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Life Science Academy

1.1 Final Diagnosis

8/29/17

 A team of medical professionals has been faced with a potential outbreak on a college campus. High numbers of students visited the school infirmary, within a few hours of each other. After questioning of patient history and recording of symptoms, links were made between patients. All of the patients are connected in some way to our first patient, Sue. Through patient history, patient connections, diagnostic testing, DNA sequencing, and symptom analysis, it was determined that a meningitis outbreak had occurred on campus. A few of the patients, however, were not infected with meningitis, but other pathogens, such as Influenza, Herpesvirus, and Streptococcus were present.

Day One

 Seven patients were seen in the school infirmary on day one. The attending physician completed a physical exam, patient history, and sample for diagnostic test, if complied. The patients were identified as Sue (Patient 1), Jill (P2), Anthony (P3), Wanda (P4), Maggie (P5), Maria (P6), and Arnie (P7). Their symptoms are similar of a fever, sore throat, lethargic, and cough.

Patient 1:

Sue is an 18-year-old biology major and soccer player. She came to the infirmary with a lasting headache, feeling lethargic, and a fever of 100.6 F. During the week, she lacks sleep and recently returned from an overnight trip at another university. A sample of blood, urine, and lymph was collected for further testing.

Patient 2:

Jill is Sue’s roommate and teammate on the soccer team. Her symptoms included feeling constantly sore, run down, and has a fever of 99.7 F. She feels like she drinks adequate water and eats well, yet, admitted to smoking an occasional cigarette.

Patient 3:

Anthony is a reporter for the paper. He complained of a dry cough, tired, achy feeling, sinus pressure, and a fever of 100 F for multiple days. For his reporting, he regularly runs around campus and takes shortcuts through the woods. Before he came to the doctor, he took over the counter pain relievers.

Patient 4:

Wanda is Jill’s sorority sister. Her symptoms included swollen glands, sore throat, and a constant fever. She regularly stays out late for meeting and parties. Her boyfriend, Ray, has similar symptoms.

Patient 5:

Maggie lives on the same floor as Jill and Sue. She complained of a scratchy throat that feels like its fire, heavy head, chills, and irregular temperature. In her free time, she is a singer in a band.

Patient 6:

Maria lives down the hall from Sue and Jill. Her symptoms include feeling run down, barely being able to get out of bed, and a 103 F fever. She regularly drinks and eats after her friends.

Patient 7:

Arnie lives on the same floor as Anthony and photographs sporting events. He complained of a cough, runny nose, and a 100.5 F fever. Before coming to the doctor, he attempted to battle his symptoms by increasing his vitamins.

Day Two

 On day two, two additional patients show up at the infirmary, with similar symptoms. The patients were Marco (Patient 8) and Alvin (P9). Once again, the physician completed a physical exam, patient history, and sample for diagnostic test, if complied. Patient one (Sue) came back for results of her laboratory testing.

Patient 8:

 Marco is Sue’s lab partner. He comes to the infirmary with what he feels like is a cold that he cannot get rid of. His symptoms include extreme fatigue and a killer headache. During the week, he spends eight hours with Sue in lab, sharing food.

Patient 9:

 Alvin is Marco’s neighbor in the dorm. He complains of a lasting headache and sore throat. This week, he has been staying awake studying and working on his music. He believes that his sore throat could be from a concert he recently went to, yet, he would like treatment for his headache.

Diagnostic Testing:

 Patient one’s blood, urine, and lymph has been sent from the molecular biology lab. Primers, small bits of genetic material that can be used for DNA sequencing, are isolated. The following sequence data has been returned for database analysis.

atgacccgtc aatctctgca acaggctgcc gaaagccgcc gttccattta ttcgttaaat

aaaaatctgc ccgtcggcaa agatgaaatc gtccaaatcg tcgaacacgc cgttttgcac

acaccttctt cgttcaattc ccaatctgcc cgtgtggtcg tgctgtttgg cgaagagcat

 After inserting the DNA sequence into the BLAST (Basic Local Alignment Search Tool) database, via nucleotide sequence, the pathogen neisseria meningitidis was identified.

 Neisseria meningitidis is a Gram-negative bacterium that causes the illness, meningitis. Meningitis is the inflammation of brain and spinal cord membranes. Symptoms include pain in the back/ neck, inflamed muscles, fever, chills, lethargy, and headaches. It is spread through close contact. Meningitis can be treated with an antibiotic, intravenous, if needed. To prevent the spread of the infection and a potential outbreak, all those in direct contact must be contacted.

Day Three:

 Patient one, Sue, has been identified as patient zero. She contracted the illness after an overnight stay at a friend’s university. Therefore, all those in contact with her are at risk for contracting meningitis. An ELISA, an enzyme-linked immunosorbent assay, was done on the remaining patients samples of cerebral spinal fluid. The process, of retracting the sample, is invasive and not all patients complied, if they were not at direct risk. The results of the ELISA concluded that three other patients were diagnosed with meningitis. Direct contact with patient zero was the cause for their infection. Of the remaining patients, their DNA sequence has been returned from the lab for testing. Using the BLAST database, their pathogens were diagnosed. Three pathogens were detected: Influenza B, Human Herpesvirus 4, and Streptococcus AP1.

Patient 1:

 Sue was diagnosed as patient zero, with meningitis. IV antibiotics and quarantine were recommended for treatment.

Patient 2:

 Jill was diagnosed with meningitis after the ELISA testing. She was also recommended IV antibiotics and quarantine. Her infection was contracted by direct contact with Sue.

Patient 3:

 Anthony was diagnosed with Influenza B after database analysis of his DNA sequence. Antiviral drugs, such as an amantadine or rimantadine, were recommended for treatment. His infection was spread by direct contact with his neighbor, patient seven.

Patient 4:

 Wanda was diagnosed with herpesvirus 4, a common strand of herpes. Recommended treatment included fluids, rest, and over the counter medications for pain relief. There is no drug treatment. This infection is spread by bodily fluids, saliva included.

Patient 5:

 Maggie was diagnosed with Streptococcus AP1, also known as strep throat. Recommended treatment included oral antibiotics, such as penicillin. Direct contact allows the infection to spread.

Patient 6:

 Maria was diagnosed with meningitis. She was recommended IV antibiotics and quarantine. Her infection was contracted by direct contact with patient one and two.

Patient 7:

 Arnie was infected with Influenza B after database analysis of his DNA sequence. Antiviral drugs, such as an amantadine or rimantadine, were recommended for treatment. His infection was spread by direct contact with his neighbor, patient three.

Patient 8:

 Marco was diagnosed with meningitis. He was recommended IV antibiotics and quarantine. His infection was contracted by direct contact with patient one.

Patient 9:

 Alvin refused a body sample to be taken from the infirmary. Based on an observation of sharing a drink with Wanda, it can be inferred that he is also infected with herpesvirus 4. A return to the infirmary is recommended for diagnostic testing. If he is infected with the herpesvirus, fluids, rest, and over the counter pain medications are recommended.

Final Conclusions

Patient One: Sue

Symptoms: lasting headache, feeling lethargic, and a fever of 100.6 F.

Diagnosis: Meningitis

Treatment/ Outcome: Meningitis, treated with IV antibiotics

Patient Two: Jill

Symptoms: constantly sore, run down, and has a fever of 99.7 F

Diagnosis: Meningitis

Treatment/ Outcome: treated with IV antibiotics

Patient Three: Anthony

Symptoms: dry cough, tired, achy feeling, sinus pressure, and a fever of 100 F for multiple days.

Diagnosis: Influenza B

Treatment/ Outcome: antiviral drugs

Patient Four: Wanda

Symptoms: swollen glands, sore throat, and a constant fever

Diagnosis: Herpesvirus 4

Treatment/ Outcome: rest, fluids, over the counter medication for pain relief

Patient Five: Maggie

Symptoms: scratchy throat that feels like its fire, heavy head, chills, and irregular temperature

Diagnosis: Streptococcus AP1 (Strep throat)

Treatment/ Outcome: oral antibiotics

Patient Six: Maria

Symptoms: feeling run down, barely being able to get out of bed, and a 103 F fever

Diagnosis: Meningitis

Treatment/ Outcome: IV antibiotics

Patient Seven: Arnie

Symptoms: cough, runny nose, and a 100.5 F fever

Diagnosis: Influenza B

Treatment/ Outcome: antiviral drugs

Patient Eight: Marco

Symptoms: extreme fatigue and a killer headache

Diagnosis: Meningitis

Treatment/ Outcome: IV antibiotics

Patient Nine: Alvin

Symptoms: lasting headache and sore throat

Diagnosis: (Based on inference) Herpesvirus 4

Treatment/ Outcome: Revisit to infirmary, rest, fluids, and over the counter medications for pain relief