# Inputs Parameters

This is for the “smaller instance” of the problem:

* Planning horizon is decreased from 24 weeks to 10 weeks
* Maximum tracked wait is decreased from 6 weeks to 4 weeks
* There are 3 surgeries instead of 6 surgeries
* Number of priorities is set to 1

Simulation parameters: 30 replications, 3000 weeks duration, 1000 weeks warm up.

* Additionally, the model heavily prioritizes filling out admissions

Arrival Rate:

It was set to be 95% of the capacity, however due to transitions, the resource usage should be higher than 95%

Surgeries:

* 1. SPINE POSTERIOR DECOMPRESSION/LAMINECTOMY LUMBAR
* 4. SPINE POST CERV DECOMPRESSION AND FUSION W INSTR
* 6. SPINE POSTERIOR DISCECTOMY LUMBAR

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Surgery** | **Complexity** | **Arrival per week -**  **Adjusted to capacity**  **(poisson)** | **Arrival per week –**  **Initial**  **(poisson)** | **Rationale** |
| Surgery 1 | Complexity 1 | 1.231988473 | 1 | once per week |
| Surgery 1 | Complexity 2 | 0.615994236 | 0.5 | once per two weeks |
| Surgery 4 | Complexity 1 | 0.143731988 | 0.083333333 | once per 3 months |
| Surgery 4 | Complexity 2 | 0.102665706 | 0.0625 | once per 4 months |
| Surgery 6 | Complexity 1 | 1.231988473 | 1 | once per week |
| Surgery 6 | Complexity 2 | 0.615994236 | 0.5 | once per 2 weeks |

Usage of the resources:

|  |  |  |  |
| --- | --- | --- | --- |
| **Surgery** | **Complexity** | **Resource type** | **Usage** |
| 1. SPINE POSTERIOR DECOMPRESSION/LAMINECTOMY LUMBAR | Complexity 1 | Admissions | 0 |
| 1. SPINE POSTERIOR DECOMPRESSION/LAMINECTOMY LUMBAR | Complexity 1 | OR\_Time | 3 |
| 1. SPINE POSTERIOR DECOMPRESSION/LAMINECTOMY LUMBAR | Complexity 2 | Admissions | 1 |
| 1. SPINE POSTERIOR DECOMPRESSION/LAMINECTOMY LUMBAR | Complexity 2 | OR\_Time | 4 |
| 4. SPINE POST CERV DECOMPRESSION AND FUSION W INSTR | Complexity 1 | Admissions | 1 |
| 4. SPINE POST CERV DECOMPRESSION AND FUSION W INSTR | Complexity 1 | OR\_Time | 4 |
| 4. SPINE POST CERV DECOMPRESSION AND FUSION W INSTR | Complexity 2 | Admissions | 1 |
| 4. SPINE POST CERV DECOMPRESSION AND FUSION W INSTR | Complexity 2 | OR\_Time | 5.5 |
| 6. SPINE POSTERIOR DISCECTOMY LUMBAR | Complexity 1 | Admissions | 0 |
| 6. SPINE POSTERIOR DISCECTOMY LUMBAR | Complexity 1 | OR\_Time | 1.5 |
| 6. SPINE POSTERIOR DISCECTOMY LUMBAR | Complexity 2 | Admissions | 0 |
| 6. SPINE POSTERIOR DISCECTOMY LUMBAR | Complexity 2 | OR\_Time | 2.5 |

System Capacity:

|  |  |
| --- | --- |
| **Resource** | **Capacity per week** |
| Admissions | 1.5 (patient admissions per week – requiring a bed) |
| OR Time | 11.25 (OR hours per week) |

# Description of the Policy (MDP): NEED TO FIX GRAPHS

### The policy description is based on the following graph.

This graph shows the benefit of scheduling a patient divided by the resource utilization. If it is above 0, it is better to schedule a patient than to let a patient wait. The highest points on the graph should be scheduled first.

Only the first two weeks will be scheduled into.

### There are also minor preference towards patients who waited longer (complexity 1 only)

### Description

* This plot shows that the policy would only schedule on week 1 and 2. (For all weeks after it is below 0).
* First the policy would attempt to fill week 1, then it attempts to fill week 2
  + For week 1 the policy attempts to fill the system in approximately the following order:
    - Surgery 6, Complexity 1
    - Surgery 1, Complexity 1
    - Surgery 6, Complexity 2
    - Surgery 4, Complexity 1
    - Surgery 4, Complexity 2
    - Surgery 1, Complexity 2
  + For week 2 the policy attempts to fill the system in approximately the following order:
    - Surgery 6, Complexity 1
    - Surgery 1, Complexity 1
    - Surgery 4, Complexity 1
    - Surgery 6, Complexity 2
    - Surgery 1 Complexity 2 OR Surgery 4 Complexity 2

# Result Tables

Wait Times in weeks (mean +- 95% margin of error):

Surgeries:

* 1. SPINE POSTERIOR DECOMPRESSION/LAMINECTOMY LUMBAR
* 4. SPINE POST CERV DECOMPRESSION AND FUSION W INSTR
* 6. SPINE POSTERIOR DISCECTOMY LUMBAR

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Overall | Surgery | | |
|  |  | Surgery 1 | Surgery 4 | Surgery 6 |
| MDP | 11.1 +- 9.56 | 15.5 +- 5.69 | 32.9 +- 32.2 | 3.76 +- 2.75 |
| Myopic | 66.9 +- 67.5 | 34.2 +- 10.1 | 437 +- 213 | 50.5 +- 32.6 |

Wait List Size in number of patients (mean +- 95% margin of error):

Surgeries:

* 1. SPINE POSTERIOR DECOMPRESSION/LAMINECTOMY LUMBAR
* 4. SPINE POST CERV DECOMPRESSION AND FUSION W INSTR
* 6. SPINE POSTERIOR DISCECTOMY LUMBAR

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Overall | Surgery | | |
|  |  | Surgery 1 | Surgery 4 | Surgery 6 |
| MDP | 51.3 +- 4.33 | 29.1 +- 1.74 | 14.4 +- 4.21 | 7.78 +- 1.18 |
| Myopic | 293 +- 3.61 | 63.6 +- 2.11 | 135+-2.71 | 94.5+-4.31 |

Utilization (mean +- 95% margin of error):

|  |  |  |
| --- | --- | --- |
|  | Admissions | OR Time |
| MDP | 1.19 +- 0.117 | 1.05 +- 0.103 |
| Myopic | 1.31 +- 0.0456 | 1.01 +- 0.0676 |

Percentage of patients rescheduled (mean +- 95% margin of error):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Overall | Surgery | | |
|  |  | Surgery 1 | Surgery 4 | Surgery 6 |
| MDP | 65.7 +- 1.84 | 59.2 +- 3.87 | 0 | 80.9 +- 6.88 |
| Myopic | 88.1 +- 2.35 | 12.5 +- 7.31 | 0 | 176 +- 10.5 |

Percentage of patients transitioned (mean +- 95% margin of error):

* Number of patients whose conditions worsened (complexity only)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Overall | Surgery | | |
|  |  | Surgery 1 | Surgery 4 | Surgery 6 |
| MDP | 24.7 +- 0.540 | 49.3 +- 1.32 | 0.314 +- 0.124 | 3.38 +- 0.390 |
| Myopic | 36.6 +- 1.29 | 65.9 +- 2.44 | 9.29 +- 1.52 | 10.8 +- 0.745 |

# Some Graphs:

