Kansas

Pulmonary Hypertension Hospitalizations

Continue to Increase

Research Summary

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Kansas Department of Health and Environment

Division of Health

Bureau of Public Health Informatics

Curtis State Office Building – 1000 SW Jackson, Topeka, KS 66612-1354

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This Report was prepared by:

Rachel Lindbloom, MA, LSCSW

and

David Clark, RAIII

The report was reviewed by:

Marti Macchi, KDHE, Office of Health Promotion

and

Sally Perkins, Kansas Hospital Association

Data upon which this report was based were collected by:

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Our Vision – Healthy Kansans Living in Safe and Sustainable Environments

As the state's environmental protection and public health agency, KDHE promotes responsible choices to protect the health and environment for all Kansans. Through education, direct services, and the assessment of data and trends, coupled with policy development and enforcement, KDHE will improve health and quality of life. We prevent illness, injuries and foster a safe and sustainable environment for the people of Kansas.

Pulmonary Hypertension Hospitalizations
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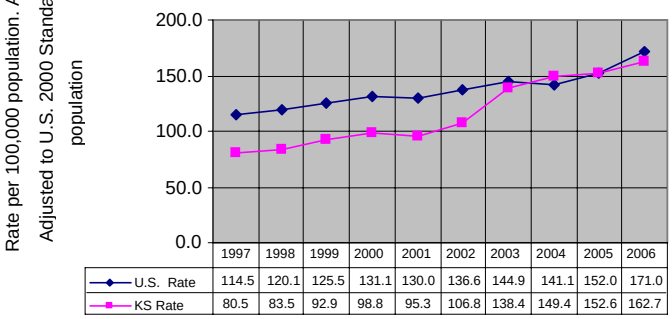
Pulmonary hypertension is a devastating disease with a poor long-term prognosis. It varies depending on diagnosis caused by diseases of the heart and lung such as COPD, emphysema, pulmonary embolism, left ventricle heart issues, among others. Early symptoms of pulmonary hypertension (PH) appear as shortness of breath and fatigue. Symptoms that often appear in later stages of the disease are reduced exercise tolerance, fainting, swelling of the ankles or legs, and chest pain.

METHODOLOGY: Healthcare Cost and Utilization Project (HCUPnet) national community hospital discharge data from the Agency for Health Research Quality (AHRQ) and Kansas community hospital discharge data from Kansas Hospital Association (KHA) for 1997-2006 are used to compare trends in Kansas and national pulmonary hypertension hospitalization rates. Any patient record diagnosis International Classification of Disease 9th Edition (ICD-9) codes of 416.0, 416.8 and 416.9 were included in this analysis. KHA data 2003-2006 are used to compare hospitalization rates among Kansas racial/ethnic population groups. Racial/ethnic group include White non-Hispanic, Black non-Hispanic, Asian/Native Hawaiian or Other Pacific Islander non-Hispanic, American Indian/Alaskan Native non-Hispanic, and Hispanic. Statistics for the category Other/Unknown consisting of multi-racial and individuals of unknown racial and ethnic origin are not included due to data reporting issues and statistical reliability concerns.

TRENDS: "Results from a national registry of patients with primary pulmonary hypertension indicated that the duration from onset of symptoms to death was 2.8 years."[1] An estimated 500 to 1,000 new cases are diagnosed annually in the U.S. [2] Between 1997 and 2006, the estimated number of patients hospitalized with pulmonary hypertension (PH) increased by 73 percent in the U.S. (303,366 to 525,567), while in Kansas for a comparable time period, the number doubled (2,238 to 4,856). The age-adjusted hospitalization rate rose 49 percent in the U.S. and increased 102 percent in Kansas between 1997and 2006. Kansas rates were lower than national rates until 2003 where a sharp rate increase is evident. (Figure 1)

Figure 1: Age-Adjusted Hospitalization Rates for Pulmonary Hypertension as Any Listed Diagnosis by Year, U.S.* and Kansas**, 1997-2006



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
U.S. Rate	114.5	120.1	125.5	131.1	130.0	136.6	144.9	141.1	152.0	171.0
KS Rate	80.5	83.5	92.9	98.8	95.3	106.8	138.4	149.4	152.6	162.7

* Nationwide Inpatient Sample, AHRQ
** Kansas Hospital Discharge Data

CATEGORIES: The World Health Organization (WHO) divides PH into five groups based on the cause of the disease. Group 1 is called pulmonary arterial hypertension (PAH) and groups 2 through 5 are called PH. However, together all groups are termed PH.

