

CLINIC PLANNING MODEL GENERATOR

**USER'S GUIDE
Version 2.04**

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Institute for Systems Research
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Introduction

The Clinic Planning Model Generator is intended to grant public health officials the ability to quickly create an accurate model that will provide immediate assistance with planning for a treatment campaign. The model can be used either in the advance planning stages of a campaign or for support during an active effort. In general this program is designed to assist in planning a clinic with improved efficiency and performance while enlightening the planners on what to expect in the event of an outbreak.

This interactive software model allows clinic planners to enter known population information and set time constraints specific to their application. Immediate results show suggested staff levels and detailed clinic information regarding waiting times, queue lengths, and cycle time. Adjustments can easily be made to staffing levels and other inputs until the user is satisfied with the efficiency of the clinic. The versatility of this program allows the user to accept default values if little information is known about their clinic, or input more detailed information such as routing probabilities and process times. Since the clinic models operate entirely in the Microsoft Excel environment, some familiarity with this package is helpful. In order to run the model, two files are needed: "Clinic Generator.xls" and "Clinic Template.xls." These two files must be placed in the same folder for the program to work.

This user guide includes details on creating clinic models with the Clinic Planning Model Generator, and discusses how to use the models once created. At each step, examples will be given pertaining to a small, fairly simple clinic; the Excel file for this model, "Sample Clinic.xls," is included in the installation package.

In 2004, Public Health Services of the Montgomery County, Maryland Department of Health and Human Services became one of the first eleven public health agencies in the nation to be recognized as Public Health Ready by the National Association of County and City Health Officials (NACCHO) and the Centers for Disease Control and Prevention (CDC) of the U.S. Department of Health and Human Services. The county is home to one of eight Advanced Practice Centers (APCs) for Public Health Preparedness funded by NACCHO through the CDC.

Important Terms

1. Cycle Time – the average time that a patient spends at a station. It includes queue time and process time. The total cycle time is the total time a patient is expected to be in the clinic.
2. Interarrival Time – the average time between patients arriving. In the case of bus interarrival time, this is the average time between two buses arriving with patients.
3. Process Time (Service Time, t_o) – the average time that a staff member is in contact with a patient at a station.
4. Queue Length – the average number of patients waiting in line at a station.
5. Queue Time (Wait Time) – the average time that a patient waits in line at a station.
6. Routing Probability – the probability that a patient at one station will visit that station when they leave. Example: If five percent of patients who leave Reception go to Sick Bay, and the remaining ninety-five percent go to Education then the routing probability from Reception to Sick Bay equals 0.05, and the routing probability from Reception to Education is 0.95.
7. Self-Service: a workstation where patients perform a process without staff assistance. Patients do not have to wait in line for staff to become available; instead, they begin service as soon as they arrive.
8. Service Time: the average time that a patient spends performing the process at a self-service workstation.
9. Utilization – the fraction of available station capacity being used.
10. Variance (σ_o) – the variance of the processing time at a station.
11. Work in Process (WIP) – the average number of people at a station. This includes patients waiting and patients being serviced.

Creating a Clinic Planning Model

Preparation

Before beginning to build the clinic planning model, it's helpful to gather all the information that will be used, as well as planning out the overall structure of the clinic. Worksheets are provided in Appendix A to help with this task; complete them before proceeding to the next section. A completed worksheet with the details of our example clinic is included below. Note that the listed stations are numbered so that the associated destinations are all later in the order. Since the model does not allow patients to travel backwards, the stations need to be listed in an order that permits the desired routings. Look at the sample model for an example of how the table should be used. By doing this, we ensure that we can easily fill in the appropriate probabilities for patient movement on the second sheet. Note that Appendix A contains two versions of the second worksheet: one with dashed lines for black and white printing, and one with colored lines.

Clinic Planning Model Generator
Clinic Planning Worksheet

This worksheet is designed to help you prepare to use the Clinic Model Generator tool. The series of questions below will guide you in gathering the necessary information to build a clinic model.

Demand data

What is the size of the population to be treated in the clinics? 50,000

How many days have been allotted for treatment? 10

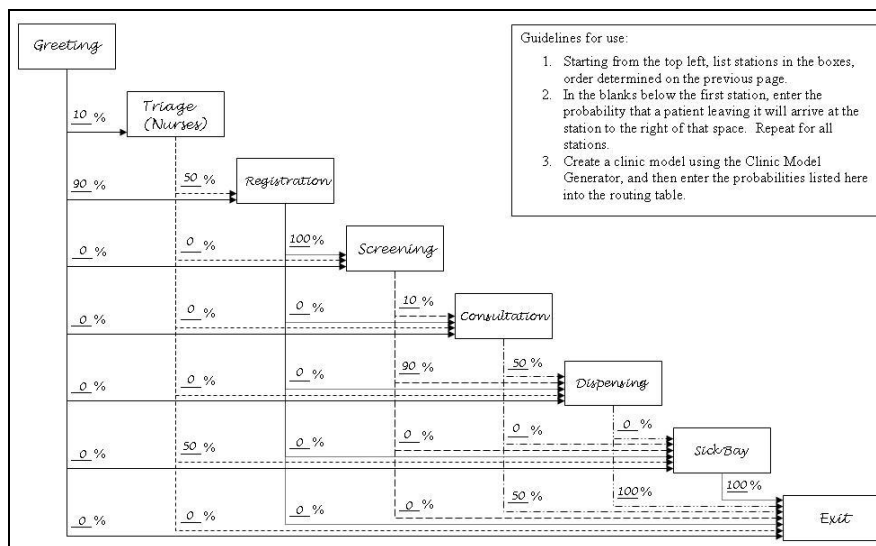
How many hours will the clinics be open each day? 16 (2 shifts)

