RUTGERS
University Behavioral Health Care

UCHC Newsletter

UNIVERSITY CORRECTIONAL HEALTH CARE

SPECIAL EDITION 2015

CONTENTS:

Mortality Rates Are Lower in Corrections

Review of Literature

The aging process has been reported to accelerate among the incarcerated, largely due to poor physical and mental health services prior to incarceration. Many have estimated that inmates' physiological age averages 10 to 15 years older than their chronological age, which has been attributed to substance abuse, lack of access to health care prior to incarceration and poverty.[1,2,3,4,5] However, little empirical evidence exists to support such claims. If, in fact, inmates were physiologically older than their chronological age (thereby experiencing concomitant higher rates of chronic medical conditions), it would follow that age adjusted mortality rates for this population would likely be higher.

In his "2004 Survey of Inmates", Binswanger et al. (2009), examined the prevalence of chronic medical conditions among inmates in U.S. jails and prisons and found that compared to the general population there was an increased odds ratio for hypertension (1.17 in prison), asthma (1.34), arthritis (1.66), cervical cancer (4.82) and hepatitis (4.23), but no increased odds for diabetes, angina or myocardial infarction; and lower odds of obesity.[6]

These findings indicated that differences between the prevalence of medical conditions in the community and corrections may not be as great as had been believed. Thus, the impact of disease burden on mortality among inmates may not be as great as had been thought. Furthermore, for those medical conditions in which the prevalence is higher in corrections, the explanation, at least partially, could be directly attributed to inmates typically undergoing a health assessment at the time they enter jails and prisons. Nevertheless, Binswanger et al. conclude "Jail and prison inmates had a higher burden of most chronic medical conditions than the general population even with adjustment for important socio-demographic differences and alcohol consumption." [6]

If inmates are physiologically older than their chronological age; and if they have a higher rate of chronic medical conditions, it should follow that age adjusted mortality rates for this population would most likely be higher. However, the U.S. Justice Department, Bureau of Justice Statistics (BJS) reported in 2007 that death rates are lower in state prisons when compared to the general population by an estimated 19%, based upon data from 2001 through 2004. The average mortality rate in prison over this time period was 250:100,000. Note that the BJS

Since 2004, the BJS reports mortality rates in prisons to be slowly increasing. They attribute this to the aging prison population. In 2013 the BJS reported the average mortality rate in United States prisons to be 274:100,000.[8] BJS also estimated 40% of state inmates report having a chronic medical condition, with 30% having high blood pressure.[9]

Morbidity and Mortality within NJDOC

This review is based upon quality improvement data related to the health care of inmates within the New Jersey Department of Corrections (NJDOC) provided by Rutgers, The State University of New Jersey (Rutgers). It compares morbidity, mortality, and census data of NJDOC inmates with available morbidity and mortality data of the New Jersey general population. Populations within prison may vary from state to state related to age, race, ethnicity and substance abuse history, so any generalizations to other prison inmates must be done with caution and warrants further analysis.

University Correctional Health Care (UCHC) is the entity within Rutgers responsible for providing physical and mental health care to inmates. UCHC's quality improvement program monitors morbidity and mortality rates. NJDOC mortality data are provided to the BJS through their Health Services Unit (HSU). This analysis excludes the morbidity and mortality information of post-incarcerated residents on Special Treatment Units jointly operated by the NJDOC and Human Services. These individuals are no longer inmates; rather, they are committed to this treatment facility as a result of having been assessed sexually violent predators who have served their prison terms.

Mortality Rates within NJDOC

This review obtained New Jersey's mortality rates from the state's Department of Health, Center for Health Statistics (*New Jersey Health Statistics, 2004)* on death by age, race/ethnicity and sex.[10] From the Department of Health data, mortality rates within the NJDOC were estimated based upon actual NJ mortality rates by age, race/ethnicity (African American, Hispanic, Caucasian exclusive of Hispanics) and sex, in 2004. And the NJDOC reports annually on the age, race/ethnicity and sex of its inmate population. By adjusting mortality rates by age grouping, race/ethnicity and sex, as found within NJDOC, and using the New Jersey Health Statistics from 2004, we can derive a predicted rate for NJDOC. With this data comes the ability to see whether or not inmate mortality rates were comparable to the general population.

