

ANALYSIS OF 2016 INMATE DEATH REVIEWS IN THE CALIFORNIA CORRECTIONAL HEALTHCARE SYSTEM

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I. INTRODUCTION

The California Correctional Healthcare System (CCHCS) was placed under Federal Receivership in October 2005, when California was found to be violating State prisoner rights under the eighth amendment to the U.S. Constitution. The long history of substandard medical care in the state prison system was found to result in poor or no access to appropriate health care services, resulting in many unnecessary deaths. Since that time, the Receivership has been transforming the CCHCS (formerly California Prison Healthcare System) in order to provide constitutionally adequate medical care to the inmates in the 35 prison facilities. The CCHCS website, cphcs.ca.gov, highlights the mission of the Receiver:

- “to reduce unnecessary morbidity and mortality and protect public health by providing timely access to safe, efficient medical care and to coordinate medical care with mental health, dental and disability programs”
- to move from a system of “chaotic care that is largely episodic and consists of often untimely and uninformed encounters between patients and clinicians” to a system of “proactive, planned, informed, patient-centered and professional care.”

This is the eleventh annual analysis of inmate death reviews in the CCHCS.

It will describe the CCHCS death review process and how it is incorporated into the overall strategy of improving the quality of healthcare. It will describe the systematic process of identifying lapses in healthcare, and how the overall goal of preventing unnecessary deaths is being accomplished. All causes of death, serious care lapses and preventable deaths will be identified and trended from 2006 through 2016.

This and all prior death report analyses are available at the [CCHCS website](http://cphcs.ca.gov).

II. DEATH REVIEW PROCESS

The CCHCS maintains a Death Reporting and Review Program in which every patient death occurring within the custody of the California Department of Corrections and Rehabilitation (CDCR) is reviewed. The purpose of the program is to identify patterns of lapses in care related to the cause of death and to determine opportunities for improvement.

When an inmate death occurs, an initial death review summary is submitted within five calendar days to the statewide Death Review Unit (DRU) by the institution where the death occurred. This initial report includes a chronology of significant events including the emergency medical response, any identified lapses in health care delivery and any identified system issue which may have contributed to death.

At the DRU, each death is assigned to a physician reviewer and a nurse reviewer. An extensive review of the patient’s medical and nursing care is conducted. Every clinical encounter in the six months prior to death, and if relevant, beyond six months, is reviewed. The quality of care experienced by the patient at each encounter is evaluated. Factors evaluated include the quality of triage and evaluation, timeliness of access to care, the quality of care for any chronic medical condition, adherence to published evidence-based care guides, responses to all abnormal laboratory and X-ray studies, and

the timing and quality of emergency response. In addition, the presence of a primary care physician and adherence to a primary care model of care delivery is noted.

All suicides or possible suicides undergo a separate case review by a member of the Suicide Prevention and Response Focused Improvement Team (SPRFIT), which includes a Mental Health Program review.

In every case, the cause of death is determined. Care lapses are noted, especially any that may have contributed to the patient death. The physician reviewer then makes a judgment as to whether the death was preventable, possibly preventable or not preventable.

Each death review is presented by the assigned reviewer to the Death Review Committee (DRC). The DRC membership is appointed by the Statewide Deputy Directors of Medical and Nursing Services. The DRC consists of three physicians, three nurses, one mental health professional, one custody representative, and one (non-voting) member of the Quality Management staff. The DRC is co-chaired by a physician and nurse executive member. Following discussion of the case, the DRC votes to attribute cause of death and the level of preventability.

Functions of the death review process include identifying individual providers for further peer review, identifying opportunities for improvement in healthcare policies and practices, making recommendations for changes to existing interdisciplinary care guides, and highlighting systemic areas in need of improvement. Extreme departures from the standard of care are referred to the Medical, Nursing or Mental Health Peer Review Committees or in the case of any sentinel event, to the Patient Safety Program.

The major purpose of the death review process is to reduce the occurrence of preventable death.

III. DEFINITIONS

The following definitions are used in this report.

Care lapse – any departure from the standard of care which posed a risk to patient safety.

Extreme departure – a care lapse that caused injury or exposed patients to substantial risk of injury and which no reasonable and competent provider would have provided under the same or similar circumstance.

Not preventable death – a death that could not have been prevented or significantly delayed despite identified opportunities for improvement in the medical care.

Possibly preventable death – a death wherein opportunities for clinical intervention or lapses related to care delivery were identified that MIGHT have prevented or significantly delayed the patient's death.

Preventable death – a death wherein opportunities for clinical intervention or lapses related to care delivery were identified that WOULD have prevented or significantly delayed the patient's death.

IV. TAXONOMY OF CARE LAPSES

In 2008, a taxonomy of types of medical errors or care lapses was incorporated into this annual review and was used to organize the findings of the DRC reviewers. When used systematically, this taxonomy has proven to be a useful quality improvement tool for identifying the common reasons for substandard healthcare that might result in preventable deaths. It has been useful for identifying potentially unsafe clinical practice, opportunities for system and process redesign, and educational strategies for CCHCS clinical staff.

In this taxonomy, care lapses can be organized into fourteen separate types.

Type 1 – Failure to recognize, evaluate and manage important symptoms and signs – so called clinical “red flags.”

Type 2 – Failure to follow clinical care guides or departmental policies developed and endorsed by the medical department of the CCHCS. These include evidence-based guidelines for the management of asthma, diabetes mellitus, hepatitis C infection, HIV/AIDS, chronic pain, and care at the end of life. Other care guides outline standards for the management of hypertension, acute coronary syndromes, congestive heart failure, cardiac arrhythmia, and anticoagulation.

Type 3 – Delay in access to the appropriate level of care, of sufficient duration as to result in harm to the patient.

Type 4 – Failure to identify and appropriately respond to abnormal test results.

Type 5 – Failure of appropriate communication between providers, especially at points where transfers of care occur (care transitions).

Type 6 – Fragmentation of care resulting from failure of an individual clinician or the primary care team to assume responsibility for the patient’s care - lack of a primary care model.

Type 7 – Iatrogenic injury resulting from a surgical or procedural complication.

Type 8 – Medication prescribing error, including failure to prescribe an indicated medication, failure to do appropriate monitoring, or failure to recognize and avoid known drug interactions.

Type 9 – Medication delivery error, including significant delay in a patient receiving medication or a medication delivered to the wrong patient.

Type 10 – Practicing outside the scope of one’s professional capability (may apply to nursing staff, midlevel practitioners, or physicians).

Type 11 – Failure to adequately supervise a midlevel practitioner, including failure to be readily available for consultation or an administrative failure to provide for appropriate supervision.

Type 12 – Failure to communicate effectively with the patient.

Type 13 – Patient non-adherence with suggestions for optimal care.

Type 14 – Delay or failure in emergency response, including delay in activation or failure to follow the emergency response protocol.

In 2016, the DRC developed a new taxonomy for classifying care lapses. This new taxonomy is more detailed in capturing the various causes for errors in coordination and continuity of care, clinical management, medication management, emergency medical care, transportation, nursing encounters, utilization management, and a miscellaneous category. But because the new taxonomy has not yet been consistently adopted by the physician and nurse reviewers in the DRC, it has not been used in this analysis of the 2016 deaths. The current review uses the original 2008 taxonomy.

V. THE CALIFORNIA PRISON POPULATION IN 2016

At the beginning of the Receivership in 2006, prison overcrowding was identified as a major factor contributing to the delivery of substandard medical care. A priority of the Receiver's office has been to work with the California Department of Corrections and Rehabilitation (CDCR) to significantly reduce the prison population and relieve the overcrowding in California state prisons. This effort has been successful in reducing the inmate population by 25 percent.

In 2006, the number of inmates in the CCHCS was 171,310.

By 2016, the average number of inmates in the CCHCS was 128,477. Of these, 122,770 (95.6%) were males and 5,707 (4.4%) were females.

VI. STUDY FINDINGS

A. Number and Causes of Inmate Death with Preventability Status, 2016

There were 334 inmate deaths in 2016. Of these, the death review committee designated 316 deaths as not preventable, 18 deaths as possibly preventable and 0 deaths as definitely preventable. Table 1 shows the causes of death and preventability status in 2016.

TABLE 1. CAUSES OF DEATH AND PREVENTABILITY STATUS AMONG ALL CALIFORNIA INMATES, 2016.

NUMBER OF CASES	CAUSES OF DEATH NOT PREVENTABLE	POSSIBLY PREVENTABLE
82	<p>Cancer 80: Lung (19); Colon & Colorectal (11); Pancreatic (10); Unknown Primary (8); Prostate (4); Stomach (3); Bladder (2); Brain (2); Esophageal (2); Lymphoma (3); Myelodysplastic Syndrome (2); Renal (3); Acute Myeloid Leukemia (1); Bile Duct (1); Breast (1); Chronic Lymphocytic Leukemia (1); Laryngeal (1); Leiomyosarcoma (1); Liposarcoma (1); Mesothelioma (1); Multiple Myeloma (1); Sinonasal (1); Tongue (1)</p>	2: Colon & Colorectal (1); Bladder (1)
52	<p>Cardiovascular Disease 50: Sudden Cardiac Arrest (24); Acute Myocardial Infarction (10); Congestive Heart Failure (11); Coronary Artery Disease (2); Cardiac Arrhythmia (1); Hypertrophic Cardiomyopathy (1); Right Ventricular Perforation (1)</p>	2: Sudden Cardiac Arrest (1); Acute Myocardial Infarction (1)
41	<p>Liver Disease 36: Cancer, Liver (18); End Stage Liver Disease (18)</p>	5: Cancer, Liver (5)
31	<p>Infectious Disease 29: Sepsis/Septic Shock (13); Pneumonia (6); Pneumonia-Aspiration (2); Coccidioidomycosis, Disseminated (1); Endocarditis (1); Fungal Meningoencephalitis (1); Herpes Simplex Encephalitis (1); HIV/AIDS (1); Infected Prosthetic Hip (1); Ischemic Colitis (1); Pneumonia-Pseudomonas (1)</p>	2: Sepsis/Septic Shock (1); Pneumonia (1)
29	<p>Drug Overdose 27: <i>Non-prescribed</i>: Methamphetamine (7); Methamphetamine plus opiate (5); Fentanyl (4); Heroin (4); Other Opiate (2); Other (2); Multiple (1) <i>Prescribed</i>: Diltiazem (1); Tricyclic Antidepressant (1)</p>	2: Methamphetamine (1); Other Opiate (1)
26	<p>Suicide 25 : Hanging (18); Asphyxiation (3); Other (4)</p>	1: Hanging (1)
26	<p>Homicide 26: Homicide by Inmate(s)</p>	
15	<p>Cerebrovascular Disease 14: Stroke, Hemorrhagic (7); Stroke, Ischemic (6); Intracranial Hemorrhage (1)</p>	1: Intracranial Hemorrhage (1)
10	<p>Pulmonary 10: Chronic Obstructive Pulmonary Disease (6); Pulmonary Fibrosis (3); Pulmonary Hemorrhage (1)</p>	

