

ANALYSIS OF 2018 INMATE MORTALITY REVIEWS IN THE CALIFORNIA CORRECTIONAL HEALTHCARE SYSTEM

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I. INTRODUCTION

The California Correctional Healthcare System (CCHCS) has been under Federal Receivership since 2005.

The receivership was established by the U.S. District Court of Northern California, four years after the settlement of a class action law suit contesting that medical care in California’s prisons constituted a violation of the Eighth Amendment. After several years of failure by the State to fulfill court orders to improve care, a Receiver was appointed to oversee operations and direct improvement in the quality of medical care.

Since then, the Receivership has transformed the system of care in the 35 California prisons. In the Receiver’s Triennial report in January 2019, the Vision and Mission of the Receivership are as follows:

Vision

As soon as practicable, provide constitutionally adequate medical care to patients of the California Department of Corrections and Rehabilitation within a delivery system the State can successfully manage and sustain.

Mission

Reduce avoidable morbidity and mortality and protect public health by providing patients timely access to safe, effective and efficient medical care, and integrate the delivery of medical care with mental health, dental and disability programs.

The history of the receivership has been one of continued improvement in the medical systems of care. As noted in previous reports, the first three years of the Receivership (2006–2008) saw the identification and elimination of unsafe practicing physicians. The next four years (2009–2013) was a period of significant improvement in the systems of care. The turnaround plan of 2008 emphasized timely access to competent medical providers in a newly designed system of primary care which replaced the previous model which, in the Receiver’s own words, had been “chaotic and largely episodic”. The next four years (2014–2017) were characterized by a shift in the culture of care to one of continuous quality improvement designed to be proactive, planned, informed, patient-centered, and professional. This period coincided with a court mandated 21% reduction in the size of the prison population. The effect of this overall trajectory of systemic improvement combined with the reduction in overcrowding was a reduction of the preventable death rates from 39/100,000 patients in the first three years of the Receivership to 13/100,000 patients in the last four-year period.

The success of the Receivership in transforming healthcare in the California state prisons had resulted in a process of revocable delegation. By December of 2018, 19 of the 35 California prison institutions had been delegated from the Receivership back to the State of California. These delegations are based on favorable reviews of medical care by the Office of the Inspector General, and are subject to ongoing periodic monitoring by the Receiver.

This is the thirteenth annual analysis of inmate death reviews in the CCHCS. As in prior years, it will summarize the causes of death and examine trends in these causes. It will also describe significant changes in the death review process which were initiated in 2018. There will be attention paid to the general category of “unexpected death”,

and what the new death review process has identified as “opportunities for improvement” in the systems of care. This and all prior death report analyses are available at <https://cchcs.ca.gov/reports/>.

II. MORTALITY REVIEW PROCESS

Every patient death in the custody of the CCHCS is reviewed in a formal death review conducted by the statewide Mortality Review Committee, formerly known as the Death Review Committee.

Prior to 2018, the major purposes of the mortality review process were to identify patterns in lapses in care, particularly those that may have contributed to the patient’s death. Each death was classified as preventable, possibly preventable or non-preventable. A major purpose of the death review process was to reduce the occurrence of “preventable” death. As was noted in prior analyses, this process had major limitations.

There were no established criteria for attribution of preventability. Reviewing single deaths is problematic because preventability depends on the reviewer’s subjective judgment. For example, in past years several sudden cardiac arrests were judged to be “possibly preventable” because of a failure of clinicians to evaluate symptoms of syncope or chest pain in the weeks or months prior to the patient’s death. Other reviewers might have judged these same deaths to have been “non-preventable”, because a proper evaluation of these symptoms might not have prevented the patients’ deaths. Furthermore, many patients with complete cardiovascular evaluations, who received appropriate medications and who had appropriate interventional procedures, nevertheless succumb to their disease. One study from the medical literature compared several reviewers’ analyses of hospital deaths, found agreement only 34% of the time, and concluded that “preventability is in the eye of the reviewer”. (Journal of the American Medical association, Vol.286, pp 415-423, 2001.)

A “taxonomy of lapses” was used from 2007–2017 to track both individual and system departures from the standard of care. This taxonomy was a precursor to the current practice of identifying “opportunities for improvement” — see below.

In December 2017, the Receiver asked for a formal assessment of the CCHCS Mortality Review Policy and Practice. This assessment was conducted by faculty at the Criminal Justice and Health program at the University of California at San Francisco (UCSF). The CCHCS mortality review program was compared to standard mortality review processes in other federal and state integrated health care systems, such as those at UCSF, San Francisco General Hospital, Kaiser of Northern California, the Mayo Clinic, and the Veterans’ Administration. All of these systems had moved away from a classification focused on labeling deaths as “preventable/non-preventable” to ones that classify each death as “expected/unexpected” (or “anticipated/unanticipated”). The Mayo Clinic further incorporated “opportunities for improvement” into its matrix. The assessment noted that the evolving standard in mortality review represents a shift away from a person centered (individual lapses) approach toward one of systemic improvement. Following the completion and submission of this assessment, the Receiver directed that a series of changes in the Death Review Process occur.

Beginning in 2018, the Mortality Review Unit and the Quality Management division were directed to:

- Eliminate the “preventable death” finding and replace it with the findings of “expected or unexpected” death with or without “opportunities for improvement (OFI)”;

- Assess the mortality review process by tracking and reporting on opportunities for improvement (OFI) generated by death review; and
- Utilize identified OFI to design and implement statewide system improvements.

III. DEFINITIONS

Expected Death: A death which is related to the natural course of a patient’s illness or underlying condition and is anticipated within the timeframe in which it occurred.

Unexpected Death: Any death which was not anticipated or predicted to occur, may be related to the natural course of a patient’s illness or underlying condition, but may also be related to a previously unrecognized condition, such as an accident, drug overdose, homicide or suicide.

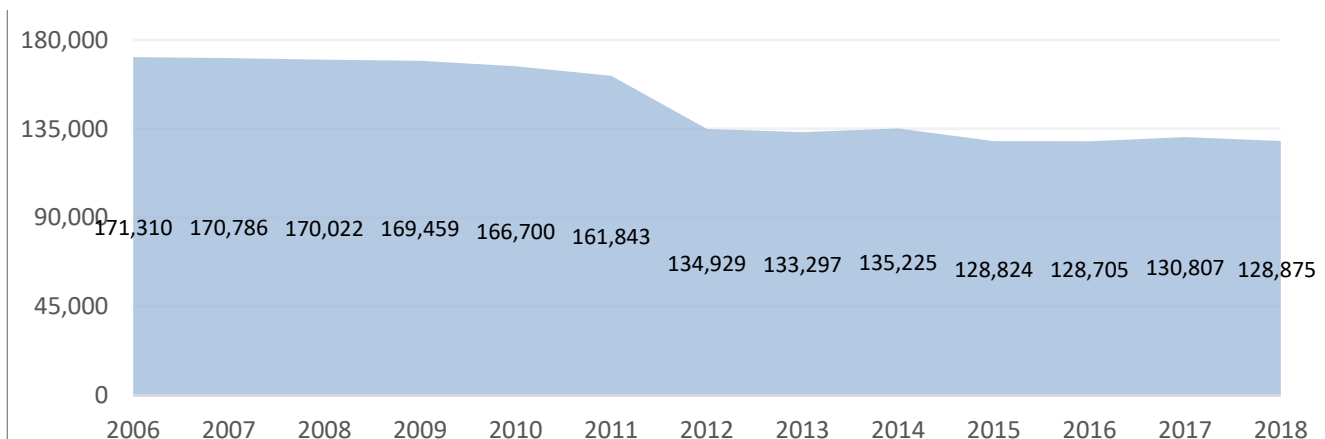
Opportunity for Improvement: An occasion or situation from which it is possible to improve systems or processes related to the delivery of health care.

IV. THE CALIFORNIA PRISON POPULATION IN 2018

When the Receivership was created in 2006, prison overcrowding was identified as one of the major contributory factors for poor medical care. The State of California was directed to significantly reduce the state prison population. Between 2008 and 2012, the California prison population decreased by 21 percent. By 2015, the average number of inmates in custody was reduced another 3 percent to 128,477.

In 2018, the average number of total inmates was 128,875 (an average of the population in custody at the end of each of calendar quarter in 2018). The average male population was 123,014, or 95.5% of the total, while the average female population was 5,861 representing 4.5% of the total inmate population.

FIGURE 1. CALIFORNIA PRISON POPULATION (AVERAGES OF QUARTER-END NUMBERS), 2006–2018.



The prison population is also gradually aging. From June of 2015 to June of 2018, the number of patients in the California prison population who were older than 55 increased from 16,212 to 19,389 – from 12.5% to 15% of the

total California prison population. (In Custody Population by Age, Offender Demographics, Office of Research, CDCR.)

V. STUDY FINDINGS

A. Number and Causes of Inmate Death

There were 452 inmate deaths in 2018. Of these, 437 occurred in males (96.7%) and 15 in females (3.3%).

The leading cause of death was cancer (124 cases). This excludes 28 cases of liver cancer, which are instead counted as cases of advanced liver disease – see below. Of the (non liver) cancer deaths, lung cancer (32 cases) was responsible for the largest number of deaths. There were significant numbers of cases of colon cancer (9 cases), lymphoma (8 cases), prostate cancer (8 cases), myeloma (7 cases) and pancreatic cancer (7 cases).

The second leading cause of death was cardiovascular disease (66 cases). Sudden cardiac arrest (26 cases), acute myocardial infarction (17 cases) and congestive heart failure (15 cases) accounted for 89% of all deaths in this category.

Drug overdose (62 cases) was the third most common cause of death in 2018, overtaking liver disease for the first time.

Liver disease (57 cases) was the fourth most common cause of death. As in past years, end stage (advanced) liver disease and liver cancer are grouped together because both are a consequence of chronic hepatitis C infection.

