Shoo Flu Don't Bother Me Part 2

New Mexico Supercomputing Challenge Final Report April 2, 2014

Team #124 Red Mountain Middle School

Team Members:

Antoni Valera Isaiah Granado Justin Maes

Teacher:

Mrs. Miller

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The purpose of this experiment is to find out what is the effect of the influenza vaccine on the number of students absent because of flu like symptoms. The directional hypothesis states

Executive Summary

that the number of students absent during the months of November 2013 to January 2014 will decrease after receiving the influenza vaccine.

This experiment was conducted by selecting a class that the students will be enrolled in from August 2013 until May 2014. Each test subject will be asked the same survey question-"Did you receive the influenza vaccine either from the school or family doctor this year?" Each test subject answered "YES" or "NO" next to their name. Count the total number of student's absent during the months of August 2013 to October 2013; this is before the influenza vaccine was available. Then count the total number of students absent during the months of November 2013 to January 2014, this is after the influenza vaccine was available. Also count the total number of students that received the influenza vaccine for this year.

The results from this experiment show that there were more students absent during the months of August 2013 to October 2013 before the influenza vaccine was available with a total of 331 students absent and an average of 82.75 absences. There were fewer students absent during the months of November 2013 to January 2014 after the influenza vaccine was available with a total of 249 students absent and an average of 62.25 absences.

The results from this experiment did support the directional hypothesis stating that the number of student absent will decrease during the months of November 2013 and January 2014 after receiving the influenza vaccine. The reason for this is because many of the students did receive the influenza vaccine and were protected from this year's seasonal flu virus.

Recommendations for further experimentation would be to make sure that those students that had a "medical excuse" when absent was because of flu like symptoms. Another recommendation would be to survey test subjects from different grade levels or ages such as elementary, middle School, and high school.

Introduction

Statement of the Problem

The purpose of this experiment is to find out what is the effect of the influenza vaccine on the number of students absent because of flu like symptoms. The directional hypothesis states that the number of students absent during the months of November 2013 to January 2014 will decrease after receiving the influenza vaccine.

Background Information

In the United States, flu season occurs in the fall and winter. Seasonal flu activity usually occurs in January or February, but it can be as early as October and as late as May. Each year approximately 5-20% the Untied States population is infected by the flu and more than 200,000 people are hospitalized for flu-related complications.

The Centers for Disease Control and Prevention (CDC) tracks and monitors flu activity in the United States year round and produces a weekly report of flu activity from October through mid-May. A recent CDC study shows that each year in the U.S. an average of 20,000 children under the age of 5 are hospitalized for flu-related complications. During the 2012-13 flu seasons, 26 deaths in children were reported.

The flu vaccine is designed to protect against three flu viruses that experts predict will be the most common during that season. Each year, one flu virus of each kind is used to produce the seasonal flu vaccine. The 2012-2013 flu vaccine is made from the following three viruses: (1) A/California/7/2009 (H1N1)-like virus, (2) A/Victoria/361/2011 (H3N2)-like virus, and (3) B/Wisconsin/1/2010-like virus.

Description

This experiment was conducted by selecting a class that the students will be enrolled in from August 2013 until May 2014. Each test subject will be asked the same survey question-"Did you receive the influenza vaccine either from the school or family doctor this year?" Each test subject answered "YES" or "NO" next to their name. Count the total number of student's absent during the months of August 2013 to October 2013; this is before the influenza vaccine was available. Then count the total number of students absent during the months of November 2013 to January 2014, this is after the influenza vaccine was available. Also count the total number of students that received the influenza vaccine for this year.

Computer Program Model

In order to recreate a scenario involving the various influenza outbreaks, our team selected the computer program, "StarLogo TNG", to help us achieve our goal. Basically, our computer model demonstrates the spread of an epidemic throughout a set population by using simple command sequences implemented through the computer program. We first selected the



population size, set around 100 agents (people), representing 100 %, in the program field. Then, we added certain command sequences such as the Scatter command, randomly placing the set agents in various places around the program field.

Once we have done this, we set certain command blocks (which when they are clicked on, they activate the connected commands) to set the agents into motion. This is achieved by connecting the specific command blocks, like forward, left ninety degrees, right forty degrees, and randomizing the total amount of steps or units they move in these directions on the field. After adding in these components, the agents now move in random directions around the field. By doing this, the agents should collide occasionally. Now that their movements are established, our team then adds in the commands to change the "breed" or shape of the agent upon collision, but only if the agent who they collided with is "infected", or otherwise the shape deemed as infected. At first we were unsure about the structure of the coding in the command program that made the infected agents recover, but we were able to determine that by adding a counter block on the amount of steps taken by each infected agent, and having that counter reach a randomized number of steps to cure the agent as a success. This specific curing process effectively models the curative processes throughout the population, because in a real world epidemic the people would all recover at different times, not all necessarily at a sequential time.





Results

The results from this experiment show that there were more students absent during the months of August 2013 to October 2013 before the influenza vaccine was available with a total of 331 students absent and an average of 82.75 absences. There were fewer students absent during the months of November 2013 to January 2014 after the influenza vaccine was available with a total of 249 students absent and an average of 62.25 absences.

Conclusion

The results from this experiment did support the directional hypothesis stating that the number of student absent will decrease during the months of November 2013 and January 2014 after receiving the influenza vaccine. The reason for this is because many of the students did receive the influenza vaccine and were protected from this year's seasonal flu virus.

The flu vaccine causes antibodies to develop in the body about two weeks after the vaccination. These antibodies provide protection against infection with the viruses that are in the

vaccine. The seasonal flu vaccine protects against the influenza viruses that research indicates will be the most common during the upcoming season. During this time, flu viruses are circulating in the population. An annual flu vaccine is the best way to reduce the chances that you will get seasonal flu and spread it to others. When more people get vaccinated against the flu, less the flu can spread through that community.

Recommendations

Recommendations for further experimentation would be to make sure that those students that had a "medical excuse" when absent was because of flu like symptoms. Another recommendation would be to survey test subjects from different grade levels or ages such as elementary, middle School, and high school.

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Appendix

Test Subjects: (1 st Hour 7 th Grade)	Received Flu Vaccine: (Yes/No)	Number of Times Absent from August 2013 –October 2013	Number of Times Absent from November 2013- January 2014	Total Absences: (August 2013- January 2014)
1	No	1	0	1
2	No	5	12	17
3	No	2	0	2
4	No	1	0	1
5	Yes	2	4	6
6	Yes	0	0	0
7	No	6	0	6
8	No	4	4	8
9	No	5	7	12
10	No	8	2	10
11	Yes	0	5	5
12	Yes	0	0	0
13	No	1	2	3
14	Yes	1	0	1
15	Yes	0	2	2
16	Yes	1	7	8
17	No	0	3	3
18	Yes	3	2	5
19	Yes	3	1	4
20	No	3	4	7
21	No	2	2	4
22	No	10	12	22
23	No	2	7	9
24	Yes	6	2	8
25	Yes	0	0	0
26	No	1	0	1
27	No	4	3	7
28	No	2	2	4
29	Yes	0	1	1
Total:	12 Yes/17 No	73	84	157

Data Table 2:					
Test Subjects: 2 nd Hour 7 th Grade	Received Flu Vaccine: (Yes/No)	Number of Times Absent from August 2013 –October 2013	Number of Times Absent from November 2013- January 2014	Total Absences: (August 2013-January 2014)	
1	Yes	1	0	1	
2	No	19	15	34	
3	Yes	1	0	1	
4	No	1	0	1	
5	No	1	3	4	
6	No	3	1	4	
7	No	0	1	1	
8	Yes	1	0	1	
9	No	1	0	1	
10	No	0	0	0	
11	Yes	1	1	2	
12	Yes	1	1	2	
13	No	0	1	1	
14	No	1	0	1	
15	No	0	1	1	
16	No	3	2	5	
17	Yes	7	5	12	
18	No	0	4	4	
19	No	0	0	0	
20	No	3	3	6	
21	Yes	5	1	6	
22	No	3	4	7	
23	No	4	0	4	
24	No	0	2	2	
25	No	1	1	2	
26	No	1	1	2	
27	Yes	2	0	2	
28	No	0	0	0	
29	No	0	5	5	
30	Yes	0	5	5	
Total:	9 Yes/21 No	60	57	117	

Data Table 3:

Test Subjects: 4 th Hour 7 th Grade	Received Flu Vaccine: (Yes/No)	Number of Times Absent from August 2013 –October 2013	Number of Times Absent from November 2013- January 2014	Total Absences: (August 2013-January 2014)
1	No	1	0	1
2	No	1	1	2
3	No	4	4	8
4	No	16	0	16
5	No	6	9	15
6	Yes	2	1	3
7	No	1	0	1
8	No	3	5	8
9	No	5	0	5
10	No	2	2	4
11	No	2	1	3
12	No	0	0	0
13	No	4	4	8
14	No	0	1	1
15	No	0	1	1
16	No	0	0	0
17	No	3	0	3
18	No	1	0	1
19	No	3	0	3
20	Yes	5	2	7
21	No	1	1	2
22	No	10	3	13
23	No	0	0	0
24	No	3	1	4
25	No	7	6	13
26	No	18	3	21
27	No	5	2	7
28	No	0	0	0
29	No	6	1	7
30	No	3	4	7
Total:	2 Yes/28 No	112	52	164

Test Subjects: 5 th Hour 7 th Grade	Received Flu Vaccine: (Yes/No)	Number of Times Absent from August 2013 –October 2013	Number of Times Absent from November 2013- January 2014	Total Absences: (August 2013-January 2014)
1	No	1	0	1
2	No	1	0	1
3	No	0	1	1
4	No	6	1	7
5	No	3	1	4
6	No	0	1	1
7	No	0	3	3
8	No	2	0	2
9	Yes	4	0	4
10	No	0	2	2
11	No	1	1	2
12	No	3	2	5
13	No	9	7	16
14	No	12	11	23
15	No	0	0	0
16	No	4	6	10
17	No	1	0	1
18	No	5	2	7
19	No	2	0	2
20	Yes	7	0	7
21	No	1	3	4
22	No	0	1	1
23	No	1	0	1
24	No	3	2	5
25	No	12	7	19
26	Yes	2	1	3
27	Yes	6	4	10
28	No	0	0	0
29	No	0	0	0
Total:	4 Yes/25 No	86	56	142

Class Period: Number of Test Subjects:	Flu Vaccine: (Total Yes)	Flu Vaccine: (Total No)	Before: (Total <i>Absences from August</i> 2013 –October 2013)	After: (Total Absences from November 2013- January 2014)
1 st Period: (29)	12	17	73	84
2^{nd} Period: (30)	9	21	60	57
4 th Period: (30)	2	28	112	52
5 th Period: (29)	4	25	86	56
Total: 118	27	91	331	249
Average:	6.75	22.75	82.75	62.25

Data Table 5:







