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**Case Study**

# Complaints of Fever in the Elderly in Urgent Care: Pay Attention!

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## Citation

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## Abstract

**Introduction:** Studies conducted in hospital emergency departments have shown a high correlation between fever in the elderly and serious infection. However, elderly patients presenting to community based Urgent Care Centers (UCCs), who may perhaps be not as ill, have been less studied. The goal of this study was to determine the frequency of patients presenting to UCCs with a complaint of fever, the percentage diagnosed with significant illness, and data associated with hospitalization/discharge home.

**Methods:** This was a retrospective chart review from the computerized database of a system of UCCs in five locations in and around Jerusalem. All centers were open most hours daily and on weekends; two were open 24/7. Laboratory and radiological services were available during all hours of operation. This was a consecutive cohort of all patients ≥ 65 years who presented between 1/1/2010 and 31/12/2011, with a chief complaint of fever. Variables included age, gender, complete blood count, urinalysis results, and chest radiograph interpretations.

**Results:** During the study period, there were 920 visits by patients ≥ 65 years old (48.8% male) with a chief complaint of fever. Average age was $75.11 \pm 7.4$ years. The most common diagnosis was pneumonia (25%). Most of the patients (774/920) were discharged home. Only 12.5% of patients were treated with intravenous antibiotics in the UCCs. Variables associated with hospitalization were abnormal oxygen saturation, elevated pulse rate, and elevated white blood cell count ($p<0.001$).

**Conclusion:** Even when presenting to UCCs, patients ≥ 65 years old complaining of fever are a high-risk cohort. One should highly consider including chest x-ray and/or urinalysis in this group.

## Introduction

As of 2014, there were over 46 million people in the United States aged 65 or over, representing 15 percent of the population. This is expected to double by 2065 [1]. The rapid growth of the geriatric population is not unique to the US. In Israel, the total population in 2017 was 8.7 million people, of which those aged 65 and over accounted for 1,108,000 (12.7% of the population) [2]. It is estimated that by 2065, this will group will be 3 million (15% of the population) [3].

In 2015 the total number of emergency department visits in the US was 136,943,000 out of a population of 321 million [4]. This contrasts with Israel where in 2015 the number of visits to hospital emergency departments

in Israel totaled 2.9 million out of a total population of 8.38 million. In Israel in 2015, the number of ED visits was 427.6, 704.2, and 1,154.3 per thousand (some patients had multiple visits per year) for the 65-74, 75-84, and 85+ age groups respectively [5]. Considering that the evaluation of geriatric patients often requires more time due to the complexity of the cases, and other factors, the demands on the physician have significantly increased [6]. This highlights the necessity of being able to quickly assess the clinical features that are predictable indicators of serious illness.

Studies of Fever of Unknown Origin in the elderly have demonstrated that unlike the young population, a precise diagnosis can be made 87%-95% of the time [7]. On the other hand, signs of infection may have different manifestations in the elderly compared to the younger population. This includes falls or delirium as the presentation of an infectious process in the absence of fever. Tachycardia or an elevated white blood cell count may also be absent [8].

Not all visits to the emergency department are in fact true emergencies. For this reason, there has been growing use of ambulatory, community based Urgent Care Centers (UCCs) [9]. However, the epidemiology of fever in the elderly has yet to be studied in this setting. The goal of this study is to determine the frequency of patients presenting to UCCs with a complaint of fever, the percentage diagnosed with significant illness, and physiologic and objective data associated with hospitalization/discharge home.

## Methods

TEREM (Hebrew for Immediate Medical Care) is currently a system of over 20 urgent care centers throughout Israel. The study focused on five centers in and around Jerusalem. All centers are open most hours daily and on weekends; two are open 24/7. Laboratory and radiological services are available during all hours of operation. Clinical data (vital signs, laboratory results, digital radiographs, and interpretations) are part of the electronic medical record and stored in a central computerized database.

This was a retrospective chart review of a consecutive cohort of patients ≥ 65 years who presented between 1/1/2010 and 31/12/2011, with a chief complaint of an oral temperature of ≥ 38 Celsius. The data abstracted included age, gender, vital signs, laboratory results, chest radiograph interpretations (when performed), treatment modalities, and disposition (home or hospital). Ethics approval was received from the Helsinki Committee (Institutional Board Review) of the Shaare Zedek Medical Center (P32/12).

