**Optimal Patient Mix for Surgery Schedule**

The NUH Department of Surgery is tasked with scheduling surgeries for a list of patients while operating within a limited 12-hour time frame for next Wednesday, assuming that only 1 patient can be in the OT at any point of time. The following details information about the patients.

|  |  |  |  |
| --- | --- | --- | --- |
| Patient | Estimated Surgery Duration (hours) | Surgery Need\* (0-10) | Chance of Noshow |
| A | 2 | 5 | 10% |
| B | 3 | 2 | 25% |
| C | 1 | 5 | 5% |
| D | 3 | 7 | 15% |
| E | 2 | 1 | 20% |
| F | 0.5 | 2 | 30% |
| G | 5 | 9 | 3% |
| H | 4 | 3 | 15% |

*\*Surgery Need = how important the surgery is on the patient’s life*

Excel solver was used to find the optimal mix of patients (maximizing surgery need and minimizing noshow) for surgery next Wednesday. The following table is the results, indicating that select patient **A, C, D, F, G** is recommended which would take a total of **11.5 hours**.

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Firstly, an interaction term is created by multiplying each patient's surgery need by (1 - Chance of Noshow). This term reflects the adjusted surgery need, considering the probability that a patient may not show up for the scheduled surgery.

Next, a binary decision variable, where "1" indicates that the patient should be scheduled for surgery (Go), and "0" indicates that the patient should not be scheduled (No-go), is introduced. Before using Excel Solver, these decision variables are initially set to 1, indicating that all patients are considered for surgery. These will be the variables that Solver will optimize.

The objective function will be to maximize the total sum of the interactions for patients who are scheduled for surgery which effectively prioritizing patients with higher surgery necessity and lower risk of no-show.

Next, the total sum of coefficients of the patient planned for the surgery will be used as the objective. By maximizing it, it effectively maximizes surgery need and minimizes the chances of noshow. Additionally, the total time required for the selected surgeries will be constrained to ensure it does not exceed the 12-hour limit.

**Appendix**

Annex A: Constraints set in Excel Solver

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Annex B: Calculation of Objective Function

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Annex C: Calculation of Total Surgery Duration for Planned Patients

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