CYPRUS JOURNAL OF MEDICAL SCIENCES

Original Article

DOI: 10.5152/cjms.2016.116

Effects of the Beginning of the Academic Year on Hospital Mortality: Is the July Phenomenon Real?

Ömer Acar[1], Hasan Hüseyin Mutlu[1], Mehmet Uzunlulu[1], Özge Telci Çaklılı[2], Aytekin Oğuz[1]

[1]Department of Internal Medicine, Kocaeli State Hospital, Kocaeli, Turkey
[2]Department of Internal Medicine, İstanbul Medeniyet University School of Medicine, İstanbul, Turkey

BACKGROUND
It is suggested that in teaching hospitals, mortality rates are higher in the beginning of the academic year (July phenomenon) than in other months of the year. Differences in mortality rates have been reported according to working hours, weekdays, weekends, and off months. The aim of this study was to search for differences in mortality rates in intensive care units or clinics between working hours and night shift hours, weekends and weekdays, and off months and the months when residents start work.

MATERIAL and METHODS
From a total of 65.535 patients hospitalized in clinics and intensive care units of (blinded for peer review) between April 2009 and May 2015, data from 2.210 patients who died due to any cause were retrospectively evaluated. Patients' exitus frequencies were investigated to find a difference according to working hours/night shift hours, weekends and weekdays, and off months and the beginning of the academic year.

RESULTS
The rate of mortality in months when residents began to work was 47.3% and that in other months was 52.7% (p=0.98). The risk of mortality in months when residents began to work did not show significant difference compared with other months (Odds Ratio (OR): 1.001, 95% CI: 0.919–1.089; p=0.987). The mortality rate was lower in months when residents begin to work than in other months in the departments of surgical sciences (39.8% vs 60.2%, p=0.03), while the rates were similar in the departments of internal sciences and intensive care units.

CONCLUSION
The results of this study did not support literature data suggesting that the risk of mortality is higher in months when new residents begin to work in a training and research hospital.

Keywords: Academic medical centers, mortality, academic year

INTRODUCTION

It has been suggested that the rates of fatal medical errors, morbidity, and mortality increase in the beginning of the academic year when new residents begin their duties in training hospitals and that this may be due to the lack of clinical experience. This transition period has been defined as the "July phenomenon" in the United States of America and "killing August season" in the United Kingdom" (1-4). Conversely, numerous studies have reported that the rates of mortality and other complications in the beginning of the academic year are not different from those in other months and that the July phenomenon does not reflect reality (5-7).

This study aimed to investigate whether the risk of mortality shows an increase in months when new residents begin to work compared to other months.

MATERIAL and METHODS

From a total 65.535 patients hospitalized in clinics and intensive care units of the İstanbul Medeniyet University, Göztepe Training and Research Hospital between April 2009 and May 2015, data from 2.210 patients who died due to any cause were retrospectively evaluated. The study was approved by the ethical committee (Decision no: 2014/0092). Helsinki declaration principles were followed during the study.

Study Design

Patients' age and gender, date and hour of exitus, clinic/intensive care unit/emergency department in which exitus occurred, and death recordings were examined and recorded. The International Classification of Diseases was used in grouping the causes of hospital admission and death. The rates of mortality were compared between months when new residents began to work (December–February and September–November) and other months (March–June and

Correspondence Author: Özge Telci Çaklılı
E-mail: wattersonx@gmail.com

Received: 18.07.2016
Accepted: 11.10.2016
Available Online Date: 30.11.2016

October–November). The rate of mortality in the departments of internal sciences and surgical sciences and in intensive care units were further assessed.

Statistical Analysis

Statistical analyses were performed using Statistical Package for the Social Sciences software version 16 (SPSS Inc.; Windows, Chicago, USA). Variables were investigated using visual (histograms and probability plots) and analytical (Kolmogorov–Smirnov/Shapiro–Wilk test) methods to determine whether they were normally distributed. Mortality frequencies in different academic periods [(December–February and September–November) and other months (March–June and October–November)] were assessed using the chi-square test and Fisher's exact test. Descriptive analyses were presented using mean and standard deviation as appropriate. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The number of patients who died due to any reason was 2,210 (1.208 males and 1.002 females, mean age: 54±30 years). The total number of hospitalizations was 31.498, and the number of patients who died was 1.259 (4%) in the departments of internal science, while this number was 241 out of 19.166 (1.3%) in the departments of surgical sciences and 710 out of 14.871 (4.8%) in intensive care units. The rate of mortality in the months when residents began to work was 47.3%, and the rate of mortality in the other months was 52.7% (p=0.98) (Figure 1). The risk of mortality in the months when residents began to work did not show a significant difference compared to the other months (OR: 1.001, 95% CI: 0.919–1.089; p=0.987). Mortality rate was lower in the months when residents began to work than in the other months in the departments of surgical sciences (39.8% vs 60.2%, p=0.03), while the rates were similar in the departments of internal sciences and intensive care units (Table 1).

