



SHIGA TOXIN-PRODUCING *SHIGELLA SONNEI* IN SOUTHERN CALIFORNIA, 2014

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- Shiga toxins
 - Cytotoxins produced by Shiga toxin-producing *E. coli* (STEC) (Stx1 and Stx2) and *Shigella dysenteriae* type 1 (Stx)
 - Involved in severe gastrointestinal illness
 - Related to severe complications: hemolytic uremic syndrome (HUS)
 - Antimicrobial treatment associated with increased risk of HUS
- STEC and Shigellosis
 - Similar illness: diarrhea, frequently bloody
 - Differing antibiotic recommendations
- Recent instances of other *Shigella* serotypes producing Stx

CLUSTER DETECTION



- Late August 2014: 2 case reports
 - Shiga toxin-positive stool by EIA
 - Within 2 days, received culture results showing *Shigella sonnei* from the same clinical specimens
 - False positive Shiga toxin EIA? Co-infection?
- By September 16: 8 cases
- Raised many questions
 - Follow up – clearance, interview form, reporting
 - Clinical – treatment recommendations
- Late September 2014: Launched investigation
 - Consulted California Department of Public Health
 - Retrospective review – 2 previous cases



- Re-interview all suspect cases
 - Shiga toxin and *Shigella sonnei* detected in same clinical specimen collected June-December 2014
- Structured supplemental questionnaire
 - Demographics, risk factors, exposures
 - Clinical attributes: symptoms, treatment, outcomes
- Specimens submitted to California Department of Public Health Microbial Diseases Laboratory (CDPH MDL)
- Confirmed case: Stx1-positive *S. sonnei* isolated from a clinical specimen collected June-December 2014

