2013

Documenting Death: Transitioning from a County Coroner System to a Medical Examiner System in Jefferson County, Alabama

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DOCUMENTING DEATH: TRANSITIONING FROM A COUNTY CORONER SYSTEM TO A MEDICAL EXAMINER SYSTEM IN JEFFERSON COUNTY, ALABAMA

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A THESIS

Submitted to the graduate faculty of The University of Alabama at Birmingham,
in partial fulfillment of the requirements for the degree of
Master of Public Administration

BIRMINGHAM, ALABAMA

2013

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ABSTRACT

A coroner and a medical examiner are legal certifiers of death. A coroner is an elected official who often lacks formal medical training. A medical examiner is usually an appointed official who has formal medical training in forensic pathology. Each state within the U.S. can be comprised of a coroner system, a medical examiner system, or a blended statewide system. The coroner or the medical examiner documents the cause and manner of death of a person both on a report and on a death certificate. Deaths are classified as natural, accidental, suicide, homicide, or undetermined.

In 1978, Jefferson County, Alabama switched from an elected coroner system to an appointed medical examiner system. In this thesis, a systematic review and coding of all death reports within Jefferson County, Alabama excluding Bessemer, Alabama during the years of 1970, 1971, 1976, and 1977 was performed and combined with the Jefferson County Coroner/Medical Examiner's database for 1978 through 2008 to create a data set of mortality aggregated at Jefferson County, AL per month for 1970-1971 and 1976-2008. An initial bivariate analysis of the data set was performed using an independent-samples t-test followed by a discontinuity regression analysis of the data set. The output generated from both analyses was used to answer the following question: *When a system changes from a coroner system to a medical examiner system, is there an effect on how the manner of death is reported?*

I hypothesize that *there would be systematic variations in reporting death across elected coroner and appointed medical examiner systems.* Specifically, I hypothesize that *elected coroners would have higher official justifiable homicide rates than medical examiners. Conversely, appointed medical examiners would have higher official autopsy, overall homicide, natural death, suicide, undetermined death, and work related death rates than elected coroners.* The reasons for and implications of the differences are discussed in detail in the following chapters.

Keywords: coroner, medical examiner, death certification, autopsy, forensic pathology, manner and cause of death

DEDICATION

This thesis is dedicated to Stella Cocoris for encouraging me to return to school.

You were the catalyst that I needed.

ACKNOWLEDGMENTS

I thank Dr. Nevbahar Ertas, my Thesis Committee Chair. Thank you for your steadfast guidance and support over the past two years. You have been a dedicated teacher and mentor who has significantly influenced my knowledge in both research and Public Administration. I have the utmost respect and gratitude for your high expectations of me and your dedication to my success. Thank you for the motivation and encouragement to go above and beyond. I couldn't have selected a better mentor and chair.

I thank Dr. Gregory G. Davis, Thesis Committee Member. Despite me being a complete stranger, you listened to my research ideas and agreed to help. You allowed me to unconditionally explore and research the local Coroner/Medical Examiner system of Jefferson County, Alabama. Thank you for giving me great insight into your profession as a Forensic Pathologist and Associate Coroner/Medical Examiner.

I thank Dr. Akhlaque Haque, MPA Program Director and Thesis Committee Member. You have been a great guide over the past two years. Your advice and encouragement were stellar, and I am grateful to you for allowing me to be innovative and creative in exploring the Science and Technology side of Public Administration.

I thank Dr. Suzanne Perumean-Chaney who served as an unofficial fourth member of my thesis committee by continuously meeting with me, helping me to determine the proper model and methods to use, reviewing my methods and results sections, and teaching me the correct way to check research. I thank Dr. C. Bruce Alexander for leading me to this topic and Dr. Robert M. Brissie for allowing me to collect the data. I am

grateful to Dr. Wendy Gunther-Canada for allowing me to combine my interests and for supporting my academic and professional development. I am grateful to Dr. Michael Howell-Moroney and Dr. Vickie Edwards for their savvy support with research methods and statistics, and Dr. Sunjoo Kwak for teaching me Public Administration theory and providing constructive criticism for my literature review. I am also extremely appreciative to Dr. Robin Lorenz, Dr. Rakesh Patel, Dr. Peter Anderson, and Scott Austin for allowing me to take courses through the Hughes Med-to-Grad Program and Pathology.

I thank Debbie Foushee, Barbara Cole, and Randy and Cindy Godwin for believing in my potential. You took me into your hearts and homes. You demonstrated an unprecedented generosity and kindness that I will never forget.

Finally, I must thank my friends and mentors. To Rosie O'Beirne, Dr. Kajal Buckoreelall, and Dr. Scott Isbell, I thank each of you for your guidance, persistent friendship, and continual encouragement in all that I do. To Dr. Bill Hutchings, Dr. Virginia Gauld, Dr. Catherine Daniélou, Dr. Ken Marion, Dr. Anne Cusic, and Dr. Robert Fischer, I am ever grateful to each of you. You have dedicated yourself to my personal and professional development, and each of you has been an influential mentor in my life for many years. You spent countless hours teaching me how to think critically and write clearly. You encouraged my creativity and inspired me to be innovative. You supplied personal counsel, taught me ethics, and provided stellar supervision. You ignited my scientific curiosity and instilled in me a thirst for knowledge that has yet to be quenched. You have written numerous letters of recommendations on my behalf. Each of you has significantly contributed to my academic, personal, and professional life through your demonstrated care, excellent instruction, and outstanding mentorship.

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LIST OF ABBREVIATIONS

CDC	Center for Disease Control and Prevention
FBI	Federal Bureau of Investigation
NAME	National Association of Medical Examiners
NCHS	National Center for Health Statistics
NDI	National Death Index
UCR	Uniform Crime Reports
RD	Regression Discontinuity
ME	Medical Examiner

CHAPTER 1

INTRODUCTION

In 1978, Jefferson County, Alabama underwent a change in how death was documented. The Jefferson County Coroner/Medical Examiner Office transitioned from an elected coroner system to an appointed medical examiner system. The medicolegal system is imperative for reporting vital statistics and has broad impacts on society. The National Center for Health Statistics of the Center for Disease Control and Prevention houses a compilation of information on national health data within the United States. This data includes mortality data which is obtained from death certificates filed with each state's health department. A central computerized warehouse of information regarding death, known as the National Death Index, is also available at state vital statistics offices to aid health and medical investigators with assessing mortality trends and concerns. Concerns have been raised both in the past as well as the present regarding the qualifications of coroners due to their being elected officials unlike medical examiners who are medically trained experts in certifying death (Flynn, 1955; Johnson-McGrath, 1995; Keyvan, 2006).

Historically, the coroner system is based on the old Anglo-Saxon tradition in which a coroner was needed to make sure that a king's kingdom remained under his control. This medieval system was founded in order to evaluate if the manner of death was caused by murder or suicide for any decedent in the kingdom (Flynn, 1955). If the

death was ruled suicide, then the property and its belongings were relinquished to the king. Murder also "contributed to the royal purse" (Davis, 1997, p. 220). By assessing a murder fine, villages that allowed violence to occur resulting in death were punished financially by the king (Knapman, 1972). The coroner system is an artifact which has established itself within the United States and many states still rely on the Office of the Coroner to certify death.

A medical examiner is a licensed and trained physician who performs autopsies to determine a cause of death especially in the death of infants. Medical examiners also perform autopsies of suspicious deaths, unnatural or untimely deaths, and at the order of the judicial system. Many medical examiners are pathologists or forensic pathologists, but this specialty is not a requirement to be a medical examiner. The differences between coroners and medical examiners can be seen in Table 1.

	Coroner	Medical Examiner
Required To Be A Physician	Usually Not Required	Almost Always
Investigates Deaths If death is sudden, violent, untimely, unexpected or cause of death is unknown	Yes	Yes
Performs Autopsies	No	Yes
Determines Cause of Death If death is natural, an accident, a homicide, a suicide or undetermined	Yes	Yes
Death Certificates Assigns cause of death	Yes	Yes
Appointed Or Elected	Either	Appointed
Pathologist or Forensic Pathologist	Not Required	Almost Always

Table 1. Differences Between Coroner and Medical Examiners

An elected official with little to no medical training who reports death has the potential to impact multiple areas including the criminal justice system, public health, vital statistics, and medical insurance. There are several examples across the nation of people in coroner positions who call into question the office being held by elected officials. Two rather extreme and alarming examples that call into question the requirements to certify death as an elected official are that of Amanda Barnett, who is an eighteen year old deputy coroner in Indiana, and a blind coroner by the name of Francis Stanton, who served for many years in Marlboro County, South Carolina. In order to better grasp the concern with the two aforementioned examples, one should ask – if I had a loved one die unexpectedly and suddenly or under suspicious circumstances, would I want an eighteen year old or a blind person investigating the death of my loved one.

In this thesis, a systematic review and coding of all death reports within Jefferson County, Alabama excluding Bessemer, Alabama during the years of 1970, 1971, 1976, and 1977 was performed. This information was combined with the database housed within the Jefferson County Coroner/Medical Examiner's Office which contains all death investigations performed in Jefferson County, Alabama from 1978 through 2008. The data from the database was used to create a data set for death investigations within Jefferson County, AL per month within the years of 1970-1971 and 1976-2008. An initial bivariate analysis of the data set was performed using an independent-samples t-test followed by a discontinuity regression analysis of the data set. The output generated from both analyses was used to answer the following questions: *When a system changes from a coroner system to a medical examiner system, is there an effect on how the manner of*

death is reported? Specifically, is there an overall change in autopsy rates, manslaughter rates, overall accidental rates, justifiable homicide rates, overall homicide rates, natural death rates, suicide rates, undetermined death rates, and work related death rates when the system changes?

My hypothesis is that: *When a system changes from a coroner system to a medical examiner system, there would be systematic variations in the reporting of death across the two systems.* Specifically, I hypothesize that *elected coroners would have higher official justifiable homicide rates than medical examiners. In contrast, appointed medical examiners would have higher official autopsy rates, overall homicide rates, natural death rates, suicide rates, undetermined death rates, and work related death rates than elected coroners.*

CHAPTER 2

LITERATURE REVIEW

A. Current State Practices and Policies

Within the United States, there are three different possible systems for officially reporting death. Some states including North Carolina, Oregon, and Virginia solely rely on a state medical examiner system. Other states have a blended approach to reporting death in which a medical examiner's office can be found in some counties and a coroner's office can be found in others. The final approach is a system in which only the coroner is responsible for certifying death. The current U.S. Standard Certificate of Death is provided in its entirety within this document as an addendum. Two tables have been adapted from the work of Randy Hanzlick, M.D. in order to illustrate the medical examiner and coroner system in the United States. Table 2 provides the total number of counties served by a medical examiner and having no coroner office within the system (Hanzlick, 2007). Table 3 provides sporadically located counties which have Medical Examiner systems as of January 1, 2006 (Hanzlick, 2007).

TABLE 2. Total Number of Counties Served by a Medical Examiner System and Having No Coroner Offices Within the System

Setting	**Counties**
State medical examiner system; no coroners (19 states) AK, CT, DE, IA, MA, MD, ME, NC, NH, NJ, NM, OK, OR, RI, TN, UT, VT, VA, and WV	697
Medical examiner system in every county (2 states) AZ and MI	98
District medical examiner system; no coroners (1 state) FL	67
Sporadic county medical examiner systems (14 states) AL, CA, CO, GA, HI, IL, MN, MO, NY, OH, PA, TX, WA, and WI	98
Total counties in the United States	3137
Total counties served by a medical examiner system	960 (31%)

TABLE 3. Sporadically Located Counties (n _ 98) Which Have Medical Examiner Systems as of January 1, 2006	
State	**Counties**
Alabama	Jefferson (1978); Mobile (1987); Tuscaloosa (1987)
California	Los Angeles (1956); Ventura (1974); San Francisco(1974); San Diego (1990)
Colorado	Weld (after 2000)
Georgia	Fulton (1965); Cobb (1973); DeKalb (1981); Gwinnett (1989); Clayton (2003)
Hawaii	Honolulu (1961)
Illinois	Cook (1976)
Minnesota	Winona (1950); Clay (1960); Hennepin (1965); Douglas (1976); St Louis (1976); Ramsey (1980); Washington (1981); Fillmore (1981); Lake (1986); Polk (1987); Stearns (1993); Morrison; Pennington; Marshall (2005)
Missouri	St Louis County (1969); Jackson (1970); Greene (1973); Callaway (1973); Boone (1973); Buchanan (1975); St Louis City (1977); Jefferson (1980); St Charles (1981); Platte (1993); Franklin (1994); Cole(early 1990s); Clay (1991); Cass (2001)
New York	Erie (1902); New York City (1918); Nassau (1938); Suffolk (1960); Monroe (1962); Schenectady (1967); Delaware (1967); Jefferson (1968); Rockland (1968); Chenango; Dutchess*; Onondaga (1982); Rensselaer (pre 1984); Tompkins; Ulster (pre 1990); Westchester (pre 1970)
Ohio	Summit (1995)
Pennsylvania	Philadelphia (1954); Delaware (1979); Allegheny (2005)
Texas	Bexar (1956); Harris (1957); Tarrant (1965); Galveston (1968); Dallas (1969); Nueces (1970); El Paso (1974); Johnson (1975); Travis (1977); Parker (1983); Collin (1987); Denton (1989); Lubbock (1994); Wichita
Washington	King (1969); Whatcom (1980); Pierce (1985); Snohomish (1987); Spokane (1999)
Wisconsin	Milwaukee (1943); LaCrosse (1978); Taylor (1980); Dunn (1981); Racine (1981); Monroe (1986); Kenosha (1987); Oneida (1987); Eau Claire (1990); Douglas (1991); St Croix (1991); Brown (1993); Door (1983); Waukesha(1985); Fond du Lac (1999) Dodge (2000)
Santa Clara County, California converted to a Medical Examiner System in 1962, but in 2004, reverted to a Sheriff-Coroner System. Michigan went to its county-based medical examiner system in 1969 and Arizona did so in 1976. Florida adopted its district medical examiner system in 1970. The counties for which no implementation date is shown have not reported an implementation date, but based on data from other counties in the same state, it is likely that most developed between 1980 and 1999. *Dutchess County, NY began its conversion in the late 1990s and formalized it in 2003.	

