A Case Study in Assessment and Assurance

Meddling With the System:
An Unexpected Migrating Virus

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PART I

Introduction

As technology develops and the distribution of mass media becomes more widespread, the "rich" lifestyles of some countries become more evident to those that lack such readily available commodities. An average worker living in Tuxtla, Mexico compares his living conditions and income to what he sees and hears about in the United States. He hears of opportunities for acquiring durable goods, such as clothing, household materials, jewelry and electronic equipment through seasonal work in the U.S. agricultural industry. As a result, he, and thousands of others like him, chooses to pack up his belongings and head North with aspirations of finding a hiring farm and a large steady paycheck.

Each year, "approximately 10,000 migrant workers spend part of the year working in Indiana." (*Indiana in the World*) One of the direct impacts such an influx in worker availability has is on the economy. The majority of these workers establish themselves at labor-intensive farms, such as those growing fruits and vegetables. Owners of such farms tend to bear many of the costs associated with migrant housing and utilities in order to grow labor-intensive crops that are much more profitable – particularly when compared to income flows generated from traditional crops or livestock production. In fact, these costs represent an increased income flow into the local economy (NEXO).

As positive impacts may exist in a particular situation, one may also identify vulnerabilities. Migrants crossing the borders of the United States – sometimes annually, sometimes permanently – also are crossing epidemiological boundaries. As inhabitants of other environments enter new ones, there is the potential of an increased circulation of pathogens, and thus new disease challenges (International Society of Travel Medicine).

This case examines the potential health risks introduced to a community when a migrant worker unknowingly is a carrier of measles. A focus is also placed on the health care received by a non-U.S. citizen and the response of the Meddle County, Indiana Health Department and other affiliated entities when such an outbreak occurs.

"Arriving With High Hopes"

The day had finally come! It was Wednesday, April 9, 2003 and Pedro Santiago had made it from his home in rural Mexico to the U.S. border. Though he had been working on the small family plot at home from the time he could follow his parents, he now was old enough to join his older brothers in Indiana. He would work alongside them in the fields, following the crops as they matured to harvest. The work would keep them employed until the fall. He had heard the stories about Indiana, and now he was eager to see, for himself, the flat farms and large stores. His brothers told him of the many choices of clothing and food piled so high that machines had to lift them up toward the ceiling.

By Tuesday, April 16, Pedro made it to Meddle County, Indiana. There, he would meet his brothers and begin work. Meddle is well known for its agriculture and industry.

Though industrial jobs and manufacturing are plentiful, local residents fill those positions. It is on the farms where seasonal migrant workers fill the majority of labor-intensive jobs. Pedro's brothers had become known for being reliable and industrious. The crew bosses were happy to learn that another family member would be available for employment. The spring weather had been good. The rainfall and temperatures were ideal; there would be a lot of good work available this season.

Unfortunately, upon his arrival, 18-year-old Pedro is feeling rundown and achy. He's certain it's the flu, and that a good-night's rest will be the cure. But, the next day he is no better. His symptoms have worsened. He's warm to touch, his eyes are red, he's coughing, and has a runny nose. Pedro is not well enough to begin work on Wednesday or Thursday. However, he opts to ride along on a visit to Wal-Mart on Thursday evening.

He's even worse on Friday. All Pedro is able to do is lie in bed and complain about his terrible sore throat and headache. He feels even hotter to touch. His brothers are very concerned. They have never been to an American doctor. They speak no English and know their clothes are worn and muddy from the fields. Not only do they worry about how their appearance and customs will be perceived, but they also worry about the costs for the visit and medicines. They don't know what to do. Concern for their younger brother overcomes their reticence and, by Friday evening after the workday is finished, a migrant campmate and one of his brothers takes him to the local hospital's Emergency Department. There, the physician on call treats Pedro for influenza and sends him back to the farm and the rest of the workers. Pedro remains sick all weekend. He is eating no solids and drinking very little.

By Monday morning a red, raised and fluid-filled rash begins on his neck and face and quickly spreads to the rest of his body. On the lateral margins of his very red throat one can see multiple white spots. Other workers within the camp begin to feel ill as well. One of the ill workers is a female, six months pregnant. Pedro's family brings him back to the ER on Monday night. Following an evaluation and tests, the doctor confirms his first case of measles. The Meddle County's Health Officer (a local family practice physician in private practice) and the Indiana State Health Department are notified that a possible measles outbreak has occurred.

It is advised that other patients treated for "flu" during the week, either in the ER or in doctor's offices within the area, be tested. Two local high school students are included among the other cases confirmed. One student works as a cashier and the other as a bagger at Wal-Mart in the evenings. Both had missed the regulatory MMR vaccines before entering school. So late in their education, immunization coverage was assumed and no one had picked up this gap during annual physicals for sports. The last case of measles was confirmed in a six-month old child of a local factory worker. He and his wife had spent "an evening out" shopping at Wal-Mart last Thursday evening.

All of the migrant workers, farm owners and their families are also tested. All told, thirty-two workers become sick. No farm owners or their family members are affected.

The Measles Low-Down

Measles is a highly communicable viral illness characterized by cough, runny nose, red eyes, and an erythematous maculopapular (red, raised and purulent) rash that begins on the neck and face and spreads to the rest of the body. Measles is considered a vaccine-preventable disease.

