



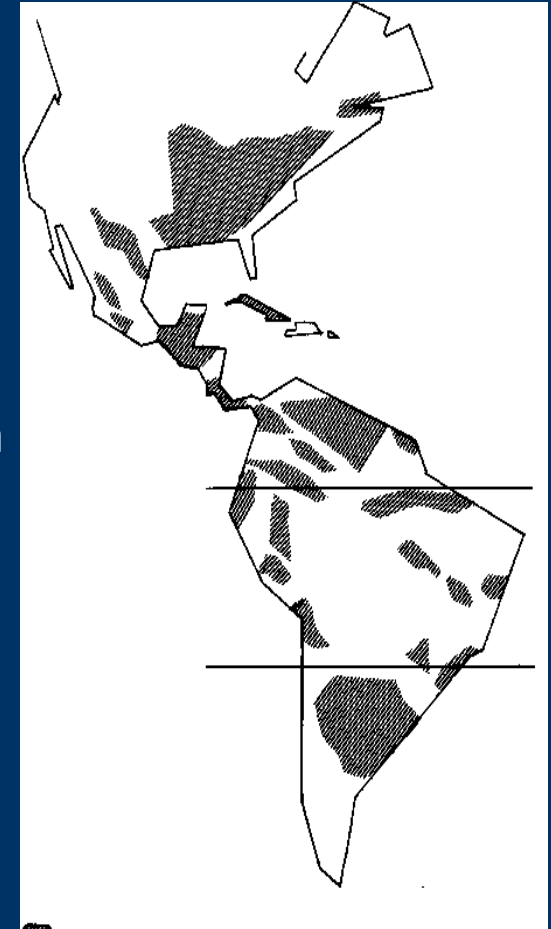
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Recurrent Histoplasmosis Outbreaks in Acapulco, Mexico

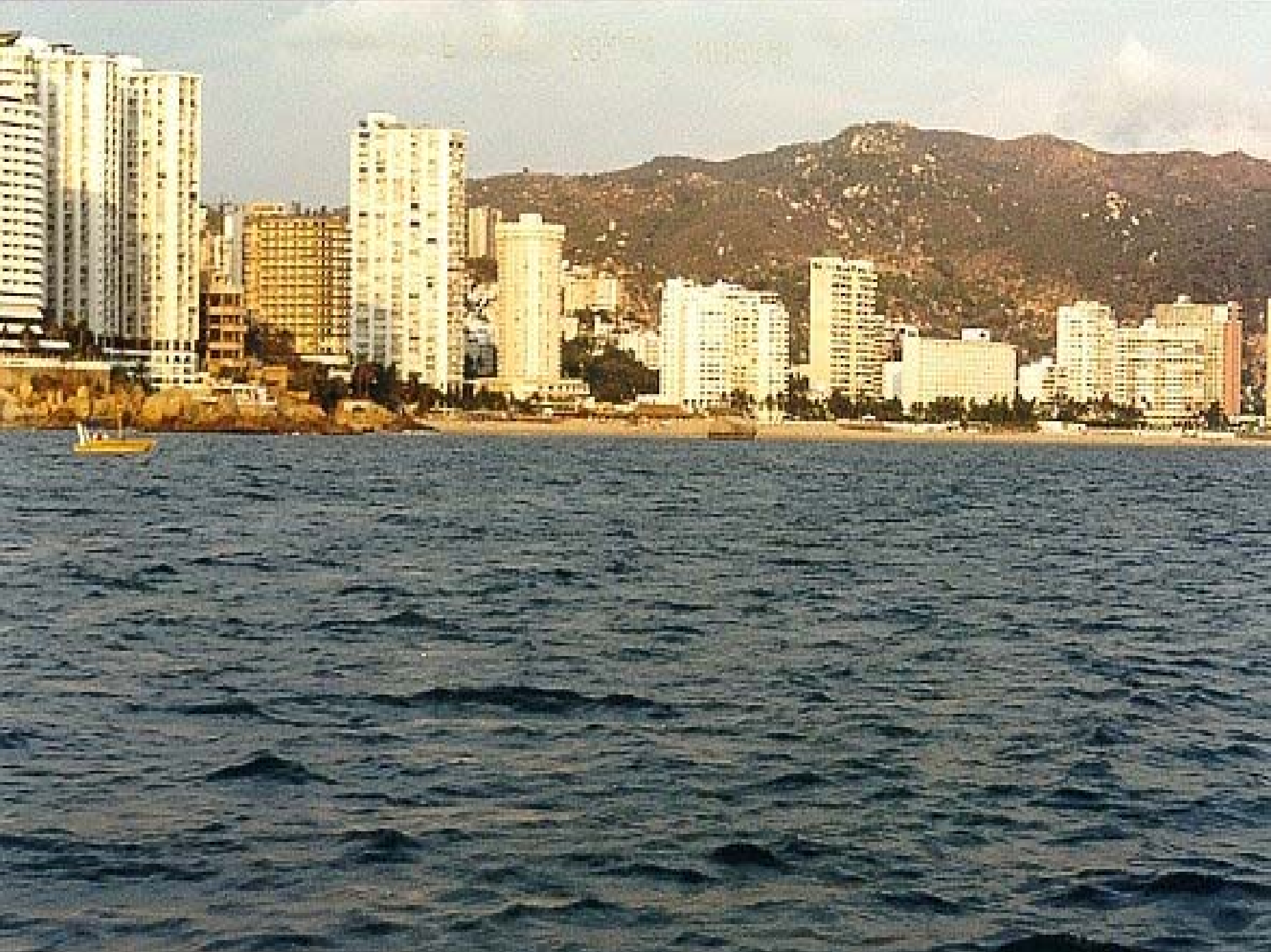
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Introduction

