Analysis of Year 2009 Inmate Death Reviews — California Prison Health Care System

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California Prison Healthcare Receivership

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I. Introduction

The California Prison healthcare system has been in federal receivership since April of 2006. During these past four years, there has been significant effort directed toward improving healthcare for California prison inmates.

Since the beginning of the Receivership, there has been demonstrable improvement in the number and quality of the professional healthcare staff. Systemic improvements have been focused on introducing standardized guidelines for caring for chronic illness such as asthma, diabetes mellitus, hepatitis C, and chronic pain management. In 2009, two major initiatives took place: guidelines for specialty referral were introduced and a Primary Care team-based system of healthcare was installed in all of the thirty-three California prisons.

For these efforts to have been effective there should be demonstrable improvement in both process and outcome measures.

This fourth consecutive annual analysis of California inmate deaths will again focus on three major areas – trends in inmate mortality, identification and trending of serious lapses in healthcare using a standardized taxonomy, and trends in the number of unnecessary deaths in the inmate population.

II. Death Review Process

After each inmate death, a board certified physician or licensed mid level provider from the Clinical Support Unit (CSU) reviewed the care provided to the patient and completed a standardized death review template. All midlevel practitioner reviews were discussed with and signed by one of the physician reviewers. In 2009 there were 32 reviewers: thirty physicians, one nurse practitioner and one physician's assistant.

Each death review was based on a reading of the entire healthcare record, focusing on all clinical encounters occurring in the year prior to the patient's death. Reviewers spent from 4 to 20 hours in each review.

Reviewers were asked to:

- determine the cause of death, using autopsy findings when available
- identify all significant lapses in care
- determine whether the death was non preventable, possibly preventable or likely (probably) preventable
- make recommendations for referral of findings

Beginning in 2008, reviewers were also asked to decide whether the patient had an identifiable primary care physician.

Each completed death review was then presented to and discussed by the Death Review Committee (DRC). Members of the DRC are a multidisciplinary group of nurses, physicians, healthcare and correctional administrators. The chair is a physician manager.

The DRC voted to accept or modify the death review with respect to preliminary findings including classification of type of death, severity of departures from the standard of care (lapses), preventability of the death, and recommendations.

The DRC referred systemic lapses such as delays in access or breakdowns in emergency response protocol to the individual prison healthcare managers. Lapses in care attributed to individual nurses, physicians or midlevel providers were referred to local physician and nursing leaders and to the appropriate nursing or physician peer review committees. Lapses in care occurring at contracted hospitals were referred to that facility's chief of staff.

III. Definitions

CSU reviewers use the following definitions:

Natural expected death – In the judgment of the reviewer, the death is a natural consequence of a known disease.

Natural unexpected death – In the judgment of the reviewer, the death is unexpected but attributable to a natural disease process, not a consequence of a homicide, suicide, or drug overdose.

Non-preventable death – in the judgment of the reviewer, the patient's death could not have been prevented or delayed by more optimum health care.

Possibly preventable death – In the judgment of the reviewer, better medical management or improvement in the system of care might have prevented or delayed the patient's death.

Likely preventable death – In the judgment of the reviewer, better medical management or improvements in the system of care would likely have prevented or delayed the patient's death.

Lapse in care – Extreme departure -In the judgment of the reviewer, a clinician has rendered a departure from the standard of care that a reasonable and competent clinician would not have committed under the same or similar circumstance.

Lapse in care – Simple departure – In the judgment of the reviewer, a clinician has rendered a departure from the standard of care that a reasonable and competent clinician might have committed under the same or similar circumstance.

IV. Taxonomy for lapses in care

In late 2007, a taxonomy was developed grouping lapses in care into fourteen general categories. The taxonomy was presented to the DRC in June of 2008, was further discussed and refined in several iterations, and was then incorporated into the death review template. The finalized taxonomy was also presented in April 2009 at the National Commission on Correctional Health Care (NCCHC) meetings and in September 2009 at the American Correctional Health Services Association (ACHSA) meetings.

The fourteen categories of lapse are:

1. Failure to recognize, evaluate and/or treat important symptoms and signs (clinical "red flags").
2. Failure to follow clinical guidelines. Examples include evidence-based guidelines developed by CPHCS leadership for the screening, evaluation, monitoring and /or management of asthma, diabetes mellitus, hepatitis C, HIV/AIDS and chronic pain. Other guidelines include nationally recognized standards for the treatment of hypertension and coronary heart disease.
3. Delay in access to the appropriate level of care of sufficient duration as to result in harm to the patient.
4. Failure to identify or appropriately follow up abnormal tests results.