To further examine the role of the coroner within a particular state within the U.S., the Alabama Coroners Association provides several examples including state rules governing who can be a coroner. Up until March 1, 2007, no minimum standards of training for county coroners within the state of Alabama were required. Legislation was introduced on January 10, 2006 in order to require continuing education for coroners in the state of Alabama. To decide viable training for state coroners, the Alabama Coroner's Training Commission was formed with membership comprised of an appointed county coroner by the President of the Alabama Coroner's Association, one district attorney appointed by the Attorney General, one county coroner appointed by the Governor, one state medical examiner or forensic scientist appointed by the Director of the Alabama Department of Forensic Sciences, and three county coroners appointed by the Board of Directors of the Alabama Coroner's Association (AL Constitution, 2006).

The legislation required 12 hours of training each year for anyone serving as coroner, deputy coroner, or an authorized individual representing the county coroner. The legislation also required 12 hours of training within the first six months of assuming the office of coroner or deputy coroner. The commission was deemed responsible for the implementation and continuous oversight of the training program. The legislation also set out criteria which must be met in order to qualify to hold the office of the coroner. In order to qualify to hold the position of county coroner within Alabama a person must be a U.S. citizen, a resident within the count one year prior to election, continued residency in the county in which elected, a registered voter, 25 years old prior to election, obtainment of a high school diploma or its equivalent, no felony or moral turpitude convictions, and

training which must be completed no later than 180 days after election or appointment as county coroner. This legislation provides the authority to any coroner or deputy coroner to certify any death that occurs within the jurisdiction of that county coroner (AL Constitution, 2006).

In total contrast to Alabama's county coroner system, the state of Virginia became one of the first states in the nation to shift to a statewide medical examiner system. The general assembly of Virginia disbanded the office of Coroner's Physician in 1946 and appointed a chief medical examiner. The Office of the Chief Medical Examiner resides within the Virginia Department of Health and currently supports 230 local medical examiners that function as death investigators. These medical examiners serve as the primary contact at the onset of a death, are usually licensed physicians but not forensic pathologists, and determine whether the death should fall under the jurisdiction of the medical examiner (Virginia Department of Health, 2006).

The minimum qualifications to become a local medical examiner within Virginia require that the person possess a valid Virginia license as a doctor of medicine or osteopathy, an appointment by Virginia's chief medical examiner, and a valid Virginia (or contiguous state's) driver's license. The local medical examiner within Virginia also provides authorization prior to cremation at funeral homes. This requires that the medical examiner views the body and validates the death certificate prior to cremation. The medical examiner is paid $150.00 per case, an additional $50.00 for visits to sites, and $50.00 for cremation certification. If an autopsy is deemed necessary, it occurs at one of four district offices in the state of Virginia (Virginia Department of Health, 2006).

B. Use of Mortality Data in the United States

In 2007, according to the National Center for Health Statistics, the number of deaths in the United States was 2,423,712 with a death rate of 803.6 deaths per 100,000 population, and the top three causes of death were heart disease, cancer, and stroke (Xu, Kochanek, Murphy, & Tejada-Vera, 2010). These statistics were gathered from each certificate of death for the year of 2007. Statistical data is then collected, analyzed, and reported by the National Center for Health Statistics. This data is used by various organizations including scientific groups, public policy agencies, and legal agencies to potentially impact the health of community members through research, policy, and law. An evolution has occurred for the role of medical examiners and coroners from "a criminal justice service focus to a broader involvement that now significantly benefits the public safety, medical and public health communities" (Hanzlick, 2006, p. 1274).

The Federal Bureau of Investigation (FBI) uses a Uniform Crime Reporting System to determine the amount of and types of homicide in the United States. Through the mortality data, the National Center for Health Statistics also gathers the same data related to homicides. A report compared the two during a period from 1976-1982 and noted that "there are important differences, however, in both the substance and quality of the information that the two systems collect. The NCHS mortality system reported an average of 9% more homicides nationally than did the FBI crime reporting system" (Rokaw, Mercy, & Smith, 1990, p. 447). The authors concluded that lack of reporting within certain law enforcement agencies was the cause of the variation in statistics.

However, the questions of who was recording the deaths on the certificates of death throughout the nation or the credentials the certifiers hold were never asked.

Another example of how the mortality data from the National Center for Health Statistics is used can be found in the report by Lund, Harlan, Yabroff, and Warren. The report notes that their "findings support the usefulness of site and cancer cause-specific causes of death reported on the death certificate for distant stage patients with a single cancer" (Lund, Harlan, Yabroff, & Warren, 2010, p. 758). These reports are probably useful for advocating for specific types of cancer research as well as new treatments and possible treatment facilities; however, the data being used cannot be documented as truly accurate due to the lack of requirements for training, licensing, or accreditation of persons who serve as official certifiers of death.

Public health policy, education, and programming also use the Mortality Data from the NCHS to focus on specific populations or at-risk groups. One example of a specific population that intersects with public health policy and Mortality Data are smokers. Based on an earlier study by Sterling, it was found that smoking habits influence how the certifier completes the death certificate for a smoker or non-smoker with lung cancer. This report raises "important questions about differential misclassification of the underlying cause of death and the bias that may have occurred in some studies of smoking and lung cancer mortality" (Flanders, 1992, p. 3). In fact, the Sterling study found that within the National Mortality Followback Survey almost all of the nonsmokers who died with lung cancer listed as a contributory cause also had another form of cancer. Interpretation of Sterling and the posed hypothesis suggests that results from the National Mortality Followback Survey indicate that "the number of death

certificates with lung cancer as the underlying cause was too low among nonsmokers, or too high among smokers" (Flanders, 1992, p. 4). With modern science, there is no question that smoking causes cancer; however, this report raises the concern that inaccurate reporting of death certificate information can lead to inaccurate data and vital statistics.

Inaccuracies in reporting manner and cause of death on death certificates are common. Multiple reasons for these inaccuracies can be attributed to "antemortem diagnostic errors, inadvertent omissions, coding errors, death before completion of medical workup, unavailability of medical records to the certifying physician, misunderstanding of the certification process, and the complexity of sorting out the causal sequence that led to death when several disease processes are involved" (Flanders, 1992, p. 3). Although these inaccuracies exist, the question that remain unanswered is what training, certification, or credentials must the certifier possess to produce a valid and accurate manner and cause of death for the certificate of death. Within the U.S., certification of death appears to have no single governing body of trained professionals whose sole purpose is to use their training to validate and certify death accurately without bias and with protection from negative consequences.

C. Public Administration Theory and Reporting Death

The paradigm of mixed investigation systems and death reporting within the United States is inherently appropriate for the field of public administration. For scholars, the coroner/medical examiner system is an untapped resource overflowing with

key concepts and theories from public administration including the politics-administration dichotomy debate, the classical approach to organizational theory, and complementarity.

The politics-administration dichotomy was introduced by Woodrow Wilson one hundred years after the founding of the United States when Wilson wrote, "Administration lies outside the proper sphere of *politics*" (Wilson, 1887, p. 210). The politics-administration dichotomy stated that politics and administration are and should be two separate entities. The concept was readily adopted by many and demonstrated the importance for a true separation in policy development and policy implementation. The politics-administration dichotomy can be found at the core of the debate surrounding the coroner system versus the medical examiner system. Can an elected official properly report death to the best of his or her ability without any influence from the citizens who elected him or her into that office? Should the administrative functions of reporting death be removed from the political process all together? Should there only be administrators who are appointed to report death based on their skillsets and medical training? One concern with elected officials reporting death is that "persons filling elected office at the local level are now more likely to be electoral activists rather than trustees who hold their office primarily as a service to the community" (Prewitt, 1970; Svara, 1999, p. 50). With ever changing conditions in local government along with local politics, pressures may be created "that alter official roles and the relative contributions of officials" (Svara, 1999, p. 44). Based on the hodgepodge of death reporting systems in the United States (Figure 1), the aforementioned questions have been decided by individual states rather than a collective nation. For those states that have transitioned to a medical examiner

system, it can be concluded that they strongly favor Wilson's politics-administration dichotomy since they have eliminated elected officials from reporting death.

In contrast to Wilson, Dwight Waldo vehemently disagreed with the notion that politics could be separated from administration. Waldo illustrated this notion when he wrote, "Doubt has arisen about both the possibility and the desirability of making a sharp separation of power or division of function between the deciding and the executing agencies of government" (Waldo, 1948, p. 200). Through empirical data, Waldo demonstrated that administration wasn't value neutral and that administrators had values of political nature when making decisions. The states that strictly have a coroner system within Figure 1 support Waldo's theory that politics and administration are conjoined and not able to be separated.

The politics-administration dichotomy debate is clear-cut with two major schools of thought being that administration and politics should either always remain separated or that they can never be separated. Although it would be easier to keep the debate black and white, the question remains regarding the medicolegal systems that have mixed

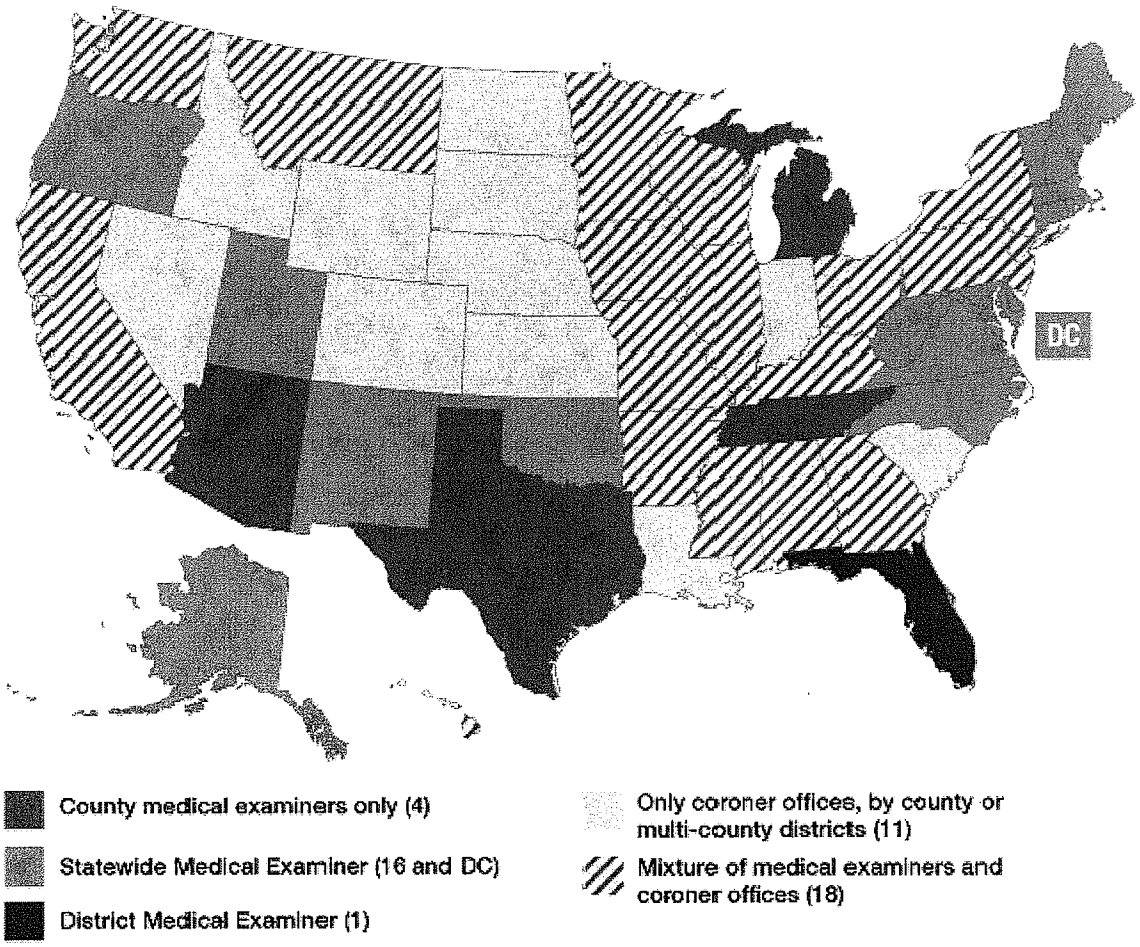

Figure 1. Death Investigation Systems in the United States, 2004.

SOURCE: J.M. Hickman, K.A. Hughes, K.J. Strom, and J.D. Ropero-Miller. 2004. Medical Examiners and Coroners' Offices, 2004. U.S. Department of Justice, Bureau of Justice Statistics Special Report NCJ216756. (In 2007, Kentucky became legally a mixed county ME/C system.)

systems within a state. If the system of reporting death for the state is mixed or in a transition with both coroners and medical examiners, then the politics-administration dichotomy debate doesn't hold entirely true for either Wilson's or Waldo's side if discussing the system as a whole.

Shared or dualistic systems of administration and elected officials can be seen in a variety of contexts including council-manager cities, board-manager counties, and local/stated judges-federal judges. These dualistic systems are often comprised of both appointed administrators and elected officials. For these types of systems, the "relationship of elected officials and administrators is best understood as complementarity" (Svara, 1999, p. 50). Complementarity is defined as "a model of interaction in which administrators respect the control of elected officials, and at the same time there is interdependency and reciprocal influence between elected officials and administrators who fill distinct but overlapping roles in policy and administration" (Svara, 1999, p. 50). It is based on "the premise that elected officials and administrators join together in the common pursuit of sound governance" (Svara, 2001, p. 179). Administrators and elected officials are seen as "separate parts, but parts that come together in a mutually supportive way" (Svara, 2001, p. 179). The complementarity of politics and administration "is a replacement of the earlier dichotomy-duality model" (Svara, 2006, p. 1084) and "holds that elected officials and administrators – both in regular communication with citizens – need and help each other in a partnership for governance" (Svara 2001, p. 180). To summate Svara's theory, the complementarity view is based "on the premise that there is a continuum that moves from politics on one end toward management on the other end" "with policy and administration standing in the middle" (Demir, 2009, p. 876).

When discussing the coroner/medical examiner system, the debate of elected official versus administrator frequently arises. Within the context of complementarity, Svara defines the interactions and values of administrators as those who "support the law,

respect political supremacy, and acknowledge the need for accountability," "are responsible for serving the public and supporting the democratic process," "are honest in their dealings with elected officials, seek to promote the broadest conception of the public interest, and act in an ethically grounded way," and are respected by elected officials for their contributions "and the integrity of the administrative process" (Svara, 2006, p. 1082). In the context of the classical approach to organizational theory, Frederick Taylor emphasized that there was one best way to approach any specific problem. Scientific management, a phrase coined by Taylor, contended that there should be one best way found for any particular problem and that once the solution was rendered, it should be shared with others working on the same problem in order to maximize efficiency (Taylor, 1914). Medical examiners' daily interactions and values represent Svara's administrator definition since they are appointed administrators who strive to better the community through a detailed administrative process that documents death in an ethical manner which yields an honest reporting of the findings after an investigation concludes. Medical examiners who are trained forensic pathologist epitomize Taylor's scientific management in that they are specifically trained in the precise study and diagnosis of disease. By being trained in forensic pathology, they can accurately attest to the cause and manner of death of a decedent through the performance of an autopsy. Coroners are the antithesis of Taylor's scientific management approach due to the fact that they have the least amount of (and sometimes no) formal training and education regarding disease and death. Should the system ever change to become fully administrative without any elected officials, then a change in structure through reorganization of the system would be necessary.

The literature regarding changes in governmental structure indicates that there are split views regarding the effects of changing structure. One side states that "'reformed' government structures produce better public services, lower tax rates and expenditures, and more professional administration" (Benton, 2002, p. 471) while the other side states that "government structure does not matter" (Benton, 2002, p. 471). Despite the split view on the effects of changing structure, reorganization is a necessity for any system wishing to undergo a structural change; however, "serious empirical work on the real effects of reorganization is not only deficient, it is non-existent" (Salamon, 1981, p. 474). Paradoxical in nature, reorganizations are "common and often painful events yet few would argue they achieve visible improvements" (Maynard-Moody, Stull, & Mitchell, 1986, p. 302). Reorganizations are "highly symbolic events" that communicate "the status of dominant subcultures and institutionalized power" (Maynard-Moody, Stull, & Mitchell, 1986, p. 308). Typically, reorganizations are "social interventions that may challenge deeply held assumptions" (Maynard-Moody, Stull, & Mitchell, 1986, p. 309). Since established systems are hard to change and often face tremendous pushback during reorganization, many governmental structure changes occur reactively instead of proactively.

When considering massive governmental structure overhauls or policy changes, it is a rarity that the overhauls are initiated in order to avoid potential pitfalls or major problems. Instead, most governmental policies or structures undergo reactive changes after adverse events instead of proactive changes to evade such events. Changes to governmental structure and/or national policy often result from painful and/or costly

events which affect people by causing psychological trauma and/or possible or actual physical harm or loss of life. Several examples of actual reactive policies and changes of procedures include the Pendleton Civil Service Reform Act, the Brady Handgun Violence Prevention Act, 9/11 and Airport Security, 9/11 and Homeland Security, Katrina and FEMA, TSA and the shoe removal policy, and Columbine to Sandy Hook which will inevitably affect gun control policy due to school violence. These changes in governmental structure and policy were all reactive and due to a violent or destructive situation or person. The manner in which deaths are documented and investigated in the United States also has the potential to bring about reactive structural and policy changes.

D. Pitfalls and Reform

A final case calls for proactive thinking and planning regarding the way deaths are documented and certified in the United States. The notable case is that of a British physician, Harold Fredrick Shipman. Ultimately, Dr. Shipman became known as the most prolific serial killer in British history. Shipman was convicted of killing 15 patients, but a public inquiry, known as *The Shipman Inquiry*, established that he probably killed 250 total patients. The Shipman case was unique, because he killed his victims and used his ability as a physician to sign off on their deaths without any form of checks or balances in place to monitor his actions. The inquiry eventually revamped 200 years of how death was reported within the British system due to evidence that the system was flawed, ineffective, and unchecked. The inquiry and investigation cost the British people nearly twenty-one million pounds, and it took a total of five years to complete. Six total reports totaling 5,000 pages were generated by the inquiry with the third report being

entitled Death Certification and the Investigation of Deaths by Corners. The final report resulted in a required second certification in all cases by someone who is deemed to be medically qualified (Inquiry, S., 2003). This will essentially close the loop in Britain and prevent a case like Harold Shipman's from ever occurring again.

The current mixed system for reporting death within the United States should be reconsidered for a multitude of reasons. A common system with people who are medically qualified to document death should be considered. Although a total overhaul of the existing system may be too costly or not important at the time, it only takes one severe incident like that of Harold Shipman to make policy makers reconsider the current structure along with the necessary checks and balances that should be in place for certifying death. The change of structure and reporting by a trained medical professional could cause a ripple effect in multiple areas. By changing how death is reported, a more accurate and valid manner and cause of death could yield better statistical data for the Mortality Data of the National Center for Health Statistics. With more accurate mortality data, additional information may be gathered by public health agencies and the scientific community to implement better programming and possible research in an attempt to decrease the mortality rate within a specific group or population of people. Public policy makers have the potential to enact such changes in the system, but several reasons exist as to why the current Coroner system is still highly utilized within the United States. The Coroner system remains in place due to reasons which include some states needing to amend their state constitutions, the preexisting political factions within communities who have coroners, small populations with small budgets that can't support a full-time

medical examiner, a lack of trained forensic pathologists, unwillingness of different counties to work together to centralize services within a region, and a lack of advocates to encourage reform while educating the public about the current system (National Research Council, 2009). Whether the current system has remained unchanged due to long-standing traditions or other factors like money, a continued pursuit for medically trained certifiers of death should be called for throughout the United States by a variety of researchers, agencies, administrators, and elected officials.

CHAPTER 3

METHODS

A. Jefferson County, Alabama Coroner/Medical Examiner Files

The Jefferson County Coroner/Medical Examiner's Office houses files of all decedents who have been examined within Jefferson County, Alabama. Information from all files beginning in 1978 through 2008 has been abstracted and entered into a database possessed by the Jefferson County Coroner/Medical Examiner's Office. The information began being collected from 1978 onwards since that year was the inception of the medical examiner system for Jefferson County. No information had been abstracted from files or placed into the database prior to 1978 since that information was generated under the previous Coroner's system.

For a three year period from 1978 to 1981, the Jefferson County Coroner/Medical Examiner's Office didn't operate under the same guidelines as it did from 1981 through 2008. In 1981, the Jefferson County Coroner/Medical Examiner's Office began to operate "under a consistent medical examiner's statute" where "all deaths investigated by the office were certified by one of five forensic pathologists" (Taylor, McGwin, Davis, Brissie, & Rue, 2002, p. 103). The statute in which the office operated under from 1981 through 2008 charged "the office with the responsibility of investigating all sudden and unexpected deaths that have occurred in Jefferson County and that have been caused by events that transpired there" (Taylor, McGwin, Davis, Brissie, & Rue, 2002, p. 103).

The database consists of 22, 477 individual cases from 1978 through 2008. Each case provides details including the case number, the date the case was reported, the

division (Birmingham or Bessemer) under which the case falls, if an autopsy was performed or not, and the person in charge of the case. For an individual case, the manner of death (A=Accidental, H=Homicide, N=Natural, S=Suicide, U=Undetermined), the cause of death, and the date of death were listed. Demographic information including age, race, sex, and marital status has been recorded for each case. Other information including level of education, place of injury, job related death, blood alcohol level, and other toxins detected are also located in the database.

For this study, a total of 2,000 cases from 1970, 1971, 1976, and 1977 under the Birmingham division were reviewed and information for each file was abstracted and added into the database. The files consisted of a multitude of information and that information varied based on the manner of death. Files could consist of a Coroner's report, a death certificate, an autopsy report, toxicology results, police reports, firefighter reports, personal identification, photos from the scene of the crime or accident, jury decisions, and headlines from newspapers. The information for 1977 was gathered first and entered for most columns within the database. This allowed for a thorough understanding of what a file consisted of, where information was housed, and how to use multiple sources to collect the necessary information. For 1970, 1971, and 1976, the only information which was collected was the date of the report, whether an autopsy was performed, the person responsible for the case, the manner of death, the cause of death, the means of death, age, race, sex, marital states, date of death, and if the death was job related.

A total of 24,483 cases from the years 1970-1971 and 1976-2008 were available for this study. Cases within the Bessemer division were excluded under the Medical

Examiner system which resulted in a total of 18,152 cases available for 1978 through 2008. The original 2,000 cases from 1970-1971 and 1976-1977 were solely under the division of Birmingham. Therefore, for this study a total of 20,152 cases were used to make the data set.

B. Bivariate Analysis and Discontinuity Regression

First, bivariate analysis of the data set was performed using an independent-samples t-test to understand if the independent variable of Coroner/Medical Examiner caused a change in autopsy rates, manslaughter rates, overall accidental rates, justifiable homicide rates, overall homicide rates, natural death rates, suicide rates, undetermined death rates, and work related death rates. Assumptions for normality and equal variance have been tested within the independent-samples t-test.

Then, discontinuity regression was used to assess whether the differences noted in the bivariate analyses held once demographics of the decedents were accounted for after the intervention in 1978. The Regression Discontinuity (RD) method was first introduced by Thistlethwaite and Campbell in 1960. The RD method "is a quasi-experimental design with the defining characteristic that the probability of receiving treatment changes discontinuously as a function of one or more underlying variables" (Hahn, Todd, &Van der Klaauw, 2001, p. 201). The RD method is categorized as a pretest-posttest design in which an intervention is assigned and causal effects can be observed due to that intervention. For this study, the intervention occurred in January

1978 when Jefferson County, Alabama switched from a Coroner system to a Medical Examiner system.

C. Variables

Covariates including age, race, gender, and marital status were added into the regression models. The impact of changing from a Coroner to a Medical Examiner system was assessed for autopsy rates, manslaughter rates, overall accidental rates, justifiable homicide rates, overall homicide rates, natural death rates, suicide rates, undetermined death rates, and work related death rates while controlling for demographics. Normality and linearity assumptions were checked by scatter plots of predicted against residuals values. Linearity was specifically checked through visual assessment of scatterplots of dependent variables with each independent variable. SPSS was used for all statistical calculations.

In order to build the data set, cases were sorted into individual years according to the date of death. Each year was then sorted per month. The data set contained the year for each month as well as each month coded as a number (January = 1, February = 2, March = 3, April = 4, May = 5, June = 6, July = 7, August = 8, September = 9, October = 10, November = 11, December = 12). Coroner and Medical Examiner were coded with dummy variables where Coroner = 0 for each month within 1970, 1971, 1976, and 1977 and Medical Examiner = 1 for each month within 1978-2008. A total count of cases per month was counted and listed. Within each month, a count of autopsies, manner of death, missing files, and work related deaths was performed. A count of demographic information was also performed including ages (0-19, 20-39, 40-59, 60-79, 80-99, and

100-119), race (White, Black, Hispanic, American Indian, Asian, and unknown), gender (male, female, and unknown), and marital status (divorced, married, never married, widowed, and undetermined).

A crucial caveat exists regarding manner of death when comparing the Coroner system to the Medical Examiner system. The manner of death within the Coroner system was reported as accidental, manslaughter, homicide, justifiable homicide, natural, suicide, and undetermined. This reporting method was found within the Coroner's report but not on the death certificate. The manner of death within the Medical Examiner system was reported as accidental, homicide, natural, suicide, and undetermined. Manslaughter was commonly used within the Coroner system to describe vehicular accidents such as drunk driving and hit-and-runs. For the Coroner system, the data for manslaughter and accidental were combined in order to give an overall accidental count. The same method was used to combine homicide and justifiable homicide into an overall homicide count.

Population counts per year for Jefferson County, Alabama were obtained through the United States Census Bureau in order to calculate autopsy rates, mortality rates, missing file rates, and work related death rates. Each rate is calculated to equate to the rate per 100,000 persons. In order to calculate the rate per month, the total count per month for each area of interest was divided by the total annual population for that year and multiplied by 100,000. The following rates were calculated per month using the aforementioned formula and added to the data set: autopsy, accidental, manslaughter, overall accidental, homicide, justifiable homicide, overall homicide, natural, suicide, undetermined, missing file, and work related. The control variables were not converted

to rates since specific population data per year for age, race, gender, and marital status was not available for Jefferson County, Alabama. Dividing each control variable by the overall general population per year of Jefferson County would not yield the specific rate of the control. Therefore, control variables were reported and analyzed as counts per month.

CHAPTER 4

RESULTS

Table 4 provides the results for the independent-samples t-test for the Coroner/Medical Examiner systems and their effects on autopsy rates, manslaughter rates, overall accidental rates, justifiable homicide rates, overall homicide rates, natural death rates, suicide rates, undetermined death rates, and work related death rates.

Table 4. Descriptive Statistics for Coroner and Medical Examiner Systems for Jefferson County, AL (excluding Bessemer, AL) for 1970 -1971 and 1976 -2008

	CORONER (n=48)			MEDICAL EXAMINER (n=372)		
Rates (Per 100,000 Persons)	Mean	Std. Dev.	Std. Error	Mean	Std. Dev.	Std. Error
Autopsy***	2.38	1.453	.210	4.27	1.367	.071
Manslaughter***	0.15	.357	.051	0.00	0.00	0.00
Overall Accidental***	2.83	.781	.113	2.39	.706	.037
Justifiable Homicide***	0.17	.377	.054	0.00	0.00	0.00
Overall Homicide	1.29	.544	.079	1.51	.651	.034
Natural***	1.27	1.005	.145	2.38	.826	.043
Suicide	0.77	.472	.068	0.87	.450	.023
Undetermined***	0.06	.245	.035	0.20	.406	.021
Work Related	0.17	.377	.054	0.07	.255	.013

*** p<0.10 **p<0.05 ***p<0.01**

An independent-samples t-test was conducted to compare the reporting of manner of death in rates between the Coroner system and the Medical Examiner system of Jefferson County, Alabama. Significance was found to exist between the Coroner and

Medical Examiner systems for multiple reporting areas of manner of death. Specifically, autopsy rates, manslaughter rates, overall accidental rates, justifiable homicide rates, natural death rates, and undetermined death rates proved to have significant differences between the two systems.