- Histoplasmosis has a worldwide distribution
- March 2001: 229 American students visiting Acapulco became ill with a febrile respiratory disease, strongly associated with staying at a beach hotel (RR=13.8, $p < 0.001$, CDC and Mexican Ministry of Health)
- 1 month before, an outbreak was reported in tourists from Monterrey, Mexico, staying at the same hotel



MMWR 2001;50:359-360



Methods

- **Population**

- 382 individuals attending two different meetings in September, 2001.

- **Case definitions**

- **Symptomatic case**: any case with documented fever and any other symptom known to be associated with histoplasmosis, with no other cause for the illness
- **Case**: any individual with or without symptoms and with positive serology for histoplasmosis
- **Control**: any individual with or without symptoms and a negative serology by the end of the study

Methods

- **Serology**
 - Serum samples from acute and/or convalescent phase
- **Risk factor study**
 - A questionnaire was administered to obtain information regarding illness and potential sources of infection
- **Environmental samples**
 - Collected from areas in and around the hotel
 - Intraperitoneal mouse inoculation
 - Direct exposure of sentinel BALB/C mice



Conventions Attendees
382

Group 1
Sept. 13-16
71 participants

Group 2
Sept. 18-21
311 participants

Patients seen at the
outpatient clinic
173 (45%)

Chest X-ray
147 (85%)

