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(facility)            (process)    .

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(4)      ,        ,

(5)                  ,      ,

(6)          ,

(7)          ,            ,            (reactor  vessels),


(8)                              ,

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(simulation)

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.(Dennis,  1990)

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| | 195 | 195 | 381 | 92 | 229 | 0 | 10 |
| | 216 | 219 | 280 | 97 | 137 | 0 | 8 |
| | 232 | 198 | 276 | 129 | 149 | 3 | 7 |
| | 227 | 191 | 284 | 130 | 155 | 2 | 11 |
| | 216 | 170 | 296 | 148 | 121 | 1 | 6 |
| | 212 | 168 | 168 | 156 | 207 | 1 | 8 |
| | 204 | 170 | 377 | 103 | 236 | 1 | 9 |
| | **1502** | **1311** | **2289** | **855** | **1234** | **8** | **59** |
| | **54** | **47** | **82** | **30** | **44** | **0.3** | **2** |

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(1999   3  )

|  |  | (%) |  | (%) |
|---|---|---|---|---|
|  | 651 | 22.7 | 425 | 42.1 |
|  | 161 | 5.6 | 76 | 7.5 |
|  | 33 | 1.1 | 13 | 1.3 |
|  | 530 | 1.8 | 193 | 19.1 |
|  | 16 | 0.6 | 0 | 0 |
|  | 127 | 4.4 | 70 | 6.9 |
|  | 38 | 1.3 | 24 | 2.4 |
|  | 174 | 6.1 | 69 | 6.9 |
|  | 115 | 4.0 | 54 | 5.4 |
|  | 53 | 1.8 | 3 | 0.3 |
|  | 60 | 2.1 | 32 | 3.2 |
|  | 92 | 3.2 | 7 | 0.7 |
|  | 56 | 1.9 | 13 | 1.3 |
|  | 38 | 1.3 | 11 | 1.1 |
|  | 19 | 0.6 | 8 | 0.8 |
|  | 4 | 0.1 | 0 | 0 |
|  | 24 | 0.8 | 7 | 0.7 |
|  | 638 | 24.0 | 3 | 0.3 |
|  | 2874 | 100 | 1008 | 100 |

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**2.**

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(parameter)                    .


1)

2) triage

3) triage

4)

5)        order

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                                2000    6    1          2000    6    2        2    0

    23    59                          228

                                                                    , triage

                    , triage

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2000    6    1          6   2          2

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2000    4    21          2000    5   10          20

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1)                              : triage                                          1

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.                                          70%      ,

30%      .

. 70%                    80%

20%                                      ,                        .

30%

90%                          10%                        .

2)　　　　　:　　　　　　　　　　　90%

　　10%　　　　　　　　　　　　　　　　　　　　　．

3)　·　　　　　:　　　　　　　　　　　　·

　　　　　　　　　　　　18

60%　　　　　　40%　　　　　　　·

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　　　　　　60　　　　　　　.
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　3)　　　　　:

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　　　　12　　　　　　360　　　　　6　,　12　,　18

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| | triage | | |
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| O | | | O |

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1)                  triage

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**2.**

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                (T1)     triage                  (T2)

                                 (T3)

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                       (T5)

       .                            (T6),

                 (T7),

     .              (T8)

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                   .                         .

(T9).                            .

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1)                        triage

  (T2)                        (T3)

    triage        3              ,

          .(T2-1)              ,    ,

2                    (T5-1)

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                    (T6)                              (T7)
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3)                                    (T9)         6, 12, 18

