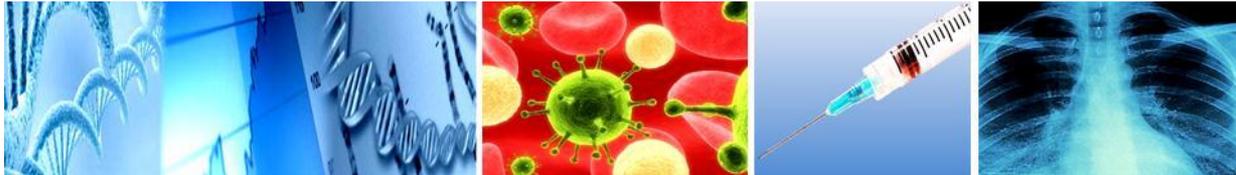


# Foodborne Outbreak Investigation: Norovirus



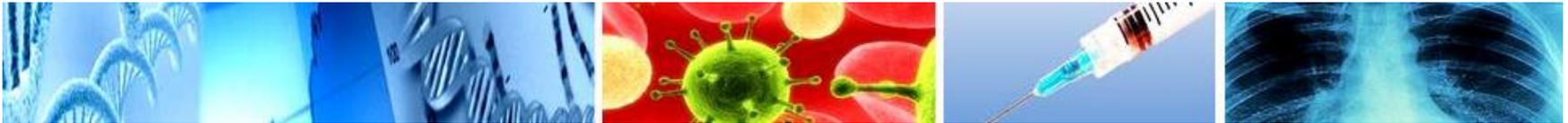
## Epidemiology & Case Study

Stacey A. Davis, MPH

Communicable Disease Section

San Bernardino Department of Public Health

# National FBI

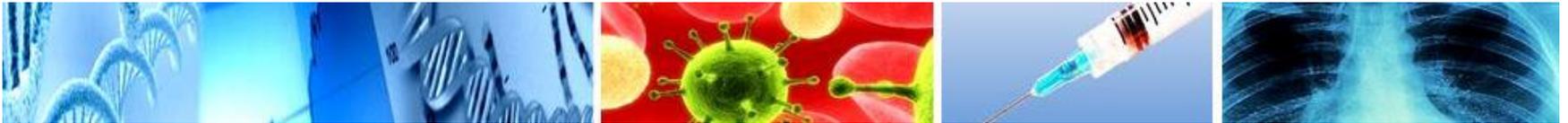


- Why is FBI important?

Table 2. Top five pathogens causing domestically acquired foodborne illnesses

Pathogen	Estimated annual number of illnesses	90% Credible Interval	%
Norovirus	5,461,731	3,227,078–8,309,480	58
<i>Salmonella</i> , nontyphoidal	1,027,561	644,786–1,679,667	11
<i>Clostridium perfringens</i>	965,958	192,316–2,483,309	10
<i>Campylobacter</i> spp.	845,024	337,031–1,611,083	9
<i>Staphylococcus aureus</i>	241,148	72,341–529,417	3
Subtotal			91

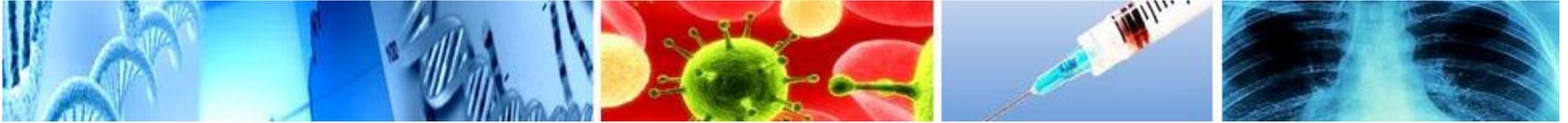
# County of San Bernardino FBI



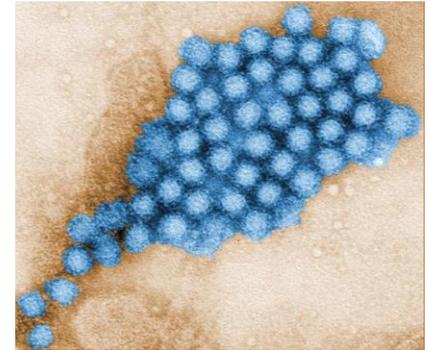
- Top pathogens (morbidity)