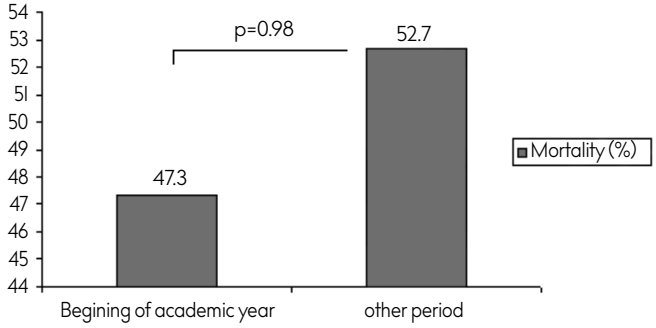

FIGURE 1. Rate of mortality in the months when residents began to work

TABLE 1. Comparison of the rate of mortality between months when residents began to work and other months

	Other months (n, %)		Months when residents began to work (n, %)		
	Number of hospitalizations	Number of exitus patients	Number of hospitalizations	Number of exitus patients	p
Overall mortality	34528 (52.7)	1164 (52.7)	31007 (47.3)	1046 (47.3)	0.98
Mortality in the departments of internal sciences	16607 (52.7)	655 (52.0)	14891 (47.3)	604 (48.0)	0.61
Mortality in the departments of surgical sciences	10207 (53.3)	145 (60.2)	8959 (46.7)	96 (39.8)	0.03
Mortality in intensive care units	7714 (51.9)	364 (51.3)	7157 (48.1)	346 (48.7)	0.74

Other months: March–June+October–November
Months when residents began to work: December–February+July–September

DISCUSSION

The results of this study showed that the rate of mortality in the months when new residents began to work was not significantly higher than in the other months.

It has been suggested that the rates of fatal medical errors, morbidity, and mortality increase in the beginning of the academic year when new residents begin their duties in training hospitals and that this may be due to the lack of clinical experience (1-4). In a study by Phillips et al. (3) all death certificates (n=62.338.584) in the United States of America between 1979 and 2006 were examined, and among 244.388 cases it was found that rate of fatal medical errors was greater by 10% in training hospitals than in those which are not training hospitals in July, which is the beginning of the academic year. In a retrospective observational study comparing the rates of mortality and complications between May and July in patients hospitalized in 98 training hospitals and 1.353 non-training hospitals in the United States of America due to acute myocardial infarction between 2000 and 2008, the rate of mortality was lower in May than in July, which is the beginning of the academic year, and that it was similar in training and non-training hospitals (8). It has been demonstrated in studies conducted in different clinics that the rate of adverse events in patients who have undergone anesthetic procedure, postoperative morbidity and mortality rates in patients hospitalized due to surgical reasons, and preventable or potentially preventable complications in patients hospitalized due to trauma were higher in the beginning of the academic year (4, 9, 10). There are studies showing that the beginning of the academic year is not effective on the rates of mortality and adverse events in training hospitals (11-13). It has been reported in a study evaluating life-saving treatments, diagnostic and therapeutic procedures, and in-hospital outcomes in patients hospitalized with a diagnosis of acute coronary syndrome and decompensated heart failure in July–September and November–January periods that there was no significant difference between patients hospitalized in both periods in terms of treatment characteristics and hospital mortality (14). Several retrospective cohort studies have evaluated whether poor clinical outcomes due to a lack of experience, particularly in intensive care units, surgical clinics, and transplantation and trauma centers, are seen more frequently in the beginning of the academic year and reported that mortality rates, hospitalization length, postoperative complications, and infection rates were similar to those observed in the other months of the year (15-18). In contrast, in our study, the rate of mortality in the months when new residents began to work (July–September and December–February) was similar to that in the other months. However, there are some differences affecting the comparison of our results with those from other

studies. The period when new residents begin to work is twice a year Turkey; the beginning of the academic year is in December–January or July–September. Therefore, it is not possible to compare the rate of mortality in a single month with that in other months as in other studies. In our study, the lower rate of mortality in the departments of surgical sciences in the months when new residents began to work than in the other months might be incidental as it might be related to the lower rate of hospitalization in the departments of surgical sciences.

Limitations of the Study

The most important limitations of this study were that the diagnoses of hospitalization and exitus, status of comorbidity, and characteristics of treatment could not be assessed in exitus patients.

CONCLUSION

A similar rate of mortality between the months when new residents began to work and the other months indicates that the beginning of the academic year is not effective on the rate of mortality.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of İstanbul Medeniyet University (Decision no: 2014/0092).

Informed Consent: Informed consent was not received due to the retrospective nature of the study.