How many clinic sites will be opened for treatment? 10

Station data

In the 'Station Name' column of the table below, list all stations that patients might visit as they pass through the clinic. In the 'Possible destinations' column, make a note of the stations that patients might visit after that station. Since the model only allows for forward travel, the stations need to be listed in an order that permits the desired routings. Use the column labeled '#' to note the correct order for the stations, look at the sample model for an example of how the table should be used.

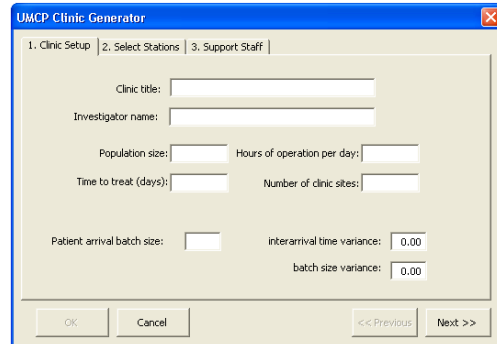
Station Name	Possible destinations	#
Greeting	Triage; Registration	1
Triage (Nurse)	Registration; Sick Bay	2
Sick Bay	Exit	7
Screening	Consultation; Dispensing	4
Consultation	Dispensing; Exit	5
Dispensing	Exit	6
Registration	Screening	3



Clinic Setup

Step 1: Open the *Clinic Generator.xls* file (If a Security Warning appears, select 'Enable macros'; they are required for this software to function correctly). The clinic setup dialog (right) will appear. The dialog can also be called up by pressing the button labeled "Create Clinic Model".

Make the appropriate entries and selections for your clinic in the "Clinic Setup" tab, then move to the "Select Stations" tab by clicking the "Next >>" button. In the picture at the right, we've entered the sample clinic data from our worksheet.

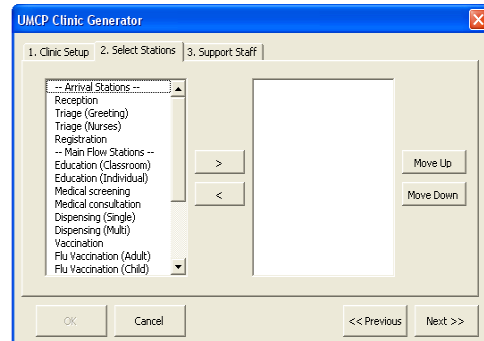


Step 2: Select the stations required for your clinic from the list on the left, using the right arrow button to add them to the list of selected stations. Double-clicking a station will also add it to the list.

You can use more than one of the same types of station – for instance, if you have two separate paths for patients, both of which include a registration or dispensing station.

The order of stations in the list can also be changed, using the "Move Up" and "Move Down" buttons.

Proceed to "Support Staff" by clicking "Next >>" or go back to "Clinic Setup" by clicking "<< Previous."



Step 3: Select the staff required for your clinic from the list on the left. The Support Staff tab operations the same as the previous tab.

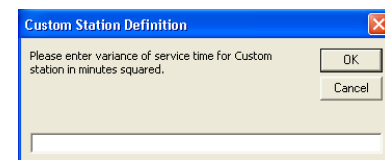
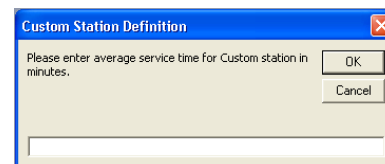
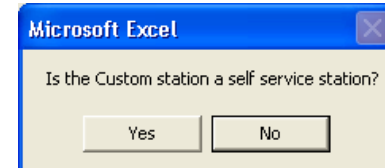
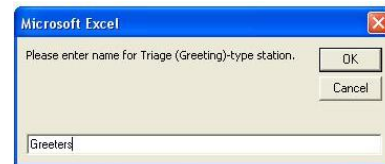
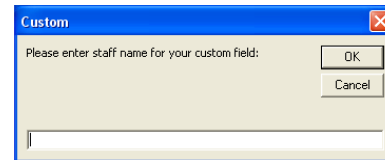
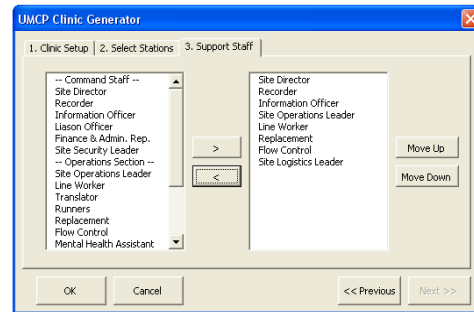
The Support Staff tab can be used to keep track of staffing in the clinic. However, it does not affect the outcomes of the clinic setup. Once a support staff has been selected, the generator will automatically add one to the total staff count.