Infectious disease (37 cases) was the fifth most common cause of death. This category includes 22 cases of sepsis (of which 12 had a known underlying focus of infection), 8 cases of pneumonia without sepsis, 3 cases of infectious endocarditis, and 2 cases of coccidioidomycosis.

Suicide and homicide (30 cases each) tied as the sixth most common reasons for death in 2018, similar to past years.

TABLE 1. CAUSES OF DEATH AMONG ALL CALIFORNIA INMATES, 2018.

| NUMBER OF CASES | CATEGORY AND CAUSES OF DEATH |
|-----------------|--|
| 124 | Cancer 32 lung; 9 colorectal; 8 lymphoma, (6 b-cell, 2 t-cell); 8 prostate; 7 multiple myeloma; 7 pancreas; 6 esophagus; 5 melanoma; 4 brain; 4 stomach; 3 bladder; 3 unknown primary; 3 leukemia (2 acute myeloblastic, 1 acute lymphoblastic); 2 bile duct; 2 kidney; 2 tongue; 2 malignant neuroendocrine; 1 skin; 1 squamous cell carcinoma; 1 tonsil; 1 larynx; 1 Merkel cell carcinoma; 1 retroperitoneal sarcoma; 1 myeloproliferative disorder; 1 gastrointestinal; 1 oropharynx; 1 gastric stromal tumor; 1 abdominal wall; 1 gall bladder; 1 testis; 1 sinonasal; 1 penis; 1 sarcoma; 1 breast |

| NUMBER OF CASES | CATEGORY AND CAUSES OF DEATH |
|-----------------|--|
| 66 | Cardiovascular Disease 26 sudden cardiac arrest; 17 acute myocardial infarction; 15 congestive heart failure; 3 aortic dissection; 1 aortic aneurysm rupture; 1 cardiomyopathy; 1 CHF/aortic valve stenosis; 1 coronary artery disease; 1 endocarditis, infectious |
| 62 | Drug Overdose 10 methamphetamine; 8 heroin/meth; 7 heroin; 6 fentanyl/meth; 6 opiate; 5 fentanyl; 4 morphine; 2 fentanyl/heroin; 2 fentanyl/meth/morphine/alcohol; 3 unknown; 1 cocaine; 1 fentanyl/morphine; 1 fentanyl/opioids; 1 heroin/amphetamines; 1 meth/morphine; 1 mixed/opioid; 1 narcotic; 1 propranolol; 1 venlafaxine |
| 57 | Liver Disease 29 end stage liver disease; 28 liver cancer (hepatocellular carcinoma or HCC) |
| 37 | Infectious Disease 22 sepsis (9 sepsis, pneumonia; 8 sepsis, without known source; 1 sepsis, axillary abscess; 1 sepsis, Crohn disease; 1 sepsis, colitis; 1 sepsis, endocarditis; 1 sepsis, ESLD); 8 pneumonia (incl. 1 aspiration); 3 endocarditis, infectious; 2 coccidioidomycosis (incl. 1 disseminated); 1 acute respiratory failure; 1 cellulitis |
| 30 | Suicide |
| 30 | Homicide |
| 10 | Pulmonary 5 chronic obstructive pulmonary disease; 2 interstitial lung disease; 2 pulmonary fibrosis; 1 aspiration pneumonia in Crohn disease |
| 9 | Circulatory System 8 pulmonary embolism; 1 gangrene secondary to peripheral vascular disease |
| 9 | Neurological Disease 3 dementia; 1 amyotrophic lateral sclerosis; 1 aspiration (seizure disorder); 1 dementia-Alzheimer; 1 epilepsy; 1 Guillain-Barré syndrome; 1 Parkinson disease |
| 7 | Renal Disease 6 end stage renal disease; 1 Polycystic kidney disease |
| 5 | Cerebrovascular Disease 5 stroke (3 hemorrhagic; 1 ischemic; 1 non-hemorrhagic) |
| 3 | HIV/AIDS |

| NUMBER OF CASES | CATEGORY AND CAUSES OF DEATH |
|-----------------|---|
| 2 | Endocrine/Metabolic/Nutrition/Immunity 1 adrenal insufficiency; 1 diabetes mellitus |
| 1 | Unknown |
| 452 | Grand Total |

TABLE 2. TOP CAUSES OF DEATH AMONG CALIFORNIA INMATES, 2006–2018.

| YEAR | RANK | | | | | | | | |
|------|--------|--------------------------|--------------------------|--------------------------|----------------------|--------------------------|---------------------------|-----------------------------|---------------------------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2018 | Cancer | Cardio-vascular Disease | Drug Overdose | End Stage Liver Disease* | Infectious Disease** | (tied) Suicide, Homicide | | Pulmonary | Circulatory System |
| 2017 | Cancer | Cardio-vascular Disease | End Stage Liver Disease* | Drug Overdose | Infectious Disease** | Suicide | Homicide | Cerebro-vascular Disease | Pulmonary |
| 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 |

| YEAR | RANK | | | | | | | | |
|------|---------|--------------------------|--------------------------|-------------------------|--------------------------------|-----------|--------------------------|--------------------------|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 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; and as Liver Disease from 2008 onward.

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

The next table compares the top causes of death in CCHCS men with those in the non incarcerated American male population. Significant differences can be seen. In the prison population, cancer (25.3%) was the number one cause of death while cardiovascular disease (17.5%) was second most frequent and drug overdose (13.7%) was third. Advanced liver disease (including liver cancer was fourth (12.6%). These four accounted for 68% of all deaths. For the American male population in 2016 (the last year for which statistics are available), cardiovascular disease (24.4%) was number one, cancer (22.8%) ranked number two, and accidental injury was a distant third (6.8%). Chronic liver disease accounted for 1.9% and ranked ninth.

Drug overdose, advanced liver disease, infectious diseases, suicide and homicide were all at significantly higher percentages in the prison population than in free living American males, whereas cardiovascular disease was significantly lower.

TABLE 3. TOP CAUSES OF DEATH AMONG CALIFORNIA INMATES, 2018, COMPARED TO AMERICAN MALE DEATHS, 2016.

| CCHCS 2018 | AMERICAN MALES 2016 |
|----------------|------------------------|
| Cancer (27.3%) | Cardiovascular (24.2%) |

| | |
|--|------------------------------|
| Cardiovascular (14.6%) | Cancer (22.5%) |
| Drug overdose (13.7%) | Unintentional injury (7.4%) |
| Liver disease (end stage, includes liver cancer) (12.6%) | Chronic respiratory (5.2%) |
| Infectious diseases (8.2%) | Stroke (4.2%) |
| Suicide (6.6%) | Diabetes mellitus (3.1%) |
| Homicide (6.6%) | Alzheimer’s disease (2.5%) |
| Pulmonary (2.2%) | Suicide (2.5%) |
| Circulatory System (2.0%) | Chronic liver disease (1.8%) |
| Neurological disease (1.8%) | Kidney disease (1.8%) |

B. Life Expectancy in the CCHCS, 2018

The average age at death of all CCHCS male patients in 2018 was 55.9 years. That of females was 54.3 years. Non incarcerated American males and females enjoy a life expectancy more than two decades longer. In 2016, the American male life expectancy was 76.3 years and the average American female lived to be 81.1.

Life expectancy in California prisons is bimodal. Drug overdoses, suicides and homicides cause death at an average of 40.3 years, whereas prisoners dying from all other causes live to an average age of 61.6 years.

TABLE 4. RANGES AND AVERAGE AGES AT DEATH AMONG ALL CALIFORNIA INMATES, 2018.

| | | |
|--|---------|------|
| Age of all 437 male decedents | 19 – 94 | 55.9 |
| Age of all 15 female decedents | 28 – 77 | 54.3 |
| Age of suicides, drug overdoses, and homicides | 19 – 77 | 40.3 |
| Suicide | 22 – 71 | 38.7 |
| Drug overdose | 21 – 71 | 42.3 |
| Homicide | 19 – 77 | 37.8 |
| Age excluding suicide, drug overdose, and homicide | 25 – 94 | 61.6 |

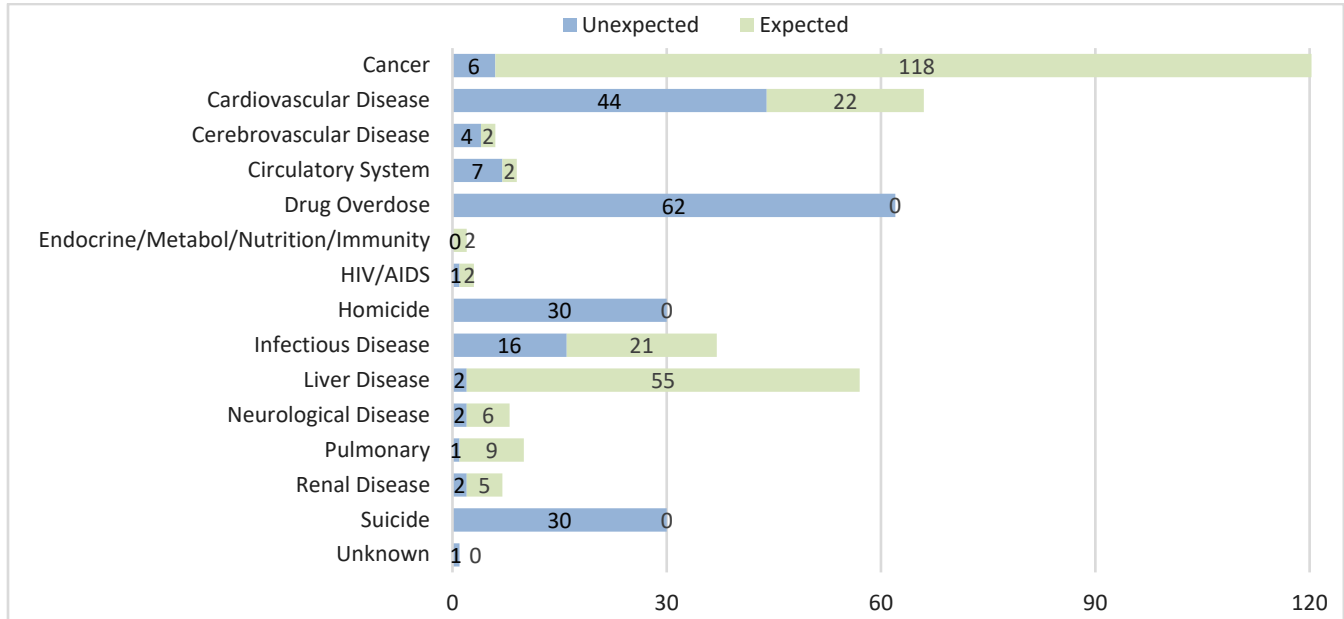
C. Expected Deaths in 2018

There were 244 cases of expected death in 2018. All expected deaths were the result of known disease processes. Cancer, liver disease, chronic cardiovascular disease (mainly congestive heart failure) and infectious disease processes accounted for nearly 90% of all expected deaths.