NUMBER OF CASES	CAUSES OF DEATH NOT PREVENTABLE	POSSIBLY PREVENTABLE
8	Circulatory System 8: Pulmonary Embolism (3); Aortic Aneurysm, Thoracic (3); Aortic Aneurysm, Abdominal (2)	
5	Neurological Disease 5: Huntington Disease (2); Alzheimer Dementia (2); Parkinson Disease (1)	
3	Gastrointestinal Disease 3: Perforated Duodenal Ulcer (1); Acute Pancreatitis (1); Hemorrhage from Gastrointestinal Wounds (1)	
2 each	Accidental Injury to Self 1: Accidental Asphyxiation due to Hanging (1) Trauma	1: Brain Anoxia (1) 2: Trauma, Multiple (1); Trauma, Head (1)
1 each	Hematology 1: Refractory Autoimmune Hemolytic Anemia (1) Endocrine/Metabolic/Nutrition/Immunity 1: Hyponatremia (1)	
334	Total 316	18

In 2016, the top seven underlying causes of death were cancer (82 cases), cardiovascular disease (52 cases), end stage liver disease including liver cancer (41 cases), infectious diseases (32 cases), drug overdose (29 cases), suicide (26 cases), and homicide (26 cases).

Because cancer of the liver (hepatocellular cancer) is a consequence of chronic inflammation and scarring caused by end stage liver disease, it is included in this analysis (as in previous annual analyses) as a subset of chronic liver disease. In 2016, all of these cases were caused by chronic hepatitis C infection, which is endemic in the CCHCS population. (Hepatitis C virus was detected in 39% of the 334 decedents.)

Of the 334 deaths, there were 325 deaths in males (97.3%) and 9 deaths in females. This is roughly proportional to the gender differences in the prison population, which in 2016 was 95.6% male.

Table 2 compares the top causes of death in CCHCS men with those in the free living American male population.

TABLE 2. TOP CAUSES OF DEATH AMONG CALIFORNIA INMATES, 2016, COMPARED TO AMERICAN MALE DEATHS, 2014 (MOST RECENT DATA AVAILABLE).

CCHCS 2016	AMERICAN MALES 2014
1. Cancer (24.6%)	1. Cardiovascular (24.5%)
2. Cardiovascular (15.9%)	2. Cancer (23.4%)
3. Liver disease (end stage), includes liver cancer (12.3%)	3. Accidental injury (6.4%)
4. Infectious diseases (9.3%)	4. Chronic respiratory (5.2%)
5. Drug overdose (8.7%)	5. Stroke (4.2%)
6. (tied) Suicide (7.8%)	6. Diabetes mellitus (3.1%)
Homicide (7.8%)	7. Suicide (2.5%)
	10. Chronic liver disease (1.4%)

Table 2 shows significant differences in the prevalence of top causes of death in the prison population as compared to all American males. In the prisoners, cancer, cardiovascular disease and end stage liver disease were the top three, accounting for 176 of 334 deaths, or 53%. There were 82 cases of cancer representing 22 separate types. Cancers of the lung (19 cases), colon and rectum (11 cases), and pancreas (10 cases) were most common. Cardiovascular disease was the cause of death in 52 cases. The 18 cases of liver cancer are grouped with the 18 cases of end stage liver disease for a total of 36 cases.

Infection by the hepatitis C virus affects 14% of all CCHCS inmates and 39% of all CCHCS decedents. In the CCHCS, the prevalence of death caused by all end stage liver disease – cirrhosis and/or hepatocellular cancer – is nine times more frequent than in the general population.

Infectious diseases, the fourth most common category of death in CCHCS patients, consists of a number of different types of infection which in prior years’ analyses, were counted as separate causes. These include sepsis, a syndrome of systemic infection that can be caused by a variety of bacterial organisms – usually victimizing patients who have compromised immune systems by virtue of advanced age, multiple chronic diseases such as diabetes or cancer, or therapies that render their immune systems vulnerable; pneumonia, often seen in patients with chronic lung disease: aspiration pneumonia, seen in patients who have compromised swallowing mechanisms because of underlying neurological disease; and a number of single cases of specific infections, such as fungal coccidioidomycosis, bacterial endocarditis, an infected artificial hip and a case of herpes simplex viral encephalitis.

Drug overdoses (29 cases), suicides (26 cases), and homicides (26 cases) are also disproportionately higher in the prison population. These three causes will be analyzed further on in this report.

The causes of death in free living American males (2014, cdc.gov) are qualitatively and quantitatively different than in the CCHCS. For American men, cardiovascular disease and cancer (all types) rank first and second and together account for 48% of all causes. Accidental injury ranks a distant third at 6.4%. Suicide ranks seventh at 2.5%. Chronic liver disease is tenth most common at 1.9%.

B. Life Expectancy in the CCHCS, 2016

Life in prison is associated with early mortality. Table 3 shows that the 325 male deaths in 2016 had an average age of 57 years, 19 years shorter than the life expectancy of American males, who lived to an average age of 76.3 years in 2014. The 9 female inmates who died in 2016 had an average age of 54, compared to the life expectancy of all American females, which was 81.2 years in 2014.

TABLE 3. RANGES AND AVERAGE AGES AT DEATH AMONG ALL CALIFORNIA INMATES, 2016

	AGE RANGE	AVERAGE AGE
Age of all 325 male decedents	20 - 87	57
Age of all 9 female decedents	27 - 70	54
Age of suicides, drug overdoses, and homicides	20 - 79	42
Suicide	21 - 67	42
Drug overdose	20 - 79	42
Homicide	27 - 66	43
Age excluding suicide, drug overdose, and homicide	26 - 87	61

The major factors in prison life which directly contribute to this early mortality are well known and include the high prevalence of depression, violence, and drug addiction. But even eliminating the 81 suicide, homicide and drug overdose deaths, the age of all other decedents in the CCHCS averaged 61 years.

There are also significant social determinants of health outcome which disproportionately affect the prison population throughout their lives. These include poverty, lack of education, severe mental illness, domestic violence, unstable families and unhealthy lifestyles. All of these contribute to the vastly shorter life expectancy in this population.

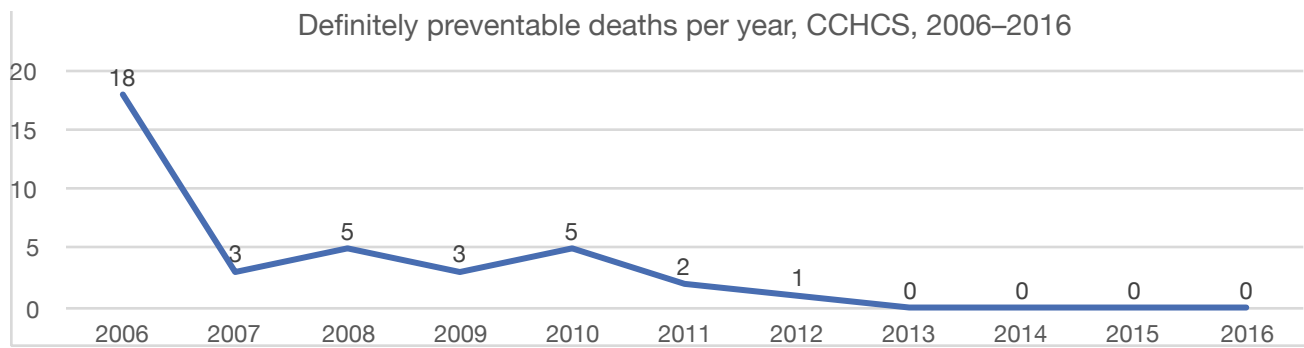
C. Not preventable Deaths in 2016

The 316 deaths classified by the DRC as not preventable in 2016 were 96.4% of the total. As seen in Table 1, except for suicides, homicides and drug overdoses these deaths were an expected result of chronic underlying disease.

D. Preventable Deaths in 2016

There were no (definitely) preventable deaths in 2016. As seen in Figure 1, this marks the fourth consecutive year in which there were no definitely preventable deaths identified by DRC review.

FIGURE 1. TREND IN CCHCS DEFINITELY PREVENTABLE DEATHS, 2006-2016.



E. Possibly Preventable Deaths in 2016.

There were 18 deaths classified by the DRC as possibly preventable in 2016. Table 4 shows the causes of death in these cases.

TABLE 4. CAUSES OF POSSIBLY PREVENTABLE DEATH AMONG CALIFORNIA INMATES, 2016.

NUMBER OF CASES	CAUSE OF DEATH
5	LIVER DISEASE - 5 Cancer, liver
2 each	CANCER - 1 Colon; 1 Bladder CARDIOVASCULAR DISEASE - 1 Acute myocardial infarction; 1 Sudden cardiac arrest DRUG OVERDOSE - 1 Methamphetamine; 1 Opioid narcotic INFECTIOUS - 1 Pneumonia; 1 Sepsis/septic shock TRAUMA - 1 Head; 1 Multiple
1 each	ACCIDENTAL INJURY TO SELF - Brain anoxia CEREBROVASCULAR DISEASE - Intracranial hemorrhage SUICIDE - Hanging/asphyxiation
18	Total

Each case is described briefly below and the type of lapse most contributory to the death is noted.

Type 1 lapses – failure to recognize, identify, or adequately evaluate important symptoms or signs – contributed in six cases:

A 74 year old man with chronic obstructive pulmonary disease died of pneumonia and sepsis. A type 1 lapse – failure to adequately manage low blood pressure and dizziness – may have contributed to this death by delaying transfer by 4 hours to a higher level of care.

A 44 year old man died of methamphetamine overdose. A type 1 lapse – failure to recognize combative agitation as a symptom of intoxication – and a type 14 lapse – delay in transfer and delay in emergency response – might have contributed to this death.

A 39 year old man died of sepsis from endocarditis. A type 1 lapse – failure to properly evaluate fever and chills and failure to follow up significant symptoms – contributed to a 3-day delay in diagnosis (type 3 lapse), which might have contributed to this death.

A 40 year old man died of suicidal asphyxiation. A failure to recognize the patient's suicidal ideation – a type 1 lapse – may have contributed to this death.

A 32 year old man died of intracranial hemorrhage following an unrecognized skull fracture. A type 1 lapse – failure to evaluate the patient's altered mental status and altered gait – contributed to this death.

