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Examining the Difference Between Asynchronous and Synchronous Training

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EXAMINING THE DIFFERENCE BETWEEN ASYNCHRONOUS AND SYNCHRONOUS TRAINING

A Thesis

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LIST OF ABBREVIATIONS

ACMC – Asynchronous computer mediated communications

CIT – Computer and information technology

CMC – Computer mediated communications

ESL – English as a second language

GSS – Group support system

JITT – Just in time training

OLS – Organizational leadership and supervision

POD - Point of dispensing

SCMC – Synchronous computer mediated communication

GLOSSARY

CADE: This is the Center for the Advancement of Distance Education which is a self-supporting unit within the School of Public Health at the University of Illinois at Chicago. (Livingstone)

EMP – Emergency Medical Personnel (Vico)

eTraining – Training online or in this case a mobile device. (Vico)

JITT – Refers to just-in-time training that can be taken whenever it is relevant. (Mangana)

Knowledge Book- a thorough presentation in multimedia form of all the knowledge required for following each step of the algorithm. (Mangana)

Second Life: A virtual world that offers an alternative medium for delivery of blended learning solutions for people that meet online. (Livingstone)

SMIL- Synchronized Multimedia Integration Language which is a message that includes simultaneous imagery and audio. (Vico)

ABSTRACT

Craig, Colby R. M.S., Purdue University, August 2016. Examining the Difference Between Asynchronous and Synchronous Training; Major Professor: Eric Dietz.

For my project, we chose to do a thesis so that it would better help me out in the future in the case I wanted to get my PhD. My thesis so far has been to develop software that will help POD sites better be able to train their volunteers in the case of an emergency. We have already collected some data for our research from a test POD site that was constructed. We took data on the amount of time it took each volunteer to get an individual actor through the line depending on whether they learned via teacher or by my software. The data helped to prove how beneficial teaching via software could be, due to the fact there wasn't any missing information, and there was a greater retention rate. Currently I just work at Lowes as a customer service administrator, mostly so I get to interact with customers every day to better understand how to communicate and give the information I would have on my software. The general are that my research has been taken so far is in emergency preparedness, and I would like to continue heading this direction until other opportunities arise.

CHAPTER 1. INTRODUCTION

1.1 Introduction

This chapter will help to provide an overview to the study being conducted in this document. This chapter will show the scope, methodology, significance, assumptions, and limitations of the study that was conducted. It will finish with an overview of the exercise and data that will be established.

1.2 Significance

The significance of this study was to help show that asynchronous learning can be not only a cheaper method to multiple ways of training, but also a better way to train. If asynchronous learning shows to have an equal or higher retention rate than its counterpart, it would be possible to develop multiple applications that can far better train emergency responders and other volunteers who are put into a multitude of different situations with little or no training beforehand. The study helps to show a greater uncertainty reduction when having taken the asynchronous learning as opposed to the traditional approach. Third, the research shows significantly higher scores on the surveys than the traditional method. The goal was to be able to show that the benefits of the asynchronous training would far outweigh the costs to produce such applications. These above statements were shown to be true, so it could change the way that many

organizations train their employees. It would require less volunteers, resources, and time to teach. It would make emergency response volunteers be able to have confidence in their new knowledge of the tasks at hand. It also would have the ability to be able to show a much higher retention rate due to the applications that will be developed to be readily used at a moment's notice, for the situation at hand.

1.3 Scope

The research addressed how asynchronous learning could help to benefit multiple organizations better than more traditional synchronous methods of training.

Asynchronous learning must show that it is as good as or better than the traditional methods to be accepted as an alternative solution to synchronous training. Also the cost of producing the asynchronous learning must show significant advantages in retention to be able to warrant the cost of the alternate method.

The training constructed has been able to help volunteers to staff a POD (point of dispensing) unit in the event of an emergency. The training has shown the volunteers how to effectively dispense the medication correctly to all of the subjects, and make sure to keep mistakes to a minimum due to the consequences of dispensing medicine incorrectly.

This study tested eight nursing students on their ability to adapt quickly to material learned under stressful situations. This study assumed that the participants are of equal learning ability, so that it can accurately test how the asynchronous courses compare to its synchronous counterpart. It also assumed that conditions are the same for both teams during the study to ensure none of the data has any outliers.

1.4 Statement of Purpose

The goal was to provide reproducible training that could be measured to be replicated with fewer errors, intensive resources or large well trained staffs while reducing the cost it takes to train responders while increasing the retention rate of essential tasks. By researching how well asynchronous learning can help in the workplace, the researchers' hope is to be able to design a training process that can eventually help government and companies develop training programs. The research team formed a pilot study to find out how well asynchronous learning compares to the more traditional methods of learning in the workplace using a POD exercise as the model event requiring a number of trained volunteers to collect information and dispense emergency medicals rapidly enough to change the outcome during a disease outbreak. Specifically, the research sought to determine if making just-in-time training videos for emergency response needs would be just as beneficial as traditional training. If this proves to be true, or if it shows to be just as good a learning tool as the traditional method, then the researchers would further an understanding on time and resource needs for responders' teams

1.5 Research Questions

The questions that were proposed were:

1. How does asynchronous and synchronous training compare in the scope of the time it takes students to complete the task?
2. What are the different accuracy levels that students have based on the two types of training they received?

1.6 Assumptions

The following assumptions were used in this study:

1. All volunteers completed their assigned tasks to the best of their abilities
2. Each volunteer assigned to a desk to be tested on the material, has equal learning capabilities
3. All volunteers were trained with the same material whether it be asynchronous or synchronous
4. The measurements taken accurately reflect the effectives of each training method

1.7 Limitations

The following limitations were used in this study:

1. The study is limited by how truthful and cooperative the volunteers are

2. The study is limited by the ability of each volunteers ability to learn information quickly
3. Statistical significance due to the size of the population being observed
4. The study is limited to the effectiveness of the data being gathered

1.8 Delimitations

1. All of the volunteers that were drawn from a large, Midwestern University's nursing and pharmacy classes
2. The amount of time the researcher had to conduct the study, which was a three hour block of time

CHAPTER 2. REVIEW OF RELEVENT LITERATURE

2.1 Online Synchronous vs. Asynchronous Training through Modeling

Since the steady increase in technology, there has been an increased amount of training online. This raises the question pertaining to the most effective method of training. The behavior modeling approach, otherwise defined as teaching through demonstration, has been shown as the most effective approach in a face-to-face environment. To answer this question, a quasi-experiment was conducted with 96 undergraduate students all taking a Microsoft SQL Server 2000 course. The behavior modeling approach was then used in three learning environments; face-to-face, online synchronous, and online asynchronous. The results would be measured by seeing which method produced the best performance (Chen & Shaw, 2006).

Bandura (1977) suggests that behavioral modeling takes place in four sequential steps. The four steps are attention, retention, motor reproduction, and motivation and reinforcement. The problem is not knowing how well this approach can be transferred to online training due to the fact that there isn't a face-to-face interaction with the asynchronous method. This leaves a strong chance that using the behavioral modeling method cannot be replicated in an online environment which means other methods would have to be used (Chen & Shaw, 2006).

Knowledge transfer is the application of acquired skills and knowledge into different situations, generally having four formats. The first two are positive versus

negative transfer, which is learning stimulating more learning versus learning hindering more learning. Next, have near versus far transfer; this is basically asking face-to-face or asynchronous (Chen & Shaw, 2006). The two others, which are specific versus general transfer and lateral versus vertical transfer, are less important in this study. In this study the researchers adopted both near and far transfer measures of learning outcomes for the experiment.

This study lasted for four weeks, with fifty-minute training sessions each week for class. The students were given pretests, posttests, and quizzes. All of the scores were taken down and compared to one another. The results were that no significant advantage could be seen between the three methods. The conclusion was that it may be almost as effective to use online training (synchronous or asynchronous) as it is to use a costlier face-to-face training in the long term. However, in the short term, face-to-face was still deemed the most effective method when using the behavior modeling approach (Chen & Shaw, 2006).

2.2 Discourse Functions/Syntactic Complexity in Synchronous and Asynchronous Communication

Sotillo's study measured discourse function and complexity in communication helps to investigate discourse function and syntactic complexity in ESL (English-as-a-second-language) learner output using two different modes of computer-mediated communication: asynchronous and synchronous. To establish this study, two instructors and 25 students were used. The two questions were if the discourse function present in

ESL learners' synchronous discussion of reading assignments quantitatively and qualitatively differ from those found in asynchronous discussions, and which mode of computer-mediated communication would show more syntactically complex learner output (Sotillo, 2000).

As some of the teachers in the study had shown, teacher domination of the discussions that the students are writing about seems to influence the student's participation in both synchronous and asynchronous modes of communication. In this study, both of the teachers were given the task to make sure that students stayed on topic. Though students didn't always stay exactly on topic, this wasn't seen as necessarily a bad thing. In the asynchronous training, the discussions between students promoted critical thinking linked, the researcher states, to the opportunity to have time to produce syntactically complex language (Sotillo, 2000). This provides a greater extent of learning than does the synchronous training alone where students just have immediate exchanges on the topic and not time beforehand to prepare.

2.3 The Effect of Synchronous and Asynchronous CMC on Oral Performance in German

This study included a total of 96 students, divided into three groups to assess the different effects that synchronous and asynchronous learning had on oral performance. The first group was the control group, which had regular classroom exercises. The second participated in one hour of synchronous computer-medicated communication (CMC) using a WebCT's chat tool each day before their discussion period, while the third

participated in a week long asynchronous CMC session using the WebCT's bulletin board that began one week before the oral discussion day (Abrams, 2003).

This study tried to answer four hypotheses; the first was whether CMC (SCMC, synchronous or ACMC, asynchronous) would result in better oral performance. The second was whether CMC would have a positive effect on oral performance, and if this were so to see if there was a difference between the effects of asynchronous and synchronous. The last hypotheses examined if there would be any difference in the oral performance of students in the SCMC and the ACMC groups. To determine the effects of these two groups of learners, the oral output of the students was analyzed according to gains in scores between the pretest and the final discussion (Abrams, 2003).

The results of this study showed that those students who participated in CMC produced more language during oral discussions than those who didn't have the same preparation using CMC. The study did show that the SCMC group performed better than the ACMC group, but this was thought to be most likely due to the fact that students had to wait to discuss until other students participated in the online discussion. This was thought to hinder some of the students from being able to discuss topics as well as those in the SCMC group (Abrams, 2003).]. It would be interesting to see if imposing a mandated time to reply to the discussion would modify the results of the ACMC group to show as beneficial results as the SCMC group. This would help so that all students in the ACMC group would be able to discuss the topics around the same time.

2.4 Asynchronous Stream Modeling for Large Vocabulary Audio-Visual Speech Recognition

This study attempts to address the problem with audio-visual information fusion to help provide a higher level of speech recognition. The researchers wanted to investigate various methods that help to make different assumptions about the asynchrony and the dependence to help propose a technique to help account for stream asynchrony at different levels (Luettin, Potamianos, & Neti, 2001).

Luetting, Potamanos, and Neti identified three main issues in information integration which are the classes' conditional dependence across streams, the level of integration, and the kind of integration. Their research addressed each of these issues and compared asynchronous and synchronous methods against each other. The evaluation was that the synchronous integration showed improved performance with the additive speech noise, but would also increase the error rate in the clean audio case. The asynchronous method showed better performance with the added "babble" and also with the audio-visual speech (Luettin, Potamianos, & Neti, 2001). This adds to the literature suggesting that the asynchronous stream models were best for providing a higher level of speech recognition.

2.5 Comparison of Asynchronous Online Text-Based Lectures and Synchronous Interactive Web Conferencing Lectures

This study was developed to compare pre-service general and special education students' performance and satisfaction in a course that used two types of online

instruction. Two courses were then developed, one using asynchronous text-based lectures and one using synchronous interactive web conferencing lectures. The purpose of the study was to see if there are differences in performance between students accessing content presented in a synchronous interactive web conferencing lecture format compared to students that access content in an asynchronous text based lecture. The researchers also wanted to see which method the students would prefer to use as well as seeing how well students perceived an increased level of technology skills when taking online courses (Skylar, 2009).

The procedure used 44 students equally divided into two sections, one section for the asynchronous and one for the synchronous. Students then took a 100-item pretest and a survey. Once this was completed, they were split into their groups. One of the groups had an asynchronous text based lecture while the other group had a synchronous web conference (Skylar, 2009). This would help to show which method promoted the most learning and retention by a final test taken at the end of the study, and comparing it to their original pretest. The conclusion was that there was no significant advantage for either method of teaching. There was only a slightly higher score mean with the synchronous online training method. This supports that asynchronous learning could be beneficial to students and workplaces as an alternative method to teach that is significantly cheaper and requires fewer hours to procure a lesson.

2.6 Affective Learning Outcomes in Workplace Training

This study tested the difference between asynchronous and synchronous study designs. The two groups that were formed were the WebCT asynchronous group and the vClass synchronous group. They were then evaluated to see which group, if any, had a significantly higher score on the posttest.

