

Epidemiology of Coccidioidomycosis in Arizona

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Continuing Medical Education
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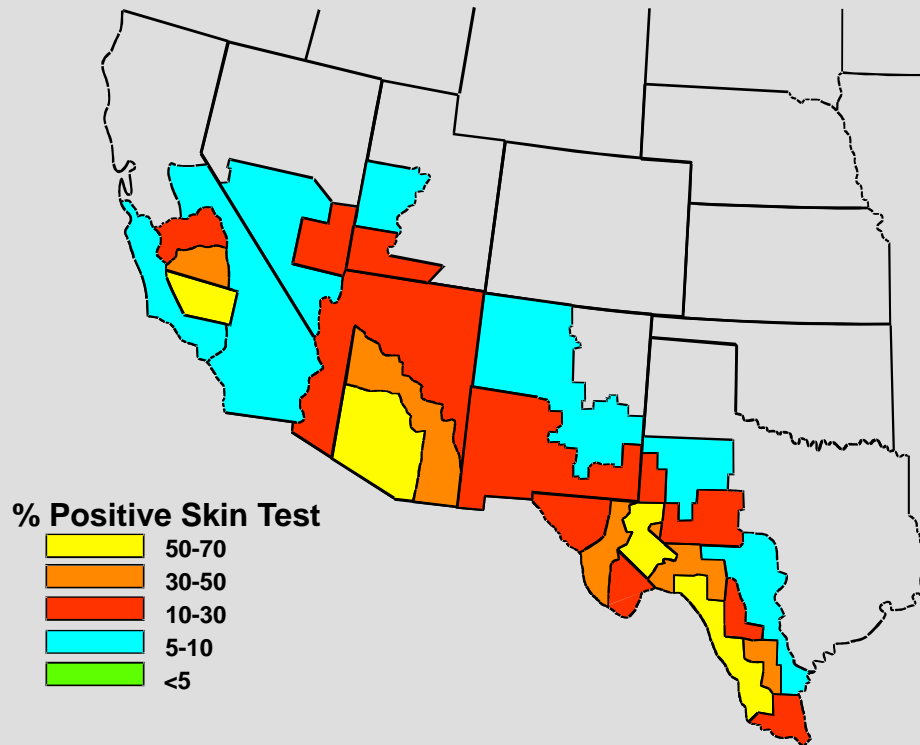




Objectives

- Understand the epidemiology of coccidioidomycosis in the US and Arizona
- Appreciate the impact of cocci on Arizona's citizens, healthcare system, and economy
- Know what ADHS is doing about cocci in Arizona

Coccidioidomycosis Epidemiology



P. Q. Edwards and C. E. Palmer. Prevalence of sensitivity to coccidioidin, with special reference to specific and nonspecific reactions to coccidioidin and to histoplasmin. *Dis.Chest* 31:35-60, 1957

- Caused by a fungus found in “thermic” soil
 - *C. immitis* (California)
 - *C. posadasii* (Arizona)
- Endemic areas: Southwestern US, Mexico, parts of Central and South America
- 60% of US disease in AZ



Transmission

- Inhalation of airborne arthrospores from soil
 - Wind
 - Soil disturbance, construction
 - Outdoor activities, gardening, golf etc.
- Incubation period: 1 – 4 weeks
- No person-to-person spread
- Usually found in soil 2-8 inches from the surface



