# Emergency Management Preparedness: SeGMENt

# 1. The goal

The goal of the SeGMENT game (Serious Game for Management of Emergency Network) is to improve the preparedness of health care system managers to face crisis situations such as bombing attacks, chemical attacks, biological attacks, etc. The game focuses on the logistic coordination of the actors involved in the emergency network. The medical responses to the crisis and best practices to implement them, are not directly integrated, and are more dedicated to MRMI exercices (Medical Response to Major Incident), see http://www.macsim.se/. Coordination of actors is the main vehicle to improve the performance of the emergency supply chain in terms of efficiency and quality of cares [Belaidi et al., 2009; Chen et al. 2015]. By sharing information between actors, a first level of cooperation can be reached. A second level can be attained by implementing an operational control center which concentrates the information about patients and actors' resources, in order to propose decisions to the different stakeholders. SeGMENT enables the actors to understand the benefits of sharing information and of the collaboration under the supervision of a coordinator or a crisis unit. Different scenarios will be discovered during the game, in order to live the consequences of situations without information exchange, with information exchanges and with a supervision help.

The addressed stakeholders are: public health institutions, firefighters, paramedics, physicians, nurses, hospital staff, other first responders, Non-Governmental institutions (such as Red Cross), etc. They are the players and they represent the actors of the emergency network in crisis situations.

# 2. The Serious Game

## 2.1 Player table sets:

There are 4 or 5 types of players (depending on scenarios) with different table sets:

- The head of a rescue center that manages 6 rescue teams for the recovery of yellow and red patients on the scene. The green patients are autonomous and go directly to the medical transport center, except to CBRN (Chemical/Biological/Radiological/Nuclear) situations where decontamination is compulsory for everybody.
- The head of an advanced medical post that manages 6 medical teams for the resuscitation of yellow and red patients, and the decontamination of all the patients. A waiting area is available for green, yellow and red patients when teams are not available.
- The head of a medical transport center that manages 5 ambulance teams and 1 MPV (multi-purpose vehicle) for patient transportation from the advanced medical post to the emergency departments of hospitals. Red and yellow patients are transported individually by ambulances, and up to 6 green patients are transported by a MPV. A waiting area is available for patients when ambulances/MPV are not available.
- The head of an emergency department that manages: 2 visiting rooms for yellow and green patients and 4 shock rooms for red patients. The shock rooms can be used for yellow and green patients. A waiting area is available for green, yellow and red patients when rooms are not available. Two emergency departments are recommended with different sizes 4 shock rooms/2 visiting rooms and 2 shock rooms/4 visiting rooms respectively.
- The head of an operational control center that plans the patients to supervise the players in order to control when and which patient has to go to which centers (only for scenario 3).
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## 2.2 Playing cards:

We distinguish three types of cards:

- Red patients: patients with major life-threatening injuries who are salvageable before a given deadline. The activity duration for red patients are of two hours each for recovery, resuscitation, transportation and medical treatment. Without medical treatment in an emergency department before or at the deadline, the patient is dead.

- Yellow patients: patients with major injuries whose treatments can be delayed until a given deadline. The activity duration for yellow patients are of one hour each for recovery, resuscitation, transportation and medical treatment. Without medical treatment in an emergency department before or at the deadline, the patient is dead. The deadlines for yellow patients are less tight than red patients and the activity durations are shorter.
- Green patients: patients with minor injuries whose treatments can be delayed until a given deadline, and who can be transported in group by bus (MPV). Without psychological treatment before the deadline, the green patients could have some post-traumatic disorders.

Each patient is identified by a number in order to be recognized by the operational control center for control and traceability reason. The proportions of patients are 32% of black (deaths), 12% of red, 24% of yellow, and 32% of green for a bombing attack of 200 casualties (Frykberg and Tepas, 1988).

## 2.3 Game rules:

The cards are initially stacked on the place "scene" of the rescue center sets. After transferring the player's cards to another player during a period, they are positioned on the place "waiting area" of the other table sets (destination players). The course of patients is compulsory: rescue center, advanced medical post, medical transport center and emergency department. Players cannot select the cards of their choice in the "scene" place or in the "waiting area" place, they must respect the arrival order. The period duration represents 1 hour. It lasts to 1 minute. Each period allows players to release teams or rooms whose activities are ended and to use available teams or rooms. The cards go from the visiting area or from the scene to the team or the room for assignment, and the cards go from the team or the room to the visiting area of another player for release. A player (destination player) cannot refuse the cards of another player (origin player). Red and yellow patients, who achieved a treatment-room of an emergency department before or at their deadline are saved, the others died. Green patients, who achieve a treatment-room of an emergency department after their deadline, have psychological troubles. The objective is to minimize the number of deaths and the number of trauma patients.

