

# The Distribution of Recommended Care Level Classification by Time of Day within the Emergency Communication Nurse System

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## ABSTRACT

**Introduction:** Research has shown that two-thirds of emergency visits occur after business hours (weekdays 9am - 5pm). Therefore, identifying primary healthcare providers available after business hours is one strategy for improving appropriate access to healthcare services. Previous studies have also shown a high and steady volume of secondary triage-eligible calls throughout the day and into the evening. However, because the Emergency Communication Nurse (ECN) performing the secondary triage has some discretion on selecting the Recommended Care Level (RCL) based on resource availability, the type and frequency of RCLs may differ by time-of-day.

**Objective:** To determine the type and frequency of each RCLs by time-of-day.

**Methodology:** This was a descriptive retrospective study involving two 9-1-1 communication centers in the United States of America (USA). The primary endpoint was the type and frequency of the used RCLs, categorized by time-of-day.

**Results:** A total of 7,231 calls were studied. The most frequently used RCLs were *Emergency Care as soon as possible* (62.4%), *Seek medical care within 1-4 hours* (12.0%), and *See doctor in the next 12 hours* (7.0%). During the early morning (i.e., 6 - 8am) and early evening (i.e., 5 - 8pm) the percentages of calls referred to the emergency department (ED) increased.

**Conclusion:** *Emergency care as soon as possible* was the most frequently encountered RCL. A definite trend in the increase of ED referrals both before and after traditional business hours and a clear decline in the number of referrals to Urgent and Primary care RCL levels during the same timeframe were very apparent. Further research should evaluate the correlation between these trends and unavailability of alternative transport, or other resources, during these hours.

## INTRODUCTION

In the United States, the 9-1-1 system acts as the gateway to emergency medical services (EMS), including ambulance response and treatment by on-scene EMS crews as well as transport and delivery to the hospital emergency departments. This model, while effective in providing patients with ready access to emergency care resources when available, has been at times a burden to high-demand urban EMS and overcrowded hospital emergency departments (EDs).<sup>1-4</sup> As health care costs rise and emergency medical resources continue to be stretched further, governments, EMS officials, and healthcare administrators continue to search for alternative, more cost-effective solutions to appropriately manage access to emergency care resources.<sup>5</sup>

Current statutes and regulations provide states with options for developing payment methodologies intended to encourage providers to direct patients to more appropriate care settings, or implementing cost-sharing for beneficiaries based on a distinction between non-emergency and emergency use of the emergency department.<sup>6</sup> These provisions, however, can be challenging to implement in light of the difficulty in distinguishing upfront what is and is not an emergency. In order to implement these options it is necessary to distinguish between emergency and non-emergency calls.

In this study distinguishing emergency cases from non-emergency cases early-on involves a primary triage process completed by an Emergency Medical Dispatcher (EMD) in the 9-1-1 center, using a protocol-based-system: the Medical Priority Dispatch System<sup>®</sup>

(MPDS). This is followed by a secondary triage process, using a specially trained caregiver (e.g., a registered nurse or higher level of clinical knowledge) to receive transferred low-acuity 9-1-1 cases from the EMD. This Emergency Communication Nurse (ECN) triages each eligible low-acuity call according to the patient's chief complaint using medical decision support software known as LowCode™ – which automates the Emergency Communication Nurse System™ (ECNS) Protocols. Through a structured caller interrogation process, the ECN determines the level-of-care most appropriate to that individual patient. This Recommended Care Level (RCL) provides a final triage determination that allows the ECN to match the patient's condition with his or her treatment need, urgency in receiving the treatment and provider type. Many of these low-acuity patients can be safely referred to non-emergency healthcare resources to help decrease the overcrowding of the hospital ED.<sup>7</sup>

Correct Chief Complaint protocol selection is vital to the use of the system, as different protocols prompt the ECN to ask different questions about the patient's symptoms. Protocols can be classified as either medical or trauma related. Medical protocols cover illness-related symptoms and conditions—for example, chest pain, abdominal pain, wheezing, back pain, fever, and many more. Trauma-related protocols deal with physical injury—for example, protocols covering chest injury, abdominal injury, ankle injury, falls, and many more.

ECNS is a secondary triage system used in emergency call centers. Therefore, it is critical that ECNs do not overlook symptoms that could indicate (despite initial coding of the call as low acuity) the presence of an emergency. The protocols will prompt the user to explore the presence of potentially life-threatening conditions and exclude these early on in the triage process, offering the ability to seamlessly send the call back to the EMD if an EMS crew needs to be dispatched.

A concurrent study showed a high and steady volume of ECNS-eligible calls throughout the day and into the evening.<sup>8</sup> However, the distribution of RCLs by time-of-day has not been studied.

