Healthway Family Clinic – Buhay Na Tubig, Imus Branch

Wendell Herrero
College of Science
Technological University of the Philippines - Manila
Parañaque, Philippines
wendell.herrero@tup.edu.ph

Errol John Lagera
College of Science
Technological University of the Philippines – Manila
Imus, Philippines
erroljohn.lagera@tup.edu.ph

Levi Mark Tuya
College of Science
Technological University of the Philippines - Manila
Pasay, Phillipines
levimark.tuya@tup.edu.ph

Ma. Jehiel Caspillan
College of Science
Technological University of the Philippines - Manila
Manila, Philippines
majehiel.caspillan@tup.edu.ph

***Abstract*— Clinics are one of the important amenities within each barangay. Though clinics are subject to a different system, they should be efficient with time. From our personal experience, clinics and hospitals deliver their job slowly due to the old system. The new system of healthcare must be implemented and with the help of simulation, these systems could come up with a new idea or concept for building new healthcare systems. Technology helps in creating new and viable things that can ease up workflow. Simulation, not only creates but gives off new ideas and perspectives in a wide variety of possibilities.**

Keywords— clinic, simulation, technology, healthcare system

I. Introduction (*Heading 1*)

With this simulation of the local clinic. We saw firsthand how Healthway Family Clinic – Buhay Na Tubig branch operates its system. The clinic was new and clean with reliable tools and equipment for their patients. Their system improved with ease years before it was Family Doc (rebrand).

This research paper includes modeling and simulation using Arena (Rockwell). With different entities and processes including the number of doctors and nurses. We created a simulation process close to the system of the clinic. We thoroughly computed and imitated each and every workflow of the clinic and finally, almost the same flow of instances came with good results.

However, the simulation faced different challenges that Arena can't handle. With enough knowledge of the application, we similarly demonstrated each process that came into the clinic. Similarly, the clinic numbers of a patient with the simulation are almost identical but the problem came with entities reaching on.

II. Entity Resource and Processes

A. Patient

Entity Patient comes into the clinic for an obvious reason of having a checkup. From this, the Patient would land in different processes he/she will encounter over the period of checkup.

B. Triage Nurse

Triage is the first part of the clinic. It examines the patient in the degree of medical attention needed. Triage in this branch applies to patients with likely similar symptoms of Covid. If the patient has similar symptoms, a certain specific doctor sometimes carries out the checkup.

C. Counter

Registers patient for clinical record. This is handled by the receptionist to carry out the patient. The receptionist decides whether the doctor is available for a certain degree of medical attention, or an appointment will be handled if the doctor is not yet in.

D. Pre-Consultation

Process in which the patient will be examined with their weight, height, heart rate, and blood pressure for initial diagnosis. Nurses handle the pre-consultation period where they initially assess the needs for diagnosis.

E. Consultation

Consultations happen as the doctor receives the initial consultation and is ready for the assessment of the patient. Usually lasts for 30 minutes depending on the medical matter. The doctor decides whether a patient needs a laboratory and schedules them for their next appointment.

F. Laboratory

Part of the clinic where samples from the patient is stored and tested. These laboratories run by medical technologists are capable of handling kinds of stuff such as blood, stool, and even urine samples. Medtech are the one in the position of looking out for even better diagnosis for the patients.

Identify applicable funding agency here. If none, delete this text box.

G. *Pharmacy*

A prescription from doctors and other medicines are usually bought within the same store. Some patient looks for cheaper stores.

H. *Payment Counter*

Same with Registration, the receptionist will receive the payment for the checkup. As it covers the pharmacy payment too.

III. DATA AND PROCESSES

Test data from our own perception was used in building the initial modeling simulation. Throughout the project, real data was implemented.