                    (    2    ).
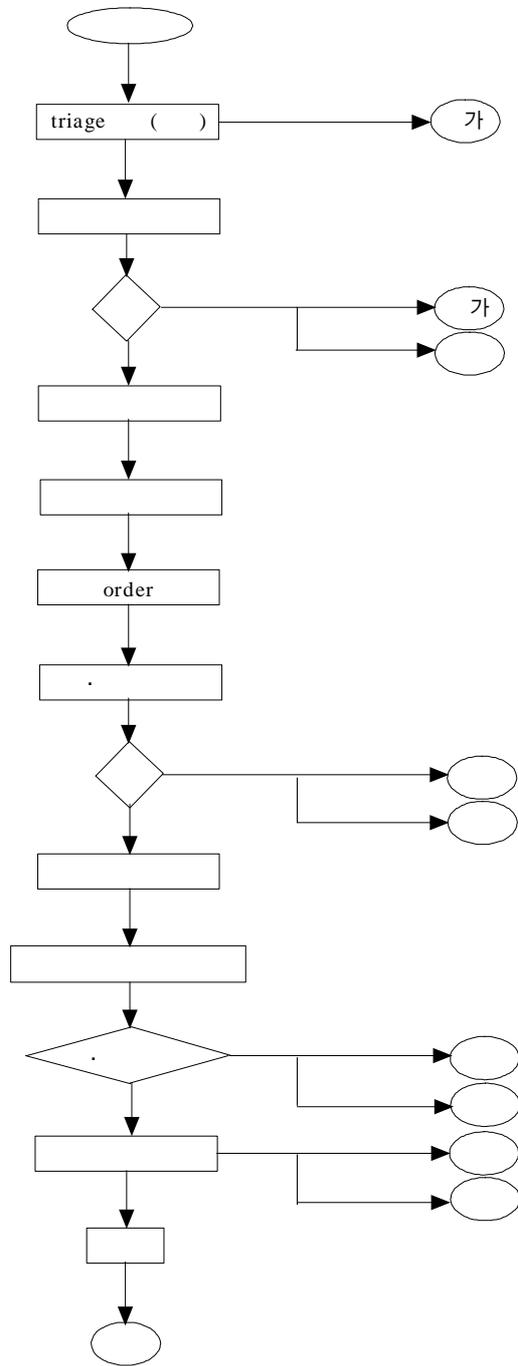
<그림 2> 대안의 시뮬레이션 모형

**3.**

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Arena chi

square test (parameter)

, 12 .

. **(T1)**

5 . chi square

test p-value 0.005 .

5 121 50 41% .

< 4> (N : 121)

| ( ) | | | |
|---|---|---|---|
| t 5 | 50 | 0.413 | 0.413 |
| 5<t 10 | 31 | 0.256 | 0.670 |
| 10<t 15 | 17 | 0.140 | 0.810 |
| 15<t 20 | 8 | 0.066 | 0.876 |
| 20<t 25 | 3 | 0.025 | 0.900 |
| 25<t 30 | 4 | 0.033 | 0.933 |
| 30<t 35 | 2 | 0.017 | 0.950 |
| 35<t 40 | 3 | 0.025 | 0.975 |
| t>40 | 3 | 0.025 | 1.000 |

응급환자의 응급실 도착시간 간격
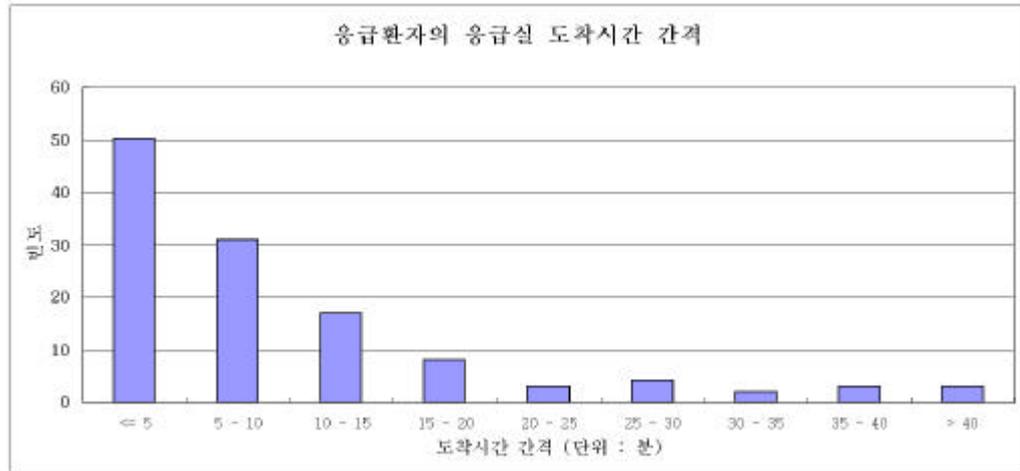
&lt;         3&gt;

. triage                                                         (T2)

    triage                                    1                               ,  chi  square
test                             P- value    0.661         .

                            5                      151           103        68%
        .  10                            16        11%        .

| ( ) | | | |
|---|---|---|---|
| 1 | 13 | 0.080 | 0.080 |
| 2 | 18 | 0.111 | 0.191 |
| 3 | 26 | 0.160 | 0.351 |
| 4 | 31 | 0.191 | 0.543 |
| 5 | 15 | 0.093 | 0.635 |
| 6 | 18 | 0.111 | 0.746 |
| 7 | 10 | 0.062 | 0.809 |
| 8 | 8 | 0.049 | 0.858 |
| 9 | 5 | 0.037 | 0.895 |
| 10 | 1 | 0.006 | 0.901 |
| 11 | 3 | 0.019 | 0.920 |
| 12 | 3 | 0.019 | 0.938 |
| 13 | 4 | 0.025 | 0.963 |
| 14 | 2 | 0.012 | 0.975 |
| 15 | 4 | 0.024 | 1.000 |