D. Unexpected Deaths in 2018

There were 208 cases of unexpected death in 2018. Drug overdose, suicide and homicide accounted for 123 or 59% of all unexpected deaths. Sudden cardiac arrest and acute myocardial infarction were 44 or 21% of all unexpected deaths. These five causes together were 90% of all unexpected deaths.

FIGURE 2. INMATE DEATHS BY EXPECTATION AND CATEGORY, CCHCS 2018.



E. Opportunities for Improvement, 2018

The identification of opportunities for improvement (OFI) is now a major responsibility of the Mortality Review process. In 2018, the Mortality Review Committee identified 392 OFI. Of these, 196 occurred in 162 of the 244 expected deaths and 196 occurred in 140 of the 208 unexpected deaths.

Thus, expected deaths yielded an average of 196/244 or 0.80 OFI per case, whereas the unexpected deaths yielded an average of 196/208 or 0.94 OFI per case.

A single OFI in a Mortality Review can be relatively minor (minor documentation inconsistencies in notation of time an incident occurred) or potentially quite serious (lost request for a diagnostic test during a patient transfer from one institution to another, resulting in significant delay in diagnosis of a treatable condition). There is currently no standardized way to grade the seriousness of any single OFI. That assessment must take place during the OFI review process.

The CCHCS is creating a taxonomy for OFIs, but a finalized version is not yet available. Therefore, for the sole purpose of this review of 2018 deaths, an interim classification system for OFI has been created.

TABLE 5: OPPORTUNITIES FOR IMPROVEMENT – INTERIM CLASSIFICATION FOR 2018 MORTALITY REVIEWS AND FREQUENCY IN UNEXPECTED AND EXPECTED DEATHS.

| Frequency in | Unexpected Deaths | Expected Deaths | All Deaths |
|---|-------------------|-----------------|------------|
| Opportunities for better education/training and improved documentation on CCHCS emergency medical response protocols | 53 | 5 | 58 |
| Opportunities to improve care near the end of life | 21 | 36 | 57 |
| <i>Physicians orders for life sustaining treatment not initiated or patients' end of life decisions for intensity of care not followed.</i> | 21 | 36 | 57 |
| Opportunities to improve clinical decision making | 37 | 36 | 73 |
| <i>Important clinical signs and symptoms that were subject to errors in decision making</i> | 24 | 26 | 50 |
| <i>Opportunities for better adherence to the care guides for a specific disease or conditions</i> | 10 | 9 | 19 |
| <i>Opportunities for better medication management</i> | 3 | 1 | 4 |
| Opportunities for improved application of the model of care as outlined in the CCHCS Complete Care Model | 37 | 61 | 98 |
| <i>General lack of Primary Care Team model</i> | 1 | 11 | 12 |
| <i>Opportunities to improve follow-up on abnormal laboratory and diagnostic imaging reports</i> | 14 | 13 | 27 |
| <i>Opportunities to apply complex care management for improved care coordination</i> | 8 | 13 | 21 |
| <i>Opportunities to improve access by meeting timeframes for routine and urgent care</i> <i>Urgent – Unexpected: 1 Expected: 4</i> <i>Routine – Unexpected: 4 Expected: 5</i> | 5 | 9 | 14 |
| <i>Opportunities for better patient counseling or education in cases where patients do not adhere to recommendations for appropriate care</i> | 4 | 6 | 10 |
| <i>Opportunities for improved pain management</i> | 4 | 5 | 9 |

| Frequency in | Unexpected Deaths | Expected Deaths | All Deaths |
|---|--------------------------|------------------------|-------------------|
| <i>Opportunities to transfer a patient to a more appropriate level of care</i> | 1 | 4 | 5 |
| Opportunities to improve medical record documentation | 18 | 24 | 42 |
| Opportunities for improved communication in a care transition | 10 | 17 | 27 |
| <i>Care Team - Specialty Care</i> | 2 | 6 | 8 |
| <i>Care Team - Hospital</i> | 2 | 5 | 7 |
| <i>Care Team - Mental health</i> | 4 | 1 | 5 |
| <i>Care Team - Custody</i> | 1 | 3 | 4 |
| <i>Care team - Emergency Dept</i> | 0 | 1 | 1 |
| <i>PCP - PCP</i> | 1 | 0 | 1 |
| <i>PCP - Nursing</i> | 0 | 1 | 1 |
| Opportunities to utilize a substance use disorder (SUD) protocol for patients who have opiate addiction | 16 | 1 | 17 |
| Opportunities to address reasons for delays in initiating appropriate treatment | 2 | 6 | 8 |
| Opportunities to mitigate fall risk | 0 | 7 | 7 |
| Opportunities to prevent a pressure ulcer | 1 | 2 | 3 |
| Miscellaneous opportunities for improvement | 1 | 1 | 2 |
| TOTALS | 196 | 196 | 392 |

The following discussion addresses each of these areas.

1. Opportunities for better education/training and improved documentation on CCHCS emergency medical response protocols.

| | | |
|----------------------|-------------------|-----------------|
| <i>Unexpected 53</i> | <i>Expected 5</i> | <i>Total 58</i> |
|----------------------|-------------------|-----------------|

There were 58 total OFI in this category. Fifty-three occurred in the unexpected deaths, and only 5 in the expected deaths. (There were many fewer emergency protocols initiated in the expected deaths because of prior discussions resulting in patients electing no resuscitation in case of a terminal event.) Areas singled out for improvement included more precise documentation and timing of events, earlier initiation of 911 calls, control of traumatic bleeding, better training in airway and vascular access, and proper response to ECG patterns. In 2019, because of these OFI and prior years’ experiences indicating a need for improvements in the area of emergency response, a major statewide initiative of onsite training in Emergency Medical Response was initiated.

2. Opportunities to improve care near the end of life.

- a. *Physicians orders for life sustaining treatment not initiated or patients’ end of life decisions for intensity of care not followed.*

| | | |
|----------------------|--------------------|-----------------|
| <i>Unexpected 21</i> | <i>Expected 36</i> | <i>Total 57</i> |
|----------------------|--------------------|-----------------|

The CCHCS honors the ethical principal of patient autonomy and directs physicians to provide a physician order for life sustaining treatment (POLST) which gives patients that are “elderly, frail, burdened with serious chronic medical conditions, or have less than six months’ life expectancy” an opportunity to provide specific directions for their end of life care, including desire to not attempt resuscitation in the event of a terminal emergency. This is called a DNR/ DNI order (“do not resuscitate/do not intubate”). Periodic discussions regarding goals of treatment or continued treatment in the face of advanced illness are to be honored. There were 36 OFI in expected deaths and 21 in unexpected deaths in this category. Of these 57 OFI, 15 patients had specific orders for no further life sustaining treatment but experienced attempted cardiopulmonary resuscitation or were sent out to hospital emergency rooms and experienced hospitalizations and heroic life sustaining measures. A few had inoperable or metastatic cancers or end stage chronic illnesses. In 44 cases, patients who fulfilled POLST criteria had not had POLST discussions initiated by their physicians or care teams.

3. Opportunities to improve clinical decision making.

- a. *Important clinical signs and symptoms that were subject to errors in decision making.*

| | | |
|----------------------|--------------------|-----------------|
| <i>Unexpected 24</i> | <i>Expected 26</i> | <i>Total 50</i> |
|----------------------|--------------------|-----------------|

There were 50 OFI in this category, almost equally distributed between deaths that were unexpected (24) and deaths that were expected (26). (See Table 5 OFI.) Many of these were “red flag symptoms” or potential

indicators of serious underlying diseases. These included chest pain and atypical left shoulder pain heralding potentially serious cardiovascular disease. Symptoms and signs of malignancy included unexplained weight loss, visible hemorrhage (hematochezia, hematemesis, hematuria). sudden alteration in mental status, persistence of enlarging or painful masses, and persistent localized pain in patients with known cancers. One case involved visible choking in which the Heimlich maneuver was not done. Table 6 details these OFI.

