OHHABS (Human Cases)—Public Health Assessment Considerations Tool

Table 1. One Health Harmful Algal Bloom System (OHHABS) definition of a human HAB-associated case

Definition	**Criteria**							
Human HAB-associated Case	**Exposure**[1]	**Signs/ symptoms**[2]	**Public health assessment**[3]	**Professional medical diagnosis**[4]	**Other causes of illness ruled out**[5]	**Observational or environmental data**[6]	**Laboratory- based HAB data**[7]	**Clinical data**[8]
1. Suspect	Required	Required	Required					
2. Probable	Required	Required	Required			Required to have 1		
3. Probable	Required	Required	Required	Required	+/-	+/-	+/-	
4. Confirmed	Required	Required	Required	Required to have 1		+/-	+/-	Required
5. Confirmed	Required	Required	Required	Required	Required		Required	

[1] Exposure (i.e. physical contact, inhalation, ingestion) to water, algae, seafood, or dietary supplements

[2] Self-reported signs/symptoms after exposure

[3] Public health assessment is defined as the action of compiling all data available and deciding that the illness in question is likely HAB-related

[4] Professional medical diagnosis being provided by a medical practitioner (e.g., doctor, nurse, physician assistant) based on his or her medical assessment of the patient's symptoms, medical history, exposure, etc.

[5] Other more likely causes of illness ruled out based on case data from the investigation (e.g., professional medical assessment, clinical testing, other health and exposure data)

[6] Observational (e.g., scum, algae, water color change, sheen, photographic evidence, satellite data) or environmental (e.g., pH, chlorophyll, nutrient levels) data from a water body to support the presence of an algal bloom

[7] Laboratory detection of cyanobacteria or other potentially toxin-producing algae, (e.g., microscopic confirmation or DNA analyses) or algal/cyanobacterial toxins (e.g., bioassay, HPLC) in a water body, finished drinking water supply, seafood or dietary supplements

[8] Laboratory documentation of cyanobacteria, other potentially toxin-producing algae, or algal/cyanobacterial toxins in a clinical specimen

Blue shaded cells: you must have at least one of the criteria described in the shaded cell.

+/-: indicates that the criterion is optional and while it strengthens the case, it does not change case classification (e.g., suspect to probable, probable to confirmed).

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Table 2: A public health assessment is defined as the action of compiling all data available and deciding that the illness in question is likely HAB-related. Public health assessment processes and standards may vary by jurisdiction. The following list of considerations, developed with state health department and federal agency input, is a resource that may be referenced by states and territories when formulating or conducting a public health assessment for a case of human illness. The results from this checklist may be summarized in Table 3 to support decision-making about case reporting and case classification. However, please note that this list many need to be adjusted to reflect the public health assessment needs of each state/territory.

Case Classification Criteria	State Considerations	Comments	Were state/territorial reporting standards met?
Exposure: Was the individual likely exposed to a HAB via physical contact, ingestion, or inhalation?	Was the exposure reported 1) directly from the patient, 2) from a proxy who observed the exposure, or 3) from a proxy who did not directly observe the exposure?		
	What was the route of exposure?		
	Did the exposure occur during a HAB advisory/warning?		
	Did the exposure occur in a location with a recorded elevated HAB cell or toxin level?		
	Were illnesses reported among persons with the same exposure from multiple households?		
	Where was the person recreating in or interacting with the water body in relation to the algal bloom (physical proximity to bloom/water)?		
	Did the person have a physical exposure to the algal bloom (or aerosols)?		
	What was the person's exposure activity?		
	Is it possible that the individual had an exposure to toxins that migrated to where the person was recreating?		
	If ingestion was the reported route of exposure, did the person ingest a substance that may have contained HAB cells or toxins?		
Signs/symptoms: Were the signs/symptoms that were reported associated with the exposure?	Were the signs/symptoms reported 1) directly from the patient, 2) from a proxy who observed the exposure, or 3) from a proxy who did not directly observe the exposure?		
	What were the signs/symptoms reported?		
	Were the signs/symptoms consistent with what is known about the type(s) of algae or toxin?		
	Were signs/symptoms consistent with the route of exposure (e.g., foodborne consumption)?		
	What was the timing of the signs/symptoms relative to the exposure?		
	Was the time to illness onset consistent with what is known about the type(s) of algae or toxin?		
	Was the time to illness onset consistent with the route of exposure of the algae/toxin?		

