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Clinical Experience, Infection Control Practices and Diagnostic Algorithms for Poxvirus Infections – an Emerging Infections Network Survey

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Abstract

Background:
The Emerging Infections Network (EIN) is a sentinel, provider-based network of infectious disease consultants. In February 2007, we conducted a survey of EIN members to determine their experience with human poxvirus infections, and their likely approaches to diagnosis and reporting of suspected cases.

Methods:
A poxvirus survey was distributed by e-mail or facsimile to EIN members. The survey consisted of two case scenarios (monkeypox and orf) and included questions regarding likely approaches to diagnostic testing, transmission precautions, and reporting mechanisms for each case. Respondents were also asked about the frequency of various poxvirus infections in their practices.

Results:
Of the 213 respondents who completed the questionnaire (20% of those surveyed), 89% of those responding to the monkeypox scenario reported that they would request diagnostic confirmation by PCR, through either a local/academic laboratory (29%) or a State or Federal laboratory (66%). Only 3% reported that they would likely rely on clinical diagnosis alone. In contrast, when presented with the orf scenario, 22% of respondents reported that they would rely on clinical diagnosis, though PCR testing is now available. The likely level of transmission precautions that would be employed during patient exam for either scenario varied greatly among respondents. When recalling suspected poxvirus cases in their practices, 96.6% of respondents had seen at least one case of molluscum contagiosum, 24% orf, and 8.5% vaccinia from contact of vaccinees.

Conclusions:
There was considerable variability in responses to the survey. More respondents would order diagnostics and institute a higher level of transmission precautions for suspected cases of monkeypox than orf, but the results of this survey suggest a greater level of physician outreach is needed to reinforce optimal detection, management and reporting of suspected poxvirus infections.

Introduction

- Poxviruses have gained renewed awareness in public health practice due to bioterrorism concerns and the publicity surrounding the 2003 US monkeypox outbreak
- Poxvirus infections are becoming more common in clinical practice and many of these infections share common clinical features
- N. American parapoxviruses, such as orf & pseudocowpox, are seen primarily in rural areas however they are also starting to be seen in larger communities (petting zoos & small animal cultivation)
- Increase in cases of vaccinia, either in contacts of vaccinees or lab accidents
- Diagnostic tests are available for poxvirus infections, however some of are only available at specialized reference centers
- The Infectious Diseases Society of America's (IDSA) Emerging Infections Network (EIN) is a provider-based sentinel network of infectious disease consultants
- We surveyed the EIN in order to understand physicians' approaches to diagnosis, infection control practices and clinical experience with poxvirus infections

Methods

Survey design:

- Survey consisted of two unknown case scenarios (monkeypox and orf) **(Figure 1)** with corresponding questions regarding diagnostic tests & labs utilized, transmission precautions taken, and points of contact used
- Case scenarios questions were in the form of checkboxes, some had an "other" option with free text
- Questions regarding previous suspected poxvirus cases seen during their practice were included
- The surveys were distributed twice during February and March of 2007 by e-mail and facsimile to the 1,080 members of the EIN.
- Concern about low response rate led to the option of omitting the name field and, in place, giving state and type of practice. Therefore, some of the survey responses have no linked demographic data

Data analysis:

- Basic response rates were calculated for the demographic data & frequencies were calculated for each survey question
- Denominators vary for several questions as members did not always respond to all the survey questions
- Chi-square tests were run using SAS® 9.1 to compare responses to the two case scenarios (significance: p<0.05)

