

# **Are Martha's Vineyard Landscapers at Increased Risk for Tularemia? Massachusetts 2001**

**Katherine Feldman, DVM, MPH**

**Division of Vector-Borne  
Infectious Diseases**

# Tularemia

- **Bacterial zoonosis**
- **Caused by *Francisella tularensis***
  - Small, gram-negative coccobacillus
- **Maintained and amplified in nature**
  - Vertebrate reservoirs, arthropod vectors
- **Transmitted various ways, resulting in various clinical manifestations**
- **On average, 124 cases annually in the U.S.**

# Martha's Vineyard

- Tularemia endemic
- Site of only reported U.S. outbreaks of pneumonic tularemia
- Summer 2000, 2<sup>nd</sup> of these outbreaks
  - 5 of 15 patients were landscapers
  - Mowing or brush-cutting risk factor for pneumonic illness
    - OR = 9.2, 95% CI (1.6, 68.0)
    - AOR = 6.7, 95% CI (1.1, 39.9)

# Martha's Vineyard 2001

- **3 pneumonic case-patients**
  - 2 were professional landscapers
  - 1 mowed 4 hours/day in week before illness
- **Objectives**
  - Determine if Martha's Vineyard landscapers at increased risk
  - Assess risk factors among landscapers

# Landscaper Serosurvey

- Professional landscapers  
n = 132
- Serology
- Risk factor questionnaire
  - Landscaping activities
  - Contact with animals
  - Exposure to arthropods
  - Past medical history



# Control Groups for Seroprevalence

## 3 control groups

- Doctor's office patients & members of civic organizations
  - n = 103
- Healthy Martha's Vineyard residents, July
  - n = 99
- Healthy Martha's Vineyard residents, Oct
  - n = 108

# Seroprevalence Ratios

Population	Sero+ among Landscapers # (%)	Sero+ among Controls # (%)	Seroprevalence Ratio (95% CI)	Yates Corrected p-value
Landscapers vs. Dr's office patients & members of civic orgs	12/132 (9.1)	0/103 (0)	Undef (Undef, Undef)	0.004
Landscapers vs. residents (July)	12/132 (9.1)	1/99 (1)	9.0 (1.2, 68.1)	0.02
Landscapers vs. residents (October)	12/132 (9.1)	0/108 (0)	Undef (Undef, Undef)	0.004

# Characteristics of Seropositive Landscapers, n=12

Male	11
History of tularemia (year)	2 (1985, 1986)
Undiagnosed febrile illness 2000 or 2001	2
Med age in yrs, range	35, 18 - 66
Med yrs landscaping, range	11, 2 - 52
Reciprocal titer range (positive cutoff 1:128)	256 – 2048



# Seropositivity by Exposure Martha's Vineyard 2001

Exposure	Sero+ among Exposed # (%)	Sero+ among Unexposed # (%)	Prevalence Ratio (95% CI)	Yates Corrected p-value
Use power blower	11/72 (15.3)	1/60 (1.7)	9.2 (1.2, 69.0)	<b>0.02</b>
Mow or brush-cut	12/116 (10.3)	0/16 (0)	Undef (Undef, Undef)	0.38
Weed-whack	11/106 (10.4)	1/26 (3.8)	2.7 (0.4, 20.0)	0.51

# Seropositivity by Exposure Martha's Vineyard 2001

Exposure	n	Mean	Median	Mann Whitney p-value
<b>Avg hours mow / week</b>				
Seropositive	12	35.2	29.5	
Seronegative	118	20.9	15	<b>0.03</b>
<b>Avg hours weed-whack / week</b>				
Seropositive	11	25.7	10	
Seronegative	114	9.1	3	<b>0.01</b>
<b>Avg num lawns mowed / week</b>				
Seropositive	11	31.4	25	
Seronegative	112	11.5	3	<b>0.0003</b>

# Correlation Coefficients

	Avg hours mow / week	Avg hours weed-whack / week	Avg number lawns mowed / week
Avg hours mow / week	1	<b>0.71</b> <0.0001	<b>0.57</b> <0.0001
Avg hours weed-whack / week		1	<b>0.64</b> <0.0001
Avg number lawns mowed / week			1