	Does the severity of the signs/symptoms seem consistent with the amount (e.g., time, number of visits) of exposure?		
	What was the duration of the signs/symptoms?		
	Was the duration of signs/symptoms consistent with what is known about the type(s) of algae or toxin?		
Professional medical diagnosis: Was the patient diagnosed with a HAB-associated illness by a medical practitioner (e.g., doctor, nurse, physician assistant) based on his or her assessment of the patient's symptoms, medical history, and exposure?	Has the individual been evaluated by a medical practitioner?		
	Did the individual receive one or multiple diagnoses from a medical practitioner? If yes, what were they?		
	Is the clinician knowledgeable/experienced with HAB-associated illnesses?		
	If not diagnosed as a HAB-associated illness, did the provider consider algal toxins when making their differential diagnosis?		
	Was the patient asked about potential algal bloom exposure during assessment?		
	Does the provider's diagnosis account for all signs and symptoms following exposure?		
Other causes of illness ruled out: Were other more likely causes of illness (e.g., infectious disease, other environmental cause, exacerbation of patient-reported preexisting condition) ruled out based on case data from the investigation (e.g., professional medical assessment, clinical testing, other health and exposure data)?	Were other more likely causes of illness considered? If yes, what were they?		
	Were other more likely causes of illness ruled out? If yes, how were they ruled out?		
	Were environmental samples tested to rule out other possible causes (e.g., poison ivy)?		
	Did other household members/close contacts without exposure become ill with the same symptoms (suggesting infectious etiology)?		
	Did the patient have any pre-existing medical conditions or disabilities that may present with similar signs/symptoms?		
	Did the patient receive any medications in the month before illness onset that may induce similar signs/symptoms?		
	If the patient visited a medical practitioner, was the patient diagnosed with a different condition by physical exam, clinical laboratory testing, imaging, or other diagnostic test?		
Observational data: Do observational data support the presence of a HAB?	Were observational data documented? If yes, what type(s) of observational data were documented?		
	Was there a HAB-related advisory associated with the implicated water body in question (e.g., recreational water use, drinking water use, food harvesting)?		
	What was the location of the observation(s) relative to where the case was exposed?		
	Were data collected multiple times? If yes, what was the consistency/comparability of the results?		
	What was the timing of the observation(s) relative to when the case was exposed?		

	Did water appearance (e.g., scum, algae, water color change, sheen) support the presence of a HAB?		
	In the absence of a bloom, did observational evidence indicate the presence of benthic algae (e.g., algae on the rocks or on the bottom sediments of the water body)?		
	Were water conditions impacted by rainfall events, runoff, flooding, storms, high winds, or other natural events before the data were collected?		
	Who documented the observational data?		
	Did photographic evidence suggest the presence of cyanobacteria and not something else, such as duckweed, pollen, or filamentous green algae?		
Environmental data: Do environmental data support the presence of a HAB?	Were environmental data documented?		
	How were the environmental data collected?		
	What type(s) of environmental data were documented?		
	Were the environmental data collected as part of routine monitoring or in response to a HAB event?		
	What was the timing of the environmental data collection relative to when the case was exposed?		
	Were data collected multiple times? If yes, what was the consistency/comparability of the environmental data collected?		
	What was the location of the environmental data collection relative to where the case was exposed?		
	Were water conditions impacted by rainfall events, runoff, flooding, storms, high winds, or other natural events before the data were collected?		
	Who documented the environmental data?		
	Were environmental data such as chlorophyll levels, Secchi depth, and trophic index supportive of a bloom?		
	In the absence of a bloom, did environmental evidence indicate the presence of benthic algae (e.g., algae on the rocks or on the bottom sediments of waterbody)?		
	Do historical water quality data indicate that the water body is susceptible to HABs?		
Laboratory-based HAB data: Were cyanobacteria or other potentially toxin-producing algae, (e.g., microscopic confirmation or DNA analyses) or algal/cyanobacterial toxins (e.g., bioassay, HPLC) detected in a water body, finished drinking	Did sampling and testing occur?		
	What type of sample(s) was collected (e.g., water body, seafood, or dietary supplement)?		
	Were water conditions impacted by rainfall events, storms, high winds, or other natural events before the sample was collected?		
	What was the timing of the sample collection relative to when the case was exposed?		
	What was the location of sample collection relative to where the person was exposed?		

