

# Inhalational Anthrax Due to Bioterrorism: Would Current Centers for Disease Control and Prevention Guidelines Have Identified the 11 Patients with Inhalational Anthrax from October through November 2001?

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**A panel of 10 physicians used the nominal group technique to assess the ability of the Centers for Disease Control and Prevention (CDC) interim guidelines for clinical evaluation of persons with possible inhalational anthrax (IA) to retrospectively identify the 11 patients with IA seen during the October 2001 bioterrorism outbreak. The guidelines would not have identified 10 of 11 of these patients, primarily because the guidelines were designed to address only those patients with a known history of exposure or clearly identified environmental or occupational risk. The panel suggested revisions to the guidelines, primarily consisting of broadening the criteria for evaluation to include either known exposure or environmental occupational risk, or to include clinical symptoms consistent with IA. These extensions of the guidelines retrospectively identified 8 of 11 of the patients with IA from October 2001.**

During October and November 2001, 11 patients with bioterrorism-related inhalational anthrax (IA) were identified and treated in the United States. The clinical course of these patients has been described in previous publications [1–8]. After evaluation of the first 10 of these cases, the Centers for Disease Control and Prevention (CDC; Atlanta, GA) issued interim guidelines for clinical evaluation of persons with possible IA [9], which have not been updated. These guidelines focused on “the evaluation of persons with a history of exposure to *Bacillus anthracis* spores or who have an occupational/environmental risk for anthrax exposure” [10, p. 984]. In an effort to address these issues, we convened a panel of physicians who used the nominal group methodology [11] to compare the CDC guidelines with the epidemiological, clinical, laboratory, and

radiologic findings of the 11 patients with bioterrorism-related IA during their first visit to a physician. In addition to determining the ability of the guidelines to identify such patients, the panel was asked to consider modifications to these guidelines that might improve the ability to identify and treat patients with possible IA.

Experience with this outbreak raises questions in 3 key areas: (1) public health recommendations and guidelines for evaluation and treatment of patients with possible IA, (2) application of clinical insight and judgment by the treating physician faced with patients who may or may not have the disease, and (3) communication between treating physicians and public health agencies regarding the evolving clinical manifestations of the outbreak.

## MATERIALS AND METHODS

By use of the nominal group technique, an expert panel of physicians (6 emergency physicians, 2 infectious diseases specialists, 2 epidemiologists, 1 internist, and 1 radiologist) who

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were involved in the evaluation and treatment of patients with IA in the fall of 2001 was convened to compare current CDC guidelines for clinical evaluation of persons with possible anthrax exposure (figure 1) to the epidemiological, clinical, laboratory, and radiologic findings of the 11 patients with IA who were affected by this outbreak. Because the study was designed to assess the ability of the CDC interim guidelines to identify patients for diagnostic evaluation and treatment, presenting signs, symptoms, and epidemiological data from the patients' first presentation to a health care provider were assessed. Clinical symptoms or signs were considered to be present if they were identified at any stage during the initial clinical visit, with the exception of tachycardia. Tachycardia (heart rate,  $\geq 100$  beats/min) was considered to be present only if it was persistent during the initial visit (after correction of fluid deficits), as confirmed by  $\geq 2$  electronic determinations.

The interim CDC guidelines do not explicitly define occupational exposure. For the purposes of this study, occupational exposure was considered to be present if, at the time of the initial clinical encounter, the patient was known to work in a facility exposed to *B. anthracis*. For example, occupation as a postal worker was not considered occupational exposure per se. However, postal workers at the Brentwood Post Office in the District of Columbia were considered to have occupational exposure after confirmation of the index case from that facility by clinical means on 19 October 2001 and PCR testing at the CDC on 21 October 2001.

Eighty percent agreement among the review panelists was required both to determine whether each patient either would or would not have been identified by the CDC guidelines and in suggesting revisions to the CDC guidelines. The modified guidelines were then reassessed with regard to retrospectively identifying and treating these patients, on the basis of their initial clinical presentation and epidemiological data. Nominal data were analyzed by Fisher's exact test.  $\alpha$  Was set at 0.05. Descriptive statistics and ORs were also calculated. Data were analyzed by SPSS, version 4.0 (SPSS).