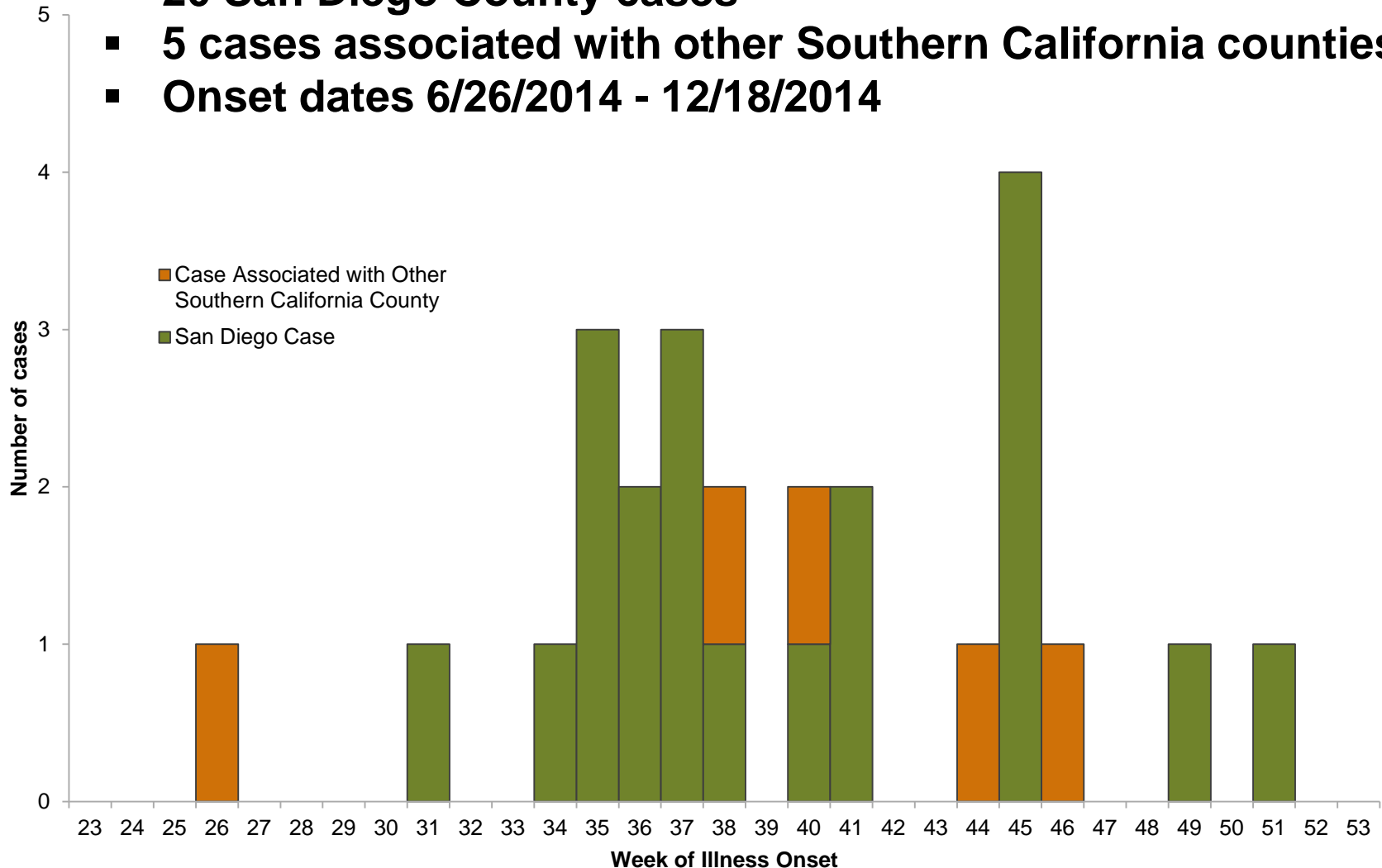


- CDPH MDL confirmed 25 cases
 - *Shigella sonnei* by agglutination in group D antiserum and/or biochemical identification
 - *stx*₁ gene positive, *stx*₂ gene negative by RT PCR
 - Active Stx1 production by vero cell assay
- PFGE following standard CDC protocol
 - Multiple PFGE patterns
 - J16X01.3287 most frequent *Xba*I → 12 (48%) isolates

EPIDEMIC CURVE



- **20 San Diego County cases**
- **5 cases associated with other Southern California counties**
- **Onset dates 6/26/2014 - 12/18/2014**