The default list of support staff can be removed by selecting a support staff and clicking the left arrow button.

Step 4: When the initial clinic parameters are set to your satisfaction, hit the “OK” button to create the clinic. You will be asked to choose a location to save the clinic model. Next, the program will ask you to enter names for your custom support staff and all your stations. If you selected a Custom support staff, please enter a name for the member. The default station names will work, but if you have multiple stations of the same type, this is when you should assign them distinctive names (for instance, in the picture at right, we’ve renamed the default “Triage (Greeting)” to the “Greeters” we used in the worksheet). Certain station types will also ask for extra information, such as the classroom size for a classroom education station.

If you selected a Custom station, please specify whether it is a self-serve station by selecting “Yes” or “No.” Enter the proper average service time and variance in the following dialog. These values can be changed later, in the clinic model, if desired.

When you have entered all the necessary data, the spreadsheet model will be generated and saved.



Step 5: After naming all the stations, you will be required to enter information about where patients go when they depart each station.

The Routing Table is used to determine what path a patient will take through the clinic. For example, in a disease outbreak situation, some small percentage of patients will be identified as symptomatic, and routed away from the main clinic path.

Routing Probabilities							
From Greeters	From Triage (Nurses)	From Registration	From Medical screening	From Medical consultation	From Dispensing (Multi)	From Sick Bay	
100.0%							To Triage (Nurses)
0.0%	100.0%						To Registration
0.0%	0.0%	100.0%					To Medical screening
0.0%	0.0%	0.0%	100.0%				To Medical consultation
0.0%	0.0%	0.0%	0.0%	100.0%			To Dispensing (Multi)
0.0%	0.0%	0.0%	0.0%	0.0%	100.0%		To Sick Bay
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	To Exit
100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	Sum

Sum should be 100%

The table lists departure stations across the top, and arrival stations down the right side. The cells denote the percentage of patients departing from a station that will arrive at another station; a probability of 0% indicates that patients cannot make that particular trip. For instance, using the values shown above, every patient who leaves the greeters (100%) will proceed to the Triage (Nurses) station, and from there to the Registration, Medical screening, Medical consultation, Dispensing, and Sick Bay stations before they reach the exit. This is the default routing specified at model creation, and it should be modified by the user if the patient paths are less straightforward. The cells in the upper right corner of the table are shaded grey because the model does not allow patients to move backwards through the clinic.

Routing Probabilities							
From Greeters	From Triage (Nurses)	From Registration	From Medical screening	From Medical consultation	From Dispensing (Multi)	From Sick Bay	
10.0%							To Triage (Nurses)
90.0%	50.0%						To Registration
0.0%	0.0%	100.0%					To Medical screening
0.0%	0.0%	0.0%	10.0%				To Medical consultation
0.0%	0.0%	0.0%	90.0%	50.0%			To Dispensing (Multi)
0.0%	50.0%	0.0%	0.0%	0.0%	0.0%		To Sick Bay
0.0%	0.0%	0.0%	0.0%	50.0%	100.0%	100.0%	To Exit
100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	Sum

Sum should be 100%

In this example (which contains more likely routings but is still fairly simplistic), only 10% of patients are identified as having potential problems and sent to from Greeters to Triage (Nurses), while the other 90% proceed to registration. From the nurses' station, 50% of the patients turn out to be healthy, and follow the others to registration. The other 50% go to sick bay for treatment. After filling out their forms at registration, the remaining patients have their forms checked at the medical screening station. While 10% have contraindications or other reasons to have a consultation with a doctor, the other 90% are cleared to get their medication and go home. Of the patients who have a consultation, half receive medication and half go home. After treatment in the sick bay, all remaining patients leave the clinic, either to go home or to be taken to the hospital. Note that the sums in the bottom row are all 100%. If the patients departing from a station aren't all accounted for, this value will turn red to indicate an error.

After entering the appropriate values from the corresponding entries in the routing worksheet, click the 'Continue...' button to finish building the clinic planning model.

Default Station Types

Several commonly used clinic stations are included in this program. Each is associated with a processing time mean and variance, which will be added to the clinic model automatically. These times will not describe every possible clinic with perfect accuracy; they depend heavily on various factors, such as the familiarity clinic workers have with their jobs, the length of forms which must be filled by patients, and the type of medication being dispensed or vaccination being applied. The pre-defined parameters for each process can be modified if data is available describing the specific type of operation in question; otherwise, the default values will serve as guidelines.

The table below lists the included stations and the processes they are intended to model. Many of the stations listed have overlapping functions, appropriate for various types of clinic; only the ones appropriate for modeling your particular clinic should be used.

