

Answer Key

Part 1 [53pt]

1. [3pt] Localized, more cases than expected, occurs over specific time period
2. [1pt] Fecal-oral route
3. [1pt] Hospital acquired infection
4.
 - a. [1pt] *E. coli*
 - b. [2pt] Infections by Shiga toxin-producing *E. coli* (STEC) can lead to hemolytic uremic syndrome (HUS), which can lead to decreased urination and tiredness.
5. [6pt] 1/2pt for each: signs/symptoms, people, location, and time; 2 pts per definition in total; answers may vary
 - a. Confirmed: Shiga toxin found in stool samples of people who have resided in the local hospital along with bloody diarrhea within the past two weeks.
 - b. Probable: Bloody diarrhea in patients of the local hospital within the past two weeks.
 - c. Possible: Diarrhea and stomachache in patients of the local hospital within the past two weeks
6. [2pt] Retrospective cohort (1pt for cohort study)
7. [4pt] 1pt per correct answer; answers may vary
 - a. Pros: can examine multiple outcomes for a single exposure; useful for rare exposures; temporality is easily established, supporting causation
 - b. Cons: expensive in terms of time (for prospective studies) and resources; rare diseases requires a large number of subjects; less control over data (for some retrospective studies)
8. [2pt] August 10th (Tiebreaker #1)
9. [1pt] Common source
10. [9pt] (1pt each, 2pt for showing work)

Food Item	Risk
Beef Sandwich	1.79
Pasta	0.57
Tacos	0.71
Salad	0.58
Milk	1.16
Apple Juice	0.86
Cookies	0.39

Beef Sandwich:

	No. Ill	No. Not Ill
exposed	26 (a)	32 (b)
not exposed	45 - 26 = 19 (c)	134 - 45 - 32 = 57 (d)

$$RR = [a/(a+b)]/[c/(c+d)] = [26/(26+32)]/[19/(19+57)] = 1.79$$

11. 1pt per answer; answers may vary
 - a. [3pt] Infected cook and improper hygiene, contamination at meat processing plant, contamination at the farm, contamination during transport
 - b. [2pt] Proper cooking of raw food, avoidance of cross-contamination
12. [1pt] Recall or Response bias

13. [12pt] 1pt per correctly filled “expected deaths” cell, except for the totals; 1pt per correct age-adjusted mortality rate; accept equivalent answers

2015 Outbreak

Age	Age-Specific Mortality Rate	Expected Number of Deaths
0-12	0.25	14.75
13-25	0.10	5.52
26-49	0.13	7.92
50-75	0.13	10.27
76+	0.27	18.10
Total	0.17	56.56

Hospital Outbreak

Age	Age-Specific Mortality Rate	Expected Number of Deaths
0-12	0.11	6.56
13-25	0.20	10.60
26-49	0.29	17.14
50-75	0.00	0.00
76+	0.50	33.00
Total	0.18	67.30

Age-Specific Mortality Rate = # deaths / # cases in a specific age group

Expected Number of Deaths = (Age-Specific Mortality Rate)*(Reference Population for the Age Group)

Age-Adjusted Mortality Rate 2015 Outbreak = 56.56 expected deaths / 315 people (from reference population) = 18 per one hundred people