인턴 초진 진찰시간
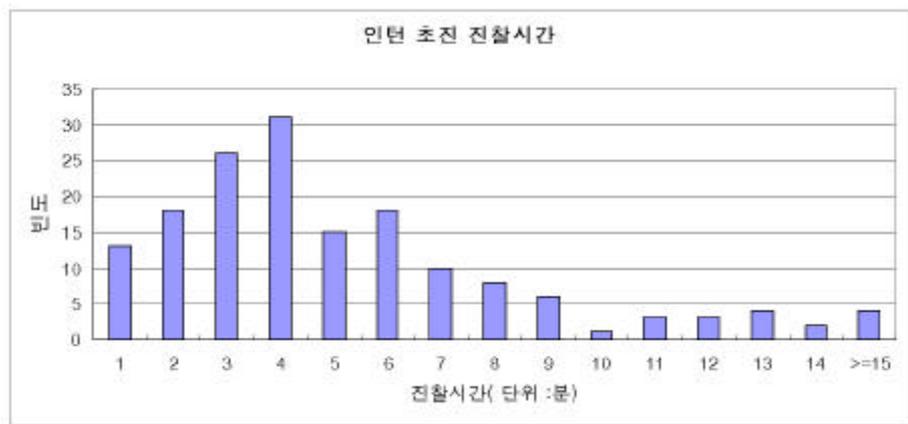
&lt;          4&gt;

**. triage**        **(T3)**

triage      1

, chi square test       p-value   0.085    .

      2      147      129    88%    .

<   6>                         (N : 147)

| ( ) | | | |
|---|---|---|---|
| **1** | 78 | 0.530 | 0.530 |
| **2** | 51 | 0.347 | 0.878 |
| **3** | 6 | 0.040 | 0.918 |
| **4** | 4 | 0.027 | 0.946 |
| **5** | 5 | 0.034 | 0.980 |
| **6** | 2 | 0.014 | 0.993 |
| **7** | 0 | 0 | 0.993 |
| **8** | 0 | 0 | 0.993 |
| **9** | 0 | 0 | 0.993 |
| **10** | 1 | 0.007 | 1.000 |
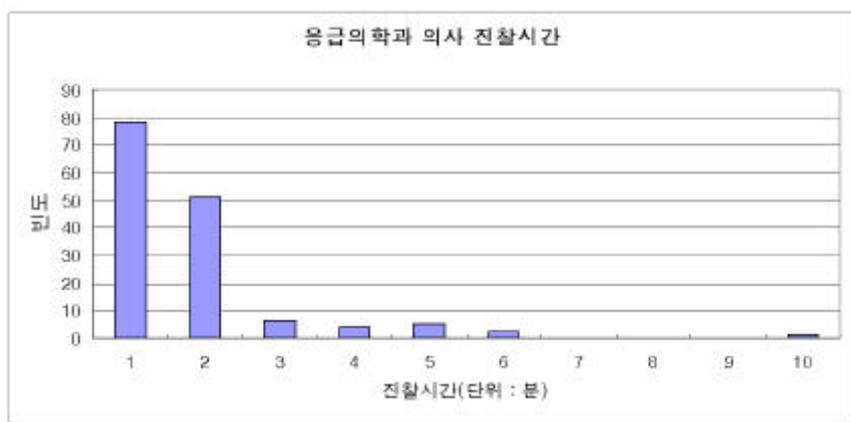


<      5>

**.**                    **(T4)**

1                 , chi square test

p-value 0.027     .

3             151       91     60%

,       5            134    89%    .

< 7>                             (N : 151)

| ( ) | | | |
|---|---|---|---|
| 1 | 15 | 0.099 | 0.099 |
| 2 | 44 | 0.291 | 0.390 |
| 3 | 32 | 0.212 | 0.602 |
| 4 | 21 | 0.139 | 0.741 |
| 5 | 22 | 0.146 | 0.887 |
| 6 | 5 | 0.033 | 0.920 |
| 7 | 7 | 0.046 | 0.967 |
| 8 | 1 | 0.007 | 0.974 |
| 9 | 3 | 0.020 | 0.993 |
| 10 | 1 | 0.007 | 1.000 |