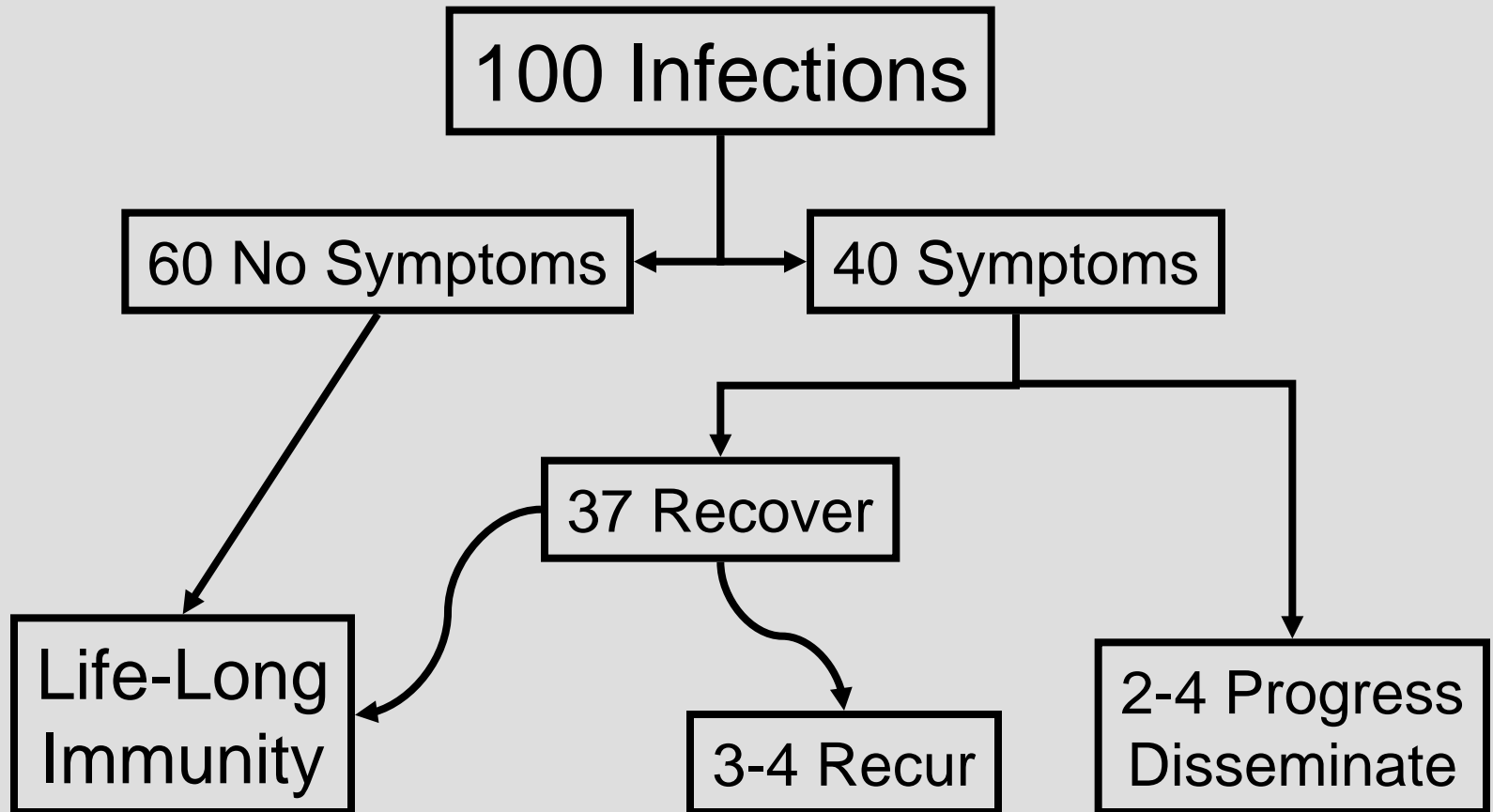
Risk Factors for Primary Cocci

- Exposure to an endemic area
- Male Sex

Risk Factors for Disseminated Cocci

- Infants and elderly (≥ 65)
- Male sex
- Filipino, African American, Native American, Hispanic, Asian
- Immune naïve
- Pregnancy, third trimester and post-partum
- Immunosuppression including HIV

Coccidioidomycosis Spectrum of Disease



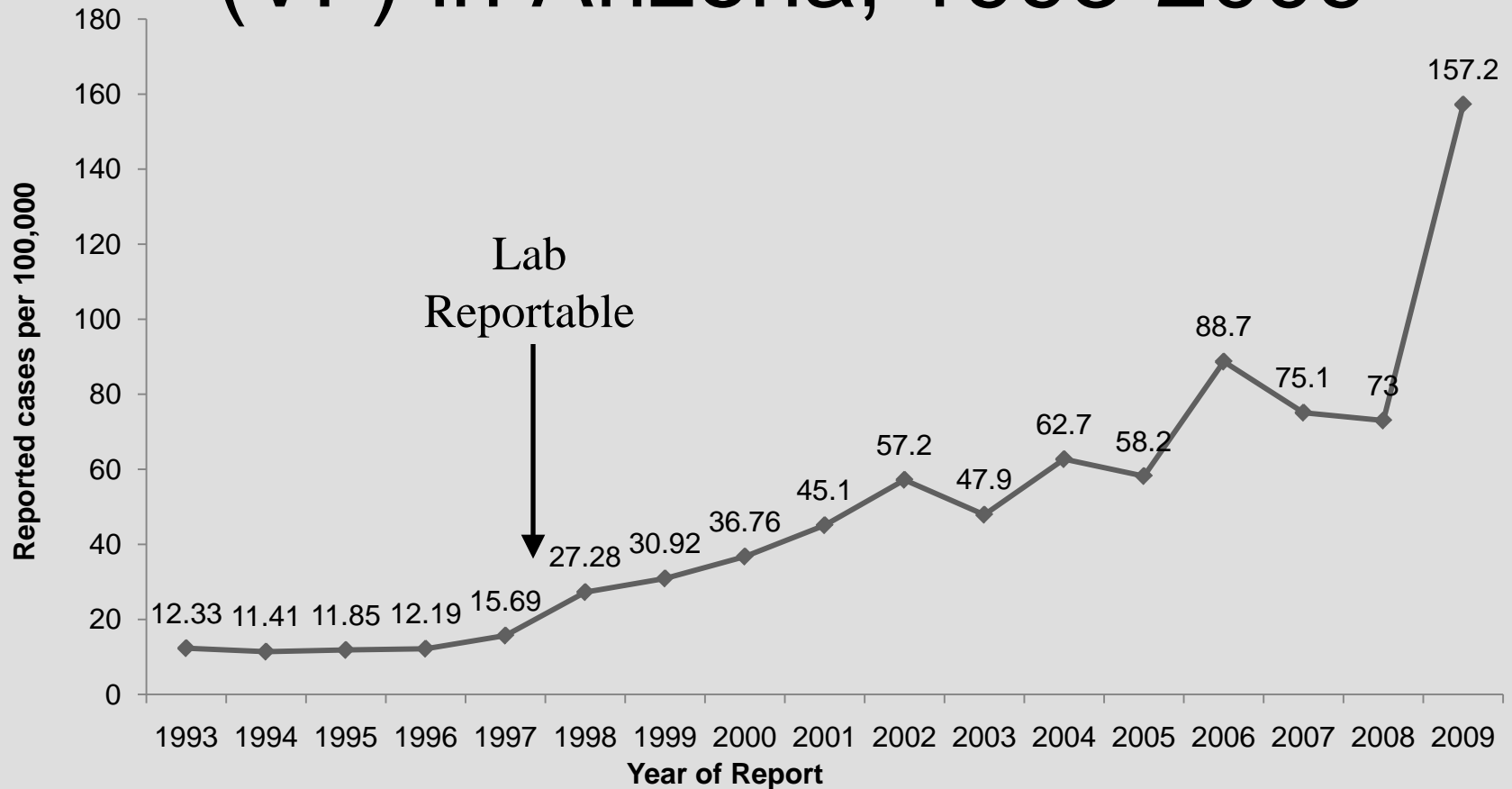
Disease Estimates

- Estimated 150,000 cases in US annually
- 90,000 (60%) in Arizona
- 36,000 (40%) symptomatic AZ cases/year