Station Type	Description
<i>Arrival Stations</i>	
Reception	Patients arrive at this station with a set of forms filled out at a Pre-POD; their answers are checked and then they are sent to the appropriate subsequent station.
Triage (Greeting)	Patients are greeted as they arrive at the clinic; those identified as needing special care (special needs populations), contact with an infectious agent, or showing symptoms of an illness are diverted to the appropriate stations.
Triage (Nurses)	Patients flagged as showing potential symptoms are examined and either return to the main patient path or receive appropriate treatment.
Registration	Patients receive forms and instructions on filling them out.
<i>Main Flow Stations</i>	
Education (Classroom)	Patients are shown an educational video for purposes of informed consent; this station includes an added parameter defining the number of seats in each classroom.
Education (Individual)	Patients who have questions can be directed to this station to receive further information.
Medical screening	Patients' forms are examined to make sure they can safely receive the treatment in question; those with potential complications are referred to an expert for a consultation.
Medical consultation	Patients with possible complications have an interview with an expert to determine whether they should be treated, and how.
Dispensing (Single)	This station dispenses the same medication to every patient.
Dispensing (Multi)	This station has several medications available, and usually

	follows consultation for patients who cannot take the standard medication.
Vaccination	The times for this station are based on a vaccine that requires three separate injections.
Flu Vaccination (Adult)	The times for this station are based on observations of a nurse vaccinating only individual, healthy adults (rather than children or family groups).
Flu Vaccination (Children)	The times for this station are based on observations of a nurse vaccinating only children and their parents.
Flu Vaccination (All Ages)	The times for this station are based on the combined observations of the two previous groups and can be used for stations where families with children are not treated separately.
<i>Patient Care Stations</i>	
Symptoms	Patients showing symptoms consistent with the disease being treated are brought to a holding room for medical examination, after which they are allowed to re-enter the main clinic flow, or sent to a primary care facility.
Contact	Patients who know they have been in contact with the agent being treated for are held for medical examination, after which they are allowed to re-enter the main clinic flow, or sent to a primary care facility.
Sick Bay	Patients who develop symptoms after passing the initial triage area are sent here for medical examination, after which they are allowed to re-enter the main clinic flow, or sent to a primary care facility.
Mental Health	Patients who become overly anxious or disruptive can be brought here to receive care from mental health professionals or crisis counselors.
<i>Custom Station</i>	
Custom	If a custom station is selected, the user will first be asked if the station is self-serviced or not, then required to enter corresponding data, such as average service time and variance.

Working with a Clinic Planning Model

Clinic Planning Model Pages: Table of Contents

When the clinic planning model is created or opened, the startup screen contains title and author information, and a link to the table of contents. Below is a list of the entries in the table of contents; more detailed explanations of each page follow. The same navigation buttons are used throughout the model.

Main	This page is the most important part of the interface, where demand and staffing values are set, and where the resulting clinic statistics can be seen.
Model Parameters	The Model Parameters page contains values that govern station operations, including arrival type and average process time and variance.
Routing Table	The routing table on this page is used to set the percentage of people who visit each station. A distance table is also included, which is used to calculate the time patients spend walking from one station to another.
Staffing	The main portion of the model allows you to dynamically configure the service staff at each station, but many other personnel are required for the operation of a clinic. The Staffing page tallies the support staff to provide an accurate estimate of total clinic staff. Security personnel are not included in the staffing estimate.
Report	This page gives a simple, printable summary of the clinic's performance, including graphs comparing the performance of individual stations.
Author Credits	The Author Credits simply names the main authors of the Clinic Model Generator program, along with several significant contributors
Startup Screen	The Startup Screen button returns the user to the initial screen of the model, which gives the clinic's name and creator.

Clinic Model Pages: Main

Inputs			Outputs			
Demand			General Performance			
Size of population to be treated:	10000		Time in clinic (min):	333.03		
Time allotted for treatment (days):	1		Average number of patients in clinic:	4625		
Daily hours of operation:	12		Batch Interarrival Mean(min):	0.07		
Number of clinic sites:	1		Clinic capacity (patients per hour):	843		
Required throughput (patients per hour):	833		Total staff per shift across all clinics:	71		
Staffing (per clinic site)			Station-Level Results			
	Staff per shift	Minimum staff per shift	Wait time (min)	Queue length	Utilization	
Greeters	4	4	Greeters	49.59	689	89.9%
Triage	3	3	Triage	187.56	260	81.1%
Registration	0	n/a	Registration	41.6	0	0.0%
Medical screening	24	24	Medical screening	18.75	247	96.3%
Medical consultation	6	6	Medical consultation	6.86	9	82.8%
Dispensing (Multi)	17	17	Dispensing (Multi)	23.17	290	98.8%
Sick Bay	9	9	Sick Bay	4391.77	3050	98.0%
Total Service Staff	63	63				
Total Staff	71	Set all to minimum				

Values in red signify below-minimum staffing levels. Values in red denote the "worst" station for that characteristic.

The main page of the clinic planning model contains a lot of information, so we'll go through it step by step according to the numbers above.

Step 1: Input Demand

After you create a model with the generator program, the numbers you input for the population demands and clinic operations will appear here. To investigate alternative scenarios, such as the effect of changing the number of clinic hours or length of a treatment campaign, change the values in the green-edged boxes.

The *required throughput* is the number of patients that must be processed by the clinic every hour in order to treat the given population in the allotted time.

Note: The model assumes that the population will be equally distributed among the chosen number of clinic sites. If this is not appropriate for your region, each clinic should be evaluated individually, with the appropriate population size and with a single clinic site.

Inputs	
Demand	
Size of population to be treated:	10000
Time allotted for treatment (days):	1
Daily hours of operation:	12
Number of clinic sites:	1
Required throughput (patients per hour):	833

Step 2: Input Staffing

Based on the patient flow requirements and the performance of the stations you selected in the model creation dialog, a minimum staffing level for each station has been determined. This value is shown in the right-hand column of black-edged boxes. To the left is the staffing level that will actually be used; this is set to the minimum value at model creation.