원무과 수속시간
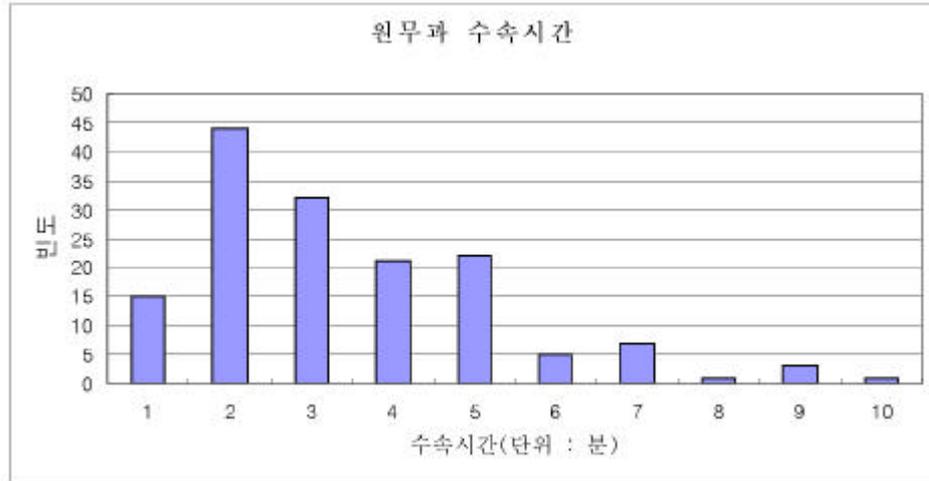
< 그림 6>

**. order                         (T5)**

order                    1                         , chi square test

p-value    0.154        .

order                  4   8      151              88          58%

,                      20                      10      6.6%      .

&lt; 8&gt;     order                                (N : 151)

| order | ( ) | | | |
|---|---|---|---|---|
| 1 | 3 | 0.020 | 0.020 |
| 2 | 3 | 0.020 | 0.040 |
| 3 | 6 | 0.40 | 0.080 |
| 4 | 20 | 0.136 | 0.218 |
| 5 | 23 | 0.156 | 0.374 |
| 6 | 9 | 0.061 | 0.435 |
| 7 | 21 | 0.143 | 0.578 |
| 8 | 15 | 0.102 | 0,680 |
| 9 | 4 | 0.027 | 0.707 |
| 10 | 8 | 0.054 | 0.762 |
| 11 | 2 | 0.014 | 0.776 |
| 12 | 5 | 0.034 | 0.810 |
| 13 | 7 | 0.048 | 0.857 |
| 14 | 1 | 0.007 | 0.864 |
| 15 | 5 | 0.034 | 0.898 |
| 17 | 1 | 0.007 | 0.904 |
| 18 | 1 | 0.007 | 0.911 |
| 20 | 3 | 0.020 | 0.932 |
| 21 | 1 | 0.007 | 0.939 |
| 23 | 3 | 0.020 | 0.960 |
| 28 | 2 | 0.014 | 0.972 |
| 30 | 4 | 0.027 | 1.000 |



&lt;      7&gt;        order

．                                                        **(T6)**
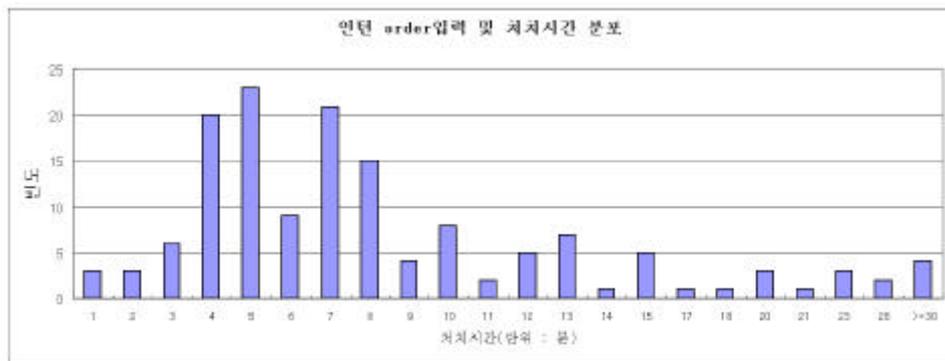
5                                        , chi square

test                            p-value    0.063          .

20              133              56

42%              , 30            81        60%        ．

30            ．


< 　9>                                                  (N  :  133)

| ( ) | | | |
|---|---|---|---|
| **5** | 19 | 0.143 | 0.143 |
| **10** | 12 | 0.090 | 0.233 |
| **15** | 12 | 0.090 | 0.323 |
| **20** | 13 | 0.097 | 0.421 |
| **25** | 15 | 0.112 | 0.534 |
| **30** | 10 | 0.075 | 0.609 |
| **35** | 13 | 0.098 | 0.707 |
| **40** | 8 | 0.060 | 0.767 |
| **45** | 5 | 0.038 | 0.805 |
| **50** | 7 | 0.053 | 0.857 |
| **55** | 4 | 0.030 | 0.887 |
| **60** | 3 | 0.023 | 0.909 |
| **60** | 12 | 0.090 | 1.000 |