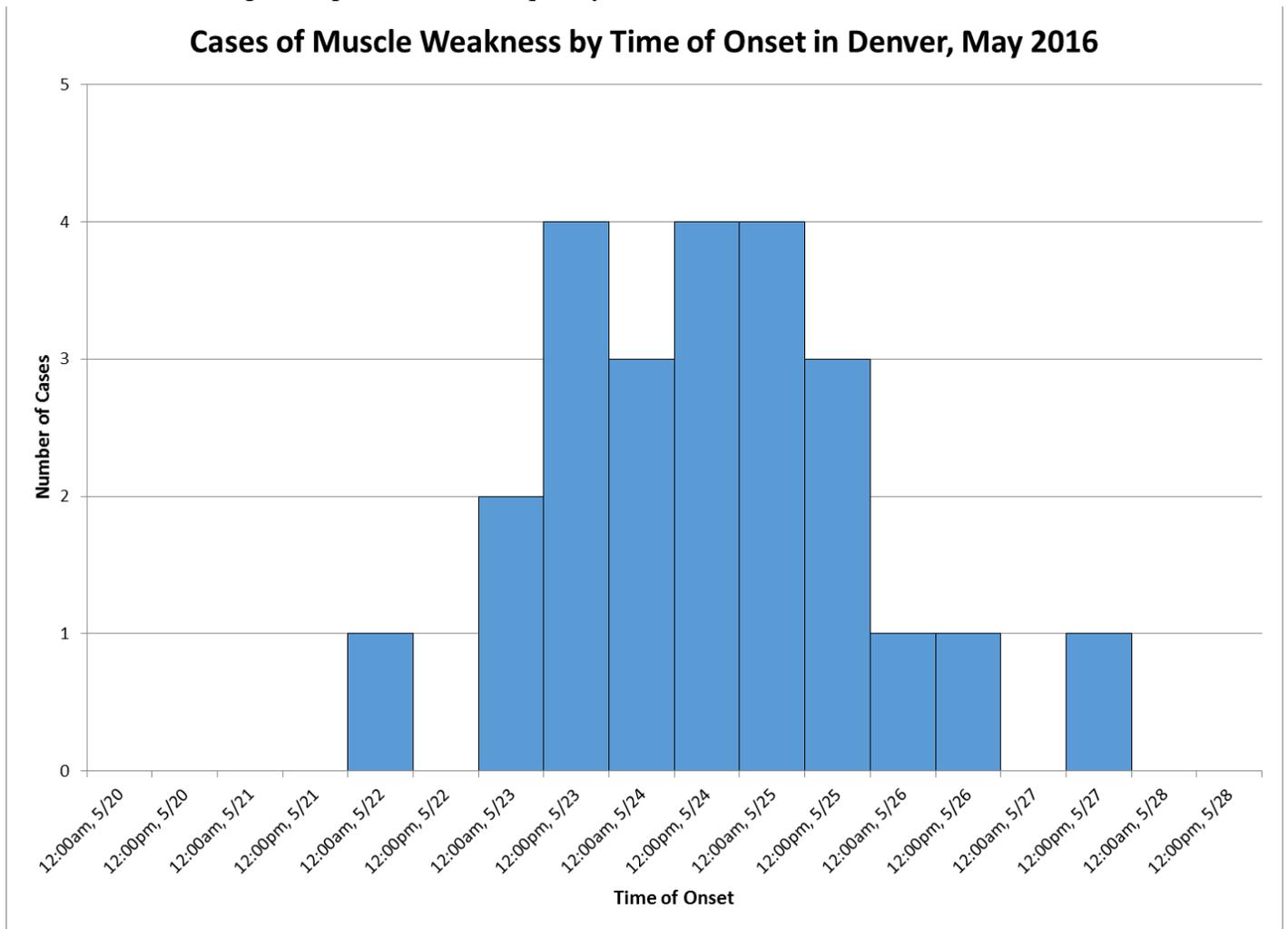
Age-Adjusted Mortality Rate Hospital Outbreak = 67.30 deaths / 315 people = 21 per one hundred people

14. [2pt] 1pt per answer; answers may vary
 random error (due to small sample size); Berkson bias
15. [1pt] b. T-test

Part 2 [27pt]

- [2pt] Pathogenicity is the capacity of a pathogen to cause disease. Virulence is the severity of the disease caused by a pathogen. Ex. TB is less pathogenic than smallpox. Smallpox is more severe than TB.
- [1pt] (answers may vary) pandemics span countries and regions, not a neighborhoods; existence of an outbreak or a pandemic hasn't been established yet; pathogen in question hasn't been confirmed
- [2pt] (answers may vary) cases who left the area, cases where patients didn't seek medical attention in the area

4. [6pt] 1/2pt per correctly labeled axis, 2pt for correct title (condition, “by time of onset,” location, time), 1pt for reasonably scaled x-axis (between 8hr and 1 day intervals), 1pt for a histogram, 1pt for correct frequency for each time interval



5. [6pt] (1pt each, 2pt for showing work; tiebreaker #3)

Exposure	Risk
Visited Areas with Local Zika Transmission	1.20
Ate Commercially Canned Food	0.96
Ate Home-Canned Food	19.95
None of the Above	0.10

Visited Areas with Zika:

OR = $(a/c)/(b/d) = (5/19)/(9/41) = 1.20$

	Muscle Weakness	No Symptoms
exposed	5 (a)	9 (b)
not exposed	24 - 5 = 19 (c)	50 - 9 = 41 (d)

6. [1pt] contingency tables
 7. [2pt] (answers may vary) recall bias, rumination bias

8. [1pt] (answers may vary) spread information on proper canning techniques; instruct on inspection of canned goods before consumption
9. [1pt] (1/2pt each, answers may vary) cheap, easy to perform, well-defined disease/condition
10. [1pt] Type II Error (1/2pt for false negative)
11. 1pt per answer; answers may vary
 - a. [2pt] test will find most cases, especially combined with evaluation of past exposures, symptoms, et cetera; people tested negative most likely do not have the disease
 - b. [2pt] high incident of false positives may lead to distress in patients; false positives may lead to burden on health system due to additional testing

Part 3 [20pt]

1. [1pt] Typhoid Mary was an asymptomatic carrier (accept asymptomatic infection)
2. [1pt] arbovirus
3. [3pt] vectors, airborne, vehicular
4. [1pt] (1/2pt each) hepatitis A & hepatitis E
5. [1pt] clean, separate, cook, chill
6. [1pt] heart disease (Tiebreaker #2)
7. [2pt] (1pt for 3+ answers, 2pt for 5+ answers) sex, age, ethnicity, immunocompromised individuals, socioeconomic status, answers may vary
8. [1pt] endemic
9. [1pt] asymptomatic
10. [1pt] fomite
11. [1pt] reservoir
12. [1pt] environment
13. [1pt] spot map
14. [1pt] portal of exit
15. [1pt] herd immunity
16. [1pt] vector
17. [1pt] attack rate