It is often useful to add more staff to a station that is not performing as well as it might. As in the input demand area, green-edged boxes indicate a user-input value. If the user-selected value for a station is below the minimum value, it will be highlighted in red. This must be corrected in order for the model to function correctly; while below-minimum values are selected, outputs will give errors or negative values.

The button in this area, labeled “Set all to minimum,” allows the user to automatically update all staffing values if the calculated minimum changes (for instance, because of updates to routing values or population size).

Station service staff are totaled below each column; below that, the total staff, including team leaders and administrators (see Staffing page), is given.

Staffing (per clinic site)		
	Staff per shift	Minimum staff per shift
Greeters	4	4
Triage	3	3
Registration	0	n/a
Medical screening	24	24
Medical consultation	6	6
Dispensing (Multi)	17	17
Sick Bay	9	9
Total Service Staff	63	63
Total Staff	71	<input type="button" value="Set all to minimum"/>

Step 3: General Performance

This area gives overall performance measures for the clinic; all of these values are calculated dynamically, and will update automatically when you change any input value.

- Time in clinic: the total time that, on average, each patient will spend in the clinic, including wait time, treatment time, and walking time.
- Average number of patients in clinic: the total number of patients in queue and being serviced at all stations.
- Bus interarrival time: if patients arrive at the clinic by bus (bus sizes are set on the Parameters page), this gives the necessary arrival frequency to support the specified patient flow. If individual arrival has been selected, this box will be grayed out.
- Clinic capacity: the maximum number of patients per hour that the clinic can serve. This is based on the capacity of the stations and the routing of patients through the clinic. The clinic capacity should be larger than the required throughput in the input demands section.
- Total staff per shift across all clinics: This total number of staff includes support and service staff for each clinic in the model, but does not take into account incident command staff.

Outputs	
General Performance	
Time in clinic (min):	333.03
Average number of patients in clinic:	4625
Batch Interarrival Mean(min)	0.07
Clinic capacity (patients per hour):	843
Total staff per shift across all clinics:	71

Step 4: Station-level Results

This part of the page gives more detailed information about individual stations, including averages for wait time, length of queue (the number of people waiting at a station), and utilization (the proportion of the time that servers are not idle).

For each of these three columns, the station with the highest value will be highlighted in red. This is intended to call attention to the station *most likely* to need improvement; however, no matter how efficient the clinic is, there will *always* be stations with the longest wait time, longest queue, and highest utilization.

Station-level Results			
	Wait time (min)	Queue length	Utilization
Greeters	49.59	689	89.9%
Triage	187.56	260	81.1%
Registration	0.00	0	0.0%
Medical screening	18.75	247	96.3%
Medical consultation	6.86	9	82.8%
Dispensing (Multi)	23.17	290	98.8%
Sick Bay	4391.77	3050	98.0%

Clinic Model Pages: Model Parameters

The Model Parameters page contains data describing patient arrivals to the clinic and operations at each station. *With the exception of group size, these values should not be altered unless you have your own data to replace them with.*

- **Arrival batch size:** the average number of patients in an arrival batch. A value of 1 indicates that patients arrive individually. The next field is the variance of the arrival batch size (the default is zero).
- **Interarrival time SCV:** this determines the regularity of the arrival process. A variability of 1 indicates moderately variable arrivals; values close to 0 mean that patients arrive like clockwork, while values greater than 1 suggest that patients arrive in very irregular spurts.
- **Average walk speed:** this walking speed is used to calculate the time patients spend walking from one station to the next. It should not be changed unless the user has data indicating a more accurate value.
- **Station processing time:** this is the average time required to complete a station process. Default values come from data recorded at exercises in Montgomery County, Maryland, and Burlington County, New Jersey.
- **Station variance:** the variance in a station's processing times.

Station	Processing Time (min)	Variance (min ²)	Batch Size	Self service
Greeters	0.259	0.0741	1	FALSE
Triage	1.752	1.6104	1	FALSE
Registration	2	1	1	TRUE
Medical screening	1.752	1.6104	1	FALSE
Medical consultation	3.765	4.3732	1	FALSE
Dispensing (Multi)	1.34	0.5408	1	FALSE
Sick Bay	12.698	75.3647	1	FALSE

- **Self-Service:** Self service stations can be identified if self-service stations were not designate during the clinic model generation process. Entering “True” in the corresponding self service station box will change the station into a self service station. A new set of data will have to be entered. The procedure is reversed in case the station is changed from self-serve to regular service. *Enter appropriate data first, and then change self-service box to “False.”*

Clinic Model Pages: Routing Table

The Routing Table is used to describe the paths that patients will take through the clinic. For example, in a disease outbreak situation, some small percentage of patients will be identified as symptomatic, and routed away from the main clinic path. The default routing specified at model creation is linear; all patients move through every station in the clinic in order. This should be modified by the user if the patient paths are less straightforward. The cells in the upper right corner of the table are shaded grey because the model does not allow patients to move backwards through the clinic.