## 2.4 Scenarios:

Different scenarios will be discovered during the game, in order to live the consequences of situations without information exchange between actors (NI: No Information), with information exchanges between actors (WI: With information), and with a Supervision Help (SP).

1. Each player plays independently without any information from other players (NI scenario).
2. Each player plays independently with information from the neighboring players (WI scenario).
3. Each player plays under the supervision of an operational control center (SP scenario), by respecting a dedicated patient planning calculated with CPLEX solver.

## 2.5 Indicators:

Different performance indicators are calculated with EXCEL to assess the resource efficiency and the quality of cares:

- Number of deaths: we count the number of red patients and the number of yellow patients who arrive to the emergency department after their deadlines,
- Number of traumas: we count the number of green patients who arrive to the emergency department after their deadlines, ,
- Average length of treatment for red patients: sum of completion dates divided by the patient number for red patients,
- Average length of treatment for yellow patients: sum of completion dates divided by the patient number for yellow patients,
- Average length of treatment for green patients: sum of completion dates divided by the patient number for green patients,
- Percentages of resource employment for patient recovery, for patient resuscitation, for patient transport, for patient medical treatment: sum of unused teams (rooms) per period divided by periods number.

# Rescue Center

Scene

Rescue team

Rescue team

Rescue team

Rescue team

Rescue team

Rescue team

Waiting area

# Advanced Medical Post

Medical team

Medical team

Medical team

Medical team

Medical team

Medical team

Medical team

**Waiting Area**

# Medical Transport Center


**Multi-Purpose Vehicle**

**Ambulance team**

**Ambulance team**

**Ambulance team**

**Ambulance team**

**Ambulance team**

**Ambulance team**

Waiting area

# Emergency Department

Visiting room

Visiting room

Shock room

Shock room

Shock room

Shock room

**Patient 001**
Red
**Deadline 12**
2 hours

**Patient 002**
Red
**Deadline 12**
2 hours

**Patient 003**
Red
**Deadline 12**
2 hours

**Patient 004**
Red
**Deadline 12**
2 hours

**Patient 005**
Red
**Deadline 14**
2 hours

**Patient 006**
Red
**Deadline 14**
2 hours

**Patient 007**
Red
**Deadline 14**
2 hours

**Patient 008**
Red
**Deadline 14**
2 hours

**Patient 033**
Yellow
**Deadline 24**
**1** hour

**Patient 034**
Yellow
**Deadline 24**
**1** hour

**Patient 035**
Yellow
**Deadline 24**
**1** hour

**Patient 036**
Yellow
**Deadline 24**
**1** hour

**Patient 037**
Yellow
**Deadline 24**
**1** hour

**Patient 038**
Yellow
**Deadline 24**
**1** hour

**Patient 039**
Yellow
**Deadline 24**
**1** hour

**Patient 040**
Yellow
**Deadline 24**
**1** hour

**Patient 121**
Green
**Deadline 24**
**1** hour


**Patient 122**
Green
**Deadline 24**
**1** hour


**Patient 123**
Green
**Deadline 24**
**1** hour


**Patient 124**
Green
**Deadline 24**
**1** hour


**Patient 125**
Green
**Deadline 24**
**1** hour


**Patient 126**
Green
**Deadline 24**
**1** hour


**Patient 127**
Green
**Deadline 24**
**1** hour


**Patient 128**
Green
**Deadline 24**
**1** hour


# 3. Operational Control Center

To simulate the operational control center, a decision making tool allows us to calculate the patients' planning for each player (actor), i.e. the numbers of red, yellow, and green patients to treat per period. An integer linear program is defined below to calculate the patients' planning and it is solved by CPLEX solver.