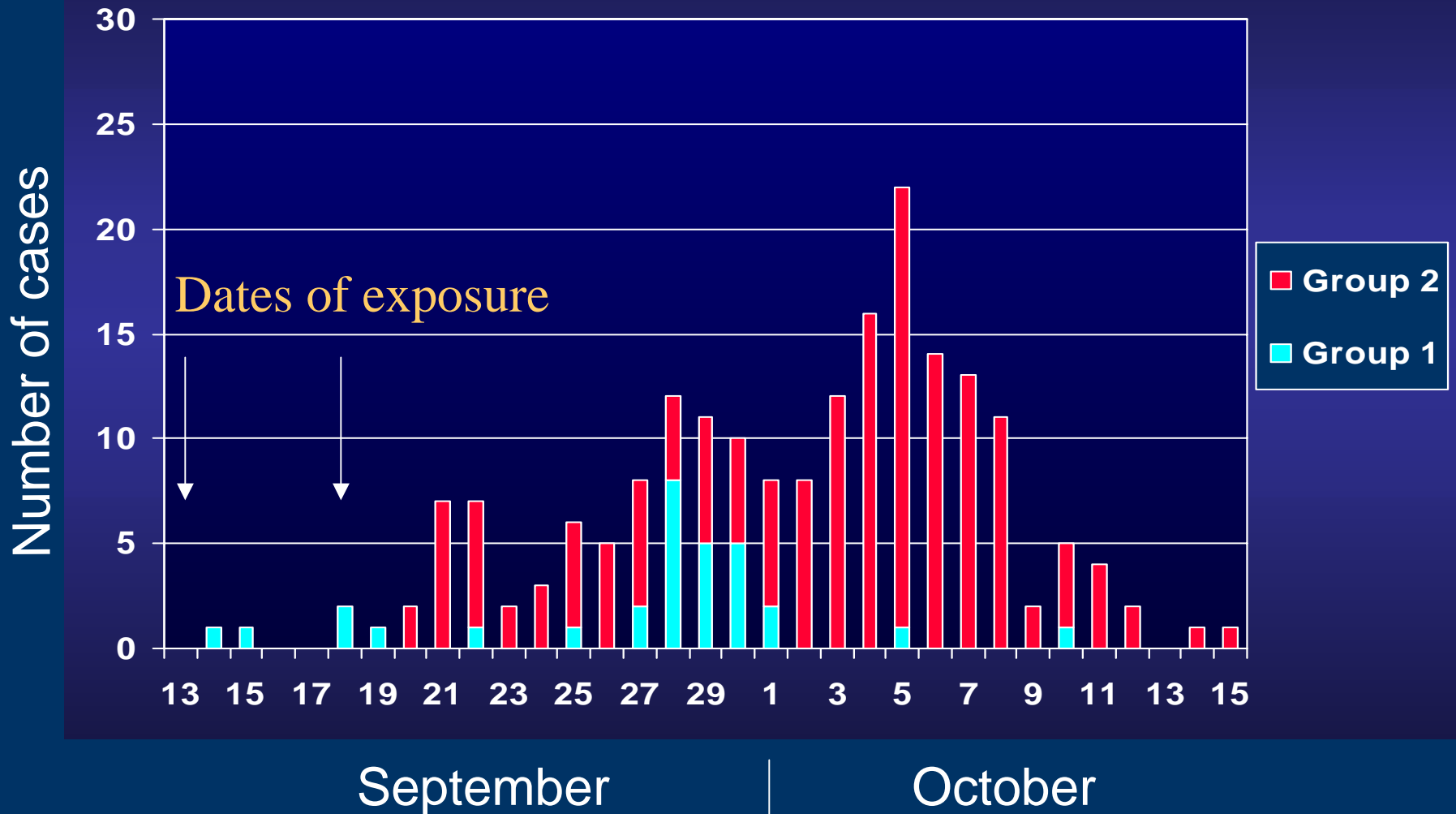
Abnormal
69 (46%)

Questionnaires
243 (63%)

Symptomatic
219 (90%)

Asymptomatic
24 (10%)

Epidemic curve by date of onset



Symptoms in 219 patients with Histoplasmosis

Symptom	Present	%
Headache	202	92
Malaise	186	84
Fever	185	84
Night sweats	177	80
Chills	161	73
Cough	144	65
Chest pain	126	57
Anorexia	118	53
Weight loss (median 8.1 lb)	97	44
Diarrhea	31	14

Patients seen at
outpatient clinic
173

Serology
173

Serology+ questionnaire
130 (75%)

Positive 144 (83%)
Negative 19 (11%)
Undetermine 10 (6%)

Cases: 113 subjects
Controls: 17 subjects

Risk Factor Analysis

Histoplasma Serology Results

- From 104 cases with paired sera, specific antibodies to *H. capsulatum* were found in 41% of acute sera and 89% of convalescent sera.
- Histoplasma antigen was found in 7/27 (26%) urine samples taken after 10 days of illness