A. *Patient*

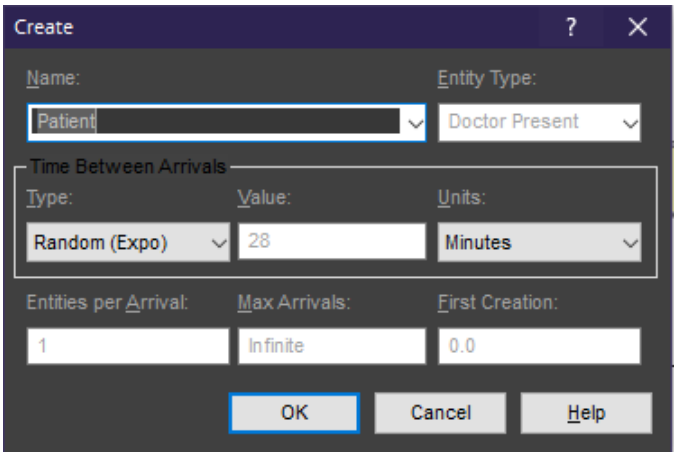

Figure 1. Patient

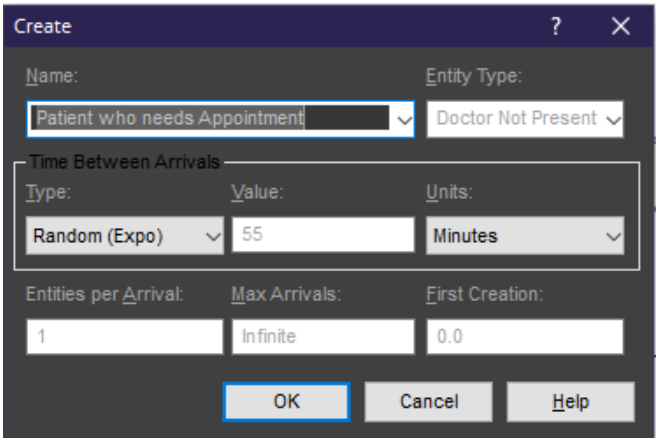

Figure 2. Patients who need appointment

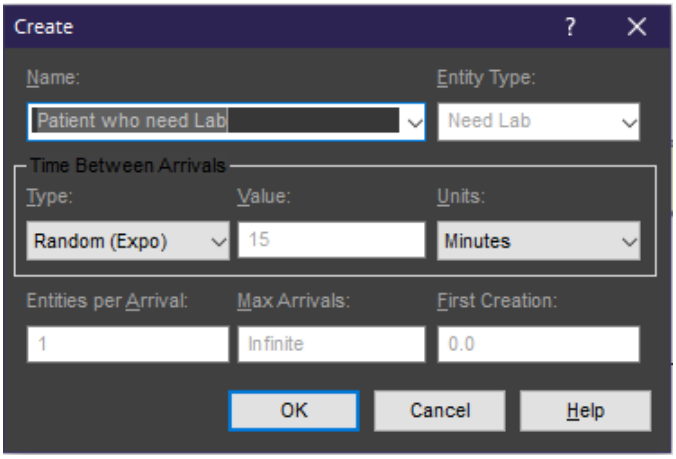

Figure 3. Patients who need Laboratory

Based on our current dataset, the Healthway clinic receives 3 kinds of patients. Patients who are normally entering for a checkup, patients whose doctors are unavailable due to health relations, and patients who are going to need a laboratory after the consultation.

