Hospital Disaster Preparedness for Obstetricians and Facilities Providing Maternity Care

ABSTRACT: Large-scale catastrophic events and infectious disease outbreaks highlight the need for disaster planning at all community levels. Features unique to the obstetric population (including antepartum, intrapartum, postpartum and neonatal care) warrant special consideration in the event of a disaster. Pregnancy increases the risks of untoward outcomes from various infectious diseases. Trauma during pregnancy presents anatomic and physiologic considerations that often can require increased use of resources such as higher rates of cesarean delivery. Recent evidence suggests that floods and human-influenced environmental disasters increase the risks of spontaneous miscarriages, preterm births, and low-birth-weight infants among pregnant women. The potential surge in maternal and neonatal patient volume due to mass-casualty events, transfer of high-acuity patients, or redirection of patients because of geographic barriers presents unique challenges for obstetric care facilities. These circumstances require that facilities plan for additional increases in necessary resources and staffing. Although emergencies may be unexpected, hospitals and obstetric delivery units can prepare to implement plans that will best serve maternal and pediatric care needs when disasters occur. Clear designation of levels of maternal and neonatal care facilities, along with establishment of a regional network incorporating hospitals that provide maternity services and those that do not, will enable rapid transport of obstetric patients to the appropriate facilities, ensuring the right care at the right time. Using common terminology for triage and transfer and advanced knowledge of regionalization and levels of care will facilitate disaster preparedness.

The American College of Obstetricians and Gynecologists (ACOG) makes the following recommendations:

- Hospitals that provide maternity services should implement a standing perinatal subcommittee (likely to include obstetrics, pediatrics, and anesthesia) in charge of disaster preparedness, which can be mobilized quickly in the event of an emergency.
- All hospitals should be familiar with the ACOG and Society for Maternal–Fetal Medicine (SMFM) levels of maternal care designations and should have integrated regional referral networks based on these levels.
- Hospitals with maternity services should develop specific strategies for stabilizing and transporting obstetric patients, managing surge capacity and the need for consultative services, sheltering-in-place, and incorporating regional facilities that do not provide maternity services.
- Hospitals providing care for maternal and neonatal patients should communicate using a common terminology, such as OB-TRAIN (Obstetric Triage by Resource Allocation for Inpatient), to facilitate and prioritize transport based on acuity of care.
- Disaster preparedness may include a designated obstetric team that can be called upon in an emergency setting or implemented as part of a planned evacuation.
- Communication strategies should include back-up broadcast systems—in the event of loss of telephone...
communication—that take advantage of new technology, such as telemedicine, that can function over the internet and still may be accessible when other lines of communication have been cut off.

- Obstetric units should have a designated safe location for laboring patients who cannot be transported because of imminent delivery. This plan should include an identified alternative site for delivery if the labor and delivery unit is damaged and a system to ensure the necessary equipment can be transported quickly to the alternative site.
- Ensuring that the woman and her infant are transported together is a vital element of disaster planning. This situation may require additional coordination in the event that the woman or her infant needs care at a specialized facility and may be initially transported separately.
- Hospitals should prepare for power outages and lack of access to electronic medical records. This scenario may include providing hard copies of the medical record at the time of patient transport or using mobile devices that can access a patient’s medical record through online patient portals.
- Obstetricians and other obstetric care providers should consider the option of altering obstetric services to function with less resource use. Examples include early hospital discharge after delivery and enhanced use of telephone and telemedicine triage, with attention to documentation requirements.

**Background**

Large-scale catastrophic events and infectious disease outbreaks—including the terrorist attacks of September 11, 2001, the bombing at the 2013 Boston Marathon, the 2009–2010 H1N1 influenza pandemic, and the 2014–2016 Ebola outbreak—highlight the need for disaster planning at all community levels. Furthermore, the increased frequency of environmental natural disasters, such as Hurricane Katrina (2005); Hurricane Sandy (2012); and the 2017 hurricanes Harvey, Irma, and Maria; and the increase in incidence of earthquakes, floods, heat waves, and severe wildfires that have direct consequences on human health, demonstrate the important role for health care providers in disaster preparedness (1).