## RESULTS

**Epidemiological data.** The timeline of events for the Brentwood (Washington, D.C.) postal workers is provided in figure 2. Patient 3 was the first identified patient from Brentwood with IA, the diagnosis of which was made on a clinical basis on 19 October 2001. On 20 October, patient 4, who was also a Brentwood postal worker, presented to the same emergency department as patient 3, where a clinical diagnosis of IA was also made. An internal communication network within the emergency department and the hospital had alerted staff of the clinical diagnosis of IA in patient 3. In addition, on the morning of 21 October 2001, a telephone conference was held with area

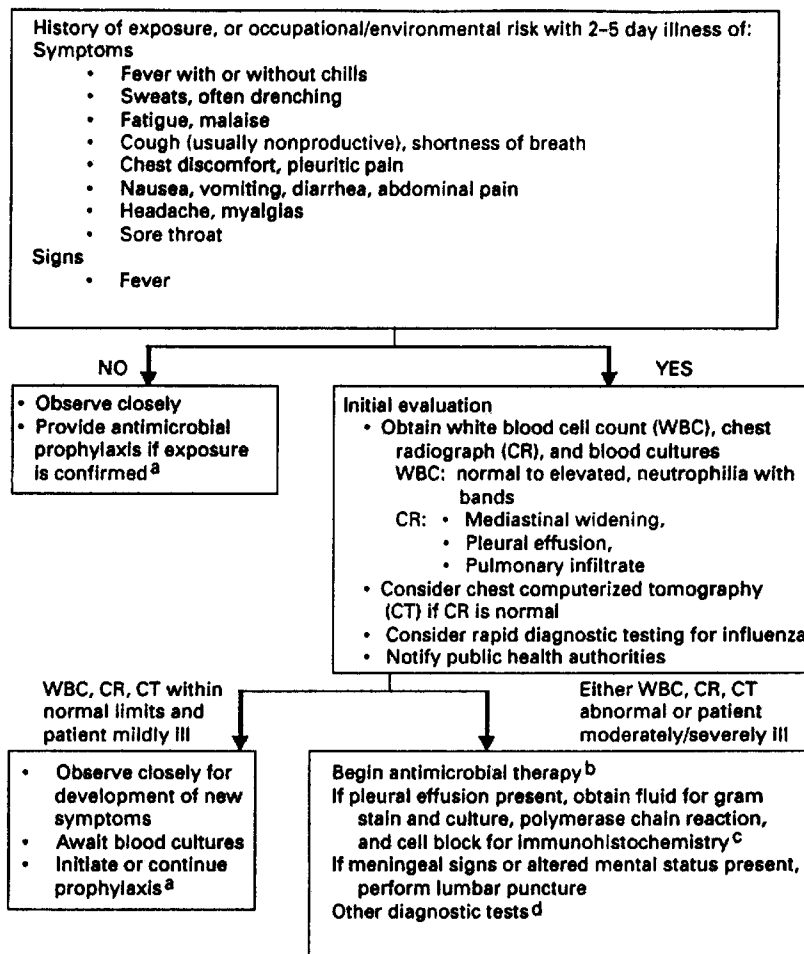
emergency departments to inform them of the clinical findings, laboratory study results, and chest radiograph and CT findings for patients 3 and 4. *B. anthracis* infection was confirmed in patient 3 by PCR testing at the CDC on 21 October, after which a press conference with national news coverage was held to announce confirmation of the diagnosis. Patients 5 and 6 presented to different emergency departments at 6:00 A.M. and 2:00 A.M., respectively, on 21 October 2001—before laboratory confirmation by PCR testing for patients 3 and 4. Thus, only 1 patient (patient 4) was known at the time of initial clinical presentation to have had a documented history of occupational risk and therefore had been identified by CDC interim guidelines on the basis of such risk.