Given that two-thirds of emergency visits occur after traditional weekday business hours (9am - 5pm), identifying primary care sites available after business hours is one strategy for improving appropriate access to healthcare services.<sup>9</sup> The private sector estimates potentially \$4.4 billion in savings nationwide (in the USA) by increasing urgent-care and retail-clinic access for patients with nonemergency conditions.<sup>10</sup>

We hypothesize that the RCL distribution will demonstrate a trend of increasing acuity of calls/cases later in the evening and throughout the night and early morning as alternative healthcare resources other than the ED will be unavailable.

## OBJECTIVE

The objective of this study was to determine the type and frequency of each RCL by time-of-day.

## METHODS

### Study design and setting

This was a descriptive, non-randomized, non-controlled retrospective study involving two 9-1-1 communication centers in the United States of America: Louisville Metro EMS (LMEMS), Louisville, Kentucky (KY), and MedStar, Fort Worth, Texas (TX). LMEMS served a population of 755,000 while MedStar served a population of 919,000. The annual 9-1-1 call volume was 104,000 and 113,000 respectively. Both centers served a mix of urban-suburban population. Both agencies were accredited by the International Academies of Emergency Dispatch™ (IAED) as Accredited Centers of Excellence (ACE). Accredited centers have proved (via rigorous audit practice) consistent high levels of compliance to protocol, thereby ensuring accurate triage dispositions being reached when selecting low-acuity eligible codes to be transferred to the ECN.

It is important to note that the agencies' hours of operation during the study period differed. MedStar operated from 9am to 5pm, Monday through Friday. However, LMEMS operated from 8am to 8pm, Monday through Friday, and from 8am to 4pm on Saturdays. Some flexibility in the hours of operation existed at both centers.

### Study population

The study population included a convenience sample, collected from the inception of the ECN program in each center until the start of the study. Only the data collected between April 19, 2010 and January 8, 2014 at LMEMS, and between May 22, 2012 and October 20, 2014 at MedStar, were included in the study.

### Outcome measures

The primary endpoint in this study was the type and frequency of the used RCLs, categorized by time-of-day.

### RCLs acuity levels

Table 1 illustrates the RCLs sorted by acuity (from highest to lowest level), and their abbreviations. For comparison purposes, the RCLs are represented in subsequent tables by time-of-day for each agency, and for the agencies combined.

### Data Analysis

STATA for Windows® software (STATA Statistical Software: Release 13.0 ©2013, StataCorp, College Station, TX, USA) was used for data analysis. Descriptive statistics such as frequencies and percentages were used to profile the distributions of RCLs by time-of-day for each agency and overall.

## RESULTS

A total of 7,231 calls (6,028 for LMEMS, and 1,203 for MedStar) were included in the study. (Table 2) Out of 22 possible RCLs, the most frequently used RCLs were *Emergency Care as soon as possible* (62.4%), *Seek medical care within*

1-4 hours (12.0%), and See doctor in the next 12 hours (7.0%). High-acuity calls that needed a 9-1-1 response only made up 3.8% of the RCLs used. The percentage of calls that fall into the Others category was very low (>0.5%), indicating that most of the symptoms addressed in the ECNS-calls are covered by the existing RCLs.

Additionally, during the early hours of 6am-8am and early evening hours of 5pm-8pm, the percentages of calls being referred to the ED increased relative to other RCLs (Fig. 1). Since the numbers before 7am and after 7pm were very low, the figures (Fig. 1, Fig. 2, and Fig. 3) only cover those RCLs documented from 7am to 7pm.

In LMEMS, the recommendation for *Emergency Care as soon as possible* was made in 65.8% of all cases (Table 3). This RCL is the most frequently used RCL in LMEMS, followed by *Seek medical care within 1-4 hours* (11.5%). LMEMS used RCL *Emergency response (911)* in 4.2% of the calls. Figure 2 is an illustrated summary of emergent and urgent RCLs distribution by time of day.

Again, the *Emergency care as soon as possible* was the most frequently used RCL in MedStar (45.3%) (Table 4). This RCL was followed by *See doctor in the next 12 hours* (18.9%) and the *Seek medical care within 1-4 hours* RCL (14.6%). *Emergency response (911)* was used by MedStar in 1.6% of the calls. The percentage of calls that fell into the *Others* category was very low for both agencies (>0.5%), indicating that most of the symptoms addressed in the ECNS calls are covered by the existing RCLs. A summary of emergent and urgent RCLs distribution by time of day is illustrated in Figure 3.