Descriptive statistics were presented as ratios, percentages, ranges and confidence intervals. Associations between disposition and other abstracted data were tested by Chi square for categorical data, and t test or ANOVA for continuous variables. Significance was set at $p < 5\%$. Data analysis performed with SPSS Statistics for Windows, version 20.0 (IBM Corp., Armonk, NY, USA).

## Results

During the study period, there were 35,853 visits by patients ≥ 65 years old to the study centers. Of these, 920 (48.8% male) presented with fever (2.56% of the total). The age distribution is seen in table 1. There was no seasonal distribution of visits, including no increase during the winter months.

| Age groups | Number of patients | Percent |
|---|---|---|
| 65-74 | 463 | 50.3 |
| 75-84 | 362 | 39.3 |
| 85+ | 95 | 10.3 |
| Total | 920 | 100.0 |

**Table 1:** Age Distribution of Elderly Patients Presenting with Chief Complaint of Fever.

Despite the chief complaint of fever, only 65.1% had a measured temperature at the UCC over or equal to 37.5. The mean temperature was 37.4 ± 0.78 (median 37.2, range 36-39.7). Five patients did not have a measured temperature on the chart.

Blood tests were performed in 714 (77.8%) cases, urinalyses in 459 (49.9%) and chest radiographs in 538 (58.5%). Of the chest radiographs, 59.7% were interpreted as normal, with the remainder depicting assorted infiltrates. The final diagnoses are shown in table 2 with pneumonia, non-specific fever, bronchitis, urinary tract infection, and upper respiratory tract infections being the most common diagnoses. Slightly more than half of patients were treated with antibiotics. Of these, 115 (12.5%) were given intravenous treatment: cefuroxime (45), ceftriaxone (45), or cefazolin (24). Oral antibiotics were prescribed at discharge for 53% of patients. Most patients (84.1%) were discharged home. Of the 146 sent to the emergency department, 33 were sent by ambulance. Disposition decisions as related to clinical, laboratory and radiographic variables are depicted in table 3. Tachycardia, oxygen saturation less than 91%, and abnormal white blood cell count were associated with disposition to the hospital as opposed to being discharged to home. Patients with documented fever at the urgent care center outside of the range of 36-38 also are more likely to be sent to the hospital, although this was not technically statistically significant (p=0.061).

| Final diagnosis | Frequency | Percent |
|---|---|---|
| Pneumonia | 230 | 25 |
| Fever, non-specific | 182 | 19.8 |
| Bronchitis | 134 | 14.6 |
| Urinary tract infection | 117 | 12.7 |
| Upper respiratory tract infection | 49 | 5.3 |
| Cellulitis | 46 | 5 |
| Tonsillitis/Pharyngitis | 29 | 3.2 |
| Viral infection | 28 | 3 |
| Pyelonephritis | 17 | 1.8 |
| Enteritis | 16 | 1.7 |
| Gastroenteritis | 15 | 1.6 |
| Abdominal pain, non-specific | 14 | 1.5 |
| Leukocytosis | 11 | 1.2 |
| Sepsis | 6 | 0.7 |
| Sinusitis | 6 | 0.7 |
| Abscess | 2 | 0.2 |
| Gingivitis | 2 | 0.2 |
| Neutropenic fever | 2 | 0.2 |
| Otitis media | 2 | 0.2 |
| Pleural empyema | 2 | 0.2 |
| Septic joint | 2 | 0.2 |
| Arthritis/monoarthritis | 1 | 0.1 |
| Atrophic vaginitis | 1 | 0.1 |
| Cholecystitis | 1 | 0.1 |
| Epiglottitis | 1 | 0.1 |
| Infected bursitis | 1 | 0.1 |
| Peritonitis | 1 | 0.1 |
| Tracheitis | 1 | 0.1 |
| Wound infection | 1 | 0.1 |
| Total | 920 | 100 |

**Table 2:** Final diagnoses.

## Discussion

The frequency of fever found in our study is slightly lower that found in previous studies conducted in emergency departments (2.56% in TEREM vs. 4% in the ED) [8]. While the measured temperature was not high in most of our patients, this may reflect the finding by others that the usual body temperature of the elderly is lower. Gomelin, for example, found that the average body temperature of the elderly is 36.4, not 37 [10]. It has also been shown that elderly with significant infections may not show signs of fever at all [11].

