

# Death in Prison: Changing Mortality Patterns among Male Prisoners in Maryland, 1979–87

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**Abstract:** The leading causes of death (rate per 100,000 prisoner-years) in Maryland state prisons for the period 1979–87 were circulatory system disease (59), suicide (40), and homicide and legal intervention (30). Acquired immunodeficiency syndrome (AIDS) became the leading cause of death in 1987. Homicides declined after

1980; drug overdose deaths peaked in 1981 and later disappeared. Male inmates have 39 percent lower all-cause death rates than the general population of Maryland after adjustment for age and race. (*Am J Public Health* 1990; 80:1479–1480.)

## Introduction

Growing concern with the quality of prison health care has led several groups, notably the American Public Health Association, to develop standards of care for the incarcerated.<sup>1</sup> Despite the recognition that outcomes, including mortality, are useful indicators of quality of care in hospitals<sup>2</sup> and potentially prisons, prison standards do not require routine monitoring. Of over 500,000 inmates in state and federal prisons, 915 males died in the year ending June 1987.<sup>3</sup> National criminal justice statistics<sup>3,4</sup> merely group by type of death, and do not compute rates, make comparisons, or follow trends. Earlier studies<sup>5,6</sup> suggest that inmates have lower mortality than the general population. Descriptive studies have been reported from jails<sup>5,7–10</sup> but not from state prisons where inmates have longer sentences.

This study was designed to: investigate deaths among inmates in the Maryland prison system, examine trends, and compare inmate mortality with that of the general population.

## Methods

All male deaths of Maryland state prisoners between January 1, 1979 and December 31, 1987 were studied. Maryland prisons house those persons convicted and sentenced to at least one year; the average stay is 40 months.<sup>11,12</sup> Females comprise only 4 percent of inmates, and were excluded. The prison management information system provided prisoner characteristics. Causes of death obtained from death certificates were classified by nosologists according to the International Classification of Diseases (ICD), 9th edition.<sup>13</sup> Deaths due to illicit drug overdose had been inconsistently classified; for the study they were grouped as unintentional poisoning (ICD E850–E858).

Annual and cause-specific death rates were calculated using prison census figures.<sup>11,12</sup> Indirect standardization used age- and race-specific death rates from Maryland<sup>12,14–16</sup> to calculate expected deaths and standardized mortality ratios (SMR). The 95 percent confidence interval (CI) of the SMR was computed.<sup>17</sup>

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## Results

Between 1979 and 1987, 204 male inmates died during 93,445 prisoner-years (crude mortality rate 218 per 100,000 prisoner-years). Of the deaths, 140 were from natural causes, 37 suicides, 16 illicit drug overdoses, 9 other unintentional injuries, and two undetermined (Table 1). Leading causes of death (rate per 100,000 prisoner-years) were circulatory system disease (59), suicide (40), homicide and legal intervention (30), malignant neoplasms (28), and unintentional injuries (25).

All-cause mortality peaked in 1980–81 and has since declined paralleling external causes (Figure 1). The natural-cause death rate remained relatively constant, although individual cause rates varied, especially for circulatory system diseases (data available from author on request). Infectious disease death rates were zero until 1984 when they increased rapidly, largely related to human immunodeficiency virus (HIV) infection, and became the leading cause of death in 1987 (65 per 100,000). Other natural causes of death occurred at steady rates. Illicit drug overdose accounted for a rise in external cause death rate that peaked in 1981 (data available from author on request). Homicide and legal intervention deaths had a slight peak in 1980–81 and decreased thereafter. Only one death was due to motor vehicles.