In temperate areas the peak incidence of infection is during the late winter and spring. Before the measles vaccine era, most cases occurred in preschool and young school age children. Few individuals remained susceptible after the age of 20. Since 1963, the United States childhood vaccination program has resulted in a 99 percent reduction in the reported incidence of measles. Cases of measles continue to occur from importation of the virus from other countries. Cases are considered imported from another country if the rash onset occurs within 18 days of entering the United States and the illness cannot be linked to a local transmission.

Measles is transmitted by direct contact with infectious droplets, or by airborne spread. Measles is very contagious; approximately 90 percent of susceptible close contacts will become infected. Patients are most contagious from 1 to 2 days before the onset of symptoms (3 to 5 days before the rash) to 4 days after the rash appears. Immunocompromised patients who may have prolonged excretion of the virus in respiratory tract secretions can be contagious for the duration of the illness.

Death, primarily due to respiratory and neurologic complications, occurs in one to three of every 1,000 cases. Case fatality rates are increased in children younger than five years of age, and immunocompromised children.

No specific antiviral therapy is available for treating measles. The World Health Organization recommends administration of vitamin A to all children diagnosed with measles where vitamin A deficiency is a health problem. Vitamin A has been shown to reduce the morbidity and mortality of children with measles in developing countries.

Exposure to measles is not a contraindication to immunization. Data suggests that the live-virus vaccine administered within 72 hours after measles exposure will provide protection in some cases. Vaccine is the intervention of choice for control of measles outbreaks in schools and child-care centers. In addition to vaccine, susceptible household contacts should receive Immune Globulin since the identification of the index case is usually after 72 hours. In an outbreak, infants as young as six months of age should receive the measles vaccine (either MMR or monovalent measles vaccine). Children immunized before their first birthday should be immunized with MMR vaccine at 12 to 15 months and again at school entry (4-6 years). (Chin)

PART II

Political, Program and Financial Concerns

Meddle County's normal routine is for the county public health nurse to handle disease investigation. In this case, the nurse relies on disease reporting from the hospital and local doctor offices. To date, there has never been any active surveillance. When diseases are reported, the county public health nurse forwards them to the State Department of Health for investigation. The county public health nurse works part time performing nursing activities and part time as the county's sanitarian. The county holds immunization clinics at the health department once a month, free for local residents. Clinics are advertised in the local paper.

The county has four elementary schools. Older students attend the county junior/senior high school located in the county seat. Enrollment has been down over the last few years. The schools have an acceptable documented immunization rate of 97 percent for routine childhood vaccine-preventable diseases; however, due to budget cuts the school nurse position has been eliminated. As a result, school immunizations are now a responsibility of the county public health nurse. This nurse spends most of her "nurse" time holding immunization clinics and manning the county's pre-natal/post-natal and home care referrals.

Only one hospital exists in the county. Three doctors are in private practice. The hospital has applied for rural health grants to help provide health care for the indigent population of the county; however, the local politicians will not sign on. This county has a long history of taking care of their own, and struggles with the idea of being labeled an "indigent"county.

This community was not very welcoming of Hispanics. However, the county's elected officials saw the opportunity of bettering the economy through productive agriculture. At the same time, they were feeling the pressure from corporations in neighboring counties to develop a more diverse population base. This community was the last hold out. The community's elected officials—while recognizing the rise in Hispanic workers—were not willing to find monies to support services the migrant workers needed. The school, hospital, and local law enforcement agency have been asking for additional resources. The elected community officials claim the farmers are responsible for the influx of Hispanics. They would much prefer that the additional costs for laborer health care be born by the farmers. The farmers state they pay a greater share of property tax, bring in revenue for the local economy, and support all the city sponsored programs. The farmers feel the county can afford to provide the additional needed resources to the community.

PART III

Organizational Relationships

An outside look could be taken of the organizations involved in this incident to see how well the organizations work together to disseminate information and provide services. The policies and procedures of each organization can be reviewed. According to the policy and procedure manual at Meddle County Memorial Hospital, when a suspicious reportable case is identified, the Meddle County Health Department is to be immediately notified. However, if it is after hours or on the weekend, the Meddle County Health Officer is to be notified. The Meddle County Health Department has a policy and procedure stating that the Indiana State Department of Health (ISDH) is to be notified immediately upon receiving a report of a suspected case of measles.

At the point of notification of the incident, the ISDH gives county health workers directions about how to proceed. The following questions are to be answered. What is the condition? How many people are affected? How much of the county is involved? And, are any surrounding counties also affected? When the policies and procedures were reviewed at the Meddle County Hospital, there were no procedures in place as to how the information would be given to the county health department. With further investigation, there was a memorandum of understanding signed by the Public Health Officer and the hospital's Chief Executive Officer, but the specifics of how communication would be handled was not addressed. The school system was found to be governed by state guidelines and had specific policies in place stating what immunizations are required and specific standards were listed for the school to follow. Policies do exist between the school corporation and the local public health department for the reporting of communicable diseases.

Role of PHN in Disease Investigation

Actions and activities are developed for the county public health nurse regarding surveillance of a potential measles outbreak by the ISDH. The nurse is to: gather symptom history, collect affected individual immunization records, draw blood Igg and Igm and send blood to ISDH lab (3-4 day return date) and call local doctors for other patients' clinical histories. The nurse also is to survey school students who have signs and symptoms; though no actual disease follow-up is permitted until the case report (blood confirmation) has been confirmed from the state laboratory. Note that the state's field representatives do not do investigations themselves. The state's role is to offer technical assistance and some guidance for immunizations. The state gives the county discretion as to how the public's concerns or fears should be handled.

