CHAPTER 2

SYSTEM MODEL

2.1 INPUT ANALYSIS :

The daily COVID hospitalizations are not time homogeneous and are closely related to the number of people infected. In particular, we focused on the catchment area of UF Health Jacksonville. It is a metropolitan area with 1.5 million people, covering five counties: Baker, Clay, Duval, Nassau, and St. Johns, Florida. The range of epidemiological variables, including hospitalization rate, hospitalizations that require ICU stay, denoted as ICU rate, hospital length of stay by unit type (ICU and ward), and case fatality rate (death rate) were determined by review of the literature and expert consensus of the team. In particular, the patient age distribution, hospitalization rate, ICU rate, and death rate were obtained from UF Health Jacksonville and the Florida Department of Health (FDOH) [18]. Based on the difference in these event rates, patients were broadly categorized into a high-risk group and a low-risk group. This was inspired by the multi-principal allocation framework for prioritizing which patients should receive ventilators when a shortage occurs [17]. In our study, the high-risk group contains patients 65 years old and above. Among the hospitalization population, the death rate of this age group exceeded 20%. The below 65-year-old group is regarded as of low-risk, with the death rate being under 11% on average after hospitalization. Similarly, there was a salient difference in ICU rates and average lengths of stay between the two groups. It is worth noting that other criteria can be used to classify patients and our choice was based on the goal of controlling the overall death rate. The hospital lengths of stay by unit type (ICU and ward) were obtained from UF Health Jacksonville and the CDC [19]. We present Table I below to summarize the basic setting. The total number of existing beds, and potential surge beds for use in the COVID unit were provided by the hospital. Currently, 35 beds are reserved for the COVID unit of UF Health Jacksonville. The market share of the hospital is assumed to be 15%. The group-wise event rates (and lengths of stay) in Table I were calculated by taking the weighted average of event rates (and lengths of stay) of each specified age stratum, for the low-risk and high-risk groups, respectively. The hospital related parameters were obtained from different healthcare provides in their regions, while the disease characteristics can be gradually updated as more instances collected and research conducted for certain new pandemic.