TABLE 6. OPPORTUNITIES TO IMPROVE CLINICAL DECISION MAKING: SIGNS AND SYMPTOMS SUBJECT TO COGNITIVE ERRORS, AND (IN PARENTHESES) THE CONDITIONS THEY PORTENDED, CCHCS 2018.

| Unexpected Death (24) | Expected (26) |
|---|--|
| 7 chest pain (1 rupture aortic aneurysm, 1 acute myocardial infarction) | 3 chest pain (2 coronary artery disease, 1 congestive heart failure) |
| 4 hypertension (1 sepsis) | 4 weight loss (liver, bile duct, prostate, esophageal cancers) |
| 2 weight loss (COPD, myeloma) | 1 hypotension (sepsis) |
| 2 hypotension (sepsis, myocardial infarction) | 2 tachycardia (sepsis, CHF) |
| 1 tachycardia (pneumonia) | 2 melena (ca stomach, esophageal varices) |
| 1 melena or blood in stool (myeloma) | 1 abdominal mass (ca, desmoplastic) |
| 1 neck mass (cancer) | 1 back pain (metastatic ca) |
| 1 back pain (metastatic lung ca) | 2 altered mental status (ca brain) |
| 1 "history of DVT" (pulmonary embolism) | 1 numbness (stroke) |
| 1 cough | 1 Abdominal pain (liver ca) |
| 1 SOB | 1 heartburn, persistent (esophageal ca) |
| 1 dizziness | 1 hemoptysis (ca esophagus) |
| | 1 skin lesion (melanoma) |
| | 1 L arm swelling (breast ca) |
| | 1 choking (Heimlich not considered) |
| | 1 leg ulcer (gangrene) |

| | |
|--|------------------------------|
| | 1 headache |
| | 1 hematemesis (ca bile duct) |
| | 1 hematuria |

b. Opportunities for better adherence to the care guides for a specific disease or condition.

| <i>Unexpected 10</i> | <i>Expected 9</i> | <i>Total 19</i> |
|----------------------|-------------------|-----------------|
|----------------------|-------------------|-----------------|

The Care Guides (<https://cchcs.ca.gov/clinical-resources/>) are tools for use by clinicians and care teams in the management of patients with the following conditions: Advanced Liver Disease, Anticoagulation, Asthma, Chest Pain, Chronic Wound Management, Clozapine, Coccidioidomycosis, Chronic Obstructive Pulmonary Disease, Cognitive Impairment/Dementia, Diabetes, Dyslipidemia (high or abnormal cholesterol), Foreign body ingestion/insertion (new), Gender Dysphoria, Hepatitis C, HIV, Hunger Strike, Hypertension, Major Depressive Disorder, Pain Management, Palliative Care, Schizophrenia, Seizure Disorders, Skin and Soft Tissue Infections, Tuberculosis, and Weight Management (new).

Similar resources for nursing staff are also in use and include protocols and encounter forms for patients with Abdominal Trauma, Allergic Reaction(s), Asthma, Burns, Chest Pain, Chest Trauma, Constipation, Dental Conditions, Earache, Epistaxis, Eye injury/ irritation, Female Genitourinary Complaints, Headache, Hemorrhoids, Rash, Insect Stings, Intravenous Therapy, Loss of Consciousness, Musculoskeletal Complaints, Respiratory Distress, Seizure, Tetanus Prophylaxis, Upper Respiratory Infections, and Wound Care.

The 19 OFI in this category were almost equally distributed among unexpected (10) and expected (9) deaths. There were 10 cases in which the Hepatitis C virus infection or Advanced liver disease guidelines were not followed. These included 5 cases in which screening for liver cancer was not done according to recommended intervals or not done at all, 1 case in which screening for esophageal varices was not done at recommended intervals, 1 case in which consideration for specific HCV treatment was delayed, and 1 case in which recommended prophylaxis for spontaneous bacterial peritonitis was not prescribed. There were 2 cases in which the Anticoagulation guide was not followed. There were 3 cases in which statins were not given to patients at risk for heart attack. There was a case of suspected tuberculosis in which recommendations from the Tuberculosis guide were not followed. There was a case of congestive heart failure in which weights were not monitored and a case in which a Foley catheter was not well cared for. Although no specific care guide or protocol exists, the care for these conditions is included in standardized nursing and physician training of which all clinical personnel should be aware. There was a case citing a failure to request autopsy when the cause of death was unknown.

c. Opportunities for better medication management.

| <i>Unexpected 3</i> | <i>Expected 1</i> | <i>Total 4</i> |
|---------------------|-------------------|----------------|
|---------------------|-------------------|----------------|

The four patients in this group were a patient with anemia on daily aspirin, a patient with a history compatible with substance use disorder prescribed narcotics for chronic pain, a patient with poor medication compliance and mental illness prescribed an antihypertensive medication, propranolol, as KOP (keep on person), which he later used to overdose, and a patient with recurrent seizures who had multiple sub therapeutic levels of anticonvulsant medication.

4. Opportunities for improved application of the model of care as outlined in the CCHCS Complete Care Model

The model of care outlined in the Complete Care Model (CCM) is the foundation for delivery of all care in the CCHCS. Based on the industry standard of the Patient Centered Medical Home, the CCM creates Interdisciplinary Care teams and assigns each patient to such a care team’s panel of patients. CCM policies and procedures are intended to ensure continuous, comprehensive, coordinated and patient centered care which meets standards for access, prevention, screening and evidence based management of acute and chronic illnesses. It makes use of standardized processes such as daily care team huddles, panel management strategies, performance dashboards, master patient registries, patient summaries, and decision support tools such as the Care Guides.

a. General lack of Primary Care Team model

| | | |
|---------------------|--------------------|-----------------|
| <i>Unexpected 1</i> | <i>Expected 11</i> | <i>Total 12</i> |
|---------------------|--------------------|-----------------|

There were 12 total OFI citing a general failure to apply a care team model of care as outlined in the CCHCS Complete Care Model. The majority of these noted the presence of multiple primary care providers (up to 8 in a single case) in cases of complex medical illness, or in cases in which patients may have been transferred several times, causing discontinuity and difficulty with needed care coordination.

b. Opportunities to improve follow-up on abnormal laboratory and diagnostic imaging reports.

| | | |
|----------------------|--------------------|-----------------|
| <i>Unexpected 14</i> | <i>Expected 13</i> | <i>Total 27</i> |
|----------------------|--------------------|-----------------|

There were 27 OFI in this category, almost equally divided between the unexpected deaths (14) and expected deaths (13). The majority of these cases occurred because of a lack of continuity of providers, poor communication on weekends or shift changes, or lack of adherence to procedures intended to ensure that all test results are conveyed in a timely manner to a member of the patient’s care team.

c. Opportunities to apply complex care management for improved care coordination.

| | | |
|---------------------|--------------------|-----------------|
| <i>Unexpected 8</i> | <i>Expected 13</i> | <i>Total 21</i> |
|---------------------|--------------------|-----------------|

There were 21 OFI in this category. All of these patients had multiple chronic diseases, recent hospitalizations, or end stage illnesses. These patients fall into the category of “high risk, high utilization”. They typically generate large numbers of encounters with the need for multiple laboratory tests, diagnostic imaging and special procedures, specialty care visits, special treatments such as chemotherapy and hemodialysis, emergency

department visits, and hospitalizations. They are at risk for events that lead to rapid changes in their clinical conditions, and would benefit from special attention by a member or members of the care team, so called “case management” or “complex care management”.

d. *Opportunities to improve access by meeting timeframes for routine and urgent care.*

| <i>Unexpected 5</i> | <i>Expected 9</i> | <i>Total 14</i> |
|---------------------|-------------------|---------------------|
| <i>Urgent 1</i> | <i>Urgent 4</i> | <i>Subtotal (5)</i> |
| <i>Routine 4</i> | <i>Routine 5</i> | <i>Subtotal (9)</i> |

There were 14 OFI citing standards of access not being met. Of these, 5 were urgent and 9 were routine.

The following 5 cases did not meet the 2-week standard for an urgent referral.

1. Urgent abdominal MRI referral for pelvic mass - 2 weeks and 5 days
2. Urgent colonoscopy referral for rectal bleeding- 3 weeks
3. Urgent cardiology referral for chemotherapy clearance - 6 weeks
4. Urgent radiation oncology referral for liver cancer therapy - 3 months
5. Urgent echocardiogram referral for congestive heart failure. Not done, and the patient expired 3 weeks after order submitted.

e. *Opportunities for better patient counseling or education in cases where patients do not adhere to recommendations for appropriate care.*

| <i>Unexpected 4</i> | <i>Expected 6</i> | <i>Total 10</i> |
|---------------------|-------------------|-----------------|
|---------------------|-------------------|-----------------|

There were 10 OFI when patients who had refused recommended treatments or tests might have benefitted from targeted counseling and more or better documented education by the care team.

f. *Opportunities for improved pain management.*

| <i>Unexpected 4</i> | <i>Expected 5</i> | <i>Total 9</i> |
|---------------------|-------------------|----------------|
|---------------------|-------------------|----------------|

There were 9 cases in which an OFI for improved pain management was cited. The application of the CCHCS Care Guides for Pain Management and for Palliative Care were mentioned in these cases.

g. *Opportunities to transfer a patient to a more appropriate level of care.*

| <i>Unexpected 1</i> | <i>Expected 4</i> | <i>Total 5</i> |
|---------------------|-------------------|----------------|
|---------------------|-------------------|----------------|

There were 5 OFI citing a missed opportunity to move a patient to a level of care more appropriate to their clinical severity. There were 2 patients with foot ulcers who might have benefitted from more aggressive monitoring and referral to the CCHCS Wound Management Team (see Care Guide for Chronic Wound Management). One patient

might have benefited from a higher level of care for progressive end stage liver disease. Another patient with end stage liver disease who decompensated one day after discharge from the local hospital might have benefited from immediate transfer to a higher level of care. A cancer patient with increasing debilitation might have benefited from transfer to a higher level of care. All of these cases placed the responsibility on the primary care team for evaluation of the whole patient, especially after a deterioration in the patient’s clinical condition.

5. Opportunities to improve medical record documentation.

| | | |
|----------------------|--------------------|-----------------|
| <i>Unexpected 18</i> | <i>Expected 24</i> | <i>Total 42</i> |
|----------------------|--------------------|-----------------|

The adoption of the electronic medical record has created a requirement for more complete documentation of visits, which has been time-consuming for provider staff. This in turn has created an unfortunate workaround by some providers who “cut and paste” sections of prior patient encounters in service of personal efficiency (termed legacy charting). Time pressure also can result in inadequate or inaccurate documentation. The need to incorporate records of patient encounters outside the prison system of care (such as outside specialist notes or hospital or emergency room visits) can result in such encounters being unavailable or missing for a time. The 42 OFI in this category showed 14 inadequate, 20 missing, 4 inaccurate and 4 legacy charting citations. All of these were referred to the institutions where they occurred for local action.