A 2004 review suggested that disasters cause the evacuation of as many as 20 hospitals per year (2); another study concluded that from 2000 to 2012 natural disasters caused $1.5 trillion in damages worldwide and affected 2.9 billion people (3). Because disasters are unpredictable in nature, attention has focused on measures that can be taken to minimize their effects and prepare citizens, businesses, health care facilities, and nations to manage the damage caused by disasters.

In recent years, new publications by ACOG and SMFM have defined specific levels of maternity care that provide important direction for managing obstetric disaster preparedness. Additionally, new disaster response protocols specific to obstetric triage have been published that help create uniform language for coordinating complex maternal and neonatal levels of acuity (4). This document integrates these updates to provide enhanced guidance for obstetric disaster preparedness. This Committee Opinion does not specifically address security breaches, such as an active shooter in the hospital, or events of bioterrorism.

**The Role of Health Care Institutions in Disaster Preparedness**

Given that health care institutions play an important role in responding to disasters, the discipline of hospital preparedness now occupies a central role in effective disaster mitigation planning (5, 6). Currently, many of the documents that offer guidance on hospital preparedness are relevant to most types of medical facilities.

Every state has a disaster preparedness team directed by the Federal Emergency Management Agency and the Department of Homeland Security. Hospitals that provide maternity services should implement a standing perinatal subcommittee (likely to include obstetrics, pediatrics, and anesthesia) in charge of disaster preparedness, which can be mobilized quickly in the event of an emergency. The obstetrician–gynecologist leadership should review hospital disaster plans to ensure optimal coordination and staffing specific to the labor and delivery and postpartum units. Disaster preparedness may include a designated obstetric team that can be called upon in an emergency setting or implemented as part of a planned evacuation.

In some instances of disaster, the National Guard, or the Department of Homeland Security, or both, may assume the administration of an existing hospital or set up satellite medical facilities. Hospital administration should recognize the potential for such emergency activities.

**Considerations for Obstetric Care Facilities**

Features unique to the obstetric population—including antepartum, intrapartum, postpartum and neonatal care—warrant special consideration in the event of a disaster. Birth is difficult to predict and obstetric units are vulnerable to a patient volume surge and unpredictable resource use. Recommendations for hospital disaster preparedness are summarized in Box 1. Additional obstetric-specific considerations and recommendations for disaster preparedness are summarized in Box 2.

Pregnancy increases the risks of untoward outcomes from various infectious diseases such as influenza (7–11). Trauma during pregnancy presents anatomic and physiologic considerations that often can require increased use of resources such as higher rates of cesarean delivery (12). Recent evidence suggests that floods and
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Box 1. General Considerations and Recommendations for Hospital Preparedness

- Appoint a full-time disaster coordinator for each hospital.
- Participate in regional hospital disaster planning.
- Create surge capacity planning for up to 30% more patients.
- Augment hospital infection control practices to permit application of different measures to minimize in-hospital spread of disease depending on the nature of each disaster. Examples of such measures include, but are not limited to, the following:
  - Group patients with similar disease characteristics.
  - Have all appropriate personal protective equipment available for employee use.
  - Limit number of staff exposed to potentially infectious individuals.
  - Have in place and enforce employment guidelines addressing employee absences when sick.
- Prioritize clinical services and develop contingency plans for canceling or minimizing elective procedures, or office visits, or both, during periods of high patient volume.
- Consider alternative care facilities to provide services during periods of high patient volume.
- Develop ethical algorithms for rationing limited health care resources in cases when demand for services exceeds supply.
- Establish templates for altered standards of care during periods of high patient volume.
- Consider mechanisms for rapid clinical credentialing of health care providers not currently practicing to enable augmentation of work force.