**Clinical signs and symptoms.** Table 1 summarizes the clinical symptoms observed in these patients at the time of their initial health care presentation. Each of the following symptoms occurred in more than one-half of the patients: fever (11 of 11 patients), fatigue (10 of 11 patients), cough (8 of 11 patients), myalgias (8 of 11 patients), nausea or vomiting (7 of 11 patients), dyspnea (6 of 11 patients), sweats (usually drenching in nature; 6 of 11 patients), and ill-defined chest pain or discomfort (6 of 11 patients). The mean number of symptoms was 7.0. Among patients who lived, the mean number of symptoms was 8.5, compared with 5.5 in those who died. The mean number of days from onset of symptoms to receipt of treatment with antibiotics known to have activity against *B. anthracis* was 5.1 days. Among patients who lived, the interval from symptom onset to receipt of treatment was 4.7 days, compared with 5.8 days for those who died.

Seven of 11 patients had fever (temperature,  $>37.8^{\circ}\text{C}$ ), but the mean presenting temperature was  $38.0^{\circ}\text{C}$ . Only 3 patients had presenting temperatures of  $>38.5^{\circ}\text{C}$ ; all of these patients died. All but 1 patient had persistent tachycardia (heart rate,  $>100$  beats/min), with a mean resting heart rate of 116 beats/min (range, 79–152 beats/min). The mean recorded respiratory rate was 19 breaths/min; however, only 5 patients had respiratory rates of  $\geq 20$  breaths/min, and 3 of 5 patients who died had initial recorded respiratory rates of 14 breaths/min.

**Outcome.** Six (55%) of 11 patients survived. Among patients who presented before they had clinical findings suggestive of the advanced stage of the disease (fever [temperature,  $>38.5^{\circ}\text{C}$ ], findings of meningitis, profound respiratory distress, and hypotension), 5 (71%) of 7 patients survived. In contrast, all 4 patients who presented in the advanced stage of the disease died.

**Comparison of interim CDC guidelines and revised guidelines for patients with IA.** Although 80% consensus was required in this nominal group technique, in fact, there was 100% agreement of the panel in both the evaluation of the CDC interim guidelines as well as the revised guidelines. Of the 11 patients with IA, only 1 (patient 4, a Brentwood postal



**Figure 1.** Clinical evaluation of persons with possible inhalational anthrax. <sup>a</sup>From [12]. <sup>b</sup>From [13]. <sup>c</sup>Available through the Centers for Disease Control and Prevention (CDC) or LRN; cell block obtained by centrifugation of pleural fluid. <sup>d</sup>Serologic testing available at the CDC may be an additional diagnostic technique.

worker) would have been identified for screening and treatment under current CDC guidelines (table 2 and figure 1). This patient would have been identified by the CDC guidelines on the basis of occupational risk because he was a Brentwood postal worker who presented to the same emergency department as patient 3 a single day after the Brentwood postal facility had been identified as an occupational risk location. Patients 5 and 6 were also Brentwood postal workers, but both presented before confirmation by PCR testing of IA in patients 3 and 4. In addition, both patients 5 and 6 initially presented before widespread media coverage of such confirmation and widespread identification of the Brentwood postal facility as an at-risk location. Thus, the lack of known history of exposure or occupational/environmental risk was the reason that 10 of 11 patients were not identified by the CDC interim guidelines, despite the fact that 8 of these 10 patients presented with clinical findings consistent with IA ( $\geq 5$  symptoms plus fever and tachycardia).

In evaluating the epidemiological, clinical, laboratory, and radiologic data on these 11 patients by using the suggested revisions to current interim CDC guidelines (history of exposure or occupational/environmental risk *or*  $\geq 5$  symptoms of IA plus the presence of fever or persistent tachycardia [heart rate,  $\geq 100$  beats/min]), 8 of 11 patients were identified, indicating substantially improved prediction rates (OR, 26.7; 95% CI, 2.3–308.2;  $P < .01$ ).