The WebCT group was offered an asynchronous discussion that would be part of each module, lasting one week. Its content included text, audio clips, and video clips. The site was available at all times, every day. The vClass was only available once per week for one hour. This platform had synchronous online presentation that incorporated audio interaction among the participants and the instructor. The key variable in this research was the type of interaction each group used. The WebCT was text based and asynchronous while the vClass students engaged in audio and text synchronous interaction once a week (Cleveland-Innes, & Ally, 2013).

The authors, like others comparing asynchronous and synchronous learning methods, found no significant difference between the methods. However, results do suggest that under the conditions of asynchronous text-based interaction (WebCT), the participants showed greater learning gains that those in the synchronous group (Cleveland-Innes, M., & Ally, M. 2013). This suggests that asynchronous learning in the workplace could be a more traditional method in the future with much less cost involved. The learning and software of the asynchronous text based learning can be copied over and over so the cost of producing the program will pale in comparison to the cost and man hours used when hiring an instructor to teach the same material.

2.7 Content Analysis of Student Interaction in Synchronous and Asynchronous Learning

This study was designed to compare learner-to-learner interaction in a distance learning environment with student interactions in synchronous and asynchronous learning environments being compared (Chou, 2002). The researchers examined differences in interaction depending on how the material is delivered and how the course is designed

There were three research questions that the study proposed. The first asked if there would be a significant difference in social emotional oriented content and task oriented content between asynchronous and synchronous communication modes. The second was if there is significant association between the moderators and the participants in online discussion. The third question was whether there is a difference in the social emotional oriented versus task oriented contents between female and male participants (Chou, 2002). The finding would help to show how each method provides different kinds of interactions as well as a different frequency of interactions. In the asynchronous method, students were only required to post twice, which meant that, most of the time students posted only twice. Synchronous has a more frequent abundance of posting and discussing topics.

The conclusions were that there was more social emotional -oriented interaction in the synchronous communication mode. The asynchronous peer review provided collaboration on building a knowledge base and sharing information. Students were shown to spend significantly more time in the synchronous social emotional oriented mode than the asynchronous method (Chou, 2002). Though there was still no significant learning difference between the two methods, in this study students showed that they

spent more time on the synchronous learning method. This suggests that it was either more widely adopted or it was easier for students to communicate with each other with this method.

2.8 Surface and Deep Learning Processes in Distance Education

This research examined differences in student achievement by those who studied the same course using synchronous versus asynchronous methods. Abstract verbal thinking ability as well as the differences between high and low level thinking were examined (Offir, Lev, & Bezalel, 2008). This research was constructed to help show the relationship between distance learning and the type of method used. The researchers hoped to show that learning asynchronously helps the student learn more autonomously and have greater ability for critical thinking.

The results of this study showed no significant differences between the two research groups. There was only a small difference in the students with low abstract thinking, but there was shown to be a significant difference in the students with high abstract thinking (Offir, Lev, & Bezalel, 2008). Students indicated that they did not feel as free to ask questions in the classroom as they did online due to the perception that they would be interfering with other classmates. Another common perception reported was that students felt that teachers needed to be present when going over lessons to help prepare for the exam more effectively. Though this was not true with all students, disconnect between students in the online class appeared to be greater than those in a traditional classroom.

2.9 Comparison of Two Technologies for Synchronous and Asynchronous Group Communication

This experiment was developed to look at the interaction between task structure and technology to support synchronous and asynchronous group communication. The authors used two communication technologies consisting of email and a group support system (GSS), with two levels of task structure (less and more structured) (Shirani, Tafti, & Affisco, 1999). This research examined which method, if any, is significantly better to enhance group communication.

This research attempted to see if there was a difference in the amount of ideas generated using each method. This was tested by seeing whether asynchronous or synchronous, paired with more and less structured tasks, promoted the biggest abundance of ideas. One hundred and forty-eight students were randomly placed into four-to-five-person groups. The research suggested that, using the GSS method, the students produced a far greater amount of ideas than did the email asynchronous group. However, the email groups seemed to have a deeper analysis of the topics than the GSS groups did (Shirani, Tafti, & Affisco, 1999). This suggests that if the goal is to generate a higher abundance of ideas, the GSS synchronous method should be used. If the goal is to develop a deeper understanding of the topic, the asynchronous method would be better to use.

2.10 Foreign Language Productivity in Synchronous versus Asynchronous Communication

This study proposed an experiment using two different types of computer-mediated-communication. The asynchronous email dialog journals and the synchronous chatroom sessions. One of the questions to be answered for the study was to help identify which form of CMC would be more effective in increasing language productivity in foreign language testing. Also to see which form of CMC would participants prefer to use (Perez, 2003). Through the past research that has been completed, the thought was that one method would not be significantly better than the other, but possibly just more preferred one over the other.

This study was constructed to help answer whether electronic dialog journals or the chatrooms would show a higher quantity of vocabulary used (Perez, 2003). Past research suggest that a high quantity of vocabulary would be used with the chatrooms due to them being the synchronous method. Though this is true, the asynchronous electronic journals should help to show a deeper understanding of the material even though it might not have a higher quantity of vocabulary.

As was assumed, the question asking which method was better showed no significant results. Answering the question which method was liked better also showed a 50/50 split and also showed no significant advantage with either technique (Perez, 2003). Instead, students seemed to show they liked each method for different reasons and liked a mix of the methods. It seems that each method has its advantages and disadvantages and really comes down to personal preference or cost. Because a common them in methods of training is cost, it could be beneficial to make training that can be replicated to cut hours

and cost of providing this training. This is assuming that no future significant advantages were seen in the synchronous methods of training.

2.11 A Comparison of Interaction Needs and Performance of Distance Learners

The purpose of the study was to see if perceived learner interaction needs and performance taught with distance education were different based on the method of delivery. The two methods being researched were asynchronous and synchronous (Miller, & Webster, 1997). This study hoped to show whether the learner interaction needs and performance of each method differed for the groups being studied. Though performance most likely will not differ significantly, this study proposed a new objective that tried to see if interaction needs differ depending on the learning method. This objective could help to show whether some students are more inclined and perceptive to a certain type of learning based on their interaction needs.

As expected, the conclusion of the study showed that the interaction needs of synchronous and asynchronous learner vary on individual items based on the delivery method used for the course (Miller, & Webster, 1997). Though all the users were overall satisfied with each method, there is still a strong need for teacher to be in contact with the students no matter what method is used. This is just to help the students maintain a correct path and to help them clarify any questions they have regarding the course. Realizing that once again no significant advantage was shown between either method of delivery, having one teacher online answering questions could prove to encompass a much larger amount of students than a single teacher in a classroom. This could help to

provide lower costs for students and more flexibility when learning and doing assignments.

2.12 A Comparison of Distance Learning and Classroom Instruction

This study was developed to deal specifically with comparative studies of distance education. The goal was to provide a quantitative synthesis of comparative literature of distance education. This would be across all age groups, media types, instructional methods, and outcome measures (Bernard, Abrami, Lou, Borokhovski, Wade, Wozney, & Huang, 2004). This will hopefully help to shed light on how affective distance education was and to see what conditions must be met to make the distance learning more effective than other forms.

Out of a total of 232 studies, 688 independent outcomes were analyzed. The research suggests that in some cases distance education worked very well and in other cases very poorly. Though the literature is large, it was difficult to draw a firm conclusion on what works and doesn't work with distance learning (Bernard et al., 2004). A common theme that keeps being seen with all the studies regarding distance education is the fact that no one really knows what methods work the best. Even with all the literature that was researched, no substantial conclusions could be developed. Though some studies show significant positive outcomes in distance education, there are just as many studies that show poor results. What needs to be researched is how the positive and poor distance education studies differ. This would help to see what the positive distance education studies had that the studies resulting in poor distance education didn't have.

2.13 Synchronous and Asynchronous Text-Based CMC in Educational Contexts

Reviewing the recent research that has been developed comparing asynchronous and synchronous technology, is starting to show that maybe a mixture of the two methods would be best for learning. A downside of synchronous chat rooms that has been recently explored is that they are viewed more as a place of recreation than as a place for learning. This article shows four studies that were located that used objective measures of student achievement to determine the effectiveness of asynchronous discussion (Johnson, 2006). This research could help show the benefits of learning online thorough bulletin board techniques, which require students to discuss multiple issues online frequently.

In 2003, Koory conducted a study that helped compare two versions of a course in Shakespeare. One version was face-to-face and the other was delivered online and requires very frequent message board postings. This study showed that the online students had higher course satisfaction, achieved higher grades, and produced more written work, while still completing the course in less time (Johnson, G. M. 2006). This finally helps to show a significantly greater amount of satisfaction and learning than an equivalent synchronous course. One question that comes to mind after reviewing the data would be why this is one of the few to show significant advantages over its counterpart? Going back to other research that said that there are certain reasons why some distance learning is better than that of the synchronous method, it makes me wonder what this online class had that the other poorly significant asynchronous classes that were developed didn’t have.

2.14 Asynchronous and Synchronous Online Teaching

This article shows results of an interpretive analysis of the perspectives of forty two Canadian high school distance education teachers on their asynchronous and synchronous online teaching. This paper hopes to show insight into the degree of use, tools used, contexts in which each occur, and student's preferences and limitations (Murphy, Rodríguez-Manzanares, & Barbour, 2011). This study will help to show the differences in online education methods and how much students use each type. Normally the tools used in the method of delivery greatly affect the amount of participation that each student is willing to give. It should prove useful to see the preferences and limitations of each different group of students.

This study slightly differed in its finding than other articles before it, saying that the preference of the students dictates how well they will do with each method. The study said that if a DE student actually prefers text, then interactive television, videoconferencing, and audio conferencing could prove to be ineffective (Murphy, Rodríguez-Manzanares, & Barbour, 2011). This helps to show that with the other studies that based their conclusion on how well each methods learning was constructed, was linear to the result of how well the students exams where. This study suggests that its more likely that how well a student does with a certain method is more closely related to the students preferences. This would suggest that a certain amount of students would prefer and do better in asynchronous just depending on how well they like the method and construction of the material. If this is the case than simply making software that students deem preferable would help to alleviate the asynchronous methods negative results.

2.15 Synchronous vs. Asynchronous Tutorials

This study tried to determine factors that affect student's preferences regarding tutorial modes. To do this they revealed four factors; time management, ease of access, positive aspects, and negative aspects. Three synchronous satellite courses and four asynchronous satellite courses were constructed to test (Beyth-Marom, Saporta, & Caspi, 2005). This study shows to ask almost the same question as the last review, which is whether preference effects how the students view and retention of the course is.

The research provided information that said when being in a classroom to learn the material, having a teacher face to face rather than a virtual one is more effective. It was shown that two thirds of students show that they like the flexibility of the asynchronous home environment. Another item that differed from method to method was the perceived amount of contribution from student to student, due to the fact that in the asynchronous method students didn't really know who was actively participating (Beyth-Marom, Saporta, & Caspi, 2005). These finding help to show that preference of method maybe one of the most influential factors when deciding whether to use asynchronous or synchronous methods. As the last three literature reviews have shown, students that prefer the method that they are in do significantly better than those who prefer the other method of learning. This would require a mix of both methods to adhere to both groups of students to be the most effective in their studies and learning, which would call for a cross functional approach to distance learning.

CHAPTER 3. METHODOLOGY

3.1 Framework

For the purpose of this study, the asynchronous group was the examined group and the synchronous group was the control group. The study, part of a functional exercise by the Homeland Security Exercise Evaluation Program, was conducted by training two different sets of volunteers. Four volunteers had been trained traditionally using synchronous group training while another group simultaneously was trained asynchronously as individuals. There were two tables for each group, one for data entry and one for dispensing the simulated medicine through empty bottles labeled as various antibiotics being distributed. There was a staging area where the volunteers were issued actor cards that would have to be read beforehand to simulate a multitude of different personalities to make the data entry and dispensing more like a real life disaster. The volunteers were instructed to proceed to the data entry, then the dispensing table, and finally the outpatient area. There were eight nursing students who were graded not only on the time it took to complete their station with each mock patient, but also the accuracy to which they did so. Four nursing students were asynchronous and four synchronous to evenly test the abilities of each training. There were two phases to the exercise. The first phase had two students from each of the training groups run through 75 total patients until finished. Once this was completed the second four students entered, and another 75

mock patients proceeded ran through the exercise while they were observed for time and accuracy in completion of their given task.

This design provided not only data for the researchers' functional exercise but also provided an education benefit. All of the students benefited from participation in the mock exercise as a means of reinforcing the classroom discussion on the Centers for Disease Control and Prevention's Strategic National Stockpile; public health principles; and definitions of outbreak, epidemic and pandemic. The exercise benefits of this process are described in more detail.

3.1 Research Type

The research that was conducted would be in the form of a case study. The study would be exploring the significance of asynchronous training compared to more traditional methods. The study hoped to show a significant advantage with the effectiveness of the training and the time the volunteers completed their task.