5. Failure of appropriate provider-to-provider communication, especially at points where transfer of care occurs.
6. Fragmentation of care, which results in failure of individual clinician or primary care team responsibility for patient care.
7. Surgical or procedural complication resulting in iatrogenic injury.
8. Medication prescribing error, including failure to prescribe indicated medication, failure to do appropriate monitoring, and failure to recognize well-known drug interactions.
9. Medication delivery error, including delays in receiving critical medications or receipt of medication intended for another patient.
10. Practicing outside the scope of one's professional competence.
11. Failure to supervise a mid level provider, including failure to be readily available for consultation and failure to arrange appropriate supervision.
12. Failure to communicate effectively with the patient.
13. Patient non-adherence with suggestions for optimal care.
14. Delay/failure in emergency response, including delays in activation or failure to follow the emergency response protocol.

V. Limitations and benefits in the death review process

As was pointed out in prior years' reports, there are significant limitations in the death review process, including absence of a system wide electronic medical record, a relatively low rate of autopsies in CDCR deaths (in 2009, that rate was 27%), off-site peer review, and inherent inter-reviewer variability in attribution of cause of death, assignation of severity of lapses of care, and subjective judgment as to a death's preventability.

The problem of potential inter-reviewer variability is particularly significant. One recent study involved 14 physicians board certified in internal medicine. They analyzed 383 hospital deaths. Initial reviewers found 23% of these deaths to be possibly preventable and 6% of deaths to be definitely preventable. But when subjected to re-review, inter-reviewer reliability was 0.34 (reviewers concurred only 34% of the time). (Hayward, et al. "Estimating hospital deaths due to medical errors: preventability is in the eye of the reviewer". Journal of the American Medical Association, Volume 286, pp 415-423, 2001)

Likewise, attribution off the severity of a particular lapse in care (simple or extreme) is subject to the same problem.

The Death Review Committee has taken some specific steps to counter inter-reviewer variability and subjectivity – including voting on assignment of "preventability " and discussing other significant findings during each case presentation. In addition, in 2009 the DRC discussed ground rules for attributing preventability. Partly as a result of that discussion, reviewers were asked to establish a cause and effect between a lapse or series of lapses in care and a preventable death. All suicides and homicides are subject to review by other committees. So reviewers now classify suicides and homicides generally as non-preventable, unless there has been a lapse or lapses in medical management, which resulted in or contributed significantly to a preventable death.

There are significant potential benefits to the CPHCS death review process, including the limited number of reviewers (in 2009, there were 32 reviewers, but 5 of them produced 50% of the reviews), the diligence expended doing each review (from 4-20 hours), and the detailed discussions conducted in order to arrive at consensus during the DRC meetings. Off site peer review could also be seen as a benefit, allowing for more objective assessments unclouded by personal relationships with the on site providers.

VI. Study findings

A. Causes of inmate death – 2009

The causes of death are shown in Table 1. The cause listed is the underlying condition that led to the patient's death. For example, if a patient dies of overwhelming infection (sepsis) because of a compromised immune system weakened by chemotherapy for a cancer, the cause of death is attributed to that cancer. There were 395 inmate deaths in 2009. Table 1 shows cause of death in 393 cases. Two (2) deaths have not yet been reviewed and await the outcome of Office of the Inspector General (OIG) investigations.

Table 1. Causes of Death Among All California Inmates, 2009

NUMBER OF CASES	*CAUSE OF DEATH*
133	Cancer Lung (36), Liver hepatoma (30), Colorectal (13), Pancreas (12), Lymphoma (6), Prostate (6), Unknown Primary (3), Bladder (2), Esophagus (2), Leukemia (2), Renal Cell (2), Stomach (2), Acute Lymphocytic Leukemia (1), Angiosarcoma (1), B Cell Lymphoma (1), Brain (1), Breast (1), Cholangiocarcinoma (1), Chronic lymphocytic leukemia(1), Epiglottis (1), Gastrointestinal Stromal Tumor (1), Head/Neck (1), Lymphoma Hodgkin's (1), Malignant Melanoma (1), Oropharyngeal (1), Prostate/Bladder (1), Squamous Cell (1), Testis (1), Thyroid (1)
60	End Stage Liver Disease
47	Sudden Cardiac Arrest /Acute Myocardial Infarction
25	Suicide
14	Drug Overdose
12	Pneumonia
10 each	Congestive Heart Failure, Homicide
5 each	Chronic Obstructive Pulmonary Disease, Coccidioidomycosis, End Stage Renal Disease, Pulmonary Fibrosis, Subarachnoid Hemorrhage, Upper Gastrointestinal Hemorrhage
4 each	Aortic Aneurysm, Dementia, Pulmonary Embolism, Stroke
3	HIV/AIDS
2 each	Amyotrophic Lateral Sclerosis, Diabetic Ketoacidosis, End Stage Kidney Disease, Endocarditis, H1N1 Influenza, Pancreatitis, Traumatic Brain Injury
1 each	Acute Hepatitis, Acute Respiratory Distress Syndrome, Acute Water Intoxication, Coronary Artery Disease, Gastric Ulcer, Hepatic Hemangioma, Peritonitis, Polycythemia, Progressive Multifocal Leukoencephalopathy, Pseudomembranous Colitis, Scleroderma, Seizure, Sepsis, Small Bowel Obstruction, Small Bowel Perforation, Suprapituitary Tumor, Systemic Lupus Erythematosis, Unknown, Vasculitis
393	CASES REVIEWED
2	Reviews Pending
395	**TOTAL DEATHS**