Lots of Fears and Lots of Finger-Pointing

What a mess! There was a lot of meddling into other people and agency matters in Meddle County. People wanted answers as to "How could this happen in 2003?" People wanted to know "Who is responsible?" and "Who is going to pay for all of this care?"

The physician seeing Pedro was chastised for not recognizing a case of measles. Pedro was made a scapegoat for many of the issues surrounding migrant workers and he came to believe that Indiana's people were intolerant and uncaring. School personnel and the public health nurse were upset that school parents were derelict in having their children immunized. The parents faulted the School Corporation for not picking up on the gaps in coverage. The County was upset with the limited state support, and ISDH was annoyed that specimens were not gathered in a rapid and efficient fashion. In time, all the cases of measles were resolved. Many persons were given Immune Globulin and others were vaccinated. Fortunately, no one died in Meddle County from measles that year, but a lot of the early crop was harvested past its prime.

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Teacher's Guide

This case is appropriate for use with healthcare workers in undergraduate or graduate courses in Community Health, Epidemiology, or Health Management. After reading the case, either (a) in its entirety or (b) in the three sections as marked by the roman numerals I, II and III, students should identify the health-related issues that might emerge from the situations described. The authors of this case have listed some of them below; your bright and creative learners will probably identify many others.

Reality at the Grassroots: Some Health-Related Issues

- No indigent health care clinic for adults
- No immunization program for adults
- No migrant health care/clinic or program
- No funding for emergency immunization of adults
- Illegal residents, communication
- Lack of collaboration between hospital ER and county health department.
- Township trustee may have run out of poor relief money
- State immunization funds can be used for person under 19 only.

Having identified many health-related issues, select three to five of those that learners feel have the highest priority or interest and discuss possible solutions or strategies to ameliorate the issue.

The second part of the case application involves answering of the following ten questions. It is suggested that small mixed groups of learners be assigned one or two questions to answer with as wide a range of resources as available—textbooks, policy manuals, Internet sites—and return after a one hour period to present the answers to the group at large.

Questions for Further Exploration:

1. How worthwhile would it be for Meddle County to consider looking at or studying the response plans in place within other Indiana county health departments? Why? What resources might they access to find this information?

2. As schools are being asked to do more with less, what technologies might assist in the monitoring of pupils' immunization levels? What other mandated screenings might also be facilitated through technological adoption?

3. Should farmers employing migrant workers be mandated for health screenings at time of arrival? What are the pros and cons?

4. What options exist for safe and adequate housing of indigent workers if farm owners are unable to meet government standards?

5. Should county health offices with high numbers of migrant workers be encouraged to purchase dialogue translation services?

6. What non-traditional leaders might be identified to help ameliorate some of the gaps?

7. What non-traditional community resources might be asked to join in a coalition to address identified needs?

8. How should the community prepare for a response if one or more of the measles cases becomes controversial or develops more public attention or concern (i.e. the unborn baby is miscarried, the six-month-old dies, or a teenager develops encephalitis)?

9. Where is the public will as regards adequate funding for health departments?

10. What educational resources (i.e. The Extension Disaster Education Network: www.agctr.lsu.edu/eden) should/could be used to properly address the community and the media?

Appendix 1: Measles Reporting Forms

Case # _____

☐ Measles _____ Source

☐ imported ☐ Epi
☐ indigenous ☐ Fits criteria
☐ Lab

☐ Not Measles _____ Explain

MEASLES CASE INVESTIGATION FORM

Part of Outbreak: Yes ____ No ____

If Yes, Identify: _____

Public Health Agency:	Date Reported:	Date Reported To Imm. Prog.:	Reported By:	Date Investigated:	Date Reinterviewed:

Investigated By:	Reason for Late Report:	Sitter, Day Care, School, Employment (including address and telephone):

Name of Case:	Sex:	Birthdate:	Age:	Race:	Parent's Name:

Address:	City:	County: / Zip:	Telephone: Work _____ Home _____

Measles Vaccine History:
☐ ? ☐ No Why? _____ ☐ Yes
Date: —/—/—
Date: —/—/— ☐ Verified Provider: _____

Diagnosed By:	Telephone:	Address:	Zip:

Family Physician:	Telephone:	Address:	Zip:

Method: ☐ Phone ☐ Visit	Date Diagnosed:	Comments:

Laboratory:	Date	IgG	IgM	☐ No Specimens Taken
Measles				
1st Blood				Notes:
2nd Blood				
Throat Culture				
		CF	HIA	
Rubella				

Onset:	First Symptom Was:	Comments:

Fever Onset:	Highest Temp:	Duration:	Comments:

Rash Onset:	First Appeared On:	Spread to:	Duration:	Description

	Yes	No	?	Onset Date:	Comments/Duration:
Cough					
Cold-like symptoms					
Red or light sensitive eyes					
Koplik's spots					
Appear very sick					
Sore throat					

Other symptoms: Medication, Allergies (Food, Chemical): _____

Complications:

	Yes	No		Yes	No
Ear Infection	☐	☐	Diarrhea	☐	☐
Pneumonia	☐	☐	Death	☐	☐
Encephalitis	☐	☐	Other	☐	☐

Other (Explain) _____

Hospitalized: Yes ____ No ____
If yes, Name: _____
Address: _____
Phone: _____ Chart No.: _____
Dates: _____ Through: _____
Reason for Hospitalization: _____