As previously stated, the BJS reported mortality rates within prison systems to be lower than the general population by 19%. Based upon additional literature review, predicted rates adjusted by age, race/ethnicity and sex should be higher than the state's general population. However, consistent with the BJS, this review observed the mortality rate to be lower. NJDOC, which included the cohort ages 65 and older, had almost twice as low a mortality rate compared to the general population as reported by BJS.

The following charts apply the anticipated mortality rates per the New Jersey Health Statistic, 2004[10] to the NJDOC population broken down by:

- 14 discrete age groupings

Anticipated Mortality Rates for Males Based Upon NJDOC Population January 2015*							
Race/Ethnicity**		African American		Hispanic		Caucasian (Exclusive of Hispanic)	
Age Groups	Male Pop	Rate/ 100,000	Anticipated Deaths	Rate/ 100,000	Anticipated Deaths	Rate/ 100,000	Anticipated Deaths
18-20	397	147.4	0.6	50.5	0.2	85.5	0.3
21-22	1,111	219.2	2.4	86.8	1.0	140.7	1.6
23-24	1,528	271.4	4.1	120.4	1.8	94.2	1.4
25-27	2,332	275.7	6.4	90.2	2.1	131.4	3.1
28-30	2,162	253.1	5.5	87.1	1.9	124.0	2.7
31-33	2,071	299.0	6.2	105.8	2.2	119.8	2.5
34-36	1,897	279.0	5.3	117.7	2.2	126.6	2.4
37-39	1,608	315.4	5.1	115.2	1.9	128.5	2.1
40-44	2,447	375.6	9.2	154.4	3.8	198.7	4.9
45-49	2,002	529.0	10.6	223.8	4.5	327.9	6.6
50-54	1,476	805.6	11.9	384.0	5.7	498.6	7.4
55-59	798	1314.3	10.5	576.2	4.6	734.5	5.9
60-64	411	2153.8	8.9	917.2	3.8	1407.0	5.8
>64	370	4413.0	16.3	2591.8	9.6	4576.9	17.0
Total	20,611		**103.0**		**45.2**		**63.4**

Anticipated Mortality Rates for Females Based Upon NJDOC Population January 2015*							
Race/Ethnicity**		African American		Hispanic		Caucasian (Exclusive of Hispanic)	
Age Groups	Female Pop	Rate/ 100,000	Anticipated Deaths	Rate/ 100,000	Anticipated Deaths	Rate/ 100,000	Anticipated Deaths
18-20	7.91	32.6	0.0	10.8	0.0	27.4	0.0
21-22	38.42	100.2	0.0	28.2	0.0	55.1	0.0
23-24	53.11	55.0	0.0	24.9	0.0	49.8	0.0
25-27	98.31	75.2	0.1	42.5	0.0	53.6	0.1
28-30	103.96	117.7	0.1	35.2	0.0	55.2	0.1
31-33	102.83	140.4	0.1	57	0.1	77.2	0.1
34-36	72.32	100.9	0.1	54.8	0.0	58.6	0.0
37-39	59.89	163.3	0.1	57.2	0.0	86.5	0.1
40-44	102.83	253.2	0.3	61.4	0.1	120.4	0.1
45-49	94.92	383.6	0.4	11.8	0.0	203.1	0.2
50-54	77.97	603.9	0.5	200.5	0.2	323.8	0.3
55-59	36.16	786.4	0.3	271.6	0.1	471.2	0.2
60-64	12.43	1324.3	0.2	577.8	0.1	883.9	0.1
>64	13.56	3754.5	0.5	2008.4	0.3	4344.5	0.6
Total Female***	874.62		**2.6**		**0.9**		**1.8**

