

# Yearly Progress of Died Patients Using Medical Recorded Information

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## Abstract

This study analyzed the varying progress of 1,306 died patients in 2000, 2005 and 2010 at K University Hospital located in Daejeon Metropolitan City. As for the causes of death, this study conducted chi-square analysis and trend analysis using frequency analysis and SPSS by deducting the top 5 diagnoses of died patients in relation to their general characteristics and hospitalization-related characteristics. Moreover, this study analyzed the trend for each item through the trend analysis method of Cochran-Armitage as to the scale that showed a significant result from the yearly progress of top 5 death causes as a result of the diagnosis. Consequently, this study aimed to utilize the results of the aforementioned analysis as preliminary data for the developing of well-dying educational program to enhance the death rate of hospitalization and the quality of life. In conclusion, the death rate among middle-aged people between 45 and 59 years old in the regions with a low degree of medical accessibility is on the rise. Thus, it is required to promote vaccination and develop educational programs for the prevention of respiratory diseases such as pneumonia and the improvement of living behaviors for education and cancer prevention as to prompt a systematic emergency treatment and delivery system. This is for the purpose of increasing the survival rate of emergency patients in relation to the development of well-dying educational programs for an improvement of quality of life for middle-aged people.

**Keywords:** Component, Death Rate, Death Trend Died Patients, Medical Recorded Information

## 1. Introduction

Death is the scale that clearly represents bad health from the perspective of health science<sup>1</sup>. The national statistics on causes of death are the objective data in relation to health; thus, the application value thereof is very high<sup>2</sup>.

An increase in death rate is closely related to the ratio of elderly people. According to the statistics on elderly people in 2013, those elderly people aged 65 years old or older accounted for 12.2 percent of the entire population in 2013. The proportion thereof has consistently increased from 3.1 percent in 1970. It is expected to reach 24.3 percent and 37.4 percent in 2030 and 2050, respectively. In particular, the proportion of super-aged population aged 85 years old or older accounted for 0.9 percent of

the entire population in 2013. However, it is expected to account for 2.5 percent and 7.7 percent in 2030 and 2050, respectively<sup>3</sup>.

The top cause of death among elderly people in 2012 was cancer as 852.9 people out of every 100,000 people died of cancer, followed by cerebrovascular disease (372.9 people), heart disease (367.1 people) and pneumonia (166.4 people). As for the causes of death for each gender, cancer was the leading cause of death among men, followed by cerebrovascular disease, heart disease, pneumonia and chronic lower respiratory disease. Among women, cancer was also the leading cause of death among women, followed by heart disease, cerebrovascular disease, diabetes and pneumonia. In regard to the top three causes of death for each age group, they were suicide, traf-

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fic accident and cancer among the 10s and 20s, whereas they were suicide, cancer and traffic accident among the 30s. Among the 40s, the top three causes of death were cancer, suicide and liver failure. Among the 50s, the top three causes of death were cancer, suicide and heart disease<sup>3</sup>.

Therefore, this study aims to identify the causes of death and progress hereof in relation to the general characteristics, hospitalization-related characteristics and diagnosis results as a result of death by utilizing the Korea uniform hospital discharge data sets; KUHDDS) produced at the medical records office in order to determine the causes of death. Also, this study aims to leverage these findings as preliminary data for developing well-dying educational programs to enhance the death rate of hospitalization and the quality of life.

## 2. Materials and Methods

### 2.1 Study Subjects

This selected a total of 1,306 died patients as study subjects by utilizing the Korea uniform hospital discharge data sets; KUHDDS) produced at the medical records office of K University Hospital located in Daejeon Metropolitan City in 2000, 2005 and 2010.

### 2.2 Analytical Method

The data was analyzed through using SPSS statistics program (version 16.0) and SAS program with personal computer. This study conducted frequency analysis, chi-square analysis and trend analysis by deducting the top 5 diagnoses of died patients in relation to their general characteristics and hospitalization-related characteristics in 2000, 2005 and 2010. Moreover, this study analyzed and stated the status on the increases or decreases for each item through the trend analysis method of Cochran-Armitage as to the scale that showed a significant result in the yearly progress.