There was a significant difference in autopsy rates for the Coroner system (M=2.38, SD=1.453) compared to the Medical Examiner system (M=4.27, SD=1.367). These results suggest that the type of system which is in place to report and investigate death does have an effect on autopsy rates. Specifically, the results indicate that the Medical Examiner system has a higher rate of autopsies compared to the Coroner system.

A significant difference also existed for manslaughter rates for the Coroner system (M=0.15, SD=0.357) compared to the Medical Examiner system (M=0.00, SD=0.00). These results suggest that the Coroner or Medical Examiner system does have an effect on manslaughter rates. Specifically, the results demonstrate that the Coroner system was the only system to report manslaughter. The Medical Examiner system for Jefferson County, AL never classified manslaughter as a manner of death. Manslaughter was never listed on the official death certificates under the Coroner system; however, if the manner of death was determined to be manslaughter, then the coroner would list manslaughter in the space under manner of death within the coroner report found within the deceased's file. It should be noted that the death certificate didn't allow for manslaughter to be reported as the manner of death. Therefore, the manner of death for cases involving manslaughter was determined through the use of death certificates which were also available within the decedent's file. The manner of death for deaths reported as

manslaughter by the Coroner system was reported as accidental on death certificates. This illustrates a change in the function of the system.

For overall accidental rates, a significant difference was found to exist between the Coroner system (M=2.83, SD=0.781) compared to the Medical Examiner system (M=2.39, SD=0.706). These results suggest that the type of death investigation system has an effect on the reporting of overall accidental rates. Results indicate that the Coroner system reports a higher rate of overall accidental deaths compared to the Medical Examiner system.

A significant difference was found to exist between the Coroner system (M=0.17, SD=0.377) and the Medical Examiner system (M=0.00, SD=0.00) for justifiable homicide rates. These results suggest that the systems of Corner/Medical Examiner do have an effect on justifiable homicide rates. Like the results found for manslaughter rates, these results demonstrate that the Coroner system was the only system to use justifiable homicide as a reporting mechanism for manner of death. The Medical Examiner system for Jefferson County, AL never classified justifiable homicide as a manner of death. Justifiable homicide was never listed on the official death certificates under the Coroner system; however, if the manner of death was determined to be justifiable homicide, then the coroner would list justifiable homicide in the space under manner of death within the coroner report found within the deceased's file. It should be noted that the death certificate didn't allow for justifiable homicide to be reported as the manner of death. Therefore, the manner of death for cases involving

justifiable was coded as homicide in order to determine the overall homicide rate for the Coroner system.

A significant difference was found to occur for natural death rates between the Coroner system (M=1.27, SD=1.005) compared to the Medical Examiner system (M=2.38, SD=0.826). These results indicate that the type of death investigation system does have an effect on the reporting of overall natural death rates. Results demonstrate that the Medical Examiner system reports a higher rate of overall natural deaths compared to the Coroner system.

There was a significant difference in undetermined death rate for the Coroner system (M=0.06, SD=0.245) compared to the Medical Examiner system (M=0.20, SD=0.406). These results suggest that the Coroner/Medical Examiner system does have an effect on the reporting of undetermined death rates. Specifically, the results indicate that the Medical Examiner system reports a higher rate of undetermined deaths compared to the Coroner system.

No significance was found to exist for the reporting of overall homicide rates, suicide rates, or work related deaths when comparing the Coroner and Medical Examiner systems. An increase was seen for the reporting of overall homicide rates when moving from the Coroner system (M=1.29, SD=0.544) to the Medical Examiner system (M=1.51, SD=0.651). A slight increase was also observed for suicide rates when transitioning from the Coroner system (M=0.77, SD=0.472) to the Medical Examiner system (M=0.87, SD=0.450). Finally, the reporting of work related deaths slightly decreased when death investigation system changed from a Coroner system (M=0.17, SD=0.377) to a Medical Examiner system (M=0.07, SD=0.255).

Table 5 through Table 12 provides the results for the discontinuity regression analysis and changes in autopsy rates, manslaughter rates, overall accidental rates, justifiable homicide rates, overall homicide rates, natural death rates, suicide rates, undetermined death rates, and work related death rates due to the intervention of the Medical Examiner system.

Table 5. Coroner and Medical Examiner Systems, Age, Race, Gender, and Marital Status Effects on Autopsy Rates in Jefferson County, AL for 1970 -1971 and 1976 -2008

Independent Variable	Coefficient/(beta)	Standard error	t statis-tic
<u>System</u>			
Coroner/Medical Examiner	1.221 (.259)	.196	6.240***
<u>Age</u>			
# between 0-19	-.030 (-.057)	.099	-.309
# between 20-39	-.070 (-.207)	.102	-.688
# between 40-59	-.014 (-.045)	.102	-.140
# between 60-79	-.092 (-.255)	.101	-.909
# between 80-99	-.123 (-.179)	.103	-1.188
# between 100-119	-.676 (-.092)	.291	-2.323**
<u>Race</u>			
# of Black	.158 (.613)	.176	.896
# of White	.162 (.645)	.176	.925
# of Hispanic	.435 (.188)	.198	2.196**
# of Native American	-1.073 (-.035)	1.095	-.980
# of Asian	.044 (.008)	.260	.170
# of Undetermined	.151 (.021)	.313	.484
<u>Gender</u>			
# of Female	-.046 (-.137)	.121	-.380
# of Male	-.016 (-.075)	.120	-.132
# of Undetermined	-.513 (-.050)	.426	-1.204
<u>Marital Status</u>			
# of Divorced	.050 (.112)	.081	.617
# of Married	.009 (.030)	.079	.116
# of Never Married	.007 (.023)	.080	.086
# of Widowed	.023 (.045)	.082	.276
# of Undetermined	-.012 (-.023)	.081	-.152
R^2 = .521			
Adj. R^2 = .496			
F = 20.60			
p = .000***			
N of cases = 420			
*** p<0.10 **p<0.05 ***p<0.01**			

Table 5 provides the results for the discontinuity regression analysis, where the dependent variable is the autopsy rate per 100,000 persons. The Coroner/Medical Examiner system is coded as a dichotomous variable and takes on the value 1 for observations from the ME system and 0 for observations from the Coroner system. Consequently, the coroner system is the base category in the regression models. The model also includes the following control variables: age, race, gender, and marital status. The R-square indicates that approximately 52.1% of variance in autopsy rates is explained by the model. The coefficient for system variable is 1.221 and highly significant. Holding all other variables constant, the Medical Examiner system performs autopsies at a rate that is 1.221 greater, on average, than the Coroner system ($p<0.01$).

Other coefficients which are significant for autopsy rate are numbers between 100-119 and numbers of Hispanic. The coefficient for number between age 100-119 is -.676 holding all other variables constant and the coefficient for number of Hispanic is .435 holding all other variables constant and both are statistically significant. The interpretation for these results indicates that for every unit number increase in age from 100-119 a decrease of .676 units in autopsy rate holding all other variables constant is predicted and for every unit number increase of Hispanics that and an increase of .435 units in autopsy rate is predicted holding all other variables constant.

Table 6. Coroner and Medical Examiner Systems, Age, Race, Gender, and Marital Status Effects on Manslaughter Rates in Jefferson County, AL for 1970 -1971 and 1976 -2008

Independent Variable	Coefficient/(beta)	Standard error	t statistic
System			
Coroner/Medical Examiner	-.141 (-.350)	.022	-6.437***
Age			
# between 0-19	-.001 (-.014)	.011	-.057
# between 20-39	.000 (-.015)	.011	-.037
# between 40-59	.003 (.119)	.011	.286
# between 60-79	-.001 (-.029)	.011	-.078
# between 80-99	.005 (.083)	.012	.419
# between 100-119	.017 (.026)	.033	.508
Race			
# of Black	-.017 (-.755)	.020	-.843
# of White	-.014 (-.646)	.020	-.707
# of Hispanic	-.015 (-.074)	.022	-.663
# of Native American	.025 (.009)	.122	.202
# of Asian	-.010 (-.020)	.029	-.328
# of Undetermined	-.009 (-.015)	.035	-.262
Gender			
# of Female	-.001 (-.045)	.014	-.096
# of Male	-.002 (-.097)	.013	-.130
# of Undetermined	-.014 (-.016)	.048	-.301
Marital Status			
# of Divorced	.011 (.298)	.009	1.253
# of Married	.017 (.638)	.009	1.882**
# of Never Married	.017 (.689)	.009	1.940**
# of Widowed	.014 (.331)	.009	1.545
# of Undetermined	.008 (.177)	.009	.905

R^2 = .179
Adj. R^2 = .136
F = 4.134
p = .000***
N of cases = 420

*** p<0.10 **p<0.05 ***p<0.01**

Table 6 provides the results for the discontinuity regression analysis, where the dependent variable is the manslaughter rate per 100,000 persons. The Coroner/Medical Examiner system is coded as a dichotomous variable and takes on the value 1 for observations from the ME system and 0 for observations from the Coroner system. Consequently, the coroner system is the base category in the regression models. The model also includes the following control variables: age, race, gender, and marital status. The R-square indicates that approximately 17.9% of variance in manslaughter rates is explained by the model. The coefficient for system variable is -.141 and highly significant. Holding all other variables constant, the Medical Examiner system reports manslaughter at a rate that is .859 less, on average, than the Coroner system ($p<0.01$).

Other coefficients which are significant for manslaughter rate reside under the marital status category. The coefficient for number of married is .017 holding all other variables constant and the coefficient for number of never married is .017 holding all other variables constant and both are statistically significant with a p-value which is less than .05 but greater than .01. The interpretation for these results indicates that for every unit number increase in the number of married and the number of never married that an increase of .017 units in manslaughter rate is predicted holding all other variables constant.

Table 7. Coroner and Medical Examiner Systems, Age, Race, Gender, and Marital Status Effects on Overall Accidental Rates in Jefferson County, AL for 1970 -1971 and 1976 -2008

Independent Variable	Coefficient/(beta)	Standard error	t statistic
System			
Coroner/Medical Examiner	-.677 (-.296)	.106	-6.394***
Age			
# between 0-19	-.009 (-.035)	.053	-.171
# between 20-39	-.030 (-.185)	.055	-.549
# between 40-59	-.030 (-.192)	.055	-.538
# between 60-79	-.053 (-.304)	.055	-.970
# between 80-99	-.033 (-.100)	.056	-.596
# between 100-119	-.139 (-.039)	.158	-.880
Race			
# of Black	.181 (1.458)	.095	-1.908**
# of White	.235 (1.928)	.095	2.474**
# of Hispanic	.288 (.257)	.107	2.686**
# of Native American	-.236 (-.016)	.592	-.399
# of Asian	.244 (.092)	.141	1.733**
# of Undetermined	.384 (.113)	.169	2.272**
Gender			
# of Female	-.064 (-.396)	.066	-.979
# of Male	-.072 (-.705)	.065	-1.107
# of Undetermined	-.373 (-.074)	.231	-1.617
Marital Status			
# of Divorced	-.062 (-.287)	.044	-1.414
# of Married	-.067 (-.450)	.043	-1.555
# of Never Married	-.063 (-.441)	.043	-1.453
# of Widowed	-.061 (-.252)	.044	-1.685
# of Undetermined	-.074 (-.282)	.044	-1.380**
R^2 = .401			
Adj. R^2 = .370			
F = 12.708			
p = .000***			
N of cases = 420			

*** p<0.10 **p<0.05 ***p<0.01**

Table 7 provides the results for the discontinuity regression analysis, where the dependent variable is the overall accidental rate per 100,000 persons. The Coroner/Medical Examiner system is coded as a dichotomous variable and takes on the value 1 for observations from the ME system and 0 for observations from the Coroner system. Consequently, the coroner system is the base category in the regression models. The model also includes the following control variables: age, race, gender, and marital status. The R-square indicates that approximately 40.1% of variance in overall accidental rates is explained by the model. The coefficient for system variable is -.677 and highly significant. Holding all other variables constant, the Medical Examiner system reports overall accidents at a rate that is .323 less, on average, than the Coroner system ($p<0.01$).

Other coefficients which are significant for overall accidental death rates occur mainly under the category of race. The coefficients for number of Black (.181), number of White (.235), number of Hispanic (.288), number of Asian (.244), and number of Undetermined race (.384) are all statistically significant holding all other variables constant with p-values less than .05 but greater than .01. The interpretation for these results indicates that for every unit number increase in the number of Black, number of White, number of Hispanic, number of Asian, and number of Undetermined race that a corresponding increase of .181, .235, .288, .244, and .384 units in overall accidental rates is predicted holding all other variables constant. In addition, the coefficient for number of Undetermined within the category of marital status is -.074 holding all other variables constant and is also significant with the p-values being less than .05 but greater than .01. This information can be interpreted as for every unit number increase in the number of

Undetermined marriages that a corresponding decrease of .074 units in overall accidental rates is predicted holding all other variables constant.

Table 8. Coroner and Medical Examiner Systems, Age, Race, Gender, and Marital Status Effects on Justifiable Homicide Rates in Jefferson County, AL for 1970 -1971 and 1976 -2008

Independent Variable	Coefficient/(beta)	Standard error	t statistic
<u>System</u>			
Coroner/Medical Examiner	-.160 (-.372)	.023	-6.955***
<u>Age</u>			
# between 0-19	.001 (.030)	.012	.128
# between 20-39	.000 (-.010)	.012	-.026
# between 40-59	-.002 (-.066)	.012	-.160
# between 60-79	-.002 (-.076)	.012	-.210
# between 80-99	-.002 (-.037)	.012	-.188
# between 100-119	-.035 (-.052)	.034	-1.015
<u>Race</u>			
# of Black	.030 (1.292)	.021	1.468
# of White	.032 (1.414)	.021	1.575
# of Hispanic	.031 (.146)	.023	1.329
# of Native American	.017 (.006)	.128	.131
# of Asian	.032 (.065)	.031	1.061
# of Undetermined	.038 (.059)	.037	1.038
<u>Gender</u>			
# of Female	.008 (.272)	.014	.585
# of Male	.007 (.348)	.014	.474
# of Undetermined	-.021 (-.022)	.050	-.421
<u>Marital Status</u>			
# of Divorced	-.038 (-.933)	-.933	-3.983***
# of Married	-.039 (-1.401)	-1.401	-4.199***
# of Never Married	-.035 (-1.310)	-1.310	-3.748***
# of Widowed	-.035 (-.765)	-.765	-3.633***
# of Undetermined	-.036 (-.721)	-.721	-3.740***
R^2 = .205			
Adj. R^2 = .163			
F = 4.895			
p = .000***			
N of cases = 420			
*** p<0.10 **p<0.05 ***p<0.01**			

Table 8 provides the results for the discontinuity regression analysis, where the dependent variable is the justifiable homicide rate per 100,000 persons. The Coroner/Medical Examiner system is coded as a dichotomous variable and takes on the value 1 for observations from the ME system and 0 for observations from the Coroner system. Consequently, the coroner system is the base category in the regression models. The model also includes the following control variables: age, race, gender, and marital status. The R-square indicates that approximately 20.5% of variance in justifiable homicide rates is explained by the model. The coefficient for system variable is -.160 and highly significant. Holding all other variables constant, the Medical Examiner system reports justifiable homicide at a rate that is .840 less, on average, than the Coroner system ($p<0.01$).