Predicted Number of Deaths within NJDOC Adjusted by Age, Race/Ethnicity, and Sex within NJDOC Using Rates from NJ Health Statistics, 2004					
NJDOC Population		**Predicted Deaths Per Year**	**African American 61%**	**Hispanic 16%**	**Caucasian (Excluding Hispanic) 23%**
Total Male	20,611	Anticipated Deaths of Males by Race	102.99 x 0.61	45.17 x 0.16	63.43 x 0.23
Total Female ****	875	Anticipated Deaths of Females by Race	2.64 x 0.61	0.91 X 0.16	1.77 x 0.23
Total	21,486	Anticipated Adjusted by Race	105.63x0.61= **64.43**	46.08x0.16 = **7.37**	65.2x0.23= **15.00**
Total Predicted Deaths Per Year Adjusted by Age, Race/ Ethnicity & Sex					**86.80**

Predicted Compared to Actual Number of Deaths

Sex	**Predicted per Year**		**Actual CY 2015 thru September**	**Actual CY 2014**	**Actual CY 2013**	**Actual CY 2012**
Male	84.6		38	47	47	46
Female	2.2		1	3	0	3

Predicted Number of Deaths within NJDOC Based Upon NJ Health Statistics 2004

NJDOC Population		**Predicted Deaths Per Year**	**African American 61%**	**Hispanic 16%**	**Caucasian (Excluding Hispanic) 23%**
Total Male	20,611	Anticipated Deaths of Males by Race	102.99 x 0.61 = 62.82	45.17 x 0.16	63.43 x 0.23
Rate of Accidents & Homicide for Males			9.61% (6.04)	14.11% (1.01)	4.30% (0.63)
Total Female ****	875	Anticipated Deaths of Females by Race	2.64 x 0.61 = 1.61	0.91 x 0.16	1.77 x 0.23
Rate of Accidents & Homicide for Females			7.38% (0.11)	4.28% (0.01)	2.35% (0.01)
Total	21,486	Total Anticipated Adjusted by Race	64.43 – (6.04+0.12) = **58.28**	7.37 – (1.02 + 0.01) = **6.35**	15 – (0.63 +0.01) = **14.36**
Total Predicted Deaths Per Year Adjusted by Age, Race/Ethnicity, & Sex, Exclusive of Accidents and Homicides					**78.99**

*Source: http://www.state.nj.us/health/chs/stats04/mort04.pdf#dt2
**Source: http://www.state.nj.us/corrections/pdf/offender_statistics/2015/By%20Ethnicity_Race%202015.pdf January 2015; Asian and Pacific Islander, 1% of Population included in White category
*** Formula-% Race/Ethnicity*(Male and Female Anticipated Deaths)-%Race/Ethnicity*(Rate of Accidents

Based upon these rates, NJDOC would anticipate with its current population to have approximately 86 deaths annually. Exclusive of accidents and homicides (which occur much less frequently within prisons), the anticipated number of deaths would be approximately 79. Using the more conservative BJS rate estimate that excludes the group ages 65 and older and those with MVAs, BJS would predict a mortality rate 19% lower than the general population of approximately 64 (78.98 x 0.81) per year.

In the past 3.75 years, NJDOC has seen an annual range of 47 to 52 deaths per year averaging 50 per year for a rate of 230:100,000. This is approximately 37% below the predicted rate based upon mortality in the community, exclusive of accidents and homicides. This is also approximately 16% below the national mortality rate for prison inmates reported by the BJS in 2013 (274:100,000).

The following table provides a comparison of the predicted number of deaths by age group in the community based upon NJ Health Statistics 2004[10], and the average number of deaths by age group within the NJDOC. For those under age 50, the actual number of deaths within NJDOC is remarkably lower than the community. For those over age 50, the predicted rate is comparable to the actual rate.