The following table, Table 2, compares the top causes of death in 2009, 2008, and 2007.

Table 2 . Top causes of death among California inmates 2007-2009

Rank	*2009*	*2008*	*2007*
1	Cancer	Cancer	Cancer
2	End Stage Liver Disease	Suicide	End Stage Liver Disease
3	Sudden Cardiac Arrest/ Acute Myocardial Infarction	End Stage Liver Disease	Sudden Cardiac Arrest/ Acute Myocardial Infarction
4	Suicide	Sudden Cardiac Arrest/ Acute Myocardial Infarction	Suicide
5	Drug Overdose	Drug Overdose	Homicide
6	Pneumonia	Pneumonia	HIV/AIDS
7	Congestive Heart Failure	HIV/AIDS	Stroke
8	Homicide	Congestive Heart Failure	Drug Overdose
9		Sepsis	Pneumonia

In 2009, there were 395 total deaths. The most common cause of death was cancer, followed by end stage liver disease, sudden cardiac arrest/acute myocardial infarction, suicide, and drug overdose.

Cancer of the lung accounted for 36 deaths. Nearly all of the lung cancer victims were heavy smokers.

Cancer of the liver (hepatoma) accounted for 30 deaths, and all occurred in patients with cirrhosis caused by chronic hepatitis C infection.

End stage liver disease accounted for 60 deaths. All but one of these was caused by chronic hepatitis C infection. The other was caused by alcoholic liver disease.

Sudden cardiac arrest and acute myocardial infarction together accounted for 47 deaths (29 cases of sudden cardiac arrest and 18 cases of acute myocardial infarction). It is appropriate to lump these conditions together, since they often share a common underlying condition, coronary heart disease. In fact, 23 of the 29 patients who died of sudden cardiac arrest had documented coronary artery disease (21), isolated hypertension (1), or diabetes mellitus (1), a coronary artery disease equivalent.

Suicide accounted for 25 deaths.

Drug overdose accounted for 14 deaths.

In 2008, there were 369 deaths, and cancer was the leading cause, followed by suicide, end stage liver disease, drug overdose and sudden cardiac arrest.

In 2007, there were 397 deaths and the leading causes were cancer, end stage liver disease, sudden cardiac arrest, suicide and homicide.

Inmate deaths are largely the result of demographic features of the incarcerated population - tobacco, alcohol and drug addiction are reflected in the high incidence of lung and liver cancer, end stage liver disease caused by chronic hepatitis C infection, and suicide caused by endemic depression and hopelessness. Cardiovascular disease, the number one cause of death in the adult non incarcerated population, is less common overall in the inmate population but is nevertheless a significant cause of potentially treatable chronic disease.

Both suicides and homicides have also shown a significant downward trend over the past 4 years. The 25 suicides in 2009 were 66% of the average (37) for the preceding three years, and the 9 homicides were 60% of the average (15) for the preceding three years.

Asthma, the cause of five preventable deaths in 2006, the first year of the Receivership, accounted for zero deaths in 2009.

B. Lapses in care

As noted in previous annual reports of prison deaths, lapses in care are unavoidable in the process of medical care. CPHCS reviewers are asked to identify all lapses in care, and to grade such lapses as either simple or extreme departures from the standard of care. This exercise as applied to death analysis provides a “biopsy” of the quality of care being provided by the entire healthcare system, and provides a framework upon which to organize systematic improvement in the delivery of care. Since simple departures are commonplace, this analysis focuses only on the extreme departures noted by the CSU reviewers.

Table 3 shows that, as in past years, the most frequently cited extreme lapse in care in 2009 was “failure to recognize, evaluate, and manage important clinical signs and symptoms”. These type 1 lapses accounted for one third of all identified lapses in care.

Taken together types 1, 2 and 3 account for 60% of total lapses in 2009.