## DISCUSSION

This retrospective study of 11 patients with bioterrorism-related IA indicates that only 1 of 11 patients would have been evaluated and treated under interim CDC guidelines. The CDC interim guidelines (figure 1) recommend evaluation for patients with “history of exposure, or occupational/environmental risk *with* two to five day illness” (emphasis added) [9, p. 946] involving 8 symptoms and 1 clinical sign (fever). Perhaps because

Date, month/day

	10/15	10/16	10/17	10/18	10/19	10/20	10/21	10/22
<b>General information</b>	Letter delivered to Hart Senate Office Building	Contents confirmed as <i>B. anthracis</i> spores		CDC Health Alert indicates area of exposure limited to Hart Senate Bldg., 5 <sup>th</sup> -6 <sup>th</sup> floors SE wing from 0900-1900			Press conference announces inhalational anthrax (Patient 3)  12:00-Network news coverage begins	First <i>Washington Post</i> story of confirmed IA
<b>Patient information</b> <b>Patient 3 (lived)</b>		First symptoms (fever, chills, dyspnea, malaise)			Presents to ED clinical diagnosis of IA made, antibiotics		<i>B. anthracis</i> confirmed by PCR testing at CDC	
<b>Patient 4 (lived)</b>			First symptoms (headache, nausea, chills, sweats)			Presents to ED—clinical diagnosis of IA made, antibiotics given	<i>B. anthracis</i> confirmed by PCR testing at CDC	
<b>Patient 5 (died)</b>			First symptoms (myalgias, weakness, fever)				6:00 A.M.—presents to ED (dyspnea, myalgias, chest pain, fever); antibiotics started. 3:00 P.M.—Hypotension, cardiac arrest, death	
<b>Patient 6 (died)</b>		First symptoms (nausea, abdominal pain, “flu-like” symptoms)				Syncopal episode	2:00 A.M.—ED visit (nausea, abdominal pain, profuse sweating) 5:00 A.M.—Discharged from ED following IV fluids, promethazine, famotidine	4:45 A.M.—ED by ambulance (nausea, vomiting, light headedness); antibiotics begun; 12:00—Cardiac arrest; death

**Figure 2.** Timeline of events involving Brentwood postal workers with inhalational anthrax (IA). Reproduced from [9]. *B. anthracis*, *Bacillus anthracis*; CDC, Centers for Disease Control and Prevention; ED, emergency department.

**Table 1. Summary of symptoms in 11 patients with inhalational anthrax.**

Symptom	Patient											No. of patients with symptom
	1	2	3	4	5	6	7	8	9	10	11	
Fever/chills	+	+	+	+	+	+	+	+	+	+	+	11
Fatigue	+	+	+	+	-	+	+	+	+	+	+	10
Cough	-	+	+	+	-	-	+	+	+	+	+	8
Dyspnea	-	+	+	+	-	-	-	+	+	+	-	6
Nausea/vomiting	+	-	+	+	-	+	+	+	+	-	-	7
Myalgias	-	-	-	+	+	+	+	+	+	+	+	8
Sweats	+	+	+	+	-	+	+	-	-	-	-	6
Chest discomfort	-	-	+	+	-	-	+	+	+	+	-	6
Headache	-	-	+	+	-	-	+	+	+	-	-	5
Abdominal pain	-	+	-	-	-	+	+	-	-	-	-	3
Confusion	+	-	-	-	-	-	-	-	+	-	-	2
Sore throat	-	-	+	+	-	-	-	-	-	-	-	2
Rhinorrhea	-	+	-	-	-	-	-	-	-	-	-	1
Syncope	-	-	-	-	-	+	-	-	-	-	-	1
No. of symptoms	5	7	9	10	2	7	9	8	9	6	4	— <sup>a</sup>
Outcome	D	L	L	L	D	D	L	L	L	D	D	—

**NOTE.** D, died; L, lived; +, present; -, absent.

<sup>a</sup> Mean no. of symptoms, 7.0.

the guidelines were directed specifically at patients with known exposure or identified occupational/environmental risks, they require both epidemiological risk factors and a clinical presentation consistent with IA, a requirement that is the primary reason for the inability of the current guidelines to clearly identify patients in this outbreak for screening and treatment. A second reason is the failure to include persistent tachycardia as a clinical sign of the disease. The third reason is the guidelines' recommendation that clinical signs and/or epidemiological confirmation of exposure be present before antimicrobial treatment is administered to such patients. Each aspect deserves careful consideration.