MEASLE1A/CDC 5

SBH 23-026
State 37381

Time Line

Probable Source Period

( ) ( ) ( )

-3 Days | Date 14 Days Before Rash Onset | + 3 Days

Probable Spread Period

( ) ( ) ( )

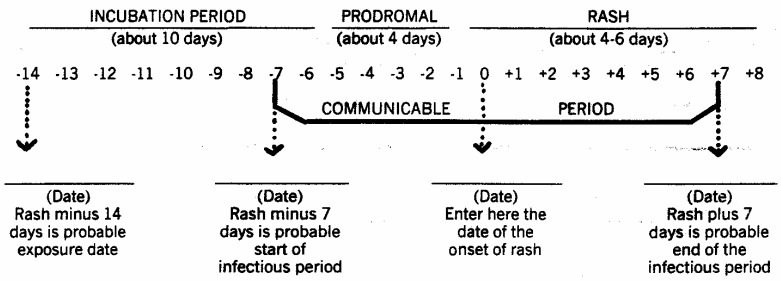
Date 1st Symptom | Date Rash Onset | 4th Day of Rash

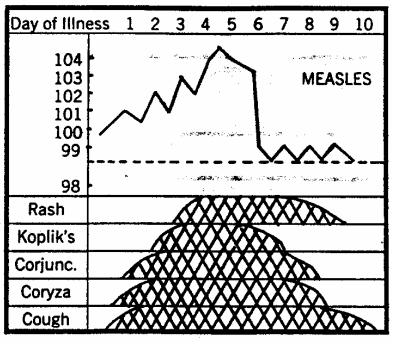
Expected Next Generation of Cases

( ) ( ) ( )

-3 Days | Date 14 Days From Rash Onset | +3 Days

SCHEMATIC DEPICTING THE CLINICAL COURSE OF MEASLES





Possible Source

Travel: Yes _____ No _____ Where: _____

Groups:

Date of Contact	Date Group Notified	Organization	Contact Person	Telephone	# in Group	Recent Measles *Yes (date)	No	?

Individuals: Source Identified: Yes _____ No _____ If yes, Case No. _____

Date of Contact	Date Individual Notified	Name	Address	Phone	School, DCC Work, etc.	Date Imm.	Recent Measles *Yes (date)	No	?

*Fill out Measles Case Followup Form on all cases.

MEASLES2/CDC5

HOUSEHOLD

Name	Birthdate	Date Immunized	School, Day Care Center, etc.	Recent Measles	
				*Yes (date)	No

Possible Spread

Groups (including school and medical setting): If a group is already listed on a previous form in the same outbreak, indicate Case # in "Contact Person" column.

Organization	Date of Contact	Contact Person	Telephone	# in Group	# Susceptible	# of Susc. immunized

Individuals exposed outside of the group setting: Advise contacts to isolate themselves at first sign of rash illness, and call health provider and you.

Name	Date of Contact	Expected Onset	Address	Telephone	School, DCC or Work	Birthdate	Date Imm.

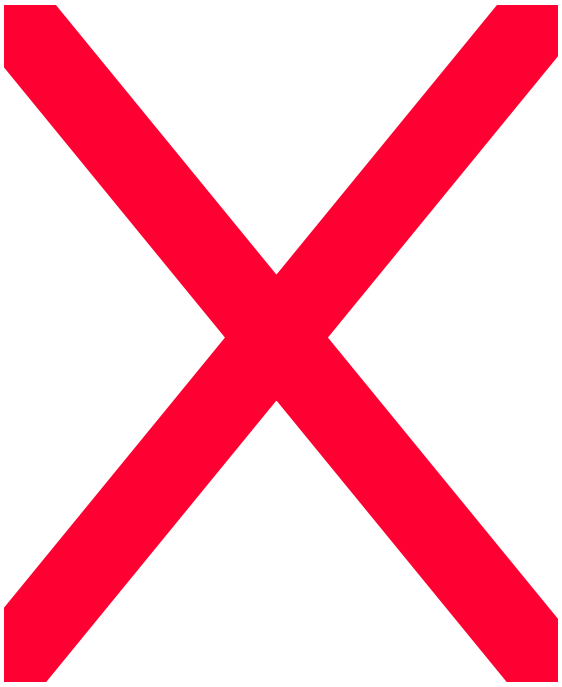
MEASLES3/CDC5

Investigation Log

Date:	Comments:

MEASLES4/CDC 5
SBH23-026
Rev. 6-90
State Form 37381R

Appendix 2: Historical View of Indiana Vaccines



MORBITITY: VACCINE PREVENTABLE DISEASES
INDIANA, 1949 – 2001

YEAR	DIPHTHERIA	TETANUS	PERTUSSIS	MEASLES	MUMPS	RUBELLA	POLIO	HEPATITIS B	*Haemophilus influenzae* (invasive)
1984	0	0	259	3	77	5	0		
1985 Mumps K-1	0	2	223	58	*44*	1	0		**Vaccine Licensed**
1986	0	2	39	39	339	0	1	360	
1987	0	2	37	0	1,006	0	1	339	
1988	0	0	86	59	83	0	0	354	
1989	0	2	95	115	50	0	0	219	97
1990	0	3	147	412	27	2	0	330	95
1991 2nd dose Measles - 6	0	2	66	*6*	9	1	1	243	44 (31 <5years of age)
1992	0	0	64	20	12	0	0	227	19 (6 <5years of age)
1993	0	1	178	1	8	3	0	249 8 < 5 years	12 (6 <5years of age)
1994	0	2	97	1	7	0	0	216 2 < 5years	26 (8 <5years of age) (1 type b <5years)
1995	0	0	76	0	10	0	0	239 5< 5 years	22 (9 <5years of age) (5 type b <5 years)
1996	1	0	128	0	8	0	0	141 3 < 5 years	21 (5 <5years of age) (0 type b<5 years)
1997	0	0	104	0	15	0	0	102 0 <5 years	24 (6 <5years of age) (1 type b <5 years)
1998	0	1	185	3	7	0	1	101 1<5years	51 (14 <5years of age) (2 type b <5 years)
1999 Hep B K-Measles K-1	0	2	90	*2*	5	1	0	*80 0<5years*	30 (3 <5years of age) (2 type b <5 years)
2000	0	0	153	0	2	0	0	92 (1 < 5 years)	33 (4 <5 years of age) (1 type b < 5 years)
2001	0	0	116	4	3	0	0	75 (0 < 5 years)	59 (8 < 5 years of age) (0 type b < 5years)

Numbers that are bolded indicate the year vaccine was licensed. (Diphtheria-1923, Tetanus-1927 and Pertussis-1926 - all licensed prior to 1949). School requirements are indicated in *italics* in the row of the applicable year and the appropriate disease column.

Appendix 3: Measles Overview

INDIANA STATE DEPARTMENT OF HEALTH

QUICK GUIDE: MEASLES

GENERAL INFORMATION

Infectious agent:

The measles virus is a paramyxovirus, genus Morbillvirus

Mode of transmission:

1. Person to person - via large respiratory droplets (most common)
2. Airborne - via aerosolized droplet nuclei (tine droplets suspended in the air for up to 2 hours)

Incubation period:

1. Exposure to prodrome - average 10-12 days
2. Exposure to rash onset - average 14 days (range 7-10 days)

Period of communicability:

From onset of prodrome through the first 4-5 days of rash

MEASLES IMMUNITY

Proof of measles immunity is determined by meeting one of the following criteria:

1. Documentation of having received two doses of live virus measles vaccine, the first dose on or after Months of age and the second dose at least 30 days after the first (the recommended interval between doses is 90 days)
2. Serological evidence of measles antibodies.
3. Diagnosis of having had measles disease as documented by a physician.

MEASLES CASE DEFINITION and CASE CLASSIFICATION (CDC)

Case definition:

A generalized maculopapular rash of ***at least 3 days duration,*** **AND a fever equal to or greater than** degrees Fahrenheit *(orally)*, **AND** <u>one or more</u> of the following: **cough, coryza, or conjunctivitis.**

Case Classification

1. **Suspected** - any rash illness with fever
2. **Probable** - *meets clinical case definition*
3. **Confirmed** - *meets clinical case definition,* and is serologically confirmed or epidemiologically linked to another confirmed or probable case.

THE COURSE OF MEASLES DISEASE

Incubation

- exposure to prodrome, average 10-12 days
- exposure to onset of rash, average 14 days (maximum range 7-18 days)

Prodrome

- begins 10-12 days after exposure to virus; generally less than 2-4 days, with a maximum range of 1-7 days
- fever and malaise for about 24 hours; fever gradually increases often as high as 103-105 degrees F
- cough, coryza (runny nose), and conjunctivitis
- Koplik's spots may occur 1-2 days before rash to 1-2 days after rash. They appear as pinpoint, depressed blue-white spots on bright red background on the buccal mucosa.

Rash

- maculopapular, usually lasting 5-6 days
- begins at the hairline, then involves the face and upper neck
- during the next threes days, gradually proceeds downward and outward, reaching hands and feet
- rash fades in the same order that it appears, from head to feet

OTHER MEASLES SYNDROMES

Atypical *measles* and *modified measles* are two syndromes frequently misinterpreted in measles surveillance and investigation. These terms should not be generalized or attributed to a rash/febrile illness not consistent with meeting the CDC case definition for measles. By definition:

atypical measles syndrome occurs only in person who are exposed to natural measles after they received killed measles vaccine (KMV), (600,000-900,000 persons received KMV in the U.S. from 1963-1967)

modified measles syndrome occurs primarily in patients who received immune globulin (IG) as post-exposure prophylaxis and in young infants who may have some residual maternal antibody.

Revised 9/98

ASLES INVESTIGATION

Measles is a reportable disease and Local Health Departments must be notified immediately when a case of measles is suspected. Local Health Departments must in turn notify the Indiana State Department of Health, Immunization Representative or the Communicable Disease Section immediately. Reporting of communicable disease is mandate under Indiana Rule 410-IAC-1-2.1.

stigation Process:

Upon notification of measles case, contact the doctor's office and begin completing the Measles Case Investigation Form. Be sure to confirm laboratory diagnosis or request serology if not already done.