A 31 year old man died of sudden cardiac arrest. Failure to evaluate recurrent chest pain (type 1) and a significant delay in activating the emergency medical response to a man down situation (type 14), contributed to this death.

Type 2 lapses – a failure to follow established guidelines for care – contributed in the following five cases:

A 59 year old man with cirrhosis died of liver cancer. A type 2 lapse -failure to do surveillance ultrasounds after treatment for hepatitis C – contributed to a possible 1 year delay in the diagnosis of liver cancer.

A 55 year old man with cirrhosis died of cancer of the liver. A type 2 lapse – failure to follow clinical guidelines for the monitoring of patients with cirrhosis for the development of liver cancer – might have caused up to a 4.5 year delay in diagnosis.

A 61 year old man with cirrhosis died of metastatic liver cancer. A type 2 failure to follow care guidelines for screening for liver cancer in patients with cirrhosis resulted in a possible 15 month delay in diagnosis, which was thought to have contributed to this patient's death.

A 67 year old man with liver cirrhosis died of complications of liver cancer. The clinical guideline for surveillance liver ultrasounds every six months in patients with end stage live disease was not followed. This may have contributed to a possible 2.5 year delay in diagnosis of the patient's liver cancer, and a lost opportunity for early treatment.

A 65 year old man with chronic hepatitis C died of metastatic cancer of the liver. Failure to follow the clinical guideline which recommends abdominal ultrasound screening every six months in patients with chronic liver disease resulted in a possible 10 month delay in the diagnosis of liver cancer.

Type 3 lapses – delay in access to care – contributed in the following two cases:

A 42 year old man died of metastatic cancer of the urinary bladder. Type 3 lapses in the surveillance plan following initial diagnosis of cancer – oncology followup was initially absent and then significantly delayed – as well as a type 6 lack of a primary care model of care contributed to a significant delay in diagnosis of recurrent bladder cancer.

A 60 year old man died of stage 4 cancer of the appendix (colon). A type 3 failure to refer to oncology after the laparoscopic diagnosis of cancer resulted in a 10 month period during which salvaging chemotherapy might have delayed or prevented death.

A Type 4 lapse – failure to respond appropriately to an abnormal test result – contributed to the following case:

A 59 year old man with liver cancer and thrombosis of the portal vein following chemotherapy, died of intracranial hemorrhage. The death was possibly preventable because of inadequate reversal of the patient's anticoagulation therapy (a type 4 lapse) and failure of provider to provider communication (type 5 lapse).

Type 5 lapses – failure of provider to provider communication – contributed to the case described above as well as to the following case:

A 59 year old man died of a cardiac arrhythmia from bilateral hemothorax (blood in the chest) due to rib fractures. A type 5 lapse – failure to recognize rib fractures after transfer – and fragmentation of care, a type 6 lapse, resulted in a failure to properly evaluate the patient's progressive dyspnea, and a delay in recognition of blood in the chest cavity.

Type 6 lapses – fragmentation of care and the absence of a primary care model – also contributed to the preceding case.

Type 14 lapses – delays in emergency response or failure to follow emergency response protocol – contributed to the following cases:

A 64 year old man with severe mental illness including schizophrenia and a recent hunger strike, died of asphyxiation after intentionally forcing various objects into his mouth. His death was considered possibly preventable because of a delayed access to the patient during an emergency situation (type 14 lapse), and a failure to access psychiatry during a life-threatening psychiatric situation.

A 57 year old man died of acute myocardial infarction. A type 14 lapse – delay of 53 minutes in activation of an emergency transport to the hospital – possibly contributed to his death.

Multiple lapses – types 1, 4, 9 (a medication delivery error) and 14 – were active in the following case:

A 79 year old man in hospice for advancing stage 4 bladder cancer, died of an accidental overdose of prescribed morphine. Multiple lapses contributed to this death, including a 3 year delay in the cancer diagnosis because of incomplete evaluation of hematuria (type 4), a failure to recognize increasing congestive heart failure (type 1), a type 9 medication delivery error (50 mg of morphine delivered by injection instead of the 15 mg ordered), and a type 14 failure to correctly use naloxone during the emergency monitoring of the patient after the morphine overdose was recognized by staff.

F. The Taxonomy for Care Lapses in 2016

One of the primary purposes of the death reviews is to identify lapses in care, regardless of whether these lapses lead to a patient death. The taxonomy for tracking these lapses has been described. Table 5 summarizes these lapses in the 2016 deaths.

TABLE 5. SUMMARY OF CARE LAPSES, 2016.

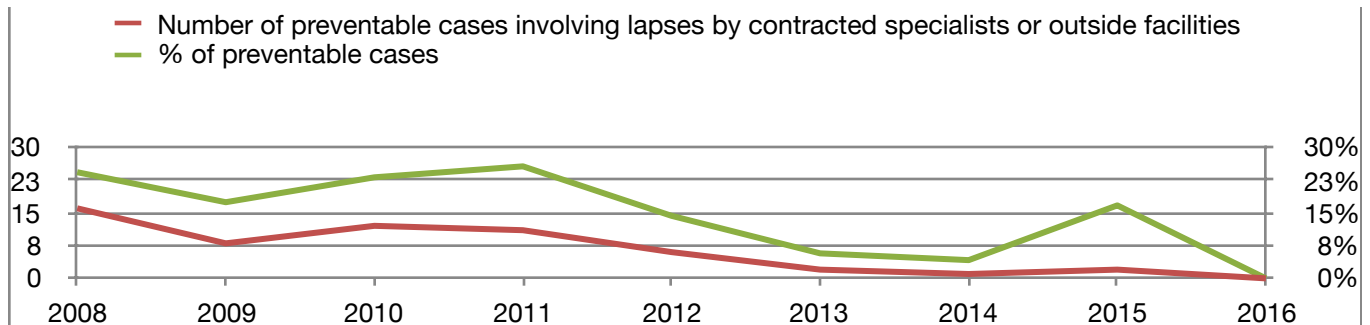
LAPSES OF CARE TYPES	# OF LAPSES IN 316 NOT PREVENTABLE DEATHS	# OF LAPSES IN 18 POSSIBLY PREVENTABLE DEATHS	TOTAL LAPSES IN ALL 334 DEATHS
#1 - Failure to recognize, identify or adequately evaluate important symptoms or signs	42	7	49
#2 - Failure to follow established guidelines for evaluation and/or management of a specific condition	14	9	23
#3 - Delay in access to care sufficient to result in harm to the patient	14	4	18
#4 - Failure to adequately pursue abnormal test results	9	2	11
#5 - Failure of provider-to-provider communications including botched handoffs	13	3	16
#6 - Fragmentation of care such that individual responsibility for patient is waived	2	4	6
#7 - Surgical/procedural complication resulting in iatrogenic injury	4		4
#8 - Medication prescribing error	5	1	6
#9 - Medication delivery error	7		7
#10 - Practicing outside the scope of one's professional capabilities	1		1
#11 - Unsupervised mid-level (nurse practitioner or physician assistant) care			0
#12 - Failure to communicate effectively with the patient	1	1	2
#13 - Patient non-adherence with recommendation for optimal care	10	1	11
#14 - Delay in emergency response or failure to follow emergency response protocol	34	2	36
#15 - Other (legacy charting)	7	1	8
All Types	163	35	198

There were 163 lapses in the 316 not preventable deaths and 35 lapses in the 18 possibly preventable deaths. Lapses per case averaged 0.52 in the not preventable cases and 1.94 in the possibly preventable cases. As demonstrated in our case vignettes, the more lapses there are in individual case, the greater the likelihood of a preventable death occurring.

G. Preventable Deaths Attributed to Lapses by Contracted Specialists and Outside Facilities

Figure 2 tracks the number of possibly preventable deaths resulting from lapses by contracted specialists and facilities from 2008 to 2016. In 2016, there were no lapses by contracted specialists that contributed to any of the possibly preventable deaths. This continues the positive trend which began in 2012.

FIGURE 2. POSSIBLY PREVENTABLE DEATHS OF CALIFORNIA PRISON INMATES INVOLVING LAPSES BY CONTRACTED SPECIALISTS OR OUTSIDE FACILITIES, 2008-2016.



VII. DISCUSSION OF TRENDS

A. Trends in Prison Mortality Rates in California and the United States

Annual death rates in the CCHCS are shown in Table 6 and compared to rates in all U.S. state prisons. (U. S Bureau of Justice statistics, bjs.gov). The 2016 death rate is 260/100,000 inmates for CCHCS. Coincidentally, the average death rate from 2006–2014 for all U.S. State prisons is also 260/100,000.

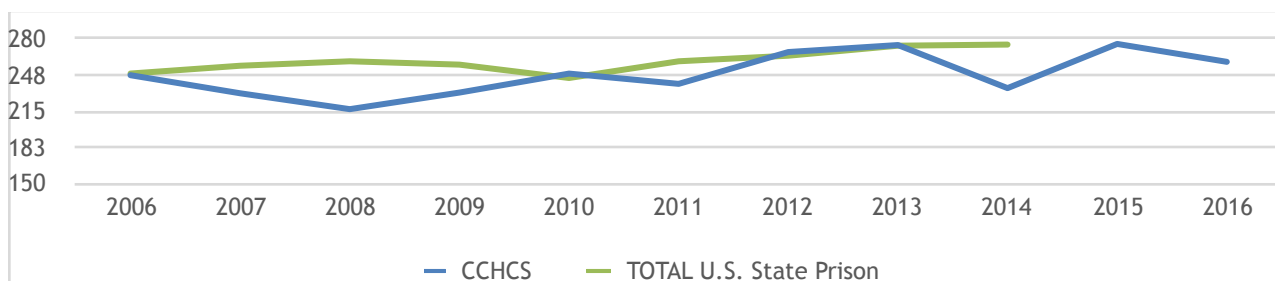
TABLE 6. ANNUAL DEATH RATES AMONG CALIFORNIA AND U.S. STATE PRISON INMATES, 2006-2016.

YEAR	CCHCS NUMBER OF DEATHS	CCHCS NUMBER OF INMATES	CCHCS DEATH RATE PER 100,000 INMATES	TOTAL U.S. STATE PRISON DEATH RATE PER 100,000
2006	424	171,310	248	249
2007	395	170,786	231	256
2008	369	170,022	217	260
2009	393	169,459	232	257
2010	415	166,700	249	245
2011	388	161,843	240	260
2012	362	134,929	268	265
2013	366	133,297	275	274
2014	319	135,225	236	275
2015	355	128,824	276	NA
2016	334	128,705	260	NA
Average (Range)			248 (217-276)	260 (245-275)

NA = data not yet available

Figure 3 below shows no significant variation in the overall death rate for the CCHCS since at least 2010.

