

Descriptive evaluation of measles post-exposure prophylaxis administration and failure during two 2011 outbreaks in Pennsylvania

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Introduction

- Measles is a highly transmissible, vaccine-preventable viral disease
 - Characterized by rash, fever, cough, conjunctivitis, coryza and Koplik's spots
 - Highly communicable through droplet spread; virus particles can remain on surfaces for up to 3 hours
 - Usual incubation period is 7-14 days after exposure
 - Persons with measles are infectious from four days before to four days after rash onset

Background

- In Pennsylvania, persons are considered immune to measles if they:
 - Were born before 1957
 - Had physician-diagnosed and documented measles
 - Can document >1 dose of measles, mumps, rubella (MMR) vaccine
 - Have serologic evidence of measles immunity
- Post-exposure prophylaxis (PEP) is recommended for exposed, non-immune persons, using either:
 - MMR vaccine within 72 hours of earliest exposure
 - Immunoglobulin (IG) within 6 days of earliest exposure
- In Pennsylvania, exposed susceptible persons who do not receive PEP are quarantined from day 8–21 post-exposure

Objective

To review contact tracing, PEP administration and reported PEP failures during two measles outbreaks occurring in Pennsylvania during 2011.

Methods

- Contact Tracing
- Locations where measles patients were present while infectious were identified
 - Immunity status was evaluated for all identified exposed contacts
 - Non-immune persons were offered MMR, IG or measles serology testing; susceptible persons not receiving PEP were quarantined
 - For exposures occurring in public venues, press releases were made to notify the public of possible exposure(s)

- PEP Timeliness and Failure
- PEP timeliness was defined as a binary variable in accordance with current recommendations
 - PEP failures were defined as persons who received timely PEP and subsequently developed measles
 - PEP failure rates were calculated by dividing reported failures by total administered doses
 - Transmission following PEP failure was assessed

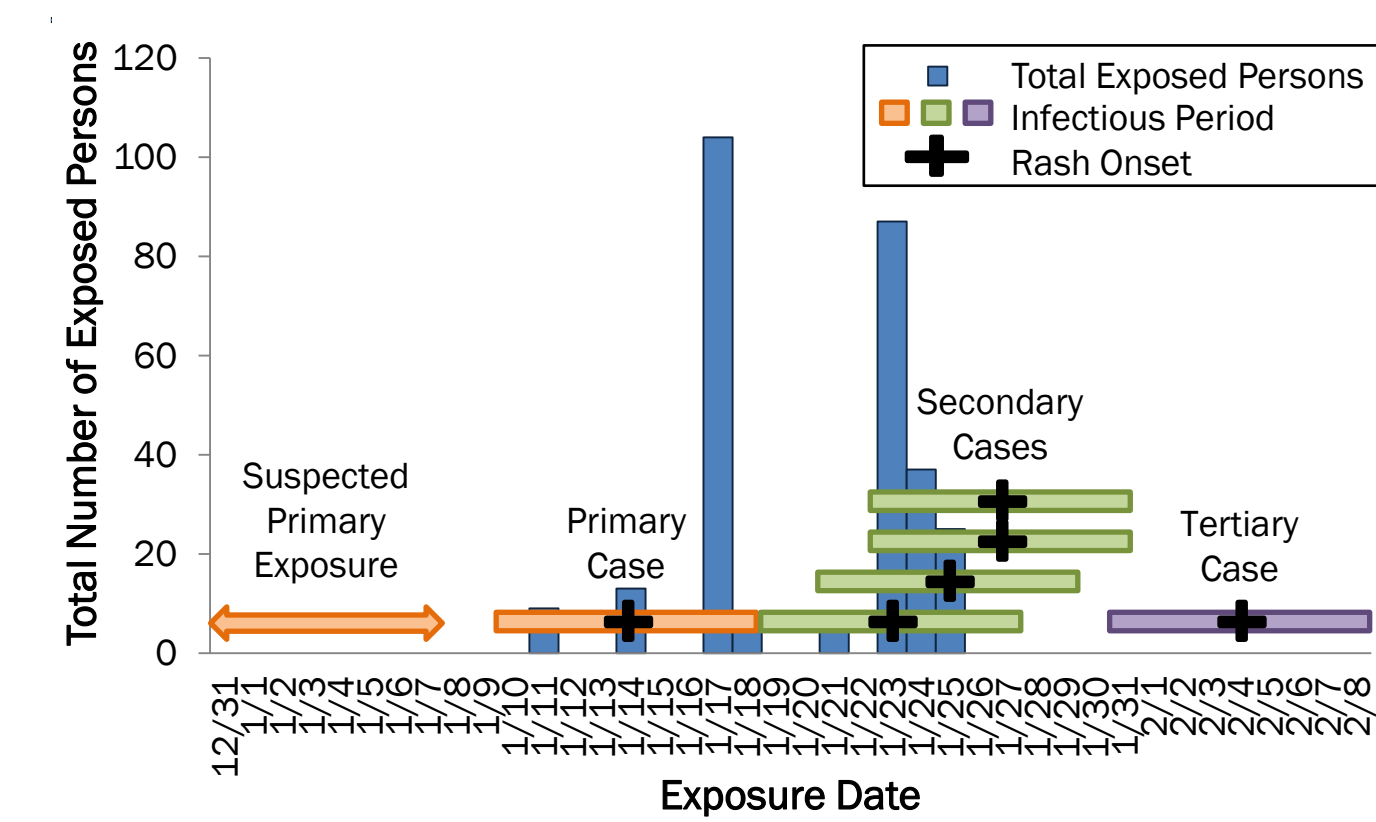
- Data Management and Analysis
- Contact tracing databases were constructed and managed using Epi-Info version 3.5.3
 - Analysis was conducted using SAS 9.2