water supply, seafood or dietary supplements?	Was the sample collected according to protocol? Was the person who collected the sample familiar with the protocol?		
	Was the sample handled properly (e.g., was the cold chain preserved)?		
	What was the condition of the sample?		
	What algae or toxins were the samples tested for?		
	How were the samples analyzed?		
	What was the timing of sample testing relative to when the patient was exposed and the sample was collected?		
	What species was detected? Is it known to produce toxins or otherwise be able to cause symptoms in humans?		
	What was the detected cell or toxin concentration?		
	Do detected levels support the presence of a HAB at time of exposure?		
	Are measured cell concentrations, toxin concentrations, and species detected capable/sufficient to cause disease (observed symptoms) in this person?		
	Were there environmental factors that would affect sample result interpretation (e.g., presence of benthic cyanobacterial mats)?		
Clinical data: Was there laboratory detection/identification of cyanobacteria, other potentially toxin-producing algae, or algal/cyanobacterial toxins in a clinical specimen (e.g., urine, blood)?	Was a clinical specimen tested? If yes, what was it tested for?		
	Did the test identify the presence of cyanobacteria, other potentially toxin-producing algae, and/or cyanotoxins in blood, stomach content, or other source?		
	Is the type of algae (if identified) known to produce toxins?		
	Is the species or toxin (if identified) known to cause illness in humans?		
	Was the clinical specimen tested of appropriate quality and condition for the test (right type of specimen, right form of specimen, right preservation media, right temperature, right specimen age, etc.)?		
	How long after exposure was the clinical specimen collected? If results were negative, did specimen collection timing potentially influence the results?		
	Were any antidotes or medical treatments administered that may have interfered with results?		
	Was the test used to diagnose the poisoning validated or approved for this use?		
	Was the test performed at a laboratory with experience running this type of test?		
	Did clinical laboratory testing results support toxic effects of cyanotoxins (e.g., abnormal liver function test after exposure to microcystin)?		

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Table 3: This table may be used to summarize the findings from a public health assessment and evaluate whether or not to report a case of illness in OHHABS. This table may also serve as a reference when classifying a HAB-associated illness as suspect, probable, or confirmed.

Criteria Consideration	Criteria							
	Exposure	**Signs/ symptoms**	**Professional medical diagnosis**	**Other causes of illness ruled out**	**Observational data**	**Environmental data**	**Laboratory-based HAB data**	**Clinical data**
Was the individual likely exposed to a HAB via physical contact, ingestion, or inhalation?								
Were the signs/symptoms that were reported associated with the exposure?								
Was the patient diagnosed with a HAB-associated illness by a medical practitioner (e.g., doctor, nurse, physician assistant) based on his or her assessment of the patient's symptoms, medical history, and exposure?								
Were other more likely causes of illness (e.g., infectious disease, other environmental cause, exacerbation of patient-reported preexisting condition) ruled out based on case data from the investigation (e.g., professional medical assessment, clinical testing, other health and exposure data)?								
Do observational data support the presence of a HAB?								
Do environmental data support the presence of a HAB?								
Were cyanobacteria or other potentially toxin-producing algae, (e.g., microscopic confirmation or DNA analyses) or algal/cyanobacterial toxins (e.g., bioassay, HPLC) detected in a water body, finished drinking water supply, seafood or dietary supplements?								
Was there laboratory detection/identification of cyanobacteria, other potentially toxin-producing algae, or algal/cyanobacterial toxins in a clinical specimen (e.g., urine, blood)?								