3.2 Sampling Approach

Of the nursing students the researcher had selected eight of them at random to be trained either traditionally or asynchronously. They were then to be the volunteers at the tables collecting the data and dispensing the medicine in the scenario.

3.3 Sampling Size

The sample size was be anywhere from 24 to 50 nursing students, basing this solely on the instructor that provided the number of possible volunteers for this case study. In total there were 161 data points collected from the student volunteers.

3.4 Population

The population for study was a group of Midwestern university nursing students. There was no stratification of the population because the characteristics of the population did not matter in this study; and, for the study's purposes, all nursing students were equal.

3.5 Variables

The variables that were observed were whether the students received asynchronous or synchronous training. Within these two variables, the time and accuracy of the students were tested to further validate each training method.

3.6 Units of Measurement

The units that the study compared were the effectiveness and time of each group of training. The study examined data on the effectiveness of the data entry and dispensing based on the material that was given to the students beforehand, whether it was traditionally or asynchronously learned. Each mock patient case also had a completion time for each volunteer, starting from the time they handed their paper to the data entry

volunteer until the time they received their medicine from the dispensing station. There was also an after study survey that only the participants at the table took to see how well they had learned and retained the information that was given. It also might have been advantageous to do a follow up survey one to two weeks after the exercise to see how well they would have retained the information for future application.

3.7 Assessment Instruments

The researcher had one volunteer per student with a stopwatch. The researcher then timed from the beginning of the exercise until the volunteer had completed the dispensing table. At the same time, the researcher graded the effectiveness of each participant that received the training. On a scale from best outcome to worst outcome. The four outcomes were screener correct and dispenser correct, screener correct and dispenser incorrect, screener incorrect and dispenser incorrect, and screener incorrect and dispenser correct.

3.8 Data Collection Methods

A spreadsheet comparing the effectiveness and time differential between the asynchronous and traditional methods of training. This helped to show how each varies within each type of measurement.

3.9 Analysis

Once the data had been collected, the researchers were able to show how much time one method could save when compared to the other. The data also was able to show if one method could prove to be more effective at training in these types of just-in-time scenarios.

3.10 Chapter Summary

This section talked a lot about the methods and measurements that the researcher will be using for the development and data collection of the study. This should give better insight into the reasons why the variables and units seen above were used in this study.

CHAPTER 4. PRESENTATION OF DATA

4.1 Observed Training Times

The POD exercise produced 159 data points that helped the researchers gather how effective each of the training methods were. Each data point was separated by group, player, screening one, screening three, dispensing two, dispensing four, total time, training type, and medication count Each one of the screening and dispensing numbers designated whether the training received by those volunteers was synchronous or asynchronous. To make things easier, a training type was added so that the data could be sorted in a timelier manner once in a spreadsheet. Table I indicates the average time it took to screen an individual, the medication count is also very important to observe because each patient could be responsible for up to five patients. This was discussed early with the patient forms, which included family member spaces to limit the amount of patients needed to appear at the POD.

4.2 Efficiency of Data

Once the observed data was compiled and sorted between training types, it was inserted into a separate table to account for varying levels of effectiveness, see tables 4.1 and 4.2. Further analysis of this data is the subject of another paper in development.

Table 4.1 POD Training Times

	Total Time	Average
Asynchronous (78)	6302.28 Seconds	80.33 Seconds
Synchronous (82)	6477.43 Seconds	82.59 Seconds

Table 4.2 POD Efficiency Data

	Count (Asynchronous, Synchronous)
Screener right decision, Prescriber right decision	(86,91)
Screener right decision, Prescriber wrong decision	(0,2)
Screener wrong decision, Prescriber wrong decision	(11,9)
Screener wrong decision, Prescriber right decision	(1,0)
Total	(98,102)

4.3 Summary of Data

Each encounter with the nursing student control group or experimental group could result in four decision counts. The first count was if the screener made the right decision, and the prescriber made the right decision. This outcome was rated the best of the four, due to the fact that both volunteers correctly evaluated the patient. The next count was when the screener made the right decision and the prescriber made the wrong one. This

was labeled as an incorrect decision due to the prescription being wrong for the patient, but was not the worst of the outcomes. The third count is when the screener made the wrong decision and the prescriber made the wrong decision. This level was labeled as the worst because both volunteers failed to accurately assess the patient. The final count was when the screener made the wrong decision, but the prescriber noticed and made the right decision. This outcome was rated under best because, even though the patient received the correct medication, it was due to the prescriber catching the error the screener made.

The final counts of these four varying levels were recorded and totaled for each type of training to measure how they compared. As shown in the appendices labeled "final counts of decisions observed," asynchronous had 87 correct decisions and a total of 11 incorrect decisions. This gave an 11.22% error rate just given the asynchronous training. The synchronous training had 91 correct decisions and 11 incorrect decisions, which gave an error rate of 10.78%. This resulted in a 0.44% difference in the error rates based on each type of training. This shows very little difference in the amount of effectiveness and retention that each type of training provides and warrants additional research.

4.4 Implications

Though this case was a pilot study, it demonstrates the possible advantages of using just-in-time training. If the differences found in other studies observing these two training types also yield no statistical differences, then government and others programs could begin developing asynchronous learning environments to help save money and time. The

researchers plan to build on the pilot study by conducting another simulated exercise in 2016 to allow for more rigorous statistical analysis.to

Asynchronous training has the potential to save money and time, both commodities of importance when responding to disasters. The possibility of a neutral effect on dispensing accuracy would lend credence to the increased development in the future of asynchronous training

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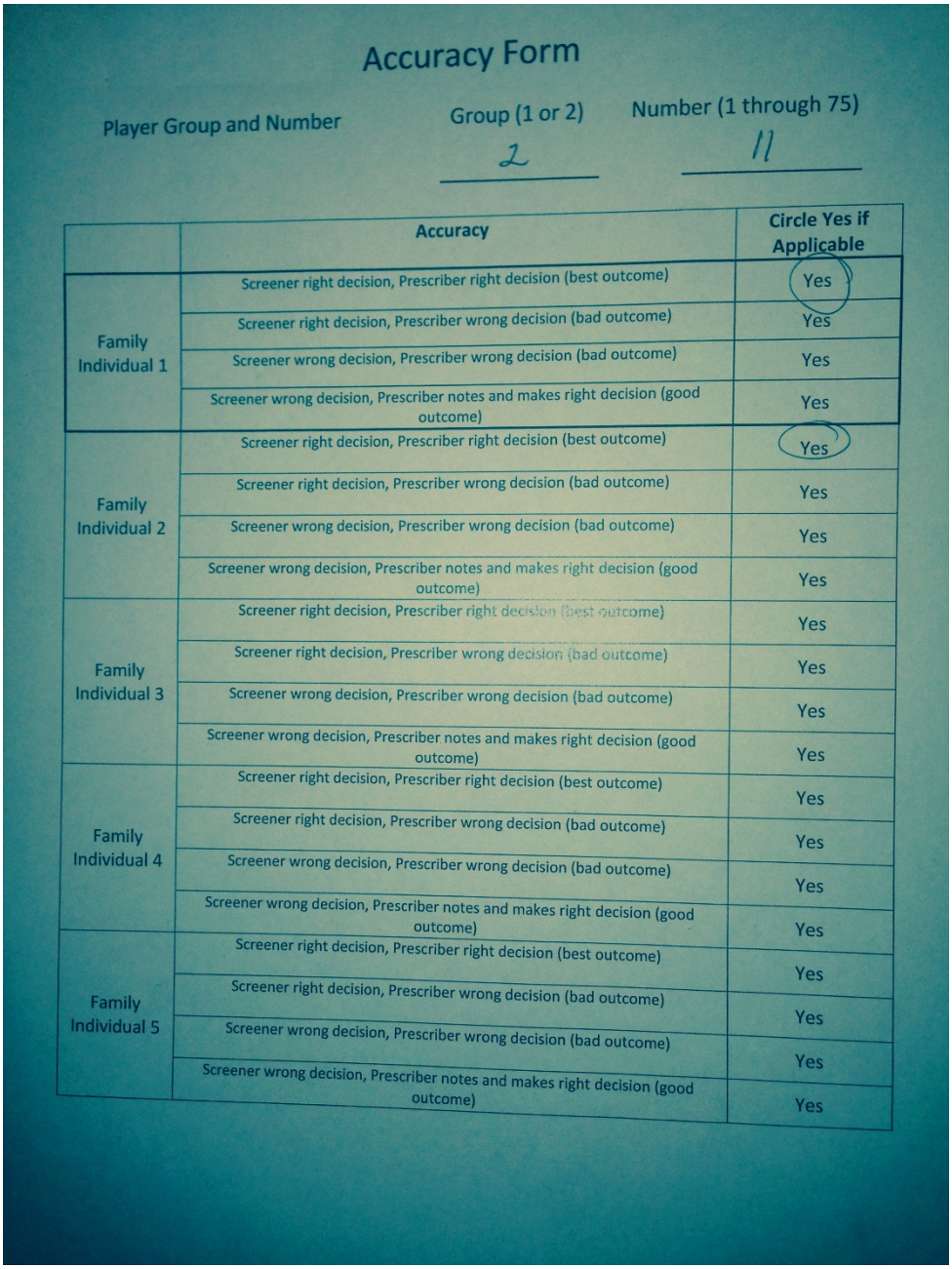
APPENDICES

Appendix A. Accuracy Form



Accuracy Form

Player Group and Number — Group (1 or 2): 2 — Number (1 through 75): 11

	Accuracy	Circle Yes if Applicable
Family Individual 1	Screener right decision, Prescriber right decision (best outcome)	Yes
	Screener right decision, Prescriber wrong decision (bad outcome)	Yes
	Screener wrong decision, Prescriber wrong decision (bad outcome)	Yes
	Screener wrong decision, Prescriber notes and makes right decision (good outcome)	Yes
Family Individual 2	Screener right decision, Prescriber right decision (best outcome)	Yes
	Screener right decision, Prescriber wrong decision (bad outcome)	Yes
	Screener wrong decision, Prescriber wrong decision (bad outcome)	Yes
	Screener wrong decision, Prescriber notes and makes right decision (good outcome)	Yes
Family Individual 3	Screener right decision, Prescriber right decision (best outcome)	Yes
	Screener right decision, Prescriber wrong decision (bad outcome)	Yes
	Screener wrong decision, Prescriber wrong decision (bad outcome)	Yes
	Screener wrong decision, Prescriber notes and makes right decision (good outcome)	Yes
Family Individual 4	Screener right decision, Prescriber right decision (best outcome)	Yes
	Screener right decision, Prescriber wrong decision (bad outcome)	Yes
	Screener wrong decision, Prescriber wrong decision (bad outcome)	Yes
	Screener wrong decision, Prescriber notes and makes right decision (good outcome)	Yes
Family Individual 5	Screener right decision, Prescriber right decision (best outcome)	Yes
	Screener right decision, Prescriber wrong decision (bad outcome)	Yes
	Screener wrong decision, Prescriber wrong decision (bad outcome)	Yes
	Screener wrong decision, Prescriber notes and makes right decision (good outcome)	Yes

Appendix B. Player Form

Actor #	15	Gender:	Female
Address:	Fill in your own or someone's address		
Phone:	Fill in your own or someone's number		
DOB:	December 6, 1984	Weight (lbs.):	175