- Group 1 PAH includes cases with no known cause, those that are inherited, and those caused by conditions such as congenital heart disease, HIV infection, certain diet medicines, street drugs, and thyroid diseases.
- Group 2 includes PH with left heart disease. Conditions such as mitral valve disease or long-standing high blood pressure can cause left heart disease and PH.
- Group 3 includes PH linked to lung conditions such as COPD (chronic obstructive pulmonary disease) and interstitial lung disease. Group 3 also includes PH linked to disorders such as sleep apnea.
- Group 4 includes PH due to blood clots in the lungs. This group also includes PH due to sickle cell anemia.
- Group 5 includes PH due to various other diseases or conditions like sarcoidosis, Langerhans cell histiocytosis, and lymphangioleiomyomatosis (LAM). This type of PH also may be due to an object, such as a tumor, pressing on the pulmonary blood vessels.

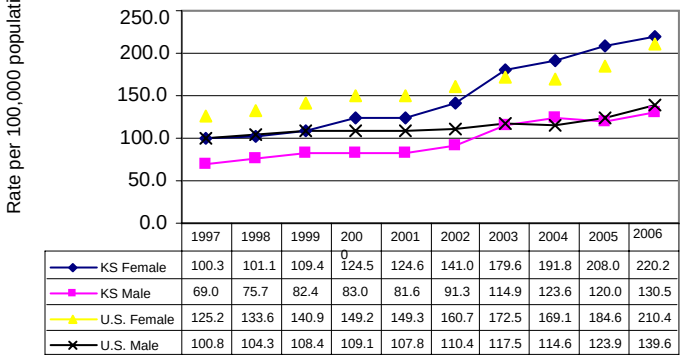
“Sometimes other terms are used to describe the different types of PH. Group 1 PAH that has no known cause may be called primary or idiopathic PAH. When PH occurs with or is caused by another disease or condition, it may be called secondary PH.” [3]

Risk Factors: Anyone can develop PH. People who are at increased risk for PH include:

- People between the ages of 20 and 60.
- Those of female gender.
- “Those who have a family history of the condition.
- Those who have certain diseases or conditions, such as heart and lung diseases, liver disease, HIV infection, or blood clots in the pulmonary arteries.
- Those who use certain diet medicines or street drugs”. [3]
- Those of African-American descent. [4]

Characteristics like gender, age and race are important risk factors in the development of PH. [4] According to the National Heart, Lung and Blood Institute, there are twice as many cases of primary PH reported for women than men. [3] Both nationally and in Kansas, PH rates increased for both males and females, however, hospitalization rates among women were higher than those in men only after 1995. [5] In Kansas during years 1997 through 2006, 33,623 persons were hospitalized with PH as one of their diagnoses. Among those, 61 percent were women. (Figure 2)

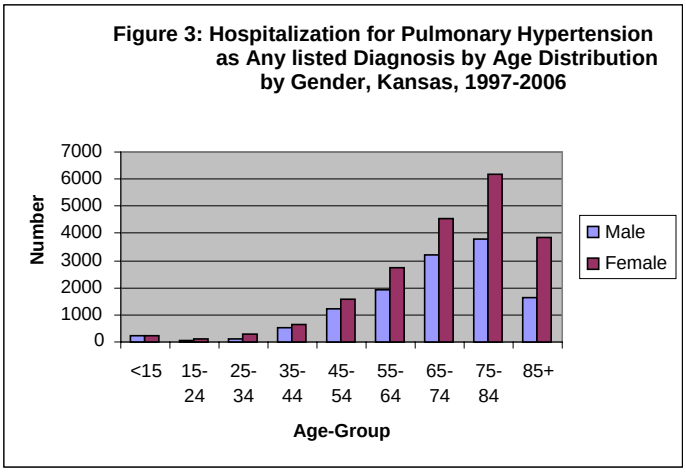
Figure 2: Hospitalization Rates for Pulmonary Hypertension as Any Listed Diagnosis by Year by Gender, U.S. and Kansas, 1997-2006