A classic study of fever in the elderly studied 470 patients over 65 who were treated over a 12- month period showed that most patients had a serious illness - one that leads to hospitalization.

Certain signs - WBC count over 11,000, fever over 39.4, respiratory rate per minute over 30, and heart rate over 120 were significantly associated with hospitalization. However, 63 of the remaining 127 patients without any of these associated findings also had a serious illness. The most common diagnosis was pneumonia (24.9%) and UTI (21.7%) [12]. The associated signs found in our study are in direct correlation with these findings, taking into consideration that breaths per minute are not measured at TEREM but another sign of respiratory difficulty - saturation - was associated instead.

Respiratory diagnoses are the most common in our study. The number of cases of pneumonia and the large percentage of positive chest radiographs and the consequences of pneumonia in the elderly would seem to indicate that imaging be considered

| Variable | Discharge decision | Within normal range | Number of results | Normal range by SIRS criteria | | Mean | Standard Deviation | p-value |
|---|---|---|---|---|---|---|---|---|
| **Fever** | **Home** | No | 158 | 36-38°C | | 37.4°C | 0.78 | p=0.061 |
| | | Yes | 613 | | | | | |
| | **Hospital** | No | 40 | | | | | |
| | | Yes | 104 | | | | | |
| **Heart Rate** | **Home** | No | 216 | 60-100 | | 89.92 | 17.22 | P<0.001 |
| | | Yes | 558 | | | | | |
| | **Hospital** | No | 70 | | | | | |
| | | Yes | 76 | | | | | |
| **Oxygen Saturation** | **Home** | No | 54 | >91% | | 94.36% | 4.09% | P<0.001 |
| | | Yes | 689 | | | | | |
| | **Hospital** | No | 46 | | | | | |
| | | Yes | 90 | | | | | |
| **MAP (Mean Arterial Pressure)** | **Home** | No | 136 | 70-105 | | 93.35 | 12.99 | p=0.037 |
| | | Yes | 614 | | | | | |
| | **Hospital** | No | 37 | | | | | |
| | | Yes | 106 | | | | | |
| **WBC )White Blood Cell count)** | **Home** | No | 216 | 4.0-12.0 x $10^9$/L | | 11.14$^9$ x109/L | 6.42 x $10^9$/L | P<0.001 |
| | | Yes | 399 | | | | | |
| | **Hospital** | No | 59 | | | | | |
| | | Yes | 40 | | | | | |
| **Kidney function (BUN and creatinine) results combined** | **Home** | No | 30 | BUN | 4.6-21mg/dL | 39.03 | 39.28 | p=0.308 |
| | | Yes | 12 | | | | | |
| | **Hospital** | No | 14 | Creatinine | 0.50-1.20 mg/dL | 1.404 | 0.55 | |
| | | Yes | 2 | | | | | |
| **Positive urine dipstick results (any of: RBC, WBC, nitrites)** | **Home** | No | 94 | N/R | | N/R | N/R | p=0.526 |
| | | Yes | 302 | | | | | |
| | **Hospital** | No | 17 | | | | | |
| | | Yes | 45 | | | | | |
| **Positive Chest X-ray results (any infiltrate/effusion)** | **Home** | No | 181 | N/R | | N/R | N/R | p=0.126 |

**Table 3:** Disposition decisions as related to clinical, laboratory, and radiographic variables.

a routine part of the evaluation of such patients. Urinary tract infection is also quite common, suggesting that urinalysis be highly considered as well.

## Limitations

This study was performed in an urban population in Israel, so the findings may not be able to be extrapolated to other countries or rural or tropical regions where the causes of infectious disease may be different. The discharge diagnoses were those recorded on the medical chart by the physician of record and did not undergo any external verification. In addition, there is no outcome data for the patients who were

discharged to home. However, TEREM has established since its inception a rigorous auditing process. This includes alerts in the electronic medical record, chart reviews, and patient call backs.

## Conclusion

Many patients over 65 have significant illness when they present with fever, even when presenting to community based urgent care centers. Complaints of fever, even when not measured on admission, should be investigated which includes having a low clinical threshold for ordering a chest x-ray or urinalysis. Those who are stable can be treated without admission, but

those who have abnormal vital signs will likely need hospital admission.

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