After talking with doctor's, conduct an interview with the measles patient/parent to:

- ✓ confirm patient information
- ✓ confirm clinical signs and symptoms (**at a minimum**: rash onset, fever, cough, coryza, or conjuncitivitis)
- ✓ collect all pertinent medical information (recent medications, physician information, hospitalization, etc.)
- ✓ determine patient's immune status (history of **measles** vaccination)
- ✓ determine the possible source of exposure (two weeks prior to rash onset)
  - contact with a person who is suspected of having measles or who has a febrile/rash illness
  - travel or gathering
  - medical facility
- ✓ list all household contacts and determine those who do not have **measles** immunity.
- ✓ list all other contacts (include person sharing the same air space during the time and for three hours after the case was present and for those who do not have **measles** immunity.

3. Laboratory confirmation is critical; every effort should be made to obtain serology (2-3 days after onset is ideal) for IgM Testing. Indiana State Department of Health Immunology Laboratory will test at no cost. Cost of blood draw must be taken care of locally.

EASLES OUTBREAK CONTROL RECOMMENDATIONS

Live measles vaccine may prevent disease if administered within 72 hours of exposure. Immune globulin (IG) may prevent or modify sease and provide temporary protection if given within six days of exposure. (***see* NOTE**)

The following course of action is recommended to prevent the spread of measles disease:

1. Determine the type of setting involved (i.e., school, institution, camp, hospital, clinic, or physician's office).
2. Refer to the Communicable Disease Reporting Rule (IAC 410 IAC 1.2.1) for guidance on handling suspect on confirmed measles cases.
3. Identify individuals who *do not have measles immunity* and follow the recommended prophylactic treatment:
   - → individuals 12 months of age or older should receive one doe of MMR.
   - → individuals 6-12 months of age should receive one does of single antigen measles vaccine. (***See NOTE***)
   - → individuals 0-6 months of age should be referred to their pediatrician for recommended treatment with IG.
   - → Individuals who are pregnant should be referred to their OB/GYN for recommended treatment with IG.

Note

Immune globulin may be especially indicated for susceptible household contact under 1 year old (for whom the risk of complications is highest). The recommended dosage is 0.25ml/kg of body weight, maximum 15 ml intramuscularly. Live measles vaccine, preferably MMR, should be given about 5 months later if the child is then 12 months of age or older.

Do not use IG to control measles outbreaks.

Individuals less than 1 year of age given single antigen measles vaccine, should receive live measles vaccine, preferably MMR, about three months later if the child is then 12 months of age or older.

Appendix 4: Measles Activity Report for 2002

Weeks 33-52, 2002/No. 3 1/17/03

MEASLES UPDATE

National Immunization Program, Centers for Disease Control & Prevention
Measles Activity through Week 52 (ending Dec 28, 2002)

CONFIRMED CASES REPORTED TO THE MMWR (U. S. only)

Cumulative Total by Week 52, 2002: Provisional*	**37***
Total by Week 52, 2001:	**116**
Number of OUTBREAKS IN 2002: (Outbreak = 3 or more linked cases)	**3**
Number of current outbreaks:	**0**

To date, NIP has been notified of 42 confirmed measles cases for the reporting year 2002 (U.S. only). No new cases were reported to MMWR as of Week 3, 2003.

Confirmed cases recently reported (2002):

Import from India in unimmunized U.S. resident

The **Chicago** Department of Public Health confirmed measles in a 22-year-old U.S. resident sick upon her return from mission work in Madras, India on **12/17/02.** The case-patient had been home schooled and had never been immunized. While in India, the unvaccinated 22-year-old resident of Wisconsin received antibiotics for sore throat and fever. On 12/17, about 5 hours before boarding Lufthansa (Madras>Frankfurt>Chicago), she broke out in rash. The Division of Quarantine was notified by Lufthansa flight crew upon arrival in Chicago. Attempts were made to notify all passengers of exposure. The patient was hospitalized and serologically confirmed in Chicago. Viral specimens received at CDC were PCR+ and genotyping is pending. This case was reported to MMWR during Week 52, 02 by **Wisconsin** since Outagamie County is the patient's county of residence. The Lufthansa flight on 12/17 (date of rash onset) was: Flight LH 759 from Madras, India to Frankfurt, Germany with transfer to LH 430 in Frankfurt, Germany for Chicago, Illinois.

Import in an 8-month-old adoptee from China

Vancouver, **Washington (Clark County)** will report a serologically confirmed case of measles in an adoptee from China, rash onset **12/14/02**. The adoptee arrived in Portland, Oregon on 12/4/02—10 days prior to rash onset. The 8-month-old female had respiratory symptoms present when her new parents arrived in China on 11/23. She was hospitalized in Changsha Hunan Province in Yong Zhou for pneumonia on 11/26. She received continued care on 11/29 in Guangzhou Hospital. On 12/4, the family departed on China Southern Airline to Los Angeles to Portland . The infant was treated by a Portland HMO several times between 12/5 and 12/14 for pneumonia follow-up, fever, respiratory symptoms, and mouth infection. She was diagnosed and hospitalized in Portland on 12/14 (day of rash onset) and serologically confirmed as having measles infection (IgM+). The adoptive parents stated they did not visit the orphanage while in China and saw no others with febrile rash illness; however, the practice at one hospital was 2 or 3 families to a room with bedding was not changed between patients. The parents received a 2nd dose of MMR on 12/16. No other cases were identified. The Division of Quarantine notified the Guangzhou International Travelers Healthcare Center and the U.S. Consulate regarding the case.