직원이 검사물을 이동하는 시간

이동시간(단위 : 분)
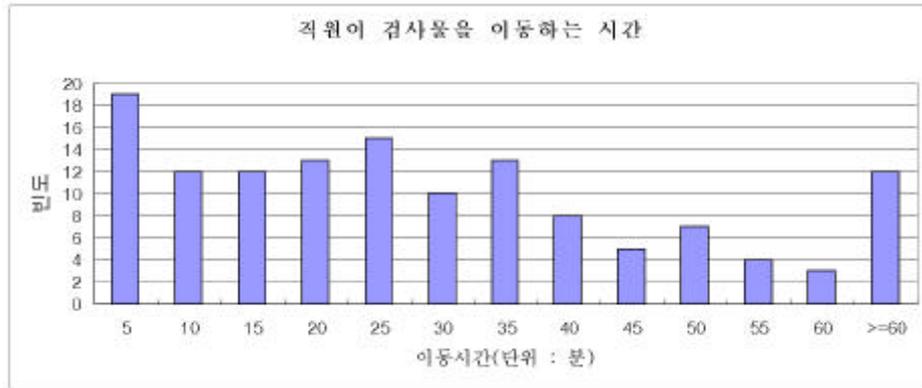
< 8>

. (T7)

5 , chi square test

p-value 0.005 .

10 123 6

5% , 30 84 68% .

| ( ) | | | |
|---|---|---|---|
| **5** | 1 | 0.008 | 0.008 |
| **10** | 5 | 0.041 | 0.049 |
| **15** | 13 | 0.106 | 0.154 |
| **20** | 8 | 0.065 | 0.220 |
| **25** | 25 | 0.203 | 0.423 |
| **30** | 32 | 0.260 | 0.683 |
| **35** | 11 | 0.089 | 0.772 |
| **40** | 6 | 0.049 | 0.821 |
| **45** | 3 | 0.024 | 0.846 |
| **50** | 5 | 0.040 | 0.886 |
| **55** | 2 | 0.016 | 0.902 |
| **60** | 4 | 0.033 | 0.935 |
| **>60** | 8 | 0.065 | 1.000 |



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(T8)
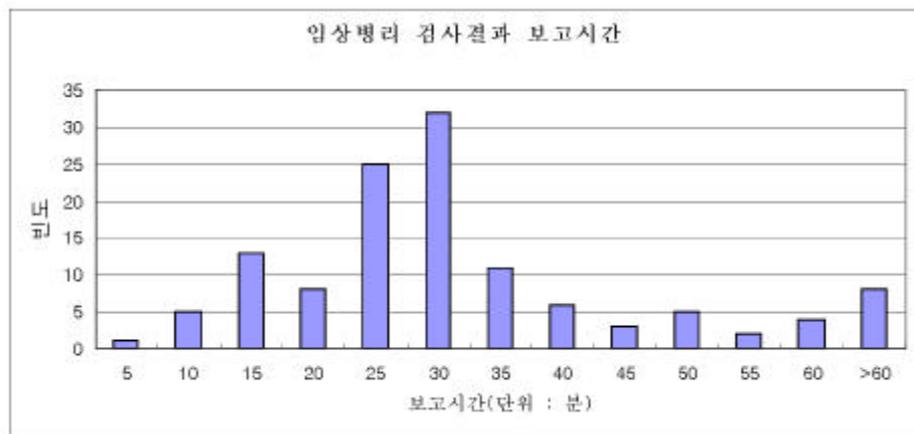
5 , chi square test

p-value 0.005 .

<    11>                                                                (N : 143)

| | | | |
|---|---|---|---|
| 5 | 21 | 0.147 | 0.147 |
| 10 | 7 | 0.049 | 0.196 |
| 15 | 7 | 0.049 | 0.245 |
| 20 | 10 | 0.070 | 0.315 |
| 25 | 7 | 0.049 | 0.364 |
| 30 | 9 | 0.063 | 0.427 |
| 35 | 3 | 0.020 | 0.448 |
| 40 | 2 | 0.013 | 0.462 |
| 45 | 4 | 0.028 | 0.490 |
| 50 | 5 | 0.034 | 0.524 |
| 55 | 3 | 0.021 | 0.545 |
| 60 | 3 | 0.021 | 0.566 |
| $1.0 < t \leq 1.5$ | 14 | 0.098 | 0.664 |
| $1.5 < t \leq 2.0$ | 8 | 0.056 | 0.727 |
| $2.0 < t \leq 2.5$ | 5 | 0.035 | 0.755 |
| $2.5 < t \leq 3.0$ | 6 | 0.042 | 0.797 |
| $3.0 < t \leq 3.5$ | 3 | 0.020 | 0.818 |
| $3.5 < t \leq 4.0$ | 2 | 0.014 | 0.832 |
| $4.0 < t \leq 6.0$ | 7 | 0.049 | 0.881 |
| $6.0 < t \leq 10$ | 4 | 0.028 | 0.909 |
| $10 < t \leq 20$ | 6 | 0.042 | 0.951 |
| $t > 20$ | 7 | 0.049 | 1.000 |