## 3. Results

### 3.1 General Characteristics of Study Subjects

The number of died patients has increased from 16.2 per-

cent in 2000 to 34.0 percent in 2005 and 49.8 percent in 2010. As for the gender, men accounted for 60.5 percent, whereas women accounted for 39.5 percent.

As for the age, those aged 60 years old or older accounted for the highest proportion with 72.4 percent, followed by those aged between 45 years old and 59 years old with 18.5 percent and those aged between 30 years old and 44 years old with 4.4 percent. Thus, the number thereof has significantly increased with older age ( $p < 0.001$ ). According to the yearly progress from the trend analysis method of Cochran-Armitage, the number of died patients among the group aged 14 years old or younger has significantly decreased from 9.0 percent in 2000 to 3.8 percent in 2005 and 2.0 percent in 2010 ( $p < 0.001$ ). In contrast, the number of died patients among the middle-aged group between 45 years old and 59 years old has significantly increased from 14.2 percent in 2000 to 17.3 percent in 2005 and 20.6 percent in 2010 ( $p < 0.05$ ).

As for the region, Daejeon accounted for the highest proportion with 47.4 percent, followed by Sejong/Chungcheong with 43.1 percent and other with 9.5 percent ( $p < 0.001$ ). In regard to the yearly progress, the number of died patients in Daejeon has significantly decreased from 71.2 percent in 2000 to 51.2 percent in 2005 and 37.1 percent in 2010 ( $p < 0.001$ ). In contrast, the number of died patients in Sejong/Chungcheong has significantly increased from 22.6 percent in 2000 to 41.5 percent in 2005 and 50.8 percent in 2010 ( $p < 0.001$ ).

As for the insurance type, those having health insurance accounted for the highest proportion with 79.8 percent. There was no available data on the yearly progress hereof Table 1.

### 3.2 Characteristics of Died Patients in Relation to Hospitalization

As for the course of hospitalization of died patients, ER accounted for the highest proportion with 73.6 percent, followed by OPD with 23.2 percent, infant unit with 3.1 percent and delivery room with 0.1 percent ( $p < 0.001$ ). According to the yearly progress thereof, the number of died patients in ER has significantly increased from 67.9 percent in 2000 to 70.5 percent in 2005 and 77.5 percent in 2010 ( $p < 0.05$ ). In contrast, the number of died patients in the infant unit has significantly decreased from 8.0 percent in 2000 to 3.2 percent in 2005 and 0.8 percent in 2010 ( $p < 0.001$ ).

**Table 1.** General Characteristics

Unit : N(%)

General Characteristics	Year				p-value <sup>1)</sup>	p-value <sup>2)</sup>	p-trend <sup>3)</sup>
	2000	2005	2010	Total			
Gender					0.954		
Men	129(60.8)	266(59.9)	395(60.8)	790(60.5)			
Women	83(39.2)	178(40.1)	255(39.2)	516(39.5)			
Age					<0.001	0.008	
Under 14	19(9.0)	17(3.8)	13(2.0)	49(3.8)			<0.001
15 - 29	5(2.4)	2(0.5)	6(0.9)	13(1.0)			0.2056
30 - 44	10(4.7)	13(2.9)	35(5.4)	58(4.4)			0.3139
45 - 59	30(14.2)	77(17.3)	134(20.6)	241(18.5)			0.0458
60 or older	148(69.8)	335(75.5)	462(71.1)	945(72.4)			0.9973
Region					<0.001	<0.001	
Daejeon	151(71.2)	227(51.2)	241(37.1)	619(47.4)			<0.001
Sejong/ Chungcheong	48(22.6)	184(41.5)	330(50.8)	562(43.1)			<0.001
Other	13(6.1)	32(7.2)	79(12.2)	124(9.5)			0.0018
Insurance Type					0.141	0.182	
Health Insurance	172(81.1)	340(76.6)	530(81.5)	1042(79.8)			
Medical Benefit	21(9.9)	71(16.0)	77(11.8)	169(12.9)			
Car Insurance	12(5.7)	15(3.4)	30(4.6)	57(4.4)			

Occupational Health and Safety Insurance	1(0.5)	2(0.5)	1(0.2)	4(4.0)			
General	6(2.8)	16(3.6)	12(1.8)	34(2.6)			
Total	212(100.0) (16.2)	444(100.0) (34.0)	650(100.0) (49.8)	1306(100.0) (100.0)			

1) p-value: calculated by  $\chi^2$ -test. 2) p-value: linear by linear association. 3) p-trend: Cochran-Armitage test.