**Reliance on epidemiological plus clinical factors.** The current CDC guidelines require a known "history of exposure or occupational/environmental risk with a two to five day illness" consistent with IA [9, p. 946]. This approach might be effective in a bioterrorism incident in which the at-risk population is more clearly identified. In contexts in which the risk factors for exposure are less certain, the CDC guidelines appear to be less useful. All 10 patients whom the CDC guidelines failed to identify for screening and treatment lacked a clearly known exposure or known occupational/environmental risk *at the time of their initial clinical presentation*. Clearly, the epidemiological factors suggesting an exposure to a bioterrorism agent evolve over the course of an investigation. In the Washington, D.C., anthrax bioterrorism attack of 2001, for example, at the time that the initial clinical diagnoses of IA were made for patients

3 and 4 (19 and 20 October 2001, respectively), epidemiological investigations to that point had limited the area of known exposure to people who had been on the fifth and sixth floors of the southeast wing of the Hart Senate Office Building on 15 October 2001 from 9 A.M. to 7 P.M. [14].

Only after the clinical diagnosis of IA was made in patient 3 on 19 October 2001 was it known that the Brentwood Postal Facility constituted an additional at-risk location and that others outside the Senate Office Building had been exposed. Patient 4 (a second Brentwood postal worker who presented on 20 October 2001) would have been identified by the current CDC guidelines. It is important to note that patients 3 and 4 presented to the same health care facility, where a clinical diagnosis of IA was made and treatment was instituted. Although confirmation of *B. anthracis* infection by PCR testing occurred on 21 October 2001, an internal communication network established within the hospital and its emergency department had communicated the clinical diagnosis and laboratory and imaging findings of IA in patient 3 (figure 2). Two additional Brentwood workers (patients 5 and 6) first presented at other health care facilities on 21 October 2001 but before the announcement that IA had been confirmed by PCR testing, because widespread media coverage of the confirmation of IA came via television and print coverage on the afternoon of 21 October 2001 and the morning of 22 October 2001, respectively [15, 16].

Several days later, an additional postal worker whose work-

**Table 2. Identification of patients with bioterrorism-related inhalational anthrax by interim Centers for Disease Control and Prevention (CDC) guidelines and by revised guidelines.**

Patient	Date of first health care visit	Identified by current CDC guidelines <sup>a</sup>	Reason	Identified by revised guidelines	Outcome
1	2 Oct 2001	No	No known exposure or known risk; <i>Bacillus anthracis</i> discovered by CSF culture	Yes	Died
2	1 Oct 2001	No	No known exposure or known risk; <i>B. anthracis</i> identified on nasal swab and pleural fluid culture and by bronchial biopsy	Yes	Lived
3	19 Oct 2001	No	No known exposure or occupational risk; first identified Brentwood postal worker	Yes	Lived
4	20 Oct 2001	Yes	Second Brentwood postal worker; occupational risk	Yes	Lived
5	17 Oct 2001	No	Brentwood postal worker; not treated with antibiotics at initial visit	No	Died
6	21 Oct 2001	No	Brentwood postal worker; not treated with antibiotics at initial visit	Yes	Died
7	24 Oct 2001	No	US State Department mail facility; receiving mail from Brentwood; treated with ciprofloxacin at first visit	Yes	Lived
8	19 Oct 2001	No	Second Hamilton, NJ, postal worker; treated with levofloxacin at first visit	Yes	Lived
9	16 Oct 2001	No	First Hamilton, NJ, postal worker; treated with levofloxacin at first visit	Yes	Lived
10	28 Oct 2001	No	No known exposure; hospital supply room worker	No	Died
11	16 Nov 2001	No	94-Year-old patient in Connecticut; possible cross-contamination of mail	No	Died

<sup>a</sup> From [9].

place received mail from Brentwood became ill and was later confirmed to have IA (patient 7). On 17 October 2001, a Brentwood postal worker (patient 5) presented to his primary care physician with symptoms of fever and myalgias, a temperature of 38.9°C, and a pulse rate of 79 beats/min. This case would not have been identified at the initial clinical visit either by epidemiological factors (because Brentwood was not known to have been exposed to *B. anthracis* on 17 October 2001) or by clinical findings, and, therefore, it would not have been identified by either the CDC interim guidelines or the proposed revised guidelines we have suggested.