B. *Triage*

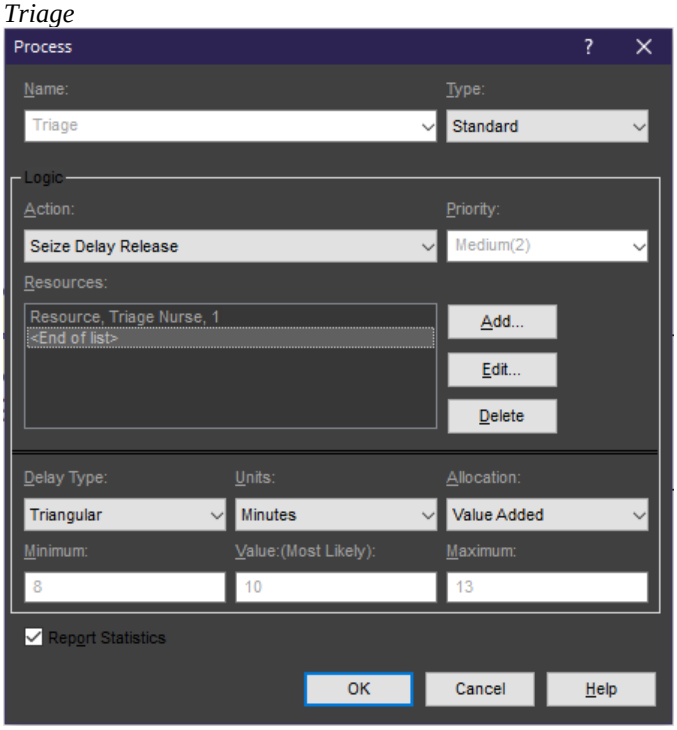

Figure 4. Triage

Triages are usually accommodated by nurses outside the clinic. Patients are examined and questioned for a possible covid symptoms. Ranging from 7.46 minutes to 12.25 minutes with the most likely value of 10.2 minutes.

Identify applicable funding agency here. If none, delete this text box.

C. Registration

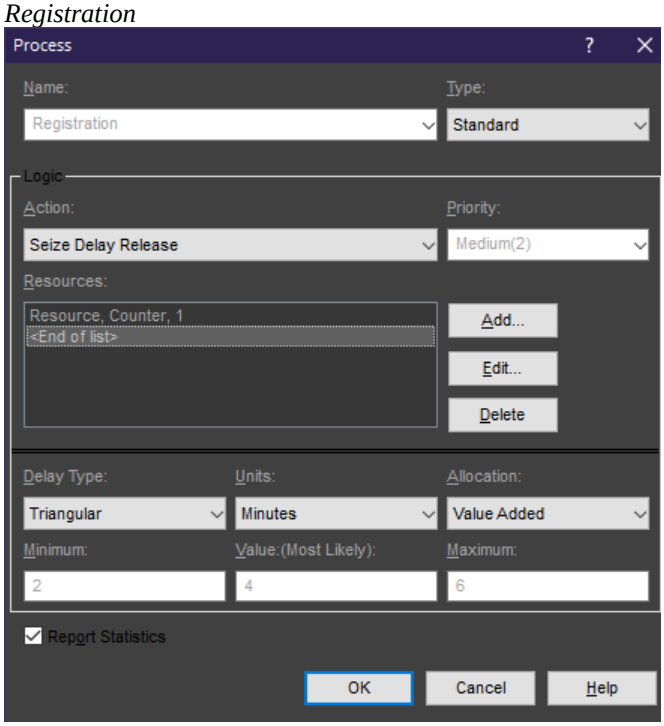

Figure 5. Registration

After examining the patient, they will be assessed initially, filling up the name, contact number, and additional details. The counter will be deciding whether the doctor is available, whether patients need an appointment, or if they would exit for other reasons.