## 3.1 Data:

- T: the number of periods (in hours), T > 24 (a non feasible scenario of one day, i.e. more than 24 hours are needed to treat all the patients whose deadlines do not exceed 24 hours),
- M: the number of activities, M=5, activity 1 is rescue center, activity 2 is advanced medical post, activity 3 is medical transport center, activities 4 and 5 are emergency departments, 1 > 2 > 3 > 4||5,
- N(i): the number of patients in state i, to take care, N(1)=64 for green patients, N(2)=48 for yellow patients, and N(3)=8, N(4)=8, N(5)=4, N(6)=4 for red patients regarding to their deadlines,
- Dur (i,j): the duration of the activity j for a patient in state i (in numbers), Dur(1,j)=1, Dur(2,j)=1, Dur(3,j)=2, Dur(4,j)=Dur(5,j)=Dur(6,j)=2,
- Suc (j): the set of successors of the activity j defining the network structure, 1 > 2 > 3 > 4||5
- Cap (j,t) : the capacity of the resource associated to the activity j (in numbers), Cap(j,t)=6.

## 3.2 Variables:

- X (i,j,t) : the number of patients in state i, who benefit from the activity j during period t,
- S (i,j,t) : the number of patients in state i, who wait for the next activity after activity j during period t (waiting areas of the successors).

## 3.3 Model:

$$Minimize \sum_{i=1}^{6} \sum_{j=1}^{M} \sum_{t=1}^{T} X(i,j,t) * t * i * Dur(i,j) \quad (1)$$

Subject to:

$$S(i,j,t) + X(i,j,t) - S(i,j,t + Dur(i,j)) \;=\; \sum_{k \in suc(j)} X(i,k,t + Dur(i,j)) \quad (2)$$

$$\forall i = 1,\dots,6 \;\; \forall j = 1,\dots,3 \;\; \forall t = 1,\dots,T - Dur(i,j)$$

$$\sum_{i=1}^{6} \sum_{p=1}^{Dur(i,j)} X(i,j,t-p+1) \;\leq\; Cap(j,t) \quad (3)$$

$$\forall j = 1,\dots,M \;\; \forall t = 1,\dots,T$$

$$\sum_{j|suc(j)=\emptyset} \sum_{t=1}^{T} X(i,j,t) \;=\; N(i) \quad (4)$$

$$\forall i = 1,\dots,6$$

$$\sum_{t=1}^{T} X(i,j,t) \;=\; N(i) \tag{5}$$

$\forall i = 1,\dots,6 \quad \forall j = 1,\dots,3$

$$S(i,j,1) \;=\; 0, \qquad S\big(i,j,T - Dur(i,j)\big) \;=\; 0 \tag{6}$$

$\forall i = 1,\dots,6 \quad \forall j = 1,\dots,3$

$$X(i,j,t) \in N, \qquad S(i,j,t) \geq 0 \tag{7}$$

$\forall i = 1,\dots,6 \quad \forall j = 1,\dots,M \quad \forall t = 1,\dots,T$

The objective function endeavors to minimize the weighted sum of patient treatments X(i,j,t) with a weight equal to t*i*Dur(i,j). The weights take into account the period, the different priorities regarding to the patient state i (greens are equal to 1, yellows are equal to 2, and reds go from 3 until 6), and the activity duration. So patients with high priority and high treatment duration are treated on the first periods, i.e. at the earliest. The constraints (2) control the patient flow through the activities in series, by enabling some waiting patients. Constraints (3) allow respecting the resource capabilities. Constraints (4) define the number of patients to be treated for duplicated activities, i.e. activities 4 and 5. Constraints (5) define the number of patients to be treated for non-duplicated activities, i.e. activities 1 to 3. Constraints (6) enable to treat all waiting patients.

Different deadline priorities are assigned to red patients: 3 for red patients with a deadline equal to 18, 4 for red patients with a deadline equal to 16, 5 for red patients with a deadline equal to 14, and 6 for red patients with a deadline equal to 12 (i.e.: N(3)=8, N(4)=8, N(5)=4, N(6)=4).

## 3.4 Patients' Plannings:

Patients' planning are calculated for each activity: Rescue Center, Advanced Medical Post, Medical Transport Center, Emergency departments. Each player will assign patients to teams/rooms by respecting the planning i.e. the number of patients per color for each period.

The previous model has been experimented for a CBRN situation (Chemical/Biological/Radiological/ Nuclear), i.e. each green patient must go to the advanced medical post in order to be decontaminated. We have not represented the MPV, we have replaced it by an ambulance, and i.e. each green patient will go to the emergency department by ambulances. This hypothesis can be easily removed.