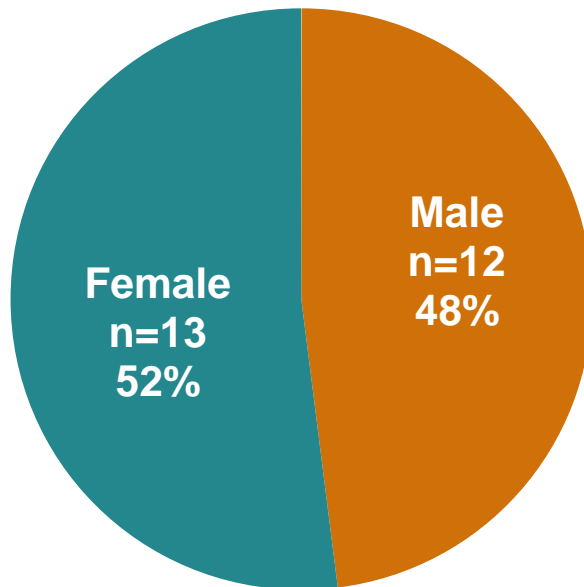
DEMOGRAPHICS



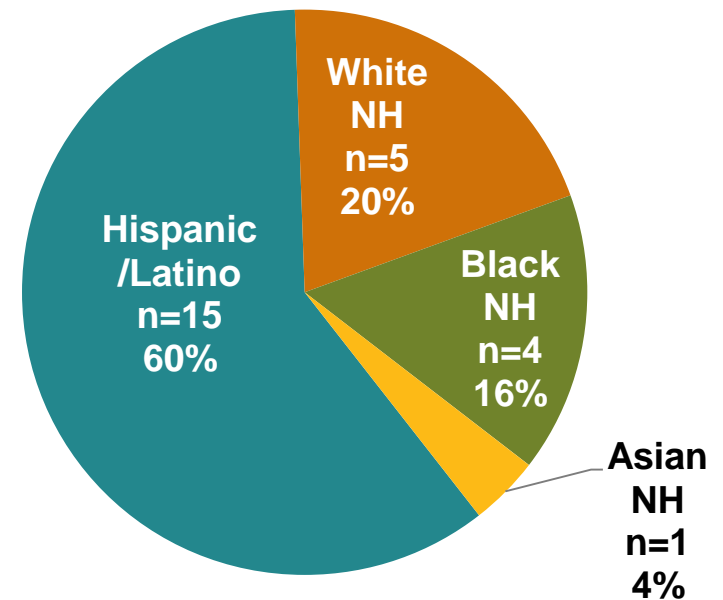
AGE

Median: 10 years
Range: 2-64 years

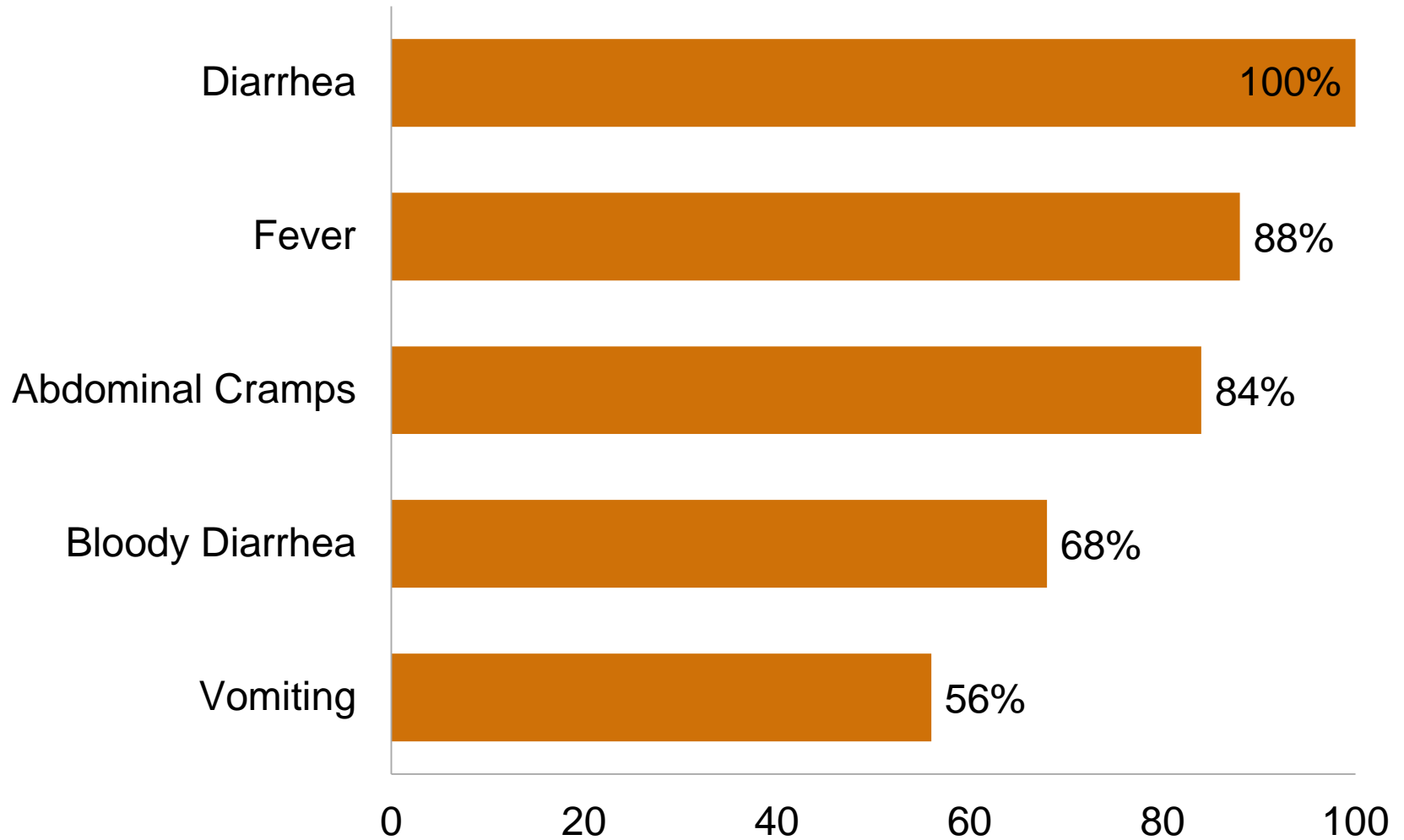
GENDER



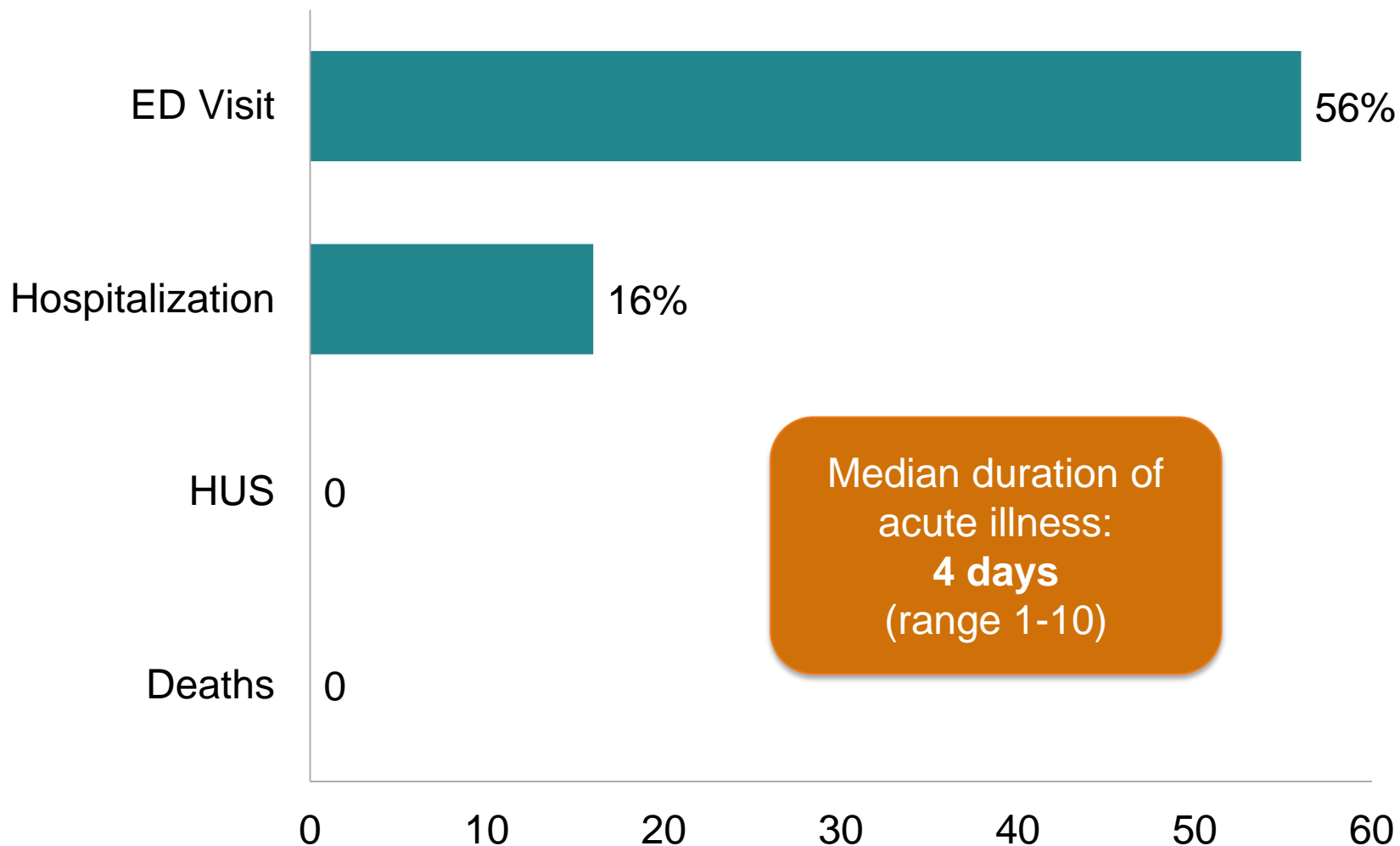
RACE/ETHNICITY



SYMPTOMS



OUTCOMES



ANTIBIOTIC TREATMENT



- 88% treated with antibiotics
- Commonly used antibiotics:
 - Ciprofloxacin
 - Azithromycin
 - Metronidazole
- Median days from onset to start of antibiotics:
2.5 (range 0-32 days)
- 64% started antibiotics within 4 days of onset



ANTIMICROBIAL RESISTANCE



- Results from clinical laboratories available for 19 cases
- **18 of 19 resistant to Trimethoprim Sulfamethoxazole (TMP-SMX, Bactrim, Septra, Sulfatrim)**
- 1 also resistant to Tetracycline
- All susceptible to all other antibiotics tested

EXPOSURE SUMMARY



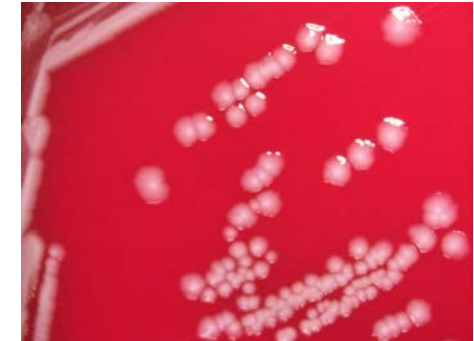
- Secondary cases = household transmission (64%)
 - 7 secondary to another confirmed case (4 household clusters)
 - 9 secondary to a contact with undiagnosed diarrheal illness
- Epidemiologic link to Mexico (56%)
 - 5 of 9 primary cases reported travel to Mexico
 - 9 of 16 secondary cases had contact with someone who lived in or visited Mexico
 - Primarily Baja California
 - No cases with onset after mid October (n=8)
- No common exposures identified in California or Mexico



CHALLENGES



- Public health challenges
 - Detection
 - Follow up: interviews, clearance testing
 - Reporting, tracking
- Clinical challenges
 - Detection and awareness
 - Treatment, risk for HUS?
- Limitations
 - Not able to reach all cases for re-interview
 - Possibility of adverse outcomes post-interview
 - Excluded undiagnosed cases



CONCLUSIONS



- 1st U.S. cases and cluster of Stx1-producing *S. sonnei*
- Clinical
 - Typical shigellosis presentation
 - No known severe outcomes
- Laboratory
 - Multiple PFGE patterns
 - Significant resistance to TMP-SMX
- Epidemiology
 - Considerable household transmission
 - No common exposures identified
 - May have been introduced from Mexico
 - Evidence of sustained domestic transmission
- Continued surveillance, investigation, education



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THANK YOU!

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