6. Opportunities for improved communication in a care transition

| | <i>Unexpected 10</i> | <i>Expected 17</i> | <i>Total 27</i> |
|-----------------------------------|----------------------|--------------------|-----------------|
| <i>Care Team - Specialty Care</i> | <i>2</i> | <i>6</i> | <i>8</i> |
| <i>Care Team - Hospital</i> | <i>2</i> | <i>5</i> | <i>7</i> |
| <i>Care Team - Mental health</i> | <i>4</i> | <i>1</i> | <i>5</i> |
| <i>Care Team - Custody</i> | <i>1</i> | <i>3</i> | <i>4</i> |
| <i>Care team - Emergency Dept</i> | <i>0</i> | <i>1</i> | <i>1</i> |
| <i>PCP - PCP</i> | <i>1</i> | <i>0</i> | <i>1</i> |
| <i>PCP - Nursing</i> | <i>0</i> | <i>1</i> | <i>1</i> |

The accurate transfer of clinical information between care teams at transitions of medical care is important for high quality patient care. Lost or inaccurate information as to patients’ end of life wishes for care, for example, can lead to unnecessary procedures or expensive and painful efforts to prolong life in the emergency room, hospital, or intensive care unit. Missed information from specialists to the primary care teams can lead to critical tests being delayed or not done. There were 27 OFI in this general category. Of these, 7 cited deficiencies in communication between the primary care team and the hospital facility, 5 cited care team - emergency room communication, 6 cited care team - specialist consultation, 5 cited care team - mental health, 4 cited care team - custody and 1 each cited primary care provider - primary care provider, and primary care provider - nursing communications.

7. Opportunities to utilize a substance use disorder (SUD) protocol for patients who have opiate addiction.

| | | |
|----------------------|-------------------|-----------------|
| <i>Unexpected 16</i> | <i>Expected 1</i> | <i>Total 17</i> |
|----------------------|-------------------|-----------------|

During 2017 the CCHCS developed a proposal to revise and expand existing Substance Abuse Disorder training, including the incorporation of Medication Assisted Treatment (MAT) for patients identified as having Substance Use Disorder (opiate addiction). This treatment of SUD as a chronic medical condition has been shown to significantly reduce overdose deaths in non prison populations. There were 16 patients who might have qualified for a SUD protocol. Of these, 15 were patients who had died from opiate overdose.

8. Opportunities to address reasons for delays in initiating appropriate treatment.

| | | |
|---------------------|-------------------|----------------|
| <i>Unexpected 2</i> | <i>Expected 6</i> | <i>Total 8</i> |
|---------------------|-------------------|----------------|

There were 8 OFIs in which a delay in initiating appropriate treatment was cited. These cases are described in Table 7 below.

TABLE 7. DELAYS IN INITIATING APPROPRIATE TREATMENT

| Unexpected Deaths |
|---|
| 1. 8 month delay in treatment of a cancer of the vocal cord - multifactorial (lack of coordinated care) |
| 2. 9 month delay in treatment of scalp cancer - due to lack of coordination of care, case management |
| Expected Deaths |
| 3. A 3 week delay initiating treatment for melanoma because of lost specialty referral requests during a period in which electronic medical record was being installed at the institution. |
| 4. A 12 hour delay initiating treatment for central line bacteremia with positive blood culture. The provider was aware but did not initiate rx because “visual inspection of IV appeared normal “. |
| 5. Indeterminate delay in initiating transfer to hospice - reason not cited |
| 6. A 3 week delay in obtaining a staging CT scan for pancreatic cancer staging (ordered “routine” instead of “urgent”) |
| 7. A 7 month delay in the diagnosis of pancreatic cancer. The specialist recommendation for CA -19 lab test was either lost or not acted upon. |
| 8. A delay initiating oxygen therapy for a patient with COPD and low oxygenation. |

Delays in initiating treatment can be the result of poor decisions, failed processes, or both. Mistakes in judgment led to an incorrect action or lack of action in cases 1, 4, 6, and 8. Systemic problems led to delays in cases 2, 3, 5, and 7.

9. Opportunities to mitigate fall risk.

| | | |
|---------------------|-------------------|----------------|
| <i>Unexpected 0</i> | <i>Expected 7</i> | <i>Total 7</i> |
|---------------------|-------------------|----------------|

The local operating procedures for Falls Risk Assessment is intended to provide guidelines for the prevention of falls, for post-fall assessment, treatment, and intervention. There were 7 OFI citing high fall risk, all in chronically ill patients who eventually had expected deaths. These patients had either not had a fall protocol applied to their care, or in some cases, fall protocols were not followed.

10. Opportunities to prevent a pressure ulcer.

| | | |
|---------------------|-------------------|----------------|
| <i>Unexpected 1</i> | <i>Expected 2</i> | <i>Total 3</i> |
|---------------------|-------------------|----------------|

There were 3 OFI in which patients developed pressure ulcers. One developed in a bed bound patient with myeloma, and two others developed in patients during prolonged hospitalizations at outside facilities.

11. Miscellaneous Opportunities for Improvement

| | | |
|---------------------|-------------------|----------------|
| <i>Unexpected 1</i> | <i>Expected 1</i> | <i>Total 2</i> |
|---------------------|-------------------|----------------|

There were 2 miscellaneous OFIs. One cited a delay in delivery of prescribed medication - a man who had resection of a malignant brain tumor who missed starting a seven day taper of dexamethasone by 24 hours after discharge from the hospital where he had undergone tumor resection. A second case cited possible inappropriate housing when a patient with severe mental illness who had expressed fear of “enemies” was placed at risk in a double cell.

A process for tracking, analyzing and prioritizing of OFI is being integrated into the overall Quality Improvement Program. This process is expected to be formalized in the revised Mortality Review and Reporting policy by the end of 2019.

F. Delays in Diagnosis, 2018

Delays in diagnosis should be avoided whenever possible. There were 37 cases in which significant delays were noted in 2018. All of these cases generated “opportunities for improvement”. They are gathered here to allow analysis of the specific categories of OFI which carried the greatest risk for delays in diagnosis.

TABLE 8. DIAGNOSTIC DELAYS, CCHCS 2018.

| “Red flag” symptom or sign | Diagnosis | Delay |
|--|--------------------------|------------------|
| weight loss | esophageal cancer | 4 weeks |
| weight loss | cholangiocarcinoma | 6 weeks |
| weight loss | multiple myeloma | indeterminate |
| weight loss | liver cancer | indeterminate |
| persistent pain (“rib”) | neuroendocrine tumor | 6 months |
| persistent pain (back) | metastatic cancer | indeterminate |
| persistent pain (mid sternum) | metastatic round cell ca | 8 months |
| suspicious skin lesion | melanoma | 3 months |
| suspicious skin lesion | squamous cell ca, scalp | 9 months |
| abnormal history: “I have DVT” | deep vein thrombosis | 20 days |
| abnormal history: “I have prostate cancer” | prostate cancer | 3 years |
| persistent sore throat | tonsillar cancer | 3 months |
| persistent hoarseness | laryngeal cancer | 7 months |
| heartburn | esophageal cancer | 3 years |
| hemoptysis | esophageal cancer | 5 months |
| hematochezia | stomach cancer | 5 months |
| persistent neck mass | base of tongue cancer | 3 months |
| hemisensory numbness | brain cancer | 6 weeks |
| Abnormal test | Diagnosis | Delay |
| chest x ray | lung cancer | 4 months |
| chest x ray | lung cancer | 6 months |
| chest x ray | lung cancer | 3 years 5 months |

| | | |
|-----------------------------|---|----------------------------------|
| chest x ray | mediastinal mass | 6 months |
| pancytopenia | lymphoma | 5 yr 3 mo (also patient refusal) |
| pancytopenia | myeloproliferative disorder | 11 months |
| fecal blood test | rectal cancer | 16 months |
| prostate specific antigen | prostate cancer | 7 months |
| CT pelvis | sarcoma | 33 days |
| liver biopsy | amyloidosis in myeloma | 3 months |
| liver function | liver cirrhosis | 6 years (also patient refusal) |
| Access to Specialist | Diagnosis | Delay |
| oncology | colon cancer | 1 month |
| dermatology | melanoma | 2 months |
| oncologist | liver cancer | 6 months |
| tumor board | liver cancer | 10 months |
| Screen | Diagnosis | Delay |
| ultrasound | liver cancer | indeterminate (years) |
| “surveillance” | testicular cancer | indeterminate |
| Miscellaneous | Diagnosis | Delay |
| two interfacility transfers | anal melanoma | 3.5 months |
| multiple PCPs over years | cardiomyopathy with sudden cardiac arrest | 4 years |

A delay in diagnosis can occur when an error in clinical judgment results in a failure to properly evaluate an important clinical sign or symptom.

There were 18 of these “red flag” cases in the 2018 mortality reviews, resulting in a range of delays from 20 days to 3 years. Eleven were in expected deaths and 7 were in unexpected deaths. Sixteen of these cases resulted in a delayed diagnosis of cancer. One resulted in a delayed diagnosis of a deep vein thrombosis.

Inexplicable loss of weight was nearly always an indication of serious underlying disease, usually cancer. Persistent symptoms or symptoms involving blood loss or focal pain were also red flags signifying potential cancers. Suspicious skin lesions should have been referred expeditiously for biopsy.

Abnormal diagnostic test results which were lost, not noted or not followed up resulted in 11 cases of delayed diagnosis ranging 3 months to 6 years. The vast majority of these (10 cases) occurred in expected deaths. Two cases were complicated by prolonged patient non adherence to recommendations for follow up testing.

A delay in access to one or more specialist consultations resulted in significant delays in 4 cases. In one of these, the diagnosis had been made but availability of a tumor board opinion delayed treatment recommendations.

Recommended screening intervals were not followed, resulting in diagnostic delay in 2 cases.

Miscellaneous systemic reasons were cited in 2 cases as reasons for diagnostic delay.

In all, 34 of the 37 cases resulted in a delayed diagnosis of cancer.