| Recommended Care Level             | Abbreviation        | Acuity |
|------------------------------------|---------------------|--------|
| Emergency response (911)           | 911 Response        | High   |
| Emergency care as soon as possible | ED ASAP             |        |
| Seek medical care within 1-4 hours | Med care 1-4 hrs    |        |
| Consult doctor to review symptoms  | MD to review Sx     |        |
| Consult regional Poison Control    | Poison Control      |        |
| See doctor in the next 12 hours    | MD within 12 hrs    |        |
| See doctor in the next 1-3 days    | MD within 1-3 days  |        |
| Routine appointment with doctor    | MD Routine          |        |
| Routine appointment with dentist   | Dentist             |        |
| Self-care/Home-care                | Self-care           |        |
| Others                             | Others <sup>†</sup> |        |

<sup>†</sup>Includes all other RCLs such as community crisis line, police, obstetrician/gynecologist, specialist nurse, and social services.

**Table 1.** Recommended Care Levels acuity categories

| Time (hour) | N     | n (%)        |              |                  |                 |                |                  |                    |            |           |           |                     |
|-------------|-------|--------------|--------------|------------------|-----------------|----------------|------------------|--------------------|------------|-----------|-----------|---------------------|
|             |       | 911 response | ED ASAP      | Med care 1-4 hrs | MD to review Sx | Poison Control | MD within 12 hrs | MD within 1-3 days | MD Routine | Dentist   | Self-care | Others <sup>†</sup> |
| 6           | 6     | 0            | 5 (83.3)     | 0                | 0               | 0              | 1 (16.7)         | 0                  | 0          | 0         | 0         | 0                   |
| 7           | 35    | 0            | 29 (82.9)    | 3 (8.6)          | 0               | 0              | 2 (5.7)          | 1 (2.9)            | 0          | 0         | 0         | 0                   |
| 8           | 326   | 12 (3.7)     | 231 (70.9)   | 26 (7.98)        | 7 (2.2)         | 0              | 19 (5.8)         | 2 (0.61)           | 9 (2.8)    | 0         | 18 (5.5)  | 2 (0.61)            |
| 9           | 787   | 32 (4.1)     | 440 (55.9)   | 113 (14.4)       | 16 (2.0)        | 1 (0.13)       | 61 (7.8)         | 38 (4.8)           | 41 (5.2)   | 5 (0.64)  | 36 (4.6)  | 4 (0.51)            |
| 10          | 878   | 35 (4.0)     | 534 (60.8)   | 98 (11.2)        | 19 (2.2)        | 0              | 71 (8.1)         | 42 (4.8)           | 32 (3.6)   | 2 (0.23)  | 43 (4.9)  | 2 (0.23)            |
| 11          | 912   | 29 (3.2)     | 559 (61.3)   | 115 (12.6)       | 22 (2.4)        | 0              | 66 (7.2)         | 42 (4.6)           | 31 (3.4)   | 1 (0.11)  | 45 (4.9)  | 2 (0.22)            |
| 12          | 873   | 41 (4.7)     | 564 (64.6)   | 83 (9.5)         | 23 (2.6)        | 0              | 63 (7.2)         | 44 (5.0)           | 27 (3.1)   | 1 (0.11)  | 26 (3.0)  | 1 (0.11)            |
| 13          | 942   | 43 (4.6)     | 595 (63.2)   | 99 (10.5)        | 22 (2.3)        | 1 (0.11)       | 65 (6.9)         | 31 (3.3)           | 26 (2.8)   | 0         | 56 (5.9)  | 4 (0.42)            |
| 14          | 758   | 37 (4.9)     | 483 (63.7)   | 94 (12.4)        | 16 (2.1)        | 0              | 49 (6.5)         | 15 (2.0)           | 24 (3.2)   | 2 (0.26)  | 34 (4.5)  | 4 (0.53)            |
| 15          | 702   | 24 (3.4)     | 406 (57.8)   | 102 (14.5)       | 15 (2.1)        | 1 (0.14)       | 52 (7.4)         | 25 (3.6)           | 27 (3.9)   | 2 (0.28)  | 47 (6.7)  | 1 (0.14)            |
| 16          | 532   | 13 (2.4)     | 320 (60.2)   | 77 (14.5)        | 17 (3.2)        | 1 (0.19)       | 37 (7.0)         | 22 (4.1)           | 23 (4.3)   | 0         | 22 (4.1)  | 0                   |
| 17          | 267   | 6 (2.3)      | 193 (72.3)   | 30 (11.2)        | 7 (2.6)         | 0              | 7 (2.6)          | 8 (3.0)            | 3 (1.1)    | 0         | 12 (4.5)  | 1 (0.37)            |
| 18          | 146   | 2 (1.4)      | 105 (71.9)   | 17 (11.6)        | 3 (2.1)         | 0              | 8 (5.5)          | 5 (3.4)            | 0          | 0         | 6 (4.1)   | 0                   |
| 19          | 63    | 0            | 46 (73.0)    | 8 (12.7)         | 3 (4.8)         | 0              | 2 (3.2)          | 1 (1.6)            | 2 (3.2)    | 0         | 0         | 1 (1.59)            |
| 20          | 2     | 0            | 2 (100)      | 0                | 0               | 0              | 0                | 0                  | 0          | 0         | 0         | 0                   |
| 21          | 2     | 0            | 1 (50.0)     | 0                | 0               | 0              | 1 (50)           | 0                  | 0          | 0         | 0         | 0                   |
| Total       | 7,231 | 274 (3.8)    | 4,513 (62.4) | 865 (12.0)       | 170 (2.4)       | 4 (0.06)       | 504 (7.0)        | 276 (3.8)          | 245 (3.4)  | 13 (0.18) | 345 (4.8) | 22 (0.30)           |