Therefore, the absence of specific, confirmed epidemiological evidence of exposure should not, in and of itself, exclude consideration of IA if, in the context of a possible bioterrorist attack, the clinical presentation, laboratory findings, and radiographic studies raise significant clinical suspicion of the disease. Indeed, these data indicate that patients with  $\geq 5$  clinical symptoms of IA and signs of fever and persistent tachycardia should be evaluated and treated if there is reasonable suspicion on the part of the clinician that there is or may have been exposure to an agent of bioterrorism, rather than waiting for definite confirmation of epidemiological risk.

**Tachycardia as a clinical sign.** The only clinical sign included in the current CDC guidelines is fever [9]. Seven of 11 patients had fever, but the mean presenting temperature was

only 38.0°C, and all 3 patients who had temperatures of  $>38.5^\circ\text{C}$  died. The clinical presentation of patients in the first phase of the disease more often included low-grade fever, as opposed to higher temperatures in the patients who presented in the advanced phase of the disease, all of whom died. Although previous reports and commentary [2, 17, 18] have noted the importance of tachycardia out of proportion to the clinical symptoms in these patients, tachycardia is not currently listed as a presenting sign in the CDC guidelines. All but one patient in this series had persistent tachycardia, with a mean presenting heart rate of 116 beats/min.

**Reliance on clinical observation before confirmation of exposure.** The CDC interim guidelines indicate that patients who do not have both a documented history of exposure or occupational/environmental risk and a 2–5 day illness consistent with IA should be “observed closely” and should be “provided antimicrobial prophylaxis if exposure is confirmed” [9, p. 946]. Among survivors in this small case series of IA, the mean interval from onset of symptoms to receipt of treatment with antibiotics known to be effective against *B. anthracis* was 4.7 days. Among those who died, the mean interval between onset of symptoms and receipt of appropriate antibiotic treatment was 5.8 days. This suggests that the window of opportunity for treating IA in symptomatic patients is narrow—perhaps as short as 24 h. Four patients who were not recognized

to have IA upon first presentation to health care facilities were subsequently determined to have the disease. Two patients (patients 5 and 6) were not treated with antibiotics and later died. Both patients had presented to health care facilities in the second, fulminant stage of the disease and were then treated with antibiotics known to have activity against *B. anthracis*. Neither of these patients would have been identified by current CDC guidelines, and one (patient 5) would not have been identified by the revised guidelines. The 2 patients who were originally discharged from the hospital but survived (patients 7 and 8) had been given ciprofloxacin or levofloxacin therapy and had blood samples obtained for culture at the time of the first visit; however, neither patient would have been identified by the CDC guidelines for screening. Patient 7 was called back to the emergency department 17 h after being first seen when culture of a blood sample that had been obtained before antibiotic administration grew *B. anthracis*. He had only taken a single dose of ciprofloxacin. Patient 8 was provided oral levofloxacin upon initial discharge and survived, although a definitive diagnosis by blood culture and initiation of intravenously administered antibiotic therapy did not occur until 2 days later.

Although this is a small case series, the fact that 2 patients who received oral antibiotic therapy soon after onset of symptoms survived and 2 patients for whom antibiotic therapy was relatively delayed died suggests that interruption of the progression of the disease by appropriate antibiotic therapy at an early stage may be essential for successful treatment. All patients who presented with the advanced stage of the disease died despite receipt of aggressive therapy. Thus, this episode of bioterrorism-related IA suggests that a survival rate of 55% is attainable only when early identification of such patients is followed by aggressive and rapid treatment with antibiotics known to have activity against *B. anthracis*.