VI. DISCUSSION OF TRENDS

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

The following table shows the number of deaths and the corresponding mortality rates from 2006–2018. (U.S. State Prison figures from the Bureau of Justice Statistics 12/15/2016 (most recent available): <https://www.bjs.gov/index.cfm?ty=pbdetail&iid=5866>)

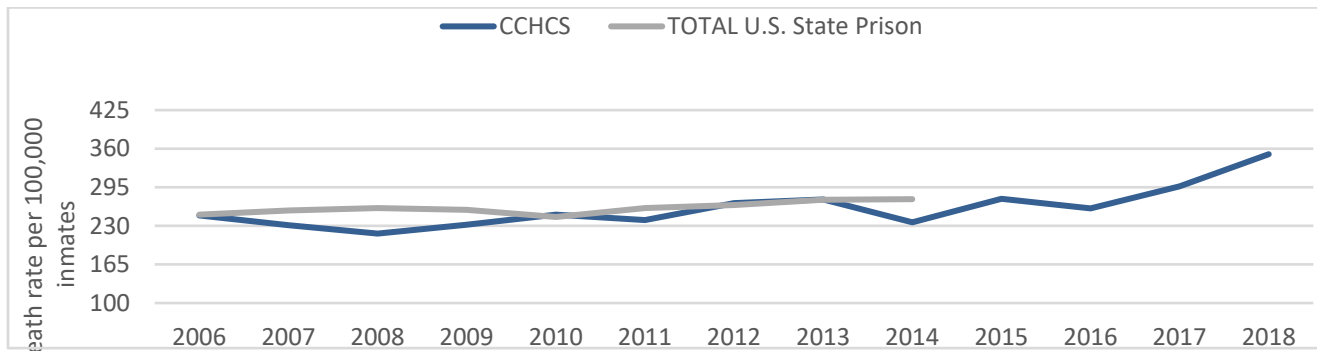
TABLE 9. ANNUAL MORTALITY RATES AMONG CALIFORNIA AND U.S. STATE PRISON INMATES, 2006–2018.

| YEAR | CCHCS NUMBER OF DEATHS | CCHCS NUMBER OF INMATES | CCHCS DEATH RATE PER 100,000 | 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 | <i>not available</i> |
| 2016 | 334 | 128,705 | 260 | <i>not available</i> |
| 2017 | 388 | 130,807 | 297 | <i>not available</i> |
| 2018 | 452 | 128,875 | 351 | <i>not available</i> |
| Average (Range) | | | 260 (217–351) | 260 (245–275) |

The following figure shows the trended death rates for the CCHCS from 2006–2018, and the trended death rates for all US prisons from 2006–2014 (most recent available). The rate of death in California prisons has risen in each of the past two years, and appears to be on a generally upward trend since 2014 - 2015.

FIGURE 3. TRENDED ANNUAL DEATH RATES AMONG CALIFORNIA AND U.S. STATE PRISON INMATES, 2006–2018.



B. Discussion of Trends in CCHCS Mortality Rates

In 2018, the 452 CCHCS deaths and the mortality rate of 351/100,000 were the highest in the 13-year history of this report. Possible reasons for this include the general aging of the prison population, as well as specific causes that contribute disproportionately to the increase.

1. *Aging.* It is known that death rates in general increase with age. And as was noted in a previous section of this report, the age of the CCHCS population has been gradually increasing, especially over the years from 2015–2018, when the number of patients over the age of 55 increased from 12.5% to 15% of the population.

An analysis was performed by CCHCS staff, comparing age adjusted mortality rates for “non natural” versus “natural” causes of death. (Non natural causes were considered to be accidents, homicides, suicides and drug overdoses. Natural causes were all other.)

The analysis concluded that there was no statistically significant increase in age adjusted deaths from natural causes but there was a statistically significant increase in age adjusted deaths related to drug overdoses, suicides and homicides.

2. *Specific causes.* The inmate population reached a new lower baseline after the mandated reduction was accomplished in 2012. For this 2018 analysis, an adjusted baseline mortality rate is established for the period between 2012 and 2015. This is then compared to the mortality rates in the subsequent three year period, 2016–2018, a period during which the aging of the general population was demonstrated.

The trends in mortality for the non natural causes drug overdose, homicide, and suicide are discussed. Trends in mortality for three of the natural causes – cardiovascular disease, lung cancer and advanced liver disease – are also discussed.

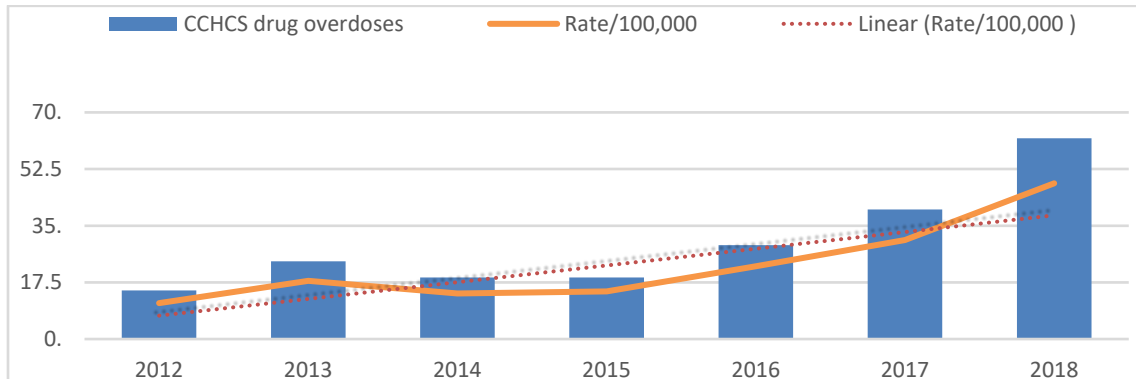
C. Annual Mortality Rates, 2012–2018

1. Drug overdose

TABLE 10. NUMBERS AND RATES OF OVERDOSE DEATHS, CCHCS 2012–2018.

| Year | CCHCS drug overdoses | CCHCS Overdose Rate/100,000 |
|------|----------------------|-----------------------------|
| 2012 | 15 | 11.1 |
| 2013 | 24 | 18 |
| 2014 | 19 | 14.1 |
| 2015 | 19 | 14.7 |
| 2016 | 29 | 22.5 |
| 2017 | 40 | 30.6 |
| 2018 | 62 | 48.1 |

FIGURE 4. NUMBERS AND RATES OF OVERDOSE DEATHS, CCHCS 2012–2018.



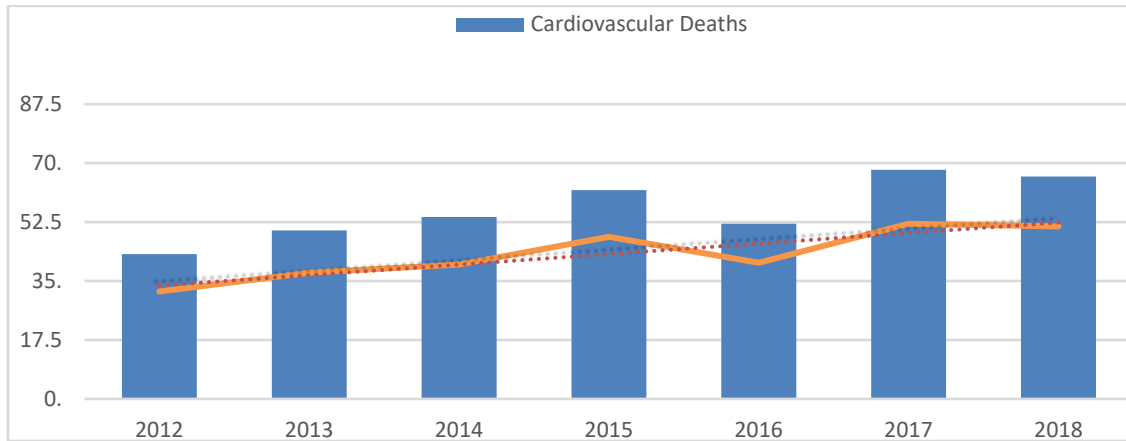
There has been a dramatic increase in the number of deaths and death rates from drug overdose from 2016–2018, reflecting the experience in the non incarcerated general population of the United States. Of the 62 overdose deaths in 2018, there were only two in which a prescribed drug was used. One of these cases involved the antidepressant venlafaxine (thought to be an unintentional overdose). One other case was a probable intentional overdose with prescribed propranolol. The overwhelming majority of other cases were caused by illicit opioids and/or amphetamines. Various opioids (heroin, morphine, fentanyl, opioids, codeine) either alone or in combination, were detected in 47 of these cases. Fentanyl, a powerful synthetic opioid increasingly seen in overdoses in the civilian population, was detected in 17 cases. Methamphetamines, either alone or in combination with opioids, were detected in 28 cases. As in the past several years, none of these deaths were caused by opioids prescribed to the patients by CCHCS physicians.

2. Cardiovascular Disease

TABLE 11. NUMBERS AND RATES OF CARDIOVASCULAR DEATHS, CCHCS 2012–2018.

| Year | Cardiovascular Deaths | Rate/100,000 |
|------|-----------------------|--------------|
| 2012 | 43 | 31.9 |
| 2013 | 50 | 37.5 |
| 2014 | 54 | 39.9 |
| 2015 | 62 | 48.1 |
| 2016 | 52 | 40.4 |
| 2017 | 68 | 52 |
| 2018 | 66 | 51.2 |

FIGURE 5. NUMBERS AND RATES OF CARDIOVASCULAR DEATHS, CCHCS 2012–2018.