**Table 2.** Characteristics of Died Patients in Relation to Hospitalization

Unit : N(%)

Characteristics of died patients in relation to hospitalization	Year				p-value <sup>1)</sup>	p-value <sup>2)</sup>	p-trend <sup>3)</sup>
	2000	2005	2010	Total			
Course of Hospitalization					<0.001		
ER	144(67.9)	313(70.5)	504(77.5)	961(73.6)			0.0014
OPD	50(23.6)	117(26.4)	136(20.9)	303(23.2)			0.1665
Infant Room	17(8.0)	14(3.2)	10(0.8)	41(3.1)			<0.001
Delivery Room	1(0.1)	0(0.0)	0(0.0)	1(0.1)			0.0710
Course of Visiting Hospital					<0.001		
Direct Visit	150(70.8)	316(71.2)	386(59.4)	852(65.2)			<0.001
Directed from Other Hospital	62(29.2)	122(27.5)	262(40.3)	446(34.2)			<0.001
Family Medicine	0(0.0)	6(0.5)	2(0.3)	8(0.6)			0.7434
Medical Office					0.014	0.015	
Internal Medicine	185(87.7)	352(79.3)	512(78.8)	1049(80.4)			0.0196
Surgery Department	26(12.3)	92(20.7)	138(21.2)	256(19.6)			0.0138
Surgical Hisotry					0.052		
Yes	29(13.7)	43(9.7)	95(14.6)	167(12.8)			
No	183(86.3)	401(90.3)	555(85.4)	1139(87.2)			
Treatment Result					0.659		
Died within 48 hours	43(20.3)	93(20.9)	148(22.8)	284(21.7)			
Died after 48 hours	169(79.7)	351(79.1)	502(77.2)	1022(78.3)			
Total	212(100.0) (16.2)	444(100.0) (34.0)	650(100.0) (49.8)	1306(100.0) (100.0)			

1) p-value: calculated by  $\chi^2$ -test. 2) p-value: linear by linear association. 3) p-trend: Cochran-Armitage test.

As for the course of hospitalization, direct visit accounted for the highest proportion with 65.2 percent, followed by those directed from other hospitals with 34.2 percent and family medicine with 0.6 percent ( $p < 0.001$ ). According to the yearly progress, the number of died patients from direct visit has significantly increased from 70.8 percent in 2000 to 71.2 percent in 2005 and 59.4 percent in 2010 ( $p < 0.001$ ). In contrast, the number of died patients directed from other hospitals has significantly increased from 29.2 percent in 2000 to 27.5 percent in 2005 and 40.3 percent in 2010 ( $p < 0.001$ ).

As for the medical office, the internal medicine accounted for the highest proportion with 80.4 percent, followed by surgical department with 19.6 percent. According to the yearly progress, the number of died patients from the internal medicine has significantly increased from 87.7 percent in 2000 to 79.3 percent in 2005 and 78.8 percent in 2010 ( $p < 0.05$ ). The number of died patients in the surgical department has also significantly increased from 12.3 percent in 2000 to 20.7 percent in 2005 and 21.2 percent in 2010 ( $p < 0.05$ ).

As for the surgical history, the number of the died patients who did not undergo surgery accounted for 87.2 percent, whereas the number of the died patients who underwent surgery accounted for 12.8 percent. As for the

treatment result, the number of those who died after 48 hours accounted for 78.3 percent, whereas the number of those who died within 48 hours accounted for 21.7 percent. However, there was no available data on the yearly progress thereof Table 2.