Note: if the number of stations in the model makes it difficult to see everything at once, you can zoom out to view more of the table. Alternatively, you can select the first of the 'To' stations on the right and click on 'Window – Split'. This will allow you to scroll the main part of the table while the top and right labels remain visible.

Routing Probabilities							
From Greeters	From Triage (Nurses)	From Registration	From Medical screening	From Medical consultation	From Dispensing (Multi)	From Sick Bay	
10.0%							To Triage (Nurses)
90.0%	50.0%						To Registration
0.0%	0.0%	100.0%					To Medical screening
0.0%	0.0%	0.0%	10.0%				To Medical consultation
0.0%	0.0%	0.0%	90.0%	50.0%			To Dispensing (Multi)
0.0%	50.0%	0.0%	0.0%	0.0%	0.0%		To Sick Bay
0.0%	0.0%	0.0%	0.0%	50.0%	100.0%	100.0%	To Exit
100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	Sum
Sum should be 100%							

The table lists departure stations across the top, and arrival stations down the right side. The cells denote the percentage of patients departing from a station that will arrive at another station; a probability of 0% indicates that patients cannot make that particular trip. For instance, using the values shown above, upon leaving the Greeter station, 10% of patients will be sent to Triage (Nurses), while the rest will proceed to Registration.

Note that the sums in the bottom row are all 100%. If the patients departing from a station aren't all accounted for, this value will turn red to indicate an error.

Distance Table (in ft)							
From Greeters	From Triage (Nurses)	From Registration	From Medical screening	From Medical consultation	From Dispensing (Multi)	From Sick Bay	
0.00							To Triage (Nurses)
0.00	0.00						To Registration
0.00	0.00	0.00					To Medical screening
0.00	0.00	0.00	0.00				To Medical consultation
0.00	0.00	0.00	0.00	0.00			To Dispensing (Multi)
0.00	0.00	0.00	0.00	0.00	0.00		To Sick Bay
0.00	0.00	0.00	0.00	0.00	0.00	0.00	To Exit

The Distance Table on the same page works similarly. Here, the distance from each station to the next is specified, in order to incorporate walking times into the model. By default, all distances are zero, so that walking time is ignored. When assigning distances, it is only necessary to fill in values for possible combinations. For instance, in the previous example, no patients go from registration to the exit, so there is no need to assign a distance to this route.

Clinic Model Pages: Staffing

	Staff
Site Director	1
Recorder	1
Information Officer	1
Site Operations Leader	1
Line Worker	3
Replacement	8
Flow Control	2
Site Logistics Leader	1
Total	18

This page allows the model to estimate the various support staff required to run a clinic; the default values come from Annex 3 of the CDC's Smallpox Vaccination Clinic Guide. The numbers for each support position, highlighted with green borders, can be adjusted by the user, but service staff at each station can only be changed on the Main page. A team leader is also provided for each station. The total of the staff specified here is the number seen at the bottom of the Main page and used to calculate staffing across all clinics. Incident command and security personnel are not included in this estimate.

Clinic Model Pages: Report

A printable summary of the clinic can be found on the Report page. It lists the clinic demand information, along with the overall clinic performance data and a breakdown of each station. Additional station details are included in this table, such as the physical queuing space required and station cycle time. Two bar charts are also provided; these allow easy comparison of station queue time and utilization.

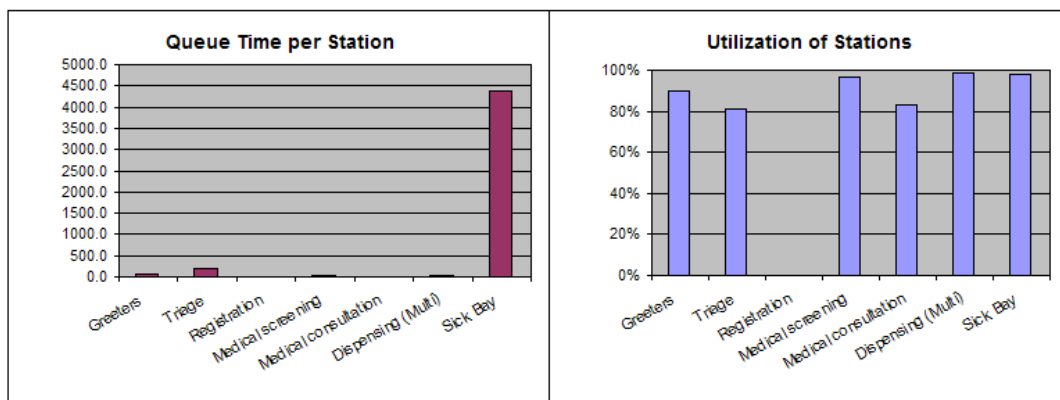
Sample Clinic

5/21/2007

Model created by Investigator with Clinic Planning Model Generator 2.03

Size of population to be treated:	10000	Time in clinic (min):	333.03
Time allotted for treatment (days):	1	Average number of patients in clinic:	4625.41
Daily hours of operation:	12	Bus interarrival time (min):	0.07
Number of clinic sites:	1	Clinic capacity (patients per hour):	843.43
Required throughput (patients per hour):	833	Service staff per shift across all clinics:	63
		Administratif staff per shift across all clinics:	8
		Total staff per shift across all clinics:	71