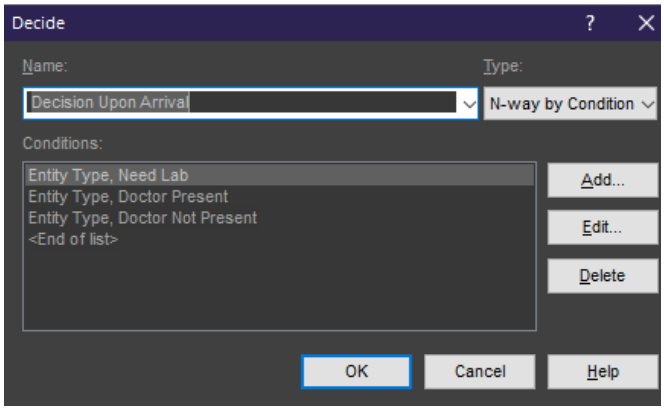

Figure 6. Decision upon arrival

D. Pre-consultation

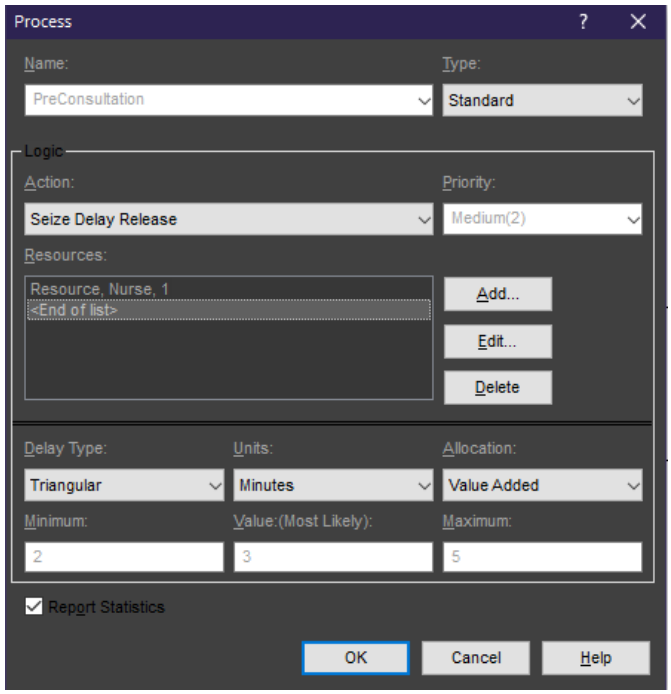

Figure 7. Pre-consultation

Nurses examine the patient with an initial diagnosis, checking the patient's height, weight, temperature, and blood pressure.

E. Consultation

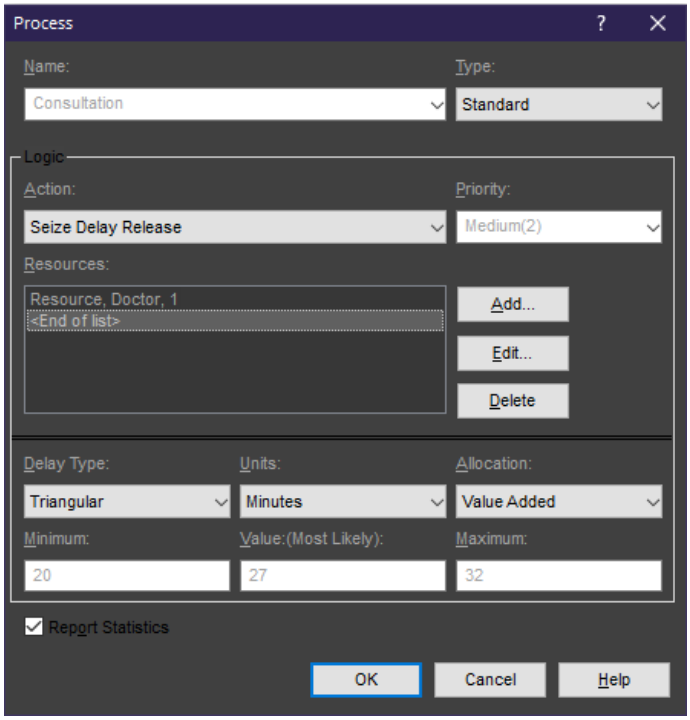

Figure 8. Consultation

Doctors' consultation has a long processing time. With 26.3 minutes as the most likely finishing time for consultation. Ranging from 19.5 minutes to 31.5 minutes.