Results

Outbreak A: Southcentral PA

- 6 confirmed measles cases occurred (1 primary, 4 secondary, 1 tertiary)
 - All cases were previously unvaccinated
 - The primary case's exposure was not identified, however, international travel through two international airports during the likely exposure period was reported
 - The primary and secondary cases are siblings
 - The tertiary case was a non-household, extended family member who received IG on day 6 after exposure to a secondary case
- In total, 290 exposed contacts were identified
 - 140 (48%) had previous evidence of measles immunity
- 54 exposed contacts received PEP (4 MMR, 50 IG)
 - 96% of all administered doses were timely (MMR: 75%, IG: 98%)
 - No MMR failures were identified
 - Only 1 IG failure (2% failure rate) was reported, in day 6 post-exposure recipient.

Outbreak A: Reported cases and total exposed contacts by date



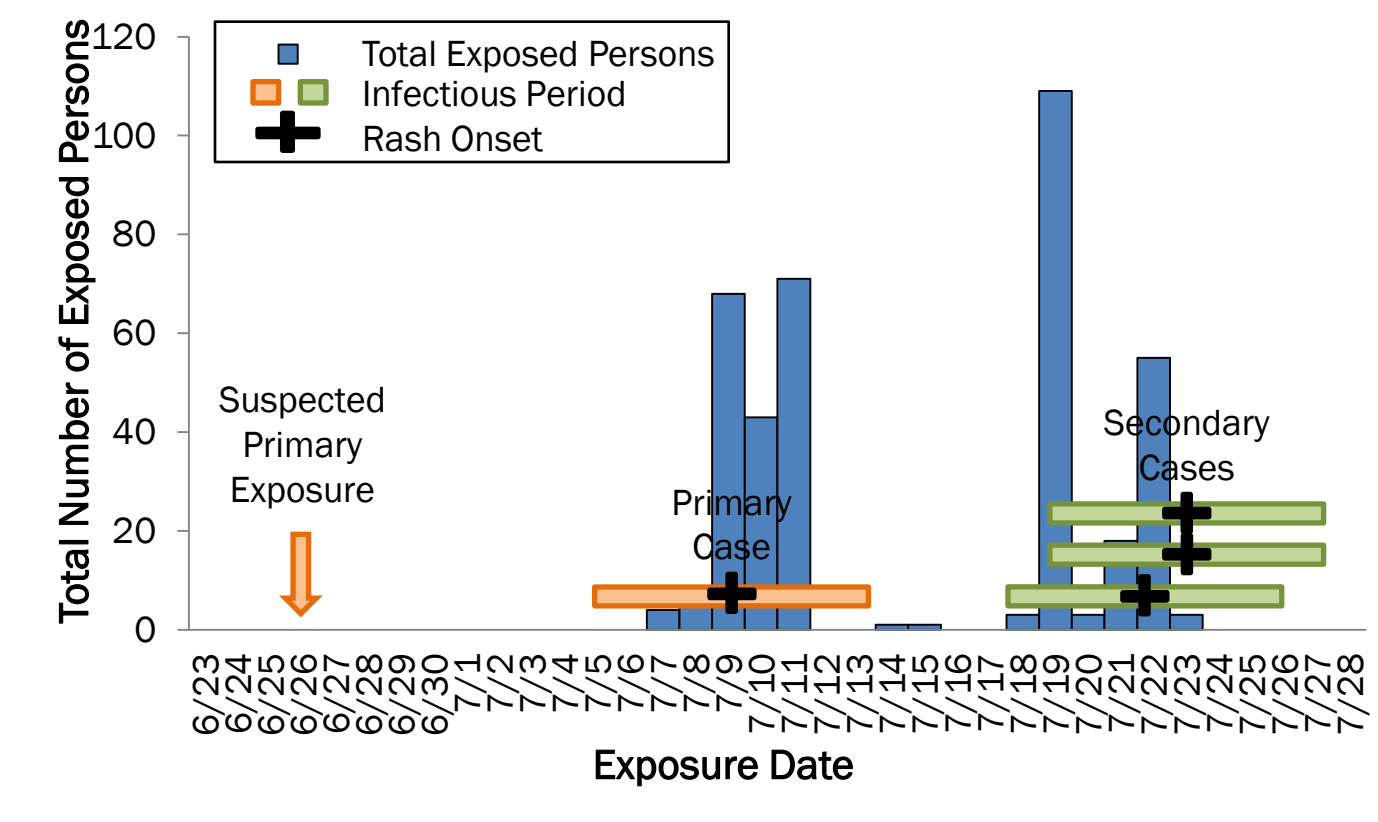
Outbreak A: PEP doses administered, by post-exposure administration day and reported failures