<sup>†</sup>Includes all other RCLs such as community crisis line, police, obstetrician/gynecologist, specialist nurse, and social services.

**Table 2.** Recommended Care Level by time-of-day for both agencies combined

| Time (hour) | N     | n (%)        |              |                  |                 |                |                  |                    |            |           |           |           |
|-------------|-------|--------------|--------------|------------------|-----------------|----------------|------------------|--------------------|------------|-----------|-----------|-----------|
|             |       | 911 response | ED ASAP      | Med care 1-4 hrs | MD to review Sx | Poison Control | MD within 12 hrs | MD within 1-3 days | MD Routine | Dentist   | Self-care | Others†   |
| 6           | 6     | 0            | 5 (83.3)     | 0                | 0               | 0              | 1 (16.7)         | 0                  | 0          | 0         | 0         | 0         |
| 7           | 35    | 0            | 29 (82.9)    | 3 (8.6)          | 0               | 0              | 2 (5.7)          | 1 (2.9)            | 0          | 0         | 0         | 0         |
| 8           | 291   | 12 (4.1)     | 209 (71.8)   | 23 (7.9)         | 5 (1.7)         | 0              | 14 (4.8)         | 2 (0.69)           | 7 (2.4)    | 0         | 17 (5.8)  | 2 (0.69)  |
| 9           | 674   | 31 (4.6)     | 392 (58.2)   | 97 (14.4)        | 12 (1.8)        | 1 (0.15)       | 37 (5.5)         | 28 (4.2)           | 37 (5.5)   | 3 (0.45)  | 32 (4.8)  | 4 (0.59)  |
| 10          | 753   | 32 (4.3)     | 476 (63.2)   | 83 (11.0)        | 13 (1.7)        | 0              | 44 (5.8)         | 33 (4.4)           | 29 (3.9)   | 2 (0.27)  | 39 (5.2)  | 2 (0.27)  |
| 11          | 758   | 27 (3.6)     | 499 (65.8)   | 91 (12.0)        | 10 (1.3)        | 0              | 35 (4.6)         | 29 (3.8)           | 24 (3.2)   | 1 (0.13)  | 40 (5.3)  | 2 (0.26)  |
| 12          | 735   | 39 (5.3)     | 502 (68.3)   | 70 (9.5)         | 13 (1.8)        | 0              | 34 (4.6)         | 30 (4.1)           | 19 (2.6)   | 1 (0.14)  | 26 (3.5)  | 1 (0.14)  |
| 13          | 801   | 39 (4.9)     | 535 (66.8)   | 80 (10.0)        | 15 (1.9)        | 1 (0.12)       | 32 (4.0)         | 23 (2.9)           | 18 (2.3)   | 0         | 55 (6.9)  | 3 (0.37)  |
| 14          | 626   | 35 (5.6)     | 422 (67.4)   | 73 (11.7)        | 7 (1.1)         | 0              | 23 (3.7)         | 10 (1.6)           | 19 (3.0)   | 2 (0.32)  | 33 (5.3)  | 2 (0.32)  |
| 15          | 576   | 22 (3.8)     | 358 (62.2)   | 82 (14.2)        | 8 (1.4)         | 1 (0.17)       | 27 (4.7)         | 17 (3.0)           | 16 (2.8)   | 1 (0.17)  | 43 (7.5)  | 1 (0.17)  |
| 16          | 403   | 10 (2.5)     | 263 (65.3)   | 50 (12.4)        | 9 (2.2)         | 1 (0.25)       | 20 (5.0)         | 15 (3.7)           | 18 (4.5)   | 0         | 17 (4.2)  | 0         |
| 17          | 241   | 6 (2.5)      | 178 (73.9)   | 26 (10.8)        | 5 (2.1)         | 0              | 5 (2.1)          | 8 (3.3)            | 2 (0.83)   | 0         | 10 (4.2)  | 1 (0.41)  |
| 18          | 104   | 2 (1.9)      | 79 (76.0)    | 10 (9.6)         | 2 (1.9)         | 0              | 2 (1.9)          | 3 (2.9)            | 0          | 0         | 6 (5.8)   | 0         |
| 19          | 21    | 0            | 18 (85.7)    | 2 (9.5)          | 0               | 0              | 0                | 0                  | 1 (4.8)    | 0         | 0         | 0         |
| 20          | 2     | 0            | 2 (100)      | 0                | 0               | 0              | 0                | 0                  | 0          | 0         | 0         | 0         |
| 21          | 2     | 0            | 1 (50.0)     | 0                | 0               | 0              | 1 (50.0)         | 0                  | 0          | 0         | 0         | 0         |
| Total       | 6,028 | 255 (4.2)    | 3,968 (65.8) | 690 (11.5)       | 99 (1.6)        | 4 (0.07)       | 277 (4.6)        | 199 (3.3)          | 190 (3.2)  | 10 (0.17) | 318 (5.3) | 18 (0.30) |

