

Anthrax and Pregnant and Postpartum Women: Guidance for Public Health Communication and Training

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Abstract

In 2012, the Centers for Disease Control and Prevention (CDC) convened a national meeting where medical and public health experts evaluated existing data, identified knowledge gaps, and provided expert opinion to support the creation of evidence-based CDC guidance for clinicians on managing anthrax exposure and providing treatment to pregnant and postpartum women. Following development of this guidance, we developed recommendations pertaining to communication about anthrax exposure and treatment for lay and professional audiences and training for health professionals. These recommendations can guide future planning of communication and training activities for partners who would be involved in the care of pregnant and postpartum women exposed to anthrax.

Anthrax and Pregnant and Postpartum Women: Guidance for Public Health Communication and Training

Since anthrax-tainted letters were used as a weapon in 2001, the United States (U.S.) public health system has strengthened its preparedness activities in anticipation of another anthrax attack.^{1,2} If large amounts of anthrax were released, everyone in the affected area would need to receive post-exposure prophylaxis (PEP), and some would require treatment of clinical anthrax disease. Pregnant and postpartum women (including breastfeeding women) comprise a population of special concern due to issues such as the relative lack of data about proper medication dosages, safety of recommended treatments, and benefit or risk of medications and/or treatments to the infant. Moreover, a recent review of worldwide cases revealed that anthrax infection in pregnant and postpartum women is associated with high rates of maternal and fetal death.³

In 2012, the Centers for Disease Control and Prevention (CDC) convened a national meeting where medical and public health experts evaluated existing data, identified knowledge gaps, and provided expert opinion to inform CDC's development of evidence-based guidance for clinicians and public health practitioners on managing anthrax exposure and providing treatment to pregnant and postpartum women. The resulting guidance for clinicians on PEP (which may include use of antibiotics and the anthrax vaccine), treatment of clinical anthrax (including use of anthrax antitoxin), and health care planning is reported elsewhere.⁴ In this paper we present recommendations for communicating the above anthrax prophylaxis and treatment guidance to pregnant and postpartum women and their health care providers, including recommendations for future research and training health care providers. In consultation with national experts at the 2012 meeting, CDC authors of this manuscript developed these recommendations. None of the authors (CDC and non-CDC) have any conflicts of interest to disclose related to this manuscript.

The public health system provides timely and appropriate communication and training to primary care providers about real or potential threats to the public's health.^{5,6} These vital functions promote community preparedness, rapid engagement in response activities, and protection of the health of affected populations. Behavioral models, such as the Transtheoretical Model and Social Cognitive Theory, have been used to guide communication and behavior change during preparedness and crisis.⁷ To highlight the communication and training roles of essential partners during an anthrax emergency, we created a communication and training ecological model which acknowledges that human behavior can be affected by personal factors, organizations, environments, and policy.⁸⁻¹⁰ This model also assumes interactions exist among these levels, requiring partner collaboration and coordination of communication and training activities to enhance public health benefits.

ECOLOGICAL MODEL

We adapted an ecological model of disaster management¹¹ and identified what roles CDC, national partners, state, tribal, and local public health agencies, health care providers, local communities, and pregnant and postpartum women would assume during an organized public health response to an anthrax event (Figure 1). To our knowledge, this is the first adaptation of the ecological model to the specific circumstance of an anthrax attack as it would affect pregnant and postpartum women. In this model, we assigned national public health agencies the role of providing leadership, building collaboration among federal, state, and tribal health agencies, and developing and disseminating scientific guidance and communication strategies. We tasked CDC partner organizations (e.g., professional organizations) and state, tribal, and local health departments to assist with developing and disseminating guidance and communication strategies. Health care providers would then provide medical care to affected pregnant and postpartum women, and local communities would assist their members to understand their risk of disease and to access appropriate prevention and treatment modalities. Representatives in each of these response tiers would engage prospectively in preparedness activities (including training). The desired

outcome of these coordinated activities is that the pregnant or postpartum woman would understand the risk to herself, her infant, and her family, and then be able to identify and employ appropriate prevention and treatment strategies.