Results

- 212 (20%) of 1,080 members returned completed surveys; respondents represent all census regions across the US along with 2 from Canada
- U.S. response rates ranged from 25.93% in the Mountain region to 13.83% in the New England region **(Table 1)**
- 141 (77.5%) practice adult medicine, 93 (63.7%) have urban practices, 131 (72.8%) teach, 105 (52.2%) have an academic type practice
- 51 (45.5%) reported having 10 to 20 years of experience **(Table 1)**
- More respondents would rely on clinical diagnosis alone for the orf scenario (22%) than for the monkeypox scenario (3%) (p<0.0001).
- More respondents would order PCR, serology, and culture or histopathology for monkeypox than for the orf case scenario (p<0.0001) **(Table 2)**
- Respondents more likely to utilize a state/federal lab for PCR & serology and in-house or local academia lab for culture & histopathology **(Table 2)**
- A majority (48.5%) would choose airborne precautions for the monkeypox scenario and contact (63%) for the orf scenario **(Figure 2)**
- The majority would contact their state or local health department (60% and 49% respectively) for both scenarios. **(Figure 3)**
- Respondents were more likely to say they would not contact anyone for the orf scenario (28.4%) vs. the monkeypox scenario (2.4%) (p<0.0001)
- A majority (96.6%) have seen ≥ 1 case of molluscum contagiosum and 24% of respondents have seen ≥ 1 case of orf **(Figure 4)**
- 4% have seen vaccinia in a lab worker and 8.5% have seen vaccinia in a vaccinee contact **(Figure 4)**
- 6% have seen at ≥ 1 case of monkeypox, with the majority being in the Midwest region where US monkeypox outbreak occurred **(Figure 4)**

Table 1: Demographic data and response rate

Variable	Respondents (n=212), no. (%)	Total EIN (n=1076*), no. (%)	Response Rate
Type of practice			
Adult	141 (77.5%)	786 (73.1%)	17.94%
Pediatric	34 (18.7%)	213 (19.8%)	15.96%
Both	7 (3.9%)	75 (7.0%)	9.33%
Other	0	2 (0.2%)	0%
Practice location			
Rural	11 (7.5%)	48 (6.8%)	22.9%
Suburban	40 (27.4%)	150 (21.3%)	26.67%
Urban	93 (63.7%)	496 (70.6%)	18.75%
Combination	2 (1.4%)	9 (1.3%)	22.22%
Teach			
Yes	131 (72.8%)	637 (61.6%)	20.57%
No	49 (27.2%)	397 (38.4%)	12.34%
Practice type			
Academic	105 (52.2%)	404 (55.9%)	25.99%
Private	84 (41.8%)	264 (36.7%)	31.82%
Other	12 (6.0%)	54 (7.5%)	22.22%
Region			
New England	13 (6.3%)	92 (8.6%)	13.83%
Mid Atlantic	28 (13.5%)	196 (18.2%)	14.29%
East North Central	36 (17.3%)	144 (13.4%)	25.00%
West North Central	16 (7.7%)	75 (7.0%)	21.33%
South Atlantic	34 (16.4%)	214 (19.9%)	15.89%
East South Central	12 (5.8%)	49 (4.5%)	24.49%
West South Central	18 (8.7%)	72 (6.7%)	25.00%
Mountain	14 (6.7%)	54 (5.0%)	25.93%
Pacific	35 (16.8%)	160 (14.9%)	21.88%
Canada	2 (1%)	13 (1.2%)	15.38%
Puerto Rico	0 (0%)	6 (0.6%)	0%
No. yrs practice			
<10 yrs	9 (8.0%)	74 (16.9%)	12.16%
10-20 yrs	51 (45.5%)	162 (37.0%)	31.48%
21-30 yrs	38 (33.9%)	147 (33.6%)	25.85%
31+ yrs	14 (12.5%)	55 (12.6%)	25.45%

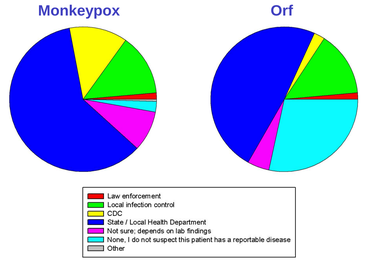
Note: # of respondents does not equal 212 for all variables due to missing information
*Demographic data was available for 1076 of the 1080 members in the EIN