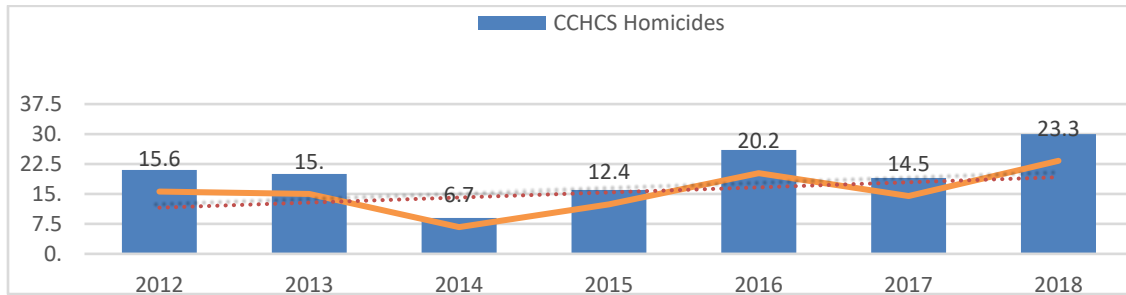
There has been an increase in the average numbers and rates of deaths due to cardiovascular disease between the two periods of 2012–2015 and 2016–2018. Most of this increase has been in sudden cardiac arrest, myocardial infarction and congestive heart failure. The CCHCS Care Guides for chest pain, diabetes, dyslipidemia and hypertension all address the management of the significant risk factors for coronary heart disease. They contain “state of the art” evidence-based guides for management of known coronary heart disease and congestive heart failure and recognition of red flag symptoms indicating acute coronary syndromes. Nevertheless, the frequency of known risk factors including smoking, hypertension, hyperlipidemia and diabetes mellitus is high in this population and a renewed emphasis on prevention and control might be warranted.

3. Homicide

TABLE 12. NUMBERS AND RATES OF HOMICIDES, CCHCS 2012–2018.

| Year | CCHCS Homicides | CCHCS Homicide Rate/100,000 |
|------|-----------------|-----------------------------|
| 2012 | 21 | 15.6 |
| 2013 | 20 | 15 |
| 2014 | 9 | 6.7 |
| 2015 | 16 | 12.4 |
| 2016 | 26 | 20.2 |
| 2017 | 19 | 14.5 |
| 2018 | 30 | 23.3 |

FIGURE 6. NUMBERS AND RATES OF HOMICIDES, CCHCS 2012–2018.



The numbers and death rates for homicide trended up for the period 2016–2018. In 2018, the homicide mortality rate (23.3/100,000) was the highest since these reports have been tracking them. Accounting for this increase is beyond the scope of this report, except to note that the homicide rate continues to be more than 3 times the national average for state prisons, which was 7.0 for the three-year average from 2012–2014.

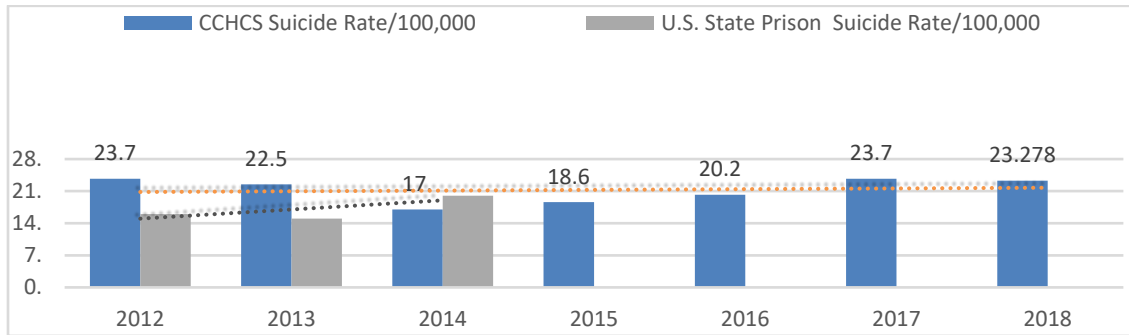
bjs.gov/content/pub/pdf/shspli.pdf

4. Suicide

TABLE 13. NUMBERS AND RATES OF SUICIDES, CCHCS 2012–2018.

| Year | CCHCS Suicides | CCHCS Suicide Rate/100,000 |
|------|----------------|----------------------------|
| 2012 | 32 | 23.7 |
| 2013 | 30 | 22.5 |
| 2014 | 23 | 17 |
| 2015 | 24 | 18.6 |
| 2016 | 26 | 20.2 |
| 2017 | 31 | 23.7 |
| 2018 | 30 | 23.3 |

FIGURE 7. SUICIDE RATES IN CCHCS AND U.S. STATE PRISONS, 2012–2018.



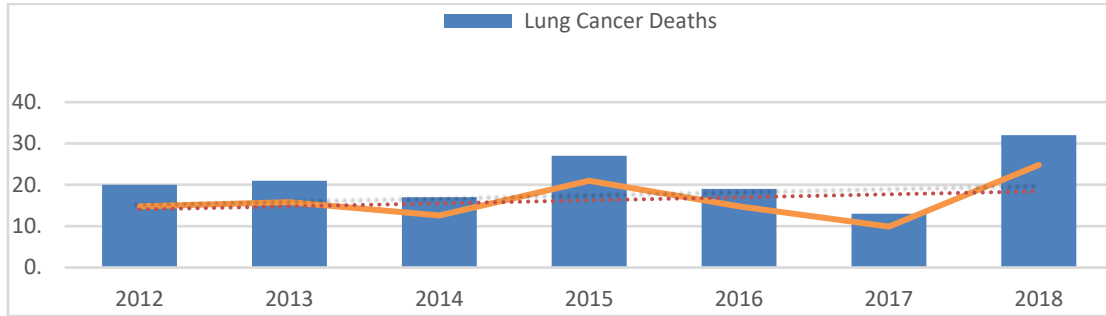
The numbers and rates of suicide for the period of 2016–2018 show a slight increase over the baseline period of 2012–2015. There have been ongoing persistent efforts to recognize and treat severe depression and suicidal ideation and to improve the communication between the behavioral health and the medical departments of CCHCS.

5. Lung cancer

TABLE 14. NUMBERS AND RATES OF LUNG CANCER DEATHS, CCHCS 2012–2018.

| Year | CCHCS lung cancer deaths | CCHCS lung cancer mortality rate/100,000 |
|------|--------------------------|--|
| 2012 | 20 | 14.8 |
| 2013 | 21 | 15.8 |
| 2014 | 17 | 12.6 |
| 2015 | 27 | 21 |
| 2016 | 19 | 14.8 |
| 2017 | 13 | 9.9 |
| 2018 | 32 | 24.8 |

FIGURE 8. NUMBERS AND RATES OF LUNG CANCER DEATHS, CCHCS 2012–2018.



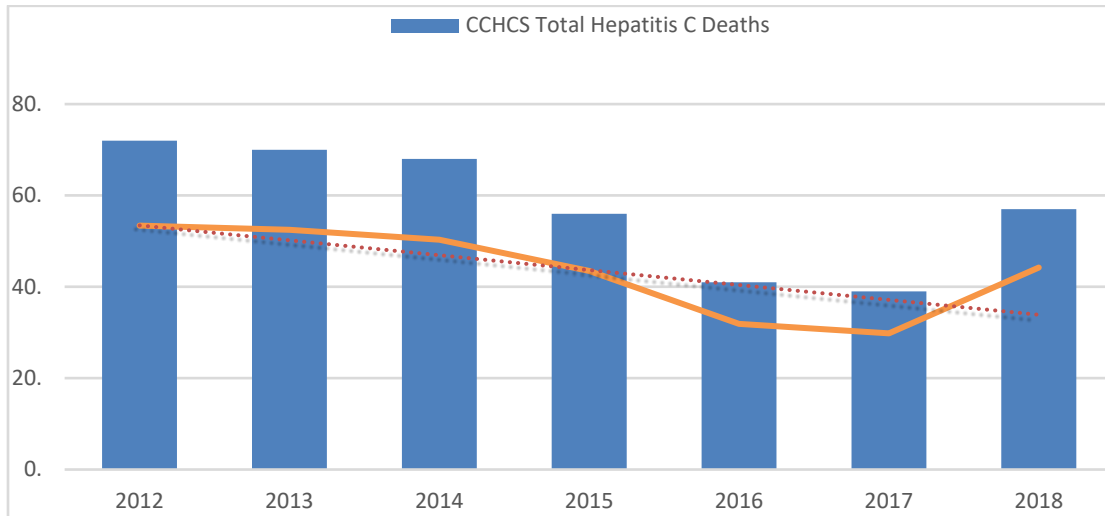
The change in mortality rates from lung cancer between the two periods is not significant. There is no obvious explanation for the spike in the rate of CCHCS lung cancer deaths in 2018. Lung cancer is also the leading cause of cancer death in males in the United States. Interestingly, in recent years there has been some movement toward the evidence based recommendation for screening for lung cancer at an earlier stage. In 2014, the US Preventive Services Taskforce issued a Grade B recommendation for the use of low dose CT scanning to screen for lung cancer in patients older than 55 who have a long history of smoking. The CCHCS has not yet adopted this recommendation.

6. Advanced liver disease (end stage liver disease and liver cancer combined)

TABLE 15. NUMBERS AND RATES OF LIVER DISEASE DEATHS, CCHCS 2012–2018.

| YEAR | Liver Cancer Deaths | Cirrhosis Deaths | Total Hepatitis C Deaths | CCHCS Number of Inmates | CCHCS HEP C ASSOCIATED DEATH RATE PER 100,000 INMATES |
|------|---------------------|------------------|--------------------------|-------------------------|---|
| 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 |
| 2017 | 18 | 21 | 39 | 130,807 | 29.8 |
| 2018 | 28 | 29 | 57 | 128,875 | 44.2 |

FIGURE 9. NUMBERS AND RATES OF ADVANCED LIVER DISEASE DEATHS, CCHCS 2012–2018.



The CCHCS has created a number of initiatives to improve the screening for and treatment of hepatitis C with the new direct acting antiviral agents, for the use of ultrasound screening for liver cancer in these high risk patients, and for improving the overall care of patients with advanced liver disease by recommending evidence based screening and treatment strategies for specific complications such as esophageal varices and spontaneous bacterial peritonitis. The overall course of disease progression in these patients is many years in duration, but it appears that significant improvements in mortality might be a result of these efforts.