Peer-review: Externally peer-reviewed.

Author contributions: Concept - O.A., M.U., A.O.; Design - M.U., A.O., O.A.; Supervision - A.O.; Resource - H.H.M.; Materials - O.A.; Data Collection and/or Processing - O.A., M.U.; Analysis and/or Interpretation - M.U., H.H.M.; Literature Search - O.T.C.; Writing - H.H.M., O.T.V.; Critical Reviews - O.T.C., A.O.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Aylin P, Majeed FA. The killing season--fact or fiction? BMJ 1994; 309: 1690. [CrossRef]
2. Claridge JA, Schulman AM, Sawyer RG, Ghezel-Ayagh A, Young JS. The "July phenomenon" and the care of the severely injured patient: fact or fiction? Surgery 2001; 130: 346-53. [CrossRef]
3. Phillips DP, Barker GE. A July spike in fatal medication errors: a possible effect of new medical residents. J Gen Intern Med 2010; 25: 774-9. [CrossRef]
4. Haller G, Myles PS, Taffé P, Perneger TV, Wu CL. Rate of undesirable events at beginning of academic year: retrospective cohort study. BMJ 2009; 339: b3974. [CrossRef]
5. Finkielman JD, Morales IJ, Peters SG, Keegan MT, Ensminger SA, Lymp JF, et al. Mortality rate and length of stay of patients admitted to the intensive care unit in July. Crit Care Med 2004; 32: 1161-5. [CrossRef]
6. Claridge JA, Schulman AM, Sawyer RG, Ghezel-Ayagh A, Young JS. The "July phenomenon" and the care of the severely injured patient: fact or fiction? Surgery 2001; 130: 346-53. [CrossRef]
7. Ravi P, Trinh VQ, Sun M, Sammon J, Sukumar S, Gervais MK, et al. Is there any evidence of a "July effect" in patients undergoing major cancer surgery? Can J Surg 2014; 57: 82-8. [CrossRef]
8. Jena AB, Sun EC, Romley JA. Mortality among high-risk patients with acute myocardial infarction admitted to U.S. teaching-intensive hospitals in July: a retrospective observational study. Circulation 2013; 128: 2754-63. [CrossRef]
9. Englesbe MJ, Pelletier SJ, Magee JC, Gauger P, Schifftner T, Henderson WG, et al. Seasonal variation in surgical outcomes as measured by the American College of Surgeons-National Surgical Quality Improvement Program (ACS-NSQIP). Ann Surg 2007; 246: 456-62. [CrossRef]
10. Inaba K, Recinos G, Teixeira PG, Barmparas G, Talving P, Salim A, et al. Complications and death at the start of the new academic year: is there a July phenomenon? J Trauma 2010; 68: 19-22. [CrossRef]
11. Smith ER, Butler WE, Barker FG 2nd. Is there a "July phenomenon" in pediatric neurosurgery at teaching hospitals? J Neurosurg 2006; 105: 169-76. [CrossRef]
12. Ford AA, Bateman BT, Simpson LL, Ratan RB. Nationwide data confirms absence of 'July phenomenon' in obstetrics: it's safe to deliver in July. J Perinatol 2007; 27: 73-6. [CrossRef]
13. Bohl DD, Fu MC, Golinvaux NS, Basques BA, Gruskay JA, Grauer JN. The "July effect" in primary total hip and knee arthroplasty: analysis of 21,434 cases from the ACS-NSQIP database. J Arthroplasty 2014; 29: 1332-8. [CrossRef]
14. Garcia S, Canoniero M, Young L. The effect of July admission in the process of care of patients with acute cardiovascular conditions. South Med J 2009; 102: 602-7. [CrossRef]
15. Dhaliwal AS, Chu D, Deswal A, Bozkurt B, Coselli JS, LeMaire SA, et al. The July effect and cardiac surgery: the effect of the beginning of the academic cycle on outcomes. Am J Surg 2008; 196: 720-5. [CrossRef]
16. Pang JH, Karipineni F, Panchal H, Campos S, Ortiz J. Seasonal variations in outcomes after kidney transplantation: UNOS review of 336,330 transplants. J Surg Educ 2013; 70: 357-67. [CrossRef]
17. Karipineni F, Panchal H, Khanmoradi K, Parsikhia A, Ortiz J. The "July effect" does not have clinical relevance in liver transplantation. J Surg Educ 2013; 70: 669-79. [CrossRef]
18. Weaver KJ, Neal D, Hoh DJ, Mocco J, Barker FG 2nd, Hoh BL. The "July phenomenon" for neurosurgical mortality and complications in teaching hospitals: an analysis of more than 850,000 neurosurgical patients in the nationwide inpatient sample database, 1998 to 2008. Neurosurgery 2012; 71: 562-71. [CrossRef]