### 3.3 Top 5 Diagnosis Results of Died Patients

As a result of deducting and analyzing the top five diagnoses at the time of discharge of died patients, malignant neoplasm of bronchus and lung (C34) accounted for the highest proportion with 7.3 percent, followed by malignant neoplasm of liver and intrahepatic bile duct (C22) with 7.0 percent, intracranial damage (S06) with 5.5 percent, malignant neoplasm of stomach (C16) with 5.1 percent and bacterial pneumonia that is not otherwise classified (J15) with 3.9 percent ( $p < 0.001$ ). According to the yearly progress, the number of died patients due to malignant neoplasm of liver and intrahepatic bile duct (C22) has significantly decreased from 10.4 percent in 2000 to 8.1 percent in 2005 and 5.1 percent in 2010 ( $p < 0.05$ ). In contrast, the number of died patients due to bacterial pneumonia that is not otherwise classified (J15) has significantly increased from 0.9 percent in 2000 to 3.4 percent in 2005 and 5.2 percent in 2010 ( $p < 0.05$ ) Table 3.

**Table 3.** Top 5 Diagnosis Results of Died Patients

Unit : N(%)

Top 5 diagnosis results of died patients	Year				p-value <sup>1)</sup>	p-trend <sup>2)</sup>
	2000	2005	2010	Total		
Result of Main Diagnosis					<0.001	
Malignant Neoplasm of Bronchus and Lung (C34)	17(8.0)	29(6.5)	49(7.5)	95(7.3)		0.9840
Malignant Neoplasms of Liver and Intrahepatic Bile Duct (C22)	22(10.4)	36(8.1)	33(5.1)	91(7.0)		0.0041
Intracranial Injury (S06)	12(5.7)	20(4.5)	40(6.2)	72(5.5)		0.5278
Malignant Neoplasm of Stomach (C16)	14(6.6)	27(6.1)	25(3.8)	66(5.1)		0.0573
Bacterial pneumonia that are not classified otherwise (J15)	2(0.9)	15(3.4)	34(5.2)	51(3.9)		0.0040
Total	67(31.6)	127(28.6)	181(27.8)	375(28.8)		

1) p-value: calculated by  $\chi^2$ -test. 2) p-trend: Cochran-Armitage test.

## 4. Discussion

This study analyzed the varying progress of 1,306 died patients in 2000, 2005 and 2010 at K University Hospital located in Daejeon Metropolitan City. As for the causes of death, this study conducted chi-square analysis and trend analysis using frequency analysis and SPSS by deducting the top 5 diagnoses of died patients in relation to their general characteristics and hospitalization-related characteristics. Moreover, this study analyzed the trend for each item through the trend analysis method of Cochran-Armitage as to the scale that showed a significant result from the yearly progress of top 5 death causes as a result of the diagnosis.

As for the gender of died patients in 2000, 2005 and 2010, the men accounted for 60.5 percent, whereas the women accounted for 39.5 percent. This finding was consistent with the finding of 60.6 percent for the men in the study of Khang and Kim<sup>4</sup> and the finding of 65.7 percent for the men in the study of Yi et al<sup>5</sup>. As for each age, those aged 60 years old or older accounted for 72.4 percent, followed by the age group between 45 years old and 59 years old with 18.5 percent, the age group between 30 years old and 44 years old with 4.4 percent, the age group between 15 years old and 29 years old with 1.0 percent and the age group of 14 years old or younger with 3.8 percent. The finding hereof was consistent with the finding of the study of Lee, Jo, Choi and Lee<sup>6</sup>. In particular, as a result of examining the yearly progress, the number of died people from the age group of 14 years or younger has significantly decreased from 9.0 percent in 2000 to 3.8 percent in 2005 and 2.0 percent in 2010 ( $p < 0.001$ ). The number of died people from the age group between 45 years old and 59 years old has significantly increased from 14.2 percent in 2000 to 17.3 percent in 2005 and 20.6 percent in 2010 ( $p < 0.05$ ).

The number of died people in Daejeon has significantly decreased from 71.2 percent in 2000 to 51.2 percent in 2005 and 37.1 percent in 2010 ( $p < 0.001$ ). In contrast, the number of died people in Sejong/Chungcheong has significantly increased from 22.6 percent in 2000 to 22.6 percent in 2005 and 50.8 percent in 2010 ( $p < 0.001$ ).

As for the death rate for each course of hospitalization, emergency room (ER) accounted for a substantially higher percentage with 73.6 percent than outpatient clinic with 23.2 percent. This finding was consistent with the finding of the study conducted by Kim et al<sup>7</sup> that the the percentage of hospitalization through emergency

room was higher than the one through outpatient clinic. According to the yearly progress hereof, ER has significantly decreased from 67.9 percent in 2000 to 0.5 percent in 2005 and 7.5 percent in 2010 ( $p < 0.05$ ).

As for the course of visit, direct visit accounted for the highest proportion with 65.2 percent, followed by visit through other hospitals with 34.2 percent and visit through family medicine with 0.6 percent ( $p < 0.001$ ). According to the yearly progress, the number of died people from direct visit has significantly decreased from 70.8 percent in 2000 to 71.2 percent in 2005 and 59.4 percent in 2010 ( $p < 0.001$ ). In contrast, the number of died people from visit through other hospitals has significantly increased from 29.2 percent in 2000 to 27.5 percent in 2005 and 40.3 percent in 2010 ( $p < 0.001$ ).

As for the medical office, the internal medicine accounted for the highest proportion with 80.4 percent, followed by the surgical department with 19.6 percent ( $p < 0.05$ ). According to the yearly progress, the number of died people from the internal medicine has significantly decreased from 87.7 percent in 2000 to 79.3 percent in 2005 and 78.8 percent in 2010 ( $p < 0.05$ ). In contrast, the number of died people from the surgical department has significantly increased from 12.3 percent in 2000 to 20.7 percent in 2005 and 21.2 percent in 2010 ( $p < 0.05$ ).

As a result of deducting and analyzing the top five diagnoses at the time of discharge of died patients, malignant neoplasm of bronchus and lung (C34) accounted for the highest proportion with 7.3 percent, followed by malignant neoplasm of liver and intrahepatic bile duct (C22) with 7.0 percent, intracranial damage (S06) with 5.5 percent, malignant neoplasm of stomach (C16) with 5.1 percent and bacterial pneumonia that is not otherwise classified (J15) with 3.9 percent ( $p < 0.001$ ). The finding thereof was consistent with the top diagnosis found in the study of Kim, Kim, Han, and Kang<sup>8</sup> showing malignant neoplasm of bronchus and lung (C34) with 5.8 percent. However, this study had a different result in terms of the second and third highest diagnoses from the finding in the study of Kim, Kim, Han, and Kang<sup>8</sup> showing bacterial pneumonia that is not otherwise classified (J15) with 5.2 percent and malignant neoplasm of stomach (C16) with 4.4 percent. According to the yearly progress, the number of died patients due to malignant neoplasm of liver and intrahepatic bile duct (C22) has significantly decreased from 0.4 percent in 2000 to 8.1 percent in 2005 and 5.1 percent in 2010 ( $p < 0.05$ ). In contrast, the number of died patients due to bacterial pneumonia that is not

otherwise classified (J15) has significantly increased from 0.9 percent in 2000 to 3.4 percent in 2005 and 5.2 percent in 2010 ( $p < 0.05$ ) Table 3.

Consequently, this study aimed to utilize the results of the aforementioned analysis as preliminary data for the developing of well-dying educational program to enhance the death rate of hospitalization and the quality of life. In conclusion, the death rate among middle-aged people between 45 and 59 years old in the regions with a low degree of medical accessibility is on the rise. Thus, it is required to promote vaccination and develop educational programs for the prevention of respiratory diseases such as pneumonia and the improvement of living behaviors for education and cancer prevention as to prompt an systematic emergency treatment and delivery system. This is for the purpose of increasing the survival rate of emergency patients in relation to the development of well-dying educational programs for an improvement of quality of life for middle-aged people.

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