Disease	2012 Cases (n)	Incidence Rate per 100,000
Salmonellosis	248	12.0
Campylobacteriosis	192	9.3
Giardiasis	28	1.4
<i>E. Coli</i> O157, STEC non-O157, Shiga toxin positive feces	28	1.4
Shigellosis	20	1.0
Hepatitis A	5	0.2
Cryptosporidiosis	8	0.4
Listeriosis	0	0.1

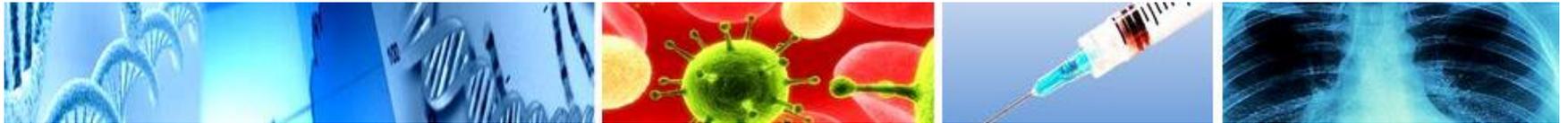
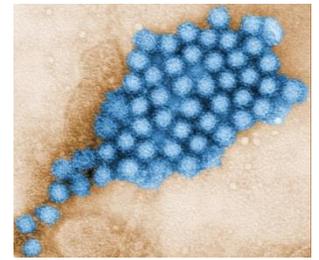
# Norovirus



- Group of related non-enveloped RNA viruses
- Symptoms: watery non-bloody diarrhea, nausea, vomiting, abdominal cramps, low-grade fever
  - Studies have shown asymptomatic infection can occur in as many as 30% of infections
- Incubation period: 12-48 hours (commonly 24-48h)
- Infectious period: Few hours before onset to 72 hours *after symptom resolution*
- Transmission: fecal-oral

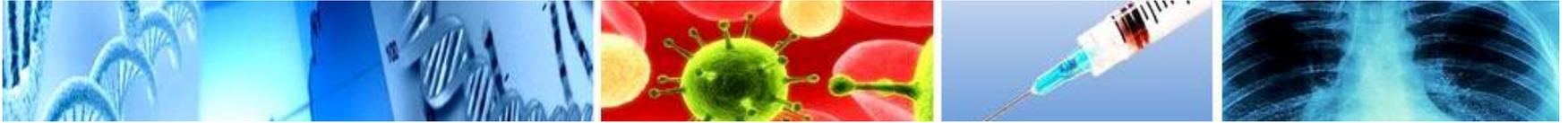


# Important Contributory Factors to Outbreak Spread



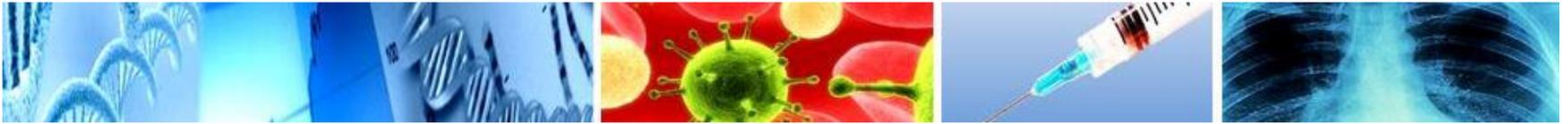
- Environmental persistence
  - Withstands freezing and temps up to 140 °F
    - Check your ice machine!
  - Resists many common cleaners & disinfectants (e.g. quaternary ammonium compounds)
- Short incubation period
- High Infectivity
  - Low infectious dose: 10-100 viral particles are sufficient to cause infection
  - Viral shedding can begin before symptom onset
  - Viral shedding can occur up to 2 weeks after symptoms stop, but it is unclear how viral shedding after 72h post-recovery contributes to infectivity
- Immunity is short-lived (a few months) and strain-specific

