ASSESSING THE RISK OF CHOLERA AND THE BENEFITS OF IMPLEMENTING ORAL CHOLERA VACCINE

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INTRODUCTION

Cholera outbreaks are life-threatening events which can spread through populations rapidly, as recently seen in many African countries and Haiti. They are also a continuing threat in many endemic countries in South Asia and now in some areas in Africa. Preparing for, and responding to, cholera outbreaks is a challenge since these often occur in areas with the fewest medical resources and the lowest levels of water and sanitation infrastructure.

When facing the threat of a cholera outbreak, many questions need to be addressed by health planners to minimize the threat and prevent cholera deaths in the most humanitarian and cost effective manner. These questions include many of the following.

1. What is the probability that a cholera outbreak will occur during the next few weeks or months?
2. Based on historical information, is there a way to predict which area is most vulnerable to cholera?
3. If a cholera outbreak occurs, how severe is it likely to be?
4. If the outbreak does not occur during the next few months, what is the probability that an outbreak will occur in the next 3-5 years?
5. What interventions are appropriate for the situation to minimize the probability of an outbreak and to minimize deaths if an outbreak does occur?
6. Does the situation warrant an emergency campaign with oral cholera vaccine?
7. If a vaccine campaign is mobilized, how rapidly must it be deployed?
8. If a campaign is mobilized, to whom should it be targeted?
9. If there is a moderate threat of cholera and vaccine is not used, what additional preparations are needed to monitor the ongoing threat level in case the situation changes?
10. If an outbreak has already started, should I use vaccine now and how quickly must the vaccine campaign start?

This risk assessment tool is designed to provide guidance as to what actions are appropriate for a given situation. For many areas of the world, cholera is still unpredictable as to the time, place and severity; thus, this tool can only be used as a guide to be updated as new information is developed. Many situations are unique and these unique situations will require judgment on the part of the local planners. This tool should improve as experience is gained in using it.

BACKGROUND INFORMATION ON CHOLERA

Prior to introducing the risk assessment tool, some basic understanding of cholera is needed. Cholera is caused by the bacterium, *Vibrio cholerae*, serogroup O1 or O139. This bacterium can survive in water for a very long time, probably indefinitely, even without human infections. For reasons not clearly understood, this “normal inhabitant” of environmental water can, from time to time, infect humans. When the human swallows the bacteria, it can multiply in the human small intestine, causing diarrhea. The diarrhea stool contains huge numbers of these [1]

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[1] There are more than 200 serotypes of *Vibrio cholerae* but only the serogroup O1 and O139 has caused epidemic cholera. In fact, O139 is rarely seen in South Asia and cholera due to this serotype has never been documented in Africa. The other serotypes may cause cases diarrhea but not epidemics.
bacteria and if the stool contaminates the environmental water, the bacteria can then spread to the next person who drinks the contaminated water. Thus, the cycle continues from person to person by way of the fecally contaminated water. With each cycle, the increasing numbers of infected people multiply the numbers of infectious bacteria in the environment.

Whether a person who drinks the contaminated water gets sick or not depends on how many bacteria they consume as well as whether they have some immunity. The more bacteria the person consumes, the higher the chance that the person will have severe (even life-threatening) diarrhea. In fact many people do become infected but do not develop diarrhea; these people may be partially immune or they may have consumed a lower dose of bacteria. These “asymptomatic excreters” can spread the bacteria in their stool, but they do not contribute as much to the outbreak as those with diarrhea simply because their stool does not have as many of the V. cholerae bacteria.

Cholera is often referred to as a “water borne infection,” but both food and water can be vehicles for its spread. Food that is contaminated with water actually acts as a medium for the bacteria to grow, so both food hygiene as well as safe water must be considered when attempting to control cholera.

During an outbreak, large numbers of people can become severely ill and the outbreak can accelerate rapidly such that clinics and hospitals are overwhelmed. Treatment is not complicated and is always successful if given properly, but effective treatment must be provided quickly and efficiently. A previously healthy person may die within a few hours of onset of illness if the proper rehydration treatment is not provided. The case fatality rate (CFR) for severe cholera patients without treatment is about 50%. In many treatment centers in Africa the CFR has still been around 5% of even higher even with treatment, but if rapid and effective treatment is provided, no one should die of cholera. Most of the deaths are related to slow rehydration, inappropriate rehydration fluids, or failure to keep up with diarrhea fluid losses after the initial rehydration. However, the most common cause of death is simply the inability to reach the treatment center in time. Since “time between onset of symptoms and good treatment” is such a critical factor, treatment facilities need to be rapidly accessible.

The natural history of a cholera outbreak was thought to be fairly short lived. That is, the outbreak was thought to start, build rapidly, and then decline over a period of a few weeks. This pattern still occurs, but some outbreaks have continued for many months; at this time it has not been possible to predict whether an outbreak will be self-limited or will continue for a prolonged period. The reason for the decline in the outbreak is not well understood. One hypothesis suggests that the climatic factors which led to the outbreak change, becoming less favorable to its continued spread. Another hypothesis suggests that increasing numbers of vibriophages (viruses that attacks and kills the bacteria) may cleanse the environmental waters. Finally, the numbers of susceptible people decrease as the population becomes immune. It seems likely that each of these may contribute to the decline in the outbreak.