†Includes all other RCLs such as community crisis line, police, obstetrician/gynecologist, specialist nurse, and social services.

**Table 3.** Recommended Care Level by time-of-day for LMEMS

| Time (hour) | N     | n (%)        |            |                  |                 |                |                  |                    |            |          |           |          |
|-------------|-------|--------------|------------|------------------|-----------------|----------------|------------------|--------------------|------------|----------|-----------|----------|
|             |       | 911 response | ED ASAP    | Med care 1-4 hrs | MD to review Sx | Poison Control | MD within 12 hrs | MD within 1-3 days | MD Routine | Dentist  | Self-care | Others†  |
| 8           | 35    | 0            | 22 (62.9)  | 3 (8.6)          | 2 (5.7)         | 0              | 5 (14.3)         | 0                  | 2 (5.7)    | 0        | 1 (2.9)   | 0        |
| 9           | 113   | 1 (0.88)     | 48 (42.5)  | 16 (14.2)        | 4 (3.5)         | 0              | 24 (21.2)        | 10 (8.9)           | 4 (3.5)    | 2 (1.8)  | 4 (3.5)   | 0        |
| 10          | 125   | 3 (2.4)      | 58 (46.4)  | 15 (12.0)        | 6 (4.8)         | 0              | 27 (21.6)        | 9 (7.2)            | 3 (2.4)    | 0        | 4 (3.2)   | 0        |
| 11          | 154   | 2 (1.3)      | 60 (39.0)  | 24 (15.6)        | 12 (7.8)        | 0              | 31 (20.1)        | 13 (8.4)           | 7 (4.6)    | 0        | 5 (3.3)   | 0        |
| 12          | 138   | 2 (1.5)      | 62 (44.9)  | 13 (9.4)         | 10 (7.3)        | 0              | 29 (21.0)        | 14 (10.1)          | 8 (5.8)    | 0        | 0         | 0        |
| 13          | 141   | 4 (2.8)      | 60 (42.6)  | 19 (13.5)        | 7 (5.0)         | 0              | 33 (23.4)        | 8 (5.7)            | 8 (5.7)    | 0        | 1 (0.71)  | 1 (0.71) |
| 14          | 132   | 2 (1.5)      | 61 (46.2)  | 21 (15.9)        | 9 (6.8)         | 0              | 26 (19.7)        | 5 (3.8)            | 5 (3.8)    | 0        | 1 (0.76)  | 2 (1.5)  |
| 15          | 126   | 2 (1.6)      | 48 (38.1)  | 20 (15.9)        | 7 (5.6)         | 0              | 25 (19.8)        | 8 (6.4)            | 11 (8.7)   | 1 (0.8)  | 4 (3.2)   | 0        |
| 16          | 129   | 3 (2.3)      | 57 (44.2)  | 27 (20.9)        | 8 (6.2)         | 0              | 17 (13.2)        | 7 (5.4)            | 5 (3.9)    | 0        | 5 (3.9)   | 0        |
| 17          | 26    | 0            | 15 (57.7)  | 4 (15.4)         | 2 (7.7)         | 0              | 2 (7.7)          | 0                  | 1 (3.9)    | 0        | 2 (7.7)   | 0        |
| 18          | 42    | 0            | 26 (61.9)  | 7 (16.7)         | 1 (2.4)         | 0              | 6 (14.3)         | 2 (4.8)            | 0          | 0        | 0         | 0        |
| 19          | 42    | 0            | 28 (66.7)  | 6 (14.3)         | 3 (7.1)         | 0              | 2 (4.8)          | 1 (2.4)            | 1 (2.4)    | 0        | 1 (2.4)   | 0        |
| Total       | 1,203 | 19 (1.6)     | 545 (45.3) | 175 (14.6)       | 71 (5.9)        | 0              | 227 (18.9)       | 77 (6.4)           | 55 (4.6)   | 3 (0.25) | 28 (2.3)  | 3 (0.25) |

†Includes all other RCLs such as community crisis line, police, obstetrician/gynecologist, specialist nurse, and social services.