# Logistic Regression

## Martha's Vineyard 2001

Exposure	AOR	(95% CI)	p-value
Use power blower	7.0	(0.8, 58.4)	0.07
Avg hours mow / week	1.02	(0.99, 1.05)	0.12
Use power blower	5.4	(0.6, 48.3)	0.12
Avg hours wd-whack / week	1.03	(1.00, 1.06)	0.05
Use power blower	7.4	(0.9, 62.1)	<b>0.07</b>
Avg number lawns mowed / week	1.03	(1.01, 1.06)	<b>0.02</b>

# Threshold for Number Lawns Mowed / Week

Exposure	Sero+ among Exposed # (%)	Sero+ among Unexposed # (%)	Prevalence Ratio (95% CI)	Yates Corrected p-value
Num lawns mowed / week $\geq$ 10	10/44 (22.7)	1/79 (1.3)	18.0 (2.4, 135.7)	<b>0.0002</b>

# Adjusted Odds Ratios of Dichotomous Variables\*

Exposure	AOR	(95% CI)	p-value
Use power blower	4.1	(0.5, 36.1)	0.21
Num lawns mowed / week $\geq 10$	15.4	(1.8, 131.0)	0.02

\* Calculated using logistic regression

# Conclusions

- **Martha's Vineyard landscapers were at least 9 times more likely to be seropositive than other residents**
- **Among landscapers, the number of lawns mowed appears to be associated with seropositivity**
- **Prevention efforts should target aerosol-generating landscaping activities, especially in those who mow many lawns**

# Landscaper Education

- **Survey area for carcasses or excreta**
- **Ensure equipment in good working order**
- **Seek prompt medical attention if febrile illness develops after aerosol-generating activities**



# Possible Limitations

- Convenience sample of landscapers and controls
- Total landscaper population on Martha's Vineyard is unknown
- Small number of seropositive landscapers
- Cross-sectional survey
  - Cannot assess temporal relationship

# Acknowledgments

- **Co-authors**
  - Donna Stiles-Enos, Kathleen Julian, Bela Matyas, Sam Telford, May Chu, Lyle Petersen, Ned Hayes
- **Martha's Vineyard Medical Community**
  - Drs. Hoak and Tsikitas and their staffs
- **Martha's Vineyard Hospital**
  - Maia Gaillard and staff
- **Martha's Vineyard State Forest HQ and staff**
- **C & W Power Equipment**
- **Harvard School of Public Health**
  - Heidi Goethert, Philippe Parola, Zenda Berrada
- **Massachusetts Dept of Public Health**
  - Sue Soliva, Melissa Cumming, Cheryl Gauthier

# On Tularemia...

**I know of no other infection of animals communicable to man that can be acquired from sources so numerous and so diverse. In short, one can but feel that the status of tularaemia, both as a disease in nature and of man, is one of potentiality.**

**R. R. Parker, 1934**



# Gender and Age of Landscapers and Control Groups

Potential Risk Factor	n	Median Age	n	% Male
Landscapers	130	37.5	131	79.4
Patients / civic orgs	103	57	103	60.2
Landscapers	130	37.5	131	79.4
MV residents (July)	99	49	99	48.5
Landscapers	130	37.5	131	79.4
MV residents (October)	108	48.5	108	40.7

# Risk Factors for Seropositivity Martha's Vineyard 2001

Potential Risk Factor	Sero+ among Exposed # (%)	Sero+ among Unexposed # (%)	Prevalence Ratio (95% CI)	Yates Corrected p-value
Mow or brush-cut over animal	4/30 (13.3)	8/79 (10.1)	1.3 (0.4, 4.1)	0.90
Did not have attached ticks	8/59 (13.6)	4/73 (5.5)	2.5 (0.8, 7.8)	0.19
Smoke in past year	3/49 (6.1)	9/82 (11.0)	0.6 (0.2, 2.0)	0.54
MD dx'd asthma	0/16 (0)	11/113 (9.7)	Undef (Undef, Undef)	0.41

# **Are Martha's Vineyard Landscapers at Increased Risk for Tularemia? Massachusetts 2001**



**Katherine Feldman, DVM, MPH**

**Centers for Disease Control  
and Prevention**

**Division of Vector-Borne  
Infectious Diseases**