Other coefficients which are significant for justifiable homicide rate fall under the marital status category. The coefficients for every category of marital status (number of Divorced, number of Married, number of Never Married, number of Widowed, and number of Undetermined) are negative holding all other variables constant and statistically significant with p-values that are smaller than 0.01. The interpretation for these results indicates that for every unit number increase for any of the categories within marital status that a decrease for the units of justifiable homicide rate is predicted holding all other variables constant.

Table 9. Coroner and Medical Examiner Systems, Age, Race, Gender, and Marital Status Effects on Overall Homicide Rates in Jefferson County, AL for 1970 -1971 and 1976 -2008

Independent Variable	Coefficient/(beta)	Standard error	t statistic
<u>System</u>			
Coroner/Medical Examiner	-.013 (-.006)	.098	-.131
<u>Age</u>			
# between 0-19	.059 (.256)	.050	1.188
# between 20-39	.084 (.582)	.051	1.647*
# between 40-59	.045 (.328)	.051	.876
# between 60-79	.033 (.218)	.051	.660
# between 80-99	.049 (.165)	.052	.935
# between 100-119	.120 (.038)	.146	.820
<u>Race</u>			
# of Black	-.130 (-1.181)	.088	-1.472
# of White	-.164 (-1.528)	.088	-1.867*
# of Hispanic	-.170 (-.172)	.099	-1.715*
# of Native American	-.701 (-.053)	.549	-1.276
# of Asian	-.290 (-.123)	.130	-2.223**
# of Undetermined	-.213 (-.071)	.157	-1.355
<u>Gender</u>			
# of Female	.076 (.531)	.061	1.253
# of Male	.094 (1.044)	.060	1.563
# of Undetermined	.023 (.005)	.214	.106
<u>Marital Status</u>			
# of Divorced	.026 (.134)	.041	.626
# of Married	.033 (.256)	.040	.843
# of Never Married	.039 (.313)	.040	.983
# of Widowed	.027 (.126)	.041	.886
# of Undetermined	.036 (.156)	.041	.657
R^2 = .340			
Adj. R^2 = .305			
F = 9.770			
p = .000***			
N of cases = 420			
*** p<0.10 **p<0.05 ***p<0.01**			

Table 9 provides the results for the discontinuity regression analysis, where the dependent variable is the overall homicide rate per 100,000 persons. The Coroner/Medical Examiner system is coded as a dichotomous variable and takes on the value 1 for observations from the ME system and 0 for observations from the Coroner system. Consequently, the coroner system is the base category in the regression models. The model also includes the following control variables: age, race, gender, and marital status. The R-square indicates that approximately 34.0% of variance in overall homicide rates is explained by the model. The coefficient for system variable is -.013 holding all other variables constant and is not significant.

Coefficients which are significant for overall homicide rates occur mainly under the category of race or age. The coefficients for number of White (-.164), number of Hispanic (-.170), and number between age 20-39 (.084) are all statistically significant holding all other variables constant with p-values less than .05 but greater than .01. The interpretation for these results indicates that for every unit number increase in the number of White and number of Hispanic that a corresponding decrease of .164 and .170 units in overall homicide rates is predicted holding all other variables constant. The results also demonstrate that for every unit number increase in the number within the age range of 20-39 that a corresponding increase of .084 units in overall homicide rates is predicted holding all other variables constant. The coefficient for number of Asian is -.290 holding all other variables constant and is significant with the p-values being less than .01. Therefore, every unit number increase in the number of Asian a corresponding decrease of .290 in overall homicide rates is predicted holding all other variables constant.

Table 10. Coroner and Medical Examiner Systems, Age, Race, Gender, and Marital Status Effects on Natural Death Rates in Jefferson County, AL for 1970 -1971 and 1976 -2008

Independent Variable	Coefficient/(beta)	Standard error	t statistic
<u>System</u>			
Coroner/Medical Examiner	.547 (.190)	.114	4.790***
<u>Age</u>			
# between 0-19	.029 (.088)	.058	.501
# between 20-39	.013 (.065)	.059	.227
# between 40-59	.055 (.279)	.059	.918
# between 60-79	.087 (.397)	.059	1.482
# between 80-99	.073 (.174)	.060	1.206
# between 100-119	.316 (.070)	.170	1.861*
<u>Race</u>			
# of Black	.022 (.141)	.102	.215
# of White	-.012 (-.077)	.102	-.116
# of Hispanic	-.071 (-.050)	.115	-.614
# of Native American	-.139 (-.007)	.638	-.217
# of Asian	-.094 (-.028)	.152	-.618
# of Undetermined	.083 (.019)	.182	.455
<u>Gender</u>			
# of Female	-.007 (-.034)	.071	-.098
# of Male	-.022 (-.169)	.070	-.311
# of Undetermined	.241 (.038)	.249	.968
<u>Marital Status</u>			
# of Divorced	.041 (.152)	.047	.873
# of Married	.018 (.094)	.046	.380
# of Never Married	.014 (.077)	.046	.297
# of Widowed	.009 (.028)	.048	.180
# of Undetermined	.000 (.000)	.048	-.002
R^2 = .563			
Adj. R^2 = .540			
F = 24.429			
p = .000***			
N of cases = 420			
*** p<0.10 **p<0.05 ***p<0.01**			

Table 10 provides the results for the discontinuity regression analysis, where the dependent variable is the natural death rate per 100,000 persons. The Coroner/Medical Examiner system is coded as a dichotomous variable and takes on the value 1 for observations from the ME system and 0 for observations from the Coroner system. Consequently, the coroner system is the base category in the regression models. The model also includes the following control variables: age, race, gender, and marital status. The R-square indicates that approximately 56.3% of variance in natural death rates is explained by the model. The coefficient for system variable is .547 and highly significant. Holding all other variables constant, the Medical Examiner system reports natural deaths at a rate that is .547 greater, on average, than the Coroner system ($p<0.01$).

The only other coefficient which was significant for natural deaths was within the number between 100-119 years of age category. The category number between 100-119 years old is statistically significant holding all other variables constant with p-values less than 0.10 but greater than .05. The interpretation for this result indicates that for every unit number increase in number between 100-119 years of age that a corresponding increase of .316 units in natural death rates is predicted holding all other variables constant.

Table 11. Coroner and Medical Examiner Systems, Age, Race, Gender, and Marital Status Effects on Suicide Rates in Jefferson County, AL for 1970 -1971 and 1976 -2008

Independent Variable	Coefficient/(beta)	Standard error	t statis-tic
<u>System</u>			
Coroner/Medical Examiner	.010 (.007)	.078	.134
<u>Age</u>			
# between 0-19	.035 (.216)	.039	.892
# between 20-39	.041 (.399)	.040	1.004
# between 40-59	.045 (.462)	.041	1.100
# between 60-79	.047 (.433)	.040	1.169
# between 80-99	.023 (.109)	.041	.549
# between 100-119	-.129 (-.058)	.116	-1.116
<u>Race</u>			
# of Black	-.053 (-.687)	.070	-.761
# of White	-.038 (-.507)	.070	-.551
# of Hispanic	-.082 (-.117)	.079	-1.036
# of Native American	.065 (.007)	.436	.148
# of Asian	.101 (.061)	.104	.978
# of Undetermined	-.157 (-.074)	.125	-1.257
<u>Gender</u>			
# of Female	.013 (.126)	.048	.265
# of Male	.019 (.294)	.048	.392
# of Undetermined	.075 (.024)	.170	.442
<u>Marital Status</u>			
# of Divorced	.004 (.028)	.032	.116
# of Married	.006 (.064)	.032	.188
# of Never Married	.008 (.089)	.032	.248
# of Widowed	.003 (.020)	.033	.094
# of Undetermined	-.006 (-.038)	.032	-.193
R^2 = .166			
Adj. R^2 = .122			
F = 3.764			
p = .000***			
N of cases = 420			
*** p<0.10 **p<0.05 ***p<0.01**			

Table 11 provides the results for the discontinuity regression analysis, where the dependent variable is the suicide rate per 100,000 persons. The Coroner/Medical Examiner system is coded as a dichotomous variable and takes on the value 1 for observations from the ME system and 0 for observations from the Coroner system. Consequently, the coroner system is the base category in the regression models. The model also includes the following control variables: age, race, gender, and marital status. The R-square indicates that approximately 16.6% of variance in suicide rates is explained by the model. The coefficient for system variable is .010 holding all other variables constant and is not significant.

Table 12. Coroner and Medical Examiner Systems, Age, Race, Gender, and Marital Status Effects on Undetermined Death Rates in Jefferson County, AL for 1970 -1971 and 1976 -2008

Independent Variable	Coefficient/(beta)	Standard error	t statistic
<u>System</u>			
Coroner/Medical Examiner	.123 (.099)	.070	1.750*
<u>Age</u>			
# between 0-19	-.050 (-.353)	.035	-1.404
# between 20-39	-.052 (-.587)	.036	-1.426
# between 40-59	-.047 (-.558)	.037	-1.280
# between 60-79	-.062 (-.655)	.036	-1.706*
# between 80-99	-.053 (-.296)	.037	-1.434
# between 100-119	-.048 (-.025)	.104	-.464
<u>Race</u>			
# of Black	.057 (.840)	.063	.899
# of White	.065 (.988)	.063	1.037
# of Hispanic	.057 (.094)	.071	.808
# of Native American	-.272 (-.034)	.392	-.694
# of Asian	.082 (.057)	.093	.885
# of Undetermined	.044 (.024)	.112	.397
<u>Gender</u>			
# of Female	.000 (-.006)	.043	-.011
# of Male	-.003 (-.049)	.043	-.063
# of Undetermined	.034 (.013)	.153	.226
<u>Marital Status</u>			
# of Divorced	.001 (.004)	.029	.018
# of Married	.001 (.016)	.028	.045
# of Never Married	-.003 (-.040)	.029	-.109
# of Widowed	-.006 (-.046)	.029	-.205
# of Undetermined	.024 (.165)	.029	.808
R^2 = .105			
Adj. R^2 = .057			
F = 2.215			
p = .002***			
N of cases = 420			
*** p<0.10 **p<0.05 ***p<0.01**			

Table 12 provides the results for the discontinuity regression analysis, where the dependent variable is the undetermined death rate per 100,000 persons. The Coroner/Medical Examiner system is coded as a dichotomous variable and takes on the value 1 for observations from the ME system and 0 for observations from the Coroner system. Consequently, the coroner system is the base category in the regression models. The model also includes the following control variables: age, race, gender, and marital status. The R-square indicates that approximately 10.5% of variance in undetermined death rates is explained by the model. The coefficient for system variable is .123 and significant. Holding all other variables constant, the Medical Examiner system reports undetermined deaths at a rate that is .123 greater, on average, than the Coroner system ($p<0.10$).

The only other coefficient which was significant for undetermined deaths was within the number between 60-79 years of age category. The category number between 60-79 years old is statistically significant holding all other variables constant with p-values less than 0.10 but greater than .05. The interpretation for this result indicates that for every unit number increase in number between 60-79 years of age that a corresponding decrease of .062 units in undetermined death rates is predicted holding all other variables constant.

CHAPTER 5

SUMMARY AND CONCLUSION

The debate surrounding the Coroner/Medical Examiner system dates back to at least 1928 in a bulletin from the National Research Council entitled *The Coroner and the Medical Examiner* which stated as one of its four recommendations "that the office of the coroner be abolished" (National Research Council, 2009, p. 242). Eighty-five years later the debate still rages on regarding the Coroner/Medical Examiner system. A multitude of qualitative examples from forensic pathologists and Medical Examiners exist which favor the Medical Examiner system. Coroners also have their own qualitative examples and counterpoints as to why the Coroner system should remain in place. Despite the continuous debate, very few quantitative studies have been produced regarding what changes (if any) occur when a system transitions from a Coroner system to a Medical Examiner system. This study was conducted in order to contribute quantifiable data to better inform the Coroner/Medical Examiner system debate.

The results indicate that significant changes do occur in the reporting rates of autopsy as well as several reporting rates for manner of death including manslaughter, overall accidental, justifiable homicide, natural, and undetermined when the death reporting and investigation system changed from a Coroner to Medical Examiner within Jefferson County, Alabama. The results did not indicate significance for the reporting rates of overall homicide or suicide when the system changed, but one qualitative example will demonstrate how misreporting of manner of death for suicide occurred within the Coroner system for Jefferson County, Alabama.

The Coroner system changed to a Medical Examiner system in Jefferson County, Alabama in 1978. During the three years after the intervention, the Medical Examiner's office was not regimented or consistent regarding amount of deaths investigated or autopsies performed. In fact, the number of autopsies saw a tremendous spike when the new system was implemented in 1978. In 1981, the Jefferson County Coroner/Medical Examiner's Office began to operate under a consistent medical examiner's statute. Even with the three year transition period of 1978-1980 removed from the dataset, the independent t-test as well as the discontinuity regression results remained significant. Overall, the Coroner system of Jefferson County, Alabama had a significantly greater rate of reported manslaughters, overall accidental deaths, and justifiable homicides compared to the Medical Examiner system. For the Medical Examiner system of Jefferson County, Alabama, there was a significantly greater rate of autopsies performed compared to the Coroner system. Also, the Medical Examiner system had a significantly greater rate of reported undetermined and natural deaths compared to the Coroner system.