When compared with the Maryland general population,

**TABLE 1—Comparison of Mortality among Male Prisoners (1979–87) with That of Men in the Maryland General Population (1983) for Major Causes of Death**

Cause of Death (ICD Code)	Number of Deaths			
	Observed	Expected	SMR*	(95% CI)
Infectious and parasitic (001–139)	12	6.1	197	(114, 366)
Malignant neoplasms (140–208)	26	53.9	48	(33, 73)
Endocrine and metabolic (240–279)	1	4.6	22	(1, 121)
Circulatory system (390–459)	55	76.8	72	(54, 93)
Respiratory system (460–519)	9	8.6	105	(48, 199)
Digestive system (520–579)	5	11.4	44	(14, 103)
Genitourinary system (580–629)	3	3.3	90	(19, 264)
External causes (E800–E999)	88	119.4	74	(59, 91)
Unintentional injuries (E800–E949)	23	48.6	47	(23, 87)
Suicide (E950–959)	37	20.1	184	(130, 253)
Homicide and legal intervention (E960–E978)	28	47.5	59	(39, 85)
Other causes of death (290–239, 280–389, 630–799)	5	38.6	13	(4, 30)
All causes	204	334.2	61	(53, 70)

\*Standardized mortality ratio

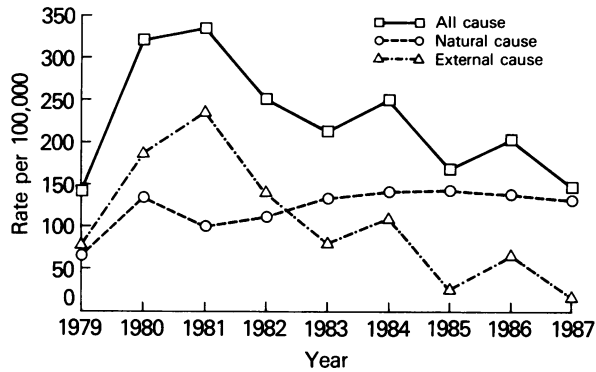


FIGURE 1—All Cause Mortality Rate of Male Inmates over Time, Natural Cause and External Cause Mortality Rates, Maryland State Prison System, 1979–87.

prisoners had lower all-cause mortality for the eight-year period (Table 1) and only suicide and infectious disease deaths were significantly elevated.

### Discussion

We examined cause of death in long-term (prison) inmates. Although prisoners had lower all-cause mortality than the general population, significant elevations of suicide and infectious disease deaths were observed. Infectious disease mortality increased due to AIDS, which emerged in 1987 as the leading cause of inmate death. Although fewer than 20 AIDS cases were diagnosed before 1988, the problem will increase since 7 percent of entering male inmates were HIV infected,<sup>18</sup> and HIV transmission has been demonstrated.<sup>19</sup> AIDS prevention and treatment should remain a top correctional health priority. The need for suicide prevention was discussed elsewhere.<sup>12</sup>

Cancer mortality was 46 percent below the comparison population. Circulatory system deaths were also lower, in contrast to prior studies.<sup>6</sup>

External cause mortality overall was 26 percent below that of the general population. Homicide declined steadily and was 41 percent below that of the general Maryland population, although 13 percent of prisoners were convicted murderers. Improved security in the prison, including metal detector installation, is probably responsible for this decline. All injury deaths are potentially preventable and should be investigated.<sup>10</sup>

The epidemic of illicit drug overdose deaths between 1980 and 1982 is probably related to pentazocine (Talwin) use. Six of 16 overdose death certificates reported pentazocine. Pentazocine, although manufactured for oral use, was frequently injected by drug abusers. Its 1983 reformulation added the narcotic antagonist naloxone (inactive when taken orally), reducing overdose deaths nationwide<sup>20,21</sup> and in this prison.

There is a great deal of appropriate concern about poor conditions, riots, murders, outbreaks of illness, and standards of medical care in prisons. Nevertheless, the 39 percent lower Maryland prisoner mortality, similar to that reported in other studies,<sup>5,6</sup> suggests reason for optimism. Decreased mortality may be from a protected environment or lifestyle or a "healthy inmate effect" from selection factors.<sup>5,6</sup> Although data were unavailable from the medical parole program, in our experience premature discharges were rare (none for AIDS) and unlikely to explain lower mortality. Access to medical care may be better in prison than in the general

population, which may lead to early detection and treatment of chronic disease. The effect of the availability of correctional officers trained in cardiopulmonary resuscitation needs further study. Limited access to weapons and motor vehicles is likely responsible for low injury mortality, although suicide is elevated. Data limitations preclude an analysis of the development of conditions over time.