**Suggested revisions to IA guidelines.** On the basis of this review, the panel suggested revisions to the CDC interim guidelines (figure 3). Because of the inherent limitations in accurately and rapidly ascertaining those at risk for exposure to *B. anthracis* spores within the setting of bioterrorism (as illustrated by the outbreak of infection in Washington, D.C.), either epidemiological factors or a clinical presentation consistent with IA should provoke careful consideration of a clinical diagnosis of *B. anthracis* infection by appropriate laboratory and radiologic investigation of the disease, consisting, at a minimum, of blood cultures, chest radiography, and, when indicated, chest CT. Gram staining of the buffy coat and analysis of pleural effusions after thoracentesis may also be helpful. On the basis of review of these patients, a clinical presentation consistent with IA was defined by the panel as  $\geq 5$  symptoms of the disease (fever/chills, fatigue, cough, dyspnea, nausea/vomiting, sweats, myalgias, chest discomfort, headache, abdominal pain, or confusion) plus clinical signs of fever and persistent tachycardia

(heart rate,  $\geq 100$  beats/min). In such cases, clinicians should consider whether the patient may have had a history of exposure to *B. anthracis*, including occupational and/or environmental risk. In addition to evaluating such patients, clinicians should alert appropriate public health authorities to their clinical suspicion of IA, so that appropriate epidemiological and public health investigations can be pursued.

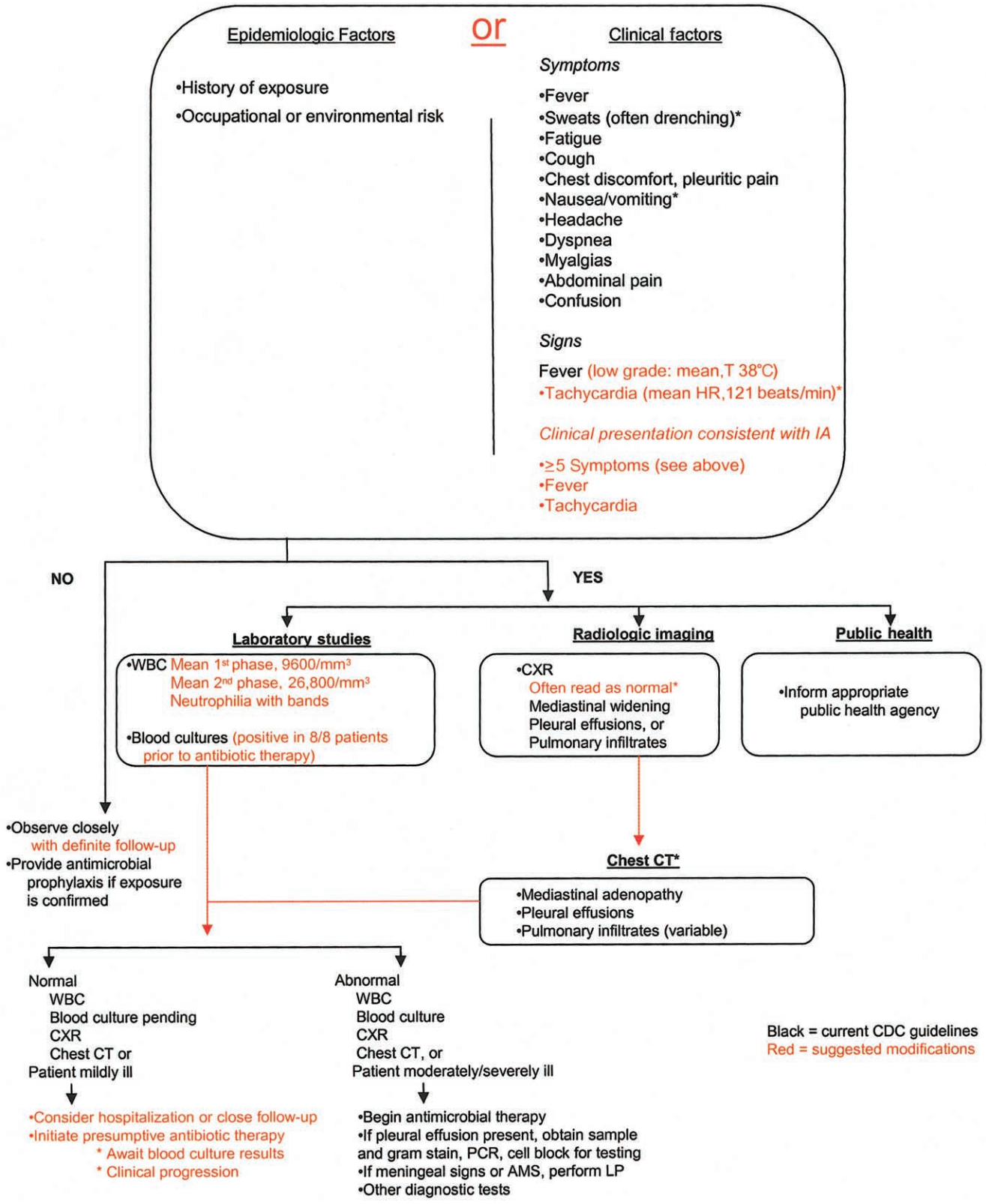
Our analysis indicates that patients with either epidemiological exposure or clinical signs and symptoms of the disease should receive treatment for IA with appropriate antibiotics until blood culture results are negative and the patients' subsequent clinical course can be determined. However, we are *not* suggesting that patients with this constellation of clinical signs and symptoms be treated unless there is reasonable suspicion on the part of the treating physician that bioterrorism or other exposure to *B. anthracis* may have occurred.