Cocci Surveillance

- 40% are symptomatic
- $< 1/3$ are clinically evaluated
- Only 8-10% of total infections are serologically confirmed
- Only serologically confirmed are reported to public health

Rates of Reported Valley Fever (VF) in Arizona, 1993-2009

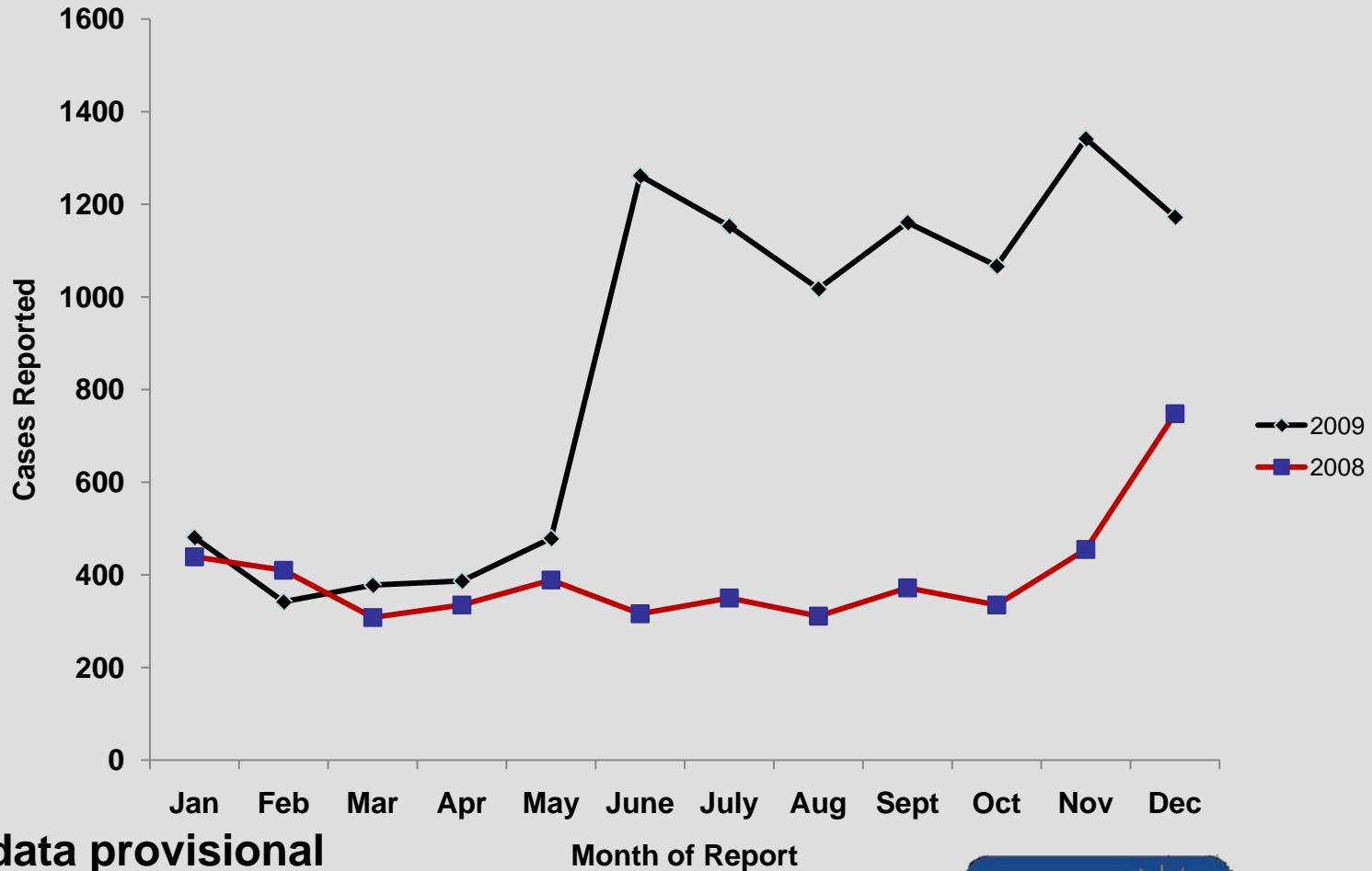


* 2009 data provisional

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2009 change in reporting



* 2009 data provisional

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Valley Fever Surveillance - Arizona, 2007