The Supreme Court has reiterated the right of prisoners to adequate health care.<sup>22</sup> Any inmate death raises questions about cause, quality of care, and legal responsibility.<sup>5,10</sup> Despite our finding of lower mortality among prisoners, all prisoner death should be investigated to identify remediable health care or safety deficiencies. Improved prison health surveillance is needed for deaths and to determine the effect of prison health services on morbidity.

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### REFERENCES

- Dubler NN (ed): Standards for Health Services in Correctional Institutions, 2nd Ed. Washington, DC: American Public Health Association, 1986.
- Kahn KL, Brook RH, Draper D, *et al*: Interpreting hospital mortality data: how can we proceed? *JAMA* 1988; 260:3625–3628.
- American Correctional Association: Juvenile and adult correctional departments, institutions, agencies and paroling authorities, United States and Canada. College Park, MD: ACA, 1988; xxxii–xxxiv.
- McGarrell EF, Flanagan TJ (eds): Sourcebook of Criminal Justice Statistics—1984. Pub. No. NCJ-96382, US Department of Justice, Bureau of Justice Statistics. Washington, DC: Govt. Printing Office, 1985.
- Novick LF, Remmlinger E: A study of 128 deaths in New York City correctional facilities (1971–76). Implications for prisoner health care. *Med Care* 1978; 16:749–756.
- Clavel F, Benhamou S, Flamant R: Decreased mortality among male prisoners. *Lancet* 1987; 2:1012–1014.
- Smialek JE, Spitz WU: Death behind bars. *JAMA* 1978; 240:2563–2564.
- Lanphear BP: Deaths in custody in Shelby County, Tennessee, January 1970–July 1985. *Am J Forens Med Pathol* 1987; 8:299–301.
- Copeland AR: Deaths in custody revisited. *Am J Forens Med Pathol* 1984; 5:121–124.
- Smith R: Deaths in prison. *Br Med J* 1984; 288:208–212.
- Salive ME, Brewer TF: Medical care behind bars: Maryland prison system. *Maryland Med J* 1989; 38:246–249.
- Salive ME, Smith GS, Brewer TF: Suicide mortality in the Maryland State prison system, 1979 through 1987. *JAMA* 1989; 262:365–369.
- International Classification of Diseases, ninth revision. Clinical modification, DHEW Pub. No. PHS-80-1260. Washington, DC: Govt Printing Office, 1980.
- National Center for Health Statistics. Vital Statistics of the United States, 1983 Vol. II-Mortality, Pt. A. Hyattsville, MD: Department of Health and Human Services, NCHS, 1987; 244–277.
- National Center for Health Statistics. Vital Statistics of the United States, 1983 Vol. II-Mortality, Pt. B. Hyattsville, MD: Department of Health and Human Services, NCHS, 1987; 309–314.
- Bureau of the Census: General Population Characteristics, Final Report 1980, PC80-1-B22, Maryland. Washington, DC: US Department of Commerce, Series P-26, No. 84-52-C, March 1985.
- Bailar JC, Ederer F: Significance factors for the ratio of a poisson variable to its expectation. *Biometrics* 1964; 20:639–643.
- Vlahov D, Brewer F, Munoz A, *et al*: Temporal trends of human immunodeficiency virus type 1 (HIV) infection among inmates entering a statewide prison system, 1985–1987. *J AIDS* 1989; 2:283–290.
- Brewer TF, Vlahov D, Taylor E, Hall D, Munoz A, Polk BF: Transmission of human immunodeficiency virus (HIV) within a statewide prison system. *JAIDS* 1988; 2:363–367.
- Baum C, Hsu JP, Nelson RC: The impact of the addition of naloxone on the use and abuse of pentazocine. *Public Health Rep* 1987; 102:426–429.
- Pokolis A: Decline in abuse of pentazocine/tripelenamine (T's and blues) associated with the addition of naloxone to pentazocine tablets. *Drug Alcohol Dependence* 1984; 14:135–140.
- West v. Atkins*, 108 S. Ct. 2250 (1988).