General information

Pregnant	Breastfeeding	Seizures	Asthma
No	No -	No -	No

Allergies

Doxycycline	Tetracycline	Ciprofloxacin	Penicillin
No	No	No	No

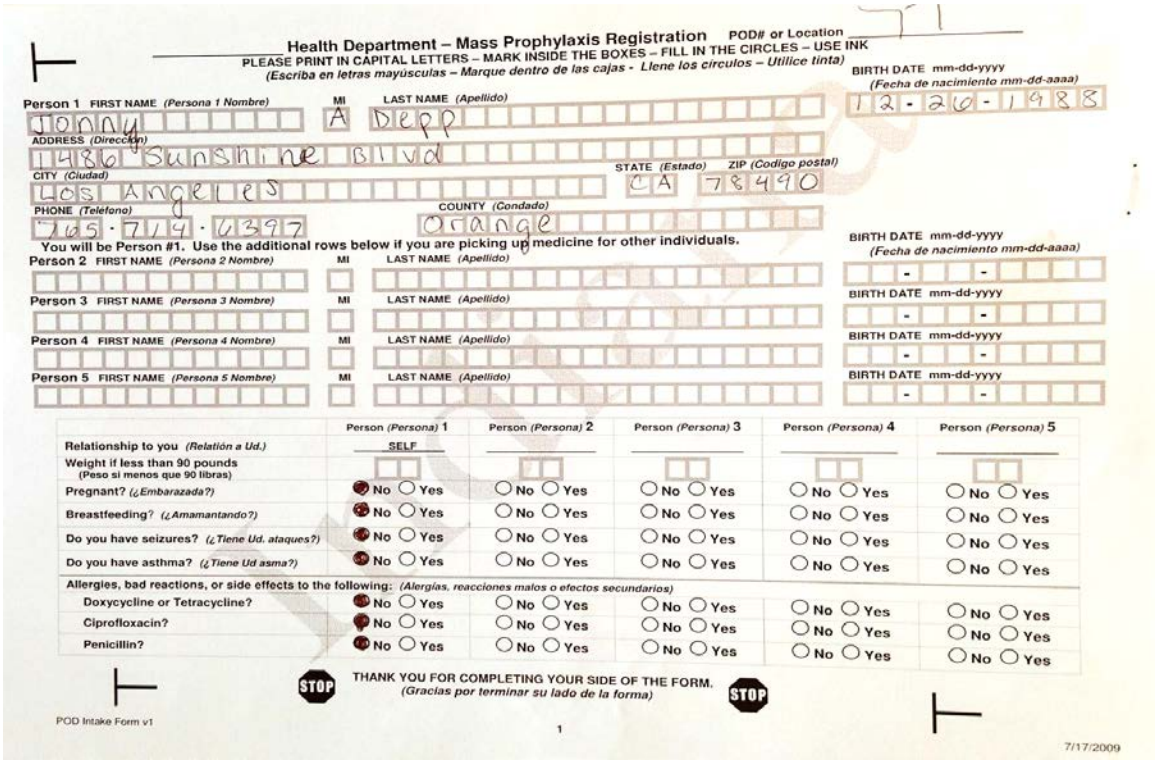
Patient Scenario

Ask for a chair as you feel weak

Spouse

	DOB	Weight	Allergies
Husband	June 13, 1981	210	No

Appendix C. Registration Form Front



Health Department – Mass Prophylaxis Registration POD# or Location 71

PLEASE PRINT IN CAPITAL LETTERS – MARK INSIDE THE BOXES – FILL IN THE CIRCLES – USE INK
(Escriba en letras mayúsculas – Marque dentro de las cajas - Llene los círculos – Utilice tinta)

Person 1 FIRST NAME (Persona 1 Nombre): JONNY | MI: A | LAST NAME (Apellido): DEPP | BIRTH DATE mm-dd-yyyy (Fecha de nacimiento mm-dd-aaaa): 12-20-1988

ADDRESS (Dirección): 1486 Sunshine Blvd

CITY (Ciudad): Los Angeles | STATE (Estado): CA | ZIP (Codigo postal): 78490

PHONE (Teléfono): 765-714-6397 | COUNTY (Condado): Orange

You will be Person #1. Use the additional rows below if you are picking up medicine for other individuals.

Person 2 FIRST NAME (Persona 2 Nombre) | MI | LAST NAME (Apellido) | BIRTH DATE mm-dd-yyyy (Fecha de nacimiento mm-dd-aaaa)

Person 3 FIRST NAME (Persona 3 Nombre) | MI | LAST NAME (Apellido) | BIRTH DATE mm-dd-yyyy

Person 4 FIRST NAME (Persona 4 Nombre) | MI | LAST NAME (Apellido) | BIRTH DATE mm-dd-yyyy

Person 5 FIRST NAME (Persona 5 Nombre) | MI | LAST NAME (Apellido) | BIRTH DATE mm-dd-yyyy

	Person (Persona) 1	Person (Persona) 2	Person (Persona) 3	Person (Persona) 4	Person (Persona) 5
Relationship to you (Relatión a Ud.)	SELF				
Weight if less than 90 pounds (Peso si menos que 90 libras)					
Pregnant? (¿Embarazada?)	● No ○ Yes	○ No ○ Yes	○ No ○ Yes	○ No ○ Yes	○ No ○ Yes
Breastfeeding? (¿Amamantando?)	● No ○ Yes	○ No ○ Yes	○ No ○ Yes	○ No ○ Yes	○ No ○ Yes
Do you have seizures? (¿Tiene Ud. ataques?)	● No ○ Yes	○ No ○ Yes	○ No ○ Yes	○ No ○ Yes	○ No ○ Yes
Do you have asthma? (¿Tiene Ud asma?)	● No ○ Yes	○ No ○ Yes	○ No ○ Yes	○ No ○ Yes	○ No ○ Yes
Allergies, bad reactions, or side effects to the following: (Alergías, reacciones malos o efectos secundarios)					
Doxycycline or Tetracycline?	● No ○ Yes	○ No ○ Yes	○ No ○ Yes	○ No ○ Yes	○ No ○ Yes
Ciprofloxacin?	● No ○ Yes	○ No ○ Yes	○ No ○ Yes	○ No ○ Yes	○ No ○ Yes
Penicillin?	● No ○ Yes	○ No ○ Yes	○ No ○ Yes	○ No ○ Yes	○ No ○ Yes

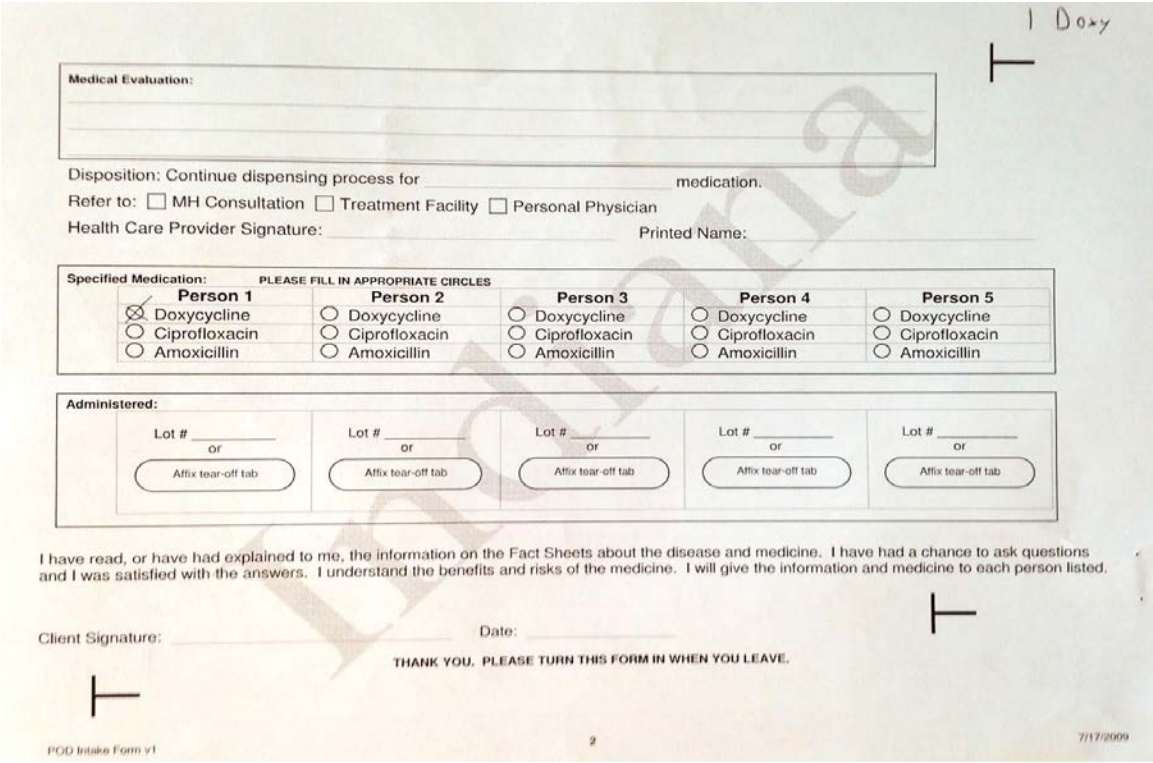
STOP THANK YOU FOR COMPLETING YOUR SIDE OF THE FORM. (Gracias por terminar su lado de la forma) STOP

POD Intake Form v1

1

7/17/2009

Appendix D. Registration Form Back



1 Doxy

Medical Evaluation:

Disposition: Continue dispensing process for _____ medication.

Refer to: ☐ MH Consultation ☐ Treatment Facility ☐ Personal Physician

Health Care Provider Signature: _____ Printed Name: _____

Specified Medication: PLEASE FILL IN APPROPRIATE CIRCLES

Person 1	Person 2	Person 3	Person 4	Person 5
⊗ Doxycycline	○ Doxycycline	○ Doxycycline	○ Doxycycline	○ Doxycycline
○ Ciprofloxacin	○ Ciprofloxacin	○ Ciprofloxacin	○ Ciprofloxacin	○ Ciprofloxacin
○ Amoxicillin	○ Amoxicillin	○ Amoxicillin	○ Amoxicillin	○ Amoxicillin

Administered:

Lot # _____ or Affix tear-off tab	Lot # _____ or Affix tear-off tab	Lot # _____ or Affix tear-off tab	Lot # _____ or Affix tear-off tab	Lot # _____ or Affix tear-off tab

I have read, or have had explained to me, the information on the Fact Sheets about the disease and medicine. I have had a chance to ask questions and I was satisfied with the answers. I understand the benefits and risks of the medicine. I will give the information and medicine to each person listed.

Client Signature: _____ Date: _____

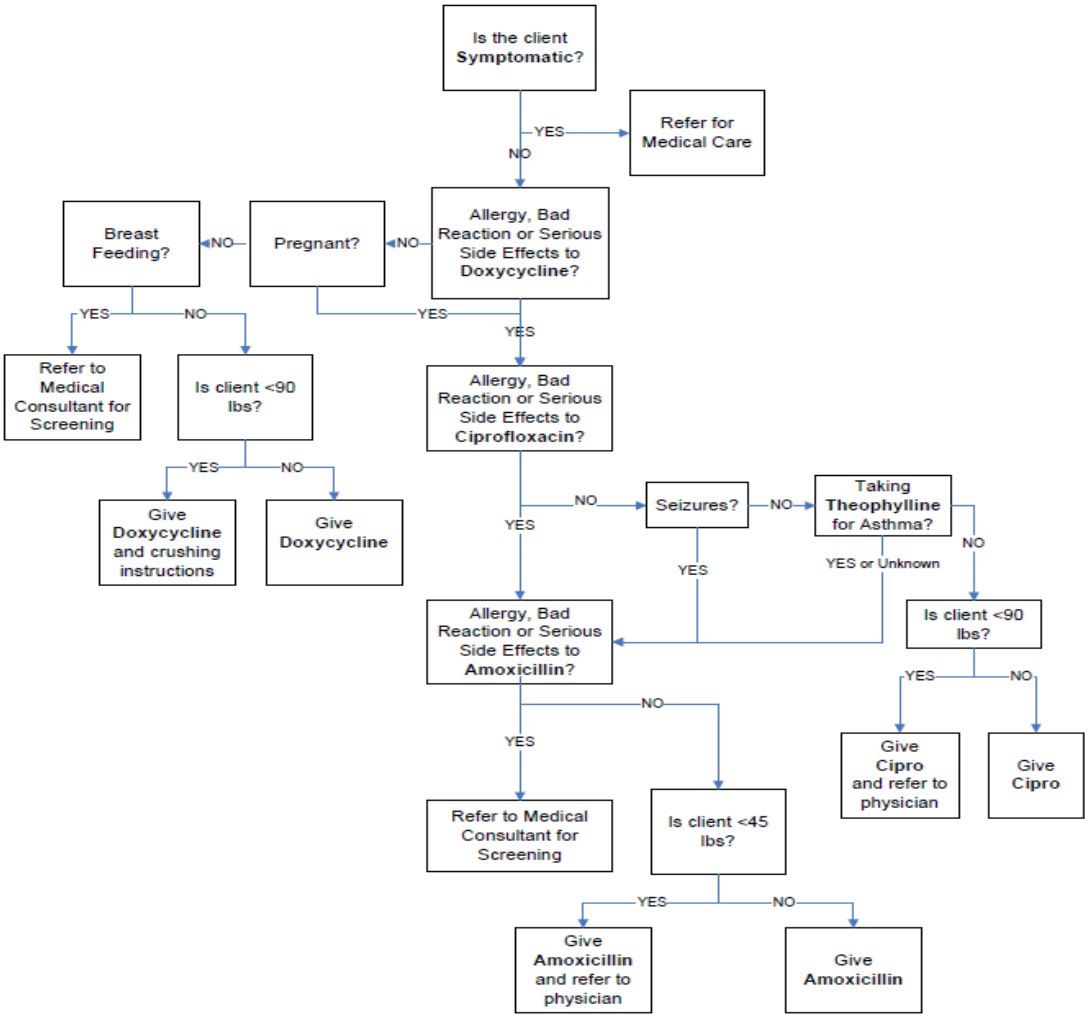
THANK YOU. PLEASE TURN THIS FORM IN WHEN YOU LEAVE.