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.                                                                                                    **(T9)**

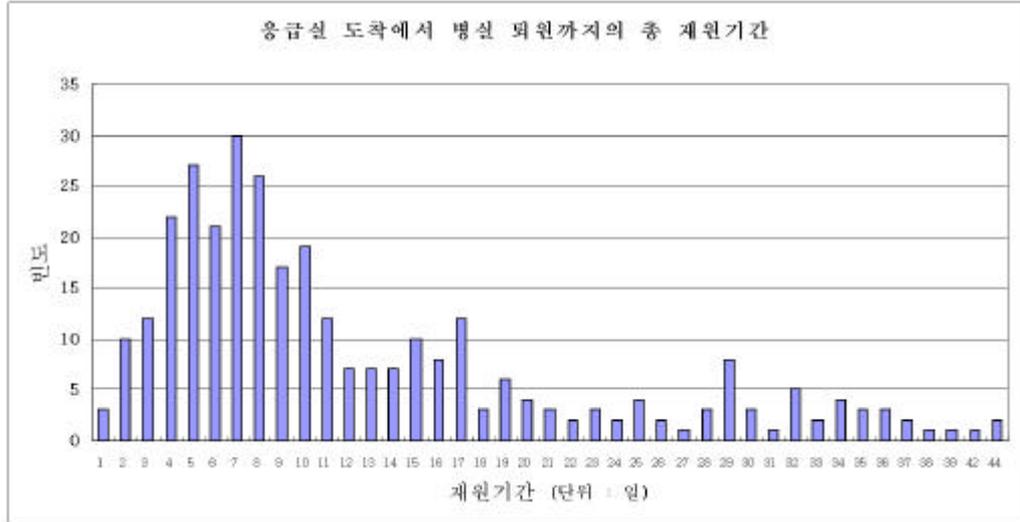                                                                                      1

          , chi square test                                          p-value      0.005

.                                                                                                    12

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응급실 도착에서 병실 퇴원까지의 총 재원기간

세로축: 빈도
가로축: 재원기간 (단위 : 일)
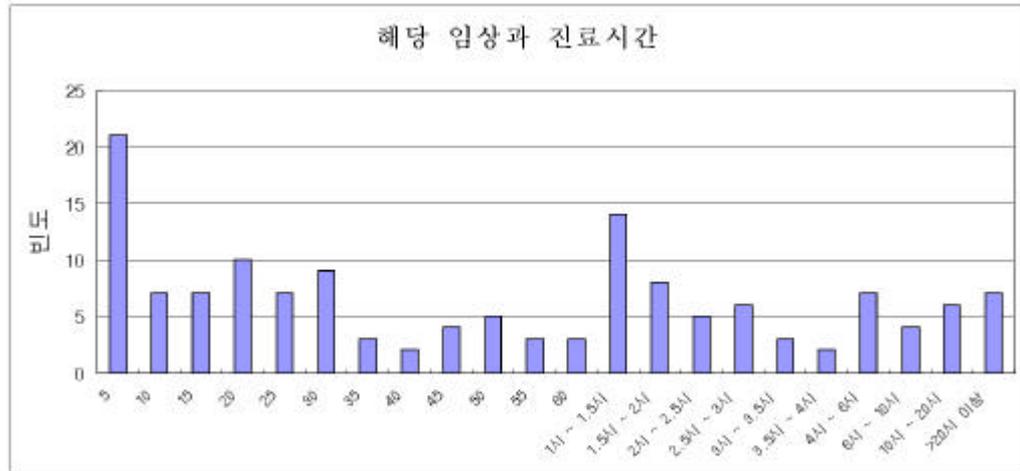
&lt;     11&gt;

< 　　12>

|  |  |  | **p-value** |
|---|---|---|---|
| **(T1)** | LOG Normal | -0.5 + LOGN<br>(LogMean:16.1, LogSTD:25.3) | <0.005 |
| **(T2)** | Gamma | GMMA<br>(Beta:3.36, Alpha:1.82) | 0.661* |
| **(T3)** | Exponential | EXPO<br>(Mean:2.04) | 0.085* |
| **(T4)** | Erlang | 0.5 + ERLA<br>(ExpMean:0.644, k(int):3) | 0.027 |
| **orderd**<br>**(T5)** | NOG Normal | 0.5 + LORN<br>(LogMean:27.6, LogSTD:11.8) | 0.154* |
| **(T6)** | Normal | NORM<br>(Mean:27.6, STD dev:13.4) | 0.063* |
| **(T7)** | Beta | 13 + 169 * Beta<br>(Beta:0.354, Alpha:1.23) | <0.005 |
| **(T8)** | Weibull | 0.999 + WEIB<br>(Beta:230, Alpha:0.568) | <0.005 |
| **(T9)** | Weibull | WEIB<br>(Beta:1.75e+004, Alpha:1.17) | <0.005 |

) *p-value>0.05

**4.**

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1) -

- 17.5 5.8

67% , 19.6 2.1

12% . + 17.5 0.9

95% .