FIGURE 3. TRENDED DEATH RATE PER 100,000 INMATES, CCHCS AND TOTAL U.S. STATE PRISONS, 2006-2016.



B. Trends in Specific Causes of Mortality: Top Causes

Table 7 shows the top nine causes of death in the CCHCS from 2006–2016.

TABLE 7. TOP CAUSES OF DEATH AMONG CALIFORNIA INMATES, 2006-2016.

YEAR	RANK								
	1	2	3	4	5	6	7	8	9
2016	Cancer	Cardio-vascular Disease	End Stage Liver Disease*	Infectious Disease**	Drug Overdose	(tied) Suicide, Homicide		Cerebro-vascular Disease	Pulmonary
2015	Cancer	Cardio-vascular Disease	End Stage Liver Disease*	Infectious Disease**	Suicide	Drug Overdose	Homicide	Cerebro-vascular Disease	Pulmonary
2014	Cancer	End Stage Liver Disease*	Cardio-vascular Disease	Suicide	Drug Overdose	Pneumonia	Homicide	Pulmonary	(tied) Infectious; Stroke-Hemorrhagic
2013	Cancer	End Stage Liver Disease*	Cardio-vascular Disease	Suicide	Drug Overdose	Homicide	Sepsis	(tied) Pulmonary; Pneumonia	
2012	Cancer	End Stage Liver Disease*	Cardio-vascular Disease	Suicide	Homicide	Drug Overdose	(tied) Sepsis; Infectious		Stroke
2011	Cancer	End Stage Liver Disease*	Cardio-vascular Disease	Suicide	Pneumonia	Homicide	Sepsis	Drug Overdose	Stroke
2010	Cancer	End Stage Liver Disease*	Cardio-vascular Disease	Suicide	(tied) Drug Overdose; Homicide		Pneumonia	Congestive Heart Failure	(tied) Coccidioidomycosis; End Stage Renal Disease; Stroke
2009	Cancer	End Stage Liver Disease*	Cardio-vascular Disease	Suicide	Drug Overdose	Pneumonia	Congestive Heart Failure	Homicide	
2008	Cancer	Suicide	End Stage Liver Disease*	Cardio-vascular Disease	Drug Overdose	Pneumonia	HIV/AIDS	Congestive Heart Failure	Sepsis
2007	Cancer*	End Stage Liver Disease	Cardio-vascular Disease	Suicide	Homicide	HIV/AIDS	Stroke	Drug Overdose	Pneumonia
2006	Cancer*	Cardio-vascular Disease	End Stage Liver Disease	Suicide	Drug Overdose	Homicide	Pulmonary	End Stage Renal Disease	Stroke

* Liver Cancer was counted as Cancer in 2006 and 2007; as Liver Disease from 2008 onward.

** Beginning with 2015, Pneumonia and Sepsis were included in Infectious Disease, which also includes HIV/AIDS.

Cancer, cardiovascular disease, end stage liver disease, and infectious diseases (including sepsis and pneumonia) remain the top four causes in 2016, unchanged from 2015. The top three causes have remained the same during the entire duration of the Receivership, with the exception of 2008, when suicide was the number two cause of death. Drug overdoses have become the fifth most common case in 2016, and they are discussed in more detail in section VII B 4 of this report. The triad

of drug overdose, suicide and homicide share a high prevalence in the incarcerated and are a likely manifestation of the desperation of prison life.

C. Trends in Specific Causes of Mortality: End Stage Liver Disease and Liver Cancer from 2008-2016

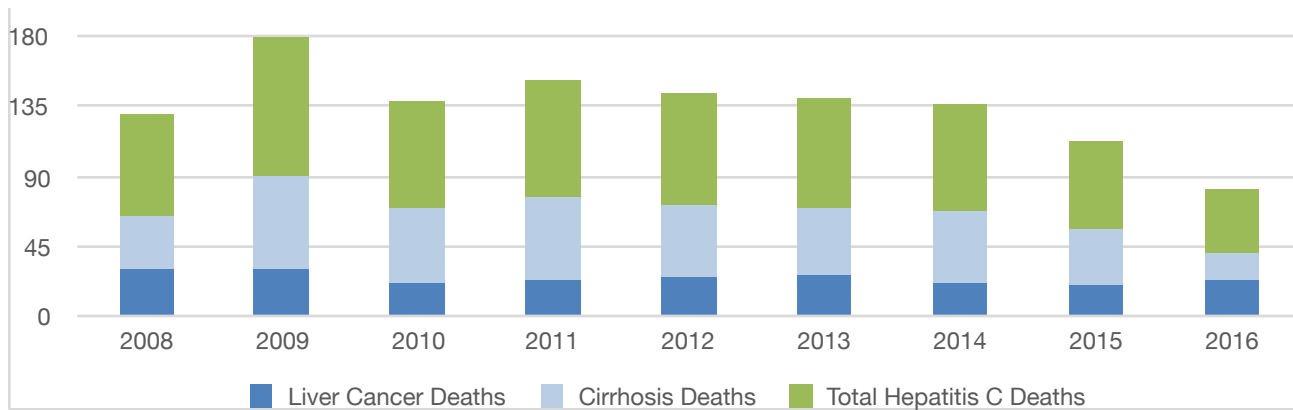
In 2008, these annual analyses began tracking liver cancer and ESLD (cirrhosis) together as both are sequelae of hepatitis infection. In the prison population, nearly all of these cases are caused by hepatitis C. Chronic liver disease has consistently ranked as one of the top three causes of death in this population. In 2016, there were 41 deaths by this cause, 12.3% of all deaths. Table 8 shows observed numbers of deaths from both causes of chronic hepatitis C infection from 2008–2016.

TABLE 8. CCHCS CHRONIC HEPATITIS C DEATHS, 2008-2016.

YEAR	LIVER CANCER DEATHS	CIRRHOSIS DEATHS	TOTAL HEPATITIS C DEATHS	CCHCS NUMBER OF INMATES	CCHCS HEP C DEATH RATE PER 100,000 INMATES
2008	30	35	65	170,022	38.2
2009	30	60	90	169,459	53.1
2010	22	47	69	166,700	41.4
2011	23	53	76	161,843	47.0
2012	25	47	72	134,929	53.4
2013	27	43	70	133,297	52.5
2014	21	47	68	135,225	50.3
2015	19	37	56	128,824	43.5
2016	23	18	41	128,705	31.9

Figure 4 shows trended deaths from liver cancer, cirrhosis, and all chronic hepatitis C from 2008 to 2016.

FIGURE 4. CCHCS CHRONIC HEPATITIS C DEATHS, 2008-2016.



There may be a downward trend beginning in the past two years. This coincides with the 2014 CCHCS statewide initiative to improve the care of patients with ESLD, which included the establishment of a patient registry, statewide dashboards emphasizing indicators cited in the care guide for end stage liver disease, and a demonstrated increase in the appropriate use of medications, screening for liver cancer with ultrasounds and screening for esophageal varices with endoscopy. In addition, excellent treatments for chronic hepatitis C have become available. If given at an early stage of cirrhosis or even before cirrhosis develops, these treatments may prevent end stage liver disease from developing. If surveillance for liver cancer in all cirrhotics is improved going forward, there is the added potential for continued reductions in liver cancer mortality.

C. Trends in Specific Causes of Mortality: Suicide

Suicide was the sixth leading cause of death in the CCHCS in 2016. The 26 cases were 7.8% of all deaths in the system. The rate of suicide as a cause of death was 20.2/100,000. Table 9 shows the suicide rates in the CCHCS from 2006–2016 and compares these to rates for all U.S. state prisons from 2006–2014.

TABLE 9. NUMBERS AND RATES OF SUICIDE-RELATED DEATHS: CALIFORNIA, ALL U.S. STATE PRISONS, 2006-2016.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	AVG
Suicides	43	33	38	25	34	34	32	30	23	24	26	31.0
CCHCS Rate/ 100,000	25.1	19.3	22.3	14.8	20.4	21	23.7	22.5	17.0	18.6	20.2	20.4
U.S. State Prison Rate/100,000	17	16	15	15	16	14	16	15	20	NA	NA	16.0

NA = data not yet available

FIGURE 5. SUICIDE DEATH RATES IN THE CALIFORNIA CORRECTIONAL SYSTEM, 2006-2016.

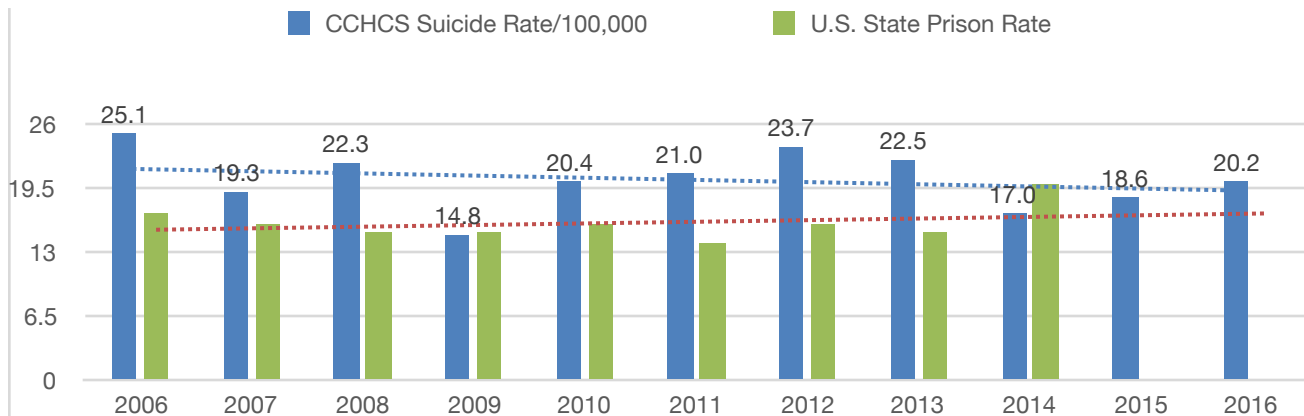


Figure 5 shows the trend lines for these rates, indicating that the rate for CCHCS may be trending slightly downward while the rate for all U.S. State prisons may be trending slightly upward.

D. Trends in Specific Causes of Mortality: Homicide

Homicide was tied with suicide for the sixth leading cause of death in the CCHCS. In 2016, there were 26 deaths by homicide, representing 7.8% of all deaths. Table 10 shows numbers and rates of homicides in the California prisons from 2006–2016 and compares the rates with those for the entirety of U.S. state prisons through 2014.