Table 3. Summary of lapses of care (extreme departures), 2009.

Lapses of Care Types (Extreme Departures)	*# of Lapses in the 347 Non Preventable Deaths*	*# of Lapses in the 43 Possibly Preventable Deaths*	*# of Lapses in the 3 Likely Preventable Deaths*	***Total Number of Lapses***	*Cumulative Percent*
#1 – Failure to recognize, identify or adequately evaluate important symptoms or signs	61	32	5	**99**	32.4%
#2 – Failure to follow established guidelines for evaluation and/or management of specific condition	23	7	1	**31**	42.5%
#3 – Delay in access to care sufficient to result in harm to the patient	35	14	1	**50**	58.8%
#4 – Failure to adequately pursue abnormal test results	13	5	0	**18**	64.7%
#5 – Failure of provider-to-provider communications including botched handoffs	10	6	0	**16**	69.9%
#6 – Fragmentation of care such that individual responsibility for patient is waived	10	7	1	**18**	75.8%
#7 – Surgical/procedural complication resulting in iatrogenic injury	11	3	0	**14**	80.4%
#8- Medication prescribing error	11	3	1	**15**	85.3%
#9- Medication delivery error	8	2	0	**10**	88.6%
#10- Practicing outside the scope of one's capabilities	1	2	1	**4**	89.9%
#11- Unsupervised mid-level (nurse practitioner or physician assistant) care	2	0	0	**2**	90.5%
#12 – Failure of communication with patient	6	0	0	**6**	92.5%
#13 – Patient non-adherence with recommendation for care	4	2	0	**6**	94.4%
#14 – Delay in emergency response or failed to follow emergency response protocol	9	6	0	**15**	99.3%
#`5 - Other (including unavailability of medical record)	1	0	1	**2**	100.0 %
TOTAL LAPSES	**205**	**90**	**11**	**306**	

In 2009, reviewers identified a total of 306 extreme departure lapses in care. Of these, 205 lapses (67%) occurred in the 347 non preventable death cases, 90 lapses (30%) in the 43 possibly preventable cases and 11 (3%) in the 3 likely preventable cases.

The total number of lapses identified in 2009 (306) was significantly less than in 2008 (359).

C. Non preventable deaths - 2009

Of the 395 deaths in 2009, 347 (88%) were called non preventable.

Table 4 shows the causes of these non preventable deaths.

Table 4. Causes of non preventable death among California inmates, 2009.

Number of Cases	*Cause of Death*
123	Cancer
57	End Stage Liver Disease
25	Sudden Cardiac Arrest
25	Suicide
13	Acute Myocardial Infarction
12	Drug Overdose
10	Pneumonia
10	Congestive Heart Failure
10	Homicide
5 each	Chronic Obstructive Pulmonary Disease; End Stage Renal Disease; Pulmonary Fibrosis
4 each	Dementia; Pulmonary Embolism; Subarachnoid Hemorrhage; Upper Gastrointestinal Hemorrhage
3 each	Aortic Aneurysm; Coccidioidomycosis; HIV/AIDS; Stroke
2	Amyotrophic Lateral Sclerosis
1 each	End Stage Kidney Disease; Acute Hepatitis; Acute Respiratory Distress Syndrome; Coronary Artery Disease; Endocarditis; H1N1 Influenza; Pancreatitis; Peritonitis; Progressive Multifocal Leukoencephalopathy; Scleroderma; Seizure; Sepsis; Small Bowel Perforation; Systemic Lupus Erythematosis; Traumatic Brain Injury; Unknown
347	**TOTAL NON PREVENTABLE DEATHS**

With the exception of suicides, homicides, and drug overdoses, these deaths had natural causes and were expected. Chronic diseases such as cancer, heart disease, stroke, chronic liver disease, even when well managed, can lead ultimately to death.

Drug overdoses accounted for 12 deaths in the “non preventable” category. Reviewers did not focus on the narcotic prescribing practices of providers, although

recently published guidelines on the management of chronic pain have been introduced to the CPHCS staff.

HIV/AIDS caused only 3 deaths in 2009. Three additional patients had chronic HIV/AIDS but their deaths had other causes. All deaths of patients with known HIV/AIDS were reviewed separately by non-CPHCS specialists for the quality of HIV care. In all six such cases in 2009, there were no citations for deficiencies in HIV management.

D. Possibly Preventable Deaths – 2009

Table 5, Causes of possibly preventable death among California inmates, 2009.