**Table 4.** Recommended Care Level by time-of-day for MedStar

**DISCUSSION**

As shown by earlier research, a very low percentage of ECNS calls get a 9-1-1 emergency ambulance response assigned, (*Emergency response, (911)*), confirming safe levels of primary triage filtering by the MPDS for both agencies.<sup>7</sup>

In spite of the nurse triage desk not being staffed a full 24 hours, an interesting observation was made during the early hours of 6 to 8am and early evening hours of 5 to 8pm the percentages of calls being referred to the ED increased relative to other RCLs other than ED for example *Seek medical care within 1- 4 hours, See doctor in the next 12 hours, or Self-care* and could be due to a lack of alternative transport or a lack of these other resources during these hours. As EMS agencies come to realize the available potential of calls that could be triaged safely to alternative care resources, and if cost benefit analyses prove that 24-hour staffing is feasible, the picture might become more telling about the perceived lack of alternative resources at night and weekend days. A similar trend was observed with the RCL of *See doctor in the next 12 hours* with the data indicating a smaller percentage of patients receiving this RCL outside of regular clinic business hours.

A significant difference in ED dispositions were observed between the two agencies (MedStar 45.3% and LMEMS 65.8%) and can be due to a variety of factors including: availability of alternative transport or other care resources other than the ED, a difference in the specific illnesses and injuries of the two populations, choice of eligible codes to triage through the ECNS system, compliance to ECNS triage protocols, and patients' health-insurance status, to name a few. In spite of this discrepancy in

ED dispositions between the two agencies, more than a third of the patients were triaged to resources other than an emergency ambulance and or the hospital ED.

**Limitations**

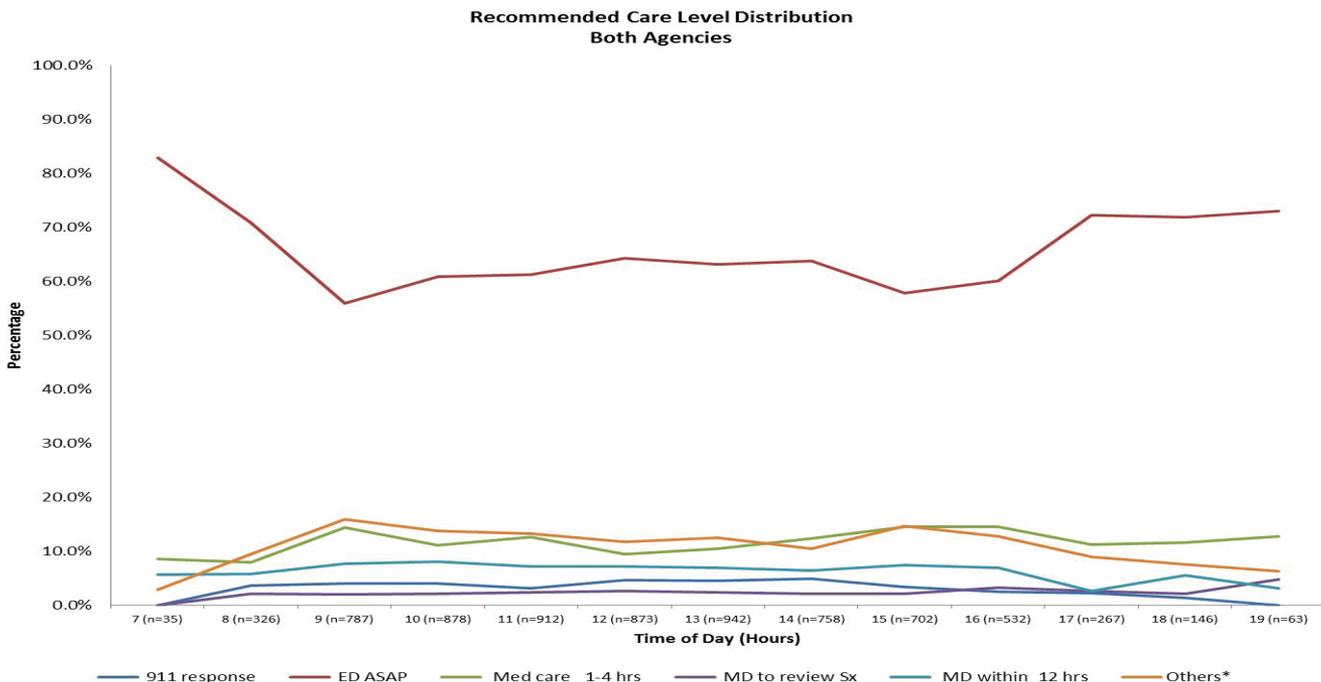
EMS call centers were not staffed 24/7 by ECNs, which would have given a more thorough understanding of RCL distribution by hour-of-day.