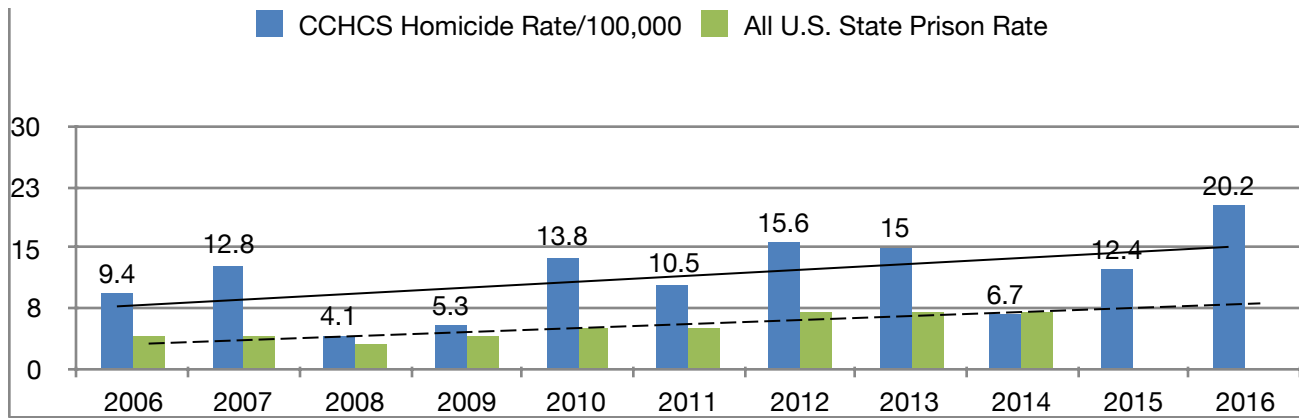
TABLE 10. NUMBERS OF HOMICIDE-RELATED DEATHS IN CALIFORNIA AND ALL U.S. STATE PRISONS, 2006-2016.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	AVG
Homicides	16	22	7	9	23	17	21	20	9	16	26	16.9
CCHCS Rate/ 100,000	9.3	12.9	4.1	5.3	13.8	10.5	15.6	15.0	6.7	12.4	20.2	11.4
U.S. State Prison Rate/100,000	4	4	3	4	5	5	7	7	7	NA	NA	5.1

NA = data not available

Figure 6 graphs those same figures and shows the trends of homicide death rates over time. The homicide death rate in California prisons is more than twice that of all U.S. state prisons (including California). Both in California and in the U.S. prisons, the rate of homicide deaths is increasing, but more dramatically so in the CCHCS. In 2016, the death rate by homicide was the highest since at least 2006. It is beyond the scope of this analysis to speculate as to the reasons for this increase, but a special report for the Bureau of Justice Statistics prepared in 2005 pointed out that the homicide rate in all U.S. state prisons had dropped by 93% from 1980 (54/100,000) to 2002 (4/100,000). (bjs.gov/content/pub/pdf/shsplj.pdf)

FIGURE 6. HOMICIDE DEATH RATES IN THE CALIFORNIA CORRECTIONAL SYSTEM, 2006-2015.



E. Trends in Preventable Deaths, 2006-2016

Because of the creation of the Federal Receivership in 2005, California is the only state in which preventable or possibly preventable deaths are identified and tracked by a death review process. This process has been explained in section II of this report.

The rates of all preventable and possibly preventable death added together for each year from 2006 to 2016 are shown in Table 11. In 2016, that rate was 14/100,000.

TABLE 11. RATES OF PREVENTABLE DEATHS AMONG CALIFORNIA INMATES, 2006-2016.

YEAR	PREVENTABLE DEATHS			INMATE POPULATION	PREVENTABLE DEATH RATE PER 100,000 INMATES
	DEFINITELY	POSSIBLY	ALL		
2006	18	48	66 total	171,310	38.5
2007	3	65	68 total	170,786	39.8
2008	5	61	66 total	170,022	38.8
2009	3	43	46 total	169,459	27.1
2010	5	47	52 total	166,700	31.2
2011	2	41	43 total	161,843	26.6
2012	1	40	42 total	134,929	30.4
2013	0	35	35 total	133,297	26.3
2014	0	24	24 total	135,225	17.7
2015	0	12	12 total	128,824	9.3
2016	0	18	18 total	128,705	14.0

Figures 7 and 8 show the favorable downward trend in all cause preventable death which has been experienced since 2009, the fourth year of the Receivership.

FIGURE 7. NUMBER OF PREVENTABLE DEATHS IN THE CALIFORNIA CORRECTIONAL HEALTHCARE SYSTEM, 2006-2016.

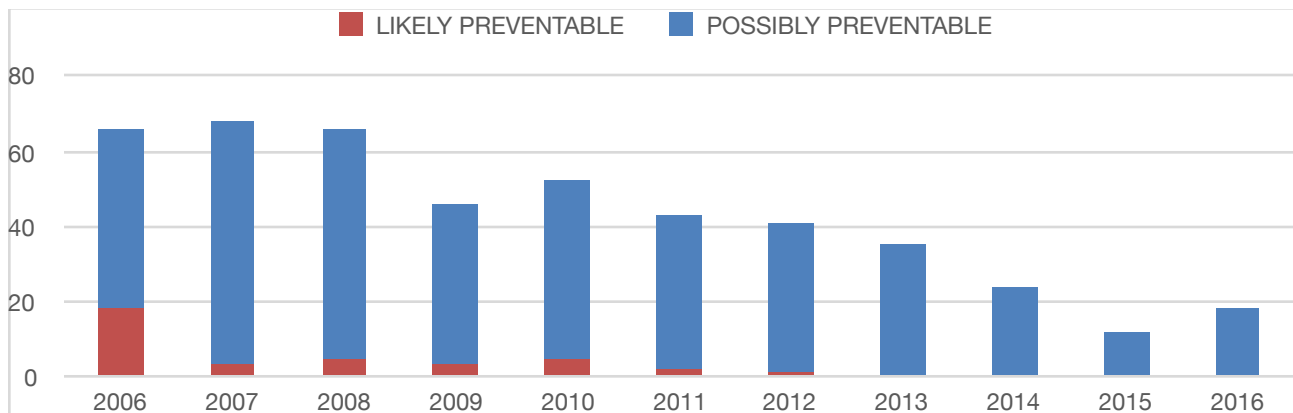
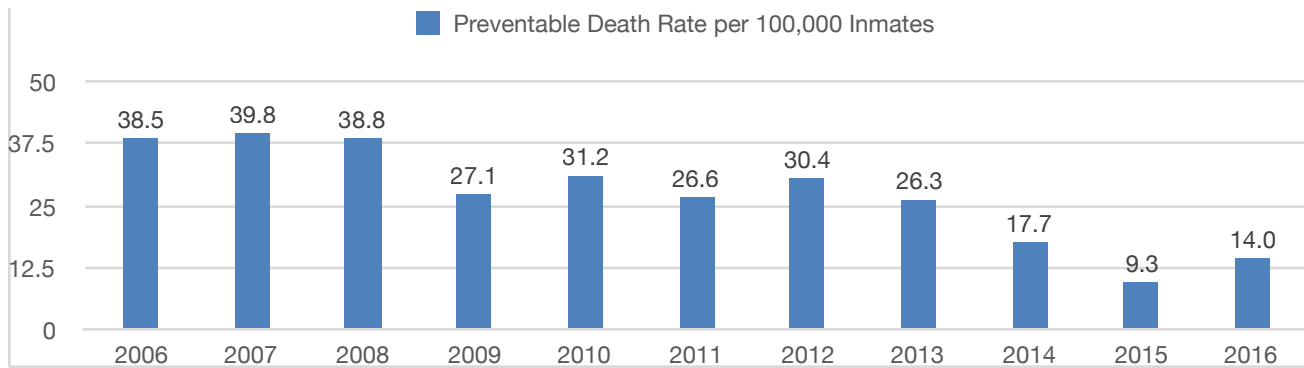


FIGURE 8. PREVENTABLE DEATH RATES IN THE CALIFORNIA CORRECTIONAL SYSTEM, 2006-2016.



The pattern of this improvement appears to show three periods: The first three years, 2006–2008, coincide with the first stage of the Receivership during which the identification and elimination of unsafe physicians was a major goal of the organization.

The next five years, 2009–2013, the first period of significant improvement, followed the successful removal of unsafe practitioners and coincided with the Receivership’s redesign of the entire system of care as outlined in The Receiver’s Turnaround Plan of Action submitted in 2008. This Plan called for timely access to competent medical and clinical personnel, timely access to prescribed medication and treatment, to specialists and to appropriate levels of care, and the construction of improved infrastructure including new medical facilities.

The last three years, 2014–2016, mark a second period of significant improvement, coinciding with the creation of a culture of quality improvement, a maturation of the redesign elements begun in the turnaround plan, and the opening of the California Health Care Facility for the care of the more severely chronically ill California inmates. As seen in Table 11, the mandated and largely successful reduction in the total prison population was mainly seen in the years since 2011. The CCHCS population from 2006–2011 averaged 168,353. From 2012–2016, the average population was 132,196, a reduction of 21.5%.

F. Trends in Care Lapses

1. The Relationship Between the Number of Lapses and Patient Complexity

Lapses occur frequently in the practice of medicine, but because patients are basically healthy and our systems of care have a built-in redundancy, the majority of lapses do not result in significant clinical consequences.

It follows that certain patients would be more susceptible to medical lapse or error. This includes those who are older and sicker, who require more prescription medication or specialist care, or who experience more encounters, such as those with severe mental illness or more chronic medical conditions.

Beginning in 2015, this review looked at all of the patients who died and counted the number of chronic medications prescribed and the number of associated medical conditions they experienced.

Prescribed Medications – The 334 decedents in 2016 were taking an average of nine prescription medications (range zero to 24).

Associated conditions – Table 12 shows the number of associated conditions for the 334 decedents in 2016.

TABLE 12. FREQUENCY OF ASSOCIATED CONDITIONS (EXCLUSIVE OF PRIMARY CAUSE OF DEATH) IN CCHCS INMATE DEATHS, 2016.

CONDITION	NUMBER OF CASES
Hypertension (HTN)	145
Hepatitis C	88
Diabetes mellitus (DM)	78
Dyslipidemia (DLP)	68
Severe mental illness	67
Coronary artery disease (CAD)	56
Chronic obstructive pulmonary disease (COPD)	53
Gastroesophageal reflux disorder (GERD)	38
Chronic pain/Osteoarthritis	27
Chronic kidney disease (CKD)	26
Cancer	26
Asthma	26
Benign prostate hypertrophy (BPH)	25
Obesity	25
Cancer-liver, ESLD	24
Seizure disorder	23
Other Conditions (appearing in fewer than 10 cases each)	231
TOTAL	1155

These conditions are in addition to the designated cause of death, and contribute to the disease burden which the patients bring to the primary care setting, adding to the complexity of management and increasing the chance for care lapses to occur. The average number of associated health conditions for the 334 patients who died in 2016 was 3.5.