Station	Staff	Utilization	Process Time (min)	Wait Time (min)	Cycle Time (min)	Queue Length	Suggested Queue Space (ft)	WIP
Greeters	4	89.9%	0.26	49.59	49.84	689	4132	4625
Triage	3	81.1%	1.75	187.56	189.31	260	1563	463
Registrati	0	0.0%	1.50	0.00	1.50	0	0	4394
Medical s	24	96.3%	1.75	18.75	20.50	247	1484	4394
Medical c	6	82.8%	3.77	6.86	10.63	9	54	439
Dispensir	17	98.8%	1.34	23.17	24.51	290	1743	4174
Sick Bay	9	98.0%	12.70	4391.77	4404.47	3050	18299	231
Total	63							



Additional Information

For information about how the model calculates these results, see the report “Queueing Network Approximations for Mass Dispensing and Vaccination Clinics,” by Ali Pilehvar and Jeffrey W. Herrmann, Technical Report 2008-2, Institute for Systems Research, University of Maryland, College Park, 2008. It is available via the project web site at <http://www.isr.umd.edu/Labs/CIM/projects/clinic/>

If you have questions or suggestions, please contact Jeffrey Herrmann at the following address:

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Appendix A:
Clinic Planning Worksheets

Cooperative Agreement Number U50/CCU302718 from the CDC to NACCHO supported this publication. Its contents are solely the responsibility of the University of Maryland and the Advanced Practice Center for Public Health Emergency Preparedness and Response of Montgomery County, Maryland, and do not necessarily represent the official views of CDC or NACCHO.

Clinic Planning Model Generator Clinic Planning Worksheet

This worksheet is designed to help you prepare to use the Clinic Model Generator tool. The series of questions below will guide you in gathering the necessary information to build a clinic model.

Demand data

What is the size of the population to be treated in the clinics? _____

How many days have been allotted for treatment? _____

How many hours will the clinics be open each day? _____

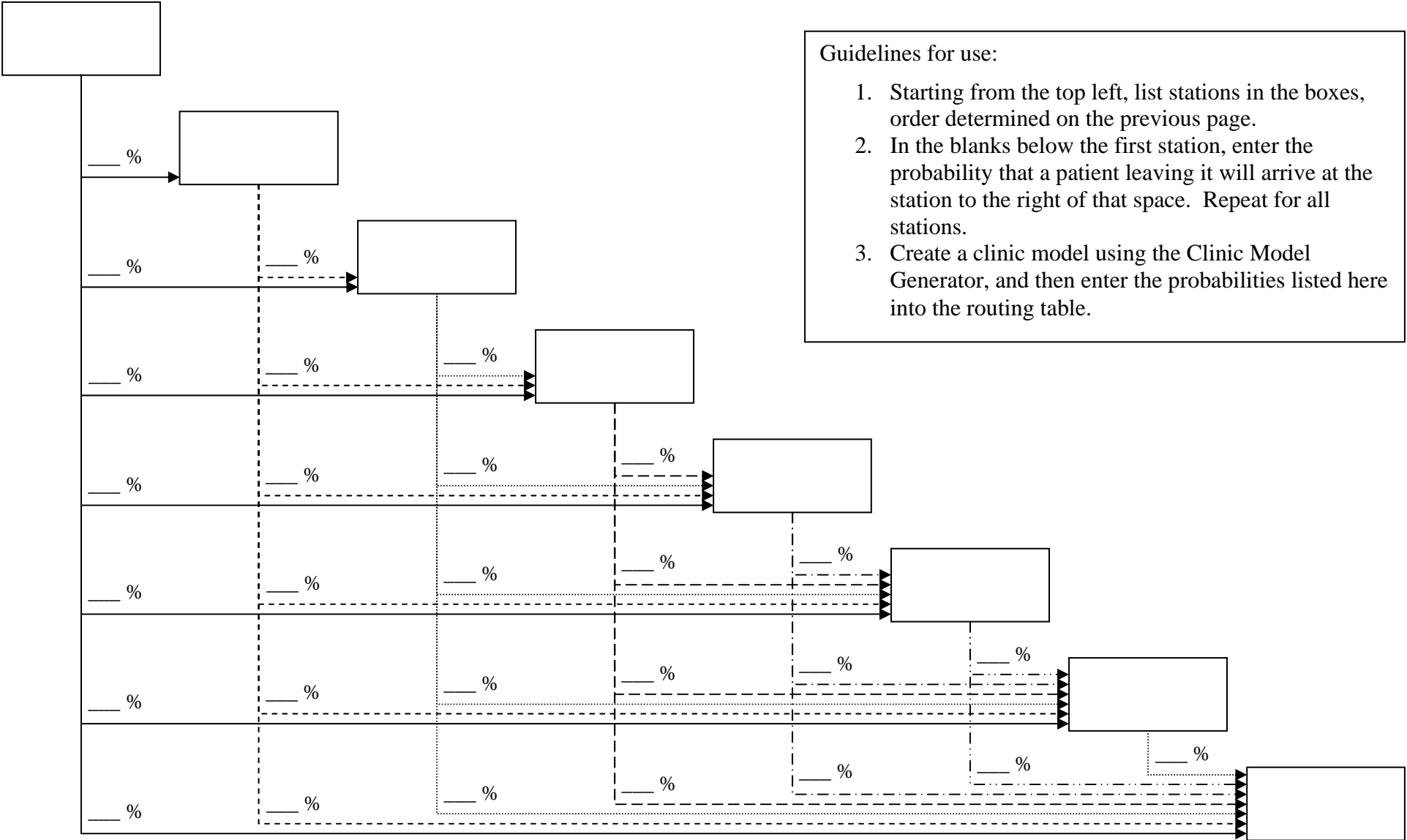
How many clinic sites will be opened for treatment? _____