In this study, the results for the Coroner system having a statistically significant reporting rate of manslaughters and justifiable homicides was expected and predicted. Since neither manslaughter nor justifiable homicide was reported within the Medical Examiner system, there was only data to be interpreted for the Coroner system. Manslaughter was significantly higher within the marital status category for number of Married as well as number of Never Married. These results could be interpreted as those who were married or never married had a higher rate of manslaughter reported compared to those who were divorced, widowed, or had an undetermined marital status. Regarding justifiable homicide, the results indicated that all marital statuses had a significant decrease in

justifiable homicide. Interpretations as to why marital status causes a change in manslaughter and justifiable homicide are not of significant importance since the reporting of either of these was used solely by the Coroner system.

The results for the reporting of overall accidental rates showed statistical significance for the Coroner system. Based on the results for both systems when analyzing the data, a possible conclusion is that accidental death was reported more frequently for the Coroner system while natural or undetermined death was more frequently reported for the Medical Examiner system. Several postulations may also explain these results. First, accidental deaths are commonly attributed to falls, motor vehicle accidents, house fires, pedestrians being struck by cars, drug overdoses, drowning, and exposure to the elements. If considering the advancement of both technology and healthcare, the results for accidental deaths being reported more often under the Coroner system can be explained. The invention of better protective gear and helmets for motorcycle riders, airbags for cars, and smoke detectors for homes may offer a possible explanation for less accidental deaths occurring and thus being reported for the period of time after 1978. In addition, healthcare has seen great strides since the late 1970's and this may also explain why fewer accidents were reported for the manner of death within the Medical Examiner system. It is unclear as to why almost all categories of race as well as undetermined marital status would significantly contribute to the overall rate of reporting for accidental deaths.

The present study provided definitive and statistically significant results for the autopsy rate being greater for the Medical Examiner system. Multiple possibilities can be provided to better explain this phenomenon. First, the Jefferson County Coroner/Medical

Examiner's Office "is notified to investigate approximately 25% of the deaths occurring in Jefferson County," and "notification is made when there is suspicion of criminal violence or criminal neglect, when death occurs in suspicious or unusual circumstances and when deaths are thought to result from trauma or violence" (Jefferson County Coroner/Medical Examiner Office, 2013). The next explanation is that under the Coroner system, an elected official may be more hesitant to investigate specific types of crimes including those involving police officers or parents of infants. Under the Medical Examiner system, the forensic pathologist doesn't have to be concerned about re-election and is free to perform their assigned duties without fear of repercussions to their job based on public opinion. Autopsies may not have been as frequently performed under the Coroner system for infants who appeared to have experienced Sudden Infant Death Syndrome even when the infant may have suffered from Shaken Baby Syndrome or asphyxiation due to smothering or strangulation. Finally, financial resources have been committed to the Medical Examiner system which may not have been available to the previous County Coroner system. With financial resources, the Medical Examiner system has the ability to perform its duty without concern of cost and within a space that is suitable and equipped for autopsies. It is also worthy to note that autopsy rates were significantly lower for decedents within the number between 100-119 years of age. The conclusion for this result is that persons living to 100-119 years of age are expected to die from natural causes or an accident (like a fall) and not require an investigation or autopsy.

Natural death rates were reported at a significantly greater rate within the Medical Examiner system compared to the Coroner system. The major explanation for this result is that people in general are living longer. Therefore, with greater age, naturally occur-

ring diseases become more prevalent and often cause the death of those who are older. The Graying of America is a common term which has been used to describe what the U.S. Census has been reflecting over time – that Americans are living longer. This explanation fits nicely into the conclusion that if people are living longer, then it would be expected that natural death would begin to increase over other manners of death like homicide. To reinforce this point, the only other statistically significant coefficient demonstrated an increase in reported natural deaths for those in the number between 100-119 years of age category.

Slight significance favoring the Medical Examiner system was demonstrated for the reporting rate of undetermined deaths. A possible explanation for this result is that the Medical Examiner reports absolute facts and truths regarding medical examination and sometimes the facts state that the manner of death can't be determined. In general, people want a definitive answer and finality when dealing with disease and death. Listing undetermined may be a greater challenge for an elected Coroner who ultimately relies on the votes of constituents within the community to reelect him or her into to the position of County Coroner. Slight significance was also found within the number between 60-79 years of age for the reporting of undetermined deaths. This result indicated that a decrease would occur for every unit number increase in the reporting of undetermined death rates which could be interpreted as an age range in which undetermined death is less likely to occur compared to accidental, suicide, or natural. A final reason as to why the Medical Examiner system had slight significance in reporting undetermined deaths is due to how infant deaths were reported after 1995. Infant deaths were typically classified

as natural if the cause was believed to be SIDS. Around 1995, the Medical Examiner system of Jefferson County, Alabama began to classify infant deaths as undetermined instead of SIDS which was considered a natural death.

Although the reporting rate of overall homicide and suicide weren't statistically significant for the Coroner/Medical Examiner system, several important factors remain to be discussed. For the reporting of overall homicide rate, the regression results demonstrated statistical, positive significance for number between 20-39 years of age. Since violent crimes are typically associated with young adults, a positive and significant coefficient within the age range of 20-39 for reported homicide rates supports the notion that violence is more prevalent in the aforementioned age group. Race for number of White, number of Hispanic, and number of Asian had negative and significant coefficients for the reporting of overall homicide rates. In particular, # of Black was the least negative for the Race coefficients, but it wasn't statistically significant. This indicates that # of Black would see the smallest decrease for every unit increase in reporting of overall homicide rates. Violent crimes are frequently shown to have a disproportional amount of racial minorities associated with them especially African Americans. This data supports the case that race does contribute significantly to the reporting of overall homicide rates.

Of all the reporting rates for manner of death, the results for suicide were the least impressive and showed absolutely no significance within any category. Despite no significance existing between the Coroner/Medical Examiner system for suicide rates, a pertinent qualitative example from the Coroner system will illustrate concerns regarding the accurate reporting of suicide by elected officials. Suicide has been defined as "death arising from an act inflicted upon oneself with the intent to kill oneself" (Shields, Hun-

saker, & Hunsaker III, 2005, p. 613). In 1977, a 35 year old white male with a previous history of depression pulled the gas line from the space heater in his bathroom and led it towards the living room. He also turned the gas on from his gas stove. After ten minutes, he decided that he wanted to smoke and lit a cigarette. The house exploded, and the man ran outside of the house after he caught on fire. The man died a week later as a result of burns obtained from the explosion. In reviewing all of the contents within the Coroner's file for this case, a fire chief's report indicated that during an interview with the victim a few days after the explosion, the man freely admitted to trying to kill himself by igniting the gas from the space heater and the stove. Despite the victim conceding his attempt to kill himself in the house explosion in conjunction with his subsequent death from the explosion, the Coroner listed the manner of death as accidental for the man and not suicide. This qualitative example provides an example to validate the necessity for accurate reporting of death in order to insure the integrity of the National Vital Statistics System for the United States which uses a variety of data collected from death certificates including manner and cause of death.

A final qualitative example provides a very disturbing look into how some coroners in the state of Alabama reported the cause of death on official death certificates. These examples were provided by C. Bruce Alexander, M.D., Professor and Vice Chair of Pathology at the University of Alabama at Birmingham and current President of the American Society of Clinical Pathology. These examples are from death certificates completed under a county coroner in Alabama. Some of the inaccurate causes of death which were reported by coroners include: "Short winded;" "Broke out with thunder-

wood;" "Auto accident. Contributory bookworm;" "Automobile wreck started it but pneumonia killed him;" "Stab wound of chest inflicted by lady friend;" "Rubbed to death by chiropractor;" "Homicide. Hit over head with slop jar;" "Cerebral hemorrhoids;" "Frightened to death by deputy sheriff;" and "Went to bed well and woke up dead." These examples provide evidence as to how an elected official with little to no medical training can use common vernacular instead of accurate, scientific and medical descriptions when reporting causes of death.

There are two major limitations to this study which can be rendered with future studies. The first limitation is due to the small number of cases for the Coroner system compared to the Medical Examiner system. Although the independent t-test and the discontinuity regressions were tested for normality and equal variance, a study with equal months for pre- and post- with the intervention being directly at the midpoint could have been the ideal model to work with. This would have also allowed for the choice to use different models like an interrupted time series to produce results from the data. The second limitation is that this study is based solely off the cases which occurred in Jefferson County, Alabama. These results are only for one county in a single state, and they may not be able to be generalized to all death investigation systems within the United States that have transitioned from a County Coroner to a Medical Examiner system (Taylor, McGwin, Davis, Brissie, & Rue, 2002). Future studies should investigate either multiple counties or an entire state that has undergone the transition from a Coroner to a Medical Examiner system in order to quantitatively contribute to the literature regarding this very important issue.

The findings of this study have broad implications on multiple fields including health care, vital statistics, criminal justice, medical records, and public administration. The current structure of the Coroner and Medical Examiner system demonstrates how policy enactment or failure to enact can have a broader effect on citizens. The current medicolegal system in the U.S. begs the question that when expertise is required then shouldn't science be required. Reporting death shouldn't be based on value judgments; it should be based on scientific judgments alone. In reporting death, "Medical Examiners and appointed death investigators are more likely to be responsive to the norms of their *professional* community while coroners and elected death investigators are more vulnerable to pressures exerted by their *local* community" (Klugman, Condran, & Wray, 2013, p. 465). When value judgments triumph over purely scientific judgments, a system can be considered to be flawed and in need of repair and restructuring.

The Pendleton Civil Service Reform Act moved the country away from the spoils system to one based on merit and expertise. However, there are current examples which illustrate how the spoils system is still currently functioning in some areas of employment and local government. Two modern examples of the spoils system involve a water treatment plant and the implementation of a medical file system. As daily consumers of water, most citizens pay for their water to be treated by experts. However, in the spoils system, the city manager's child may actually be awarded a job to treat the water plant over someone who is trained, certified, and more qualified simply based on the fact that the child's father is the city manager. The next example is the implementation of new software for a hospital changing to electronic medical records. It would make sense to hire

someone who had experience implementing a multi-million dollar system and converting medical records to electronic data. However, many political officials win political favor by appointing friends or relatives to oversee the implementation of such systems. By appointing unskilled and inexperienced people to implement or monitor systems which typically require scientific knowledge or expertise, significant fiscal or physical damage could occur to the citizens who will ultimately interact and use those systems.

This issue should be considered highly relevant to public administration due to the fact that it has the potential to have profound effects on the future of patient care and healthcare policy. This research should be used as a stepping stone to aid in transforming policies on a national basis regarding death certificate reporting. This research has the potential to yield even larger policy changes within the healthcare setting in the near future. As individuals begin to have their own genome sequenced for individualized healthcare within the next five to ten years, the implications of changing the way people think about medicine will have to evolve (Green, Guyer, & National Human Genome Research Institute, 2011). Also, as medical records become electronic and centralized within the next five to ten years, it will be essential to discuss both records of birth and death during this transition. Inputting death certificates and birth certificates from the past may allow for further studies into the medicolegal system. The time and knowledge required to transfer paper medical records to electronic medical records could potentially yield high costs and take a substantial amount of time. Obstacles that may be encountered in transferring the information to an electronic format include the changing of how the reporting of information is formatted, missing files, illegible handwriting, and conflicting information within files. However, the ability to have all files in an electronic format will

allow for data mining and possible research that could bring insight into medical systems, patient information, and disease.

This research could potential help guide some of those discussions as well. This evolution of thinking due to technology should involve a collective evaluation of how death is reported. There are vast implications for reevaluating the method by which death is report in the United States. By using technology, the possibility exists to network multiple systems together in which fields like criminal justice and public health use a collaborative system to better the lives of the citizens they serve. Technology has the power to initiate collaborative governance where multiple groups or agencies who represent a variety of interests align together to collectively make suggestions and recommendations in order to influence or change policy. Finally, new and exciting advances in science could be implemented through this research in order to better the lives of people at the local, state, national, and international level.

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APPENDIX A

UAB IRB APPROVAL PROTOCOL #N120801001

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

Institutional Review Board for Human Use

DATE: August 13, 2012

MEMORANDUM

TO: Nathaniel Lane Wade
Principal Investigator

FROM: Cari Oliver, CIP
Assistant Director, UAB OIRB

RE: Request for Determination—Human Subjects Research
IRB Protocol #N120801001– Documenting Death: Transitioning from a Coroner System to a Medical Examiner System in Jefferson County, Alabama

A member of the Office of the IRB has reviewed your application for Designation of Not Human Subjects Research for above referenced proposal.

The reviewer has determined that this proposal is **not** subject to FDA regulations and is **not** Human Subjects Research. Note that any changes to the project should be resubmitted to the Office of the IRB for determination.

470 Administration Building
701 20th Street South
205.934.3789
Fax 205.934.1301
irb@uab.edu

The University of
Alabama at Birmingham
Mailing Address:
AB 470
1530 3RD AVE S
BIRMINGHAM AL 35294-0104

APPENDIX B

U.S. STANDARD CERTIFICATE OF DEATH

U.S. STANDARD CERTIFICATE OF DEATH

LOCAL FILE NO. STATE FILE NO.