	PEP Non-Failures		PEP Failures	
	N	%	N	%
Received MMR (N = 4)				
0 days after exposure	1	25%	0	0%
3 days after exposure	2	50%	0	0%
5 days after exposure	1	25%	0	0%
Total	4	100%	0	0%
Received IG (N = 50)				
3 days after exposure	5	10%	0	0%
4 days after exposure	13	26%	0	0%
5 days after exposure	23	46%	0	0%
6 days after exposure	7	14%	1	2%
12 days after exposure	1	2%	0	0%
Total	49	98%	1	2%

Outbreak B: Southeastern PA

- 4 confirmed cases occurred (1 primary, 3 secondary)
 - All cases were previously unvaccinated
 - Secondary cases occurred among two siblings and a playmate of the primary case
 - The primary case's exposure was not identified, however, domestic travel through two international airports during the likely exposure period was reported
- In total, 387 exposed contacts were identified
 - 269 (70%) had previous evidence of measles immunity
- 43 exposed contacts received PEP (11 MMR, 32 IG)
 - 93% of all doses were timely (MMR: 82%, IG: 97%)
 - Only 1 MMR failure (9% failure rate) was reported, in a day 2 post-exposure recipient.
 - No IG failures were identified
 - Two additional cases occurred among index case household contacts who received MMR on post-exposure day 7

Outbreak B: Reported cases and total exposed contacts by date



Outbreak B: PEP doses administered, by post-exposure administration day and reported failures

	PEP Non-Failures		PEP Failures	
	N	%	N	%
Received MMR (N = 11)				
1 day after exposure	3	27%	0	0%
2 days after exposure	4	36%	1	9%
3 days after exposure	1	9%	0	0%
7 days after exposure	2	18%	0	0%
Total	10	91%	1	9%
Received IG (N = 23)				
0 days after exposure	1	3%	0	0%
2 days after exposure	1	3%	0	0%
4 days after exposure	8	25%	0	0%
5 days after exposure	13	41%	0	0%
6 days after exposure	8	25%	0	0%
7 days after exposure	1	3%	0	0%
Total	32	100%	0	0%

Summary

- Two outbreaks involving many susceptible contacts were investigated in Pennsylvania during 2011
- Among 677 persons exposed during both outbreaks, 97 (14%) received PEP (15 MMR, 82 IG)
- 95% of all administered PEP doses were given within the recommended timeframe
- Two PEP failures were reported (2% failure); further transmission was not identified

Discussion

- Measles has been eliminated from the Western Hemisphere, however importations from other parts of the world continue
 - Due to ongoing importation and under-immunization, the largest number of reported measles cases in the United States since 1996 occurred in 2011
- Though several cases were reported in each outbreak, sustained community transmission was not identified, likely because of generally high community levels of measles immunity
 - Continued routine vaccination with MMR vaccine prevents measles disease and should be strongly encouraged
- Each identified case requires significant public health agency efforts to reduce subsequent transmission potential

Limitations

- Immunity status of exposed contacts was assessed by self-report
- Limited information on non-household exposures was available

Conclusion

- These findings demonstrate that pockets of non-immune populations exist in the United States and emphasize the importance of prompt identification and follow-up of susceptible exposed contacts during measles investigations

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