Station data

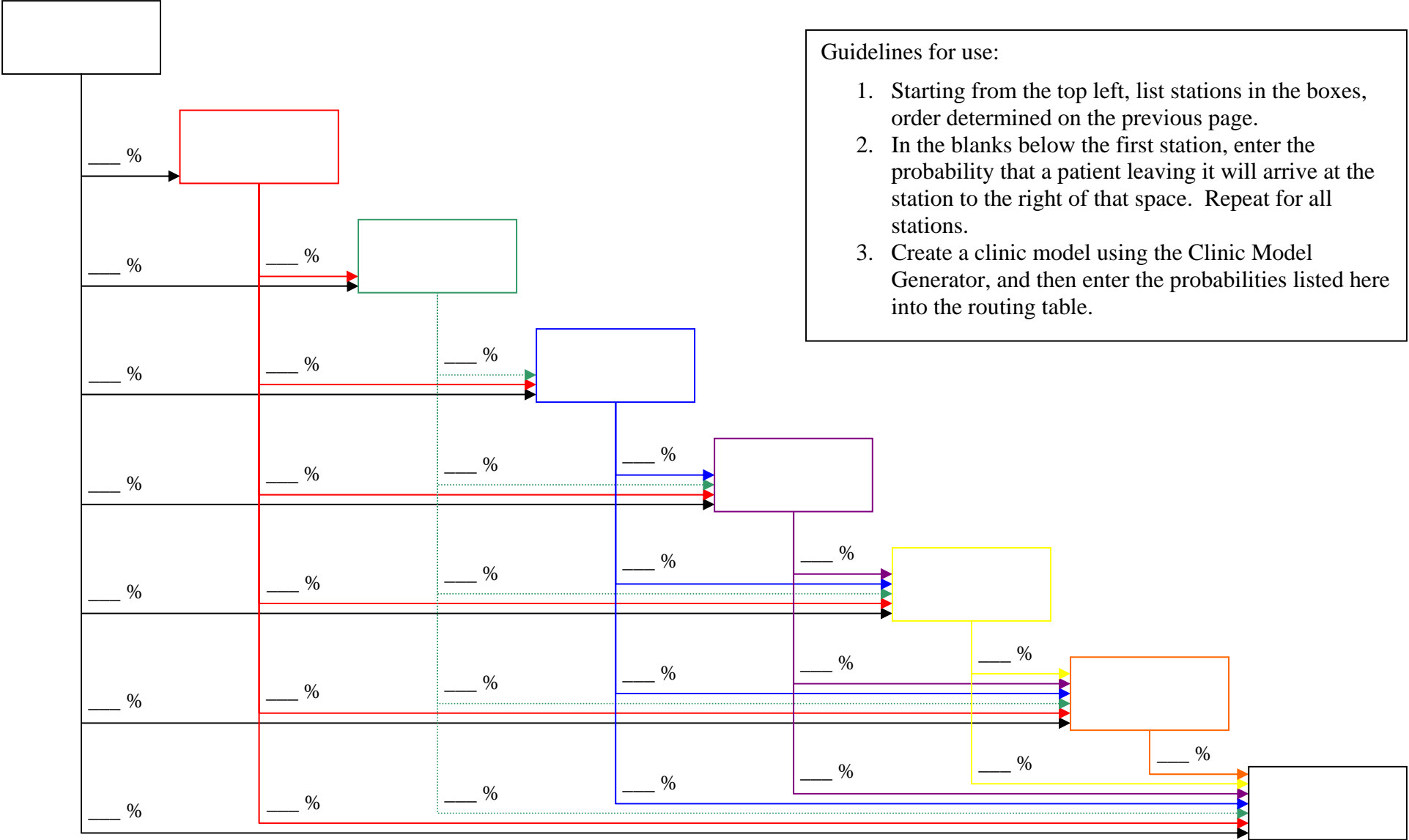
In the 'Station Name' column of the table below, list all stations that patients might visit as they pass through the clinic. In the 'Possible destinations' column, make a note of the stations that patients might visit after that station. Since the model only allows for forward travel, the stations need to be listed in an order that permits the desired routings. Use the column labeled '#' to note the correct order for the stations; look at the sample model for an example of how the table should be used.

Station Name	Possible destinations	#

Clinic Planning Model Generator Clinic Routing Worksheet



Clinic Planning Model Generator Clinic Routing Worksheet



Guidelines for use:

1. Starting from the top left, list stations in the boxes, order determined on the previous page.
2. In the blanks below the first station, enter the probability that a patient leaving it will arrive at the station to the right of that space. Repeat for all stations.
3. Create a clinic model using the Clinic Model Generator, and then enter the probabilities listed here into the routing table.