NAME OF DECEDENT
For use by physician or institution

To Be Completed/ Verified By: FUNERAL DIRECTOR:

1. DECEDENT'S LEGAL NAME (Include AKA's if any) (First, Middle, Last) | 2. SEX | 3. SOCIAL SECURITY NUMBER

4a. AGE-Last Birthday (Years) | 4b. UNDER 1 YEAR Months Days | 4c. UNDER 1 DAY Hours Minutes | 5. DATE OF BIRTH (Mo/Day/Yr) | 6. BIRTHPLACE (City and State or Foreign Country)

7a. RESIDENCE-STATE | 7b. COUNTY | 7c. CITY OR TOWN

7d. STREET AND NUMBER | 7e. APT. NO. | 7f. ZIP CODE | 7g. INSIDE CITY LIMITS? ☐ Yes ☐ No

8. EVER IN US ARMED FORCES? ☐ Yes ☐ No

9. MARITAL STATUS AT TIME OF DEATH ☐ Married ☐ Married, but separated ☐ Widowed ☐ Divorced ☐ Never Married ☐ Unknown

10. SURVIVING SPOUSE'S NAME (If wife, give name prior to first marriage)

11. FATHER'S NAME (First, Middle, Last)

12. MOTHER'S NAME PRIOR TO FIRST MARRIAGE (First, Middle, Last)

13a. INFORMANT'S NAME | 13b. RELATIONSHIP TO DECEDENT | 13c. MAILING ADDRESS (Street and Number, City, State, Zip Code)

14. PLACE OF DEATH (Check only one: see instructions)

IF DEATH OCCURRED IN A HOSPITAL: ☐ Inpatient ☐ Emergency Room/Outpatient ☐ Dead on Arrival

IF DEATH OCCURRED SOMEWHERE OTHER THAN A HOSPITAL: ☐ Hospice facility ☐ Nursing home/Long term care facility ☐ Decedent's home ☐ Other (Specify):

15. FACILITY NAME (If not institution, give street & number) | 16. CITY OR TOWN , STATE, AND ZIP CODE | 17. COUNTY OF DEATH

18. METHOD OF DISPOSITION: ☐ Burial ☐ Cremation ☐ Donation ☐ Entombment ☐ Removal from State ☐ Other (Specify):_____

19. PLACE OF DISPOSITION (Name of cemetery, crematory, other place)

20. LOCATION-CITY, TOWN, AND STATE | 21. NAME AND COMPLETE ADDRESS OF FUNERAL FACILITY

22. SIGNATURE OF FUNERAL SERVICE LICENSEE OR OTHER AGENT | 23. LICENSE NUMBER (Of Licensee)

To Be Completed By: MEDICAL CERTIFIER

ITEMS 24-28 MUST BE COMPLETED BY PERSON WHO PRONOUNCES OR CERTIFIES DEATH

24. DATE PRONOUNCED DEAD (Mo/Day/Yr) | 25. TIME PRONOUNCED DEAD

26. SIGNATURE OF PERSON PRONOUNCING DEATH (Only when applicable) | 27. LICENSE NUMBER | 28. DATE SIGNED (Mo/Day/Yr)

29. ACTUAL OR PRESUMED DATE OF DEATH (Mo/Day/Yr) (Spell Month) | 30. ACTUAL OR PRESUMED TIME OF DEATH | 31. WAS MEDICAL EXAMINER OR CORONER CONTACTED? ☐ Yes ☐ No

CAUSE OF DEATH (See instructions and examples)

32. **PART I.** Enter the chain of events--diseases, injuries, or complications--that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.

Approximate interval: Onset to death

IMMEDIATE CAUSE (Final disease or condition ——> resulting in death)
a._____ Due to (or as a consequence of):

Sequentially list conditions, if any, leading to the cause listed on line a. Enter the **UNDERLYING CAUSE** (disease or injury that initiated the events resulting in death) **LAST**
b._____ Due to (or as a consequence of):
c._____ Due to (or as a consequence of):
d._____

PART II. Enter other significant conditions contributing to death but not resulting in the underlying cause given in PART I

33. WAS AN AUTOPSY PERFORMED? ☐ Yes ☐ No

34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? ☐ Yes ☐ No

35. DID TOBACCO USE CONTRIBUTE TO DEATH? ☐ Yes ☐ Probably ☐ No ☐ Unknown

36. IF FEMALE: ☐ Not pregnant within past year ☐ Pregnant at time of death ☐ Not pregnant, but pregnant within 42 days of death ☐ Not pregnant, but pregnant 43 days to 1 year before death ☐ Unknown if pregnant within the past year

37. MANNER OF DEATH ☐ Natural ☐ Homicide ☐ Accident ☐ Pending Investigation ☐ Suicide ☐ Could not be determined

38. DATE OF INJURY (Mo/Day/Yr) (Spell Month) | 39. TIME OF INJURY | 40. PLACE OF INJURY (e.g., Decedent's home; construction site; restaurant; wooded area) | 41. INJURY AT WORK? ☐ Yes ☐ No

42. LOCATION OF INJURY: State: City or Town:
Street & Number: Apartment No.: Zip Code:

43. DESCRIBE HOW INJURY OCCURRED:

44. IF TRANSPORTATION INJURY, SPECIFY: ☐ Driver/Operator ☐ Passenger ☐ Pedestrian ☐ Other (Specify)

45. CERTIFIER (Check only one):
☐ Certifying physician-To the best of my knowledge, death occurred due to the cause(s) and manner stated.
☐ Pronouncing & Certifying physician-To the best of my knowledge, death occurred at the time, date, and place, and due to the cause(s) and manner stated.
☐ Medical Examiner/Coroner-On the basis of examination, and/or investigation, in my opinion, death occurred at the time, date, and place, and due to the cause(s) and manner stated.

Signature of certifier:_____

46. NAME, ADDRESS, AND ZIP CODE OF PERSON COMPLETING CAUSE OF DEATH (Item 32)

47. TITLE OF CERTIFIER | 48. LICENSE NUMBER | 49. DATE CERTIFIED (Mo/Day/Yr) | 50. **FOR REGISTRAR ONLY-** DATE FILED (Mo/Day/Yr)

To Be Completed By: FUNERAL DIRECTOR

51. DECEDENT'S EDUCATION-Check the box that best describes the highest degree or level of school completed at the time of death.
☐ 8th grade or less
☐ 9th - 12th grade; no diploma
☐ High school graduate or GED completed
☐ Some college credit, but no degree
☐ Associate degree (e.g., AA, AS)
☐ Bachelor's degree (e.g., BA, AB, BS)
☐ Master's degree (e.g., MA, MS, MEng, MEd, MSW, MBA)
☐ Doctorate (e.g., PhD, EdD) or Professional degree (e.g., MD, DDS, DVM, LLB, JD)

52. DECEDENT OF HISPANIC ORIGIN? Check the box that best describes whether the decedent is Spanish/Hispanic/Latino. Check the "No" box if decedent is not Spanish/Hispanic/Latino.
☐ No, not Spanish/Hispanic/Latino
☐ Yes, Mexican, Mexican American, Chicano
☐ Yes, Puerto Rican
☐ Yes, Cuban
☐ Yes, other Spanish/Hispanic/Latino (Specify) _____

53. DECEDENT'S RACE (Check one or more races to indicate what the decedent considered himself or herself to be)
☐ White
☐ Black or African American
☐ American Indian or Alaska Native (Name of the enrolled or principal tribe) _____
☐ Asian Indian
☐ Chinese
☐ Filipino
☐ Japanese
☐ Korean
☐ Vietnamese
☐ Other Asian (Specify)_____
☐ Native Hawaiian
☐ Guamanian or Chamorro
☐ Samoan
☐ Other Pacific Islander (Specify)_____
☐ Other (Specify)_____

54. DECEDENT'S USUAL OCCUPATION (Indicate type of work done during most of working life. DO NOT USE RETIRED).

55. KIND OF BUSINESS/INDUSTRY

MEDICAL CERTIFIER INSTRUCTIONS for selected items on U.S. Standard Certificate of Death

(See Physicians' Handbook or Medical Examiner/Coroner Handbook on Death Registration for instructions on all items)

ITEMS ON WHEN DEATH OCCURRED

Items 24-25 and 29-31 should always be completed. If the facility uses a separate pronouncer or other person to indicate that death has taken place with another person more familiar with the case completing the remainder of the medical portion of the death certificate, the pronouncer completes Items 24-28. If a certifier completes Items 24-25 as well as items 29-49, Items 26-28 may be left blank.

ITEMS 24-25, 29-30 – DATE AND TIME OF DEATH

Spell out the name of the month. If the exact date of death is unknown, enter the **approximate** date. If the date cannot be approximated, enter the date the body is found and identify as **date found**. Date pronounced and actual date may be the same. Enter the exact hour and minutes according to a 24-hour clock; estimates may be provided with "Approx." placed before the time.

ITEM 32 – CAUSE OF DEATH (See attached examples)

Take care to make the entry legible. Use a computer printer with high resolution, typewriter with good black ribbon and clean keys, or print legibly using permanent **black** ink in completing the CAUSE OF DEATH Section. **Do not abbreviate** conditions entered in section.

Part I (Chain of events leading directly to death)

•Only **one** cause should be entered on each line. Line (a) **MUST ALWAYS** have an entry. **DO NOT** leave blank. Additional lines may be added if necessary.

•If the condition on Line (a) resulted from an underlying condition, put the underlying condition on Line (b), and so on, until the full sequence is reported. **ALWAYS** enter the **underlying cause of death** on the lowest used line in Part I.

•For each cause indicate the best estimate of the interval between the presumed onset and the date of death. The terms "unknown" or "approximately" may be used. General terms, such as minutes, hours, or days, are acceptable, if necessary. **DO NOT** leave blank.

•The terminal event (for example, cardiac arrest or respiratory arrest) should not be used. If a mechanism of death seems most appropriate to you for line (a), then you must always list its cause(s) on the line(s) below it (for example, cardiac arrest **due to** coronary artery atherosclerosis *or* cardiac arrest **due to** blunt impact to chest).

• If an organ system failure such as congestive heart failure, hepatic failure, renal failure, or respiratory failure is listed as a cause of death, always report its etiology on the line(s) beneath it (for example, renal failure **due to** Type I diabetes mellitus).

•When indicating neoplasms as a cause of death, include the following: 1) primary site *or* that the primary site is unknown, 2) benign or malignant, 3) cell type *or* that the cell type is unknown, 4) grade of neoplasm, and 5) part or lobe of organ affected. (For example, a primary well-differentiated squamous cell carcinoma, lung, left upper lobe.)

•Always report the fatal injury (for example, stab wound of chest), the trauma (for example, transection of subclavian vein), and impairment of function (for example, air embolism).

PART II (Other significant conditions)

•Enter all diseases or conditions contributing to death that were not reported in the chain of events in Part I and that did not result in the **underlying cause of death**. See attached examples.

•If two or more possible sequences resulted in death, or if two conditions seem to have added together, report in Part I the one that, in your opinion, most directly caused death. Report in Part II the other conditions or diseases.

CHANGES TO CAUSE OF DEATH

Should additional medical information or autopsy findings become available that would change the cause of death originally reported, the original death certificate should be amended by the certifying physician by **immediately** reporting the revised cause of death to the State Vital Records Office.

ITEMS 33-34 - AUTOPSY

•33 - Enter "Yes" if either a partial or full autopsy was performed. Otherwise enter "No."

•34 - Enter "Yes" if autopsy findings were available to complete the cause of death; otherwise enter "No". Leave item blank if no autopsy was performed.

ITEM 35 - DID TOBACCO USE CONTRIBUTE TO DEATH?

Check "yes" if, in your opinion, the use of tobacco contributed to death. Tobacco use may contribute to deaths due to a wide variety of diseases; for example, tobacco use contributes to many deaths due to emphysema or lung cancer and some heart disease and cancers of the head and neck. Check "no" if, in your clinical judgment, tobacco use did not contribute to this particular death.

ITEM 36 - IF FEMALE, WAS DECEDENT PREGNANT AT TIME OF DEATH OR WITHIN PAST YEAR?

This information is important in determining pregnancy-related mortality.

ITEM 37 - MANNER OF DEATH

•Always check Manner of Death, which is important: 1) in determining accurate causes of death; 2) in processing insurance claims; and 3) in statistical studies of injuries and death.

•Indicate "Pending investigation" if the manner of death cannot be determined whether due to an accident, suicide, or homicide within the statutory time limit for filing the death certificate. This should be changed later to one of the other terms.

•Indicate "Could not be Determined" **ONLY** when it is impossible to determine the manner of death.

ITEMS 38-44 - ACCIDENT OR INJURY – to be filled out in all cases of deaths due to injury or poisoning.

•38 - Enter the exact month, day, and year of injury. Spell out the name of the month. **DO NOT** use a number for the month. (Remember, the date of injury may differ from the date of death.) Estimates may be provided with "Approx." placed before the date.

•39 - Enter the exact hour and minutes of injury or use your best estimate. Use a 24-hour clock.

•40 - Enter the general place (such as restaurant, vacant lot, or home) where the injury occurred. **DO NOT** enter firm or organization names. (For example, enter "factory", **not** "Standard Manufacturing, Inc.")

•41 - Complete if anything other than natural disease is mentioned in Part I or Part II of the medical certification, including homicides, suicides, and accidents. This includes all motor vehicle deaths. The item **must** be completed for decedents ages 14 years or over and may be completed for those less than 14 years of age if warranted. Enter "Yes" if the injury occurred at work. Otherwise enter "No". An injury may occur at work regardless of whether the injury occurred in the course of the decedent's "usual" occupation. Examples of injury at work and injury not at work follow:

Injury at work	**Injury not at work**
Injury while working or in vocational training on job premises	Injury while engaged in personal recreational activity on job premises
Injury while on break or at lunch or in parking lot on job premises	Injury while a visitor (not on official work business) to job premises
Injury while working for pay or compensation, including at home	Homemaker working at homemaking activities
Injury while working as a volunteer law enforcement official etc.	Student in school
Injury while traveling on business, including to/from business contacts	Working for self for no profit (mowing yard, repairing own roof, hobby)
	Commuting to or from work

•42 - Enter the complete address where the injury occurred including zip code.

•43 - Enter a brief but specific and clear description of how the injury occurred. Explain the circumstances or cause of the injury. Specify **type of gun** or **type of vehicle** (e.g., car, bulldozer, train, etc.) when relevant to circumstances. Indicate if more than one vehicle involved; specify type of vehicle decedent was in.

•44 -Specify role of decedent (e.g. driver, passenger). Driver/operator and passenger should be designated for modes other than motor vehicles such as bicycles. Other applies to watercraft, aircraft, animal, or people attached to outside of vehicles (e.g. surfers).

Rationale: Motor vehicle accidents are a major cause of unintentional deaths; details will help determine effectiveness of current safety features and laws.

REFERENCES

For more information on how to complete the medical certification section of the death certificate, refer to tutorial at http://www.TheNAME.org and resources including instructions and handbooks available by request from NCHS, Room 7318, 3311 Toledo Road, Hyattsville, Maryland 20782-2003 or at www.cdc.gov/nchs/about/major/dvs/handbk.htm

Cause-of-death – Background, Examples, and Common Problems

Accurate cause of death information is important
•to the public health community in evaluating and improving the health of all citizens, and
•often to the family, now and in the future, and to the person settling the decedent's estate.