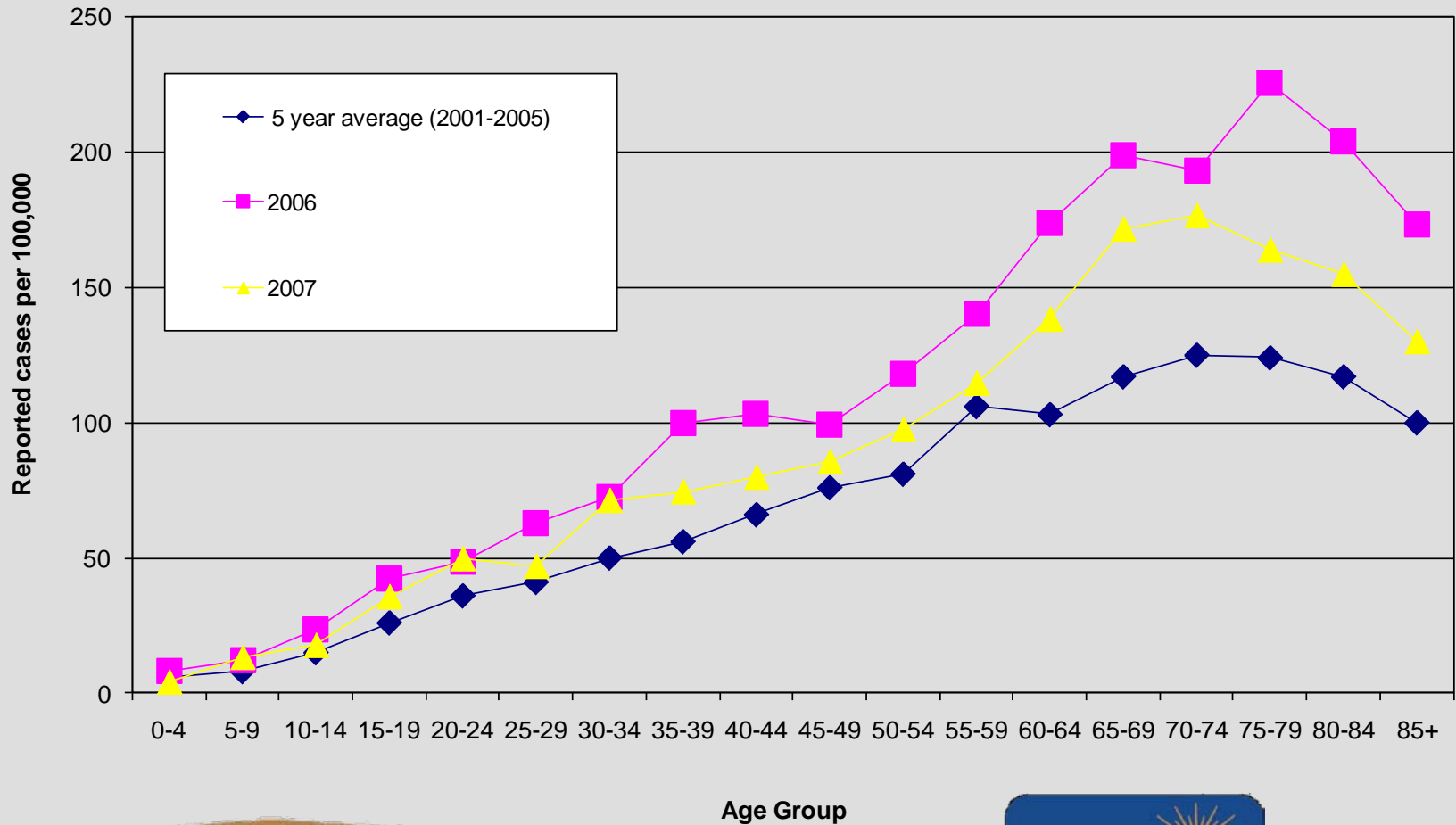
- 4,832 cases reported (75 cases/100,000)
- Sex
 - 54% male (81 cases/100,000)
 - 46% female (68 cases/100,000)