**CONCLUSION**

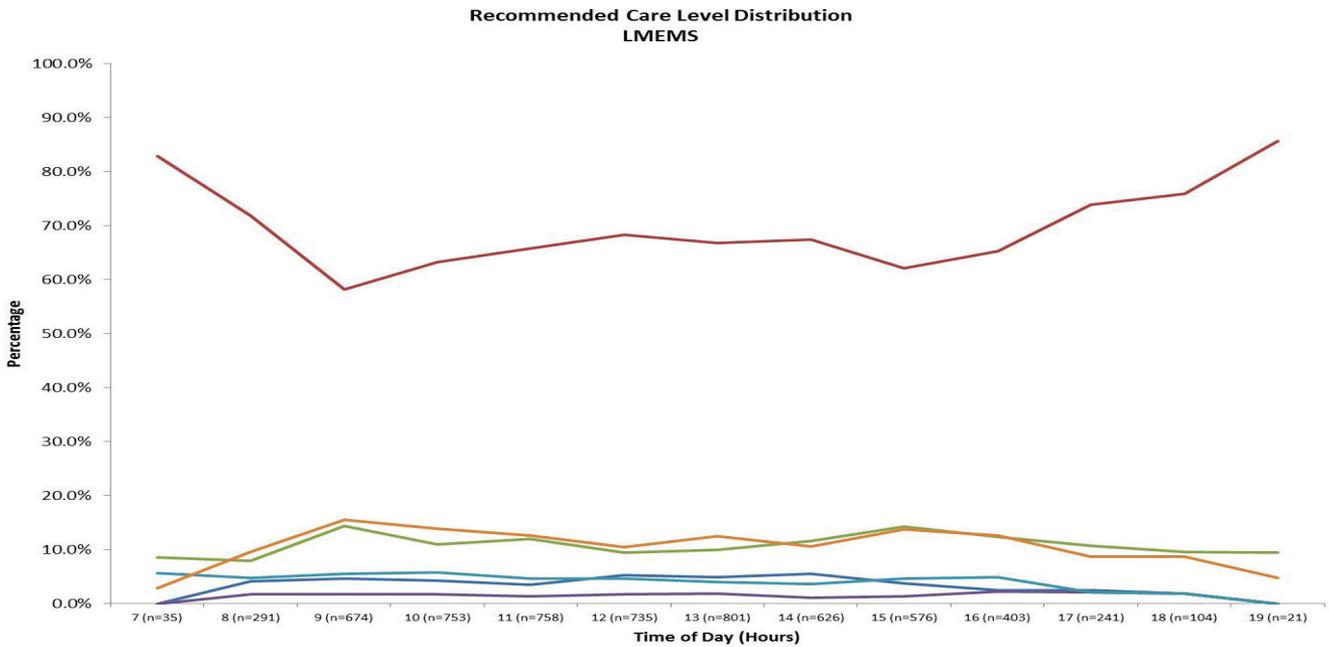
*Emergency care as soon as possible* was the most frequently encountered RCL with a definite trend in the increase of ED referrals both before and after regular, open business hours. There was also a clear decline in the number of referrals to Urgent and Primary Care RCL levels outside of regular, open business hours. Further research should evaluate the correlation between these trends and unavailability of alternative transport, or other resources, during these hours.