The cause-of-death section consists of two parts. **Part I** is for reporting a chain of events leading directly to death, with the **immediate cause** of death (the final disease, injury, or complication directly causing death) on line a and the **underlying cause** of death (the disease or injury that initiated the chain of events that led directly and inevitably to death) on the lowest used line. **Part II** is for reporting all other significant diseases, conditions, or injuries that contributed to death but which did not result in the underlying cause of death given in **Part I. The cause-of-death information should be YOUR best medical OPINION.** A condition can be listed as "probable" even if it has not been definitively diagnosed.

Examples of properly completed medical certifications

CAUSE OF DEATH (See instructions and examples)

32. **PART I.** Enter the chain of events--diseases, injuries, or complications--that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.

		Approximate interval: Onset to death
IMMEDIATE CAUSE (Final disease or condition ------> resulting in death)	a. Rupture of myocardium Due to (or as a consequence of):	Minutes
Sequentially list conditions, if any, leading to the cause listed on line a. Enter the	b. Acute myocardial infarction Due to (or as a consequence of):	6 days
UNDERLYING CAUSE (disease or injury that initiated the events resulting	c. Coronary artery thrombosis Due to (or as a consequence of):	5 years
in death) LAST	d. Atherosclerotic coronary artery disease	7 years

PART II. Enter other significant conditions contributing to death but not resulting in the underlying cause given in PART I

Diabetes, Chronic obstructive pulmonary disease, smoking

33. WAS AN AUTOPSY PERFORMED? ■ Yes ☐ No

34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? ■ Yes ☐ No

35. DID TOBACCO USE CONTRIBUTE TO DEATH?
■ Yes ☐ Probably
☐ No ☐ Unknown

36. IF FEMALE:
■ Not pregnant within past year
☐ Pregnant at time of death
☐ Not pregnant, but pregnant within 42 days of death
☐ Not pregnant, but pregnant 43 days to 1 year before death
☐ Unknown if pregnant within the past year

37. MANNER OF DEATH
■ Natural ☐ Homicide
☐ Accident ☐ Pending Investigation
☐ Suicide ☐ Could not be determined

CAUSE OF DEATH (See instructions and examples)

32. **PART I.** Enter the chain of events--diseases, injuries, or complications--that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.

		Approximate interval: Onset to death
IMMEDIATE CAUSE (Final disease or condition ------> resulting in death)	a. Aspiration pneumonia Due to (or as a consequence of):	2 Days
Sequentially list conditions, if any, leading to the cause listed on line a. Enter the	b. Complications of coma Due to (or as a consequence of):	7 weeks
UNDERLYING CAUSE (disease or injury that initiated the events resulting	c. Blunt force injuries Due to (or as a consequence of):	7 weeks
in death) LAST	d. Motor vehicle accident	7 weeks

PART II. Enter other significant conditions contributing to death but not resulting in the underlying cause given in PART I

33. WAS AN AUTOPSY PERFORMED? ■ Yes ☐ No

34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? ■ Yes ☐ No

35. DID TOBACCO USE CONTRIBUTE TO DEATH?
☐ Yes ☐ Probably
■ No ☐ Unknown

36. IF FEMALE:
☐ Not pregnant within past year
☐ Pregnant at time of death
☐ Not pregnant, but pregnant within 42 days of death
☐ Not pregnant, but pregnant 43 days to 1 year before death
☐ Unknown if pregnant within the past year

37. MANNER OF DEATH
☐ Natural ☐ Homicide
■ Accident ☐ Pending Investigation
☐ Suicide ☐ Could not be determined

38. DATE OF INJURY (Mo/Day/Yr) (Spell Month)	39. TIME OF INJURY	40. PLACE OF INJURY (e.g., Decedent's home; construction site; restaurant; wooded area)	41. INJURY AT WORK?
August 15, 2003	Approx. 2320	road side near state highway	☐ Yes ■ No

42. LOCATION OF INJURY: State: Missouri City or Town: near Alexandria

Street & Number: mile marker 17 on state route 46a Apartment No.: Zip Code:

43. DESCRIBE HOW INJURY OCCURRED:

Decedent driver of van, ran off road into tree

44. IF TRANSPORTATION INJURY, SPECIFY:
■ Driver/Operator
☐ Passenger
☐ Pedestrian
☐ Other (Specify)

Common problems in death certification

The **elderly decedent** should have a clear and distinct etiological sequence for cause of death, if possible. Terms such as senescence, infirmity, old age, and advanced age have little value for public health or medical research. Age is recorded elsewhere on the certificate. When a number of conditions resulted in death, the physician should choose the single sequence that, in his or her opinion, best describes the process leading to death, and place any other pertinent conditions in Part II. If after careful consideration the physician cannot determine a sequence that ends in death, then the medical examiner or coroner should be consulted about conducting an investigation or providing assistance in completing the cause of death.

The **infant decedent** should have a clear and distinct etiological sequence for cause of death, if possible. "Prematurity" should not be entered without explaining the etiology of prematurity. Maternal conditions may have initiated or affected the sequence that resulted in infant death, and such maternal causes should be reported in addition to the infant causes on the infant's death certificate (e.g., Hyaline membrane disease **due to** prematurity, 28 weeks **due to** placental abruption **due to** blunt trauma to mother's abdomen).

When **SIDS** is suspected, a complete investigation should be conducted, typically by a medical examiner or coroner. If the infant is under 1 year of age, no cause of death is determined after scene investigation, clinical history is reviewed, and a complete autopsy is performed, then the death can be reported as Sudden Infant Death Syndrome.

When processes such as the following are reported, additional information about the etiology should be reported:

Abscess
Abdominal hemorrhage
Adhesions
Adult respiratory distress syndrome
Acute myocardial infarction
Altered mental status
Anemia
Anoxia
Anoxic encephalopathy
Arrhythmia
Ascites
Aspiration
Atrial fibrillation
Bacteremia
Bedridden
Biliary obstruction
Bowel obstruction
Brain injury
Brain stem herniation
Carcinogenesis
Carcinomatosis
Cardiac arrest
Cardiac dysrhythmia
Cardiomyopathy
Cardiopulmonary arrest
Cellulitis
Cerebral edema
Cerebrovascular accident
Cerebellar tonsillar herniation
Chronic bedridden state
Cirrhosis
Coagulopathy
Compression fracture
Congestive heart failure
Convulsions
Decubiti
Dehydration
Dementia (when not otherwise specified)
Diarrhea
Disseminated intra vascular coagulopathy
Dysrhythmia
End-stage liver disease
End-stage renal disease
Epidural hematoma
Exsanguination
Failure to thrive
Fracture
Gangrene
Gastrointestinal hemorrhage
Heart failure
Hemothorax
Hepatic failure
Hepatitis
Hepatorenal syndrome
Hyperglycemia
Hyperkalemia
Hypovolemic shock
Hyponatremia
Hypotension
Immunosuppression
Increased intra cranial pressure
Intra cranial hemorrhage
Malnutrition
Metabolic encephalopathy
Multi-organ failure
Multi-system organ failure
Myocardial infarction
Necrotizing soft-tissue infection
Old age
Open (or closed) head injury
Paralysis
Pancytopenia
Perforated gallbladder
Peritonitis
Pleural effusions
Pneumonia
Pulmonary arrest
Pulmonary edema
Pulmonary embolism
Pulmonary insufficiency
Renal failure
Respiratory arrest
Seizures
Sepsis
Septic shock
Shock
Starvation
Subdural hematoma
Subarachnoid hemorrhage
Sudden death
Thrombocytopenia
Uncal herniation
Urinary tract infection
Ventricular fibrillation
Ventricular tachycardia
Volume depletion

If the certifier is unable to determine the etiology of a process such as those shown above, the process must be qualified as being of an unknown, undetermined, probable, presumed, or unspecified etiology so it is clear that a distinct etiology was not inadvertently or carelessly omitted.

The following conditions and types of death might seem to be specific or natural but when the medical history is examined further may be found to be complications of an injury or poisoning (possibly occurring long ago). Such cases should be reported to the medical examiner/coroner.

Asphyxia
Bolus
Choking
Drug or alcohol overdose/drug or alcohol abuse
Epidural hematoma
Exsanguination
Fall
Fracture
Hip fracture
Hyperthermia
Hypothermia
Open reduction of fracture
Pulmonary emboli
Seizure disorder
Sepsis
Subarachnoid hemorrhage
Subdural hematoma
Surgery
Thermal burns/chemical burns

REV. 11/2003

FUNERAL DIRECTOR INSTRUCTIONS for selected items on U.S.

Standard Certificate of Death (For additional information concerning all items on certificate see Funeral Directors' Handbook on Death Registration)

ITEM 1. DECEDENT'S LEGAL NAME

Include any other names used by decedent, if substantially different from the legal name, after the abbreviation AKA (also known as) e.g. Samuel Langhorne Clemens AKA Mark Twain, **but not** Jonathon Doe AKA John Doe

ITEM 5. DATE OF BIRTH

Enter the full name of the month (January, February, March etc.) Do not use a number or abbreviation to designate the month.

ITEM 7A-G. RESIDENCE OF DECEDENT (information divided into seven categories)

Residence of decedent is the place where the decedent actually resided. The place of residence is not necessarily the same as "home state" or "legal residence". Never enter a temporary residence such as one used during a visit, business trip, or vacation. Place of residence during a tour of military duty or during attendance at college is considered permanent and should be entered as the place of residence. If the decedent had been living in a facility where an individual usually resides for a long period of time, such as a group home, mental institution, nursing home, penitentiary, or hospital for the chronically ill, report the location of that facility in item 7. If the decedent was an infant who never resided at home, the place of residence is that of the parent(s) or legal guardian. **Never** use an acute care hospital's location as the place of residence for any infant. If Canadian residence, please specify Province instead of State.

ITEM 10. SURVIVING SPOUSE'S NAME

If the decedent was married at the time of death, enter the full name of the surviving spouse. If the surviving spouse is the wife, enter her name prior to first marriage. This item is used in establishing proper insurance settlements and other survivor benefits.

ITEM 12. MOTHER'S NAME PRIOR TO FIRST MARRIAGE

Enter the name used prior to first marriage, commonly known as the maiden name. This name is useful because it remains constant throughout life.

ITEM 14. PLACE OF DEATH

The place where death is pronounced should be considered the place where death occurred. If the place of death is unknown but the body is found in your State, the certificate of death should be completed and filed in accordance with the laws of your State. Enter the place where the body is found as the place of death.

ITEM 51. DECEDENT'S EDUCATION *(Check appropriate box on death certificate)*

Check the box that corresponds to the highest level of education that the decedent completed. **Information in this section will not appear on the certified copy of the death certificate. This information is used to study the relationship between mortality and education (which roughly corresponds with socioeconomic status). This information is valuable in medical studies of causes of death and in programs to prevent illness and death.**

ITEM 52. WAS DECEDENT OF HISPANIC ORIGIN? *(Check "No" or appropriate "Yes" box)*

Check "No" or check the "Yes" box that best corresponds with the decedent's ethnic Spanish identity as given by the informant. Note that "Hispanic" is not a race and item 53 must also be completed. Do not leave this item blank. With respect to this item, "Hispanic" refers to people whose origins are from Spain, Mexico, or the Spanish-speaking Caribbean Islands or countries of Central or South America. Origin includes ancestry, nationality, and lineage. There is no set rule about how many generations are to be taken into account in determining Hispanic origin; it may be based on the country of origin of a parent, grandparent, or some far-removed ancestor. Although the prompts include the major Hispanic groups, other groups may be specified under "other". "Other" may also be used for decedents of multiple Hispanic origin (e.g. Mexican-Puerto Rican). **Information in this section will not appear on the certified copy of the death certificate. This information is needed to identify health problems in a large minority population in the United States. Identifying health problems will make it possible to target public health resources to this important segment of our population.**

ITEM 53. RACE *(Check appropriate box or boxes on death certificate)*

Enter the race of the decedent as stated by the informant. Hispanic is not a race; information on Hispanic ethnicity is collected separately in item 52. American Indian and Alaska Native refer only to those native to North and South America (including Central America) and does not include Asian Indian. Please specify the name of enrolled or principal tribe (e.g., Navajo, Cheyenne, etc.) for the American Indian or Alaska Native. For Asians check Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, or specify other Asian group; for Pacific Islanders check Guamanian or Chamorro, Samoan, or specify other Pacific Island group. If the decedent was of mixed race, enter each race (e.g., Samoan-Chinese-Filipino or White, American Indian). **Information in this section will not appear on the certified copy of the death certificate. Race is essential for identifying specific mortality patterns and leading causes of death among different racial groups. It is also used to determine if specific health programs are needed in particular areas and to make population estimates.**

ITEMS 54 AND 55. OCCUPATION AND INDUSTRY

Questions concerning occupation and industry must be completed for all decedents 14 years of age or older. This information is useful in studying deaths related to jobs and in identifying any new risks. For example, the link between lung disease and lung cancer and asbestos exposure in jobs such as shipbuilding or construction was made possible by this sort of information on death certificates. **Information in this section will not appear on the certified copy of the death certificate.**

ITEM 54. DECEDENT'S USUAL OCCUPATION

Enter the usual occupation of the decedent. This is not necessarily the last occupation of the decedent. Never enter "retired". Give kind of work decedent did during most of his or her working life, such as claim adjuster, farmhand, coal miner, janitor, store manager, college professor, or civil engineer. If the decedent was a homemaker at the time of death but had worked outside the household during his or her working life, enter that occupation. If the decedent was a homemaker during most of his or her working life, and never worked outside the household, enter "homemaker". Enter "student" if the decedent was a student at the time of death and was never regularly employed or employed full time during his or her working life. **Information in this section will not appear on the certified copy of the death certificate.**

ITEM 55. KIND OF BUSINESS/INDUSTRY

Kind of business to which occupation in item 54 is related, such as insurance, farming, coal mining, hardware store, retail clothing, university, or government. DO NOT enter firm or organization names. If decedent was a homemaker as indicated in item 54, then enter either "own home" or "someone else's home" as appropriate. If decedent was a student as indicated in item 54, then enter type of school, such as high school or college, in item 55. **Information in this section will not appear on the certified copy of the death certificate.**

NOTE: This recommended standard death certificate is the result of an extensive evaluation process. Information on the process and resulting recommendations as well as plans for future activities is available on the Internet at: http://www.cdc.gov/nchs/vital_certs_rev.htm.

REV. 11/2003