The start of a cholera outbreak is illustrated here.
**STEPS IN ASSESSING THE RISK OF CHOLERA**

The following chart can be used to evaluate which of the scenarios may be most appropriate. The reader can then proceed directly to that scenario for suggestions on how to manage the cholera threat. The chart is explained in the text which follows.

Go to Scenario 1  
---------Yes--------  
Cholera occurs every year

Go to Scenario 2  
---------Yes--------  
Cholera occurs intermittently

Go to Scenario 3  
---------Yes--------  
Cholera occurred in last decade

Go to Scenario 4  
---------Yes--------  
Water and sanitation condition has deteriorated lately by natural or man-made disaster

Go to Scenario 5  
---------Yes--------  
Cholera seen in neighboring country

Go to Scenario 6  
---------Yes--------  
Water and sanitation condition is poor

Go to Scenario 7  
---------Yes--------  
Workers from cholera endemic countries coming to an area with high standard water and sanitation

Go to Scenario 8  
---------Yes--------  
Workers from cholera endemic countries coming to an area with poor water and sanitation

Cholera extremely unlikely
1.0 Past Experience with Cholera in the Area

There will be several steps in assessing the risk of cholera. This assessment should start with
the past experience with cholera in the area or nearby area. Based on this initial categorization,
decisions about the appropriate response can be assessed. (A more detailed analysis is being
developed which uses quantitative historical data to assess the risk. By contrast, this risk
assessment uses a more qualitative approach building on local information from national
regional resources.)

<table>
<thead>
<tr>
<th>Different scenarios for cholera epidemiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cholera occurs regularly (generally annually) in the area.</td>
</tr>
<tr>
<td>2. Cholera has occurred sporadically during at least 3 out of the last five years.</td>
</tr>
<tr>
<td>3. Cholera has not been recognized in the area for many years but it has occurred during the last decade.</td>
</tr>
<tr>
<td>4. Cholera has not been recognized in the area, but sanitation and water conditions are poor or have deteriorated severely.</td>
</tr>
<tr>
<td>5. Cholera has not been recognized in the area but it has been seen in a neighboring region.</td>
</tr>
<tr>
<td>6. Cholera has not been recognized in the area, there has been no cholera reported in neighboring countries, but there is still concern about whether additional measures are needed to prevent cholera because water and sanitation are poor.</td>
</tr>
<tr>
<td>7. Cholera has not been recognized in the area and water and sanitation standards are high, but there is interest in the new vaccine for special groups, such as workers from cholera endemic countries.</td>
</tr>
<tr>
<td>8. Cholera has not been recognized in the area, but there is interest in OCV for special groups, such as workers from cholera endemic countries because of fear that these workers may introduce cholera to a new area with poor water and sanitation.</td>
</tr>
<tr>
<td>9. None of the above fits our situation.</td>
</tr>
</tbody>
</table>

An explanation of these categories follows here.

If cholera occurs regularly (generally annually) in the area, the areas is definitely endemic. In
most of these endemic areas have high and low seasons for cholera and with minimal
surveillance, these seasonal patterns can be defined. Within the same country, the seasonal pattern may vary. This seasonal pattern is seen in some countries of South and Southeast Asia and in few areas of Africa.
If cholera has occurred sporadically during at least 3 out of the last five years, the area is also considered endemic. These areas generally have a higher risk season which can be understood from past experience of outbreaks, but the outbreaks may be more scattered and the seasons may be less predictable. This pattern is seen in parts of Africa where outbreaks occur from time to time. The frequent occurrence of outbreaks suggests the presence of environmental reservoirs which maintain the vibrio between outbreaks.

If cholera has not been recognized in the area for many years but an outbreak occurs, the outbreak would be considered an epidemic. The origin of the outbreak could be either due to introduction of the Vibrio by persons or by ships, or it could still be from an environmental source.

If cholera has not been recognized in the area, but sanitation and water conditions have deteriorated severely and if cholera is detected in a neighboring region, this area is one at high risk. The occurrence of cholera in a neighboring region suggests that the disease may spread, but it may also suggest that the climatic conditions are favorable for cholera. Both explanations are possible, and certainly such an area should be on alert.

If cholera has not been recognized in the area previously and there has been no change in the sanitation and water conditions, (even though these conditions are poor) and if there has been no cholera in the neighboring regions, this area would be considered to have lower risk. Such conditions exist in many developing countries. In spite of very poor water and sanitation, cholera is rare or not reported. Even though cholera may be a lower threat, such areas still have high rates of diarrheal disease, especially in children, and so plans are still needed to address the need to care for high rates of “ordinary” (non-cholera) diarrhea. Developing a strong program for managing diarrheal diseases provides the basis for a strong cholera program if this becomes a threat in the future.

If there have been few cholera cases in the area, and the water and sanitation infrastructure is of high standards, there is a low risk of a cholera outbreak. Individual cases of cholera could occur, but secondary transmission will not occur. An example of this situation is the gulf coast of the US where a few cases result from consumption of undercooked shell fish, but the infection does not spread beyond the primary case.