Box 2. Additional Obstetric-Specific Considerations and Recommendations for Disaster Preparedness

- Appoint an obstetrician to direct disaster planning for maternity services.
  - Pediatrician involvement (or pediatric codirector) recommended.
  - Maternity and pediatric nursing involvement also recommended.
- Consider regional patterns of obstetric care provision and disaster scenarios.
- Consider obstetric and neonatal needs with high obstetric patient surge.
- Establish policies for visitation and lactation that balance infection control concerns with patient and familial desires for involvement in the birthing process.
- Foster functional working relationships with local and regional critical care clinicians.
- Have a working algorithm for ethical resource allocation when demand exceeds supply that considers obstetric- and pediatric-specific needs.
- Develop a surge capacity plan, realizing the challenges that pregnancy poses, to control patient volume.
- Consider temporary alterations to usual standards of obstetric care and mechanisms to optimize obstetric services with limited resources. Examples include but are not limited to the following:
  - Early hospital discharge after delivery.
  - Enhanced telephone and telemedicine triage, with attention to documentation requirements.
  - Rapid credentialing of health care providers to enable delivery of obstetric care in the event of work force limitations.

Planning for Obstetric Surge Capacity

The potential surge in maternal and neonatal patient volume due to mass-casualty events, transfer of high-acuity patients, or redirection of patients because of geographic barriers presents unique challenges for obstetric care facilities. These circumstances require that facilities plan for additional increases in necessary resources and staffing.

There are three subsets of surge capacity: 1) conventional capacity, consistent with daily practices; 2) contingency capacity, not consistent with daily practices but which has minimal effect on usual patient care practices; and 3) crisis capacity, not consistent with usual standards of care but which provides sufficient care in the setting of a catastrophic disaster (14).

Consideration also should be given to shared needs during disaster management. The important and challenging issue of ethical resource allocation when demand exceeds supply has been addressed in the general medical literature (15, 16). Much of the focus has been on the distribution of limited numbers of ventilators among large surges of critically ill patients who require respiratory support. These principles also apply to other potentially limited resources (e.g., cardiovascular support medications, antimicrobials, and intravenous supplies). To optimize outcomes, hospital committees charged with disaster planning need to review the availability and organization of these important resources before real-time disaster management is necessary.
Levels of Maternal Care

The American College of Obstetricians and Gynecologists and SMFM’s Levels of Maternal Care consensus document calls for an integrated, regionalized network to identify when transfer of patients may be necessary to provide risk-appropriate maternal care (17). The levels of maternal care are defined as birth center, basic (I), specialty (II), subspecialty (III), and regional (IV) (17). For each level the capabilities, types of health care providers, and required services are delineated.

The regionalized, collaborative network also could facilitate the management of surge capacity during a disaster. The established relationships and enhanced lines of communication would enable the rapid and creative response required in unexpected disasters. In such circumstances, a level III or level IV center may be forced to stop accepting new patients or create additional capacity for critical patients by transporting or directing those requiring less specialized care to lower-level centers. Plans should be in place to have consultants available to provide their expertise remotely to assist lower-level centers. Facilities capable of stabilizing and transporting obstetric patients, managing surge capacity, and allowing for more intensive focus on the surge of resource-intensive patients and others affected by the disaster. One strategy to mitigate the increase in patient volume involves preemptive management of scheduled procedures, when medically appropriate (eg, full-term induction of labor or cesarean delivery). This strategy has been employed successfully in preparation for nondisaster scenarios in which the probable strain on resources is known in advance (eg, city events with large-scale road closures) and could be applied in instances of disaster preparedness in which the event has a projected window of vulnerability (eg, hurricanes).

Triage of the Obstetric Patient in Disaster Response

Once a hospital has determined its capacity to provide adequate maternity services, the next step is efficient and appropriate triage of obstetric patients. Health care facilities must identify when transfer of patients may be necessary (14). An example of OB-TRAIN coding can be seen in Table 1.