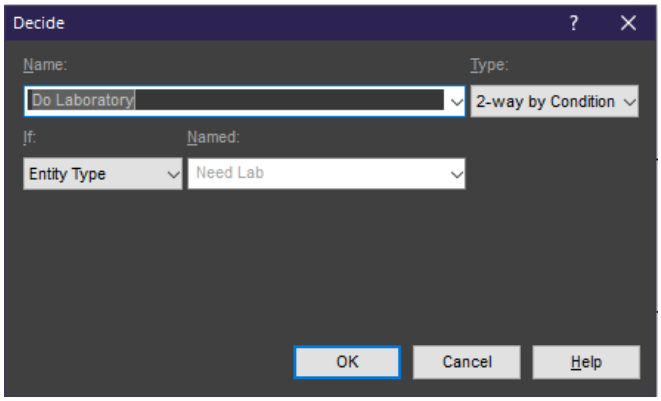

Figure 9. Laboratory Decision

F. Laboratory

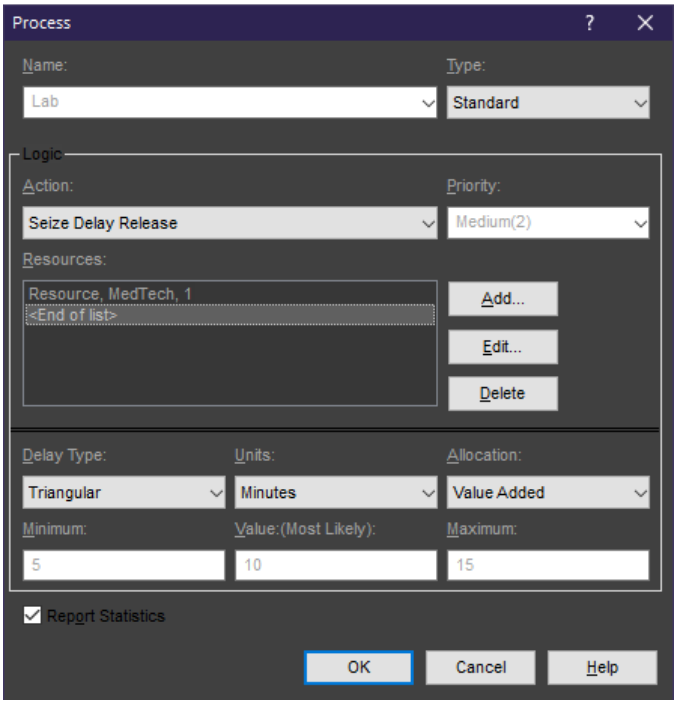

Figure 10. Laboratory

Patients who need a laboratory for further examination are crossing this process. Laboratory is fast as possible, however, results sometimes came for a day.

G. Appointment

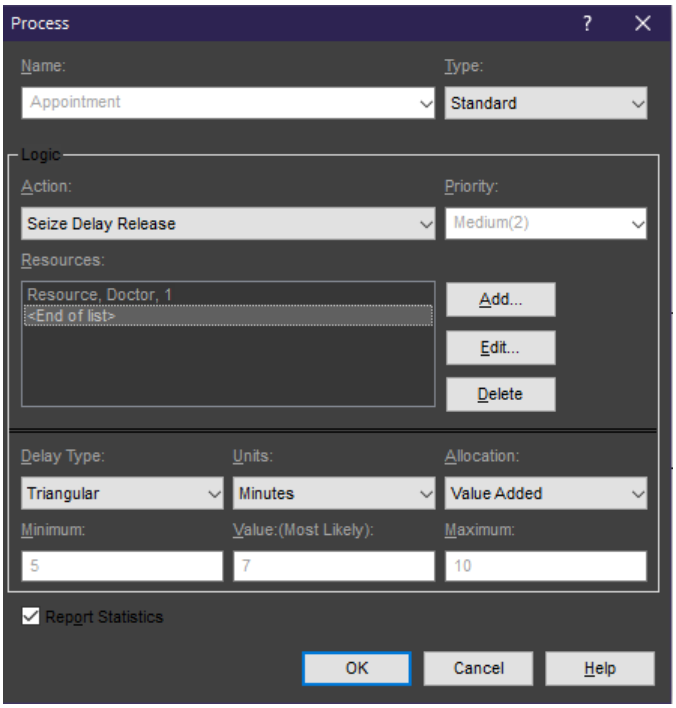

Figure 11. Appointment

If the patient comes from a laboratory, a schedule for an appointment is necessary after the results are received. Looking at **Figure 6.** a decision for appointment would be necessary if a doctor is not present for the specific healthcare need.