As the resource capacities of each activity (Cap(j,t)) are specified per period, a second strike can be modelled such as a bomb in an emergency room or in a MPV by decreasing the number of available exemplars for a given resource.

| Period | i=1 | i=2 | i=3 | i=4 | i=5 | i=6 |
|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 2 | 4 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 4 | 2 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 2 | 4 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 6 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 6 | 0 | 0 | 0 | 0 |
| 10 | 0 | 6 | 0 | 0 | 0 | 0 |
| 11 | 0 | 6 | 0 | 0 | 0 | 0 |
| 12 | 0 | 6 | 0 | 0 | 0 | 0 |
| 13 | 0 | 6 | 0 | 0 | 0 | 0 |
| 14 | 0 | 6 | 0 | 0 | 0 | 0 |
| 15 | 0 | 6 | 0 | 0 | 0 | 0 |
| 16 | 0 | 6 | 0 | 0 | 0 | 0 |
| 17 | 6 | 0 | 0 | 0 | 0 | 0 |
| 18 | 6 | 0 | 0 | 0 | 0 | 0 |
| 19 | 6 | 0 | 0 | 0 | 0 | 0 |
| 20 | 6 | 0 | 0 | 0 | 0 | 0 |
| 21 | 6 | 0 | 0 | 0 | 0 | 0 |
| 22 | 6 | 0 | 0 | 0 | 0 | 0 |
| 23 | 6 | 0 | 0 | 0 | 0 | 0 |
| 24 | 6 | 0 | 0 | 0 | 0 | 0 |
| 25 | 6 | 0 | 0 | 0 | 0 | 0 |
| 26 | 6 | 0 | 0 | 0 | 0 | 0 |
| 27 | 4 | 0 | 0 | 0 | 0 | 0 |
| 28 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31 | 0 | 0 | 0 | 0 | 0 | 0 |
| 32 | 0 | 0 | 0 | 0 | 0 | 0 |
| 33 | 0 | 0 | 0 | 0 | 0 | 0 |
| 34 | 0 | 0 | 0 | 0 | 0 | 0 |
| 35 | 0 | 0 | 0 | 0 | 0 | 0 |
| 36 | 0 | 0 | 0 | 0 | 0 | 0 |
| 38 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sum | 64 | 48 | 8 | 8 | 4 | 4 |

Rescue Center

| Period | i=1 | i=2 | i=3 | i=4 | i=5 | i=6 |
|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 2 | 4 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 4 | 2 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 2 | 4 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 6 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 6 | 0 | 0 | 0 | 0 |
| 12 | 0 | 6 | 0 | 0 | 0 | 0 |
| 13 | 0 | 6 | 0 | 0 | 0 | 0 |
| 14 | 0 | 6 | 0 | 0 | 0 | 0 |
| 15 | 0 | 6 | 0 | 0 | 0 | 0 |
| 16 | 0 | 6 | 0 | 0 | 0 | 0 |
| 17 | 0 | 6 | 0 | 0 | 0 | 0 |
| 18 | 0 | 6 | 0 | 0 | 0 | 0 |
| 19 | 6 | 0 | 0 | 0 | 0 | 0 |
| 20 | 6 | 0 | 0 | 0 | 0 | 0 |
| 21 | 6 | 0 | 0 | 0 | 0 | 0 |
| 22 | 6 | 0 | 0 | 0 | 0 | 0 |
| 23 | 6 | 0 | 0 | 0 | 0 | 0 |
| 24 | 6 | 0 | 0 | 0 | 0 | 0 |
| 25 | 6 | 0 | 0 | 0 | 0 | 0 |
| 26 | 6 | 0 | 0 | 0 | 0 | 0 |
| 27 | 6 | 0 | 0 | 0 | 0 | 0 |
| 28 | 6 | 0 | 0 | 0 | 0 | 0 |
| 29 | 4 | 0 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31 | 0 | 0 | 0 | 0 | 0 | 0 |
| 32 | 0 | 0 | 0 | 0 | 0 | 0 |
| 33 | 0 | 0 | 0 | 0 | 0 | 0 |
| 34 | 0 | 0 | 0 | 0 | 0 | 0 |
| 35 | 0 | 0 | 0 | 0 | 0 | 0 |
| 36 | 0 | 0 | 0 | 0 | 0 | 0 |
| 38 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sum | 64 | 48 | 8 | 8 | 4 | 4 |