# FBI Outbreak Overview



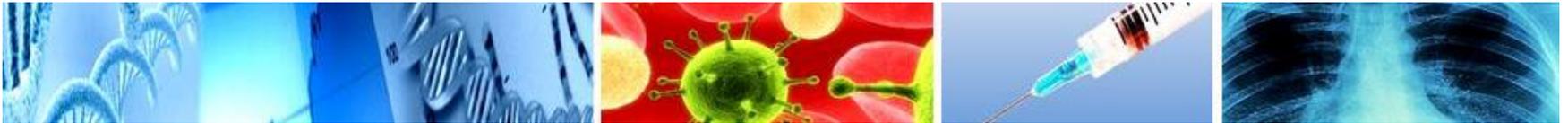
- Notification: EHS, public, laboratories, healthcare providers
- Most are local outbreaks
- Key players:
  - Epidemiologists, communicable disease investigators
  - Public health laboratories
  - Environmental health specialists
  - Possibly regulatory agencies, public information officer
  - *Food handlers & establishments*

# Case Study: FBI at Country Club



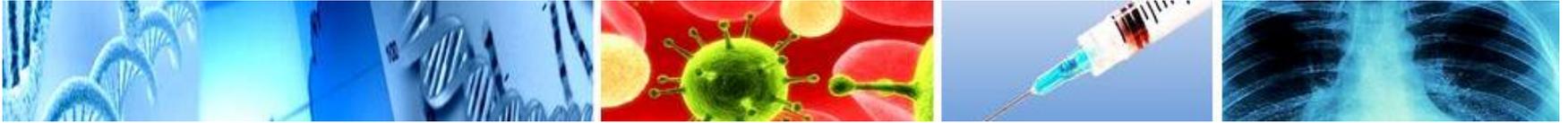
- **Jan 27, 9am:** Communicable Disease Section (CDS) receives notification from Environmental Health Services (EHS) of potential foodborne outbreak among attendees at retirement party
  - **Tuesday, Jan 24, 7pm:** party held at country club, ~50 attendees, 13 ill; menu, symptoms, onsets dates unknown

# Case Study: FBI at Country Club



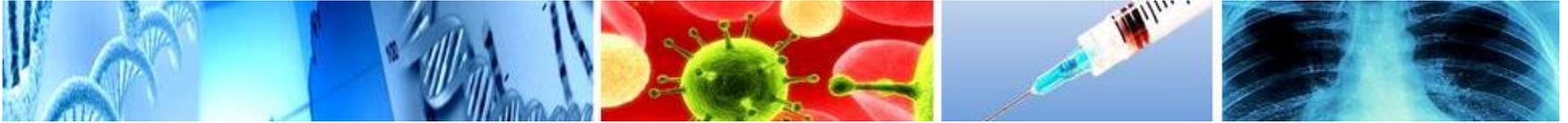
- **Friday, Jan 27, 1pm:** received attendee linelist
  - Began calling attendees, starting with initial complainants, to interview with general FBI questionnaire
  - *Simultaneously*, EHS inspectors are inspecting food facility, asking for menus, identifying ill foodhandlers
  - DPH Lab is notified that we may be submitting specimens for testing a yet unknown organism

# Case Study: FBI at Country Club



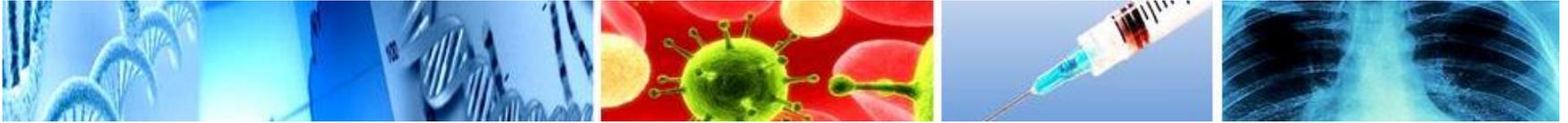
- **Jan 27, 3pm:** Call from EHS reveals
  - identified several ill foodhandlers (FHs) at the Country Club
  - collecting food specimens from facility (none left from banquet, but some prepared by same FHs)
  - will obtain contact info for people who were ill
- **Jan 27, 3:30pm:** CDS receives linelist of foodhandlers
  - Symptoms started **Jan 21-22**
  - Interviews begin of FHs and attendees