Risk factors from Population and Indoor Areas

Risk Factor	Patients (%)	Controls (%)	<i>P</i>
Age	40.5 ±10.2	43 ± 8.8	0.49
20-30 yrs.	19 (90)	2 (9)	0.69
>30-40	45 (88)	6 (12)	
>40-50	24 (80)	6 (20)	
>50	25 (89)	3 (11)	
Gender			
Male	75 (86)	12 (14)	0.73
Female	38 (88)	5 (12)	
Hotel floor			
0-10	43 (90)	5 (10)	0.77
11-20	57 (85)	10 (15)	
>20	12 (86)	2 (14)	
Hours in hotel room			
<1 - 4	11 (85)	2 (15)	0.88
5 - 8	67 (88)	9 (12)	
> 9	35 (85)	6 (15)	
Use of room air conditioning (h):			
1 - 3	29 (85)	5(15)	0.47
4 - 8	27 (87)	4(13)	
9 - 24	37 (88)	5(12)	

Risk factors from Outdoor Areas

Risk Factor	Patients (%)	Controls (%)	<i>P</i>
Swimming pool bar			
yes	14 (93)	1 (7)	0.38
no	99 (86)	16 (14)	
Gym			
yes	11 (100)	0	0.18
no	97 (85)	17 (15)	
Swimming pool 4th. Floor			
yes	9 (75)	3 (25)	0.20
no	101 (88)	14 (12)	
Time in Lobby (min)			
< 30	50 (86)	8 (14)	0.52
30 – 60	34 (92)	3 (8)	
> 60	24 (83)	5 (17)	
Beach			
yes	69 (90)	8 (10)	0.25
no	42 (84)	8 (16)	

Significant Risk factors for the acquisition of Histoplasmosis

Risk Factor	Patients (%)	Controls (%)	RR	<i>P</i>
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Univariate Analysis

Visiting swimming pool area

yes	53 (92.9)	4 (7.0)	2.87	0.06
no	60 (82.1)	13 (17.8)		

Time in Conference Hall

< 8 h	56 (81)	13 (19)	0.20	0.02
> 8 h	42 (95)	2 (5)		