2. The Relationship Between Number of Lapses and Preventability of Death in 2016

Prior annual death report analyses have shown a relationship between the number of lapses occurring in a single case and a cascade of consequences which can culminate in a possibly preventable death. The findings for 2016 reinforce this observation.

Table 13 shows that the average number of lapses in possibly preventable deaths (1.9) were four times the average number of lapses in the not preventable deaths (0.5).

TABLE 13. NUMBER OF LAPSES BY CATEGORY OF PREVENTABILITY, 2016.

PREVENTABILITY	# DEATHS	# LAPSES	AVERAGE LAPSES/ DEATH
Likely preventable	0	n/a	n/a
Possibly preventable	18	35	1.9
Not preventable	316	163	0.5

FIGURE 9. AVERAGE NUMBER OF LAPSES PER CASE BY PREVENTABILITY, 2007-2016.

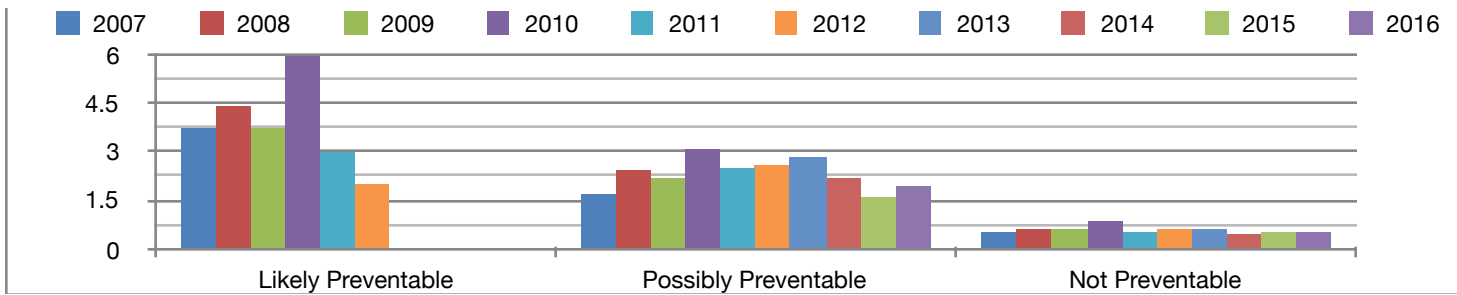


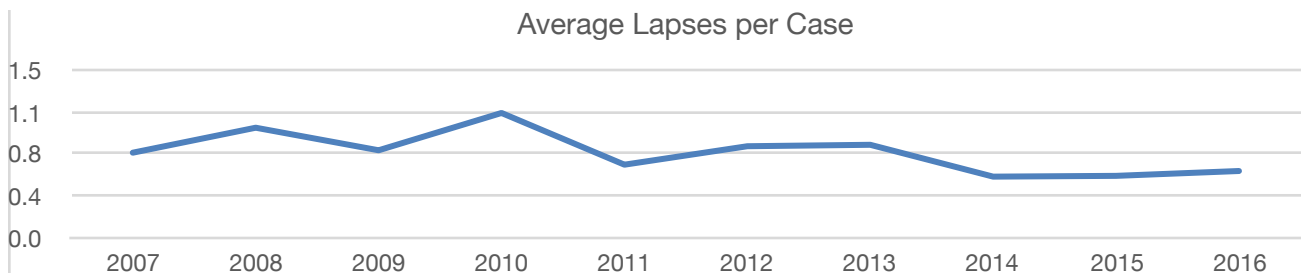
Figure 9 shows trended data for the average number of lapses per case by their preventability determination. For all years, lapses in (definitely) preventable cases averaged 3.8, in possibly preventable cases averaged 2.3 and in not preventable cases averaged 0.5.

Table 14 shows the total number of lapses from 2007 to 2016. The last column in Table 13 is trended in Figure 10, showing that the annual number of care lapses for all cases has been trending downward, stabilizing in the last three years at a little more than one half lapse per case.

TABLE 14. NUMBER OF LAPSES, BY PREVENTABILITY, IN CCHCS DEATHS, 2007-2016.

YEAR	DEFINITELY PREVENTABLE		POSSIBLY PREVENTABLE		NOT PREVENTABLE		TOTAL NO. OF LAPSES	NO. OF CASES	AVG LAPSES PER CASE
	#	%	#	%	#	%			
2007	11	4%	109	36%	179	60%	299	395	0.8
2008	22	6%	147	41%	193	53%	362	369	1.0
2009	11	4%	90	29%	205	67%	306	393	0.8
2010	31	7%	147	32%	284	61%	462	415	1.1
2011	6	2%	92	37%	154	61%	252	388	0.6
2012	2	1%	105	34%	198	65%	305	362	0.8
2013	0	0%	97	32%	206	68%	303	366	0.8
2014	0	0%	53	31%	120	69%	173	319	0.5
2015	0	0%	19	10%	176	90%	195	355	0.5
2016	0	0%	35	18%	163	82%	198	334	0.6

FIGURE 10. TREND IN ANNUAL AVERAGE OF CARE LAPSES PER DEATH, CCHCS, 2007-2016.



VIII. TARGETED OPPORTUNITIES FOR IMPROVEMENT

A. The Primary Care Model and Preventable Deaths

Planning for a primary care model of care in the CCHCS began in 2007, and by 2009 it had been implemented in all California state prisons. A primary care medical home creates an environment for ensuring continuous, integrated, coordinated and planned care, especially for patients with chronic or complex combinations of medical illness. Primary care teams are expected to have accountability for patient outcomes, to advocate on behalf of their patients and to use evidence-based guidelines in managing chronic conditions. They are responsible for timely access to appropriate care including specialty referrals, and for coordinating follow-up care after their patients are sent to hospital emergency rooms or experience hospitalizations.

TABLE 15. IDENTIFIABLE PRIMARY CARE IN CALIFORNIA INMATE DEATH CASES, 2009-2016.

YEAR	CASES WITH IDENTIFIED PRIMARY CARE PHYSICIAN	TOTAL DEATHS	% OF TOTAL	PREVENTABLE DEATH RATE PER 100,000 INMATES
2006	NA	424	NA	38.5
2007	NA	395	NA	39.8
2008	NA	369	NA	38.8
2009	141	393	35.5%	27.1
2010	217	415	52.3%	31.2
2011	209	388	53.4%	26.6
2012	230	367	62.7%	30.4
2013	240	366	65.6%	26.3
2014	200	319	62.7%	17.7
2015	237	355	66.8%	9.3
2016	235	334	70.4%	14.0

NA = data not available

In 2009, the DRC began identifying which patients had an identifiable primary care physician (PCP) and whether the primary care model is working. Table 15 shows data for 2006–2016.

FIGURE 11. PERCENTAGE OF DEATHS IN THE CCHCS WITH AN IDENTIFIED PRIMARY CARE PHYSICIAN, AND CORRESPONDING RATES OF PREVENTABLE DEATH, 2009-2016.

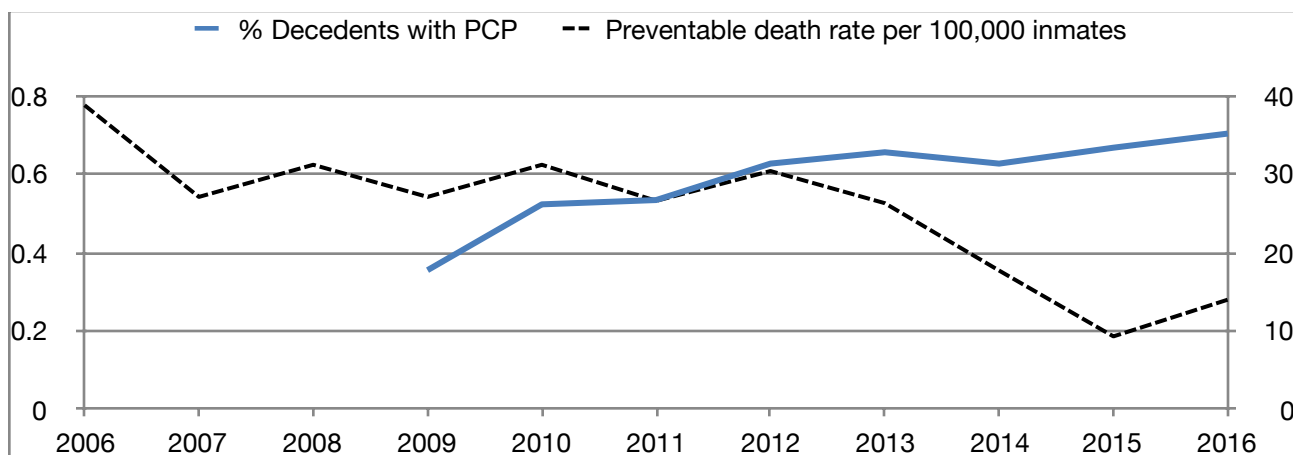


Figure 11 trends this data for the same span, showing run charts for the percentage of deaths with identifiable PCPs and a parallel run chart tracking the preventable death rates for those years. In general, as the number of patients with PCPs has increased, the preventable death rate has decreased.

As noted in last year's report, in 2015, the CCHCS adopted the Complete Care Model, a significant refinement of the primary care model which uses population health management, process indicator dashboards, and system integration to identify, track and improve patient outcomes.

B. Trends in Specific Targeted Causes for Preventable Death

Since 2013, the CCHCS has targeted action in five diagnostic areas of preventable death. These are cardiovascular disease, end stage liver disease, cancer, drug overdose, and infection by coccidioidomycosis, also known as Valley Fever.

Table 16 shows overall mortality rates for preventable cardiovascular disease, preventable end stage liver disease, and preventable cancer from 2006 to 2016. In these annual analyses, both (definitely) preventable and (possibly) preventable deaths are added together to create a single number for preventable deaths. As noted, there have been NO definitely preventable deaths in 2013, 2014, 2015, and 2016. The preventable deaths in those years are all possibly preventable.

TABLE 16. NUMBERS AND RATES OF PREVENTABLE DEATHS FROM CARDIOVASCULAR, END STAGE LIVER DISEASE, AND CANCER IN THE CALIFORNIA CORRECTIONAL SYSTEM, 2006-2016.