POD Intake Form v1 2 7/17/2009

Appendix E. Dispensing Algorithm

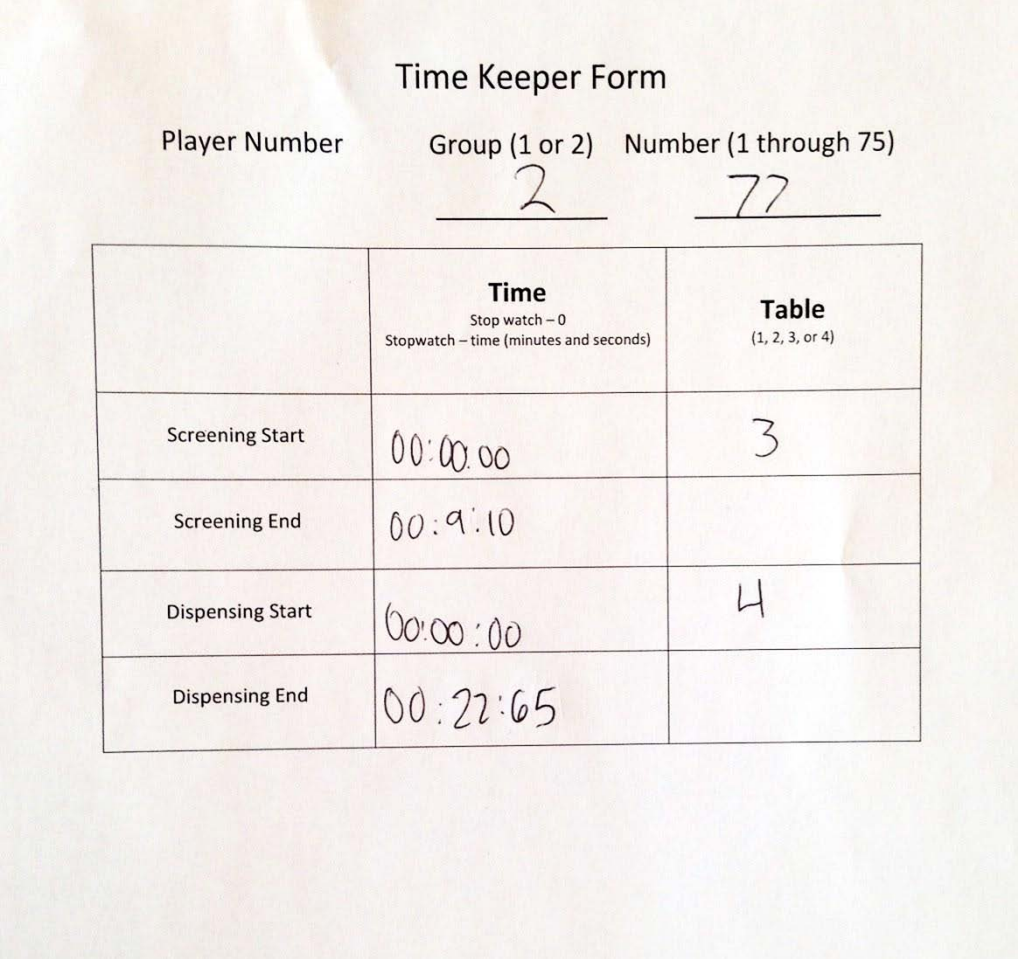
INDIANA STATE DEPARTMENT OF HEALTH
Public Health Preparedness and Emergency Response

Antibiotic Dispensing Algorithm



Current as of May 2, 2011

Appendix F. Time Keeper Form

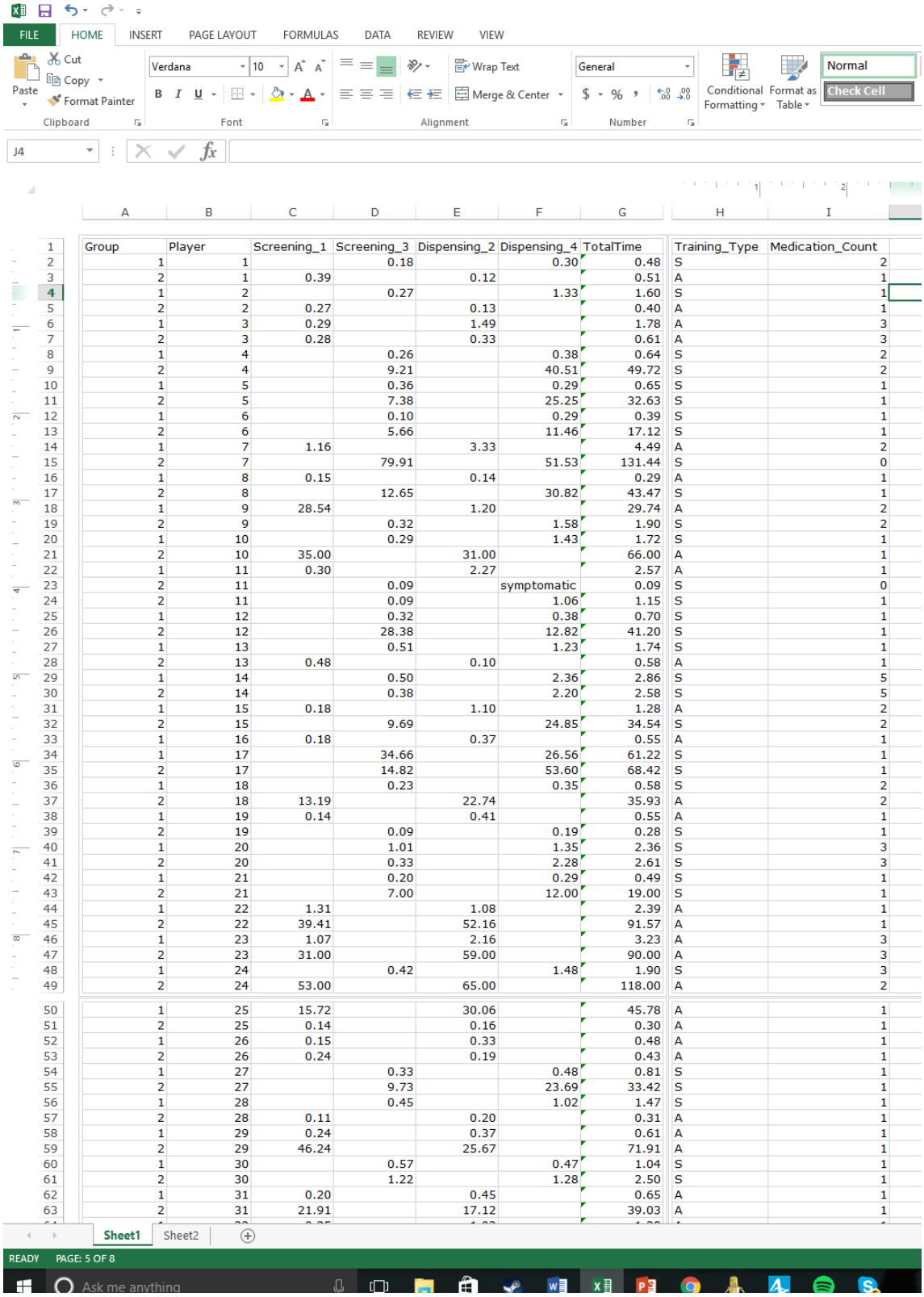


Time Keeper Form

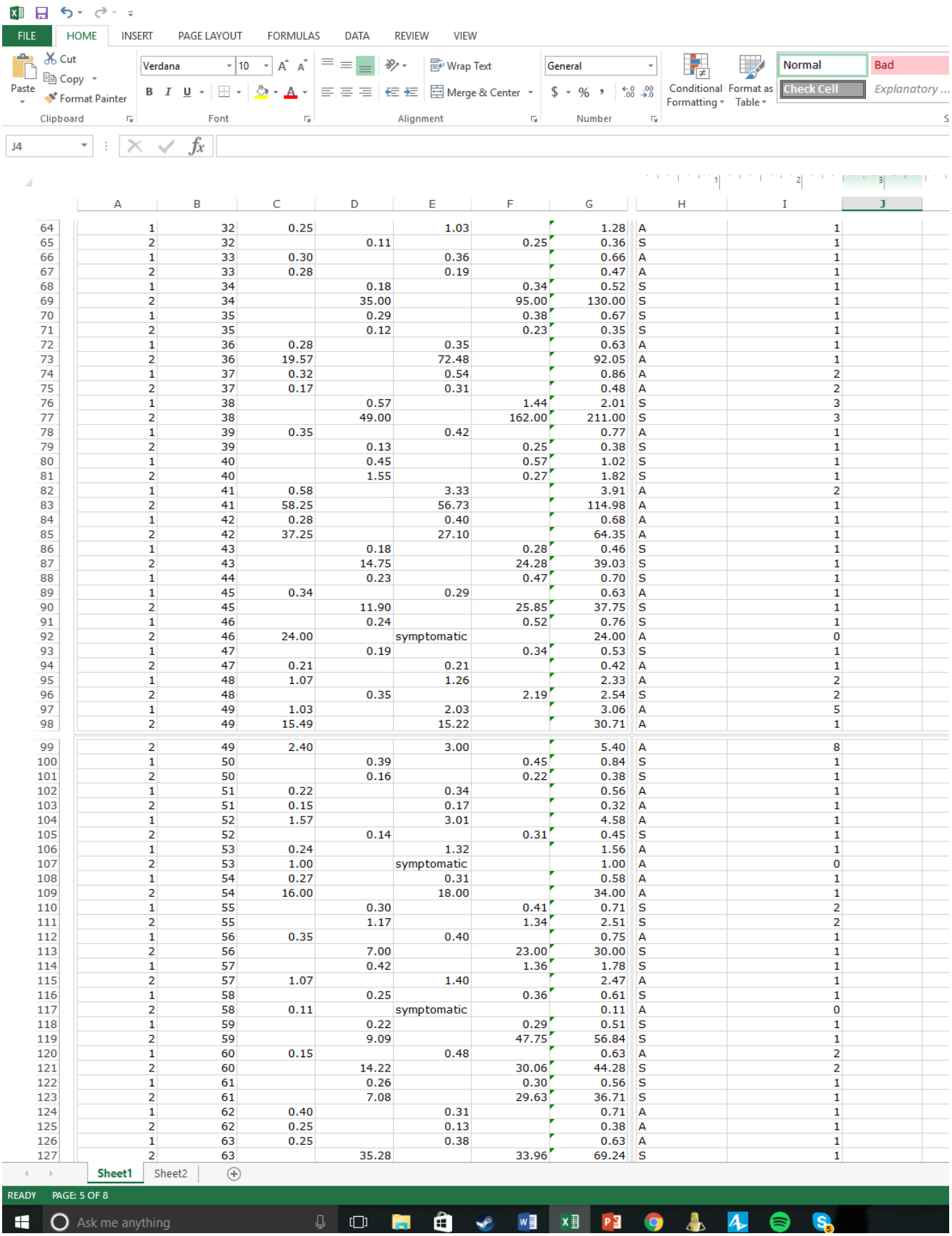
Player Number Group (1 or 2) 2 Number (1 through 75) 77

	Time Stop watch – 0 Stopwatch – time (minutes and seconds)	**Table** (1, 2, 3, or 4)
Screening Start	00:00.00	3
Screening End	00:9:10	
Dispensing Start	00:00:00	4
Dispensing End	00:22:65	

