienced colleagues. Training of the MT in Cholera patient management is critical. It has been proven to be an effective way to help control the disease if it appears suddenly. A good example is a relatively recent study by the WHO (25) conducted in Yemen. They argue that special training in Cholera management should be mandatory for all refugee camp staff upon arrival. Trained individuals can mentor newcomers and provide the required knowledge and skills upon joining. If this is done regularly, it will be very effective. What's more, it will provide adequately trained personnel with the required updates before any outbreak situation arises again [32].

The second main job of the MT in the center is increasing community awareness about the disease. Oxfam highlighted this in their Cholera guidelines, which clearly emphasized the importance of growing refugee camp community awareness about Cholera [30]. This can be done using simplified pamphlets with colored pictures marked with correct and incorrect sign images. When community members become aware, this will help the MT identify the early signs of the disease and immediately bring in any suspected patient(s) as early as possible, thereby controlling its spread. Additionally, if positive patients are not severely infected, they can be managed at home and looked after [33]. Community members who gain knowledge from the MT can help explain important actions such as fluid intake, proper waste discard, and chlorination of drinking water at their accommodation to others [30]. This can be achieved and sustained by active camp visits to explain preventative measures, participation in the distribution of Cholera prevention kits, and so on, especially when signs and symptoms initially start. However, it is worth noting the importance of training people who would like to contribute as volunteers, especially with the limited number of MT members in the camps. Volunteers can then help explain to the public basic information about the disease and the most appropriate care for patients with Cholera. They can also educate others regarding disease transmission, home-based rehydration treatment, and proper sanitation. Volunteers can be a valuable source for early identification of hotspot areas where case clusters emerge. This will save lives and time and allow for a quick and early detection and prevention of the disease [30].

Surveillance for Cholera in refugee camps is a valuable tool to detect it in its infancy, and the MT can contribute to this significantly. They should survey patients who have diarrhea. Further to its detection, more analysis can be done to determine if it is Cholera or not. Therefore, if surveillance is conducted (e.g., possible case monitoring, data collection, analysis, and

reporting of the results) and action is taken immediately, potential outbreaks can be identified early and prevented [34,35]. Moreover, the effectiveness of the surveillance role was identified in other refugee camps in other countries as well [36].

As stated previously, Yemen suffers from regular deficiencies, one of which is extended periods of limited clean water. Hence, providing clean chlorinated water within the refugee camps should be the main priority of the MT and other staff who work in the camp. It has been reported in a few studies that water needs to be treated with chlorine properly for it to be safe for drinking [37,38]. Furthermore, to decrease or prevent the spread of Cholera, it is equally important to teach refugees how to purify water themselves. Clean water plays a critical role in maintaining overall hygiene in refugee camps. Usually, UNICEF [39] provides refugee camps with safe water, especially during outbreaks. However, with the continuous military conflict in Yemen, agencies cannot always reach the camps on time. Therefore, the MT should be directly involved in the camp's water system by working with an engineer to ensure the stability and availability of a good supply of chlorinated drinking water. They should also instruct the camp community that chlorinated water must be used for fresh foods that require washing, including Khat leaves before chewing.

In addition to the latter, the MT should be involved in ensuring the provision of the safe disposal of body waste and providing soap for body hygiene, especially for hands. If all of the above-mentioned points are applied correctly, they will sustain good drinking and washing standards within the camp and minimize any chances of water contamination which can lead to another Cholera outbreak [30]. Thus, to minimize the chances of water contamination, people in refugee camps should have enough of it for daily use. Each person should be allowed to have 15 liters of water per day [26]. Moreover, chlorine residual in water should be <0.2 and not >0.5 mg/liter after treatment. Furthermore, each person needs at least 250 mg of soap per month for bathing [26].

Another important point that should be highlighted is the proper disposal of human waste without the possibility of contamination. Latrines within the camp should be at least 50 meters away from where people live, and each single one should not be used by more than 20 people. This information should be well acknowledged and enforced by the MT and, equally important, to the people living there. The WHO [40] managed to send many items to refugee camps in Yemen when the Cholera outbreak first emerged (e.g., IV fluids, Cholera kits, Cholera cots). However, such help might not always be provided constantly because of the ongoing war. The MT working in these camps should be aware of the needed items, the available stocks, and when and how to request additional supplies, including extra ones, to avoid shortages.

Finally, vaccinating camp refugees is equally essential.

Cholera oral vaccine, given in two doses and developed by the WHO in 2013, is a good option for prevention [41]. Different studies found that it can be very effective in controlling the disease, especially if combined with other preventive measures such as chlorinated water use, hand washing, and medical waste disposal [42,43]. Interestingly, another study that examined the vaccine's effectivity during a five-year duration confirmed similar results [44]. Therefore, when the support of any humanitarian agency is possible, MTs should request for the required number of doses based on the number of susceptible people in their camp and store it properly. They should also set up a strong campaign for those living in the camps. This is in addition to all the other necessary preventive measures highlighted previously that can help prevent Cholera outbreaks from reoccurring.

Conclusion

Cholera control is not difficult when resources are available, government support is provided, and there are international humanitarian agencies present. Although this is standard protocol for most refugee camp situations, it is not the case for Yemen because of its ongoing war and disunited government. This review aims to illustrate what a MT should offer in a country such as Yemen, especially when support is limited, and resources are scarce. It can be concluded that MTs in this country should take on more roles than only healthcare providers. They should be involved in the initial planning of the camp's location and the needed space by putting together standardized guidelines to provide good Cholera management. Of course, this is in addition to their involvement in Cholera control training, disease surveillance, community awareness campaigns, water chlorination, and waste disposal. MTs should also play a significant role in communicating with humanitarian agencies that can provide the needed resources and supplies to help them carry out their responsibilities to the best of their ability.

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