Unlike younger adult males living in New Jersey communities, all inmates upon intake receive an initial health assessment, are seen quarterly if they have a chronic medical condi-

Age Groups	Predicted Deaths Per Year Based on NJ Health Statistics 2004	NJ Average Deaths Per Year Over Past 3.75 Years	Predicted Deaths Per Year Based on BJS's Rate in 2013	NJ Actual Number of Deaths within NJDOC by Year and Age Grouping			
				CY 2015 thru Sept	CY 2014	CY 2013	CY 2012
18-20	0.5	0.0		0	0	0	0
21-22	2.0	0.0		0	0	0	0
23-24	3.2	0.5		0	1	0	1
25-27	5.0	0.8		1	1	0	1
28-30	4.3	0.8		1	1	0	1
31-33	4.8	1.6		1	2	2	1
34-36	4.2	1.3		3	0	2	0
37-39	3.9	1.6		0	2	1	3
40-44	7.5	2.7		1	1	5	3
45-49	9.0	3.7		1	3	4	6
50-54	10.2	7.5		6	6	7	9
55-59	8.7	8.8		7	10	5	11
60-64	7.5	5.9		3	9	4	6
>64	15.9	14.1		15	14	17	7
Total	**86.8**	**49.3**	**59.0**	39	50	47	49
Rate: 100,000	**404**	**230**	**275**				

The following table provides more details as to the cause of death for NJDOC inmates by year

Year	Cancer	Heart Disease	Liver Disease	Respiratory Disease	AIDS Related	All Other	Suicides	Drug/Alcohol Intoxication	Accidents	Homicides
2012	11	14	8	4	3	4	2	1	1	1
2013	9	15	9	5	1	7	1	0	0	0
2014	16	9	7	2	1	7	6	1	1	0
2015 thru September	8	14	6	2	0	7	1	0	0	1
Total	44	52	29	13	5	25	10	2	2	2
NJ Annual Rate/100K	*52*	*61*	*34*	*15*	*6*	*29*	*12*	*2*	*2*	*2*
BJS 2001-2012 Rates for US Prisons*	*66*	*65*	*24*	*15*	*11*	*43*	*16*	*3*	*2*	*4*

***http://www.bjs.gov/content/pub/pdf/mljsp0012st.pdf**

Overall, the N.J. rate is lower than the national rate by 14 deaths for 'All Other,' by 14 for 'Cancer,' by 5 for 'AIDS,' by 4 for 'Suicide, by 3 for 'Heart', and by 2 for 'Homicides (deaths that occur from

To calculate the rate per 100,000, an average census of 22,684 is based upon annual census numbers from 2012 through 2015.

Calendar Year	Census
2012	23,810
2013	23,123
2014	22,318
2015	21,486
Average	**22,684**

Within an increasingly aging NJDOC population, deaths related to dementia have increased. In the last three years NJDOC had five individuals whose primary cause of death attributed to dementia.

These findings do not support the widely held opinion that inmates are physiologically 10 to 15 years older than their chronological age. If that were the case, NJDOC would have more inmate deaths annually than predictions based upon the state's overall mortality rate when adjusted by age, race/Hispanic ethnicity and sex.

Another study by Binswanger et al. (2007), may offer greater understanding as related to mortality rates of individuals who have been inmates. Their observation was that a few weeks following release, inmate's mortality rates soared.[12] They attributed this finding to a large subset of this population returning almost immediately to abusing drugs after release.

Morbidity Rates within NJDOC

The NJDOC inmate population, as a result of higher rates of earlier substance abuse commonly observed in prison populations, has increased incidences of infectious diseases including HIV and Hepatitis C. The rate of HIV in the adult population within the United States is approximately 0.38% (http://www.cdc.gov/hiv/statistics/basics/ataglance.html). But the number within the NJDOC as of August 2015 is 1.52% (327), four (4) times higher than the general population. Likewise, the rate of Hepatitis C in the general population is only about 0.85% (http://www.cdc.gov/hepatitis/hcv/hcvfaq.htm.) Within NJDOC, it is at least 7.2% (1,544), eight (8) times higher than the general population. These chronic diseases within prison, however, are typically manageable.