One potential limitation of the proposed revised guidelines is the difficulty in differentiating patients with IA from those with influenza-like illnesses [10]. There is significant overlap of symptoms between the 2 entities, and patients with IA typically did not appear to be acutely ill during the initial phase of the disease. The seasonal and highly communicable nature of influenza-like illnesses is well known but is of no particular help in distinguishing individual patients. As noted by the CDC, rapid assays for influenza lack sufficient sensitivity (range, 45%–90%) and specificity (range, 60%–95%) to be of clinical usefulness in such settings [10].

The proposed guideline revisions would likely result in some patients who do not have IA being evaluated and treated until their blood culture results are known. How many patients would be treated, what complications they might face (including adverse reactions to antibiotics), and the potential cost of such screening and treatment are currently unknown. We are currently analyzing all patients presenting to the emergency department of a hospital that was one of the primary Washington, D.C.–area treatment facilities during the fall 2001 attack to determine how many patients would have been evaluated and treated under the suggested guideline revisions.

On the basis of these findings, we recommend that patients who have a clinical presentation consistent with IA presenting in a setting of known or suspected bioterrorism exposure receive antibiotic therapy, pending the findings of blood cultures, chest radiographs, and, when indicated, chest CTs. In all such cases, the treating clinician should consider the possibility of exposure to *B. anthracis* and obtain an appropriate occupational/environmental history. Close clinical follow-up for evidence of progression of the disease should also be arranged, and appropriate public health agencies should be informed regarding any patients for whom a clinical diagnosis of IA has been made or is suspected.

Clinicians faced with suspicion of IA in individual patients



**Figure 3.** Revisions to the Centers of Disease Control and Prevention interim guidelines. AMS, altered mental status; CXR, chest radiograph; HR, heart rate; IA, inhalational anthrax; LP, lumbar puncture; T, temperature. \*Feature not previously known to be associated with IA. Adapted and expanded from [9].

during such bioterrorist attacks may need to apply different thresholds for treatment than those recommended by public health guidelines, because understanding of the epidemiological risk factors associated with *B. anthracis* exposure necessarily evolves over time. The 2001 attack demonstrated the importance of rapid communication between front-line practitioners and public health agencies regarding this evolving understanding of the clinical presentation, risk factors for exposure, and appropriate treatment of IA. Improving communication systems between emergency department physicians, primary care physicians, infectious diseases specialists, and public health agencies should be a priority in future outbreaks of infection [19]. Because bioterrorism now looms as a distinct reality in our society, the intersection between public health guidelines and the application of clinical judgment regarding treatment decisions of potential victims of bioterrorism deserves continued consideration, study, and dedication of resources.

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