H. Pharmacy

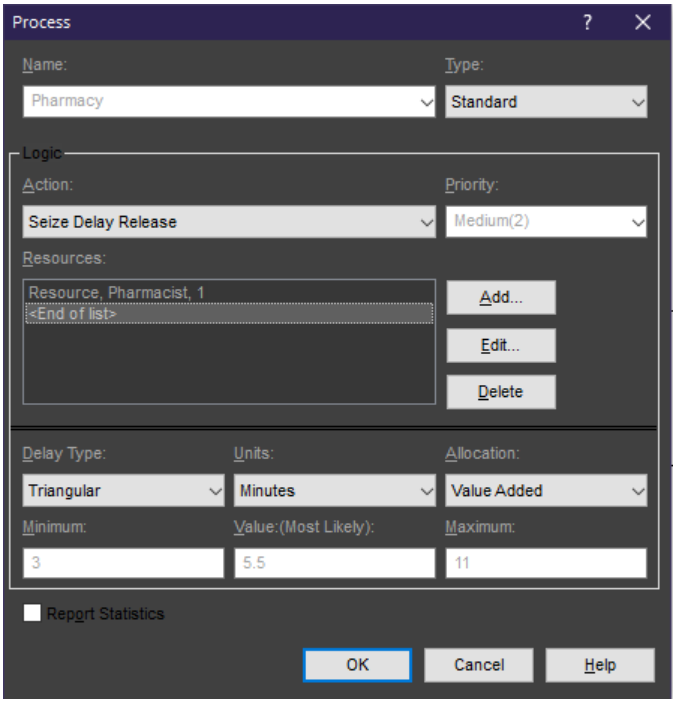

Figure 12. Pharmacy

Prescriptions from the doctors are bought here. To be paid in the counter process.

I. Counter

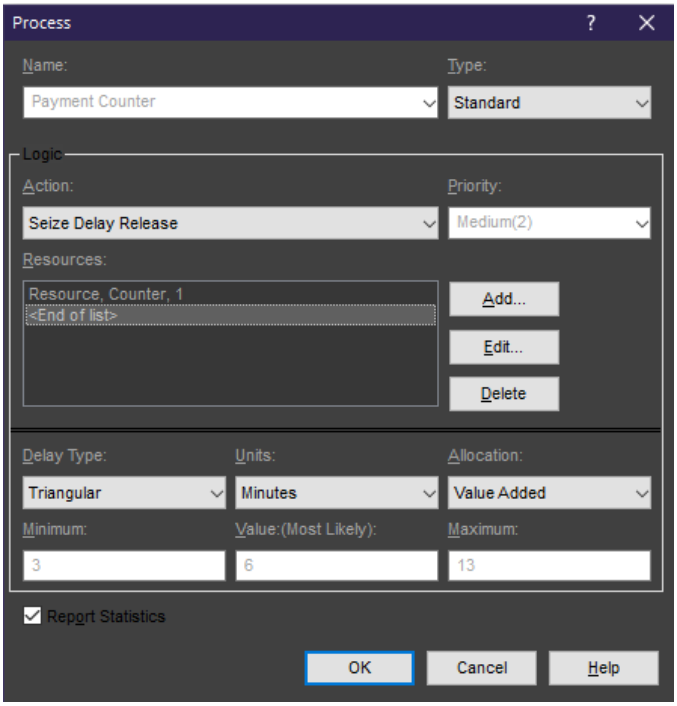

Figure 13. Payment Counter

IV. Results and Validation

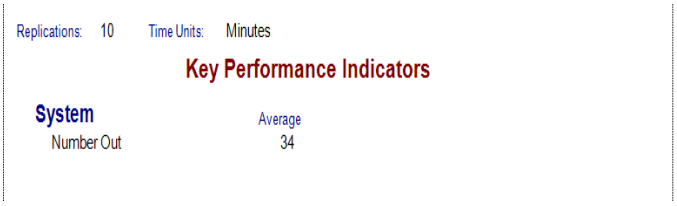

Figure 14. Simulation Overview

The results cover the overall simulation with an average of 34 patients out in the system. The 10 replications of the simulation represent the randomness of every entity per day. As for the day of the clinic, which only opens for 9 hours. Simulating the results, different replications were used in testing the real data to model data. Using the t-test, we compared two set of patient outcomes and determined its validation.

t-Test: Paired Two Sample for Means				
	Variable 1	*Variable 2*		
Mean	37.85714	36.85714		
Variance	26.47619	16.47619		
Observati	7	7		
Pearson C	0.988357			
Hypothes	0			
df	6			
t Stat	2.04939			
P(T<=t) or	0.043157			
t Critical c	1.94318			
P(T<=t) tw	0.086315			
t Critical t	2.446912			

Figure 14. Validation of Data

As the data confirms, our data set we're validated with a t-test and found that it was valid since the t-statistic is less than our t-critical value (2.04939 < 2.446912). On the other hand, our p-value is not less than the alpha itself (0.086315 > 0.05) where alpha denotes the significance of our study. All in all, our model was validated and complete