2.0 Experience with Cholera Deaths during Past Outbreaks

If the area has had cholera outbreaks in the past, the case fatality rate during these past outbreaks can be categorized and the probability of deaths in a future outbreak can also be assessed. This assessment will depend on whether treatment facilities have been improved. Cholera deaths can occur either because patients did not receive proper treatment at the health facility, or because the patients did not reach the health facility in time, or a combination. Thus, the area should be categorized according to the risk of cholera deaths.

2.1 High risk of death (CFR >2% at the health facilities in the past outbreaks)
2.2 Low risk of death at the facility (CFR<2%) but area is remote and deaths are likely to have occurred in the community because patients did not, or could not, reach the health facility in time.
2.3 Combination of High CFR (situation A) and remoteness (situation B)
2.4 Low risk of death in facility and most patients can reach a facility within a short time (within 3 hours) if cholera should occur.
3.0 Strength of the Diarrheal Disease Control Program

Areas at risk of cholera are areas that already have high rates of diarrheal diseases in children. If these programs are strong, the health facilities will already have the knowledge and supplies for treating dehydration due to diarrhea. Although cholera patients, in general, require much more aggressive treatment than non-cholera patients, still the CDD infrastructure for managing cholera will give such an area a “head start” toward managing cholera successfully. The strength of the ongoing CDD program can be assessed using ORS use rates from DHS data (Demographic Health Surveys), and health facility surveys. A health facility survey may include whether facilities have cholera cots, ORS supplies and IV supplies and whether the physicians and nurses have been trained in proper rehydration case management.

3.1 Strong CDD program in facilities and community
3.2 Strong CDD program in facilities but weak in the community
3.3 Weak in both facilities and in the community

4.0 Factors related to seasons, climate, and social political situations

Cholera tends to occur during certain seasons of the year, but this can vary between different geographic locations. If the seasonal pattern is known from past years data, this will help to assess when an outbreak is most likely to occur. Other weather patterns may also affect the probability of an outbreak and the severity of the outbreak should it occur.

4.1 Regular seasonal outbreaks in past years. If surveillance shows that most years have an increase in cholera cases during a certain period of the year, one can be confident that this is likely to happen in subsequent years in the absence of major interventions.
4.2 Unusual weather patterns, either drought or flood. With floods, water becomes contaminated and during droughts the environmental conditions for vibrio may be more favorable. In either situation, there may be “water switching” in which the normal water supply is not available, and secondary (more risky) sources are used.
4.3 Warm temperatures often increase the risk. In more temperate climates, vibrio infections are restricted to the warmer months, but in tropical areas, high temperatures may persist throughout the year.
4.4 Disruption to civil society such as occurs with wars or other civil disturbance. These situations often lead to movements of people to escape the violence resulting in refugees and / or displaced persons. Historically, refugees in Africa have been at very high risk; however, with adequate sanitation and safe water, the risk among refugees in organized camps appears to have declined. However, risk for displaced persons who do not have the infrastructure of a camp remains high. An indicator of civil unrest is the presence of UN Peacekeepers.
4.5 Poverty, poor sanitation, unsafe water obviously increase the risk for cholera, but these conditions occur in so many regions in developing countries that they are less useful as indicators of high risk areas by themselves.
4.6 Food shortage, like other general characteristics of developing countries has not been a useful indicator of high cholera risk. While many malnourished people are often more susceptible to infections, cholera is a disease that can attack persons of any nutritional status. Though food shortage may not be a direct risk factor, if a situation is severe, it could lead to massive migration, with many displaced persons and refugee camps.
5.0 Responses to a cholera threat

There can be a variety of responses to a cholera threat and the choice of the most appropriate response will depend on an assessment of the threat level and the urgency of the response. For the purpose of this tool, **it will be assumed that the first response will be to take steps to prevent cholera deaths by insuring that proper treatment is available and accessible. No cholera patient should die.** This component of the response will always be included as the first priority. In addition to providing treatment, other interventions will include one or more of the following actions. This list provides a brief menu of options for the cholera risk response, but each of these will require a detailed plan of action.

5.1 Increased surveillance will be appropriate during a cholera outbreak as well as during times of increased risk. Data from the surveillance will guide the use of resources and will allow for continuous re-assessment of the situation. Surveillance includes the collecting of data in an organized manner, the analysis of the data, and the decision process when the data is analyzed, and the reporting of the data. After decisions are made, based on the data, continued surveillance is needed to determine if the decisions are resulting in the desired outcomes and if additional interventions are needed.

5.2 Communication strategy to inform the population at risk with regard to prevention strategies and knowledge about the need for prompt treatment, and where to find this treatment when needed.

5.3 As a follow up to the disease surveillance and the communication program, an additional activity of “communication surveillance” is needed to insure that the population understands the messages and is able to take the appropriate actions.

5.4 Improving water and sanitation through latrines, water purification materials, and education, with the follow up to encourage compliance with the messages.