360 366 6

17.5 9.2 47% , 372

12 3.0 83%, 378 18

91% .

.

+ 95% , + 92%

+ .

+ + 360 366 6

17.5 2.0 15.5 89%

, 372 12 378 18

17.4 99% .

2)　　　　　　-

　　　　　　　　-　　　　　　　27.5　　　　　　　　　　13.2

14.3　　　　52%　　　　　　,　　+　　21.3　　　　　　77%

　　　　　.

　　　　　　　　　　　　　360　　　366　　　6

　　　　27.5　　　19.1　　8.4　　　30%

.　372　　　12　　　　　　15　　　54%

, 378　　　18　　　　　16.2　　　59%

　　.

　　　　　　　　　　+

　　　　6　　　　　　71%,  12

66%,  18　　　　　72%　　　.　　+

　　　　6　　　　　27%,  12

69%,  18　　　　68%　　　.

+  +　　75  81%

　　　　　　　　.

3)　　　-

　　　　9.9　　7.4　　7.3　　2.5　　2.6

25%, 26%　　30%　　.　+　　9.9

5.3　　4.6　　47%　　.　‘

‘　　　　　　　,

.

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360

352                                   98%            .

366                 6                          372                12

97%             ,  378                18

92%                         .

+                            366                  93%,  372

92%,  378                  90%              .

+                            366                  98%,  372

94%,  378                  92%                +

.

+    +                                366                      93%,  372

89%,  378                  90%                          .

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,  triage                 3                                  triage

,                       ,      ,

2

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&lt;   13&gt;                                                            (     :     )

|  |  | (    %) | (   %) | | | - |
|---|---|---|---|---|---|---|
|  |  | (   %) | - | - | - | (   %) |
|  | 360 | 352 (98) | 17.5 | 27.5 | 9.9 | 12.4 |
|  | 360 | 347 (96) | 5.8* (67) | 13.2 (52) | 7.4 (25) | 11.9 (4) |
|  | 360 | 356 (99) | 19.6 (+12) | 26.9 (2) | 7.3* (26) | 12.5 (+1) |
| + | 360 | 337 (94) | 0.9* (95) | 6.2 (77) | 5.3 (47) | 11.7 (6) |
|  | 366 | 354 (97) | 9.2 (47) | 19.1 (30) | 9.7 (3) | 12.1 (2) |
|  | 372 | 360* (97) | 3.0* (83) | 12.7 (54) | 9.7 (3) | 12.0 (3) |
|  | 378 | 346 (92) | 1.6* (91) | 11.3 (59) | 9.5 (4) | 11.8 (5) |
|  | 366 | 341 (93) | 0.7 (96) | 8.1 (71) | 7.3 (26) | 11.8 (5) |
| + | 372 | 342 (92) | 1.7 (90) | 9.4 (66) | 7.5 (24) | 11.8 (5) |
|  | 378 | 342 (90) | 0.2 (99) | 7.6 (72) | 7.3 (26) | 11.7 (5) |
|  | 366 | 358 (98) | 13.0 (26) | 20.1 (27) | 7.2 (27) | 12.3 (1) |
| + | 372 | 349 (94) | 1.3 (92) | 8.6 (69) | 7.2 (27) | 11.7 (5) |
|  | 378 | 349 (92) | 1.4 (92) | 8.7 (68) | 7.3 (26) | 11.7 (5) |
|  | 366 | 339 (93) | 2.0 (89) | 7.2 (74) | 5.3 (47) | 11.7 (5) |
| + + | 372 | 332 (89) | 0.1 (99) | 5.3 (81) | 5.3 (47) | 11.5 (7) |
|  | 378 | 342 (90) | 0.1 (99) | 5.4 (81) | 5.3 (46) | 11.6 (7) |

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5%                                24                    6.5     ,  10%                                    381.3

        364.1      ,  15%                            823.3                805.8

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616.7            599.1      ,  15%                                    1048.3                1030.8

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                              366                          22.3              4.8

          ,                   372                          10.3              7.2      ,

378                    2.8            14.7                              .  10%

                  366                          328.3            310.8               ,

372                    144.3            126.8                      ,              378