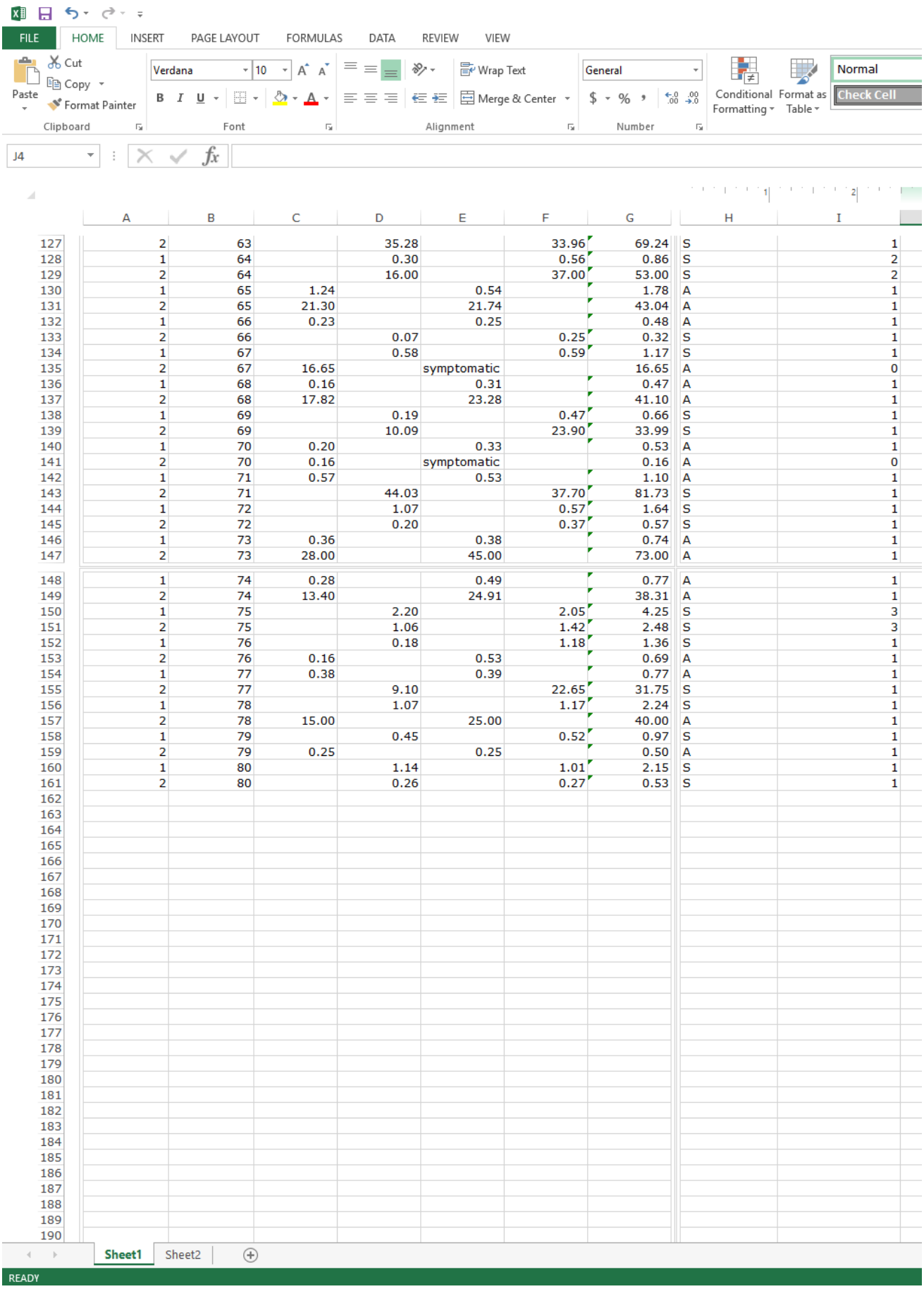
Appendix G. Exercise Data



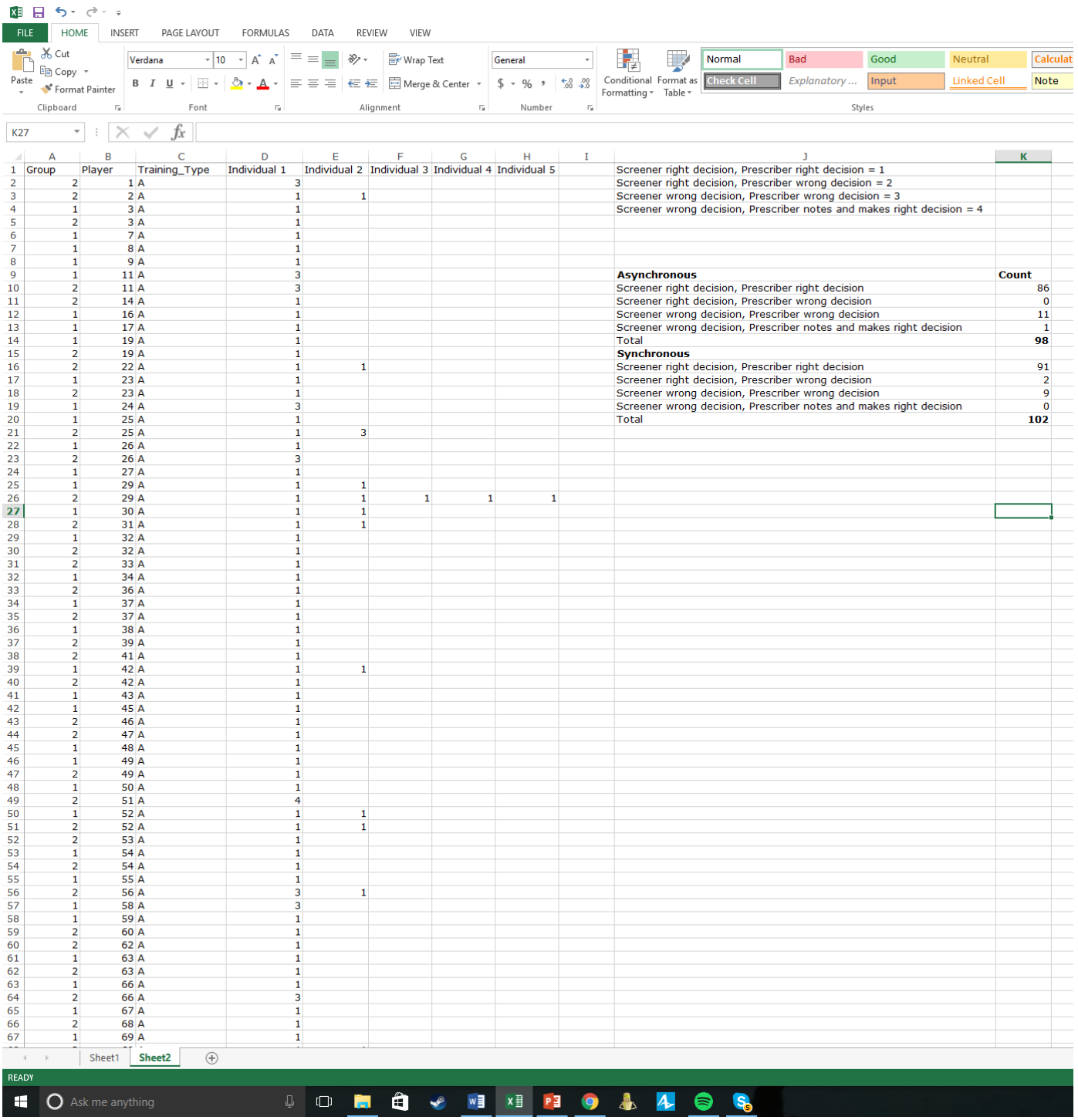
Group	Player	Screening_1	Screening_3	Dispensing_2	Dispensing_4	TotalTime	Training_Type	Medication_Count
1	1		0.18		0.30	0.48	S	2
2	1	0.39		0.12		0.51	A	1
1	2		0.27		1.33	1.60	S	1
2	2	0.27		0.13		0.40	A	1
1	3	0.29		1.49		1.78	A	3
2	3	0.28		0.33		0.61	A	3
1	4		0.26		0.38	0.64	S	2
2	4		9.21		40.51	49.72	S	2
1	5		0.36		0.29	0.65	S	1
2	5		7.38		25.25	32.63	S	1
1	6		0.10		0.29	0.39	S	1
2	6		5.66		11.46	17.12	S	1
1	7	1.16		3.33		4.49	A	2
2	7		79.91		51.53	131.44	S	0
1	8	0.15		0.14		0.29	A	1
2	8		12.65		30.82	43.47	S	1
1	9	28.54		1.20		29.74	A	2
2	9		0.32		1.58	1.90	S	2
1	10		0.29		1.43	1.72	S	1
2	10	35.00		31.00		66.00	A	1
1	11	0.30		2.27		2.57	A	1
2	11		0.09		symptomatic	0.09	S	0
2	11		0.09		1.06	1.15	S	1
1	12		0.32		0.38	0.70	S	1
2	12		28.38		12.82	41.20	S	1
1	13		0.51		1.23	1.74	S	1
2	13	0.48		0.10		0.58	A	1
1	14		0.50		2.36	2.86	S	5
2	14		0.38		2.20	2.58	S	5
1	15	0.18		1.10		1.28	A	2
2	15		9.69		24.85	34.54	S	2
1	16	0.18		0.37		0.55	A	1
1	17		34.66		26.56	61.22	S	1
2	17		14.82		53.60	68.42	S	1
1	18		0.23		0.35	0.58	S	2
2	18	13.19		22.74		35.93	A	2
1	19	0.14		0.41		0.55	A	1
2	19		0.09		0.19	0.28	S	1
1	20		1.01		1.35	2.36	S	3
2	20		0.33		2.28	2.61	S	3
1	21		0.20		0.29	0.49	S	1
2	21		7.00		12.00	19.00	S	1
1	22	1.31		1.08		2.39	A	1
2	22	39.41		52.16		91.57	A	1
1	23	1.07		2.16		3.23	A	3
2	23	31.00		59.00		90.00	A	3
1	24		0.42		1.48	1.90	S	3
2	24	53.00		65.00		118.00	A	2
1	25	15.72		30.06		45.78	A	1
2	25	0.14		0.16		0.30	A	1
1	26	0.15		0.33		0.48	A	1
2	26	0.24		0.19		0.43	A	1
1	27		0.33		0.48	0.81	S	1
2	27		9.73		23.69	33.42	S	1
1	28		0.45		1.02	1.47	S	1
2	28	0.11		0.20		0.31	A	1
1	29	0.24		0.37		0.61	A	1
2	29	46.24		25.67		71.91	A	1
1	30		0.57		0.47	1.04	S	1
2	30		1.22		1.28	2.50	S	1
1	31	0.20		0.45		0.65	A	1
2	31	21.91		17.12		39.03	A	1



	A	B	C	D	E	F	G	H	I	J
64	1	32	0.25		1.03		1.28	A	1	
65	2	32		0.11		0.25	0.36	S	1	
66	1	33	0.30		0.36		0.66	A	1	
67	2	33	0.28		0.19		0.47	A	1	
68	1	34		0.18		0.34	0.52	S	1	
69	2	34		35.00		95.00	130.00	S	1	
70	1	35		0.29		0.38	0.67	S	1	
71	2	35		0.12		0.23	0.35	S	1	
72	1	36	0.28		0.35		0.63	A	1	
73	2	36	19.57		72.48		92.05	A	1	
74	1	37	0.32		0.54		0.86	A	2	
75	2	37	0.17		0.31		0.48	A	2	
76	1	38		0.57		1.44	2.01	S	3	
77	2	38		49.00		162.00	211.00	S	3	
78	1	39	0.35		0.42		0.77	A	1	
79	2	39		0.13		0.25	0.38	S	1	
80	1	40		0.45		0.57	1.02	S	1	
81	2	40		1.55		0.27	1.82	S	1	
82	1	41	0.58		3.33		3.91	A	2	
83	2	41	58.25		56.73		114.98	A	1	
84	1	42	0.28		0.40		0.68	A	1	
85	2	42	37.25		27.10		64.35	A	1	
86	1	43		0.18		0.28	0.46	S	1	
87	2	43		14.75		24.28	39.03	S	1	
88	1	44		0.23		0.47	0.70	S	1	
89	1	45	0.34		0.29		0.63	A	1	
90	2	45		11.90		25.85	37.75	S	1	
91	1	46		0.24		0.52	0.76	S	1	
92	2	46	24.00		symptomatic		24.00	A	0	
93	1	47		0.19		0.34	0.53	S	1	
94	2	47	0.21		0.21		0.42	A	1	
95	1	48	1.07		1.26		2.33	A	2	
96	2	48		0.35		2.19	2.54	S	2	
97	1	49	1.03		2.03		3.06	A	5	
98	2	49	15.49		15.22		30.71	A	1	
99	2	49	2.40		3.00		5.40	A	8	
100	1	50		0.39		0.45	0.84	S	1	
101	2	50		0.16		0.22	0.38	S	1	
102	1	51	0.22		0.34		0.56	A	1	
103	2	51	0.15		0.17		0.32	A	1	
104	1	52	1.57		3.01		4.58	A	1	
105	2	52		0.14		0.31	0.45	S	1	
106	1	53	0.24		1.32		1.56	A	1	
107	2	53	1.00		symptomatic		1.00	A	0	
108	1	54	0.27		0.31		0.58	A	1	
109	2	54	16.00		18.00		34.00	A	1	
110	1	55		0.30		0.41	0.71	S	2	
111	2	55		1.17		1.34	2.51	S	2	
112	1	56	0.35		0.40		0.75	A	1	
113	2	56		7.00		23.00	30.00	S	1	
114	1	57		0.42		1.36	1.78	S	1	
115	2	57	1.07		1.40		2.47	A	1	
116	1	58		0.25		0.36	0.61	S	1	
117	2	58	0.11		symptomatic		0.11	A	0	
118	1	59		0.22		0.29	0.51	S	1	
119	2	59		9.09		47.75	56.84	S	1	
120	1	60	0.15		0.48		0.63	A	2	
121	2	60		14.22		30.06	44.28	S	2	
122	1	61		0.26		0.30	0.56	S	1	
123	2	61		7.08		29.63	36.71	S	1	
124	1	62	0.40		0.31		0.71	A	1	
125	2	62	0.25		0.13		0.38	A	1	
126	1	63	0.25		0.38		0.63	A	1	
127	2	63		35.28		33.96	69.24	S	1	