Other non-addiction related chronic diseases, however, do not appear to be different within the NJDOC when compared to the general population. For instance, as was noted by Binswanger et al. (2009), the rate of diabetes in prison appears to be comparable to the NJ general population. When applying the age adjusted rates of diabetes in New Jersey[11] to the prison system, the anticipated number of cases would be **1,358.** The actual number diagnosed with diabetes is **1,365**, indicating no remarkable difference between the two.

Age Group	Rate of 2011 NJ Population with Diabetes*	Expected Numbers in NJDOC 2015
<45	4 .9%	791
45-54	8.4%	305
55-64	14.1%	177
65+	22.2%	85
	Total Expected	**1,358**

* http://www.state.nj.us/health/fhs/diabetes/documents/diabetes_in_nj.pdf

Applying national data for the adjusted prevalence rate of hypertension in 2010 from the Center for Disease Control (CDC), the anticipated number would be 3,816. The actual number with this diagnosis, however, is 2,821 in a system with universal screening. This finding is different from what Binswanger et al. (2009) reported based upon a national survey of inmates using self-report of hypertension. Possible reasons for this discrepancy may result from a lack of discrete age groups in the comparison and/or individuals possibly assessing themselves to have high blood pressure based upon one high reading.

Age Group	Rate of US Population 2010 with Hypertension*	Expected NJDOC Numbers 2015
<45	9.8%	1,582
45-64	40.4%	1,976
65+	71.6%	274
	Total Expected	**3,816**

*http://www.cdc.gov/mmwr/preview/mmwrhtml/su6203a24.htm

When applying the NJ Department of Health 2011-2012 prevalence rate of 8.83% for asthma in

Overall, the percentage of inmates with one or more chronic diseases within NJDOC is comparable to the general population. As of January 2015, 7,854 inmates have been identified with one or more chronic diseases, excluding mental illness. The national rate for the population with one or more chronic diseases adjusted by age and excluding mental illnesses is as follows:

- 18 - 44: 27%
- 45 - 64: 63%

Applying the rates above to inmates within these age groups in 2015 would result in 7,758 having one or more chronic diseases, just 1% lower than the rate observed within the N.J. general population. This suggests that the number of inmates with one or more chronic diseases within prison is comparable to the rate in the general population.

With significant numbers of NJDOC inmates having a history of substance abuse, greater than expected rates of related infectious diseases have been noted. As the provision of health care within prison systems can be viewed as that of controlled medical homes, other chronic medical conditions appear to be controlled as well as, or better than, the general community. Unlike general populations, all inmates with chronic medical conditions in the NJDOC are also seen at least quarterly, which can

Clinics	Enrolled 2015	Rate
Cardiology	4,591	21.37%
Endocrinology	1,794	8.35%
Oncology	186	0.87%
General	132	0.61%
Infectious Disease	1,533	7.13%
Neurology	385	1.79%
Pulmonology	1,585	7.38%

Conclusion

Overall, the NJDOC inmate population has a much lower mortality rate as well as a lower morbidity rate for asthma and hypertension. This comparison noted a >40% lower mortality rate among inmates compared to the general population of New Jersey. It was about double the difference noted by the BJS for prison inmates throughout the United States. For individuals under 50 years of age, the risk of death in prison is far less than in the community. However, as they age, the rates shift to being comparable. This may be a result of younger men in the community being much less likely to avail themselves of health care. In prison, all inmates must go through a health screening and anyone with a chronic medical condition must be seen quarterly with the N.J. prison system.

The rate for diabetes is approximately equal. The rates for Hepatitis and HIV are eight and four times higher which is related primarily to higher rates of substance abuse. These observations do not support the claims of the aging process as being accelerated among those incarcerated.

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10/29/2015