          76.2          58.7                                    .              15%

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| | 366 | 22.3 | 30.0 | 7.8 |
| | 372 | 10.3 | 18.0 | 7.6 |
| | 378 | 2.8 | 10.6 | 7.9 |
| 10 | 360 | 381.7 | 390.2 | 8.6 |
| | 366 | 328.3 | 337.1 | 8.9 |
| | 372 | 144.3 | 153.1 | 8.8 |
| | 378 | 76.2 | 85.4 | 9.3 |
| 15 | 360 | 823.3 | 834.2 | 11.0 |
| | 366 | 695.0 | 705.4 | 10.4 |
| | 372 | 596.7 | 608.1 | 11.4 |
| | 378 | 331.7 | 341.6 | 9.9 |
| 0 | 360 | 19.6 | 26.9 | 7.3 |
| 5 | 360 | 25.7 | 33.0 | 7.3 |
| | 366 | 132.8 | 140.0 | 7.3 |
| | 372 | 29.3 | 36.6 | 7.3 |
| | 378 | 47.8 | 54.9 | 7.3 |
| 10 | 360 | 616.7 | 624.1 | 7.4 |
| | 366 | 626.7 | 634.2 | 7.6 |
| | 372 | 460.0 | 467.2 | 7.2 |
| | 378 | 388.3 | 395.6 | 7.3 |
| 15 | 360 | 1048.3 | 1055.8 | 7.4 |
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AMERICAN  COLLEGE  of emergency  physicians Dallas, Texas, Hospital
and  Emergency  Department  Overcrowding,  Ann  Emer  Med
1990;17:95-96

Barton  RF.  A  primer  on  simulation  and  gaming.  Prentice-Hall  NJ
1970;35-38

Dennis  CP,  Robert  ES,  Randall  PS.  Introduction  to  Simulation  Using
SIMAN.  McGraw-Hill,  Inc,  1990;120-129

Kellerman A. The national association of public hospitals, New York, proceeding ACEP conference overcrowding, Oct. 13. 1989

Mark MH. ED overcrowding spurs interest in quality and credentialing issues. Hospital 1991;20:33-36

Stephan GL, Arthur LK. Critical decision making. managing the emergency department in an overcrowded hospital. Ann Emer Med March 1991;20:287-292

Terry T, Robert S. The team approach to emergency department overcrowding. J Emer Nurs 1994;20:405-6

# =ABSTRACT=

## A simulation of alternative policies for reducing waiting time at the emergency room

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(Directed by Professor Seung Hum Yu, M.D, Ph D.)

The purpose of this thesis was to analyze the effects of alternative policies on waiting time consists at the emergency room(ER) system using a simulation.

The results from the three alternatives were as follows:

Alternative I. This classified ER into three areas - medical, surgical, and other area. Patients who have arrived at the ER were examined at the triage area by nurses with experiences of 3 years or more and were assigned to one of the three areas depending on these clinical condition. In the medical area, a second-year resident of department of internal medicine and a full-time intern of ER provided medical care to patients;

in the surgical area, a second-year resident of department of general surgery and an intern of ER; and in the other area, a second-year resident of department of emergency medicine and an intern of ER. If there were too many patients in the medical or surgical area, the emergency physician could help them. This alternative could reduce by 67% of the waiting time from the decision of admission to the transfer to ward, but reduced by only 25% of the waiting time from the arrival to the discharge at the ER.

Alternative II. This alternative deals with an operation of laboratory of clinical pathology for the ER only. In this case, waiting time was reduced by 26% from the arrival at the ER to leaving the hospital; and 2% from the arrival at the ER to the transfer to ward. However, the waiting time from the decision for admission to actual transfer to ward was increased by 12%. Therefore, operating a laboratory of clinical pathology within the ER provided a minor improvement in the patient flow, but had a bottle neck between the decision for admission and the actual admission because of lack of doctors.

Alternative III. This alternative deals with an increase of beds by 6, 12, 18 from 360 beds. The results of simulation showed that the waiting time were reduced by 83% from the decision for admission to transfer to ward; 54% from the arrived time at the ER to transfer to ward. Average occupancy rate in hospital-bed was 97%.

From the above results, the followings were recommended:

First, emergency patient should be assigned to nurses in the triage

area, and second-year residents of department of internal medicine, general surgery or emergency medicine on duty should provide primary medical service in order to reduce the patient's waiting time from the arrival to the decision for admission. Also, it is important to reduce the number of steps from admission to discharge.

Second, the alternative of operating laboratory of clinical pathology reduced the waiting time of the patients discharged from the ER, it may not be a practical alternative the limited space of the ER and the shortage of manpower.

Third, in case of admitting patients from the ER to general wards, increase the number of hospital beds by twelve seems to be the best alternative.

In this study, parameter of the simulation model were not adequately estimated because of sample data set. Nevertheless, this study is very significant in that three alternatives were evaluated by a quantitative model in an effort to reduce waiting time at the ER for the first time in Korea.

It is expected that the models developed in this study can be generalized and utilized in developing a more comprehensive decision support system for improving management at ER.