Number Of Cases	*Cause Of Death*
10	Cancer
5	Acute Myocardial Infarction
4	Sudden Cardiac Arrest
3	End Stage Liver Disease
2 each	Coccidioidomycosis; Diabetic Ketoacidosis; Drug Overdose; Pneumonia
1 each	Acute Water Intoxication; Aortic Aneurysm; End Stage Kidney Disease; Endocarditis; Gastric Ulcer; H1N1 Influenza; Hepatic Hemangioma; Pancreatitis; Small Bowel Obstruction; Stroke; Subarachnoid Hemorrhage; Suprapituitary Tumor; Upper Gastrointestinal Hemorrhage
43	**TOTAL POSSIBLY PREVENTABLE DEATHS**

Table 5 shows the causes of 43 deaths thought by reviewers to be possibly preventable. Initially, CSU reviewers labeled 50 cases as possibly preventable, but 2 of those cases were suicides with no medical lapses in care, and in 5 other cases either no lapses in care were noted, or only simple departures from care were noted with no clear link to possible preventability. (For example, one reviewer labeled a case of cancer of the pancreas “possibly preventable” because of delays in care, but in the narrative report wrote that “the 35 day delay in diagnosis did not contribute to the death of this patient.”) This report, then, counts 43 possibly preventable deaths in 2009.

Some representative cases and the types of lapses in care that were thought to have contributed to these unnecessary or premature deaths are described below:

> Acute myocardial Infarction - 5 cases - failure to respond to acute chest pain or chest pain in known cardiac patient, or recurrent exertional chest pain, or an RN misdiagnosing chest pain as panic attack without checking with the physician on call; delay in emergency response (types 1 3,5,9,10, and 14 lapses)

Cancer of colon/rectum –3 cases – 12 month delay in diagnosis for failure to evaluate abdominal pain for 3 months; failure to order timely colonoscopy after a positive fecal blood test; failure to expedite a colonoscopy after failed bowel prep; 10 month delay in diagnosis after initial complaint of rectal pain and fullness; inadequate pain management in patient with known cancer (types 1, 2,3 and 4 lapses)

Cancer of liver–2 cases–16 month delay in evaluating abnormal liver mass; 8 month delay in receiving regular chemotherapy (types 3 and 9 lapses); multiple providers fail to respond to jaundice and abnormal liver function tests causing 17 month delay in diagnosis (types 1,3,4, and 6 lapses)

Diabetic ketoacidosis – 2 cases – missed several doses of insulin because of poor communication between providers (type 5 lapse); failure to respond to chest pain and vomiting (type 1 lapse)

Coccidioidomycosis – 2 cases – failure to properly evaluate documented 56 pound weight loss, recurrent fever, cough and chest pain (several type 1 lapses); failure to evaluate and manage buttock abscess with positive growth of coccidioidomycosis (type 1 lapse); 2-month delay receiving antifungal medication (type 8 lapse); allowing patient to leave hospital without appropriate counseling about the importance of taking prescribed medication (type 12 lapse)

Drug overdose – 2 cases – incorrect diagnosis of narcotic withdrawal and inappropriate prescription of morphine (types 1,8, and 10 lapses); failure to administer narcan (naloxone, a narcotic blocking agent) to a young comatose patient (type 14 lapse)

Cancer of prostate – 1 case – 6 month delay in diagnosis; not responding to abnormal PSA level of 33; delayed and incomplete evaluation of symptoms of decreased urinary stream (types 1 and 4 lapses)

Gastric ulcer perforation – 1 case – 6-month delay in diagnostic endoscopy for hematemesis (vomiting blood) –(type 3 lapse)

H1N1 Influenza pneumonia – 1 case – failure to respond to low oxygen saturation of 89% (type 1); no antiviral therapy despite indication (type 2 lapse); delayed transfer of very ill patient to higher level off care (type 3 lapse)

Spontaneous bacterial peritonitis – 1 case – failure to prescribe antibiotic when indicated (type 2 lapse)

Squamous cell cancer of buttock – 1 case – 4-month delay in surgical referral (types 3,6,8 lapses)

Suprapituitary tumor – 1 case – 8-month delay in responding to complaint of unilateral decrease in vision (type 1 lapse); failure to arrange for appropriate and timely specialty referral because of poor communication and a multiplicity of providers (types 3, 5, and 6)

E. Likely Preventable deaths

Table 6. Causes of likely preventable death among California inmates, 2009.

Number of Cases	*Cause of Death*
1	Pseudomembranous Colitis
1	Traumatic Brain Injury
1	Vasculitis
3	**TOTAL LIKELY PREVENTABLE DEATHS**

There were 3 deaths that the CSU reviewers thought were likely (probably) preventable:

Case 1 - A 65 year-old man died as a result of severe head trauma incurred in a fall while being transported (type 15 miscellaneous lapse –failure of custody to properly protect patient from injury during transportation).

