**Final Summary**

1. **Average visit time:**

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| --- | --- | --- | --- |
| Numbers of caregiver/Arrival rate | 20 patients/hour | 15 patients/hour | 10 patients/hour |
| 1 Doctor – 1 Nurse | 60 minutes/patient | 29 minutes/patient | 11 minutes/patient |
| 1 Doctor – 2 Nurses | 31 minutes/patient | 15 minutes/patient | 8 minutes/patient |
| 2 Doctor – 1 Nurses | 28 minutes/patient | 10 minutes/patient | 8 minutes/patient |

* The average wait time for each patient is decreased as there are more doctors and nurses, or there are less patient arrive per hour.
* With the same arrival rate, the decrease in average waiting time can clearly be observed, especially with high arrival rate (20 patients/hour), the time can be shorten by haft just by adding another doctor/nurse
* The time when change from 1 Doctor – 2 Nurse to 2 Doctor – 1 Nurse does not change significantly, the reason maybe that even though Doctor can treat wider range of patients, their treatment time can sometime be twice as long as a Nurse.

1. **Graph**

* The time fluctuates a lots as the arrival rate rise up, there are some specific arrival rate where the average visit time of patient is higher than the average time of rate around them (arrival rate of 19 patients per hour is an exemple), and there are also some arrival rate which the hospital work with higher efficiency (arrival rate of 37)

1. **Implementation change**

* During the very first design of the program, it is designed so that every patient, when being treated by a doctor/nurse, will hold that doctor/nurse object pointer and delete it from the Hospital, so when a new patient come in, if the vector storing caregivers pointer is empty, then there is no caregiver free, and that patient will have to wait. However this is changed due to the fact that this way of approaching will make it difficult to check if the caregiver is finish with a patient or not, and assign that doctor to another patient.
  + This is then changed to that the hospital will have a vector of caregiver pointer, each caregiver object have can hold a pointer to a patient object, this will be their patient, this caregiver(nurse or doctor) object will also have method to check if they are available for the next patient.
* Another change from the first design is how the patient is assign to the doctor/nurse in the hospital. Originally, there are only 1 priority queue to hold all the patient, the patient with the highest severity will be on top. However, by doing this, there will be case where the top patient have priority higher than 10, which nurse cannot treat. This create situation where the only doctor is occupied, where the other nurses is free instead of working, since they have to wait for the doctor to take the highest priority (which higher than 10) out of the queue.
  + This is improved later as there are 2 priority queues, one for patient with severity from 1-10, the other are for severity from 11-20. By doing this, the nurses can easily check for patients that they can treat without waiting for the higher priority patient that they cannot treat. This improves the average visit time significantly.