METHODS

Since the prophylaxis and treatment guidelines would affect the content of communication messages, the Communication and Training Working Group (N=17), hereafter called the Working Group, focused on proposing the structure and strategies for communication and training and identifying communication research needs. We held three pre-meeting conference calls with a subset of this Working Group (n=6; identified by asterisk in Appendix A) to identify critical issues and draft recommendations for discussion by the full Working Group at the meeting. To facilitate discussions with the subset, two CDC expert meeting leaders (authors one and two above) queried four databases (Medline [Ovid], the Cumulative Index to Nursing and Allied Health [CINAHL], PubMed, and Web of Science) to identify English language articles and reports published from 1985 through May 2012 using these terms: anthrax, bioterrorism, prophylaxis, treatment, vaccine, pregnant and postpartum women, breastfeeding, adherence, prenatal care providers, health care providers, social marketing, sources of information, and emergency preparedness training. We also reviewed the reference lists in relevant articles to identify additional citations of interest. These two leaders then shared a summary of the articles with the Working Group subset and tasked them to identify: 1) issues that influenced pregnant and postpartum women to seek or avoid treatment or vaccinations in the pandemic H1N1 Influenza (pH1N1) response in 2009 and 2010; 2) factors that affected adherence to PEP among the people exposed to anthrax in 2001; 3) health care provider knowledge, attitudes, and behavior related to pH1N1 and the anthrax attacks; 4) research gaps related to communication with the public health and health care providers; and 5) factors that affect preparedness training among health care providers and proposed strategies for training them about anthrax among pregnant and postpartum women.

Following discussions with the Working Group subset, the lead author compiled a summary of the above content and presented these recommendations to the larger Working Group at the expert meeting for approval and/or revision. The final recommendations were then approved by the full group of experts at the meeting.

The following highlights our results and recommendations pertaining to communication about anthrax exposure and treatment for lay and professional audiences, and training for health professionals.

RESULTS AND RECOMMENDATIONS

Communication Lessons and Recommendations for the Public

Many of the pH1N1 communication lessons may also relate to anthrax PEP because both call for the use of vaccine and other medical countermeasures. In pH1N1, a pregnant woman was more likely to obtain the influenza vaccine if she believed that this vaccine was very safe for or benefited the infant¹²⁻¹¹, that pH1N1 made pregnant women sicker than non-pregnant women, and that pH1N1 might adversely affect her pregnancy.¹² Conversely, barriers to receiving influenza vaccine included concerns about fetal or maternal health^{12,13-15}, inadequate knowledge about the vaccine¹⁵, not knowing where to go to get the vaccine, and fear of side effects.¹² Results from pH1N1 focus groups of pregnant and postpartum women (18 focus groups; N-144 women) suggested that communication messages urging pregnant women to follow public health interventions should include thorough descriptions of the vaccine or medication benefit or lack of risk to the fetus, potential risks to the infant associated with breastfeeding, and clear justification about the necessity of the vaccine or medication.¹⁶

In 2001, two letters with anthrax spores were mailed to Capitol Hill, Washington, DC, and those letters affected specific employees of the Hart Senate Office Building and U.S. Postal Service (USPS). More than 2,000 USPS workers were advised to complete 60 days of PEP antibiotics, but a quantitative survey of a convenience sample of 245 workers revealed that only 40% completely adhered to the PEP recommendations, and 18% discontinued it.¹⁷ Among those who stopped PEP or reduced drug dosages,

the primary reasons were difficulty in controlling unwanted side effects, concern for potential effects of therapy over time, and perceived low likelihood of developing anthrax disease. Other factors included trouble remembering to take medications and age less than 45 years. Encouragement from coworkers, friends, and family to initiate and continue PEP often positively affected adherence.¹⁸ Qualitative studies also revealed that workers' trust in public health communication and recommendations eroded during the response due to confusion, unclear, inaccurate, or changing messages, disorganization, inability or perceived unwillingness of public health staff to answer questions, and a perception among USPS workers that they were being treated unfairly.¹⁷⁻²⁰

Recommendations

We recommend that communication messages for pregnant and postpartum women:

- Address their primary concerns (i.e., PEP benefits or lack of risk to the fetus, clear rationale about why a medicine or vaccine is necessary, implications for breastfeeding among postpartum women with anthrax or who receive antibiotics and/or vaccines, and risks to other family members),
- Include information about where to obtain antibiotics and/or vaccines,
- Are concise and flexible because guidance is likely to change during an event,
- Are pilot tested before an event to ensure that they reflect these women's primary concerns related to anthrax and are easily understood and appropriate for specific racial/ethnic groups and education or income levels. National and local partners can assist with pilot testing and adjust messages so they are appropriate to local areas and among diverse populations. Local partners can also assist by identifying priority audiences that may influence the behaviors of pregnant and postpartum women.

In addition to the recommendations above, we advocate that CDC, national professional organizations, and state, tribal, and local public health agencies collaboratively develop broad-based strategies which

include messages to pregnant and postpartum women and their families, community organizations, health care providers, and a variety of other partners regarding anthrax exposure and treatment, with particular emphasis on messages to family members, co-workers, and health care providers to encourage medication adherence among pregnant and postpartum women. Lessons from both pH1N1 and the 2001 anthrax response demonstrate that it is critical to communicate with health care providers.

Communication Lessons and Recommendations for Health Care Providers

Obstetric health care providers are the major source of information about what pregnant women should or should not do.²¹ The obstetric health care provider was a trusted source of information about pH1N1.¹⁶ Moreover, recommendations from obstetric health care providers that encouraged pregnant women to receive pH1N1 and seasonal influenza immunizations were associated with pregnant women being vaccinated.^{13,22,23} However, not all obstetric health care providers understood the pH1N1 guidance. Fourteen focus groups of 92 prenatal care providers (obstetricians/gynecologists, family physicians, certified nurse midwives and nurse practitioners) were conducted to learn about their knowledge, attitudes, and behaviors regarding influenza infection and vaccination during pregnancy.²⁴ Most providers reported having little experience treating pregnant women who were severely affected with influenza. There were mixed perceptions about the severity of the pH1N1 threat to pregnant women, and some reported having concerns about presumptive treatment of sick pregnant women. Some health care providers expressed confusion about vaccination schedules and whether it was safe to vaccinate a pregnant woman during the first trimester.

During 2001, health care providers also were influential in whether anthrax-exposed workers adhered to their recommended antibiotic treatment.^{18,19} Private physicians' advice to take medications appeared to positively affect exposed workers' adherence while physician advice to not take their medications negatively affected adherence. Of the two-thirds of workers in the Senate and USPS who received specific advice from their private physicians about taking their medications, slightly less than half stated

that their physicians strongly supported the public health recommendations.¹⁸ Some USPS workers reported that their private physicians did not seem to be informed about the public health recommendations.¹⁹

Recommendations

To prepare for an anthrax emergency, we believe that CDC can provide leadership in the development of critical background documents needed to guide communication with health care providers and other partners. These documents include:

- scientific guidance on anthrax treatment and prevention,
- talking points for both the exposed and the worried well populations,
- strategies to promote long-term drug adherence among pregnant and postpartum women,
- instructions to clinicians regarding antibiotic use during pregnancy,
- a pregnancy estimation document to guide state, tribal, and local organizations in determining the number of pregnant women in a geographic area at a point in time, and
- any surveillance data about pregnant and postpartum women in an event.

During an anthrax emergency, health professionals who could influence the behavior of pregnant and postpartum women include physicians, midwives, nurse practitioners, physician assistants, registered nurses, and pharmacists. We recommend that:

- CDC, national professional organizations, and state and tribal, as well as local public health, collaboratively develop strategies to disseminate guidance and communicate with health professionals through appropriate channels,
- Communication messages for health professionals, including vaccine safety messages, be pilot tested before an event, and national partner organizations assist with the pilot testing.

The expert meeting also identified research recommendations pertaining to lay populations and health professionals.

Research Recommendations

The expert meeting identified future research opportunities to fill persistent gaps in data.

- We recommend that qualitative and quantitative studies are conducted among lay populations and health professionals to assess their knowledge of anthrax and attitudes toward vaccines, antibiotics, and other treatment.

The research results can be used to inform revisions or enhancements of the communication messages for the respective audiences discussed above.

Provider Preparedness And Training During Emergencies

There have been mixed findings regarding the efficacy of preparedness trainings. In 2008 non-CDC investigators examined studies from 2001-2005 to assess whether preparedness training improved knowledge and skills among out-of-hospital health care providers (EMS personnel, firefighters, public health nurses, and staff of long-term care facilities) and concluded that there was insufficient evidence to determine if preparedness training is effective in improving knowledge.²⁵ However, additional studies demonstrated increases in trainee knowledge, comfort level, disaster care skills, and confidence in their ability to respond to a disaster event after competency-based and scenario-based preparedness trainings for health care providers.^{26, 27}

Yet, despite the success or limitations of specific training modules and methodologies, there continues to be need for comprehensive preparedness training among health care providers.^{27, 28} Most medical specialties have prioritized bioterrorism and emergency preparedness as critical topics in both the literature and websites of professional organizations.²⁹ The American Medical Association convened organizational leaders from medical specialties, nursing, public health, physician emergency medical services, and the Uniformed Services University of the Health Sciences to develop a new educational framework for disaster medicine and public health preparedness. This framework identifies learning domains and competencies.²⁹ In addition, a national expert panel of medical, nursing, and public health

professionals identified emergency preparedness and disaster core competencies for perinatal and neonatal nurses.³⁰ Professional organizations such as the American College of Obstetricians and Gynecologists (ACOG) also published CDC guidance on management of pregnant and postpartum women exposed to anthrax in 2002 and reaffirmed it in 2009.^{31, 32} Education and training need to be developed and delivered to health professionals involved in care for pregnant and postpartum women before an anthrax event. We believe that we can build on existing foundations to develop and disseminate training that health professionals would need to be prepared for an anthrax event.

Recommendations

We believe that CDC could provide leadership and collaborate with state, tribal, local and other partners to develop trainings for health care providers pertaining to anthrax exposure and treatment. These trainings can build on existing mechanisms pertaining to anthrax and pregnant and postpartum women, such as:

- Collaborating with professional organizations to insert articles pertaining to PEP and anthrax treatment among pregnant and postpartum women within existing training and board certification processes,
- Publishing articles that address issues of special concern related to anthrax among pregnant and postpartum women in journals that promote continuing medical education (CME) credit for physicians and continuing nurse education (CNE) or continuing education units (CEU) credits for nurses and other health professionals such as social workers,
- Developing online training modules for CMEs, CNEs, and CEUs that can be distributed through channels such as Medscape,
- Incorporating the content into existing Strategic National Stockpile training and pre-event CDC Clinician Outreach and Communication Activity (COCA) conference calls to enhance clinicians' knowledge about anthrax among pregnant and postpartum women,

- Conducting trainings that explore the unique outreach and communication needs of pregnant and postpartum women and infants,
- Developing new instruction materials such as electronic treatment algorithms for anthrax-exposed pregnant and postpartum women, Medscape videos and just-in-time trainings pertaining to anthrax considerations among pregnant and postpartum women (training that is launched coincident with identification of a public health threat) that includes easily modifiable slide presentations for the public and health care professionals, and talking points that can be adapted for a variety of training modalities.

SUMMARY

Following the review of evidence and development of anthrax prophylaxis and treatment guidance, we developed recommendations pertaining to communication about anthrax exposure and treatment for lay (pregnant and postpartum women, their families, and community leaders) and professional audiences and training recommendations for health professionals. These recommendations can guide future planning of communication and training activities for partners who would be involved in the care of pregnant and postpartum women exposed to anthrax and direct development of communications and training about care for newborns exposed to anthrax. Furthermore, preparing communication and training before an event is essential because the pH1N1 response highlighted the difficulty in getting messages out quickly during a fast-paced response.