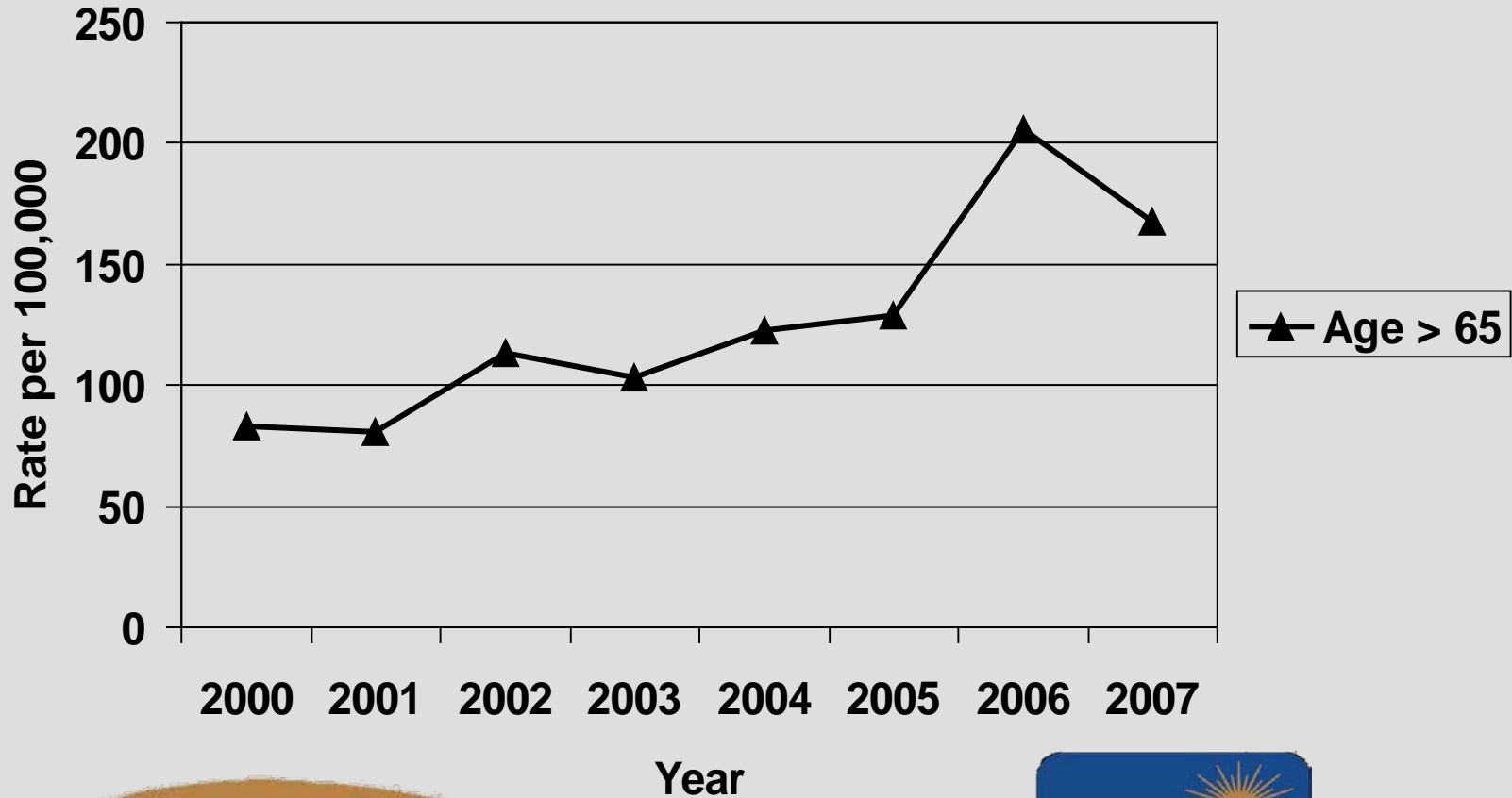
Valley Fever in Arizona, 2007

- Race
 - 6% American Indian (28 cases/100,000)
 - 3% Asian (31 cases/100,000)
 - 8% African-American (37 cases/100,000)
- Average age: 51 years
 - Range: 38 days to 99 years
 - Rates among 65+ were more than twice the general population (163 cases/100,000 vs. 75 cases/100,000)

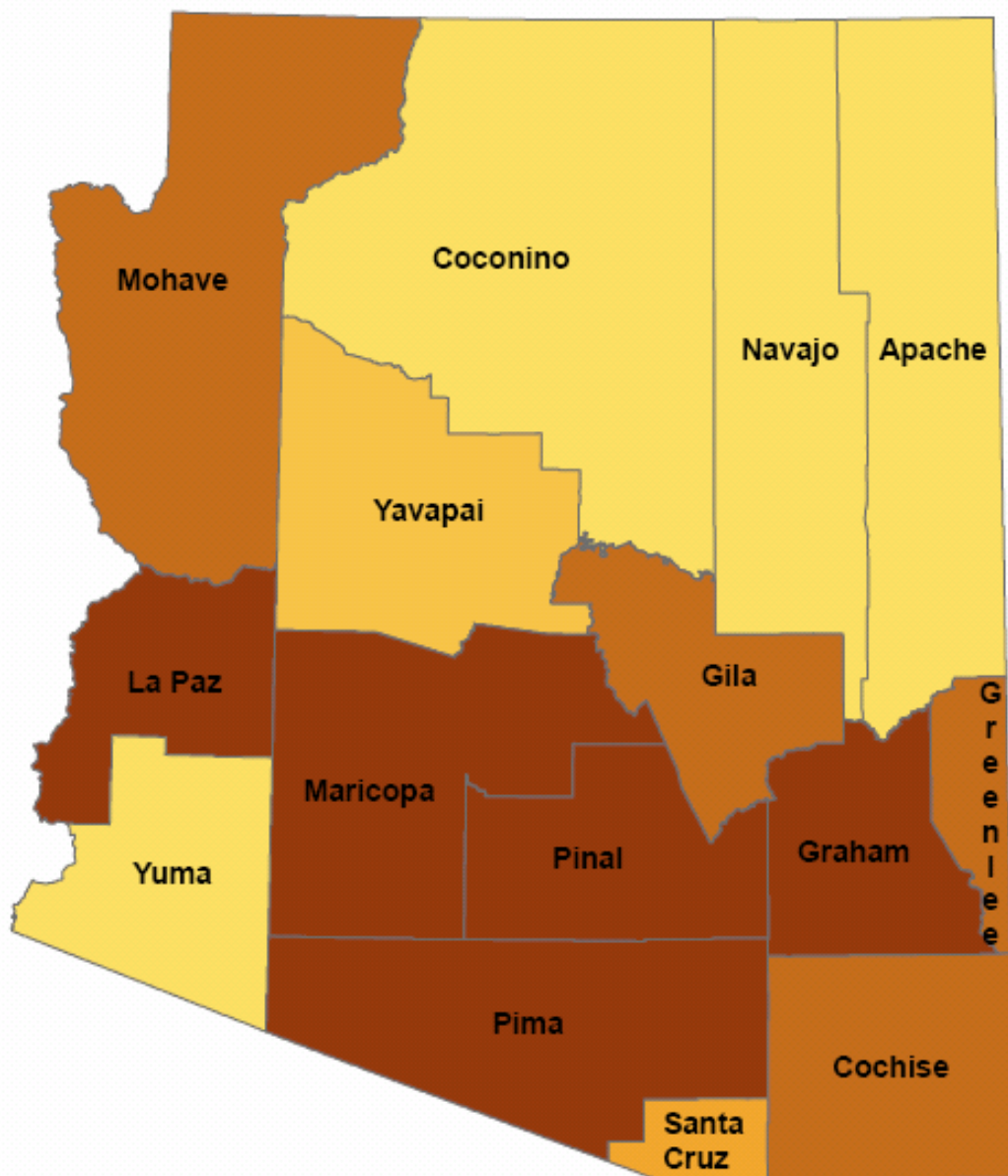
Reported VF Cases by Age Group, Arizona 2001-2007



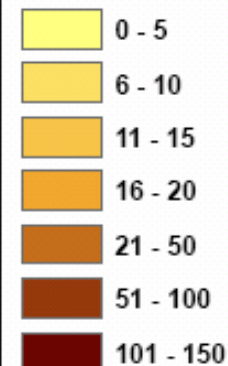
Reported Valley Fever Rates per 100,000 population in Arizona Older Persons by Year, 2000-2007