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
KS Female	100.3	101.1	109.4	124.5	124.6	141.0	179.6	191.8	208.0	220.2
KS Male	69.0	75.7	82.4	83.0	81.6	91.3	114.9	123.6	120.0	130.5
U.S. Female	125.2	133.6	140.9	149.2	149.3	160.7	172.5	169.1	184.6	210.4
U.S. Male	100.8	104.3	108.4	109.1	107.8	110.4	117.5	114.6	123.9	139.6

Nationally, although hospitalization rates increased for all age groups, the greatest increase was among adults 75 years and older [1]. In Kansas, the number of men and women hospitalized for PH increased concomitantly with age between 1997 and 2006 (Figure 3).

Figure 3: Hospitalization for Pulmonary Hypertension as Any listed Diagnosis by Age Distribution by Gender, Kansas, 1997-2006



In Kansas, during 2003 through 2006 White non-Hispanics accounted for the largest number of PH hospitalizations (79.2%), however the hospitalization rate for the Black non-Hispanic population was almost 38 percent higher than Whites. (Table 1) Black non-Hispanics are 1.4 times more likely to be hospitalized with PH than White non-Hispanics.

Table 1. Hospitalization for Pulmonary Hypertension as listed Diagnosis by Race, Kansas 2003-2006

Race	Number	Percent of Total	Rate*	Relative Rate
White non-Hispanic	14077	79.2	155.7	1.0
Black non-Hispanic	1449	8.2	214.7	1.4
American Indian/Alaska Native non-Hispanic	23	0.1	21.9	0.1
Asian/Pacific Islander non-Hispanic	54	0.3	21.8	0.1
Hispanic of Any Race	296	1.7	32.9	0.2
Other/Unknown	1873	10.5		
All	17772	100.0	162.0	

Source: KHA

*Rate per 100,000 population

DIAGNOSIS: Because PH can be of five major types, a series of tests may be conducted to determine pulmonary artery pressure, how well the heart and lungs are working, and to rule out other conditions that might be causing hypertension. These tests may include:

- Chest X-ray – Shows if the pulmonary arteries or the right ventricle in your heart are enlarged. It can also help rule out a number of lung diseases including chronic obstructive pulmonary disease (COPD).
- Electrocardiogram (EKG) – Measures the rate and regularity of your heartbeat, as well as the size and position of the right ventricle in the heart. It can rule out a number of heart diseases.
- Echocardiogram – Using sound waves it creates moving pictures of how well the heart chambers and valves are functioning and can identify areas of poor blood flow and muscles not contracting normally.
- Stress Test – During stress testing you exercise (or are given medicine if you are unable to exercise) to make your heart work harder and beat faster while heart tests are being performed. Sometimes along with stress testing, magnetic resonance imaging (MRI) or positron emission tomography (PET) scanning is performed to identify weak and or damaged parts of the heart not detected by other scanning methods.
- Spirometry – This test measures how well your lungs inhale and exhale air. It is useful to rule out lung diseases like COPD.
- Cardiac catheterization – This is the only test that can provide an accurate measure of the blood pressure in the right side of the heart and pulmonary artery.

If the tests listed above are insufficient to rule out all possible causes for the PAH, additional tests may be required:

- Perfusion lung scan – Shows blood moving in the lungs and the presence of large blood clots.
- Pulmonary arteriography – This test shows blood clots and other blockages in the pulmonary arteries and may be used if the perfusion lung scan results do not rule out blood clots.
- Blood tests – To rule out HIV, autoimmune diseases like scleroderma, and liver diseases.
- Polysomnography – Helps to rule out sleep-disordered breathing as a cause for PAH.