# Case Study: FBI at Country Club



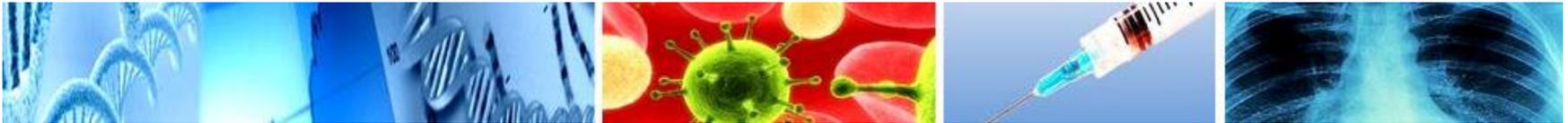
- Preliminary analysis of initial interviews reveals:
  - Estimated incubation period 24-48h
  - Symptoms were predominantly nausea, vomiting, diarrhea
  - Age range 40-64 years
  - 2 people sought medical care
- Preliminary case definition:
  - Vomiting and/or diarrhea >1x in 24 hour period after attending retirement banquet at County Club or having contact with ill person from Country Club
- **Result: CDS decides to test FHs, attendees for *Salmonella*, *Campylobacter*, *Shigella*, *E. coli* O157 and norovirus**
- **DPH Lab orders more media for testing food specimens**

# Case Study: FBI at Country Club



- **Fri, Jan 27, 5pm:**
  - EHS closes kitchen at Country Club until they are re-inspected and FHs tested by DPH
  - **CDS cannot interview or deliver stool kits to FHs because they have left for the day!**
  - Stool kits delivered to attendees living close to DPH
- **Mon, Jan 30:**
  - CDS continues interviewing cases (FHs, attendees) who return calls, coordinate specimen collection
  - More data leads to hypothesis revision, coordination w/ DPH Lab: will not test for *E. coli* O157 b/c of media needs, unlikely given symptomology & incubation period
    - No bloody diarrhea
    - Incubation period is 24-48 h from data (*E. coli* O157 2-10 days, avg 3-4 days)
- **Mon, Jan 30, 4pm:** positive results on 2 specimens—norovirus