Arizona 2007 Reported Valley Fever Cases by County



Cases per 100,000 County Residents



Arizona 2007 Reported Valley Fever Cases

County	Cases per 100,000 Residents	Total Cases
Pima	90	904
Maricopa	89	3,459
Pinal	87	256
La Paz	69	15
Graham	66	24
Gila	27	15
Mohave	25	50
Greenlee	24	2
Cochise	23	32
Santa Cruz	15	7
Yavapai	12	26
Coconino	10	13
Navajo	10	11
Apache	7	5
Yuma	6	13

Enhanced Surveillance (ES): Objectives

- To evaluate Arizona's coccidioidomycosis surveillance system
- To identify issues contributing to delayed diagnosis and under-reporting
- To measure the impact of cocci on Arizonans

ES Methods

- 4832 cocci cases reported to ADHS in 2007
- Telephoned every 10th cocci case
- Interviews conducted using standardized questionnaire
- After at least 3 attempts, subsequent case contacted

Background: Cocci Case Definition

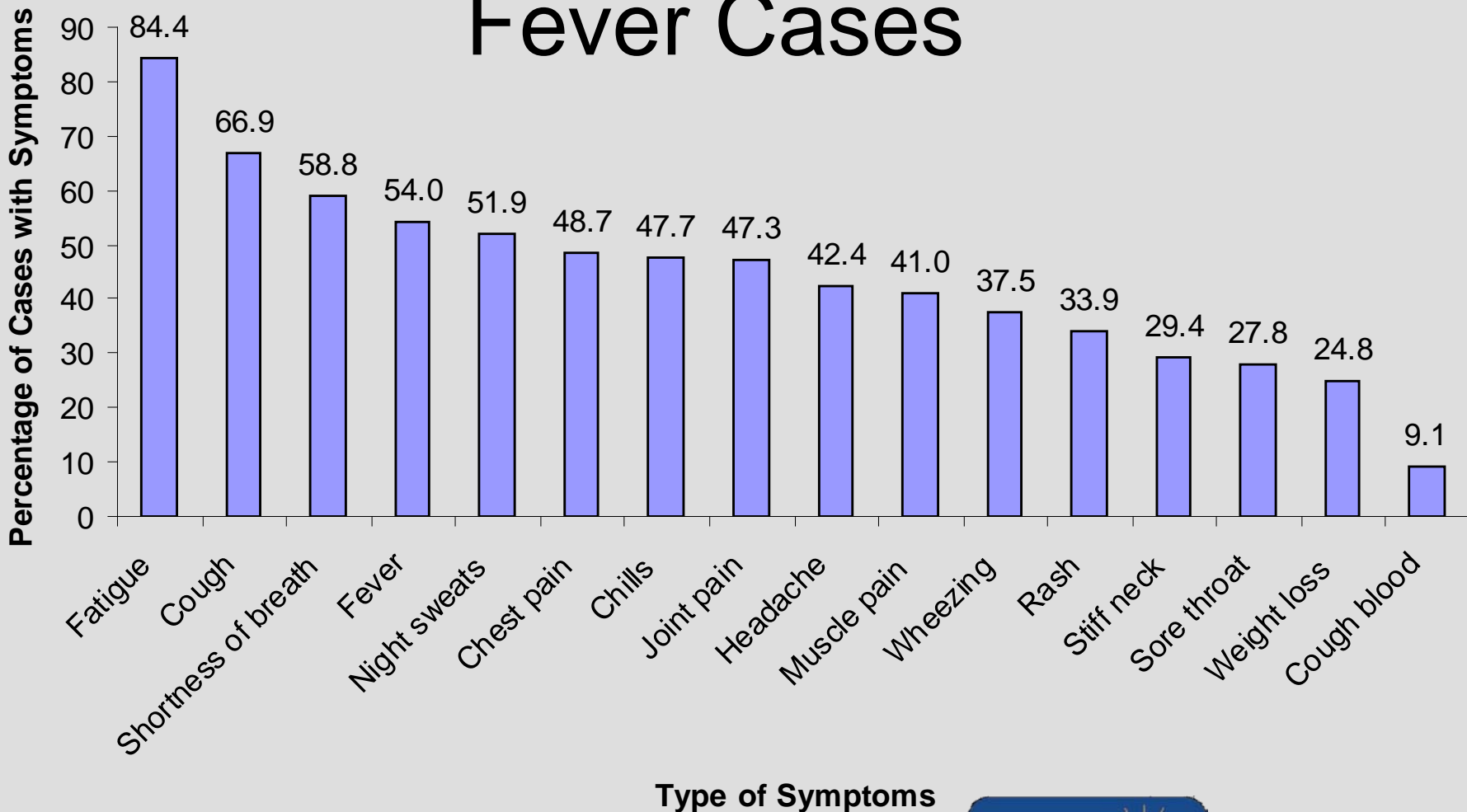
- Council for State and Territorial Epidemiologists (CSTE)
 - Updated in 1996
 - Clinical case definition
 - Lab criteria*: cocci IgG – rising titer
 - Updated in 2007
 - Clinical case definition
 - Lab criteria*: cocci IgG or IgM – single serology
- Arizona Department of Health Services (ADHS)
 - Since 1997
 - No clinical symptoms required
 - Lab criteria*: cocci IgG or IgM– single serology

*Lab criteria for diagnosis includes either detection of IgM/IgG or cultural, histopathologic, or molecular evidence of *Cocci* species

Results – Evaluation of Arizona's Case Definition

- 493 cases interviewed
- 95% of Arizona cases ALSO meet the CSTE clinical case definition
 - Only 3% of cases reported no symptoms

Common Symptoms of Valley Fever Cases



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Results – Impact on Healthcare System

- Almost half went to the ER for VF
- Over 40% were hospitalized overnight for the disease
- 1/4 saw their doctor at least 10 times during the course of their illness

Cocci in Emergency Departments

- From cocci enhanced surveillance:
 - 23% of people with valley fever first sought care for their symptoms at an emergency department
 - 46% of the patients required care from an emergency room at some point during their illness
- From the Hospital Discharge Database:
 - 70% of inpatient visits started in the ED