YEAR	PREVENTABLE CARDIOVASCULAR DEATHS		PREVENTABLE ESLD AND LIVER CANCER DEATHS		PREVENTABLE (NON-LIVER) CANCER DEATHS	
	Number	Rate/100,000	Number	Rate/100,000	Number	Rate/100,000
2006	18	10.5	2	1.2	6	3.5
2007	16	9.4	6	3.5	7	4.1
2008	14	8.2	4	2.4	9	5.3
2009	9	5.3	4	2.4	10	5.9
2010	7	4.2	2	1.2	4	2.4
2011	11	6.8	1	0.6	6	3.7
2012	8	5.9	3	2.2	1	0.7
2013	7	5.3	4	3.0	4	3.0
2014	10	7.4	2	1.5	6	4.4
2015	3	2.3	1	0.8	1	0.8
2016	2	1.6	5	3.9	2	1.6

1. Preventable Cardiovascular Death Rates

FIGURE 12. PREVENTABLE CARDIOVASCULAR DEATHS - NUMBER OF PREVENTABLE CASES AND RATES OF DEATH IN THE CALIFORNIA CORRECTIONAL SYSTEM, 2006-2016.

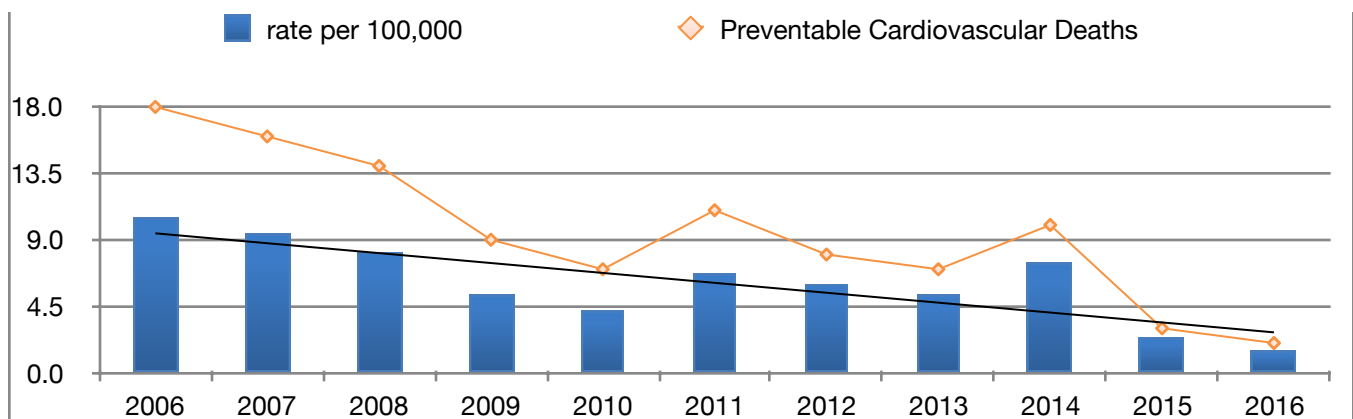
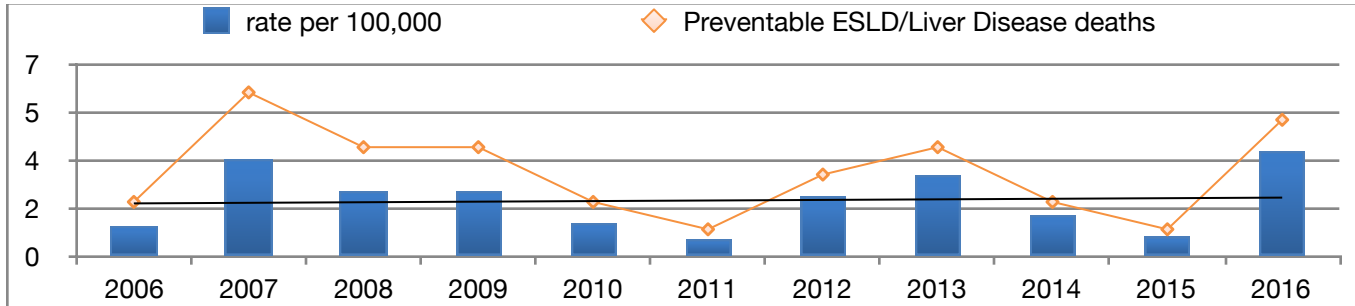


Figure 12 demonstrates the continued significant reduction in preventable deaths from CV disease, attributable to the CCHCS emphasis on better recognition and management of red flag symptoms of heart attack (reduction of type 1 lapses) and on better management of acute and chronic heart disease syndromes and treatment of CV risk factors. All of these are addressed in the CCHCS Care Guidelines for Chest Pain, Hypertension, Dyslipidemia and Diabetes Mellitus.

2. Preventable End Stage Liver Disease (including liver cancer) Death Rates

Figure 13 shows the run chart for the number of preventable cases and rates of death from end stage liver disease, including hepatocellular carcinoma (liver cancer).

FIGURE 13. PREVENTABLE END STAGE LIVER DISEASE DEATHS - NUMBER OF PREVENTABLE CASES AND RATES OF DEATHS IN THE CALIFORNIA CORRECTIONAL SYSTEM, 2006-2016.

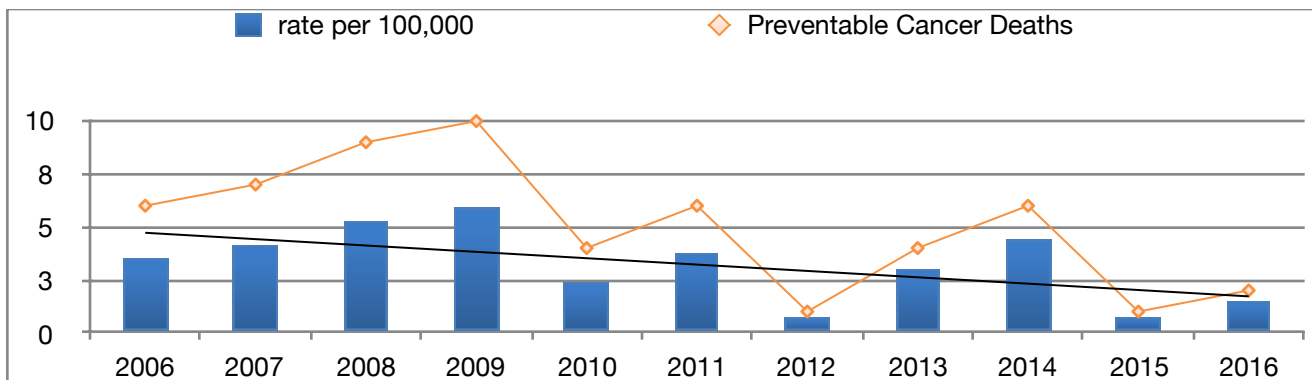


The five preventable deaths in 2016 were all from liver cancer and all were attributed to failure to follow the CCHCS Care Guide for End Stage Liver Disease (Cirrhosis), which calls for abdominal ultrasound testing every six months in order to screen for treatable liver cancer. Failure to do this screening led to potential delays in diagnosis ranging from 10 months to 4.5 years. The DRC recommended a renewed educational effort directed at all primary care physicians in CCHCS.

3. Preventable (Non-liver) Cancer Death Rates

As seen in Figure 14, the improvement in preventable cancer deaths continues.

FIGURE 14. PREVENTABLE CANCER DEATHS - NUMBER OF PREVENTABLE CASES AND RATES OF DEATH IN THE CALIFORNIA CORRECTIONAL SYSTEM, 2006-2016.



Both possibly preventable deaths in 2016 were attributed to type 3 lapses caused by delays in referral to the appropriate specialist for follow-up surveillance after the diagnosis of cancer was made. In the second case, the absence of a primary care model contributed to this delay. It should be noted that the CCHCS efforts to reduce preventable deaths from cancer were primarily directed at improving screening rates for preventable cancers such as colon, breast and cervix. Neither of these two 2016 deaths was attributable to a failure to screen for these cancers.

4. Deaths from Drug Overdose

Recognition of the problem of opioid overdose has resulted in a number of strategies to improve opioid prescribing practices. The Care Guide for Pain Management was published and circulated in 2008. (CCHCS.ca.gov) and included recommendations for the use of urine toxicology screening to aid in identifying patients who may be diverting narcotic prescriptions to barter or sell to other inmates.

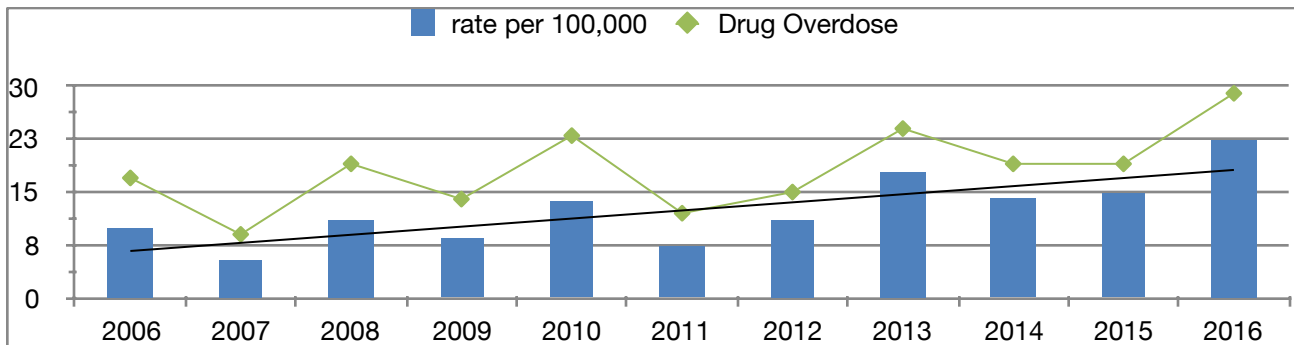
Despite these efforts, there has been a continued rise in the incidence of drug overdose deaths as shown in Table 17 and Figure 15.

TABLE 17. NUMBERS AND RATES OF DRUG OVERDOSE-RELATED DEATHS IN THE CALIFORNIA CORRECTIONAL HEALTHCARE SYSTEM AND IN ALL U.S. PRISONS, 2006-2016.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	AVG
CCHCS drug overdoses	17	9	19	14	23	12	15	24	19	19	29	18.0
CCHCS rate/100,000	9.9	5.3	11.2	8.3	13.8	7.4	11.1	18.0	14.1	14.7	22.5	12.1
U.S. State Prison Rate	4	3	4	4	3	4	3	4	4	NA	NA	3.7

NA=Data not available

FIGURE 15. DRUG OVERDOSE DEATH RATES IN THE CALIFORNIA CORRECTIONAL HEALTHCARE SYSTEM, 2006-2016.