This case resulted in comprehensive review of transportation protocols by CDCR custody.

Case 2 – A 55 year-old man died of systemic vasculitis after having complained to several providers of an unusual rash, which was not responding to topical steroids over a several month period. Failure to take clinical ownership of this patient's recurrent complaint (type 6 lapse), and failure to properly evaluate and treat this severe rash (four type 1 lapses, three by MDs and 1 by an RN) led to a prolonged delay in referral to a specialist causing delay in diagnosing systemic vasculitis (type 3 lapse) a potentially treatable condition. As a result, the patient suffered sequelae of pulmonary hemorrhage, uncontrolled exsanguination, and death.

In case 2, clinicians had multiple opportunities to have made a potentially life saving diagnosis but failed to do so. This demonstrates a problem seen with multiple providers. It may be easiest to do what has been done before (topical steroid creams) particularly if there is no ongoing primary care relationship with the patient. Prior years' reports have also noted the importance of paying close attention to recurrent complaints by patients. The presence of recurrent complaints about an unresolved problem should be a clinical "red flag".

Case 3 – A 56 year old man in relatively good health was admitted to a contracted hospital because of a head injury, which resulted in intracranial hemorrhage. The attending physician prescribed a prolonged course of antibiotics without clinical indication (type 8 lapse). The patient developed diarrhea and tense abdomen (signs of pseudomembranous colitis) on the 14th hospital day, but was not examined by the MD (type 1 lapse). When a Clostridium difficile stool test became positive, the patient was not prescribed metronidazole or vancomycin (type 2 lapse). When the patient's colitis worsened and he became gravely ill, he was not referred to surgery or a higher level of care (types 1,3, and 10 lapses). The patient died of sepsis on the 24th hospital day as a consequence of inadequately managed pseudomembranous colitis.

Case 3 provided CPHCS leadership a sound reason to closely monitor the care being given by the particular contracted hospital and the inpatient attending staff.

F. Lapses by non CPHCS contracting providers and hospitals

The possibly preventable and likely preventable deaths were analyzed to see how many of these deaths had contributing factors either wholly or partly related to lapses committed by non CPHCS providers.

In 2009, in 1 of the 3 likely preventable deaths and 7 of the 43 possibly preventable deaths (8 of total 46 cases, or 17%) there were contributory lapses in care by contracted providers or facilities.

Case 1 – A 57 year old man died of sepsis from inadequately managed pseudomembranous colitis caused by a poorly advised course of prolonged antibiotics which were ordered by an attending physician at a contracted hospital.

Case 2 – A 61 year old man died from metastatic lung cancer. The diagnosis was delayed for 6 months partly because of a failure of a radiologist to notify the prison of a suspicious lesion noted on chest x-ray.

Case 3 – A 49 year old man died from myocardial infarction. The patient had acute coronary syndrome while in a local hospital and cardiology was not called urgently to evaluate the patient.

Case 4 – A 59 year old woman died from necrotizing pancreatitis as a complication of a CT-guided needle biopsy of the pancreas.

Case 5- A 50 year old man died from coronary heart disease at an out of state contracted facility. Clinicians managed his complaints of chest pain in a substandard fashion.

Case 6 – A 55 year old man died of sepsis from inadequately treated spontaneous bacterial peritonitis at a contracted facility.

Case 7 – A 53 year old man died from hemorrhagic complications of a questionably indicated liver biopsy.

Case 8 – A 56 year old man died during surgery for bowel infarction caused by a strangulated umbilical hernia.

A similar analysis of the deaths in 2008 showed that 13 of the 61 possibly preventable deaths and 3 of the 5 likely preventable deaths had contributory lapses by contracted providers or facilities (16 of 66 such cases, or 24%).

G. Primary Care and Deaths

The primary care movement is widely held to bring accountability and improved outcomes to systems of medical care. One of the major quality initiatives of the Receivership in 2009 was the establishment of Primary Care Teams for all prisons. Although many of the prisons had some form of primary care in place, the culture of the prison system did not support such a system. Care was episodic and complaint driven, rather than systematic, proactive and guideline driven. Theoretically a primary care system fixes responsibility for patient care processes and outcomes squarely in the hands of the front line physicians, mid level providers and nurses who together make up the primary care team. Each inmate patient should have an identifiable team responsible for guiding efficient, timely and appropriate care. The team is responsible for health education and for applying evidence based guideline driven protocols in the care of patients, including appropriate counseling for end of life care in patients with terminal illness.

By the end of 2009, all 33 prisons had undergone a primary care team certification process. Table 7 shows the number of death reviews in which primary care physicians (or teams) could be identified.

Table 7. Presence of Primary Care in California inmate death cases, 2009.