Results – Impact on People

- Cases were sick for an average of 6 months (median 109 days)
- 75% of cases missed work due to cocci
 - Average: 1 month (median 14 days)
- 75% unable to do usual daily activities
 - Average: > 3 months (median 47 days)

Impact on Economy

- 2007 Hospital Discharge Database
 - 1,735 cocci-related hospital visits
 - Accounting for \$86 million in hospital charges
 - Average: \$50,000 hospital visit

Results – Delays in Diagnosis

- Cases waited average of 44 days before seeking care for their valley fever
- Average time between seeking healthcare and getting diagnosed: 5 months
 - Those who knew about VF prior to seeking healthcare were more likely to be diagnosed and treated earlier than those who were not familiar with the disease (79 days vs. 282 days; p-value: 0.04)
- A mean of 3 provider visits occurred before cocci diagnostic testing ordered

Behavioral Risk Factor Surveillance System (BRFSS)

- Conducts an annual population survey about health behaviors and opinions
- Designed to represent the entire population of Arizona

BRFSS – Results

- 1/5 Arizonans have never heard of VF
- 60% believe VF is significant health problem
- More than 1/3 of general public do not know how VF is transmitted



BRFSS – Results

- Length of time lived in Arizona
 - BRFSS average: 26 years
 - 25% lived in Arizona for less than 10 years
 - ES average: 16 years
 - 40% lived in Arizona for less than 10 years

Coccidioidomycosis and Community Acquired Pneumonia (CAP)

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Coccidioidomycosis as a Common Cause of Community-acquired Pneumonia

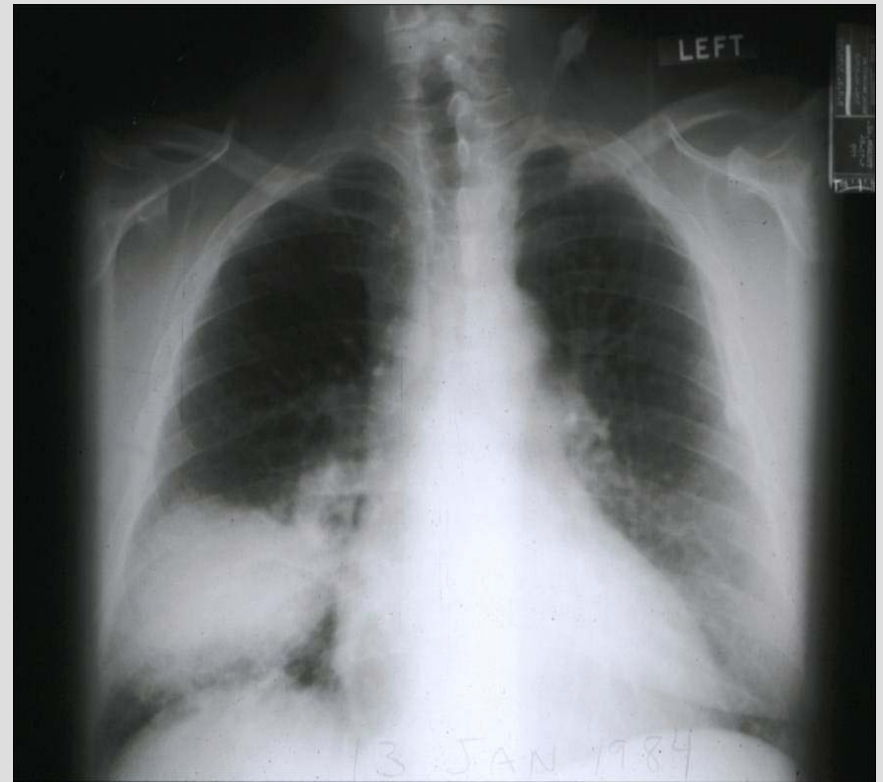
Lisa Valdivia,*† David Nix,*‡ Mark Wright,* Elizabeth Lindberg,* Timothy Fagan,§ Donald Lieberman,§ T'Prien Stoffer,* Neil M. Ampel,*† and John N. Galgiani*†

Emerging Infectious Diseases Vol 12 No 6, June 2006

- 56 patients with pneumonia recruited from 2 primary care sites and 1 urgent care clinic in Tucson
- 19 had positive antibody tests for valley fever (29%)
- 81% got antibiotics; 31% got > 1 course

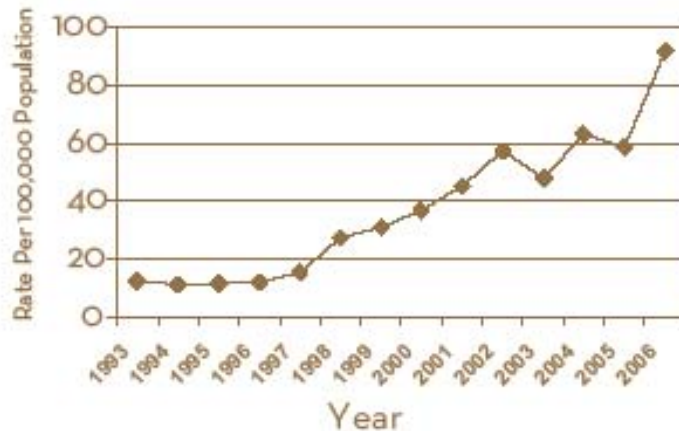
Physician Education

- ADHS recommends patients with community-acquired pneumonia (CAP) are tested for cocci since May 2006
- Brochure and poster sent to 8,000 primary care providers across AZ
- Distributing another poster targeting EDs with CAP recommendation



VALLEY FEVER CASES ARE INCREASING

Coccidioidomycosis rate per 100,000 population by year, Arizona -1993-2006



WHAT CAN YOU DO?