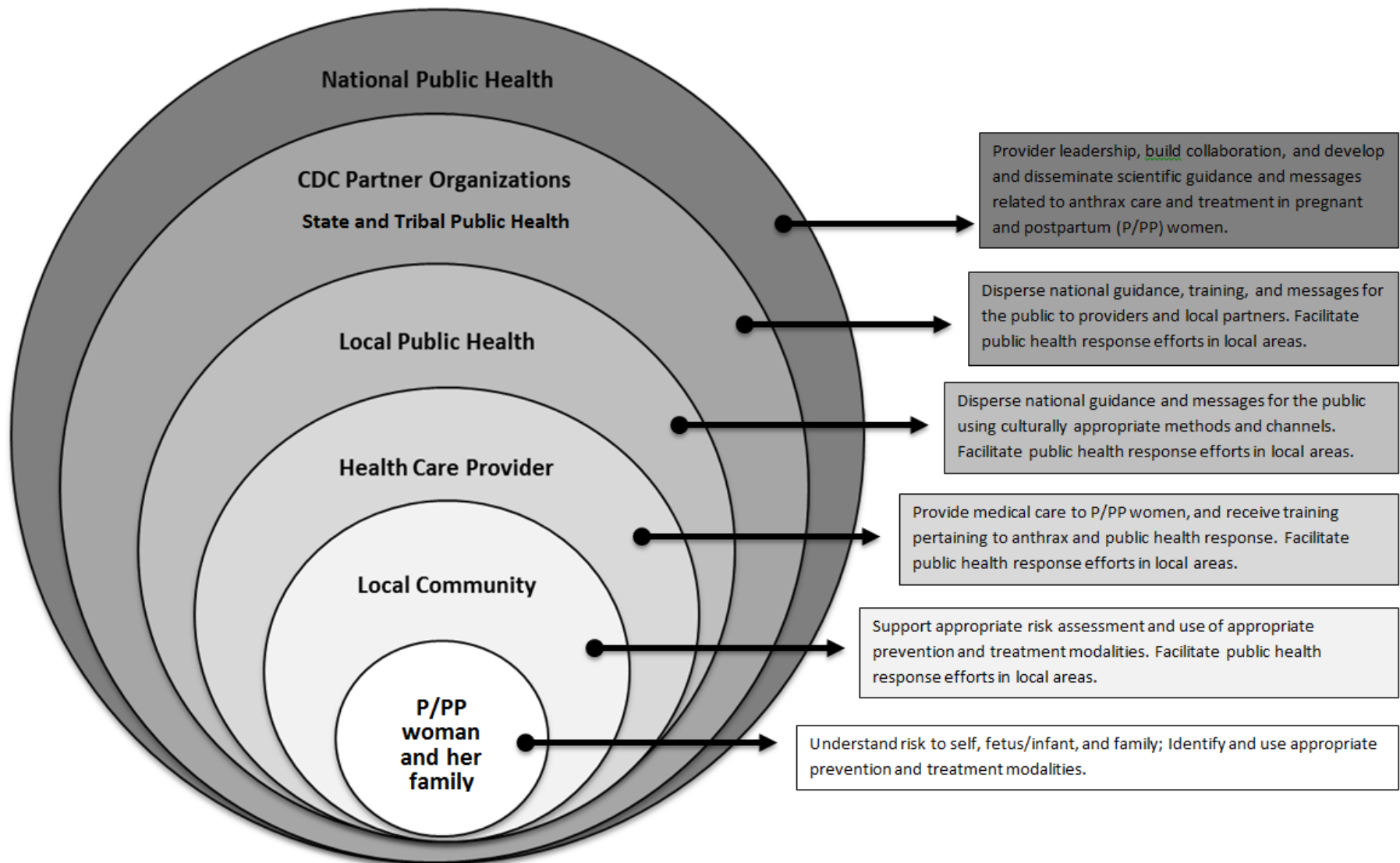
The recommendations above, when combined with the clinical guidance, will assist the U.S. to ensure that the unique needs of pregnant and postpartum women are addressed in an anthrax bioterrorism event. Communication and training are critically important to promote the population's health, integrate clinical and public health care, and improve outcomes among pregnant and postpartum women and their newborns.

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Figure 1. Ecological communication and training model depicting roles of selected organizations, CDC¹ partners, and pregnant or postpartum (P/PP) women in preparing for or responding to an anthrax event



¹CDC=Centers for Disease Control and Prevention

Appendix A

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The findings and conclusions in this paper are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.