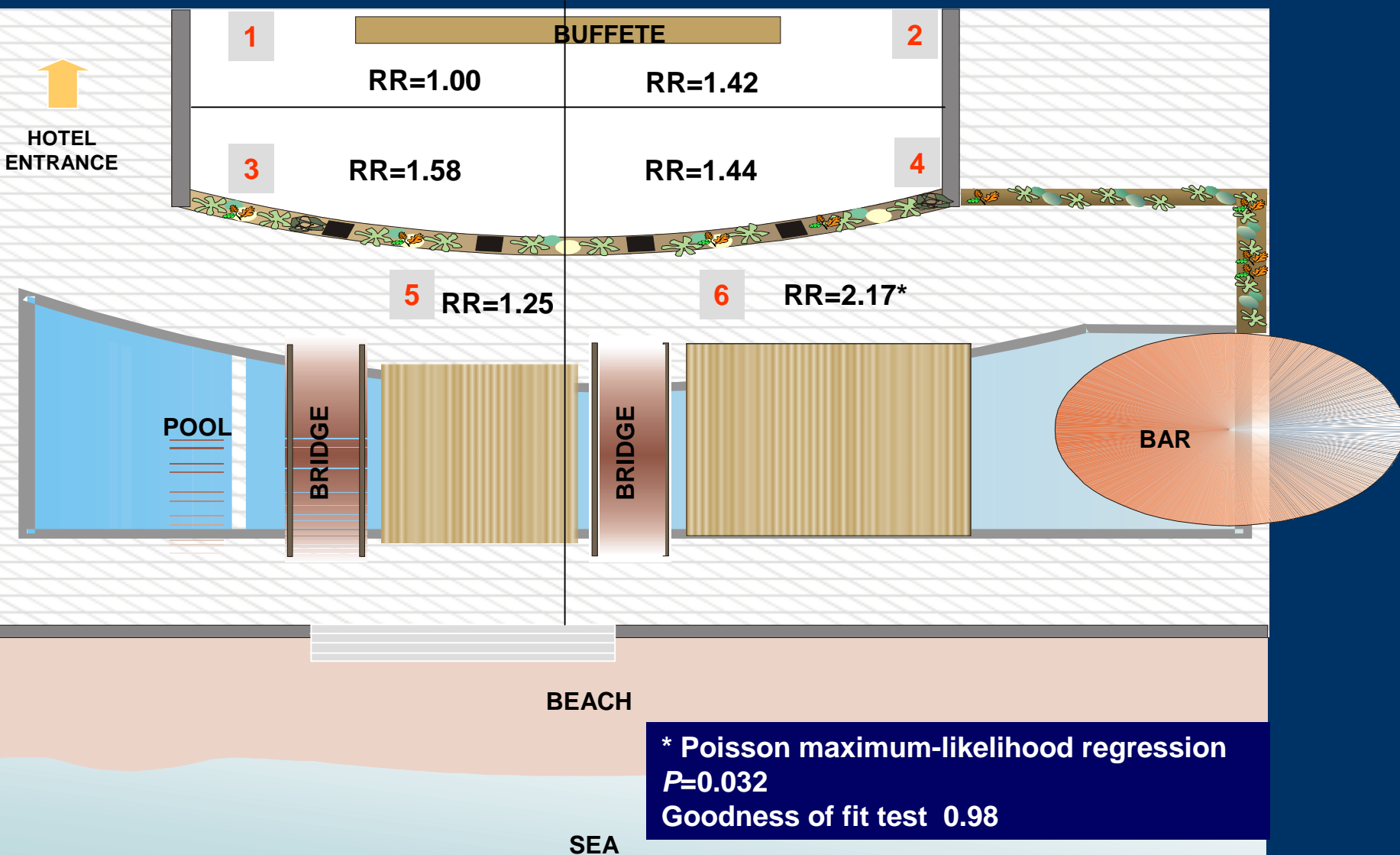
Multivariate Analysis*

Visiting swimming pool area			3.10	0.09
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Time in Conference Hall			0.20	0.02
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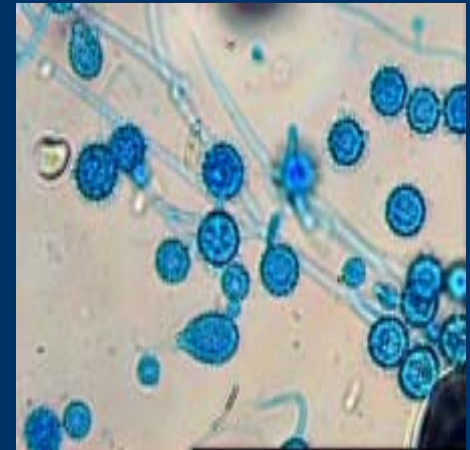
* Multivariate logistic regression; likelihood ratio test statistic (G) *P* = 0.01