5.5 Oral cholera vaccine through a campaign either preemptively or early in the outbreak.

6.0 Decisions about Use of Oral Cholera Vaccine

Oral cholera vaccine is available for use in certain situations, but the amount of vaccine is limited and the vaccine and its distribution is relatively costly, compared to many other vaccines. Thus, it should be used when needed, but it is not cost effective if the expected rates of cholera are relatively low. When considering the cost of the vaccine, one must compare the cost of the vaccine and its distribution to the cost of not giving the vaccine, while still insuring proper treatment. Treatment of a large number of cases is also expensive. If the vaccine prevents cases, it will also prevent the costs associated with the treatment of those cases, as well as saving lives. The vaccine is now known to protect for 3 to 5 years, so the benefit reduces costs, not only in the current year, but also in the next few years. A calculator is associated with this risk assessment tool which can provide a guide on the cost effectiveness of using or not using vaccine in an overall integrated response.

As a rule of thumb, if expected cholera rates in a defined group\(^2\) are high (average of \(>2\) per 1000 per year), the vaccine will reduce costs of the overall cholera control program. If rates are \(<1/1000\), the vaccine will likely not be cost effective.

\(^\text{2}A \text{ “group” could be the people living in a particular geographic area or an age/sex subgroup in the area or even a particular socioeconomic or ethnic group. However, if one defines such a group, one also assumes that it will be possible to provide vaccine to this group.}\)
DEVELOPMENT OF THE RISK ASSESSMENT

The risk assessment should be used if there is a question or concern that cholera may represent a threat to the country or a region in the country. The tool starts with some open ended questions describing the cholera threat. This is then followed by an assessment of the nature and severity of the threat. If possible the threat will fall within the “history categories” as described in Section 1 above.

Tool for Assessing the Risk and Planning For a Response

Name and position of the person filling in the form ________________________________

Country _____________________

Name of geographic region or area in the country______________________________

Is there a specific group at risk (e.g. displaced persons, refugees, urban slums, others)?
Yes □ No □

What is the specific situation that raises the concern about a cholera outbreak?
____________________________________________________________________________
____________________________________________________________________________

What is the assessment of the local capacity to respond to an outbreak should one occur?
____________________________________________________________________________
____________________________________________________________________________

Has cholera occurred previously in the country? Yes □ No □

If yes, please summarize briefly the understanding about the epidemiology of cholera in the past. Depending on the scenario that best fits the situation, proceed to the appropriate page.
____________________________________________________________________________
____________________________________________________________________________
Which of the following scenarios fit best the situation about cholera in the country?

1. Cholera occurs regularly (generally annually) in the area
2. Cholera has occurred sporadically during at least 3 out of the last five years
3. Cholera has not been recognized in the area for many years but it has occurred during the last decade.
4. Cholera has not been recognized in the area, but sanitation and water conditions have deteriorated severely.
5. Cholera has not been recognized in the area but it has been seen in a neighboring region.
6. Cholera has not been recognized in the area, there has been no cholera reported in neighboring countries, but there is still concern about whether additional measures are needed to prevent cholera because water and sanitation are not acceptable.
7. Cholera has not been recognized in the area and water and sanitation standards are high, but there is interest in the new vaccine for special groups, such as workers from cholera endemic countries.
8. Cholera has not been recognized in the area, but there is interest in OCV for special groups, such as workers from cholera endemic countries because of fear that these workers may introduce cholera to a new area with poor water and sanitation.
Scenario 1. Cholera occurs regularly (generally annually) in the area.

This scenario is common in many countries of South and Southeast Asia and few countries in Africa. It may also describe the situation in Haiti since 2011. To prepare a strategy for cholera control in such an area, both a long term and an immediate approach is needed. The components of the strategy will always include a plan to insure proper case management; thus, an assessment of the quality and availability of cholera treatment should come first. In addition to insuring that no one dies from cholera, the following questions should be addressed using the best available information.

1. What is understood about the epidemiology of cholera in the area? Be brief but include what is known about seasonality, specific geographic areas of the country at highest risk, age or sex groups at risk. Does cholera’s seasonality vary in different parts of the country?

2. What is the best estimate of the average annual rate of cholera in the country? Are there age, sex, or geographic subgroups that have a high rate? If so, what is the best estimate of the average annual rate for this group?

3. Are there areas which are more remote where cholera occurs but where treatment may not be available for many of the patients in time?

4. What is the best estimate of the case fatality rate in the treatment centers where most cholera patients are treated? Are there some areas where the case fatality rate is higher?

5. Are there unusual climate events in the area this year, such as floods or droughts?

6. Are there unusual movements of large numbers of people, e.g. refugees or displaced persons?

7. Has there been a sudden deterioration in the civil society (e.g. wars, civil unrest).

8. Have UN Peacekeepers been deployed in the area (UN Peacekeepers are an indicator of civil unrest.)?

9. Is the area near large bodies of water (rivers or lakes)?

10. Is the area well prepared to provide high quality care to patients with severe cholera, and is this treatment readily available to those with cholera considering factors of distance or time required to reach a treatment center?

Response to these questions

Since this area is one that is already known to be endemic, reduction in the disease burden will require an integrated cholera control approach. The components will include

- Establish or maintain a good sentinel surveillance to define the locations for cholera hotspots and to maintain a good early warning signal of an outbreak.
• If cases are detected, some of these cases should be confirmed with bacteriological cultures and sensitivity testing so that the proper antibiotic can be provided.
• Water sanitation improvement focusing on point of use water treatment and use of improved water supplies.

Regarding the use of Oral Cholera Vaccine,
• Vaccine is highly recommended for groups with an expected incidence of \( \geq 3 \) /1000 over a three year period (average of \( \geq 1 \) /1000 per year). The group with this high rate need not be the rate for the entire area; it could be in a specific age, sex, occupation, or geographic group if this group can be targeted for vaccine. Providing vaccine will likely save money as well as lives by reducing the cost of providing treatment if the rate is \( \geq 6 \) /1000 over three years (average of \( \geq 2 \) /1000 per year).
• Vaccine is highly recommended if there has been cholera in the area frequently and one or more of the following factors occur: a) a sudden deterioration of the water / sanitation, b) civil unrest, c) major change in the climate (e.g. drought or flood), d) sudden movement of large numbers of people, especially if there is no organized camp where improved water can be provided.
• OCV is not recommended if the expected rate of cholera <3/1000 over a three year period (average of 1/1000 per year), since the costs will be very high compared to the benefit. However, enhanced surveillance in multiple health centers and hospitals in the area at risk is needed to detect cases as early as possible should an outbreak occur.

Additional resources
Guidance on establishing an inexpensive surveillance system ________________
Guidance on when and where to vaccinate _________________.
The calculator for estimating costs and benefits of using OCV _________________.
For a manual on use of the dipstick method for detecting cholera from patient samples and water, see “Manual for Detecting V cholerae O1 from Fecal Samples and from Environmental Water Using a Dipstick Assay”
Scenario 2. Cholera has occurred sporadically during at least 3 out of the last five years

This scenario is common in many countries of Africa and some areas of South and Southeast Asia and such an area is considered “endemic.” Countries with this scenario often have specific areas where cholera is more common (hotspots). To prepare a strategy for cholera control in such an area, both a long term and an immediate approach is needed. The components of the strategy will always include a plan to insure proper case management; thus, an assessment of the quality and availability of cholera treatment should come first. In addition to insuring that no one dies from cholera, the following questions should be addressed using the best available information.

1. What is understood about the epidemiology of cholera in the area? Be brief but include what is known about seasonality, specific geographic areas of the country at highest risk, age or sex groups at risk. Does cholera’s seasonality vary in different parts of the country?

2. What is the best estimate of the average annual rate of cholera in the area? Are there age, sex, or geographic subgroups that have a high rate? If so, what is the best estimate of the average annual rate for this group over a 3 year period?

3. Are there areas which are more remote where cholera occurs but where treatment may not be available for many of the patients in time?

4. What is the best estimate of the case fatality rate in the treatment centers where most cholera patients are treated? Are there some areas where the case fatality rate is higher?

5. Are there unusual climate events in the area this year, such as floods or droughts?

6. Are there unusual movements of large numbers of people, e.g. refugees or displaced persons?

7. Has there been a sudden deterioration in the civil society (e.g. wars, civil unrest).

8. Have UN Peacekeepers been deployed in the area (UN Peacekeepers are an indicator of civil unrest.)?

9. Is the area near large bodies of water (rivers or lakes)?

10. Is the area well prepared to provide high quality care to patients with severe cholera, and is this treatment readily available to those with cholera considering factors of distance or time required to reach a treatment center?

Response to these questions.

Since this area is one that is already known to be endemic, reduction in the disease burden will require an integrated cholera control approach. The components will include

• Establish or maintain a good sentinel surveillance to define the locations for cholera hotspots and to maintain a good early warning signal of an outbreak.
• If cholera has occurred sporadically, surveillance is especially important so that a new outbreak can be detected as early as possible. If cases are detected, some of these cases should be confirmed with bacteriological cultures and sensitivity testing so that the proper antibiotic can be provided.
• Water sanitation improvement focusing on point of use water treatment and use of improved water supplies.

Regarding the use of Oral Cholera Vaccine,
• Vaccine is highly recommended for groups with an expected incidence of >3/1000 over a three year period (average of >1/1000 per year). The group with this high rate need not be the rate for the entire area; it could be in a specific age, sex, occupation, or geographic group if this group can be targeted for vaccine. Providing vaccine will likely save money as well as lives by reducing the cost of providing treatment if the rate is >6/1000 over three years (average of >2/1000 per year).
• Vaccine is highly recommended if there has been cholera in the area frequently, and one or more of the following factors occur: a) a sudden deterioration of the water / sanitation, b) civil unrest, c) major change in the climate (e.g. drought or flood), d) sudden movement of large numbers of people, especially if there is no organized camp where improved water can be provided.
• OCV is not recommended if the expected rate of cholera <3/1000 over a three year period (average of 1/1000 per year), since the costs will be very high compared to the benefit. However, enhanced surveillance in multiple health centers and hospitals in the area at risk is needed to detect cases as early as possible should an outbreak occur.

Additional resources
Guidance on establishing an inexpensive surveillance system ________________
Guidance on when and where to vaccinate_________________.
The calculator for estimating costs and benefits of using OCV ____________________

For a manual on use of the dipstick method for detecting cholera from patient samples and water, see “Manual for Detecting V cholerae O1 from Fecal Samples and from Environmental Water Using a Dipstick Assay.”
**Scenario 3. Cholera has not been recognized in the area for many years but it has occurred during the last decade.**

This scenario is common in many countries of Africa and some areas of South and Southeast Asia. Such an area is not considered “endemic.” Even though cholera is rare in the country, the disease burden from ordinary, non-cholera diarrhea is likely to be high. The specific areas where cholera did occur should be identified.

To prepare a strategy for cholera control in such an area, both a long term and an immediate approach is needed but the emphasis should be on improving management of “usual” diarrheal disease treatment. Strengthening diarrheal disease programs will form the basis for managing a cholera outbreak should this occur. The components of the strategy will always include a plan to insure proper case management; thus, an assessment of the quality and availability of diarrhea treatment should come first. To assess the situation, the following questions should be addressed using the best available information.

1. What is understood about the epidemiology of cholera in the area? Be brief but include what is known about seasonality, specific geographic areas of the country at highest risk, age or sex groups at risk. Does cholera’s seasonality vary in different parts of the country?

2. Since cholera is rare, it will not be possible to estimate an average annual rate of cholera. However, based on the last time an outbreak occurred, what is the estimate of the rate of cholera? Were there age, sex, or geographic subgroups that had a high rate (>1/1000)?

3. Are there areas which are more remote where cholera occurs but where treatment may not be available for many of the patients in time?

4. What was the case fatality rate in the treatment centers where cholera patients were treated? Were some areas where the case fatality rate is higher?

5. Are there unusual climate events in the area of concern this year, such as floods or droughts?

6. Are there unusual movements of large numbers of people, e.g. refugees or displaced persons?

7. Has there been a sudden deterioration in the civil society (e.g. wars, civil unrest).

8. Have UN Peacekeepers been deployed in the area (UN Peacekeepers are an indicator of civil unrest.)?

9. Is the area near large bodies of water (rivers or lakes)?

10. Is the area well prepared to provide high quality care to patients with severe cholera, and is this treatment readily available to those with cholera considering factors of distance or time required to reach a treatment center?
Response to these questions.

Scenario 3 is not considered endemic; hence, the risk of an outbreak is lower than the first two scenarios. However, since cholera has occurred in this area, there is still a possibility of an outbreak. Such an area is also one with high diarrhea rates due to non-cholera diarrhea and the emphasis should be on improving the diarrheal disease control program.

The components of the program will include

- Establish or maintain a good sentinel surveillance to define the locations for cholera hotspots and to maintain a good early warning signal of an outbreak.

- Surveillance is especially important so that a new outbreak can be detected as early as possible. If cases are detected, some of these cases should be confirmed with bacteriological cultures and sensitivity testing so that the proper antibiotic can be provided.

- Water sanitation improvement focusing on point of use water treatment and use of improved water supplies

Regarding the use of Oral Cholera Vaccine

- Vaccine is not recommended for this area unless an outbreak is detected.

- If cholera cases are detected and if the probability is high for an outbreak, vaccine is recommended. Factors that increase the probability of an outbreak include a) a sudden deterioration of the water / sanitation, b) civil unrest, c) major change in the climate (e.g. drought or flood), d) sudden movement of large numbers of people, especially if there is no organized camp where improved water can be provided.

- Surveillance is especially important so that vaccine can be used very early in an outbreak.

- Outbreaks may appear to move or spread. Thus, consider vaccinating populations ahead of where the outbreak appears to be going.

Additional resources

Guidance on establishing an inexpensive surveillance system ________________

Guidance on when and where to vaccinate_________________.

The calculator for estimating costs and benefits of using OCV ____________________ Note however: the calculator which is useful for Scenario 1 and 2 will not be appropriate for scenario 3 since the rates of cholera cannot be predicted.

For a manual on use of the dipstick method for detecting cholera from patient samples and water, see “Manual for Detecting V cholerae O1 from Fecal Samples and from Environmental Water Using a Dipstick Assay.”
Scenario 4. Cholera has not been recognized in the area, but sanitation and water conditions have deteriorated severely

This scenario is common in many countries of Africa and Asia. Such an area is might be considered one “at risk.” Cholera could occur in such an area if the bacteria were to be introduced and if the environmental conditions were appropriate. The risk of a cholera outbreak occurring is extremely unpredictable, but popular opinion often talks about the risk of “water borne disease” during flood events. An example is following the tsunami in Indonesia where there was concern about cholera because of this devastating event. In retrospect, the risk of cholera was probably very low because cholera had not been reported in this area prior to the tsunami. In spite of the low risk, enhanced surveillance is still warranted so that an outbreak could be detected very early if it were to occur.

As with other scenarios where cholera is a concern, the public health program should strengthen the diarrheal disease programs in general since the poor water and sanitation will almost certainly increase rates of non-cholera diarrhea and other enteric infections.

To monitor the cholera risk surveillance should be established in sentinel locations where the risk is thought to be the highest. Specifically, the following questions should be addressed using the best available information.

1. Are there areas which are more remote where cholera treatment would be difficult to provide?
2. What resources are available and will be needed if a cholera outbreak should occur?
3. What training will be needed to manage cholera patients?
4. Are there unusual climate events in the area of concern this year, such as floods or droughts?
5. Are there unusual movements of large numbers of people, e.g. refugees or displaced persons?
6. Has there been a sudden deterioration in the civil society (e.g. wars, civil unrest).
7. Have UN Peacekeepers been deployed in the area (UN Peacekeepers are an indicator of civil unrest.)?
8. Is the area near large bodies of water (rivers or lakes)?
9. Is the area well prepared to provide high quality care to patients with severe cholera, and is this treatment readily available to those with cholera considering factors of distance or time required to reach a treatment center?

Response to these questions.

Scenario 4 is not endemic; hence, the risk of an outbreak is low; however, an outbreak could occur if the bacteria were to be introduced and if other risk factors are present. Thus, the following components of cholera preparedness will include the following.
• Establish or maintain good sentinel surveillance in areas thought to be at high risk.

• Surveillance is especially important so that a new outbreak can be detected as early as possible. If cases are detected, some of these cases should be confirmed with bacteriological cultures and sensitivity testing so that the proper antibiotic can be provided.

• Water sanitation improvement focusing on point of use water treatment and use of improved water supplies

Regarding the use of Oral Cholera Vaccine

• Vaccine is not recommended for this area unless an outbreak is detected.

• If cholera cases are detected and if the probability is high for an outbreak, vaccine is recommended. Factors that increase the probability of an outbreak include a) a worsening of the water / sanitation situation, b) civil unrest, c) major change in the climate (e.g. drought or flood), d) sudden movement of large numbers of people, especially if there is no organized camp where improved water can be provided.

• Surveillance is especially important so that vaccine can be used very early in an outbreak.

• Outbreaks may appear to move or spread. Thus, consider vaccinating populations ahead of where the outbreak appears to be going.

Additional resources

Guidance on establishing an inexpensive surveillance system _______________

Guidance on when and where to vaccinate___________________.

The calculator for estimating costs and benefits of using OCV ____________________ Note however: the calculator which is useful for Scenario 1 and 2 will not be appropriate for scenario 4 since the rates of cholera cannot be predicted.

For a manual on use of the dipstick method for detecting cholera from patient samples and water, see “Manual for Detecting V. cholerae O1 from Fecal Samples and from Environmental Water Using a Dipstick Assay.”
Scenario 5. Cholera has not been recognized in the area but it has been seen in a neighboring region.

This scenario may occur in Africa; less commonly in Asia. Such an area is might be considered one “at risk.” Cholera could occur in such an area if the bacteria were to be introduced and if the environmental conditions were appropriate. The risk of a cholera outbreak occurring is extremely unpredictable so that enhanced surveillance is needed to detect cholera’s spread if it were to occur.

As with other scenarios where cholera is a concern, the public health program should strengthen the diarrheal disease programs in general since the poor water and sanitation will almost certainly increase rates of “usual” non-cholera diarrhea and other enteric infections.

To monitor the cholera risk, surveillance should be established in sentinel locations where the risk is thought to be the highest. Specifically, the following questions should be addressed using the best available information.

1. Where are the areas where cholera is most likely to spread?
2. If cholera were to spread to this new area, are some of these areas which are more remote where cholera treatment would be difficult to provide?
3. What resources are available and will be needed if a cholera outbreak should occur?
4. What training will be needed to manage cholera patients?
5. Are there unusual climate events in the area of concern this year, such as floods or droughts?
6. Are there unusual movements of large numbers of people, e.g. refugees or displaced persons?
7. Has there been a sudden deterioration in the civil society (e.g. wars, civil unrest).
8. Have UN Peacekeepers been deployed in the area (UN Peacekeepers are an indicator of civil unrest.)?
9. Is the area near large bodies of water (rivers or lakes)?
10. Is the area well prepared to provide high quality care to patients with severe cholera, and is this treatment readily available to those with cholera considering factors of distance or time required to reach a treatment center?

Response to these questions.

Scenario 5 is one that definitely represents an area “at risk.” The conditions which are favoring cholera in the nearby region suggest that these same conditions may favor the spread of cholera to this new area. Thus, the area of scenario should be on high alert.
The following components of cholera preparedness will include the following.

- Establish or maintain good sentinel surveillance in areas thought to be at high risk, especially near the areas where cholera is occurring.
- Surveillance is especially important so that a new outbreak can be detected as early as possible. If cases are detected, some of these cases should be confirmed with bacteriological cultures and sensitivity testing so that the proper antibiotic can be provided.
- Water sanitation improvement focusing on point of use water treatment and use of improved water supplies in the areas nearest the ongoing cholera outbreak.

Regarding the use of Oral Cholera Vaccine

- Depending on the severity of the nearby cholera outbreak, vaccine is recommended and should be targeted to the population closest to the ongoing outbreak, especially those living along a river connecting the outbreak area and the area at risk.
- Factors that increase the probability of the outbreak spreading include a) a worsening of the water / sanitation situation, b) civil unrest, c) major change in the climate (e.g. drought or flood), d) sudden movement of large numbers of people, especially if there is no organized camp where improved water can be provided.
- Surveillance is especially important so that vaccine can be used very early in an outbreak.