To approach the triage of patients in an obstetric unit, health care providers must consider antepartum, intrapartum, and postpartum care along with care plans for the newborn nursery and neonatal intensive care unit. Given the wide range of acuity among each of these groups of patients, common terminology and collaborative networks are crucial (14).

One proposal for managing the multiple parallel considerations among maternal, fetal, and neonatal factors is the OB-TRAIN model. Hospitals providing care for maternal and neonatal patients should communicate using a common terminology, such as OB-TRAIN, to facilitate and prioritize transport based on acuity of care. This model categorizes an obstetric patient’s acuity based on a composite scoring of specific factors with common terminology that can be used across obstetric and pediatric units. As such, the OB-TRAIN model builds upon a previously existing neonatal TRAIN system that organizes pediatric patients according to their medical needs and the type of transport required if evacuation becomes necessary (14). An example of OB-TRAIN coding can be seen in Table 1.

Obstetric units should have a designated safe location for laboring patients who cannot be transported because of imminent delivery. This plan should include an identified alternative site for delivery if the labor and delivery unit is damaged and a system to ensure the necessary equipment can be transported quickly to an alternative site. Postpartum triage for the neonate is another important consideration. Ensuring that the woman and her infant are transported together is a vital element of disaster planning. This situation may require additional coordination in the event that the woman or her infant needs care at a specialized facility and may be initially transported separately.

Special Considerations for Infectious Disease Outbreaks

Few obstetricians are trained in critical care, yet obstetric patients can be affected severely by some infectious disease outbreaks and may require disproportionate critical
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Temporary Modifications in Standard of Care

Obstetricians and other obstetric care providers should consider the option of altering obstetric services to function with less resource use. Examples include early hospital discharge after delivery and enhanced use of telephone and telemedicine triage, with attention to documentation requirements. Such alterations often are necessary and beneficial when the volume of patients in a health care facility is unusually high. This concept has received considerable legal and medical attention (20, 21).

The goal of these efforts is to give facilities and health care providers guidance on temporary flexibility in care standards as well as who is permitted to provide care. Equally important is planning by the hospital leadership for the potential need to rapidly credential temporary obstetric care providers in the face of a health care provider shortage that can occur with a variety of disaster scenarios. Facility preparedness committees are encouraged to consult with their local legal colleagues to assist in interpreting state and federal guidance on this issue.

Remote and Distance Care With Telemedicine

In the case of an environmental disaster, pregnant and postpartum women in need of care may be cut off from a hospital facility, medical records, and health care providers. Flexible infrastructure that permits expanded outpatient services by integrating “distance prenatal care,” or telephone triage, or both, may be of great value during times of overwhelming volume or inability to access care locally. The Health and Medicine Division of the National Academy of Sciences, Engineering, and Medicine (formerly the Institute of Medicine) has recently considered remote and distance care (22) and has reported on one example of the successful use of telephone triage in obstetric care (23).

If feasible, creative use of evolving telemedicine capabilities could enable facilities to maintain adequate care resource allocation (7–11). In many facilities, adult intensive care units are distant from labor and delivery units. Physical separation may pose logistic barriers to the delivery of optimal intensive care for critically ill pregnant women. These barriers may be exacerbated during times of overwhelming patient volume. These trends warrant thoughtful consideration and extra coordination with critical care clinicians before and during disaster mitigation. Advances in telemedicine, particularly in providing remote access to critical care expertise, can assist in meeting these challenges (see “Remote and Distance Care With Telemedicine” later in this document).

These considerations may be true especially when focusing specifically on influenza pandemics. Data from influenza pandemics demonstrate heightened rates of hospitalization and preterm birth associated with maternal influenza infection (8–11, 19). The increased number of newborns born at preterm gestations during an influenza epidemic has clear implications for neonatal intensive care capacity and resource allocation that parallels increased maternal resource needs.

Two special considerations presented by the obstetric population related to infection control practices are 1) the desire for familial involvement in the birthing process, and 2) the importance of lactation and early parental bonding with the neonate. Infectious disease outbreaks often require tight restrictions on visitation procedures while the nature of the epidemic is being investigated. Isolation often is a difficult hospital practice to implement in general and is especially challenging to enforce in the obstetric population given the need women have for support during labor, delivery, and the postpartum period. Likewise, the importance of lactation and early parent–newborn bonding introduces infection control considerations that are not relevant to other patient populations and, therefore, warrant additional advance planning. Maternity services should coordinate with infectious disease specialists for guidance in this challenging clinical scenario.

Table 1. The “Obstetric Triage by Resource Allocation for Inpatient”* Model

<table>
<thead>
<tr>
<th>Transport</th>
<th>Car (Discharge), Blue</th>
<th>Basic Life Support (Ambulance), Green</th>
<th>Advanced Life Support (Ambulance), Yellow</th>
<th>Specialized,† Red</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor status</td>
<td>None</td>
<td>Early</td>
<td>Active</td>
<td>At risk for en route delivery</td>
</tr>
<tr>
<td>Mobility</td>
<td>Ambulatory‡</td>
<td>Ambulatory or nonambulatory</td>
<td>Nonambulatory</td>
<td>Nonambulatory</td>
</tr>
<tr>
<td>Epidural status</td>
<td>None</td>
<td>Placement greater than 1 h§</td>
<td>Placement less than 1 h§</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Maternal or fetal risk</td>
<td>Low</td>
<td>Low or moderate</td>
<td>Moderate or high</td>
<td>High</td>
</tr>
</tbody>
</table>

*OB TRAIN, Obstetric Triage by Resource Allocation for Inpatient
†Must be accompanied by physician or transport registered nurse
‡Modified Bromage scale 6=patient is able to perform a partial knee bend from standing
§Epidural catheter capped off

patient care in the face of increased local resource demands and provide a mechanism for consultation between smaller regional facilities and larger tertiary care facilities. Some examples may include conducting virtual visits and remote delivery of routine testing, such as antenatal testing (24). Conversely, in emergency scenarios it often is necessary to provide medical care without the benefit of standard technology (eg, lack of electronic medical records during a power outage), thus reliance on paper records to facilitate communication during transport may be necessary (25). The use of social media, particularly Twitter, has provided a valuable emergency system to announce safe havens or allow electronic communication from remote areas.

Even during a disaster, documentation of all patient–health care provider interactions in the prenatal record remains important, as is the ability to access those records. Communication strategies should include back-up broadcast systems—in the event of loss of telephone communication—that take advantage of new technology, such as telemedicine, that can function over the internet and still may be accessible when other lines of communication have been cut off. Hospitals should prepare for power outages and lack of access to electronic medical records. This scenario may include providing hard copies of the medical record at the time of patient transport, or using mobile devices that can access a patient’s medical record through online patient portals. The possibility that access to the electronic medical record will be limited needs to be considered in advance, and mechanisms for providing patients with copies of their own medical records are recommended.

The disaster recovery phase also should be considered in advance as should the establishment of local mechanisms, or triggers, or both, for transitioning back to the usual standards of care. The goal is to enable a smooth recovery that optimizes care and resource use that parallels that of baseline facility function once the acute phase has resolved.

**Conclusion**

The discipline of hospital disaster preparedness has undergone significant advances in recent years, largely driven by the need to respond to an increase in natural and human-influenced crises. Many of the advancements provide new, specific guidance to obstetricians and other obstetric care providers at the individual and institution levels. Although emergencies may be unexpected, hospitals and obstetric delivery units can prepare to implement plans that will best serve maternal and pediatric care needs when disaster occurs.

Clear designation of levels of maternal and neonatal care facilities, along with establishment of a regional network incorporating hospitals that provide maternity services and those that do not, will enable rapid transport of obstetric patients to the appropriate facilities, ensuring the right care at the right time. Using common terminol-

**References**