Probability of becoming infected with *H capsulatum* by place of exposure

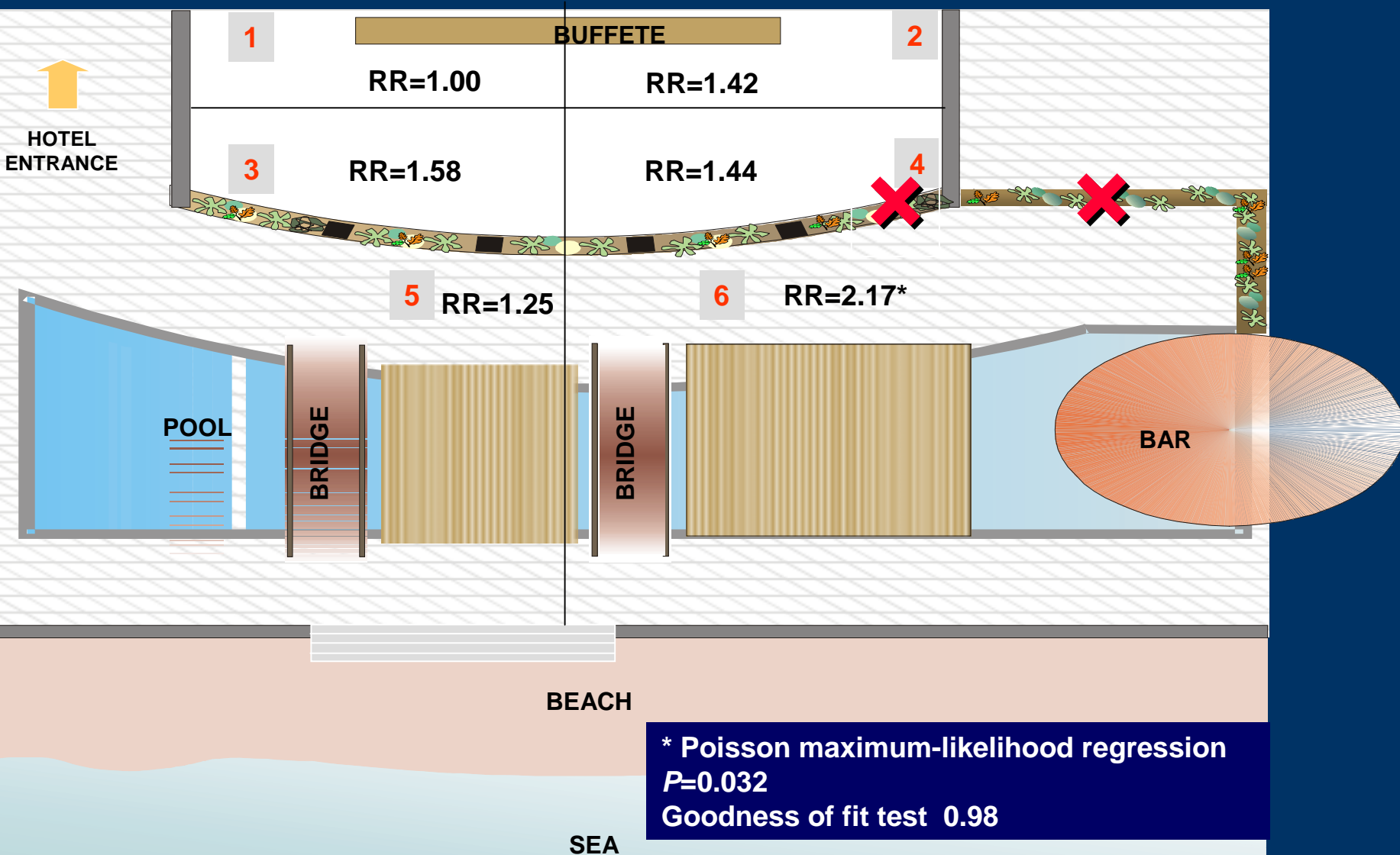


Source Identification

- *H. capsulatum* was isolated only from soil of planters located between the restaurant and the pool facing the ocean
 - Mice intraperitoneal inoculation
- Guano and a dead bat were found over the ceiling of the hotel's second floor restaurant, but no *Histoplasma* was isolated from them



Probability of becoming infected with *H capsulatum* by place of exposure



Conclusions

- Identification and elimination of the source of infection are essential for the control of histoplasma outbreaks
- Contaminated soil from planters from the beach restaurant was the infecting source for these outbreaks
- Histoplasmosis should be considered in the differential diagnosis of travelers with acute respiratory symptoms

Conclusions

- Acute and convalescent-phase serology are recommended, since over 50% of the acute sera were negative
- Among the recommendations made were to remove the soil and plants at the hotel, and the nursery was instructed not to use guano in the preparation of the composte
- No further cases have been reported for the last six months.