- Order Cocci serology on CAP cases
- Manage Valley fever cases
 - Inform patient of diagnosis
 - Report the case to public health
 - Consider treatment with anti-fungal drugs if the patient is at risk for severe disease

For more information on treatment guidelines, visit www.idsociety.org/pg

VALLEY FEVER MIMICS COMMUNITY ACQUIRED PNEUMONIA (CAP)

29% of Ambulatory CAP cases in Tucson, Arizona had diagnosis of Valley Fever.

Valdivia L, Nix D, Wright M, et al.

Coccidioidomycosis as a Common Cause of Community Acquired Pneumonia. *Emerging Infectious Diseases* 2006; 12: 958-62

Resources

Arizona Department of Health Services
Office of Infectious Disease Services
150 N. 18th Ave, Suite 140
Phoenix, Arizona 85007
(602) 364-4562
www.valleyfeverarizona.org

Valley Fever Center for Excellence
Mail Stop 11111NF
3601 S. 6th Avenue
Tucson, Arizona 85723
Hotline: (520) 629-4777
<http://www.vfce.arizona.edu/>

BIDS ED Study

- To evaluate the number of patients presenting with community-acquired pneumonia (CAP) in Tucson ERs tested for valley fever
- To determine the unmeasured burden of valley fever among these patients diagnosed with CAP
- Medical record review indicated:
 - About 1/3 of CAP patients seen in the ER were tested, despite ADHS recommendations to test these patients for valley fever
 - 6% were positive

Coccidioidal Pneumonia, AZ 2000-04

Kim, Blair, and Carey et al.

- Prospective study of 59 CAP patients
- 35 (59%) received paired serologic tests
- 6 (17%) had cocci pneumonia
- Cocci more likely to produce rash
- No help: med hx, occ or rec hx, time in endemic area, labs, CXR

EID Vol. 15, No. 3, March 2009

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Three Studies, Three Answers

- Depending on
 - CAP definition
 - How cocci diagnosed
 - How much follow required
- 6% vs. 17% vs. 29% of CAP patients have cocci in endemic areas of AZ

Knowledge, Attitudes and Practices Healthcare Provider Survey

- No data available on AZ healthcare providers regarding knowledge, attitudes and practices (KAP)
- Delays in cocci diagnosis due to patient and healthcare provider practices
- Objective: To assess health care providers' knowledge, attitudes and practices regarding diagnosis and treatment of cocci in AZ



Study Design

- Study design:
 - Cross-sectional survey
 - Self-administered
 - Initial mailing in Oct 2007
 - Repeat mailing in Dec 2007

Description of recipients (N= 7,608)

- Licensed primary care physicians (n= 5,554)
- Licensed nurse practitioners (n= 2,054)



Questionnaire

- Demographics: clinical degree, specialty field, practice history
- Knowledge: burden of disease, vaccine availability, disease reporting
- Attitudes: confidence in ability to dx and treat
- Practices: counseling, dx, treatment, referral
- 9 treatment case scenarios, 5 straightforward
- Dichotomous and Likert-scale responses

Response Results

First survey mailed to 9,248 AZ providers in Oct 2007

1,640 unable to contact

- 6 deaths
- 78 duplicates
- 228 retired
- 1,328 invalid addresses

755 respondents

Second survey mailed to 6,853 AZ providers in Dec 2007

5,785 non-respondents

1,068 respondents

1,823 (24%) total respondents

Summary of Results

- 1/3 of providers were not aware that cocci is a reportable disease in Arizona
- 1/3 of providers were not sure if a cocci vaccine is available
- 2/3 confident in ability to diagnose cocci
- About half confident in ability to treat

Summary of Results

- First cocci knowledge, attitudes and practices study conducted in the US
- Answered 2/2 knowledge questions correctly: 37.1%
- Answered cocci treatment questions based on current guidelines
 - $\geq 70\%$ correct: 42.2%
- $< 20\%$ provide VF educational materials to pts
- Providers who received VF CME in last 12 mos
 - Twice as likely to test CAP patients for cocci
 - Twice as likely to score $\geq 70\%$

Limitations

- Low response rate
- Self response – information bias
- Professionals licensed after 09/2007 not included in sample

Public Education

- New brochure with cocci info for the general public
- Video:
“Valley Fever:
The Impact on Arizonans”

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Cough? Fever?
Exhausted?

Valley Fever?

Coccidioidomycosis



Photo courtesy of Rob Schumacher, The Arizona Republic, June 7, 2006

COUGH? FEVER? EXHAUST

Photo courtesy of



ASK YOUR DOCTOR TO TEST YOU FOR VALLEY



CDC Department of Health and Human Services
Centers for Disease Control and Prevention

Arizona Department of Health Services | Office of Infectious Disease Services | 150 N. 18th Ave, Suite 140 | Phoenix, Arizona 85007 | (602) 364-4562 | www.azdhs.gov

Summary

- Reported cocci cases have been increasing in Arizona for the last decade, especially in older persons
- There are significant delays in diagnosing cocci due to provider AND patient practices
- Cocci has a tremendous impact on Arizonans
 - Healthcare system
 - Economic
 - Quality of life

Take Home Points

- Coccidioidomycosis is a reportable disease in both Arizona & New Mexico
- Think of cocci early and often in patients with prolonged (>2 weeks) of respiratory sxs
- Consider cocci in patients with Community Acquired Pneumonia especially when failed Abx

Website

The 2007 Valley Fever Annual Report and other materials are available at:

www.valleyfeverarizona.org

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- Tina Wesoloskie
- Thom Wilson
- Andrew Comrie
- Valley Fever Center for Excellence
- Local Health Departments
- AZ hospitals and laboratories

Questions?



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