TABLE 16. COMPARISON OF CCHCS MORTALITY RATES, 2012–2015 AND 2016–2018.

| Mortality Rates | 2012–2015 mean (range) | 2016–2018 mean (range) | Delta |
|-------------------------|------------------------|------------------------|-------|
| Mortality Rate, overall | 264 (236 – 276) | 303 (260 - 351) | +39 |
| Drug Overdose | 14.5 (11.1 - 18.0) | 33.7 (22.5 - 48.1) | +29.2 |
| Cardiovascular | 39.6 (31.9 - 48.1) | 47.8 (40.4 - 51.9) | +8.2 |
| Homicide | 12.4 (6.7 - 15.6) | 19.3 (14.5 - 23.3) | +6.9 |
| Suicide | 20.5 (17.0 - 23.7) | 22.4 (20.2 - 23.7) | +1.9 |
| Lung Cancer | 16.1 (12.6 - 21.0) | 16.5 (9.9 - 24.8) | +0.4 |
| Advanced Liver Disease | 50.0 (43.5 - 53.4) | 35.3 (29.8 - 44.2) | -14.7 |

The overall mortality rate increased by 39/100,000, from an average of 264/100,000 in 2012–2015 to an average of 303/100,000 in 2016–2018. Drug overdose (+29), cardiovascular diseases (+8), homicides (+7), and suicides (+2) were the major contributors to the increase in mortality rates, whereas change in lung cancer mortality (+0.4) was negligible. Advanced liver disease mortality, although much higher in 2018 alone, actually decreased significantly from 2012–15 to 2016–2018.

VII. QUALITY IMPROVEMENT INITIATIVES

Over the past five years, CCHCS has developed a Strategic Plan which adopted the Complete Care Model as the basis for its overall system wide healthcare delivery approach. Many clinical tools have been introduced to help staff reach performance targets in the service of this model.

These tools include:

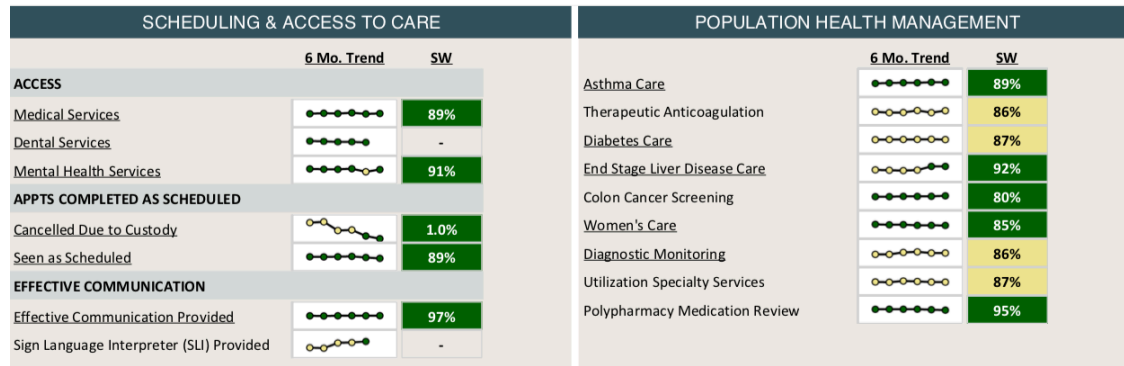
1. **Institution Dashboards and Care Team Registries with monthly performance reports.** The Statewide and Institution dashboards track key performance indicators including access, patient outcomes, utilization and cost. CCHCS leaders regularly assess progress in meeting performance objectives and to identify areas that may need improvement. Examples of the Institution dashboards can be accessed via the CCHCS website:

<https://cchcs.ca.gov/reports>

FIGURE 10. PARTIAL VIEW OF A CCHCS HEALTHCARE SERVICE DASHBOARD.

HEALTHCARE SERVICES DASHBOARD

Statewide
December 2018



Source: <https://cchcs.ca.gov/wp-content/uploads/sites/60/QM/Public-Dashboard-2018-12.pdf>

The Care Team Registries and other clinical tools are used by care teams to manage their paneled patient populations, enabling identification of individual patients in need of recommended screening. They are used to monitor key performance indicators in the management of chronic diseases like asthma, diabetes and advanced liver disease. Patients on multiple medications should have periodic medication reconciliation. Adherence to scheduling and access standards for primary care and specialty care are monitored. These

monthly dashboards are used by health care managers in each of the 35 CCHCS facilities to track performance and to target areas needing improvement.

2. **Patient registries** assist care teams and institutions to identify overdue or missing services in their high risk patients. Registries for patients with Advanced Liver Disease, Diabetes, and Hypertension are examples.
3. **Care Guides for specific clinical conditions.** These have been described previously.
4. **Initiatives to improve CCHCS processes.** A process for the classification, tracking and analysis of opportunities for improvement (OFI) will be completed by the end of 2019. Currently, all mortality reviews are entered into the electronic Health Care Incident Reporting System and are reviewed by the Health Care Incident Reporting Committee. High priority OFI are identified and forwarded to the Statewide Patient Safety Committee.

Selection of quality improvement initiatives is based on information from mortality review, the health care incident reporting system, and other sources. In addition to the formal Mortality Reviews, incidents are also reported from anywhere in the organization. Types of incidents reported include patient safety issues, medication errors, and errors that may have caused patient harm or were a “near miss” for patient harm or death. The Quality Management Program is responsible for reviewing health care areas considered to be high risk, high volume, high cost, and problem-prone and identifies organization-wide improvement priorities.

Each of the initiatives and activities listed below were identified as priorities based on mortality review OFI and other health care incident data. For example, CCHCS workgroups have revised standards for screening and treatment of for hepatitis C, and for expanding appropriate screening for liver cancer, and have directed significant resources to these recommendations.

- **Statewide Provider/Healthcare Staff Education:**
 - **Lessons from Death Review** — Uses specific cases to discuss how delay in diagnosis or error(s) in clinical decision-making affected patients’ outcomes.
 - **Cognitive Errors Webinar** — Uses specific cases to discuss various types of cognitive errors and how they may have affected patient outcomes.
- **Emergency Medical Response** — Statewide initiative for onsite hands on training with a standardized curriculum, crash carts and tools for resuscitation.
- **Integrated Substance Use Disorder Treatment Program** (approved July 2019) — Substance use disorder screening for all new patients. Medication assisted treatment (MAT) with buprenorphine, naltrexone, or methadone offered to patients with opioid use disorder who meet criteria. All appropriate providers are to receive training in order to receive waivers allowing prescription of MAT.
- **Hypertension** — New registry for care teams to more closely monitor patients whose blood pressure is not yet controlled and ensure appropriate monitoring of renal function and lipids.

- **Palliative Care** — Workgroup to identify areas for improvement including seeking end-of-life preferences earlier in the patient's illness. Develop scripts to assist with end of life conversations. Create registry to track current POLST in high risk patients.
- **Falls** — Falls are multi-factorial and, despite existing Fall Protocols being used, some patients continue to fall. This is due in part to the limited access of healthcare staff to some patients who may be in locked single cells. Nursing will be working with custody to address this and other issues to further mitigate fall risk.
- **Advanced Liver Disease Registry** — The end-stage liver disease registry has been renamed Advanced Liver Disease. Evidence based criteria for hepatocellular carcinoma screening expanded to include patients with Stage 3 liver fibrosis. Reemphasis on screening and prophylaxis for esophageal varices.
- **Hepatitis C Treatment** — CCHCS has a markedly increased prevalence of hepatitis C virus infection compared to the community. Chronic HCV is the precursor to advanced liver disease. The availability of Direct Acting Agents for HCV has been associated with decreases in liver-related death, need for liver transplantation, hepatocellular carcinoma rates, and liver-related complications, even among those patients with advanced liver fibrosis. Aggressive treatment of hepatitis C started in fiscal year 2017-2018. In fiscal 2018-2019, treatment was expanded to all HCV risk groups. Treatment is now completed in more than 10,000 patients.

Some of these activities address potential cognitive errors and behavior trends, such as clinical inertia. Lessons from Death Review and the Cognitive Errors webinars, for example, were developed in response to OFI in the categories of Improving Clinical Decision Making, Avoiding Delays in Treatment, and Improving Communication in Care Transitions.

Other initiatives address the need for attention to patient centered workflows, or specific policies and procedures. The Emergency Medical Response Trainings are a response to Mortality Review findings of OFI in unexpected deaths. The Palliative Care initiative is a response to OFI in initiating POLST conversations earlier in suitable patients and preventing overaggressive treatment in patients who have made informed decisions to limit care. The Falls Initiative is a response to the number of patient falls noted system wide (the mortality reviews contributed several OFI in this area.)

The Integrated Substance Use Disorder Treatment Program has the potential for mitigating the rising number of unexpected deaths from drug overdose.

The hypertension and advanced liver disease registries and the hepatitis C treatment initiative address opportunities for improving management and decreasing morbidity and mortality for the large number of CCHCS patients with these chronic diseases.

VIII. CONCLUSIONS

A recent rise in the CCHCS mortality rate culminated in 2018 with a mortality rate of 351/100,000 — the highest in the past 13 years. This increase in the all-cause CCHCS death rate is attributed to the aging of the prison

population as well as to a disproportionate number of deaths from unnatural causes — drug overdose, suicide and homicide. A recent somewhat higher mortality rate for cardiovascular disease may also be contributing.

At the same time there has been a recent lower rate of mortality from advanced liver disease, attributed to initiatives directed at identification and treatment of chronic hepatitis C infection. CCHCS appears to be on track for a much lower number of deaths in 2019.

In 2018 the Mortality Review Process for the CCHCS underwent significant transformation. The practice of identifying lapses in care which could inform the avoidance of preventable death was replaced by an effort to identify systemic opportunities for improvement. The tracking and analysis of these opportunities for improvement is integrated into a system of total quality improvement which results in the planning and implementation of major improvement activities and projects.

The continued maturation of the Complete Care Model coupled to transparent use of process and outcome data dashboards and the system wide implementation of improvement projects should result in further demonstrable improvements in the care of patients in the CCHCS.