	Cases with an identified Primary Care Physician	*% of total cases*
Likely Preventable deaths	1 of 3	33%
Possibly Preventable deaths	13 of 43	30%
Non Preventable deaths	127 of 248	37%
TOTAL DEATHS	**141 of 393**	**35.5%**
Cases with no lapses	80 of 210	38%

In 2009, 141 (35.5%) of the 395 patients had identifiable primary care physicians. 127 (37%) of the 347 non preventable deaths and 14 (30%) of the 46 cases of preventable

death had identified primary care physicians. Primary care physicians were identified in 38% of the deaths in which no serious lapses were identified. This finding suggests a trend favoring a functional primary care system.

VII. DISCUSSION

A. Trends in California prison death rates 2006-2010

Table 8. Death Rates among California inmates, 2006- 2009.

QUARTER	*NUMBER OF DEATHS*	*NUMBER OF INMATES*	*DEATH RATE PER 100,000 INMATES*	
			QUARTERLY	*ANNUALIZED*
Q1 2006	124	170,475	72.7	290.9
Q2 2006	108	172,561	62.6	250.3
Q3 2006	103	173,101	59.5	238.0
Q4 2006	93	172,528	53.9	215.6
Q1 2007	112	172,284	65.0	260.0
Q2 2007	100	173,312	57.7	230.8
Q3 2007	91	172,645	52.7	210.8
Q4 2007	94	171,444	54.8	219.3
Q1 2008	104	169,949	61.2	244.8
Q2 2008	88	170,983	51.5	206.0
Q3 2008	83	172,008	48.3	193.2
Q4 2008	94	171,085	54.9	219.6
Q1 2009	93	168,671	55.1	220.4
Q2 2009	92	167,832	54.8	219.2
Q3 2009	95	167,354	56.8	230.2
Q4 2009	111	168,830	65.7	266.6
Q1 2010	108	166,505	64.9	263.1
Q2 2010	89	165,817	53.7	217.7

The overall death rate/100000 in California prisons rose in 2009.

But as shown in Table 9, this increase was largely due to the increase in non preventable deaths (almost all of the non preventable deaths were natural and expected). Preventable deaths, suicides and homicides all decreased in 2009.

Table 9. Types of preventability among California inmates, 2006-2009.

YEAR	*ALL PREVENTABLE (LIKELY / POSSIBLY)*	*NON-PREVENTABLE*	*SUICIDES / HOMICIDES*
2006	66 total (18 / 48)	358	59 total (43 / 16)
2007	68 total (3 / 65)	327	55 total (33 / 22)
2008	66 total (5 / 61)	303	45 total (38 / 7)
2009	46 total (3 /43)	348	34 total (25 / 9)

B. Relationships between lapses in care and preventable deaths.

Lapses in care occur commonly in medical practice. And although physicians and nurses tend to remember clearly those lapses which led to adverse outcomes, the reality is that most lapses in care do not lead to serious injury or death, because most patients are fundamentally healthy. For these patients, only the most egregious lapses may lead to unnecessary death. But for patients with serious underlying medical conditions, serious lapses in care or multiple simple lapses may put them at risk for unnecessary suffering or death.

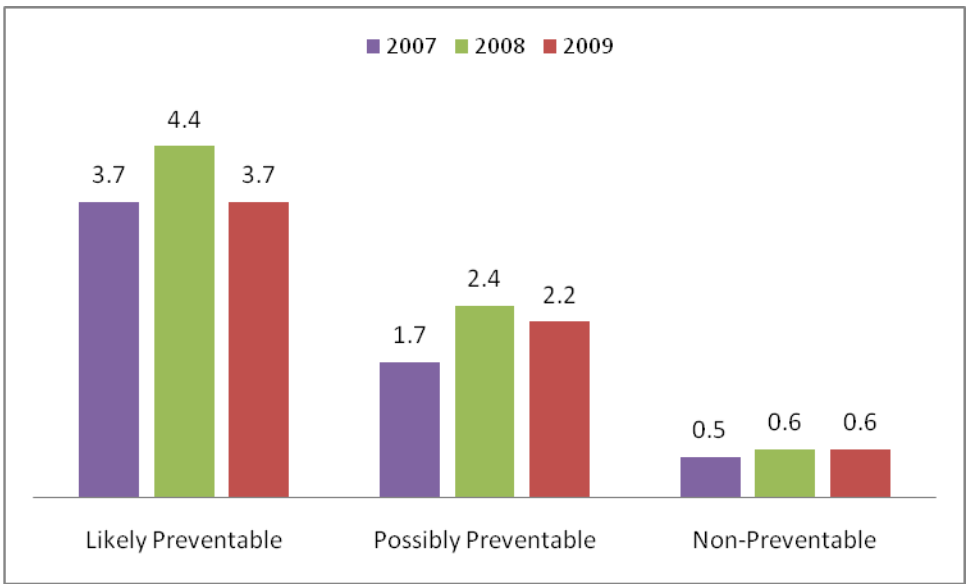
Table 10. Number of lapses by preventability among California inmates, 2009.