**REFERENCES**

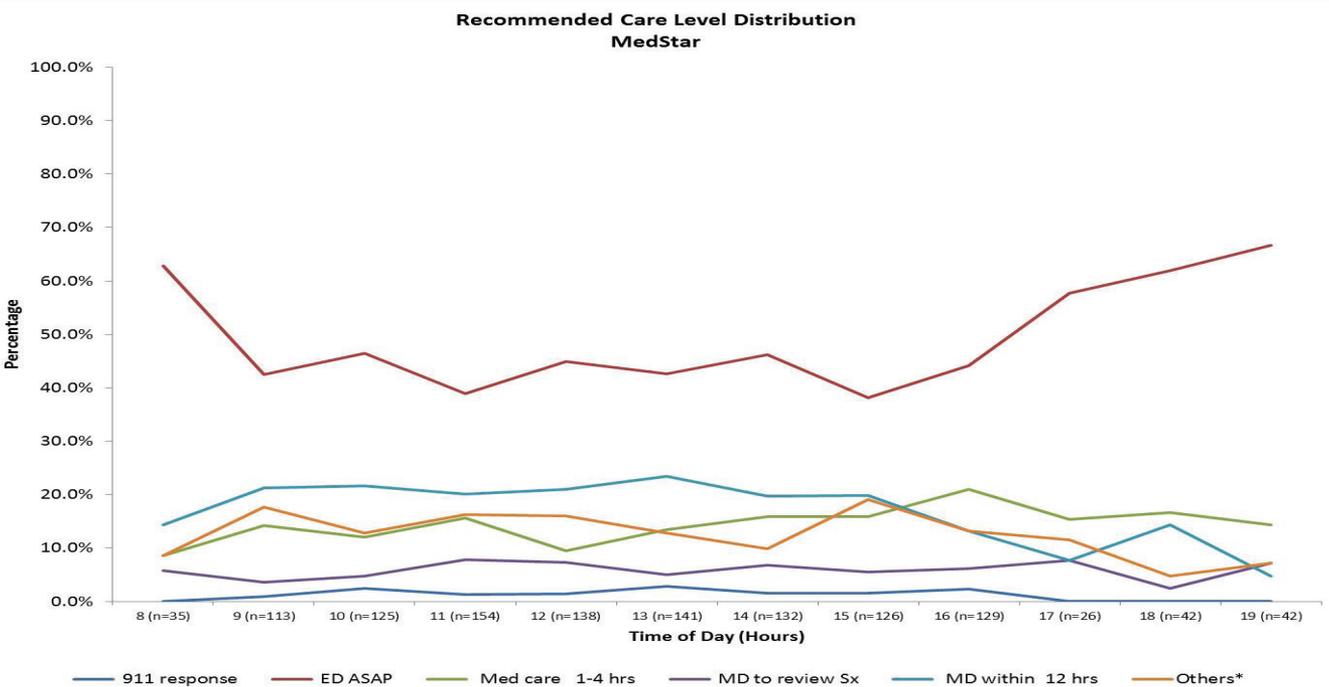
1. Schumacher JR, Hall AG, Davis TC, Arnold CL, Bennett RD, Wolf MS, Carden DL. Potentially preventable use of emergency services: The role of low health literacy. *Med Care.* 2013;51(8):654-658.
2. Institute of Medicine (IOM). Hospital-based Emergency Care: At the Breaking Point. Washington, DC: *National Academy Press.* 2006a.
3. Institute of Medicine (IOM). Emergency Medical Services at the Crossroads. Washington, DC: *National Academy Press.* 2006b.
4. Institute of Medicine (IOM). Emergency Care for Children: Growing Pains. Washington, DC: *National Academy Press.* 2006c.



**Figure 1.** Recommended Care Level by time-of-day for Both Agencies



**Figure 2.** Recommended Care Level by time-of-day for LMEMS



**Figure 3.** Recommended Care Level by time-of-day for MedStar

5. Mitka, M. Emergency Department Overcrowding Gives Ambulances the Runaround. *JAMA*. 2006;295(13):1504-1505.
6. Mann C. Department of Health and Human Services. Center for Medicaid and CHIP services, CMCS Informational Bulletin, Jan 16, 2014. <http://www.medicaid.gov/Federal-Policy-Guidance/Downloads/CIB-01-16-14.pdf>. Accessed March 19, 2015.
7. Fivaz MC, McQueen J, Barron T, Clawson J, Scott G, Gardett I, Patterson B, Zavadsky M, Richmond N, Olola CHO. The Distribution of Recommended Care Levels by Age, Gender, and Trauma vs Medical Classification within the Emergency Communication Nurse System. *Annals Emerg Disp Resp*. 2015;3(1):14-20.
8. Fivaz MC, Scott G, Clawson J, Toxopeus C, Zavadsky M, Miller K, Richmond N, Olola CHO. Assessing call demand and utilization of a secondary triage emergency communication nurse system for low acuity calls transferred from an emergency dispatch system. *Annals Emerg Disp Resp*. 2014;3(2):11-15.
9. Pitts SR, Carrier ER, Rich EC, and Kellermann AL. Where Americans get acute care: Increasingly, it's not at their doctor's office. *Health Affairs*. 2010;29(9):1620-1629.
10. RAND Corporation. Some Hospital Emergency Department Visits Could Be Handled by Alternative Care. 2010. <http://www.rand.org/news/press/2010/09/07.html>. Accessed March 19, 2015.