	A	B	C	D	E	F	G	H	I
127	2	63		35.28		33.96	69.24	S	1
128	1	64		0.30		0.56	0.86	S	2
129	2	64		16.00		37.00	53.00	S	2
130	1	65	1.24		0.54		1.78	A	1
131	2	65	21.30		21.74		43.04	A	1
132	1	66	0.23		0.25		0.48	A	1
133	2	66		0.07		0.25	0.32	S	1
134	1	67		0.58		0.59	1.17	S	1
135	2	67	16.65		symptomatic		16.65	A	0
136	1	68	0.16		0.31		0.47	A	1
137	2	68	17.82		23.28		41.10	A	1
138	1	69		0.19		0.47	0.66	S	1
139	2	69		10.09		23.90	33.99	S	1
140	1	70	0.20		0.33		0.53	A	1
141	2	70	0.16		symptomatic		0.16	A	0
142	1	71	0.57		0.53		1.10	A	1
143	2	71		44.03		37.70	81.73	S	1
144	1	72		1.07		0.57	1.64	S	1
145	2	72		0.20		0.37	0.57	S	1
146	1	73	0.36		0.38		0.74	A	1
147	2	73	28.00		45.00		73.00	A	1
148	1	74	0.28		0.49		0.77	A	1
149	2	74	13.40		24.91		38.31	A	1
150	1	75		2.20		2.05	4.25	S	3
151	2	75		1.06		1.42	2.48	S	3
152	1	76		0.18		1.18	1.36	S	1
153	2	76	0.16		0.53		0.69	A	1
154	1	77	0.38		0.39		0.77	A	1
155	2	77		9.10		22.65	31.75	S	1
156	1	78		1.07		1.17	2.24	S	1
157	2	78	15.00		25.00		40.00	A	1
158	1	79		0.45		0.52	0.97	S	1
159	2	79	0.25		0.25		0.50	A	1
160	1	80		1.14		1.01	2.15	S	1
161	2	80		0.26		0.27	0.53	S	1



Group	Player	Training_Type	Individual 1	Individual 2	Individual 3	Individual 4	Individual 5
2	1	A	3				
2	2	A	1	1			
1	3	A	1				
2	3	A	1				
1	7	A	1				
1	8	A	1				
1	9	A	1				
1	11	A	3				
2	11	A	3				
2	14	A	1				
1	16	A	1				
1	17	A	1				
1	19	A	1				
2	19	A	1				
2	22	A	1	1			
1	23	A	1				
2	23	A	1				
1	24	A	3				
1	25	A	1				
2	25	A	1	3			
1	26	A	1				
2	26	A	3				
1	27	A	1				
1	29	A	1	1			
2	29	A	1	1	1	1	1
1	30	A	1	1			
2	31	A	1	1			
1	32	A	1				
2	32	A	1				
2	33	A	1				
1	34	A	1				
2	36	A	1				
1	37	A	1				
2	37	A	1				
1	38	A	1				
2	39	A	1				
2	41	A	1				
1	42	A	1	1			
2	42	A	1				
1	43	A	1				
1	45	A	1				
2	46	A	1				
2	47	A	1				
1	48	A	1				
1	49	A	1				
2	49	A	1				
1	50	A	1				
2	51	A	4				
1	52	A	1	1			
2	52	A	1	1			
2	53	A	1				
1	54	A	1				
2	54	A	1				
1	55	A	1				
2	56	A	3	1			
1	58	A	3				
1	59	A	1				
2	60	A	1				
2	62	A	1				
1	63	A	1				
2	63	A	1				
1	66	A	1				
2	66	A	3				
1	67	A	1				
2	68	A	1				
1	69	A	1				

Screener right decision, Prescriber right decision = 1	
Screener right decision, Prescriber wrong decision = 2	
Screener wrong decision, Prescriber wrong decision = 3	
Screener wrong decision, Prescriber notes and makes right decision = 4	
Asynchronous	**Count**
Screener right decision, Prescriber right decision	86
Screener right decision, Prescriber wrong decision	0
Screener wrong decision, Prescriber wrong decision	11
Screener wrong decision, Prescriber notes and makes right decision	1
Total	**98**
Synchronous	
Screener right decision, Prescriber right decision	91
Screener right decision, Prescriber wrong decision	2
Screener wrong decision, Prescriber wrong decision	9
Screener wrong decision, Prescriber notes and makes right decision	0
Total	**102**

Appendix H. Tippecanoe County Fairground POD (Dr. James Eric Dietz, Dr. Carlos Rafael Morales, Colby Craig, Perry Cox)

Abstract

As a part of the Tippecanoe County 4-Fairground POD Exercise, we were asked to help research the potential of the system they had in place to run the POD. Our specific goal was to look for improvements within the Just In Time Training that volunteers and workers receive upon arriving at the POD before beginning work. Our goal was to design a series of training videos that could be used in place of actual trainers in the event of a POD. Our hope was that the JITT videos would produce better quality and better time from the workers than those who received the normal JITT. Just In Time Training is used in a variety of settings to provide need to know information to new employees or as a refresher of needed skills shortly before they are to be used. There are a variety of different methods for providing this Just In Time Training and the results of this training varies. Our goal is to determine if the JITT videos that we create cause a reduction in the time it takes for workers to complete their tasks without sacrificing the quality of the work or the training.

Statement of Focus

The literature that we used for the use in our just in time training research all had different aspects and ideas including just in time training as well as different ways to use it to train. They all helped immensely so that we could format our videos for the screening and dispensing videos for the exercise on April 15.

The first journal we found that we liked was the use of mobile just in time training applications for emergency healthcare services. In this journal they try to show how mobile just in time training could be used to transmit medical and on site information to emergency medical personnel that will be or are attending the emergency. Some of the reasons we picked this article is because it poses a lot of interest due to the fact we were thinking that we could develop an app as well to hold just in time training for a different individuals and fields. In their model they proposed that each module would be able to be delivered on demand to any multimedia pone over any existing service provider, which just from our school population is upwards of eighty percent of students. Furthermore, we noticed that even with JIT training there are a bunch of different methods and learning styles we could adhere to, but we had to pick one. Their software increases retention by using the different learning styles to incorporate audio, video, interactive simulations, graphics, animations, and assessments after each module is finished. This would be useful so that the software would incorporate learning for everyone, no matter how they learn best. This software is also not only available during emergencies but whenever you would need it, even if it's just to brush up on some techniques or situations. (Vico, FJ) The second article we found involved a JUST web Cd system for training and educating the everyday citizen for emergency situations using virtual reality and IT tools. They incorporate a language selection menu so users can pick from five languages which make it useful for more than one country. Then they come to a login screen which gives each person a unique identification and gives them storage space which helps to record their progress as they go about learning the materials. Once finished with the introduction material they can then choose from different topics depending on the situations that they

might be encountering so that they could better stabilize someone in one of many of the conditions listed. The conclusion of this three year project was met very favorably with many cases of potential investors due to the fact that the web cd looked extremely promising from its test results and overcame many expectations during the cycle. This led us to dive deeper into the utilities that JIT training could have in the future once more of the population has multimedia phones. The possibilities as we see some of the cases of JIT training all seem to be positives with really no other downsides then the fact that not everyone has multimedia phones to be able to use the software and the fact that developing this software is almost always quite expensive. This could be overcome by all of the investors and government aid to help purchase this software for the good of the communities and countries, so it could be affordable to almost everyone that could benefit from this software. (Mangana, A.)

The last article we wanted to look at what a virtual reality piece that involves the software Second Life. With second life it would be easy to construct real life emergency situations and still be able to use collaboration and cross functional teams to solve the problems, much like we would in the real world. Not only is this useful for exercises that would be a lot cheaper to do in a virtual setting but it could also be used as a social networking tool to join a multitude of different emergency response agencies and bring them together to set up exercises and simulations together. Also the problem that comes with has to long of an exercise and people getting tired and annoyed due to weather aren’t relative in second life. In a normal exercise or classroom less time feels like more when you are getting lectured, but with second life they help to make things actually take longer but feel as though it has been shortened due to the fact that you will

actively be participating. In the future we think all three of these methods will be used for training due to the fact it's quicker and you don't really need as many teachers and can save an immense amount of man hours to train even more responders at the same time. (Livingstone, Daniel)

Our conclusion is that we will someday see almost all training be done with virtual or multimedia software to help save time and make it more comprehendible for everyone. Though the money to develop this software is a greater cost initially, over time it will offset the cost of hiring all of the different teachers and administers you would have to hire over the years which would make it more practical and use less man hours at the same time. Also through the research we have done it suggest that using JIT methods are not only as good as original methods but most of the time has a higher comprehension rate than its predecessors. We believe this is due to the fact it helps to train people who learn best in a multitude of ways whether it be by simulation of visual representation, because as we have found out in our research most people don't learn best by just being lectured because it can get old as fast as 45 minutes into the session.

Content

What we decided to do to help the POD and at the same time see just how good just-in-time training could be, was to develop videos to test against traditional teaching. From our initial look into the POD, we decided that there were fourteen different videos we could create to educate the staff that was coming in. We decided to narrow our focus down to the two stations we thought would take the most time, screening and dispensing.

We were given the JITT material that was to be used for the regular training. From that, we developed a script for screening and dispensing so that the participants would be able to understand all of the information that was pertinent to their duties. The script was made directly from the materials given to us as well as the job action sheets. This way, the content of the two different versions of JITT would be the same. Also, we found that there was a fairly abundant amount of information that we didn't think the participants would need as it was not directly relevant to the exercise, so we decided to take that information out.

Once we had a rough draft of the script, we then sent if off to Ryan so that he could make any necessary revisions that he would like to add before we began shooting the videos. The first task was to make an introductory video that would be played before both the screening and dispensing parts of the video. This video would cover the layout of the POD and how people would flow through it, how to react in the event of a real world emergency occurring, and what procedures to follow to maintain chain of command. Once this was complete, we each filmed one of the two remaining videos. After the filming, we finalized both videos by adding images and text to make the videos more engaging.

For playing the videos, the original goal had been to distribute Ipads to all the individuals who would view our version of the training. However, upon arriving at the POD, we realized that they Ipads would not provide the necessary volume for people to be able to hear them, especially when people actually arrived. Instead, we borrowed two Lenovo tablets from the Computer Graphics Department and set up all three videos on

each screen. When played through the VLC media player, the volume could be boosted to improve sound quality.

Results

The results of our data recording didn't turn out as good as we originally thought it would. Only a few of the stations recorded their times throughout the exercise, and the rest of them didn't even realize they were supposed to. This meant that our data would be more limited than we originally thought possible. To balance this, we decided to take the averages of the data so that we could then feed them into an Anylogic diagram that I developed to see how many more people in a twenty four hour period we could get through a POD solely depending on the screening and dispensing stations. It would have been more advantageous to be able to make a video for each station so that we could compare total throughput time, differentiating between traditional and JIT training. However, time would not allow us to make enough videos in the allotted amount of time. Even so, the data that we gathered showed a positive increase in the number of people that could be ran through a POD in a twenty four hour cycle.

The data below show that in on average in a twenty four hour cycle depending on screening and dispensing alone you could run eighty three more people through the POD. However, this is once again only considering the screening and dispensing. This data does not include the triage or registration lines. Furthermore, we received some feedback

from a few of the students that received our JIT training, and the general consensus was that they enjoyed it more than the opposing traditional training.