Table 2: Diagnostic tests and labs utilized

Diagnostic Test	Lab Utilized	Monkeypox Scenario #	Monkeypox Scenario %*	Orf Scenario #	Orf Scenario %*
PCR	In-house / local academia	61	28.8%	70	33.0%
	State / Federal	141	66.5%	73	34.4%
	Commercial reference lab	25	11.8%	26	12.3%
Serology	In-house / local academia	37	17.5%	17	8.0%
	State / Federal	106	50.0%	46	21.7%
	Commercial reference lab	36	32.1%	28	13.2%
Culture / Histopathology	In-house / local academia	99	46.7%	67	31.6%
	State / Federal	68	32.1%	23	10.8%
	Commercial reference lab	8	3.8%	6	2.8%

* Percent of total responders. Numbers do not add up to 100% as respondents were able to pick multiple choices

Figure 3. First point of contact for case scenarios



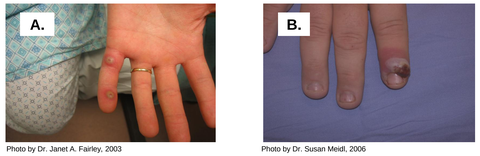


Photo by Dr. Janet A. Fairley, 2003

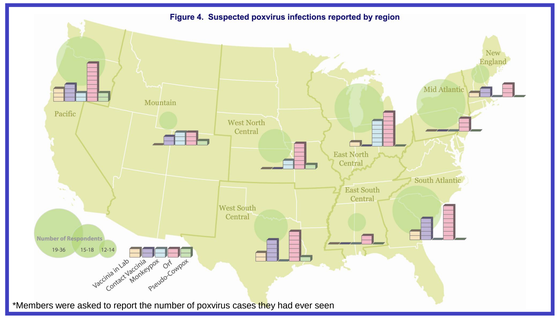
Photo by Dr. Susan Meidl, 2006

Figure 1.

A) Monkeypox case scenario: 23 yr. old male medical student; several pustular skin lesions (upper and lower extremities including volar surfaces), lymphadenopathy, fever, chills, backache, malaise; recently returned from Democratic Republic of Congo where he examines patients with undiagnosed febrile rash illness

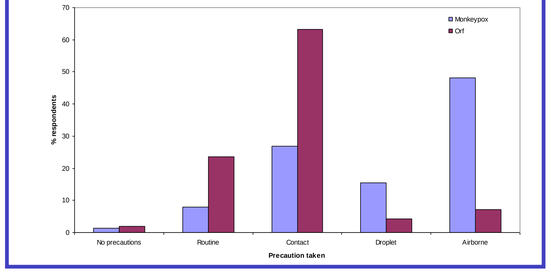
B) Orf case scenario: 42 yr. old male; 2 large nonpruitic, painless vesicular lesions on thumb and forefinger; no other symptoms; works on farm, recently purchased juvenile goats at auction and noticed ulcers on their oral mucosa

Figure 4. Suspected poxvirus infections reported by region



*Members were asked to report the number of poxvirus cases they had ever seen

Figure 2. Precautionary measures taken for case scenarios



Conclusions

- This survey provided an opportunity for public health practitioners to identify knowledge gaps and to improve the availability of educational materials (addressing infection control, diagnostics, and reporting algorithms) to front-line physicians.
- The public health community should play an active role in disseminating information about new diagnostic tests for poxvirus infections (such as PCR and serologic tests for orf; see table of diagnostic tests handout.)
- The public health community can also play a greater role in re-enforcing messages addressing the appropriate levels of infection control for dealing with suspected cases of poxvirus infection.
- Physicians responding to this survey reported having seen a variety of human poxvirus infections. Poxviruses occur across the US and across the world. They are not universally common but can raise concern. Frontline providers should be provided with the necessary tools to make reasoned decisions. This survey identified knowledge gaps and will help public health practitioners to better serve physicians by focusing educational efforts in these key areas.

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The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention