Utilization of alternative diagnostic sampling techniques during an imported measles outbreak - San Diego, California, 2008

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BACKGROUND

Public Health Significance

• Determination of case status is a requirement for identifying, tracking, and controlling diseases of public health importance
• Clinical manifestations of various diseases may differ from person to person; therefore, laboratory confirmation is important in establishing case status
• While serologic testing provides physicians and public health officials with important diagnostic information, obtaining venous blood from infants and children may pose challenges
  - Favorable anatomical attributes, such as a clearly visible and relatively large venous lumen, are often compromised in infants and children as a result of surrounding adipose tissue
  - Venous blood draws on infants and children require the skills of staff trained and practiced in pediatric phlebotomy
  - Securing access points (e.g., arms, wrists, hands) requires additional personnel to assist the phlebotomist
• Barriers to obtaining serologic specimens include resistance from the patient and/or parent to providing venous blood samples as well as limited availability of personnel experienced in pediatric phlebotomy
• The expeditious determination of case status is critical during communicable disease outbreaks
• Patients with airborne infectious diseases should not be referred to laboratories or healthcare facilities where airborne precautions cannot be implemented; obtaining blood specimens from patients in their homes is preferred

Imported Measles Outbreak, San Diego

• On February 1, 2008, the San Diego County Immunization Branch was notified of a positive measles IgM result in a child with a febrile rash illness and a history of recent travel to Switzerland, where a measles outbreak was ongoing
• The child had never received a measles-containing vaccine and held a personal belief exemption (PBE) from school immunization requirements
• While infectious, this child attended a school with a high PBE rate and was seen in four (4) different healthcare settings, resulting in the direct infection of six (6) susceptible children exposed at these sites

RESULTS

• A total of eleven (11) additional children were infected; none had received a measles-containing vaccine
• Four (4) of the 12 case-patients (33%) were referred to commercial laboratory facilities to have their blood drawn for measles serology, increasing the opportunity for disease transmission in these settings
• Clinicians did not suspect measles in a child with recent international travel and febrile rash illness or in symptomatic children with exposure to a known measles case; appropriate infection control precautions were not implemented
• During the outbreak, obtaining venous blood draws on infant and child suspect cases was problematic for a variety of reasons
  - Capillary specimens, collected via finger or heel stick, were found to be acceptable for measles serology
  - Though less demanding than venipuncture training, public health nurses and communicable disease investigators did require some training and practice in capillary specimen collection
  - Collection of capillary specimens alleviated some investigative burden, as public health nurses and communicable disease investigators were able to collect capillary specimens in patient homes; however, adequate specimens were not produced on every collection attempt
  - Capillary specimen collection was often viewed by patients and parents as a more acceptable method of serologic specimen collection, as it was perceived to be a less painful and less invasive procedure

METHODS

• Disease control measures were implemented, including isolation of suspect cases and health department coordination of specimen collection from suspect cases (i.e., limiting visits to commercial laboratories and additional healthcare facilities to decrease the opportunity for disease transmission)
• A public health investigation was initiated, including:
  - Contact tracing and quarantine of exposed, susceptible persons
  - Heightened surveillance
  - Active case finding
• Laboratory confirmation was attempted on all suspect cases

SPECIMEN COLLECTION

1. Obtain supplies:
   - Two (2) to three (3) microcollection devices consisting of a capillary tube and a serum separator microtube
   - Heparinized tubes are acceptable
   - Consult your public health laboratory regarding acceptable collection devices
2. Sterile safety lancet (fully automated devices recommended)
3. Biohazard container
4. Gauzes
5. Alcohol swabs
6. Sterile gauze
7. Band-aid
8. Label each serum separator microtube with patient name (or other identifier), date of birth, and date/time of specimen collection
9. Massage the puncture site to increase circulation and enrich blood flow
   - The heel is the recommended puncture site for infants 12 months of age or younger
   - The finger may be a suitable puncture site for children over 1 year of age
10. Clean the puncture site (heel or finger) well with alcohol; allow to dry
11. Touch the first capillary tube to subsequent free-flowing blood produced at the puncture site
   - Through capillary action, blood will fill the tube
   - If blood flow is inadequate, gently massage the proximal portion and firmly press on the distal portion of the foot or finger (do not let blood run down the heel or finger)
   - Holding the microcollection device at a downward angle may improve collection results
12. Repeat steps 8-11 until a total of three (3) capillary tubes for blood samples are collected
13. Stop the bleeding and cover the puncture site with a band-aid

CONCLUSIONS

• While venous blood remains the standard specimen for serologic testing, employment of alternative diagnostic sampling techniques may be warranted when suspect case-patients resist venipuncture or when phlebotomists with expertise in pediatric venous blood draws are not available
• Capillary specimen collection by public health practitioners facilitates rapid testing of suspect case-patients and decreases the opportunity for further disease transmission by limiting the need to refer suspect case-patients to healthcare facilities or laboratories for specimen collection
• Employment of alternative diagnostic sampling techniques may enhance routine surveillance and outbreak response activities while expediting specimen collection, diagnosis, and determination of case status
• Local and state health departments would benefit from training appropriate public health practitioners in capillary specimen collection and requiring maintenance of specimen collection skills

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