2016 saw the largest number (29) and the highest rate of drug overdose deaths (22.5/100,000) since 2006. Of these overdoses, the substance responsible was attributed to opioids or methamphetamine in 27 cases. An opiate only was the cause in 11 cases (four of these were due to fentanyl alone), methamphetamine was the sole drug in nine cases, opiates plus methamphetamine in five cases. Two cases were thought to be drug overdoses because intravenous drug paraphernalia was found in the patients' cells, although no toxicology studies were done.

Non-opioid prescribed medications were the cause in two cases – diltiazem alone (an antihypertensive drug) in one case, and a tricyclic antidepressant alone in the other.

Except for the two patients who died from diltiazem and tricyclic overdose, and one patient with terminal cancer who died from a morphine overdose, none of the other 26 patients had been

prescribed an opiate. Fentanyl and methamphetamine are not prescribed drugs. They are known drugs of abuse found “on the street.” Therefore, in these 26 cases, the drug was obtained by diversion or stealth, not because of inappropriate prescribing practices by CCHCS physicians.

Narcan, the narcotic reversal agent, was used in 16 of the 26 cases in which non-prescribed drugs were the cause.

The prison sites were varied: eight prisons had one overdose death, nine prisons had two overdose deaths, and one prison had three overdose deaths.

Ten of the 29 patients were hepatitis C positive.

It should be recognized that this problem mirrors what is known to be happening in American society. The so-called opioid epidemic has resulted in similar increases in opioid use, abuse, addiction, and death by overdose. The Center for Disease Control (CDC) reported in January 2016, that drug overdose death rates had more than doubled from 2000 to 2014, from 6.2 to 14.7/100,000. The CCHCS has experienced a similar rise in drug overdose death rates over the past eleven years, with rates ranging from a low of 5.3/100,000 in 2007 to a high of 22.5/100,000 in 2016. The national concern triggered by this problem has produced a campaign to educate the public about the dangers of addiction and overdose which accompany narcotic prescriptions for chronic non-cancer pain, and to educate prescribing physicians about safer opioid prescribing practices and encouraging the use of buprenorphine and naloxone to make opioid narcotic use less prone to death by overdose.

But, as was noted in the 2015 version of this report, and as seen in Table 16, even though CCHCS overdose death rates mirror those in American society, these rates have been more than three times higher than in all U.S. state prisons. The CCHCS might consider analyzing the reasons for its high overdose death rate, including the availability of diverted narcotics, methamphetamine and fentanyl and looking to other state prison systems with similar population demographics for examples of better practices.

5. Coccidioidomycosis Death Rates

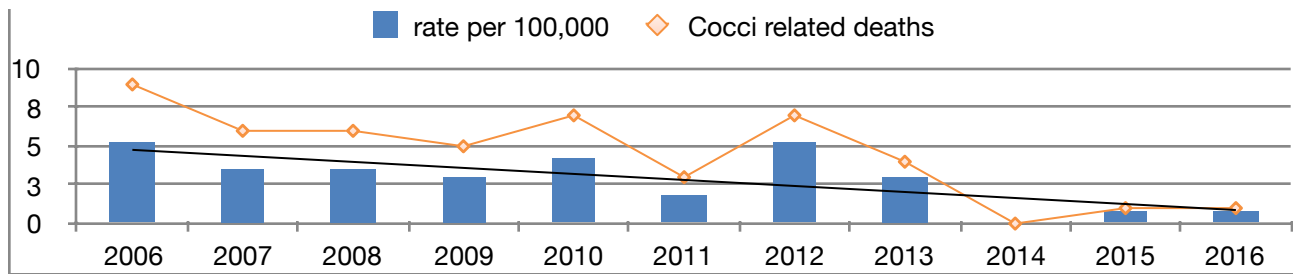
The court order to eliminate the housing of high risk patients in the eight California prisons located in Central California where coccidioidomycosis is endemic has been effective. Table 18 shows the number of cocci deaths from 2006 through 2016.

TABLE 18. COCCIDIOIDOMYCOSIS RELATED DEATHS IN THE CALIFORNIA CORRECTIONAL SYSTEM, 2006-2016.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Cocci related deaths	9	6	6	5	7	3	7	4	0	1	1

Figure 16 is a run chart trending numbers of deaths and death rates from coccidioidomycosis.

FIGURE 16. COCCIDIOIDOMYCOSIS RELATED DEATHS AND DEATH RATES IN THE CALIFORNIA CORRECTIONAL SYSTEM, 2006-2016.



The three years since the Federal order was issued have seen a dramatic decrease in cocci deaths. There were 47 deaths in the eight years prior to 2014 (5.9 deaths per year). There has been a total of 2 deaths from 2014–2016 (0.7 deaths per year).

IX. PERFORMANCE IMPROVEMENT PLANS AND TOOLS

A. The CCHCS Statewide Performance Improvement Plan 2016-2018

In January 2016, the triennial Statewide Performance Improvement Plan called for the adoption of The Complete Care Model as the foundation for health care in the CCHCS — emphasizing the provision of continuous, coordinated, comprehensive and planned care which is patient centered and focuses on access, prevention and a population management concept that uses data to drive continuous improvement — using registries of patients with like conditions and ensuring that the care provided the entire registry is consistent with certain standards (like the use of annual ultrasounds to screen for liver cancer in all qualified patients with end stage liver disease). Performance dashboards are published monthly.

Priority areas were the creation of consistent care teams, population care management for asthma, anticoagulation, colon cancer screening, women’s care, specialty referral access, advanced liver disease management, diabetes care, identification and management of patients on multiple meds, scheduling and access, medication management, availability of timely health information, and scheduled training of all staff on the Complete Care Model.

Patient registries, performance dashboards and patient summaries are all utilized during daily huddles at each care team location in every institution. Care teams are expected to use these tools to identify gaps in care for their patients and to initiate action to close those gaps.

B. CCHCS Care Guides

The care guides are tools that are evidence-based and expected to be used by clinicians and care teams in the management of their patients. Most of the high frequency conditions are covered. Each guide consists of three major sections. A Clinical Summary section contains management goals, diagnostic criteria, alerts for special situations, treatment options and recommendations for monitoring. A Decision Support section containing tools for management of patients at the point of care. A Self Management Section contains educational handouts for patients.

The care guides are accessible online (cphcs.ca.gov/careguides.aspx) They are used to reference standards of care when the DRC reviews cases looking for lapses. Current care guides are in the following areas: Anticoagulation, Asthma, Chest Pain, Coccidioidomycosis, Chronic Obstructive Pulmonary Disease, Cognitive Impairment/Dementia, Diabetes**, Dyslipidemia (high or abnormal cholesterol), End Stage Liver Disease, Gender Dysphoria, Hepatitis C, HIV, Hunger Strike (fasting and referring), Hypertension, Major Depressive Disorder, Pain Management, Palliative Care, Schizophrenia, Seizure Disorders*, Skin and Soft Tissue Infections*, Tuberculosis Disease and Tuberculosis Surveillance *, Wound and Skin Ulcer Management.

**newly written 2016; **revised 2016*

C. CCHCS Clinical Spotlights

The clinical spotlights are brief periodic publications for all clinicians and cover areas for targeted provider education. In 2016, these were Management of Acute Cystitis, Scabies, and Management of Skin and Soft Tissue Infections.

D. The Electronic Medical Record

Organizations without an electronic medical record (EMR) system are handicapped by inefficiencies of information transfer, illegibility, and the timely sharing of relevant clinical information both inside the institution and when patients receive care in transition areas like the specialist's office, the emergency room, or the hospital. Availability of such information is important for good patient care. The CCHCS contracted with Cerner, an EMR vendor, to begin installation of an EMR system. This began in October 2015, continued through 2016 and is scheduled for completion by the end of 2017.

E. Death Review Committee Referral to Professional Peer Review Committees

In 2016, the DRC proceedings resulted in the following referrals to peer review committees based on death reviews uncovering potential unsafe practices by providers: 51 Medical Peer Review referrals; seven Mental Health Peer Review referrals.

X. CONCLUSIONS

The CCHCS under the Federal Receiver has continued to make impressive gains in the creation of a mature system of care for California's prison inmates. Perhaps the best evidence for this is the continued transition of medical care in specific prisons back to the control of the State of California. Prisons are delegated back to the State based on detailed inspections by the Office of the Inspector General and continued monitoring by the office of the Receiver. By May 2017, 13 of the 35 state prisons had received (revocable) delegation. These 13 institutions will continue to be monitored and are included in all quality measures followed by the CCHCS, in order to ensure continued high quality delivery of medical care.

This eleventh annual analysis of deaths in the CCHCS has shown continued improvements in major outcomes.

These gains are impressive, given the very high burden of medical and mental illness borne by the population of the state prison system, whose 2016 decedents averaged 3.5 chronic medical comorbidities (range: zero to 11) and nine prescribed medications (range zero to 24).

There has been a continued decline in the number and rate of medical errors (care lapses).

Medical error was cited as one of the leading causes of death in the world. In 2016, an author in the British Journal of Medicine postulated that if it were possible to code deaths caused by communication lapses, diagnostic errors, substandard judgment, inadequate skill, and other human and system factors, medical error would rank #3 as cause of death, just behind heart disease and cancer. (BMJ 2016:353 – doi:10.1136/bmj.i2139)

In these annual death review analyses, preventable death, defined as death possibly or definitely caused by medical error, would have caused 15.5% of all deaths in 2006, ranking #3. By 2016, the possibly preventable deaths in which medical error played a causative role represented 5.4% of all deaths, ranking #7.

The decrease in total (definitely and possibly) preventable deaths has persisted. For the fourth consecutive year, there were no definitely preventable deaths. Although the number of possibly preventable deaths showed an increase, almost all of that increase is the result of poor monitoring of patients with end stage liver disease for the development of cancer. Corrective action has been initiated.

A major disappointing finding in 2016 was the continued rise in the rate of deaths by drug overdose. A second disappointing finding is the continued high rate of death by homicide. Both of these rates are significantly higher in CCHCS than in state prisons nationally.

By contrast, the overall rate of death from ESLD has begun to show improvement in 2016. Preventable deaths from cardiovascular disease have significantly decreased. The overall death rate from coccidioidomycosis has maintained the dramatic reductions first noted in 2014.

The primary care model has continued to penetrate the prison system at an improved rate. In 2016, 70% of all decedents had an identifiable primary care physician. This is the highest rate yet, and correlates with the improvements in preventable death rates.

We look forward to continued improvements and maintenance of existing gains as the Receiver's office and staff continue to implement the Complete Care Model and other system wide improvements, continuing the positive transformation of the California Correctional Healthcare System.