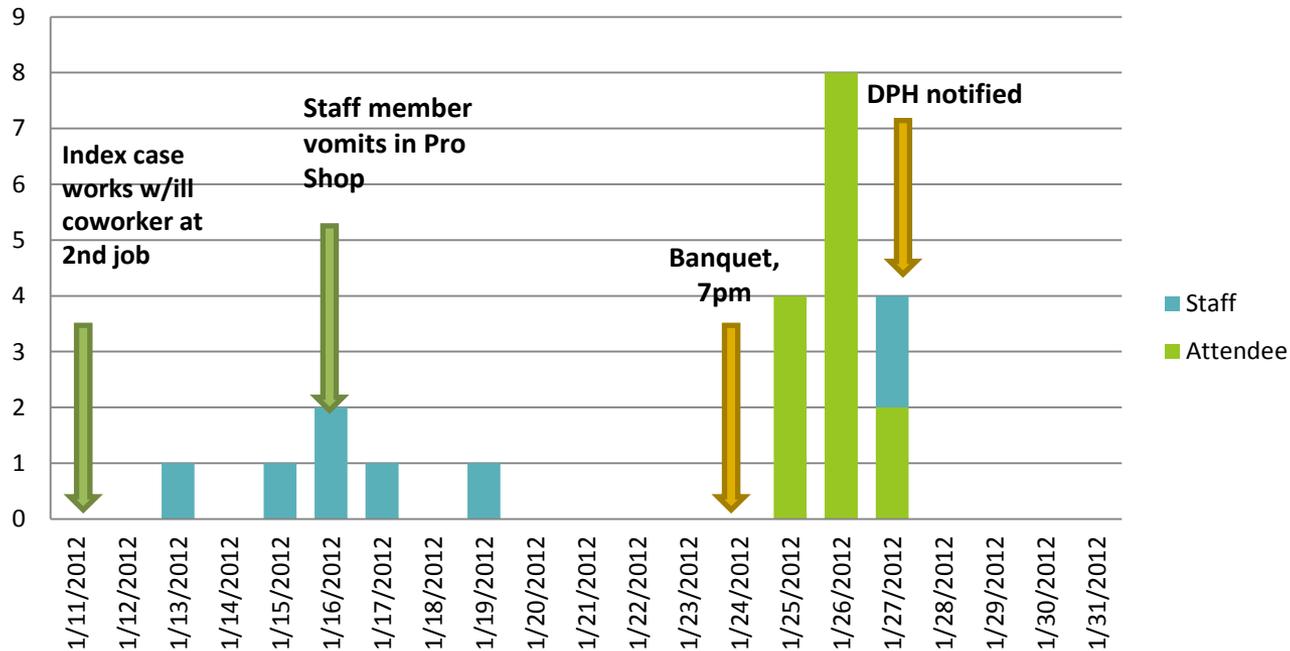
# Case Study: FBI at Country Club



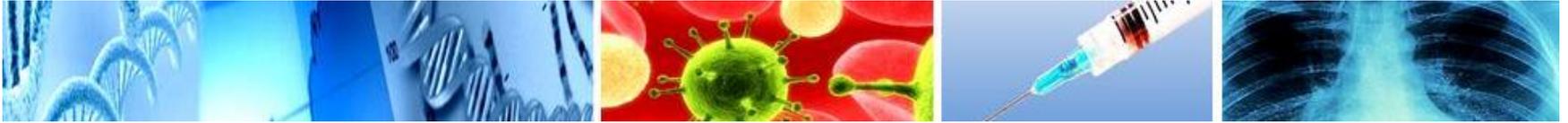
- Mon, Jan 30 cont'd:

## – Epi curve

**Gastroenteritis at Country Club, January 20XX**



# Case Study: FBI at Country Club



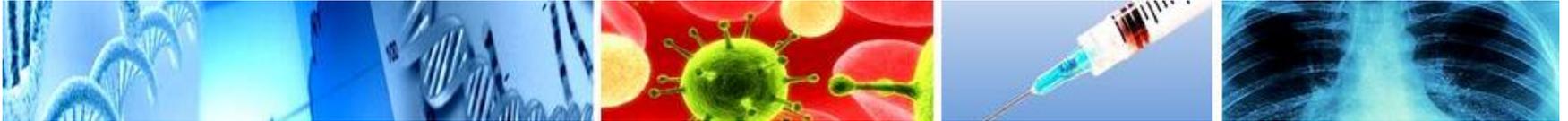
- **Tues, Jan 31:**
  - EHS has given cleaning/disinfection recommendations to facility for norovirus before allowed to re-open
  - Staff recommended to stay home for 48h post last sx
- **Wed, Feb 1:**
  - DPH Lab notifies us of positive results for norovirus G2 among most recently ill FH, couple attendees
  - Bacteriological testing continues for final results
  - CDS clears ill FHs to return to work via EHS

# Case Study: FBI at Country Club



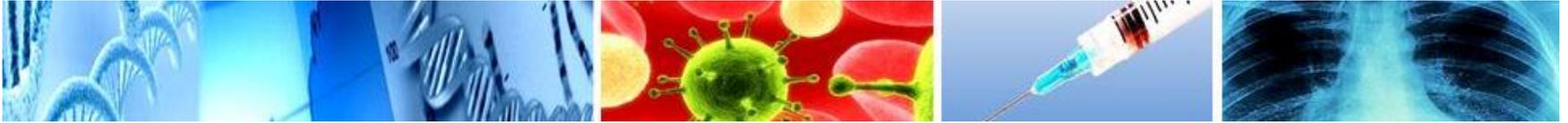
- **Wed, Feb 1, cont'd:**
  - No additional cases have been identified (last onset was Jan 27)
  - Preliminary etiology identified (bacteriological testing pending)
- **Thurs, Feb 2:**
  - EHS re-inspected facility and allowed to re-open
  - DPH Lab finalized bacteriological testing: all negative for *Salmonella*, *Campylobacter*, *Shigella*, *E. coli* O157
  - Food specimens all tested for fecal contamination: negative

# Case Study: FBI at Country Club



- Data:
  - CDS interviewed 37 people: 28 attendees, 9 staff
    - 22 cases
    - 0 deaths, 0 hospitalizations
    - 0 secondary cases
    - 11 lab-confirmed cases
    - No significant food item association observed
- Key factors contributing to this outbreak:
  - Employees may work at multiple facilities
  - Employees may become ill at work—known or unknown
  - Prompt cleaning & disinfection is key
  - Employee restriction from working while ill, and sometimes after

# Questions?



Communicable Disease Section

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