When administered tests do not reveal an underlying cause for PAH, the condition may be diagnosed as primary or idiopathic PAH.[3]

A new study from Baylor College of Medicine, finds that although there is increased awareness among doctors of PH, patients are being diagnosed an average of 10 months later than previously. [6]

TREATMENT: A variety of medications are available to lower blood pressure in the lungs and improve heart function. It may be necessary to try a number of these in order to formulate the most beneficial long-term treatment plan. Currently, about one-quarter of patients can be treated with oral calcium channel-blocking drugs. Intravenous prostacyclin delivered by a portable infusion pump is prescribed for patients who fail to respond adequately to treatment with oral calcium channel blockers. [2] Clinical trials are under way to evaluate a new generation of oral and inhalant drugs that may soon be available for use. [7]

Heart-lung or lung transplantation is reserved as a last resort for patients who are non-responsive to other types of treatment. [2]

Data Limitations: Review of community hospital discharge data indicates that there are significant differences in the likelihood of the occurrence of PH hospitalizations between White non-Hispanics and minorities in Kansas. Some of the more significant limitations include:

- "Rates for American Indian/Alaskan Native non-Hispanics may be affected by the absence of data from the Indian Health Service which provides services to this population group.
- Hospital discharge rates may be lower for Hispanics because they are healthier or younger than the general population and thus less likely to be ill or hospitalized, data coding issues or a combination of reasons.
- Patients admitted multiple times in a single year are counted as unique patients due to the lack of patient identifiers producing duplicate patient counts.
- The lack of patient identifiers limits data matching capacity and the ability to conduct statistical analysis related to the impact of socioeconomic status (SES), education, income, and other demographic factors that could improve the value of relative rate comparisons." [8]

CONCLUSION: Reporting of hospitalization and death rates for PH have increased as either any-listed hospital diagnosis or contributing cause of death. The number of hospitalizations and deaths also increased, particularly among women, blacks, and older adults. PH hospitalizations that occurred among adults aged 65 and older suggest that as the proportion of older adults increases, PH will continue as an increasingly frequent diagnosis. This may place a heavier burden of chronic disability and morbidity on families and the healthcare system. Clinical research continues to seek a better understanding of risk factors as well as prevention and treatment strategies to address PH. However, the Centers for Disease Control and Prevention suggest efforts should be considered to prompt physician recognition of the early symptoms, inform them about the treatment-based classification of disease entities and provide education about multiple evaluations necessary for accurate diagnosis and appropriate treatment. [5]

Rachel Lindbloom, MA, LSCSW
David Clark
Office of Health Assessment

References:

1. Pal, S. (2006). “Trends in Pulmonary Hypertension Diagnosis and Hospitalization”, *U.S. Pharmacist* Vol. 31:071-4. http://www.uspharmacist.com/index.asp?show=article&page=8_1784.htm, Accessed October 16, 2008.

2. American Heart Association (n.d.). “Primary or Unexplained Pulmonary Hypertension”, http://www.americanheart.org/presenter.jhtml?identifier=4752, Accessed January 5, 2009.

3. National Heart Lung and Blood Institute (2006). “Pulmonary Arterial Hypertension “, http://www.nhlbi.nih.gov/health/dci/Diseases/pah/pah_what.html, Accessed April 30, 2008.

4. “Pulmonary Hypertension Discriminates by Race, Gender”, Newswise Medical News (2006). http://www.newswise.com/articles/view/524202/, Accessed January 6, 2009.

5. Centers for Disease Control and Prevention. Hyduk, A., Croft, J., Ayala, C., Zheng, Z., Mensah, G. (2005).Pulmonary Hypertension Surveillance—United States, 1980–2002. In:” Surveillance Summaries”, *MMWR* 54(No. SS–5). http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5405a1.htm, Accessed August 7, 2008.

6. Mundell, E. (2008). “Women at Higher Risk for Pulmonary Hypertension”, *HealthDay News*. http://www.healthday.com/Article.asp?AID=620745, Accessed January 6, 2009.

7. Pulmonary Hypertension Association, “Understanding Pulmonary Hypertension” (2007). http://www.phassociation.org/Learn/Understanding_PH_broc.pdf , Accessed August 7, 2008.

8. Lindbloom, R., Crevoiserat, J., and Bukovatz, R. “Disparities in Preventable Kansas Hospitalizations Reviewed”. In: *Kansas Health Statistics Report* (2008), No. 37 pp 1-2.