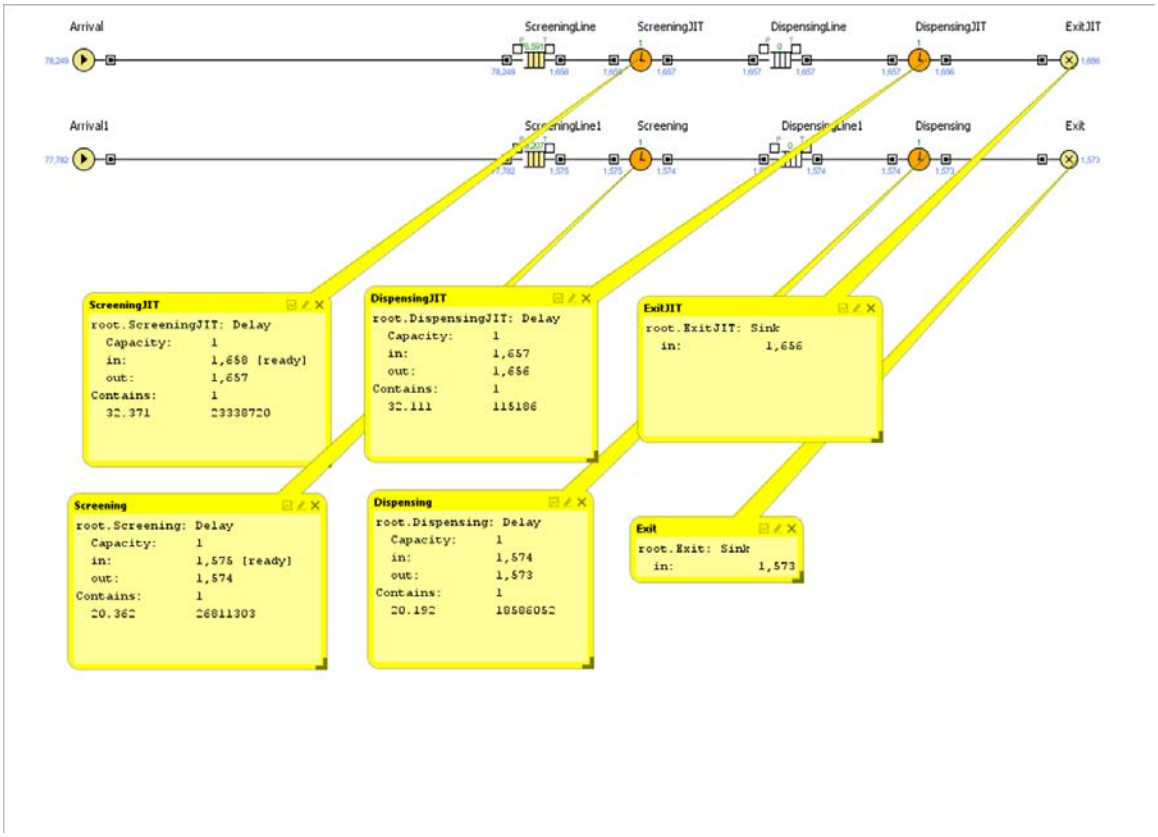


Figure Anylogic POD Data

We also collected some qualitative data from the students staffing the POD and the volunteers running it. Some of the comments on the JITT videos were that if they were to be used in the future, the videos would need to be more generalized. We actually had thought of this already. For the POD, we chose to make the videos as specific as possible since some of the operations had been changed from what would typically happen to accommodate restrictions created by the exercise. We have already begun generalizing the videos to make them more applicable to larger events. It was also pointed out that

both the JITT videos and the traditional training would have benefited from being hosted outside of the hall. The noise level made it difficult for both groups to hear and once the POD had started dispensing it would have been impossible. The main complaint that arose from the JITT videos were that one group would have preferred the actual documents in their hands in addition to being walked through them in the video. The second video group stated that they were fine without them. Our greatest advantage that arose between the two kinds of training came from deficiency in the normal way of training. The script that the trainers for the normal JITT were supposed to follow was not available for them to use and internet access was a problem. This meant that the group that received the training did not cover all the material they needed before the exercise started. One student in particular noted that the only reason she knew what to do was because her partner had received the video version of the JITT. This clearly demonstrated one of the benefits of the JITT videos. If you have drafted a script that includes all the necessary material your workers need to know, you don't have to worry about someone forgetting their script or not remembering to cover something every time they do the training. The video will not change from one training session to the next. Everyone who comes to take the JITT will receive the same training. This makes it much more reliable than the traditional methods of training.

Conclusion

Our conclusion about the JIT training for this POD exercise was very positive. Given the right technology and the right environment to display the JIT training, our results showed to be worth the time it takes to develop. Our research is just the tip of the iceberg considering we were only able to research two tables. In the future, we believe it

would also be beneficial to test how long it takes each method to teach the material and the total comprehension and throughput times. If we could develop a research project to test all of these we would better be able to see just how much JIT training can help. The goal would be to be able to prove that JIT training is worth the cost, due to all the time and volunteers you would hopefully save in the process. All it takes is setting up the right project to be able to further test these theories so that hopefully one day JIT training will be the new method to teach in a vast array of fields and emergency situations.

Appendix I. Optimal Resources for a POD Unit

Introduction

This research paper was created to explore the possible optimizations a point of dispensing unit would require to be the most effective. Utilizing every resource effectively is very important when responding to disasters as well as attacks on the country. This optimization should help to better utilize volunteers as well as non-government organizations (NGO), when in a time of need. My hope is that this optimization research will be able to cut down on the time it take to not only find volunteers and staff, but select the amount of professionals needed for each POD unit. This will hopefully serve to decrease the amount of healthcare professionals needed for each POD, while still maintaining efficiency.

Content

Staffing is of the utmost importance when developing a successful POD. Spitzer developed a study addressing these needs to address the optimal number of healthcare professionals needed to efficiently run a POD. Spitzer's exercise assumed that there was a plague that would require the just-in-time training of leaders and staff in as little as twenty-four hours. The staff would contain only sixteen percent of healthcare professionals. The remainder of the staff would be high school student volunteers who would receive JIT training only an hour before the exercise began.

The dispensing checkpoints as observed in other literature, is the biggest bottleneck of the entire POD. The greatest amount of volunteers would be needed here in order to

keep process time minimal and efficient. In order to exceed throughput of six minutes for each patient, these dispensing volunteers would need to be rapidly trained as well as skilled individuals. This station is where a majority of the healthcare professionals would need to be located in order to oversee the safe dispensing of the antibiotics. Spitzer's model helps to shed some light on the possible staffing requirements needed in order to process 300,000 people in as little as twenty-four hours. This optimization was noted to save an average of 2.6 hours, though actual patient arrival rates could affect this outcome.

Optimal allocation of emergency resources is critical in order to keep the public safe, while also helping to provide guidelines to the agencies involved in the disaster. Optimal facility locations help to provide the most coverage of a given area. Huang's study helps us to identify location models that can be used to develop areas that can be equipped with different resources to enable a community to respond more efficiently. Though each environment can have a certain level of uncertainty, this model helps to employ different strategies for maintain the maximum coverage of a given area. This study tried to maximize the allocation of three different types of resources related to fire stations, though the modeling is not limited to only these resources. This model will be more or less successful depending on the infrastructure of a given area, with regards to the implementation processes used. (Huang, 2007) This study also examined the relationship between investments and the coverage it provides in 0.3 million dollar increments. What can be seen in the tables related to this analysis is that 12.7 million dollars, the coverage only slightly increases. Though these observations are based on a small sample referring to Singapore and its resources, there is an assumption that the U.S. has a likely cap to the coverage gained based on their investment. This can serve as a

pilot study in order to help us find the optimal investment amount, which would be based on the different levels of coverage each increment of funding provides.

Preparedness in these emergencies is an important part of the planning process, and must be applied in any given situation. Perry developed a study looking at the optimal guidelines pertaining to this preparedness given a terrorist attack like the event of September 11th. The investments that the government makes in order to provide security to its people does not go unnoticed, though it needs to be optimized in order to reach higher levels of protection. The key to preparedness is forming an optimal structure that that can maintain ongoing processes while simultaneously responding to the emergency at hand. The failure to produce the needed resources combined with the incorrect knowledge during an incident can lead to the failure of this planning process. Perry outlines three components attributed to the successful preparedness of a given situation. The first step is planning, which is the most crucial when relating to preparedness level of a given situation. There needs to be a plan for any threat and disaster no matter how likely it is to occur. Without a plan across these national systems, the rest of the guidelines fall apart. Options need to be discussed before an incident occurs in order to be able to utilize the resources needed in an efficient manner. The next step is the training of the individuals and organizations who will be involved in the plan. This training can be given to the professional beforehand in order to achieve maximum proficiency given each scenario. The volunteers that will need to be utilized can be flash trained give each type of disaster. However, this training will need to be created beforehand in order to achieve the desired preparedness level, as well as quick response times. The most crucial aspect in any disaster is the response time of emergency personnel. The more rapidly a team can

respond to a situation, the more lives they save. The third component of effectively preparing pertains to the written plans and documents that need to be created in order to synergize the organizations responding to the incident. There are a multitude of agencies that will be responding to any given incident, and each of them need to be on the same page and know what each is responsible for. These plans serve to help clarify each organizations responsibilities as well as the demands each incident might involve. Though a variation in incidents can occur, the jurisdiction of each organization must be known in order to know who leads during each type of threat. Incident command must be established and efficient in order to provide an optimal amount of protection and recovery. Exercises are normally developed to help with the synergy of the organizations in any given community. Each community will be different based on their resources and demographic, which makes this exercises all the more important.

Being able to pre-position supplies for a given disaster can serve to alleviate some of the stress and hardships that occur. Rawls conducted a study to see if there was a need for different facilities to be developed in order to mitigate the amount of damage a disaster would have. She created a strategy that would help to model an optimal location for these facilities based on the incident and demographics of the area. The tool that was developed was shown to be adept at locating the optimal resource locations of any given area. (Rawls, 2010) It is my thought, that this same program could be used to locate the best possible POD locations as well as locating the best possible resource locations for them. This model could help to decrease the amount of time it takes for the response teams to arrive at any given location as well. Though this model has only been tested on a

small scale problem to date, future research has already been started to test the limitations of the model and how well it can allocate resources successfully.

Data

The data was gathered by using a program called Anylogic. Anylogic allows a user to simulate different events within three major paradigms (agent based modeling, discrete even modeling, and system dynamics). This software enabled our research to be completed in a timelier manner, without having to actually set up another POD. Below is what the main sequence of events looks like in the Anylogic program.

Figure Anylogic POD

Each one of these points represented in the simulation POD, represents the actual sequence of sections and que times observed through our experiments and research. Each que time had data inserted into it, which was based on previous times and averages recorded during earlier POD exercises. With this data inserted, it is now performing much like an actual POD exercise, without having to gather all of the volunteers and resources. One the POD was set up in Anylogic, Adam Kirby constructed a set up page

that would allow the user to input the number of workers each section of the POD would have. Below is an image of what the last stage of the model looks like before you run the program.

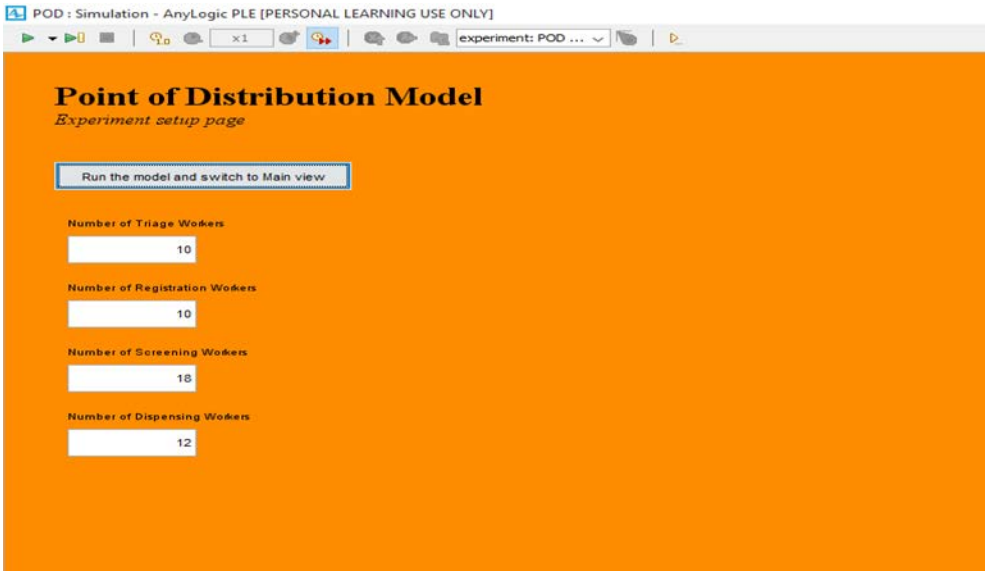


Figure Anylogic Experiment Page

This research used a possible of twenty individuals as the total amount of staff which could be used so that each individual would represent five percent of a POD's volunteer force. This model stopped once 20,000 individuals had been completely and successfully ran through the POD. Once this had completed the model would give a time of completion in seconds, which was later reduced to minutes and hours for convenience. Each relevant combination was entered into an excel sheet, based on the total time it took to complete the POD. The picture below shows the top combinations that were observed during the Anylogic simulations.

The quickest completion times were noticed with four triage, four registration, seven screening, and five dispensing workers. This outcome is not all that surprising due

to the bottle neck that occurred at our screening tables a couple of mounts ago. Our volunteers would have an unusually high wait time at the screening tables before being able to proceed to dispensing. This bottleneck would be detrimental to que times and the POD as a whole in a real life situation. Using the percentages from the best combination that was observed in this study we can see that twenty percent triage, twenty percent registration, thirty-five percent screening, and twenty-five percent of dispensing workers should be allocated to each station for the fastest que times. Once again these percentages are based on twenty possible workers, running through 20,000 people.

Conclusion

This research was developed in order to find the optimal resource allocation in a POD. This also helps to show possible allocation percentages based on volunteer base and population of POD community. For future research and an even more accurate review of optimal resource allocation, it would be great to have more averages and data of times observed in actual POD exercises to see if this sways the results that were observed. Furthermore, constructing an Anylogic model where the researcher could see every possible combination input into an excel sheet would also be beneficial. This could make it easier to observe the number of volunteers each community has to offer so that they could just input the number of volunteers they have while the program show the most optimal allocation based on their resources. With a little more research and tweaking to Anylogic, I believe this program would be a tool of great importance during an epidemic.