Additional resources

Guidance on establishing an inexpensive surveillance system ______________________

Guidance on when and where to vaccinate__________________.

The calculator for estimating costs and benefits of using OCV ______________________ Note however: the calculator which is useful for Scenario 1 and 2 will not be appropriate for scenario 5 since the rates of cholera cannot be predicted.

For a manual on use of the dipstick method for detecting cholera from patient samples and water, see “Manual for Detecting V cholerae O1 from Fecal Samples and from Environmental Water Using a Dipstick Assay.”
Scenario 6. Cholera has not been recognized in the area, there has been no cholera reported in neighboring countries, but there is still concern about whether additional measures are needed to prevent cholera because water and sanitation are poor.

This scenario is common in most developing countries. Such an area is might be considered one “at risk” but without other changes in risk, the risk is thought to be low. Cholera could occur in such an area if the bacteria were to be introduced and if the environmental conditions were appropriate, but is not likely.

As with other scenarios where cholera might be a concern, the public health program should strengthen the diarrheal disease programs in general since the poor water and sanitation will almost certainly be associated with high rates of “usual” non-cholera diarrhea and other enteric infections.

To monitor the cholera risk surveillance should be established in sentinel locations where the risk is thought to be the highest. Specifically, the following questions should be addressed using the best available information.

1. Are there areas which are at especially at higher risk than other?
2. If cholera were to spread to this new area, are some of these areas which are more remote where cholera treatment would be difficult to provide?
3. What resources are available and will be needed if a cholera outbreak should occur?
4. What training will be needed to manage cholera patients?
5. Are there unusual climate events in the area of concern this year, such as floods or droughts?
6. Are there unusual movements of large numbers of people, e.g. refugees or displaced persons?
7. Has there been a sudden deterioration in the civil society (e.g. wars, civil unrest).
8. Have UN Peacekeepers been deployed in the area (UN Peacekeepers are an indicator of civil unrest.)?
9. Is the area near large bodies of water (rivers or lakes)?
10. Is the area well prepared to provide high quality care to patients with severe cholera, and is this treatment readily available to those with cholera considering factors of distance or time required to reach a treatment center?

Response to these questions.

Scenario 6 is one that represents an area “at low risk.” However, the health centers should be alerted to the risk of cholera which could occur in a new area so that this can be reported.
quickly should it occur. The following components of cholera preparedness will include the following.

- Establish or maintain good sentinel surveillance in areas thought to be at some increased risk.

- Water sanitation improvement focusing on point of use water treatment and use of improved water supplies in the vulnerable areas.

Regarding the use of Oral Cholera Vaccine

- Since the area is one of lower risk, vaccine need not be considered unless an unexpected outbreak should occur.

- Factors that increase the probability of the outbreak spreading include a) a worsening of the water / sanitation situation, b) civil unrest, c) major change in the climate (e.g. drought or flood), d) sudden movement of large numbers of people, especially if there is no organized camp where improved water can be provided.

- Surveillance for cholera is important so that vaccine can be used very early in an outbreak.

Additional resources

Guidance on establishing an inexpensive surveillance system _________________

Guidance on when and where to vaccinate__________________.

The calculator for estimating costs and benefits of using OCV ____________________ Note however: the calculator which is useful for Scenario 1 and 2 will not be appropriate for scenario 6 since the rates of cholera cannot be predicted.

For a manual on use of the dipstick method for detecting cholera from patient samples and water, see “Manual for Detecting V cholerae O1 from Fecal Samples and from Environmental Water Using a Dipstick Assay.”
Scenario 7. Cholera has not been recognized in the area and water and sanitation standards are high, but there is interest in the new vaccine for special groups, such as workers from cholera endemic countries.

This scenario is common in industrialized countries that recruit many laborers from cholera endemic countries. There is always a potential that a worker could be colonized with *V. cholerae* and introduce the bacteria. If this were to occur, the risk that this will result in an outbreak is extremely low since the good sanitation and safe water will prevent the spread of the organism. Thus, there is no risk of cholera's spread and there is no need to consider the use of vaccine.
Scenario 8. Cholera has not been recognized in the area, but there is interest in OCV for special groups, such as workers from cholera endemic countries because of fear that these workers may introduce cholera to a new area with poor water and sanitation.

This scenario describes the situation in which workers from cholera endemic area go to work in other developing countries where water and sanitation is poor. An example is the UN Peacekeepers, but other groups of workers also are common. Providing OCV to these groups will reduce, but not eliminate the risk that such a worker could introduce *V. cholerae* into a new geographic region. Unfortunately, no studies have been conducted which quantify the benefit of OCV for reducing the risk of international spread. A more effective intervention to prevent international spread would be a single dose of azithromycin immediately before travel. As with vaccination, there have been no controlled studies documenting the benefit of this approach either, but the clinical trials of azithromycin would indicate that this would eliminate *V. cholerae* colonization. A combination of OCV and azithromycin is also a reasonable, though untested, strategy. Since OCV is a killed vaccine, the azithromycin will not interfere with the vaccination.