	Lapses	*Number of Deaths*	*Average Lapses per death*
Likely Preventable	11	3	3.7
Possibly Preventable	90	43	2.2
Non-Preventable	205	347	0.6

Table 10 shows that serious lapses in care occurred in all three types of death, but occurred more frequently in the preventable cases. In fact, the “likely preventable” deaths had more than six times as many lapses per case than the non preventable deaths.

Figure 1 shows how this finding has held up in a consistent fashion through three consecutive years of analysis, highlighting how serious adverse outcomes are often a consequence of multiple lapses lining up (the “Swiss cheese model”).

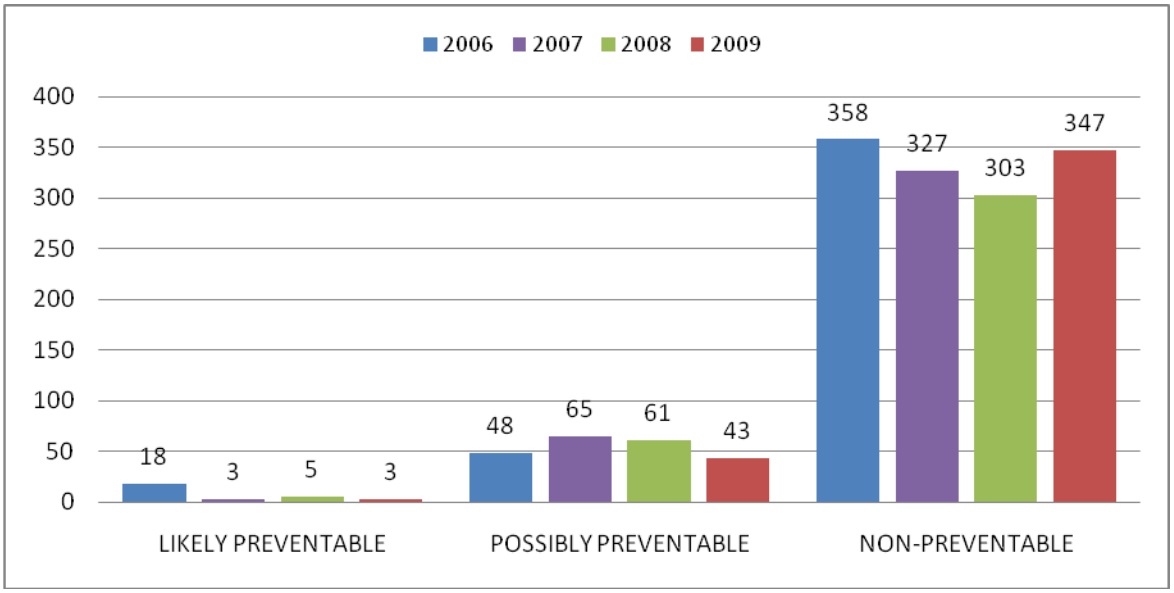
Figure 1. Average number of lapses per death by preventability among California inmates, 2009.



C. Trends in attribution of preventability

Figure 2 compares the numbers of deaths from years 2006-2010 in the three categories of non preventable, possibly preventable and likely preventable death.

Figure 2. Number of deaths by preventability among California inmates, 2006-2009.



There were a total of 46 preventable deaths in 2009 - 43 possibly and 3 likely preventable. This is a 32% reduction from the experience of the three preceding years, in which the sum of preventable deaths were 66 in 2006, 68 in 2007, and 66 in 2008.

This significant reduction in the number of attributed preventable deaths in 2009 continues a trend which shows that the overall quality of care in the California prison system is improving.

VIII. Conclusion

The death review process in the CPHCS is complicated but worthwhile. By focusing on identifying serious lapses in care, it has identified the major lapses leading to unnecessary suffering and preventable death.

Although overall death rates in the California prisons has remained stable over the past three years, there has been a 16% reduction in the number of identified lapses in care and a reduction of 31% in the number of cases of preventable death.

Patient safety is supported by a culture in which clinicians can readily identify mistakes and work to improve system vulnerabilities. Continued maturation of the primary care team system of care and appropriate support for these frontline teams should see further reductions in serious lapses of care, unnecessary suffering and preventable death.

—Kent Imai, MD