Advanced Medical Post

| Period | i=1 | i=2 | i=3 | i=4 | i=5 | i=6 |
|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 2 | 4 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 4 | 2 | 0 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 2 | 4 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 6 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 6 | 0 | 0 | 0 | 0 |
| 14 | 0 | 6 | 0 | 0 | 0 | 0 |
| 15 | 0 | 6 | 0 | 0 | 0 | 0 |
| 16 | 0 | 6 | 0 | 0 | 0 | 0 |
| 17 | 0 | 6 | 0 | 0 | 0 | 0 |
| 18 | 0 | 6 | 0 | 0 | 0 | 0 |
| 19 | 0 | 6 | 0 | 0 | 0 | 0 |
| 20 | 0 | 6 | 0 | 0 | 0 | 0 |
| 21 | 6 | 0 | 0 | 0 | 0 | 0 |
| 22 | 6 | 0 | 0 | 0 | 0 | 0 |
| 23 | 6 | 0 | 0 | 0 | 0 | 0 |
| 24 | 6 | 0 | 0 | 0 | 0 | 0 |
| 25 | 6 | 0 | 0 | 0 | 0 | 0 |
| 26 | 6 | 0 | 0 | 0 | 0 | 0 |
| 27 | 6 | 0 | 0 | 0 | 0 | 0 |
| 28 | 6 | 0 | 0 | 0 | 0 | 0 |
| 29 | 6 | 0 | 0 | 0 | 0 | 0 |
| 30 | 6 | 0 | 0 | 0 | 0 | 0 |
| 31 | 4 | 0 | 0 | 0 | 0 | 0 |
| 32 | 0 | 0 | 0 | 0 | 0 | 0 |
| 33 | 0 | 0 | 0 | 0 | 0 | 0 |
| 34 | 0 | 0 | 0 | 0 | 0 | 0 |
| 35 | 0 | 0 | 0 | 0 | 0 | 0 |
| 36 | 0 | 0 | 0 | 0 | 0 | 0 |
| 38 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sum | 64 | 48 | 8 | 8 | 4 | 4 |

Medical Transport Center

| Period | i=1 | i=2 | i=3 | i=4 | i=5 | i=6 |
|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 0 | 4 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 2 | 4 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 6 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 0 | 6 | 0 | 0 | 0 | 0 |
| 17 | 0 | 6 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 0 | 6 | 0 | 0 | 0 | 0 |
| 20 | 0 | 6 | 0 | 0 | 0 | 0 |
| 21 | 0 | 6 | 0 | 0 | 0 | 0 |
| 22 | 6 | 0 | 0 | 0 | 0 | 0 |
| 23 | 6 | 0 | 0 | 0 | 0 | 0 |
| 24 | 6 | 0 | 0 | 0 | 0 | 0 |
| 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| 26 | 0 | 0 | 0 | 0 | 0 | 0 |
| 27 | 6 | 0 | 0 | 0 | 0 | 0 |
| 28 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31 | 6 | 0 | 0 | 0 | 0 | 0 |
| 32 | 4 | 0 | 0 | 0 | 0 | 0 |
| 33 | 0 | 0 | 0 | 0 | 0 | 0 |
| 34 | 0 | 0 | 0 | 0 | 0 | 0 |
| 35 | 0 | 0 | 0 | 0 | 0 | 0 |
| 36 | 0 | 0 | 0 | 0 | 0 | 0 |
| 38 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sum | 34 | 36 | 2 | 4 | 0 | 4 |

First Emergency Department

| Period | i=1 | i=2 | i=3 | i=4 | i=5 | i=6 |
|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 | 0 | 2 | 0 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 4 | 2 | 0 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 6 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 6 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 6 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 0 | 0 | 0 | 0 | 0 | 0 |
| 25 | 6 | 0 | 0 | 0 | 0 | 0 |
| 26 | 6 | 0 | 0 | 0 | 0 | 0 |
| 27 | 0 | 0 | 0 | 0 | 0 | 0 |
| 28 | 6 | 0 | 0 | 0 | 0 | 0 |
| 29 | 6 | 0 | 0 | 0 | 0 | 0 |
| 30 | 6 | 0 | 0 | 0 | 0 | 0 |
| 31 | 0 | 0 | 0 | 0 | 0 | 0 |
| 32 | 0 | 0 | 0 | 0 | 0 | 0 |
| 33 | 0 | 0 | 0 | 0 | 0 | 0 |
| 34 | 0 | 0 | 0 | 0 | 0 | 0 |
| 35 | 0 | 0 | 0 | 0 | 0 | 0 |
| 36 | 0 | 0 | 0 | 0 | 0 | 0 |
| 38 | 0 | 0 | 0 | 0 | 0 | 0 |
| 39 | 0 | 0 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sum | 30 | 12 | 6 | 4 | 4 | 0 |

Second Emergency Department

# 4. References:

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