Outbreak in Lee County, Alabama
Total confirmed: 13 cases
Rash onset dates: 10/19/02 - 11/15/02
Setting: Day-care
Source: Import from the Philippines
Ages: Eleven cases were <13 mos;
31 yrs & 50 yrs
Genotype: D3

Recently, the Alabama Department of Public Health **officially reported 12** cases from a Lee County outbreak (near Opelika/Auburn area). The source case was a 7-month-old U.S. resident who attended day-care while infectious after returning from the Philippines on Oct 8. Two adults were also infected with direct links to the day-care cases. One adult spread-case was an unimmunized 50-year-old nurse exposed in a hospital setting; while the other was a vaccinated 31-year-old male who visitied from Alpharetta, Georgia (**GA has officially reported**). The Georgia case (rash 11/14) had been vaccinated during outbreak control but the CDC Measles Lab was able to identify wild-type virus. Viral specimens were obtained from nearly every case involved in this outbreak. Genotype was D3, consistent with virus known to be circulating in the Philippines.

Week 52, 2002

MEASLES CASES CONFIRMED as of January 17 , 2003

#	Proj	Age/DOB	Rash Onset	VAX	Spread Cases	Reported to MMWR	Viral Specimens Received	Comments/Source Country
1	FL Unknown	37-year- old female	12/27/01	N	No	Yes (Wk 37, 2002)	No	Broward County, last of December 2001 Will be included in 2002 data. Source is unknown
2	CA Unknown	10 year old male	2/8/02	Y (1)	No	Yes	No	Outpatient in Long Beach Hospital Source Unknown; part of 3-case OUTBREAK VACCINATED AT 51 weeks of age;
3	CA Unknown	25 year old male	2/11/02	N	No	Yes	No	Hospital employee in Long Beach Source Unknown; part of 3-case OUTBREAK
4	CA Unknown	40 year old male	2/11/02	N	No	Yes	No	Hospital employee in Long Beach Source Unknown: part of 3-case OUTBREAK
5	FL IMPORT	18 month old female	2/16/02	N	No	Yes	No	U.S. resident in Manatee County / IMPORT Travel to Miami 1/31 & Dominican Republic 2/1-4
6	NYC IMPORT	7 month old male	3/8/02	N	Yes (1)	Yes	No	IMPORT from Pakistan, U.S. resident Source for Brooklyn OUTBREAK Infected 20-year-old aunt (rash onset 3/21 below)
7	NYC Traceabl	20 year old female	3/21/02	N	Yes (1)	Yes	No	Traceable to Import from Pakistan (case #6) Brooklyn OUTBREAK Infected her 2.5 month old son (rash onset 4/4 below)
8	NYC Traceabl	2.5 month old male	4/4/02	N	Unk	Yes	No	Traceable to import from Pakistan Brooklyn OUTBREAK Source is case # 7
9	HI IMPORT	14-year-old female	3/29/02	U	No	Yes	No	Visitor in Honolulu from Japan. Reported to MMWR in Week 30.
10	NYC IMPORT	11 month old female Manhattan (DOB 4-01)	4/6/02	N	Unk	Yes	Yes, D4	Single IMPORT U.S. resident/Pakistan Genotype D4 Not outbreak related
11	NYC D8	11 month old female Brooklyn (DOB 5-01)	4/23/02	N	Unk	Yes	Yes, D8	Unknown source; not linked to cases above. Reported as import but case will be resent as indigenous. The child had not traveled but virus suggests importation.
12	NYS IMPORT	18 month old	5/22/02	N	No	Yes	No	Non U.S. resident, IMPORT from India. Had been living in India. ORANGE County, NYS
13	GA IMPORT	22-year-old female	6/17/02	N	No	Yes	Yes, B3	Flew back 6/11-12 Lagos to London to DC to Cincinatti to C Import from Nigeria. U.S. resident of GA Hosp in Mississippi w/pneumonia (college student in TN GA resident; Genotype B3. She was returning from missio
14	NV Unknown	23-year-old male Las Vegas	6/20/02	U	No	Yes	No	Likely a measles false positive – CMV + also Born in Hawaii, in Clark County since age 19; additional lab work could not be done Initial specimen (dis by private lab. IgM+ and patient met case definition.
15	OH IMPORT	9-year-old	6/23/02	U	No	Yes	Yes, D7	Import from Italy, visitor
16	GA IMPORT	40-year-old female	6/28/02	N	No	Yes	No	Visiting scientist from RUSSIA; No virals were obtained. Arrived 21 days before rash onset. One co-worker at CDC was excluded.
17	IN Unknown	19-year-old male	7/3/02	U	No	Yes	No. Serology was IgM+ at CDC	Foreign born restaurant worker residing in Madison Coun IgM positive results at CDC. Unknown source, no spread c Found. IgM iwas ndeterminate by Indiana State Lab.
18	TX IMPORT	38-year-old female	7/10/02	U	No	Yes	Yes, State Lab only but not successful	Importation from Iran, residency unknown Born in Lubbock, Iran from age 5-10years, later lived in Switzerland.
19	MN IMPORT	29-year-old female	7/16/02	Y(2)	No	Yes	No	Not U.S. resident ; Pregnant female (5 months) arriving in St. Paul from the Ukraine; Vax history: One dose at 10 mos and another at age 11 yrs.
20	CA D7	31-year-old twin brother	7/14/02		Yes (1)	No	Yes, at the State Lab & CDC	Unknown source; Genotype D7 San Francisco resident, twin brother to next case
21	CA D7	31-year-old twin brother	7/26/02		No	No	Yes, at State Lab & CDC	Unknown source, Genotype D7 San Francisco resident, twin brother to above case

#	Project	Age/DOB	Rash	VAX	Spread?	Reported to MMWR	Viral Specimens Received	Comments / Source Country
22	MO IMPORT	30-year-old male	7/21/02	Y (1)	Yes (1)	Yes	No	U.S. resident in Malaysia July 6-19. Flights from Malaysia/Singapore/HongKong/Chicago/ St. Louis, Missouri on 7/18-19. Hospitalized 7/22 History of vaccination before 1st birthday
23	MO Traceabl	32-year-old male	8/4/02	U	No	Yes	No	Spread case from Malaysian import above
24	NYC IMPORT	24-year-old	8/11/02	N	No	Yes	No	Non U.S. resident/ Import from Japan
25	IN IMPORT	34-year-old male	8/11/02	U	Yes	Yes	Yes	U.S. resident IMPORT from South Africa Returned to U.S. on July 28 after mission trip (orphanage
26	AL IMPORT	9-mo-old	10/19/02	N	Yes (12)	Yes	Yes D3 outbreak	Index for Lee County Outbreak in a day-care U.S. resident/ Philippines ; returned on Oct 8, 02
27	AL Traceabl	11-mo-old	10/31/02	N		Yes	D3	Outbreak related/ Traceable to Import
28	AL Traceabl	10-mo-old	10/31/02	N		Yes	D3	Outbreak related/ Traceable to Import
29	AL Traceabl	11-mo-old	11/01/02	N		Yes	D3	Outbreak related / Traceable to Import
30	AL Traceabl	11-mo-old	11/01/02	N		Yes	D3	Outbreak related/ Traceable to Import
31	PA Unknown	11-mo-old	11/02/02	N	No	To be reported Soon by PA	Received. Not successful	Not outbreak -related The child is a resident of York City, PA (infected in PA) wi And was hospitalized in NYC while visiting for Halloween There were conflicting serologic results but child was IgM While hospitalized in NYC and had fever of 104, cough, c 4 day rash
32	AL Traceabl	10-mo-old	11/03/02	N		Yes	D3	Outbreak related /Traceable to Import
33	AL Traceabl	9-mo-old	11/09/02	N		Yes	D3	Outbreak related/ Traceable to Import
34	AL traceabl	9-mo-old	11/10/02	N		Yes	D3	Outbreak related/ Traceable to Import
35	AL Traceabl	10-mo-old	11/11/02	N		Yes	D3	Outbreak related / Traceable to Import
36	AL Traceabl	9-mo-old	11/11/02	N		Yes	D3	Outbreak related/ Traceable to Import
37	AL Traceabl	13-month-old	11/14/02	N		Yes	D3	Outbreak related / Traceable to Import
38	GA Traceabl	31-yr-old male	11/14/02	Y (2)		Yes	D3 – patient was vaccinated for outbreak control but CDC Lab able to identify wild type virus	Outbreak related / Traceable to Import Recall Hx of 2 doses after 1st birthday (not counting the o Dose) but hx was not documented.
39	AL Traceabl	50-yr-old female nurse	11/15/02	N		Yes	D3	Outbreak related / Traceable to Import
40	MN IMPORT	8-mo-old	11/29/02	N		No	Not at CDC Maybe at State lab	Import from Philippines in Anoka County Not US resident
41	WI IMPORT	22-year-old female	12/17/02	N		Yes	D8	22-year-old Wisconsin resident IMPORT from india (mission work) , unvaccinated & homschooled Hospitalized and confirmed in Chicago Infectious on plane upon return into Chicago on 12/17/02.
42	WA IMPORT	8-month-old female	12/14/02	N		No	No	Adoptee from Orphanage in China Arrived 12/4/02 Hospitalized in Portland, Oregon

2002 Measles Outbreaks (3 or more cases)

Shaded = outbreak was epi-linked to an imported case
Double outline = viral sequencing was successful for an outbreak case

	Proj	Location	1st & Last Rash	#Conf Cases	Ages	Source	Comments
1	CA	Long Beach	2/8/02 - 2/11/02	3	10 years, 25 years, 40 years	Unknown	Source unknown, hospital setting. No viral specimens collected.
2	NYC	Brooklyn	3/8/02 - 4/4/02	3	2.5 months, 7 mos & 20 yrs	Pakistan	Source was 7 month old (import) Pakistan. All 3 epi-linked, relatives. No viral specimens received
3	AL	Lee County (Auburn/Opelika)	10/19/02 - 11/14/02	13 12 (AL) 1 (GA)	Most <12 mos, in one day-care. One spread to nurse (AL) and a 31-yr-old vax male from Georgia	Philippines	Index (10/19) day-care attendee was exposed in the Philippines. Eleven were spread cases in day-care enrollees <13 months of age and one was a 50-year-old nurse (AL). the 13th case is a 31-year-old Dad in GA, who visited one of the families with sick child in Alabama. Sequencing was done at CDC: Strain was genotype D3.

Please send questions or comments to Dr. Mark Papania, Chief, Measles Elimination Activity, or to r Ms. Susan Redd of the National Immunization Program via e-mail to: sbr1@cdc.gov, fax (404) 639-8665, or call (404) 639-8763/8230. We appreciate knowing of any measles activity in your project area.

For genotyping results, new publications, press releases etc., please visit the CDC Measles Lab website:
http://www.cdc.gov/ncidod/dvrd/revb/measles/